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# An Analysis of Local Taxpayers' Willingness to Finance Transit

DAVID J. FORKENBROCK AND JAMES W. STONER

A strong commitment of local tax dollars will be necessary to sustain transit service in many U.S. cities in the 1980s. Limited research has been completed on willingness to pay local taxes for transit. Factors that influenced support for a proposed special property tax millage in Council Bluffs, Iowa, are examined. Council Bluffs is a moderately low income, blue collar community within a metropolitan area of half a million people. An analytic technique known as the Automatic Interaction Detector (AID3) is applied to survey data collected through telephone interviews of 770 households in Council Bluffs. AID3 sequentially partitions a data set on the basis of maximum differences in the means of the resultant groups. Each respondent is assigned to one and only one subgroup. Results of the analysis indicate that home ownership is a major factor in the willingness to pay a local transit tax; home owners are distinctly less willing to pay than renters. Older persons are also less supportive of an additional property tax. Among homeowners, personal transit use or use by another household member is an important factor in support. The attitudes that business within the city is stimulated by transit, that low income persons are enabled to get or keep jobs, and that local government is generally performing well are highly related to willingness to pay a transit tax. The conclusion is drawn that it is important to provide transit service that conforms to the objectives of local taxpayers as well as to demand by users of the service. If these taxpayers believe that transit is making a useful contribution, they are much more likely to support a local property tax to help finance it, even if they are not making personal use of transit.

Recent policy shifts in the federal government are gradually transferring the burden for financing transit operations to the local level. With the phaseout of UMTA Section 5 operating assistance, the entire cost of operating transit must be defrayed by fares, state assistance, and local funds. Fares have been increasing quite rapidly in the early 1980s (an average of 18 percent from 1980 to 1981) and probably will continue to do so (1). Concern exists, however, that too rapid an increase in fares could bring about significant ridership losses and, in some instances, reductions in total revenue. State transit operating assistance is provided by only about half of the states, and the level of this assistance is rarely high (2,3). A strong commitment of local tax dollars to subsidize transit operations may often be the only alternative to major reductions in or even termination of service.

Limited research has been conducted in the area of local transit financing. A growing literature is emerging on the efficiency and equity implications of alternative financing strategies; Pucher (4), for example, and the probable responses to fare changes (5). Few studies have addressed the issue of local willingness to pay local taxes for transit (6-8). An earlier analysis by Forkenbrock (9) examined the relationship of various user and nonuser benefits to

transit support, but the case study city of Ann Arbor must be regarded as somewhat atypical.

This analysis is an attempt to extend what is known about factors influencing willingness to pay a local tax earmarked for transit. The data used in the analysis were collected as part of a study of citizen preferences regarding transit financing. The fundamental questions explored in this paper are the relationships between (a) personal transit use, situational attributes, and individual attitudes; and (b) willingness to pay a local property tax for transit.

## CASE STUDY AND RESEARCH METHODOLOGY

### The Case Study City: Council Bluffs, Iowa

Council Bluffs, Iowa, purchases transit service from Metro Area Transit (MAT) which serves the greater Omaha region (570,399 population). Costs are assigned to Council Bluffs on the basis of service hours provided on a monthly basis. As the hourly charge by MAT increased and the amount of federal Section 5 operating assistance began to diminish, the concern of city decision makers heightened. Alternatives ranged from terminating service to levying a local tax to help defray the burgeoning deficit.

Iowa law enables a local government to institute a special property tax assessment of not greater than 2 mills to provide for transit. In Council Bluffs a 2 mill assessment would generate approximately \$350,000 annually. Although state law does not require a referendum to establish a new tax, the mayor and city council decided that a large-scale household survey would be prudent. Such a survey would enable them to determine whether the citizenry would favor an increase in property taxes to help pay for transit.

The city council's concern over public support for a transit tax stemmed in part from the difficult economic circumstances of the city. At the time the increase was being contemplated, the city had a 9 percent unemployment rate. Most of the labor force is blue collar, and the average household income of \$17,870 is well below the national average of more than \$21,000. The median educational level is 11.8 years. In short, Council Bluffs is a lower middle income, blue collar community whose economy is not particularly strong.

In November 1981, a telephone survey of 770 Council Bluffs households was designed and carried out. Considerable media coverage characterized the survey as an informal referendum. A random digit dialing mechanism was used to select households, and a randomizing table was used to identify the person 18 years or older who was interviewed. If this person was not available, an appointment was made to call

again. The result is a representative sample of households with a telephone and a random selection of respondents within these households. Less than 2 percent of Council Bluffs residents do not have a telephone.

The dependent variable to be explained in this analysis is willingness to pay either a 2 mill or a 1 mill property tax to be earmarked for transit.

Table 1. Variables included in the analysis.

Name	Description	Category	Distribution of Responses	
			No.	Percent
Situational variables				
SUPPORT	Support for either a 2 mill or a 1 mill property tax	0 = No	214	31.8
		1 = Yes	459	68.2
		Missing data	(97)	
INCOME	Household income of the respondent	1 = Low, \$0-\$9,999	207	33.0
		2 = Middle, \$10,000-\$24,999	282	43.6
		3 = High, \$25,000+	157	24.3
		Missing data	(124)	
AGE	Age of the respondent	1 = Young, 18-25 years	133	17.3
		2 = Middle aged, 26-59 years	401	52.1
		3 = Older, 60+ years	235	30.6
		Missing data	(1)	
EDUC	Education of the respondent	1 = Low, 1-11 years	202	26.4
		2 = Medium, high school	462	60.5
		3 = High, some college+	100	13.1
		Missing data	(6)	
SEX	Sex of the respondent	0 = Male	258	33.6
		1 = Female	511	66.4
		Missing data	(1)	
TENURE	Tenure of the respondent's household	0 = Rent	219	29.5
		1 = Own	523	70.5
		Missing data	(28)	
		Behavioral variables		
USER	Transit usage by the respondent	1 = Nonuser	374	48.8
		2 = Previous user	277	36.1
		3 = Current user	116	15.1
		Missing data	(3)	
OTH USE	Transit usage by other members of the respondent's household	1 = No use	650	84.5
		2 = Occasional use	53	6.9
		3 = Frequent use	66	8.6
		Missing data	(1)	
Attitudinal variables				
STIM BUS	"Public transportation in Council Bluffs helps stimulate business in the city."	1 = Strongly agree	334	43.9
		2 = Agree somewhat	264	34.7
		3 = Neither agree or disagree	74	9.7
		4 = Disagree somewhat	52	6.8
		5 = Strongly disagree	37	4.9
		Missing data	(9)	
DIS AUTO	"The use of private cars should be discouraged."	1 = Strongly agree	36	4.7
		2 = Agree somewhat	97	12.7
		3 = Neither agree or disagree	79	10.3
		4 = Disagree somewhat	186	24.3
		5 = Strongly disagree	368	48.0
		Missing data	(4)	
IMP TRANSIT	"We should improve public transportation so it will be used more."	1 = Strongly agree	313	41.1
		2 = Agree somewhat	246	32.3
		3 = Neither agree or disagree	114	15.0
		4 = Disagree somewhat	57	7.5
		5 = Strongly disagree	31	4.1
		Missing data	(9)	
POOR TO JOB	"Public transportation in Council Bluffs helps low income people find or keep jobs."	1 = Strongly agree	408	53.5
		2 = Agree somewhat	208	27.3
		3 = Neither agree or disagree	66	8.7
		4 = Disagree somewhat	39	5.1
		5 = Strongly disagree	42	5.5
		Missing data	(7)	
TRAN POOR	"Public transportation should exist mainly to help low income people."	1 = Strongly agree	139	18.1
		2 = Agree somewhat	125	16.3
		3 = Neither agree or disagree	36	4.7
		4 = Disagree somewhat	158	20.6
		5 = Strongly disagree	308	40.2
		Missing data	(4)	
SAVE FUEL	"Public transportation should be used, rather than private automobiles, in order to conserve fuel."	1 = Strongly agree	179	23.4
		2 = Agree somewhat	287	37.6
		3 = Neither agree or disagree	79	10.3
		4 = Disagree somewhat	119	15.6
		5 = Strongly disagree	100	13.1
		Missing data	(6)	
SAT SERV	"Overall, how satisfied are you with the job being done by city government officials and bureaus?"	1 = Very satisfied	67	9.3
		2 = Somewhat satisfied	457	63.2
		3 = Somewhat dissatisfied	159	22.0
		4 = Very dissatisfied	40	5.5
		Missing data	(47)	

Specifically, respondents were asked the following question:

In Iowa, a city council can vote to add a property tax up to 2 mills to help finance public transportation within the city. A 2 mill tax would cost about \$16 per year for a family living in a house worth \$30,000 or about \$32 per year for a family living in a house worth \$60,000. Do you favor Council Bluffs' city council passing a 2 mill property tax for transit?

If the respondent opposed the 2 mill tax, the following question was then asked:

A 1 mill property tax for public transportation would cost one-half this amount. It would cost \$8 per year for a family living in a house worth \$30,000 or about \$16 for a family living in a house worth \$60,000. Do you favor Council Bluffs' city council passing a 1 mill property tax for transit?

It is worth noting that respondents were told how much the property tax would cost them. Had this information not been provided, the issue would have been too hypothetical for a meaningful answer to be given. In the case of renters, an estimate of the property tax likely to be paid on their unit was furnished, based on two assumptions: (a) the rent is approximately equal to 1 percent per month of the market value, and (b) the property tax is ultimately paid by the tenant.

To construct the dependent variable a favorable response to either question was coded as a one, and a negative response to both was coded as a zero. Actually, 43.4 percent of the sample favored a 2 mill tax and another 24.8 percent would be willing to pay a 1 mill tax. It should be stressed that the analysis is restricted to willingness to pay a property tax millage. The support for an alternative local tax, such as one on income or sales, may differ both in level and nature.

The variables included in the analysis are listed in Table 1. There is a total of five situational variables (household income, age of the respondent, education of the respondent, sex of the respondent, and housing tenure); two behavioral variables (use of transit by the respondent and use by other members of his or her household); and seven attitudinal variables (six statements with which the respondent could agree or disagree and a measure of general satisfaction with local government). Descriptions of the ordinal response categories and the associated distribution of responses are also shown in Table 1.

The variables for transit usage require a brief explanation. Respondents were asked whether they had ridden on a MAT bus during the previous 30 days; if they had, a code of three was assigned. Those who had not but who had done so during the previous 3 years were assigned a two. Finally, respondents who had not made use of transit service during the previous 3 years were assigned a one. Table 1 shows that only 15.1 percent of the sample had used transit in the previous 30 days and slightly less than half (48.8 percent) had not used transit in 3 years.

#### The Nature of the Analysis

The primary objective of this research was to examine how willingness to pay a local tax for transit varies among persons in different situations, having dissimilar usage patterns, and holding different attitudes regarding transit. A variety of analytic techniques exist for predicting a given outcome

(such as willingness to pay for transit), including multiple regression and analysis of variance. Regression, however, requires intervally scaled predictor variables; survey data are almost exclusively ordinally scaled. Analysis of variance explains how much of the variance is accounted for by each predictor, but it requires the rigid condition that the effects of each predictor be measured over the whole sample, even though in reality these effects may differ substantially among subgroups of the sample.

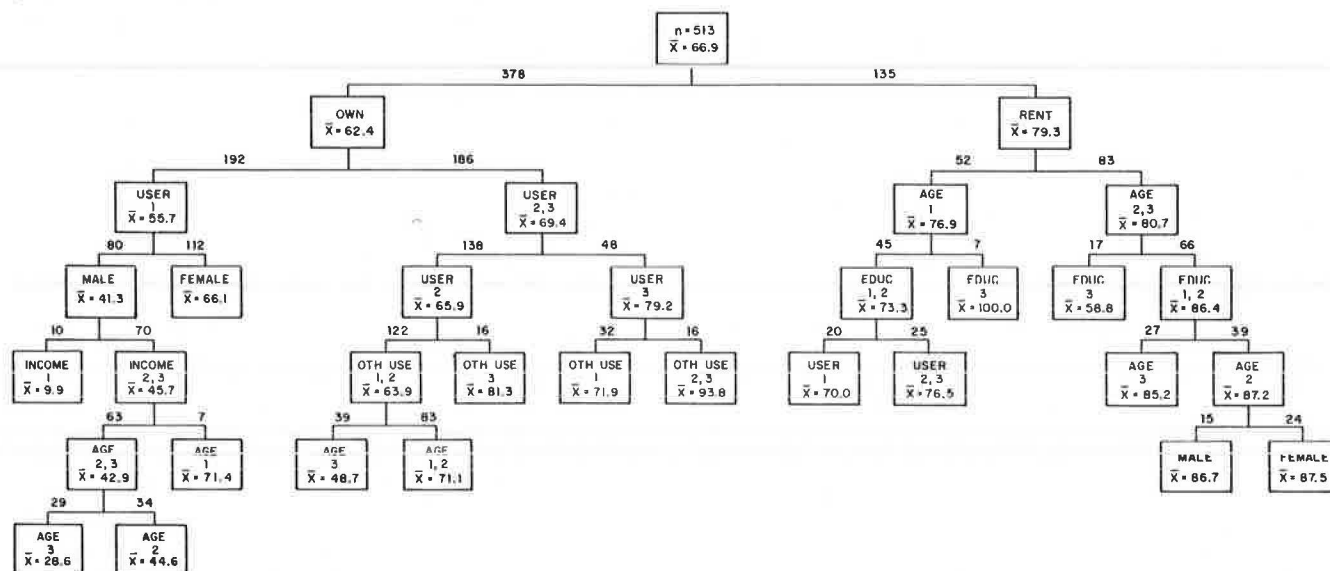
The analytic technique used in this analysis is the Automatic Interaction Detector, or AID3 (10,11), developed at the Survey Research Center of the University of Michigan. It asks the question, "What dichotomous split on which single predictor variable will give us a maximum improvement in our ability to predict values of the dependent variable?" (11, p. 2). Through a series of binary splits, AID3 divides the sample into a series of mutually exclusive subgroups. Each observation, then, becomes a member of one and only one of these subgroups. Thus, each survey respondent is assigned to a specific group.

Assignments to groups are made such that at each step in the procedure the two new means account for more of the total sum of squares than would the means of any other possible pair of subgroups. That is, the means of the two subgroups defined at each step differ from each other maximally. In this case the means in question are those of the zero-one willingness to pay measure. For example, if two-thirds of a subgroup favored the millage, the mean for that subgroup would equal 66.7 percent.

A particularly attractive characteristic of the AID3 procedure is that the divisions of the sample into subgroups occur in a series of separate steps. The result is a tree-like definition of subgroups of ever decreasing size as the analysis proceeds. At each step there is a one-way analysis of variance for all possible splits (i.e., each category of each eligible variable) to determine the groups that will vary from each other the most. It should be noted that not all of the 770 observations could be included in the analysis because some respondents declined or felt unable to answer all questions. Only cases with valid responses to all variables can be processed by the AID3 program. Because the procedure divides a data set by looking at the competitive possibilities for each split, the probability of exactly replicating the whole process is remote. (The probability of getting the same sequence of splits is the product of the probability of getting the first multiplied by the probability of making the same second one, and so on.) Statistical significance tests are therefore inappropriate and not provided by the AID3 program.

In the interest of clarity, two separate analyses will be presented; both are intended to shed light on the central question of willingness to pay a local transit tax. The first analysis includes the five situational and two behavioral variables. This analysis will help explain who favors a tax for transit and how strong support is among various subgroups of respondents. The second AID3 analysis includes the seven attitudinal variables. The objective of the latter analysis is to determine which views are most strongly associated with willingness to help finance transit. Are people who possess a certain set of attitudes toward transit and its benefits more likely to favor the tax than those with opposing views?

The attitudinal analysis is particularly intriguing from a policy perspective. Knowing the kind of feelings that exist regarding what transit should contribute to society and how strongly these feelings are related to a willingness to pay for transit enables policymakers both to modify existing ser-

Figure 1. Groups formed by situational factors affecting support for a transit tax ( $\bar{x}$  is given in percent).

VICES and to market these services more effectively. As noted earlier, transit must not only attract riders; it also must be supported by local taxpayers who are willing to help pay for it.

#### FOUNDATIONS OF LOCAL WILLINGNESS TO PAY FOR TRANSIT

##### Situational Analysis

An AID3 analysis was performed to investigate the relationships between the five situational and the two behavioral variables and willingness to pay a local property tax for transit. Figure 1 depicts the resultant partitioning of responses. Each box contains the abbreviated variable title (see Table 1), the response categories included in that partition, and the mean value for the dependent variable within the subgroup. The number of respondents in a specific subgroup appears on the branch leading to the box for that subgroup.

The strongest measure for explaining differences in support for a transit tax is housing tenure. On the average, almost 17 percentage points separate renters from homeowners in favoring either a 1 or a 2 mill tax for providing transit. Apparently, because the property tax is far more visible to homeowners and average values are higher (and, hence, higher taxes) for owner-occupied homes, owners are less willing than renters to endorse a higher millage rate.

Among renters, the young are less likely to favor a transit tax. The data in Table 1 show that persons aged 26 years and older are somewhat more supportive of the increase than those aged 18–25 years. Within the two older age categories, those with no more than a high school education are substantially more apt to support a millage for transit; almost 28 percentage points separate the two groups. Those aged 26 through 59 are proponents of a transit tax slightly more often than those 60 years and older. Likewise, women are a little more supportive than men. Overall, 87.5 percent of the women who are 26 to 59 years of age, have a high school education or less, and live in a rented house or apartment will support a transit tax. The lowest level of willingness to pay a transit tax among renters is, surprisingly, persons with at least some

college who are 26 or more years old. Interestingly, use of transit does not emerge as a major factor influencing support for a transit tax among renters.

Within the ranks of homeowners, personal use of transit is the most important factor. For users of MAT services the support is 69.4 percent compared to 55.7 percent for the nonusers. Furthermore, current users are over 13 percentage points more likely to favor the tax than are those who have not used transit within the past 30 days. Those who have used transit recently and who live in households where other persons also use transit are particularly likely to support an earmarked millage. Fully 93.8 percent of this small group support the tax.

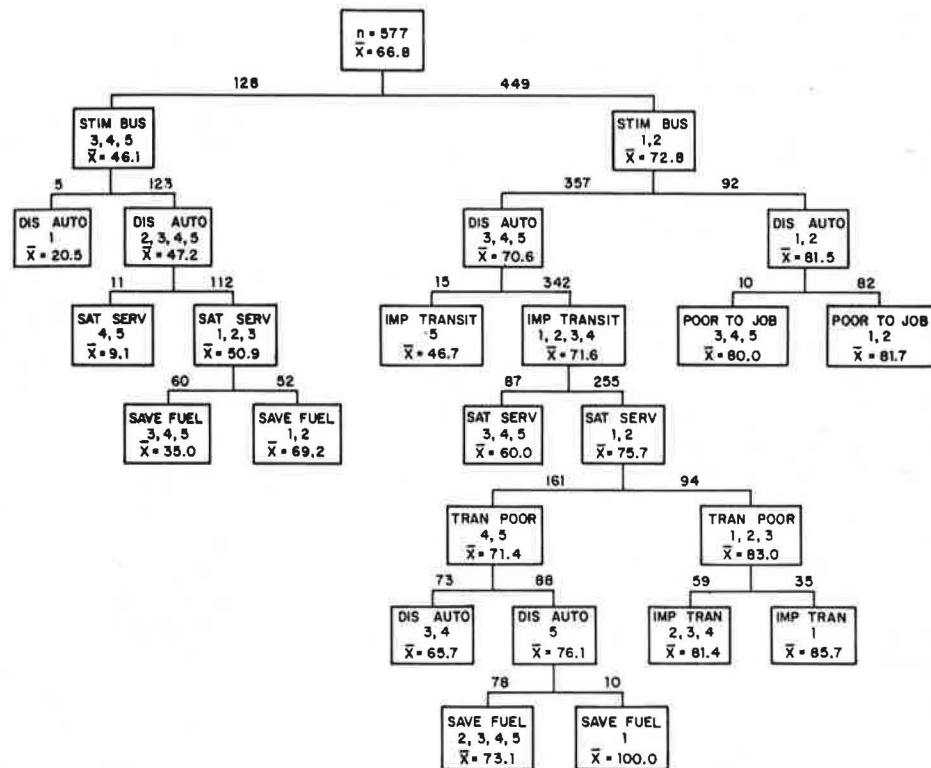
Respondents living in owner-occupied residences who do not personally use transit, are male, and have low incomes are typically not strongly favorable toward a tax for transit. Less than 10 percent of this group support such a tax. Nonusers who reside in owner-occupied housing, are male, have higher incomes, and are relatively young, however, are quite supportive. Our analysis reveals that 71.1 percent of this group favor a transit tax.

In summary, renters are stronger supporters of a local transit property tax than are homeowners. Among homeowners personal use or use by another household member is an important consideration in willingness to pay a transit tax. This suggests that those for whom the property tax is most visible feel most strongly that they must get their money's worth. Elderly persons generally are somewhat less willing to see their property taxes raised. That many of them have fixed incomes undoubtedly has a bearing on their support for a transit tax.

##### Attitudinal Analysis

Next the role played by personal attitudes in support for a local transit tax is considered. Figure 2 shows that certain combinations of attitudes lead to very high fractions of group members who are willing to pay a property tax for transit. The attitude most strongly related to support for such a tax is that transit helps stimulate business within the city. As noted earlier, the city of Council Bluffs was experiencing an economic downturn in

Figure 2. Groups formed by attitudinal variables affecting support for a transit tax ( $\bar{x}$  is given in percent).



November 1981 and respondents undoubtedly had the local economy on their minds. It is noteworthy that 449 of the 577 respondents (for whom data existed on all variables included in the analysis) strongly agreed or at least agreed somewhat that transit helps stimulate business. This belief is clearly one of the strongest bases for support in the case study city.

Agreement with the statement that use of private cars should be discouraged is strongly related to willingness to pay a transit tax among those who believe that transit fosters business activity. Eleven percentage points separate those who wish to see automobile use discouraged from those who do not. Among those preferring to see automobile use discouraged, respondents who also believe that transit helps low income persons find or keep jobs are slightly more likely to favor a transit tax. Of this group, 81.7 percent support the tax.

Those who disagree with the proposition that automobile use should be discouraged may still support a tax, provided they have certain other attitudes. For one thing, believing that transit should be improved so that it will be used more appears to be important. (MAT services in Council Bluffs have been reduced in recent years because of fiscal shortages.) Similarly, a general satisfaction with city government is a significant factor in support for a transit tax; over 15 percentage points separate those who are satisfied from those who are not. Among those satisfied with urban government, respondents who see transit mainly as a service to help low income people are 12 percentage points more likely to favor a transit tax than those who are less convinced of the income redistributional value of transit. Within this group, those with the strong belief that improvements in transit will increase its use are even more prone to favor an earmarked millage; 85.7 percent of this group favor a transit tax.

Returning to the top of the tree diagram, the 128 respondents who are unconvinced that transit helps stimulate business are unlikely to prefer automobile restrictions (the few who do are not transit supporters). Among those in this group who are at least not dissatisfied with city government and who believe that transit can help conserve fuel, 69.2 percent actually favor a millage. This is slightly higher than the percentage for the overall sample.

What the AID3 attitudinal analysis shows is that each of a series of attitudes leads to or diminishes support for a local transit tax. When certain combinations of positive attitudes are held, a high fraction of these persons will be inclined toward raising the property tax to help finance transit. The analysis also shows that certain views are particularly important to transit support. These attitudes include the belief that business is stimulated, that transit should be improved so that it will be used more, and that local government is generally performing adequately. Lacking these perspectives, one is quite unlikely to favor higher taxes to finance transit.

#### CONCLUSIONS AND POLICY IMPLICATIONS

It is commonly recognized that more local taxpayers are willing to pay taxes for transit than actually make personal use of the service. Less well understood is how extensive this support is, who the willing persons are, and what factors motivate them. The two AID3 analyses have made it possible to break down a reasonably large sample of local residents faced with a choice of whether or not to support a new tax to finance transit service within their community. The resulting subgroups often vary considerably in their support. A comparison of the two AID3 analyses shows that an individual's situation in life and his or her attitudes have rather similar effects on willingness to pay a transit



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

JON E. BURKHARDT

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