

tax. More detailed analyses than those presented here reveal tendencies for those with particular life situations to possess certain attitudes, but these are only tendencies and considerable variation exists.

Several policy implications emerge from this research. Renters are seen to be more likely to favor a property tax earmarked for transit even if they do not use it. Homeowners must be convinced they are getting their money's worth because of the visibility of their tax burden. For both groups, belief that transit helps business is exceedingly important (the 449 persons who believe that it does include many renters and homeowners). A positive image of local government in general is vital as well.

These conclusions suggest that transit planning and marketing need to be carried out so that preferences of taxpayers as well as users are taken into account. If local citizens believe that objectives important to them are being pursued, this analysis leads to the conclusion that they will support a local transit tax even in periods of economic scarcity.

When the results of the citizen survey were presented to the Council Bluffs city council, it voted to initiate a transit tax. This action ensured continued service which without this commitment was in considerable jeopardy.

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How to Avoid the Impending Disaster in Public Transportation Financing

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The imminent withdrawal of federal funding for operating assistance to public transportation agencies creates a crisis in funding. Total system deficits will rise to more than \$100 million per state in a number of states in 2 or 3 years. Funding sources, cost containment strategies, and the relative political consequences of these strategies are reviewed, and questions of how much fares can be raised and how much services can be cut are examined. A composite approach to dealing with potential revenue shortfalls is presented that may provide sufficient relief in the short run.

It is no secret that finding enough revenue to cover costs continues to be a problem for those responsible for providing public transportation; and the problem would be worsened by the withdrawal of federal funding for operating deficits. Because the existence of numerous transportation systems is threatened, it is important that plans to avoid financial catastrophes be made as soon as possible. The factors considered to be significant are as follows.

Enactment of the Surface Transportation Assistance Act of 1982: This historic legislation, signed by President Reagan on January 6, 1983, provides a significant and welcome step away from previous legislative proposals that could have led to financial disaster for many transit agencies. This law provides a dedicated source of revenue for transit funding, continues federal support for operating expenses while putting a cap on subsidies, initiates a better allocation of formula grant funds, and continues a commitment to federal participation in new transit starts.

Proposal to eliminate operating assistance to public transit: The Reagan Administration remains opposed to operating assistance for transit. It proposed a reduction in assistance to 62 percent of the FY 1982 level in FY 1983, a reduction to 27 percent in FY 1984, and elimination of assistance in FY 1985. Whether or not this philosophical stance will

continue after the passage of the Surface Transportation Assistance Act of 1982 remains to be seen. The key test will be the appropriations levels for transit in FY 1984.

Continually rising transit costs: Inflation continues to affect the transit industry substantially as labor costs, fuel costs, and the price of transit vehicles continue to increase. In particular, the price of vehicles is increasing rapidly.

Substantial opposition to new taxes: The well publicized taxpayers revolt that started with California's Proposition 13 has seriously affected the ability of local governments to raise taxes for any cause. This political climate, added to the conservative approach of many states to public spending, may make it difficult to replace federal subsidies with state subsidies.

Increases in transit patronage: On a national basis, transit ridership increased every year from 1972 until 1981, when it declined 3.4 percent from the previous year. The number of public transit and ridesharing systems has increased substantially during the last decade; however, a number of these systems now face highly uncertain futures.

Classical problems of public transportation systems: Transit continues to suffer from a severe peak-loading problem; this leads to higher labor costs (because the peaks cannot be contained within an 8-hour day) and underutilization of the fleet and related personnel during off-peak periods. Many patrons are captive riders who because of income, age, or other problems do not have access to any other transportation mode. Also, in some areas public transportation programs still have the image of offering second class service.

These and other factors demonstrate the complexity of providing a stable, long-term financial base for public transportation.

The approach to these issues begins with an analysis of which major funding sources can be tapped for more funds. The next step involves the opposite side of the coin--how much is currently being spent--and necessitates an analysis of cost containment strategies. The third step is to develop a process for deciding which strategy produces enough money with relatively few consequences, especially in the political sense. Finally, consideration is given to what would constitute something approaching an ideal situation under the current constraints.

FUNDING SOURCES

Numerous potential sources of funds exist for public transportation services. Passenger fares, federal cash grants and reimbursements, local cash grants and reimbursements, and state cash grants and reimbursements provide the bulk of funding for most systems.

Table 1 gives overall national averages for transit funding, but there are large variations in the proportion of funds from each source. In Virginia, for example, fares are always an important source of funds, but their importance varies from that of providing the vast majority of funding to providing less than one-sixth of the total (1). State cash grants and contributions play only a small role in all Virginia systems, but the roles of the federal and local cash grants and contributions again vary widely. These sources play a greater role when passenger fares contribute less of the total.

Passenger Fares

Passenger fares were the predominant, if not the only, source of funds for most public transportation

systems until the 1960s. As it became more and more difficult to finance public transportation solely from the farebox, municipalities and other public authorities assumed the ownership and responsibility of privately owned companies. The federal government began to provide greater and greater assistance to meet the deficits created by increasing costs and declining revenues.

Problems associated with reliance on fares as the major source of income include

1. A major decline in the number of persons using mass transportation since the period of greatest use during World War II,
2. A reluctance to raise fares among those responsible for regulating the operations of the then privately owned companies,
3. Perception of public transit systems as inferior goods that needed to be priced substantially below other modes to attract riders, and
4. Recognition that a substantial portion of transit riders were a captive market in that they could afford no other option (meaning that any fare increase would constitute a special economic hardship for them).

Some of these problems were explicitly recognized in the UMTA legislation of 1974 that, for the first time, provided federal funds to subsidize operating losses incurred by transit authorities in urban areas. This assistance was explicitly provided so that localities could maintain fares as low as possible and thus attract more riders.

These issues have now changed slightly. Transit ridership has been increasing since the early 1970s, and the new equipment and services operated by many transit agencies have dispelled much of the negative image associated with riding transit. But there is still a large captive or transit-dependent submarket, and this consideration makes fare increases politically sensitive and difficult.

Fare Increases: Rationale and Reactions

Part of the rationale of the Reagan Administration's opposition to federal subsidies of operating deficits for public transportation is said to be the notion that public services that benefit specific localities should be paid for by those localities. Congress appears likely to endorse--at least partially--the Administration's philosophy of greater fiscal contributions from localities.

The loss in federal operating dollars has most often been met by increasing farebox revenues and reducing operating costs to maintain the balance between revenue and cost. Typically in the wake of

Table 1. Percent of transit system revenues from various sources (all properties--FY 1979) (14).

Revenue Source	Percent
Passenger fares for transit service	40.9
Other transportation revenues	1.6
Nontransportation revenues	1.8
Taxes levied directly by transit system	5.8
Local cash grants and reimbursements	19.8
Local special fare assistance	2.1
State cash grants and reimbursements	11.7
State special fare assistance	1.0
Federal cash grants and reimbursements	14.9
Subsidy from other sectors of operations	0.4
Total	100
Total revenue	4,861.9
Number of transit systems reporting	315
Total number of transit systems	324

subsidy shortfalls, fares are arbitrarily increased and service levels reduced so that available revenues cover the operating expenses after all remaining operating subsidies are committed. Although such decisions can provide temporary solutions to financially troubled transit companies, more rational short-range policies that fit into a long-term approach to transit financial planning should be adopted if transit companies are to remain solvent and maintain the political support they require.

Aside from determining how high the fares should be with respect to the subsidy level (i.e., what percentage of total operating revenues should come from the farebox), the principal problem with transit planning today is that fare and service level decisions are seldom jointly planned and considered despite the intrinsic relationship between fares and service levels. If a greater proportion of operating revenues must come out of the farebox with minimum losses of ridership, these fare levels will have to be determined in conjunction with the quantity, quality, and cost of the service provided.

How High Can Fares Be Raised?

Most major transit systems—including New York, Chicago, Boston, Los Angeles, St. Louis, and many more—have recently increased their basic fares substantially. Base fares on some transit systems are \$1.00 or more for a one-way trip. Although fare increases will always result in fewer riders, the percent decrease in patronage is usually much less than the percent increase in the fares charged. In economists' terms, this means that the demand for transit service is inelastic with respect to price (i.e., that the numerical value of the price elasticity is less than -1.0). Experience has indicated that an overall price elasticity for transit services is probably about -0.35, meaning that for every 1 percent increase in fares, there will be a 0.35 percent decrease in ridership (2). This suggests that even though fewer people will use transit after the fare increase, the transit agency will be better off financially after the fare increase because net revenues will have increased.

If this were true in all circumstances, transit agencies could increase fares higher and higher and continue to raise greater revenues despite declining ridership. However, it is suspected that fare elasticities are not constant over all fare levels and that at some higher level of fare, further fare increases are met with much greater declines in patronage to the point where the percent decline in patronage will equal the percent increase in fares (i.e., the elasticity will equal -1.0 and no net revenue increase will result). At this point, further fare increases will result in losses of both ridership and farebox revenues.

Previous analyses of fare changes (3,4) have not revealed a clear link between fare elasticity and fare level. This is partly because previous estimates of elasticities were usually based on relatively small fare changes, both in percentage and absolute terms. Findings of several analysts of demand, nevertheless, suggest that the demand for transit is nonlinear with respect to fares. At what point will further increases in fares cause so many riders to abandon transit that the net result will be a decrease in revenues?

Following the formulation of their model of transit demand based on the Transit Authority of Northern Kentucky (TANK) base fare increase from \$0.25 to \$0.40, Knudson and Kemp (5) computed the fare level that would have maximized gross revenues in 1976, provided all the other variables remain constant. The model predicted a fare on the order of \$1.30 to

\$1.35 compared to the \$0.40 fare riders were paying. In 1982 dollars, the fare would probably have to be about \$1.50 to maximize revenues.

For other transit agencies the exact figure will depend on the specific system in question and the nature of its trips and riders. For example, it appears that the demand for transit service in small cities is often more elastic than in large urban areas. This means that persons in large urban areas will tolerate a much higher fare before switching to another mode of travel than will persons in small towns.

Previous work on elasticities (6) indicates that, in addition to this overall or average effective limit to fare levels, different subgroups of riders will respond differently to particular fare increases. It was found that

1. Off-peak riders are more sensitive to fare increases than peak-period riders,
2. Shoppers are more sensitive to fare increases than commuters,
3. Riders who have a choice in their mode of travel are more sensitive to fare increases than those who do not, and
4. Short-distance riders are more sensitive to fare increases than long-distance riders.

The behavior of other categories of passengers is more difficult to predict. On the one hand, low income and elderly persons would be expected to be more sensitive than others to fare increases; on the other hand, they are much more often captive riders—they have no other mode available—so their travel behavior might not change significantly.

Therefore, it is possible to predict with great detail how much revenue can be generated by specific fare increases for specific transit systems. It is also possible to show how much ridership will decline as a result of the fare increase and which particular groups of riders will be most affected. To make the predictions it is necessary to know current and future proposed fare levels, the proportions of riders by category of rider for each transit system, and locally observed fare elasticities (alternatively, these can be estimated). It is important to remember, however, that commonly observed fare elasticities from the past may not always be appropriate for the fare levels now being observed across the United States.

How Frequently Should Fares Be Raised?

Another issue facing many transit managers concerns the size and frequency of fare changes. During the 1970s, many transit agencies did not raise fares for 5 or 6 years; and most agencies reduced their fares. Today, however, inflation is escalating costs and the growth in deficits is not being offset by the subsidies provided. Because the fare level is being reviewed more frequently as a means of filling this gap, answers are being sought to the following questions: Is there any evidence that would favor semiannual, annual, or biannual fare reviews? Do riders respond differently to frequent small fare increases than to infrequent large fare increases?

Many analysts again argue that the greater the fare increase, the greater the rate of decline in transit riding. They argue that because the value of transit should increase over time with inflation, small fare increases that keep up with the cost of living should result in no significant change in the fare elasticity over time. Other analysts contend that even the large but infrequent fare changes should not affect the elasticity over time and thus should not affect ridership and revenue response.

Frequent fare changes, however, should be avoided because most evidence on fare elasticities suggests that it takes 6 to 9 months for the fare increase to affect patronage. In general, transit riders will not change their travel habits in the short term. Although many factors will affect the decision on when to implement a fare change, this short review suggests that time is not a major factor.

State and Local Revenues

Many state and local sources of revenue for public transportation are the same, and some of these sources are also available to transit authorities that are organized as independent political subdivisions with their own taxing powers. Which agency or level of government is legally empowered to use these sources depends primarily on the state constitution and legislation.

A useful classification of sources (7) has been established as

1. Benefit-related taxes and charges,
2. Broad-based taxes, and
3. Other sources.

The following sources are in the first group: (a) real estate value increments, (b) motor fuel and vehicle user charges, (c) parking, (d) tolls, and (e) employer payroll taxes. In the second group are (a) property taxes, (b) sales taxes, (c) general income taxes, and (d) employee payroll taxes. An example of the third group--other sources of taxes--are excise taxes; those on public utilities produce two-thirds of all excise tax revenues (other major excise taxes are those on alcohol and tobacco).

By ranking all these sources by yield potential, administrative problems, economic effects, equity, relation to benefits, and political acceptability, L.C. Fitch et al. (7) ranked the broad-based taxes as generally superior revenue sources to the benefit-related taxes and other sources like excise taxes. The following paragraphs describe these sources.

Broad-Based Taxes

Property taxes have been a common way of financing local public programs for many years. An advantage of levying property taxes is that they are easy to understand, familiar, and easy to collect. On the other hand, property taxes are currently unpopular because of the rising burden they place on property owners and the growing demands placed by all other governmental programs on the revenue that such taxes generate.

Sales taxes generate revenue by taxing goods or services that are sold within a political subdivision. The most common sales tax levied for transit is a tax (local or state) on the sale of gasoline or other transportation related items.

Another means of providing funds for transit is an income tax. This is not a common source of funds for local programs because the ability to impose such a tax is often restricted by state or local laws. One advantage of an income tax is that theoretically the burden falls most heavily on those that can most afford to pay. Unfortunately, an additional tax on income would probably be politically and legally difficult to implement in small urban and rural areas.

Another category is taxes on payrolls of employees for work performed within the political subdivision of the transit operation. This type of tax has the advantage of placing some of the burden for the subsidy of local transit on local employers. It

may, however, be politically difficult to impose such a tax.

Consumption of a utility in a political subdivision can be taxed to raise funds for transit operation. Utilities have the advantage of having a built-in collection system (utility bills) but the disadvantage of the politically unfavorable aspect of increasing, yet again, already high and increasing utility bills.

Other types of taxes can be levied to help subsidize a transit system. These include such taxes as the so-called wheel tax which is levied for every automobile in the area. The disadvantage of these separate taxes is that because they are often levied independently, they are more visible and therefore more unpopular.

Which Source?

A major task is to determine which state and local sources of revenue currently used in specific areas are applicable for financing public transportation needs. Many states provide financial assistance to public transportation through the general funds of the state. A recent survey (8) notes, however, that transit systems that have a source of dedicated revenues are often stronger financially than those systems relying on general revenues from state or local governments. The most common forms of state and local financing for transit operations are property and sales taxes; each of these sources was used by 34 percent of the respondents to the American Public Transit Association (APTA) survey. There is a greater use of sales taxes in larger cities (more than 200,000 persons) and a greater use of property taxes in smaller cities.

Examples of state revenue sources that have been dedicated to support public transportation are given below.

<u>Source</u>	<u>State</u>
Benefit-related taxes and charges	
Motor fuel	Michigan
Vehicle registration	Washington, Wisconsin, Michigan
Broad-based taxes	
Sales taxes	Florida, California
Other sources	
Cigarette taxes	Massachusetts
Lottery	Pennsylvania, Arizona

Examples of revenue sources used to support public transportation at the local level are as follows.

<u>Source</u>	<u>State</u>
Benefit-related taxes and charges	
Motor fuel	Wisconsin, Michigan, California, Hawaii, Illinois, Florida
Parking	California, Illinois
Tolls	New York, Pennsylvania, California
Employee payroll taxes	New Jersey, California
Broad-based taxes	
Property taxes	Arizona, California, Colorado, Illinois, Indiana, Iowa, Kansas, Massachusetts, Michigan, Nebraska

Source	State
Sales taxes	Indiana, Florida, California, Georgia, Missouri, Michigan, Illinois, Ohio, Colorado, Kansas, Texas
General income taxes	Maryland, Pennsylvania, Ohio, Kentucky, Michigan, Alabama, New York, New Jersey
Employee payroll taxes	Oregon, Pennsylvania, Ohio
Other sources	
Utility taxes	Washington, Louisiana

These localities obviously create a starting point for one investigation of additional funding sources. In addition to these sources, there are a variety of unique or special taxes. Examples of these taxes and the state or locality using this source are given below.

Source	State or Locality
Business license tax	Washington, Oregon
New income tax	Oregon
Bank and savings and loan tax	Lafayette (Indiana)
Profits from gas and electric companies	Springfield (Illinois)
Mortgage taxes	Albany, Syracuse
Oil company receipts tax	New York, Buffalo, Rochester

Apparently, funding sources are limited primarily by the imagination (and, after that, by the ability to get approval by the state legislature).

The Issue of Equity

All the issues mentioned previously in the evaluation of various funding sources--and in particular, potential yield and political acceptability--must be considered carefully in fashioning a new program for financing public transportation systems. Still, the issue of equity deserves careful attention because it has generated (and will again generate) considerable controversy.

In a study of alternative sources of transit subsidies in the Chicago area, Rock (9) found that property taxes, income taxes, and vehicle excise taxes would have the least effect on poor households; particularly burdensome taxes for the poor would be a household tax, cigarette tax, lottery, or vehicle registration fees. Rock suggests that "virtually any funding source will be better for the poor than increased fares." Webber (10) contends that local sales and property taxes used to finance the Bay Area Rapid Transit (BART) system in San Francisco strongly favored the rich over the poor.

Cervero (11) holds that governmental subsidies based on income taxes (e.g., federal aid for operating expenses) redistribute income from the rich to the poor, that fares generally transfer income from the transit dependent to those with higher incomes, and that those traveling shorter distances (generally the poor) provide a substantial subsidy to those traveling longer distances (generally those with higher incomes).

Because of the political implications, the issue of equity cannot be ignored. A basic precept of funding schemes is that they should not in general take money from the poor to provide money for trips for the rich. It may be preferable, however, to recommend a less equitable source--for example, sales taxes or property taxes--when more equitable

sources (such as an income tax) have less political or administrative acceptability.

Bonds Issued by Transit Operators

Some transit operators may be independent political authorities with the ability to issue bonds. In general, there are two types of bonds (12): revenue bonds and general obligation bonds. Revenue bonds are issued when the transit system is revenue producing. The bonds are paid off with farebox revenue. The money collected in the farebox is placed in a sinking fund for repayment of the bonds. The interest rate on revenue bonds is generally higher than that on general obligation bonds because the bond holder is taking more risk. (In these days of rapidly increasing costs, it is a large risk to assume that farebox revenue will be high enough to repay bonds as well as keep the system afloat.)

General obligation bonds are backed with the full faith and credit of taxing power of the issuer. In other words, if a transit operator issues a general obligation bond, the bond holders will have, as their assurance that it will be repaid, the ability of transit authorities to raise money from a variety of sources, including taxes. The advantage of a general obligation bond is that without the emphasis on farebox revenue for repayment, less pressure is placed on the farebox. The disadvantage of this type of bond is that, in many cases, voters must approve its issuance (and voter approval may be difficult to obtain).

Federal Grant Programs

A great variety of grant programs exists, but no one source is currently adequate for capital and operating costs as well. Many of the federal sources involve large amounts of red tape and coordination can be difficult. But by far the most serious problem with federal funding has been its extreme uncertainty: although operating assistance for public transportation will apparently continue, the total funding levels are likely to decline as shown by the trend in Table 2.

In addition to the U.S. Department of Transportation sources, there are a variety of other programs that can fund transportation services. Most of these are client-based programs whose funds are more applicable to paratransit and to small urban and rural operations than to major transit systems (13).

Other Sources of Funds

On occasion, the other sources of funds can play a significant role for certain types of systems. For example, in Virginia, four systems derived more than

Table 2. UMTA funding over time.

Category	Appropriation (\$ millions)			
	FY 1977	FY 1980	FY 1982	FY 1983
Administrative expenses	NA	22.2	23.8	86.5
Research, development, and training	63.7	65.5	51.6	
Urban discretionary grants (Section 3)	1,255	2,190	1,449.5	1,606
Urban formula grants (Section 5)	623	1,445	1,265	1,200
Nonurbanized formula grants (Section 18)	0	72.5	68.5	68.5
Block grant (Section 9)	NA	NA	NA	NA
Total (all UMTA programs listed)	1,985	4,660	3,495	3,739.5

half of their 1980 revenues and one more system received 30 percent of its total revenue from school and charter services (1). For the most part, however, passenger fares, state and local sources, and federal sources will provide the bulk of the funding.

COST CONTAINMENT STRATEGIES

Much more work has been done on funding services than on cost containment strategies. There are at least two factors responsible for this situation. First, transit funding grew substantially in the 1970s so that cost containment was not a major issue. Second, it is difficult to obtain substantial cost reductions--equivalent to the possible losses in federal operating assistance--without drastic changes in service structure (and even these have limited cost-effectiveness).

There are two basic strategies or approaches to cost containment: efficiency measures and service reductions. Efficiency measures relate to finding ways to provide essentially the same services at reduced cost. The corollary of efficiency is productivity, which would focus on generating more trips at current expenditure levels; however, if the total budget is the most severe constraint, the system could become more productive and still have made no progress in solving its budgetary problems.

For example, if the marginal costs of additional trips equaled the average cost (which is generally not a valid assumption), a particular transit operation would lose money for each additional trip it provided, suggesting that the budget problem would be worsened by providing more trips. More trips should be provided only if the marginal revenues from these trips exceed the marginal costs. This is often possible if the system's ridership can be increased by getting additional passengers on vehicles that are now partly empty. Adding new routes, drivers, or vehicles, however, would not appear to be prudent unless special conditions prevailed. Service reductions are an attempt to save money by providing less service. Each of these strategies has its benefits and problems.

Efficiency Measures

At the outset, it is useful to categorize the cost-containment techniques associated with efficiency as follows: (a) reduce capital expenditures, (b) reduce overhead and administrative expenditures, (c) reduce direct costs, and (d) improve financing and cash flow. Which strategy is most useful depends on the specific characteristics of an individual transit system and the current expenditure pattern.

First the largest categories of expenditures are examined to determine the kinds of reduction that can be made. For example, data from an unpublished survey by the Virginia Department of Highways and Transportation (VDH&T) gives the following pattern for operating expenses in 1981.

<u>Expenses</u>	<u>Percent</u>
Administrative	20-30
Ridesharing	0-8
Maintenance	7-20
Fuel	15-20
All other operating expenses (e.g., wages)	35-50

Obviously there is a greater impact from saving half of all other operating expenses than saving half of maintenance expenses. Therefore an initial strategy might involve investigating labor costs, work rules, and the use of part-time drivers as ways to reduce the all other operating expenses category.

Much can be gained by examining the ways individual systems vary from the norm in their expenditure patterns. For example, again using the VDH&T December 1981 survey data and projected FY 1983 figures, the city of Staunton was found to have the highest proportion of operating expenditures in the all other operating expenses category (60.6 percent). In the Public Transportation in Virginia report (1) Staunton is shown to have a higher maximum hourly wage for vehicle operators than the other small transit systems. This probably explains, in part, the high proportion of other operating expenses and suggests that a possible cost containment strategy for the Staunton system could involve a decrease in wage rates. (There may, of course, be factors that would make such a strategy difficult.)

Similarly, the Peninsula Transportation District Commission (PTDC), Bristol, James City County, Colonial Beach, and Blacksburg all appear to have administrative costs that are well above the averages for other comparable Virginia systems. Are cost savings possible here? Similarly, Roanoke and Bluefield have substantially higher than average fuel costs. Can money be saved by different purchasing plans? An analysis of such cost data will help understand the systems and provide insights for detailed investigations at each transit agency.

How Far Can Services Be Cut?

The response of most transit managers to reductions in subsidy levels is to increase fares and reduce transit service. The effect of fare increases on ridership and revenues has been discussed. The effects of service reductions on ridership and costs, however, are unclear because most studies have focused on service expansions instead of service reductions. It is possible, nevertheless, to provide guidelines on the degree to which transit services can be cut before they become self-defeating; that is, to the point where ridership and revenue losses exceed the operating cost savings of further service cutbacks.

As shown in the Ecosometrics study of transit demand elasticities (6), passengers are more sensitive to service changes than they are to fare changes. For most users reliable and frequent service is important to the point where they would be willing to pay more to maintain or improve these services. The impact of changes in transit service on demand, however, is not as high as might be expected. All the studies of transit service have not been able to find a sufficient number of instances where the proportional change in passenger demand is greater than the proportional change in transit service (transit service elasticities are therefore said to be relatively inelastic or less than unity). Transit service elasticities, however, are often numerically larger than fare elasticities. The net effect is that reductions in transit service will have a greater impact on ridership and revenues than increases in transit fares.

There are situations, however, where transit service is quite inelastic and where service reductions will drastically reduce operating costs without seriously affecting overall passenger demand. For example, it is known that service elasticities (vehicle miles or headway elasticities) vary by time of day and that ridership is more sensitive to changes during the off-peak period than to changes during the peak period. In addition, service elasticities are numerically larger (implying a greater passenger response) for suburban services than for central city and central-business-district oriented services.

Perhaps a more important finding in this study of passenger demand is that as service levels are cut

Table 3. Evaluation process for alternative funding strategies.

Benefit	Problem	Resolution	Further Problem
Raise fares			
Significant increase in revenues	Ridership declines as fares increase	Predict results carefully	
Users bear a greater proportion of costs	Many users are low-income; fare increases create economic hardship for them	Create user-side subsidy programs	Small proportion of those qualified will sign-up for the program
		Differential fares (peak/off-peak and distance-based) help remove some inequities	Many experiencing hardships are not qualified for social programs
	Nonusers also get significant benefits from transit	Raise revenues from nonusers through taxes	
Increase local taxes to pay for operating deficits			
Significant increase in revenues	Most citizens believe taxes are too high already	Earmark tax revenues for transportation so people can see how taxes are used	People may not favor transportation if it increases taxes
Indicates support of entire community	Nonusers bear a greater proportion of costs		
	Some forms of taxation focus on only a portion of population	Use broad-based forms of taxation	
	May be statutory limitations to changes in taxation	Change the laws	

back, service elasticities increase (that is, ridership decreases). Elasticities for several transit systems (6) show that further reductions in service where headways are already long will result in massive ridership (and revenue) losses that may be greater than the savings in operating costs. Some transit agencies may already be reaching this point on some routes because of recent reductions in service to contain costs.

Therefore, if services are to be cut, they should be cut selectively, keeping in mind the true marginal cost for the service, the costs of providing alternative service (such as the successful peak-period vanpool program in Norfolk, Virginia), and the demand elasticities of the transit riding population. The extent to which transit service can be cut is limited.

Evaluating Alternative Financing Strategies

The process of deciding how to choose a best strategy or best combination of strategies needs to be as complete as possible to avoid problems or surprises. There are two particular problems that should be avoided:

1. A shortfall of expected revenue from the funding sources chosen, and
2. The inability of the chosen funding source(s) to obtain the necessary political approvals.

To avoid the first problem, detailed estimates of the amount of revenue expected from each source should be developed. Optimistic, pessimistic, and probable estimates should be developed in order to have a range of anticipated revenues for each source.

To avoid surprises in the political arena, positive and negative consequences should be identified for various groups of people. Then an action plan should be developed that identifies the persons in authority and committees whose approval is necessary to obtain the legislative or regulatory approval for this financing source.

Interviews with key individuals or reports of their positions on key issues can identify the issue

with the individual. It is then possible to evaluate the extent to which a particular funding strategy resolves, exacerbates, or has no effect on these key issues. Finally, a high, medium, or low probability of obtaining the approval of this individual for this funding strategy can be developed. The same kind of approach can be used when issues are to be placed on a ballot to be voted on by the general public.

The process of identifying positive and negative consequences of various strategies deserves some elaboration. A full list of consequences should be developed. Table 3 gives the beginnings of this process for several key issues. As the data in the table show, each strategy will have benefits and problems; each should be identified so that its importance can be assessed.

For example, raising fares produces substantial new revenues but hurts some of the people most dependent on transit, the poor. One way to soften the blow somewhat is to subsidize those users who are particularly needy through a user-side subsidy program. Among the problems with this approach are the administrative hassles and the fact that some eligible individuals are too proud to participate in what appears to be a welfare program. It has been argued, however, that this approach is more equitable than the alternative, which is to subsidize fares to the extent that the base fare is affordable for the poor.

This approach demonstrates that some of the indirect consequences of a particular strategy may be as important as the direct revenue and ridership implications. It shows the need for considering who is affected by a particular strategy and, in certain instances, indicates the desirability of devising second-order strategies to deal with the side effects of programs to increase income.

AN OVERALL APPROACH TO FINANCIAL VIABILITY

It is probable that a mixture of strategies will be required to generate enough money to continue the operations of public transportation systems in the face of substantial reductions in federal funding.

The most effective strategies probably will require a great deal of flexibility at both state and local levels and achieving this flexibility will probably require political skill and compromise. Without precluding the variety of possibilities that are available, the components of an optimal financial structure would probably include

1. An increase in the amount of state funds provided to localities for public transportation with no restrictions on the proportions to be spent for capital, operating, or administrative purposes.
2. A distribution of state funds to localities based on a local match of the funds as well as on incentives for the performance of the local transit system. (For example, it was recommended at the American Public Transit Association conference, Transit at the Crossroads, in Denver, January 7-8, 1982, that cost recovery ratios of 40 to 50 percent from fares were reasonable. It was also recommended that the general public should consider the other one-half as a benefit to the community as a whole and expect to pay for it through federal, state, and local taxation.)
3. State programs of assistance for new or experimental programs.
4. An increase in transit system revenues from passenger fares. The impact of the increase on disadvantaged subgroups should be partially offset by imposing distance-based fares, peak off-peak fare differentials, and user-side subsidies to qualified individuals.
5. An increase in local tax revenues; specific sources would be determined locally from a variety of potential taxes.
6. An aggressive cost-cutting program for transit authorities, which could go as far as substituting ridesharing or paratransit programs for conventional mass transit operations in some of the smaller and less densely populated communities and rural areas.

This is probably the strongest program that can be devised. It assumes both that there will be a reduction in the proportion of federal funding for operating and capital assistance and that state and local authorities will have a strong commitment to public transportation and the flexibility to allow programs to be tailored to local conditions at the state and local levels.

Political conditions at local, state, or national levels may force compromises to this program. The program that actually results will probably be less than ideal. But these kinds of suggestions for strengthening public transportation systems form the basis of financial viability.

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