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Funding Sources for Transit System Operations

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ABSTRACT

This paper contains an analysis of transit system operating fund sources in the United States. Data were compiled from individual operators' reports to the Urban Mass Transportation Administration, U.S. Department of Transportation, as required by Section 15 of the Urban Mass Transportation Act of 1964, as amended. Funding sources are tabulated into five categories: earned income, locally provided support, federal support, state support, and other income. The average shares of a transit operator's income from these five sources are computed by the number of vehicles operated and by geographic region. The statistical correlations between the share of an operator's funding from a particular source and simple system performance measures are computed. Conclusions are drawn on the importance of federal operating support to different categories of transit operators.

The process of funding transit systems in the United States has changed substantially over the past 40 years. Until the end of the 1940s, transit systems were predominantly privately owned companies that depended on farebox revenues. Shortly after World War II, transit ridership started to decline because of increased automobile ownership and the shift of population and employment from central cities to lower density suburban areas. From 1945 to 1955 transit ridership declined by more than 50 percent in the United States (1,p.156). Private transit operators found it increasingly difficult to stay in business, and either curtailed service temporarily or abandoned operations altogether.

The 1950s marked a major conversion of the transit industry from private to public ownership, usually in the form of municipal and regional transit operating authorities. These operating authorities

were able to obtain funds to buy needed transit equipment because they normally had the authority to issue bonds backed by the newly purchased equipment or future farebox revenues. Operating expenses were, however, still largely covered by passenger fares.

By the early 1960s, most transit agencies were at the point where additional public subsidies were needed to cover operating expenses as well as new equipment purchases. The Urban Mass Transportation Act of 1964 established federal support for the purchase of new transit vehicles and the construction of facilities. This federal capital assistance freed some local and state funds for operating subsidies. But the need for additional transit operating subsidies led to the National Mass Transportation Assistance Act of 1974, which provided for Section 5 federal operating assistance for transit systems.

Reviewed in this paper is the 1982 funding of

transit operating costs through farebox receipts and revenues from different levels of government. Several analyses are presented that include:

1. Calculations of operating expenses recovered from the farebox for different-sized transit properties;
2. Examples of regional differences between local and state government responsibility for operating assistance; and
3. Measurements of the correlations between operating fund sources and transit system performances.

DATA SOURCES

The data for these analyses were obtained from the operating statistics that each transit operator reports under Section 15 of the Urban Mass Transportation Act of 1964, as amended. An annual report is compiled from these operator-supplied figures by the Urban Mass Transportation Administration, which includes individual operator and industry summary figures on transit revenues, transit expenses, nonfinancial operating data, and performance measures. The most recent report for 1982 is used in this paper (2).

Data are reported for 336 transit operators ranging in size from owners of a single vehicle to the New York Transit Authority/Metropolitan Transit Authority (TA/MTA), which operates nearly 11,000 transit vehicles. The data items used for statistical analysis are:

1. Total income received by an operator for operating expenses.
2. A breakdown of this income according to whether it is earned or comes from federal, local, or state sources.
3. Number of vehicles owned and annual passengers carried.
4. Population of the urbanized area where the operator is located.
5. UMTA local administrative region in which the operator is located.

For all practical purposes, reported income in the Section 15 report equals an operator's operating expenses.

There are several limitations to this data set, however. The most serious defect is that it does not include information on several transit modes, including commuter rail. As a result, revenue data for cities with extensive commuter rail services are incomplete. Reporting problems also occur when: (a) an operator purchases transportation services from another party; (b) when the service an operator provides covers more than one urbanized area; and (c) when there is more than one operator in an urbanized area.

AVERAGE REVENUE SOURCE CALCULATIONS

Revenue sources have been divided into five categories for the calculations:

1. Earned income, which comes primarily from fares but also includes other transportation revenue, such as school bus service, and some nontransportation revenue, such as advertising;
2. Local revenue, which includes taxes levied by the transit operator, local government special fare assistance, and local government grants;
3. Federal revenue, which comes primarily from Section 5 federal operating assistance;

4. State revenue, which includes state special fare assistance and state grants; and

5. Other revenue, such as interest income, which the operator receives from outside sources.

Total income for the 336 transit operators in 1982 was approximately \$7.5 billion.

There are two ways to compute an industry average for the contribution from each of the aforementioned sources. First, all the funds can be summed by category for the 336 operators and then the average income source shares can be computed. This calculation provides true averages; but, it may not provide the best example of revenue sources for an average company because the characteristics of a few large transit systems may dominate the calculations. The New York TA/MTA alone accounts for more than one-fourth of all transit revenue in the United States. An alternate approach is to compute the average of the individual funding shares for each of the 336 operators.

Table 1 gives the average contribution by funding source calculated by using both methods. The difference between the two averages can be illustrated as follows. For the first average, the total earned income for all 336 operators accounts for 43.7 percent of all operators' revenue. However, the average contribution that earned income makes to total income for the typical operator is only 32.3 percent. This means that the first average is not a good descriptive statistic for earned income. The earned income of individual operators is not uniformly distributed around the mean, but is skewed because a few large operators have a disproportionate share of all earned income. The 27 largest transit systems account for more than three-fourths of all transit revenue, and generally also have the highest earned income levels.

TABLE 1 Operator Income by Funding Source

	Income Source (percent)				
	Earned Income	Local Support	Federal Support	State Support	Other
Average Computed by Total Income	43.7	29.1	12.3	13.3	1.6
Average Computed by Operator Sources	32.3	26.1	27.0	14.2	0.4

Regardless of the method of computation, earned income is the most important revenue source. The relative importance of local, state, and federal subsidies is, however, not entirely clear because they would be ordered differently depending on the average used for ranking. In terms of total dollars, the federal subsidy is less than either the state or local subsidy levels. Yet for the majority of operators in the data set, it contributes more to revenue than the other two government subsidies.

Table 2 gives data on these apparent contradictions. In this table, dollar contributions to transit revenue are computed for four different-sized transit properties: (a) very large transit companies with more than 500 transit vehicles; (b) medium-sized operators with between 100 and 500 transit vehicles; (c) operators with between 50 and 100 transit vehicles; and (d) small transit operators with less than 50 vehicles. Note first that the majority of transit operators in the data set are quite small, and second, the dominance of the larger operators. The average operator allocation of reve-

TABLE 2 Income Sources by Operator Size

Operator Size (Vehicles)	Number of Operators	Percent of Total Income	Funding Source (percent)				
			Earned Income	Local Support	Federal Support	State Support	Other
500+	27	77.7	45.3	29.1	10.1	13.7	1.8
100 to 500	61	14.9	41.3	30.1	17.4	10.0	1.1
50 to 100	62	3.9	32.8	25.2	24.4	17.5	0.1
0 to 50	186	3.5	30.9	29.0	25.7	14.4	0.1
Total	336	100.0	43.7	29.1	12.3	13.3	1.6

nue closely matches the allocation of the largest operators.

The data in Table 2 indicate that the importance of earned income generally declines for smaller transit operators, and that federal operating subsidies compensate for this decline in earned income among smaller properties. Local, state, and other revenue sources are hardly affected by operator size. The sum of these three revenue sources is a fairly uniform 40 to 45 percent of all revenue, regardless of the size of transit systems.

REGIONAL DIFFERENCES IN FUNDING TRANSIT SYSTEMS

Sources of revenue for transit systems were then tabulated by UMTA administrative region to determine whether there were regional differences in their funding. The states that make up the UMTA regions are shown in Figure 1.

Table 3 gives data on income sources by UMTA administrative region. These data indicate that there are some regional differences in transit funding that are correlated to some extent with the average transit system size in each region. Region II, which includes the New York metropolitan area plus New Jersey and several upstate New York transit systems, is unique for its high level of earned income and its relatively low percentage level of federal support. Both are also characteristic of large transit

systems in general. With regard to the low level of federal support, this region accounts for one-third of all national transit revenue, and it is probably politically unacceptable for one region to receive one-third of all federal operating funds.

Some analysts have argued that federal support for transit has generally favored the new systems in the sunbelt states at the expense of the older and larger transit systems in the northeast. This appears to be only partially the case for federal operating subsidies. Although the southeast (Region IV) shows a high level of federal support, it is not significantly greater than the adjacent east coast (Region III) and midwest (Region V) UMTA regions. Surprisingly enough, the highest level of federal support occurs among the small number of transit systems in the plains states in Region VII. Federal operating subsidies for the remaining regions in the sunbelt, the southwest (Region VI), and west coast (Region IX), are only average.

The characteristics of local and state support can be summarized by examining the two extreme cases, the mountain states in Region VIII and New England (Region I). New England has the lowest level of local subsidy and the highest level of state subsidy, whereas the mountain states' region shows no state subsidies at all but the highest local support. In those UMTA regions that are not particularly urbanized, supporting transit is predominantly a local responsibility. States are more active in



FIGURE 1 UMTA administrative regions

TABLE 3 Income Sources by UMTA Administrative Region

UMTA Region	Number of Operators	Percent of Total Income	Funding Source (percent)				
			Earned Income	Local Support	Federal Support	State Support	Other
I	32	5.0	37.1	17.9	12.8	32.2	0.0
II	40	33.0	53.8	18.8	7.3	15.9	4.2
III	33	13.1	44.2	18.3	16.8	20.7	0.0
IV	46	4.7	43.4	36.6	19.6	0.5	0.0
V	75	16.3	39.8	33.6	14.3	12.3	0.0
VI	35	5.1	31.4	53.3	12.1	3.1	0.1
VII	15	2.0	30.8	40.3	23.2	5.6	0.1
VIII	6	1.6	23.9	62.3	13.8	0.0	0.0
IX	44	16.2	39.2	39.5	13.7	6.5	1.0
X	10	3.1	28.8	48.3	10.1	12.8	0.0
Total	336	100.0	43.7	29.1	12.3	13.3	1.6

subsidizing transit when their populations are largely urban. The relatively low level of combined local and state subsidies in the New York-New Jersey Region II is explained by the high level of earned income that transit systems in this region generate.

TRANSIT SYSTEM PERFORMANCE AND FUNDING SOURCES

A correlation analysis was carried out to describe the relationships between funding for transit systems and their performance. The different funding shares for the individual operators were correlated with six variables that characterized the metropolitan area where the transit service was provided and the efficiency of the transit system. These variables are total revenue, urban area population, transit vehicles operated, annual passengers carried, vehicles per population, and passengers per population.

Table 4 summarizes the results of this correlation analysis and lists the correlation coefficients along with their significance at the 95 percent level.

The data in Table 4 indicate the trend for earned income noted earlier--that the proportion of an operator's total revenue from earned income increases with the size of the transit system. Earned income also appears to depend on operator efficiency as measured by per capita urban area passengers. Local and state sources of revenue show less correlation with the selected variables. However, local support appears to be at least slightly positively correlated with the size of the operator and with transit system performance.

Federal operating support for transit shows the most interesting correlation characteristics. Federal operating support is significantly negatively correlated with size of the transit systems, thus corroborating the previous discussion. However, federal support is also negatively correlated with the three system performance variables: passengers carried, vehicles per population, and passengers per population. Transit systems that are poor performers in terms of these measures depend to a greater extent on federal operating subsidies than on better performing systems.

The data in Table 5 indicate how funding sources correlate with annual passengers and passengers per population for the four different-sized transit operations used previously. Note that the funding sources are interrelated because the funding source variables are expressed as percents and must sum to 100 percent. A positive correlation for one funding source implies that at least one other funding source must be negatively correlated for a given transit system size category. Because the data are divided into more categories than in Table 4, the significance of the correlation coefficients is generally less, and a lower value of 90 percent is used as a threshold significance.

There are some general differences in the correlation coefficients depending on the size of the transit system. By examining the signs on the correlation coefficients, it is possible to ascertain some of the reasons for these differences. For very large transit systems, high per capita ridership tends to make a transit system more self-supporting because of increased earned income. For medium-sized

TABLE 4 Correlation Between Funding Sources and System Performance Variables

Funding Source	Total Income	Urban Area Population	Transit Vehicles	Annual Passengers	Vehicles/Population	Passengers/Population
Earned Income	0.12*	0.28*	0.16*	0.13*	0.02	0.16*
Local Support	0.03	0.02	0.02	0.01	0.11*	0.09
Federal Support	-0.20*	-0.37*	-0.23*	-0.17*	-0.14*	-0.26*
State Support	-0.01	0.01	-0.01	-0.01	-0.01	-0.03
Other	0.07	-0.01	0.06	0.07	-0.07	-0.04

*Probability that the correlation is nonzero is greater than 95 percent.

TABLE 5 Correlation Between Funding Sources and Ridership Variables by Vehicles Operated

Funding Source	500+ Vehicles		100 to 500 Vehicles		50 to 100 Vehicles		1 to 50 Vehicles	
	Pass.	Pass./Pop.	Pass.	Pass./Pop.	Pass.	Pass./Pop.	Pass.	Pass./Pop.
Earned Income	0.37*	0.29	-0.00	-0.27*	0.29*	-0.08	0.22*	0.16*
Local Support	-0.15	-0.20	0.18	0.24*	-0.04	0.24*	0.04	-0.10
Federal Support	-0.33*	-0.26	-0.31*	0.01	-0.30*	0.12	-0.22*	0.03
State Support	0.01	0.15	0.00	0.02	-0.05	-0.06	-0.07	-0.07
Other	0.95*	0.54*	-0.05	-0.11	0.03	-0.05	-0.09	-0.11

*Probability that the correlation is nonzero is greater than 90 percent.

transit systems, however, the situation is reversed--high per capita ridership is associated with lower levels of earned income and higher levels of local subsidy. The positive correlation with local subsidies for these medium-sized systems means that the high per capita ridership has been achieved through high local subsidies and low fares.

Earned income is positively correlated with total riders for three of the four sizes of transit systems, as would be expected. Although there is some evidence that local support is correlated with per capita passengers for medium-sized transit systems in particular, state support is uncorrelated with this system performance measure regardless of system size. Federal operating support is generally negatively correlated with both the total passengers and per capita passenger variables. In fact, federal operating support is significantly negatively correlated with total ridership for all four size categories of transit systems.

SUMMARY AND CONCLUSIONS

Existing patterns of funding for transit can be summarized in the following manner. Earned income, largely from passenger fares, accounts for approximately one-third of smaller operators' revenue and increases up to nearly one-half of revenue for the very largest transit systems. State and local subsidies consistently account for 40 to 45 percent of a transit operator's income. Federal operating support is used to close the gap between earned income from the farebox and the operating costs remaining after state and local subsidies.

The division of subsidies for operating costs between state and local sources depends on: (a) the degree of urbanization in the state; (b) traditional divisions between state and local government responsibility within regions of the U.S.; and (c) the apparent desire of some medium-sized cities to promote transit use through high local subsidies and low fares. Local support of operating costs also appears to be somewhat related to performance of the system as measured by ridership.

Existing federal operating subsidies tend to favor smaller transit systems, but federal operating

subsidies are less regionally biased toward the sun-belt regions than many have argued. The method by which federal subsidies are distributed does appear to reward inefficient transit systems. Moreover, this tendency cannot be completely explained by different regional characteristics or by the inefficiency of smaller transit operators.

Depending on one's point of view, federal operating subsidies either support inefficient operations or are a safety net to keep marginal transit systems operating until ridership builds. Current policies for distributing federal operating support do not appear to offer incentives to transit operators to improve system efficiency or to local and state governments to increase their support. It is also clear that the smaller transit systems will be hurt the most if federal operating subsidies are reduced without changing the way federal operating support is allocated because a larger percentage of their income is obtained from federal subsidies.

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