RESEARCH REPORT:

THE ECONOMIC IMPORTANCE OF

OKLAHOMA'S TRANSIT SYSTEMS

Submitted to:

Oklahoma Transit Association
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EXECUTIVE SUMMARY

In 1997, the Oklahoma Transit Association hired the Center for Urban Economic and Business Analysis to study the economic importance of Oklahoma's transit systems. This report explains the results of that study. All data and calculations concern the 17 rural and 3 urban transit systems that comprise the membership of the OTA.

Using the average annual expenditures for the fiscal years 1993 through 1997, this study estimates that Oklahoma transit systems have approximately a **$60 million impact** each year on the Oklahoma economy and are responsible for the existence of approximately **1,000 jobs** in the state. These calculations make use of the same multiplier factors used by the Oklahoma Department of Commerce when it estimates economic impacts.

At the same time, a portion of the $60 million impact can be attributed to the large federal subsidies that transit systems receive, which have an effect similar to the dollars earned by Oklahoma's export industries. Specifically, some $27 million in economic impact and approximately 450 jobs are due to the spending and hiring enabled by the funding that transit systems bring into the state.

In addition to assessing the impact on sales and jobs, this study also examined how the actual users of the subsidized systems -- as distinct from the taxpayers or citizenry in general -- value the transit services. An estimate of the value of the rides to the riders is devised in the study. Roughly speaking, the estimate extrapolates from a calculation of how much riders would have to pay for transportation in the absence of the transit systems. It also accounts for the likelihood that many, or even most, riders would be willing to pay more for the ride than the relatively low subsidized fares they do pay the systems. The resulting estimate of **$47 million value to riders** per year is a gauge of the importance that users attach to their transit systems and could be one more consideration in determining funding.

INTRODUCTION

This report was commissioned by the Oklahoma Transit Association in order to document the economic importance of Oklahoma's 20 transit systems. The three urban and 17 rural systems together constitute a major transportation network, providing nearly 9 million rides and traveling nearly 50 million passenger-miles per year. These transportation services are funded by a combination of fares and government (local, state, federal) subsidies. In all, the transit systems spend an average of $25 million per year on payroll, equipment, supplies, and support services. They employ some 600 full and part-time staff.

TABLE 1

OKLAHOMA'S PUBLIC TRANSIT SYSTEMS[1]

SYSTEM	MAIN OFFICE	FULL AND PART-TIME STAFF	RIDERSHIP TOTAL	ANNUAL PASSENGER MILES
Metropolitan Tulsa Transit Authority	Tulsa	170	2,788,584	18,152,927
Metro Transit - Norman	Norman	35	855,410	2,588,426
Metro Transit - Oklahoma City	Oklahoma City	165	3,849,085	15,652,606
Urban Total		356	7,493,079	36,393,959
Beaver City Transit	Beaver	6	15,984	51,448
Call-A-Ride Transit	Ada	10	54,240	201,989
Cherokee Strip Transit System	Garber	5	4,374	65,735
Cheyenne/Arapaho Public Transit	Clinton	7	5,210	186,418
Delta Public Transit	Purcell	5	9,549	82,870
Enid Transit	Enid	21	75,163	251,463
Eufaula Transportation	Eufala	5	16,680	53,172
FASTrans	Carnegie	5	5,071	116,594
First Capital Trolley	Guthrie	9	30,110	230,469
KiBois Area Transit System	Stigler	22	234,504	2,969,305
Little Dixie Transit	Hugo	33	204,042	1,965,150
Muskogee County Transit	Muskogee	10	93,524	531,850
Pelivan Transit	Big Cabin	28	83,349	1,135,519
Red River Public Transportation Service	Frederick	38	155,544	871,776
Southern Oklahoma Rural Transportation	Durant	22	150,243	738,751
Southwest Transit	Altus	17	93,260	306,199

Rural Total	243	1,230,847	9,758,708
Oklahoma Transit Total	599	8,723,926	46,152,667

There are two main aspects of Oklahoma transit's economic importance that are examined here. One is the effect of the dollars spent by the systems. The expenditures of transit systems generate not only initial economic impacts but also subsequent impacts, in fact, a chain of subsequent expenditures and job creation. In addition, the systems can be viewed as acting like export industries by attracting external dollars to the state in the form of federal subsidies.

The other aspect of economic importance calculated in this report is the value of public transit to the actual users of the systems. This is a value to be calculated quite apart from the impact on expenditures and jobs and even of the costs to taxpayers of system subsidies. It is strictly a measure of the benefits that accrue specifically to riders through their access to subsidized transit.

ECONOMIC IMPACT

Expenditures and Federal Subsidies

The explanation of expenditure impacts begins with the fact that Oklahoma transit systems' expenditures on payroll, equipment, and services lead to a second round of expenditures in the state. Transit workers spend their paychecks and transit system suppliers spend their receipts on their own payroll, equipment, and services. This in turn leads to yet a third round of spending on payroll and supplies, and so on. This chain of expenditures initiated by transit system spending is called the multiplier effect. Associated with all the generated expenditures are the production and selling of goods and services, which requires workers. This means that the multiplier effect also applies to jobs.

Total Transit Expenditures

To analyze the "hole" that would be left in the Oklahoma economy if the transit systems were suddenly to disappear, average annual expenditures for all systems can be added together. Were the transit systems to disappear, these expenditures would also disappear, and along with them the subsequent chain of spending and re-spending that constitutes the multiplier effect.[2]

TABLE 2

EXPENDITURE IMPACTS

	AVERAGE ANNUAL EXPENDITURE	TOTAL OUTPUT IMPACT	TOTAL JOBS IMPACT
Urban	20,088,214	48,010,830	616
Rural	5,309,131	12,688,824	420
Oklahoma Transit Total	25,397,345	60,699,654	1036

These calculations are based on the average over five years of transit system expenditures, according to data supplied by the Oklahoma Department of Transportation and the urban transit systems. The multiplier factors are the same as those used by the Oklahoma

Department of Commerce in its calculations of economic impacts. (Appendix A contains a technical explanation of the expenditure multiplier methodology.)

Federal Subsidies

To analyze Oklahoma transit as a sort of export industry, the federal subsidies can be treated as earnings from out of state. Essentially, every dollar earned in this "export" process is spent on payroll, equipment, and support services. This initiates a multiplier effect, i.e., it generates a chain of subsequent expenditures and jobs. The subsidies' economic impact will not be as large as the impact of total transit expenditures, because spending that results from federal or "export" dollars represents only a part of total expenditures.

Table 3 below shows that spending resulting from some $11 million in obligated federal funding generates a total of some $27 million in expenditures – or sales – and accounts for some 470 jobs in the state.

TABLE 3

FEDERAL SUBSIDY IMPACTS

	AVERAGE ANNUAL OBLIGATED FEDERAL FUNDING	TOTAL OUTPUT IMPACT	TOTAL JOBS IMPACT
Urban	9,033,438	21,589,916	277
Rural	2,242,884	5,360,493	189
Oklahoma Transit Total	11,276,322	26,950,409	466

These calculations are based on the average over five years of federal funds actually obligated, according to data supplied by the Oklahoma Department of Transportation, Transit Programs. The multiplier factors are the same as those used by the Oklahoma Department of Commerce in its calculations of economic impacts. (Appendix A contains a technical explanation of the federal subsidy multiplier methodology.)

VALUE TO USERS

Subsidized Transit

Roughly speaking, this estimate extrapolates from a calculation of how much riders would have to pay for transportation in the absence of the transit systems. It construes the value of a service to a consumer as being the consumer's willingness to pay for the service, were there no subsidy. The estimate accounts for the likelihood that many, or even most, riders would be willing to pay more for the ride than the relatively low subsidized fare that they do pay. The resulting estimate sums up the value for all users and gives them a sort of dollar-denominated "vote" in evaluating the benefits of the systems -- regardless of the systems' costs to taxpayers or of the economic impact of the systems' expenditures.

The value estimate also adjusts for the fact that Oklahoma incomes are well below the national average. This is necessary because value is derived from willingness to pay, but willingness to pay depends to a large extent on income. If no extra weighting is given to the value estimates to compensate for Oklahoma's low-income average, Oklahoma's dollar-denominated "vote" will be understated.

Table 4 below shows what value users can be said to attribute to subsidized transit when the alternative transportation is taxicab. The figures assume that transit riders would be willing to pay more -- up to, but not more than, the amount of cab fares -- for transportation that they now receive at much lower subsidized fares. Some $47 million dollars in value accrue to Oklahoma transit riders: an amount that could be taken as a "vote count" were the transit programs to be compared to the benefits and costs of other programs with claims on the taxpayer dollar.

TABLE 4

ESTIMATED USER VALUE

	DOLLAR VALUE TO USERS
Urban	39,018,389
Rural	8,466,172
Oklahoma Transit Total	47,484,561

These values are calculations are based on the average fares for subsidized transit estimated from data in Oklahoma Department of Transportation, 1996, as well as on

average taxicab fares estimated from a survey of Oklahoma cab companies. (Appendix B contains a technical explanation of the user value methodology.)

CONCLUSION

Economic Development

Sixty million dollars in output per year, 1000 jobs, and 47 million dollars in user benefit do not comprise all of the importance of transit systems to Oklahoma's economy. Transit also has economic development effects, which, though not directly measured in this study, can be both significant and enduring. Transit promotes urbanization, and with urbanization comes economic growth. Moreover, subsidized transit enables poor or welfare-dependent people to commute to work, thereby increasing the size of the workforce and the total income of the region.

The economic development of a region is, more often than not, associated with the growth of its urban areas. This is because there are powerful economic advantages deriving from enterprises, and employees, and consumers clustering together (Krugman, 1995). Rural transit systems connect dispersed residences to centers of commerce and employment in the region. They also connect these centers to each other. Transit systems thereby reduce the level of remoteness and increase the interconnectedness in a region. In other words, rural transit systems promote the urbanization of the region and thus encourage economic growth. Urban transit systems help sustain the interconnectedness of the metropolitan area and thereby help maintain the economic advantages of clustering people and enterprises.

Subsidized transit can also contribute to the economic development of a region by mitigating its poverty, that is, by providing a means for the region's poor to commute to their places of employment. Most Oklahoma transit systems expect to play a role in welfare-to-work reforms enabled by rider subsidies from federally subsidized Temporary Assistance for Needy Families (TANF) programs. Family members making a transition from welfare to work receive TANF subsidies to ride transit to their places of work. Other things being equal, this enabling of more people to work will increase output and income in the region.

APPENDIX A:

Methodology for Calculating Economic Impact of Transit Expenditures[3]

1.Transit expenditure data for fiscal years 1993, 1994, 1995, 1996, and 1997 are normalized to constant (1982-84) dollars.[4]

Expenditure data sources: Tulsa Transit, 1998; Metro Transit-Norman, 1998; Metro Transit-OKC, 1998; ODOT Transit Programs, 1998 (for rural systems).

Constant dollar/price level sources: Economic Report 1996, Table B-56; Federal Reserve Bulletin, 1997, Table 2.10.

2. A multiplier factor of 2.39 is applied to the average of the five years' expenditures.

Multiplier factor source: Strawn, 1997.

3. Expenditure impact results are then converted into 1997 dollars.

1997 price level sources: Economic Report 1996, Table B-56; Federal Reserve Bulletin, 1997, Table 2.10.

4. Employment data for full and part-time staff are summed together, since the jobs multiplier factor treats full and part-time the same.

Transit employment data source: ODOT, 1996.

5. A multiplier of 1.73 is applied to the total number of full and part-time jobs.

Multiplier factor source: Strawn, 1997.

6. The impact of federal subsidies is computed with essentially the methodology, except:

a. Data from fiscal years 1988, 1989, 1990, 1991, 1992 are averaged because these years afford the most recent set of obligated federal funding figures that are complete for both the urban and the rural systems.
b. The jobs impact of subsidies is estimated by proration: the ratio of subsidy-generated jobs to expenditure-generated jobs is assumed to be the same as the ratio of average subsidies to average expenditures.

Obligated federal funding data source: LaRue, 1997.

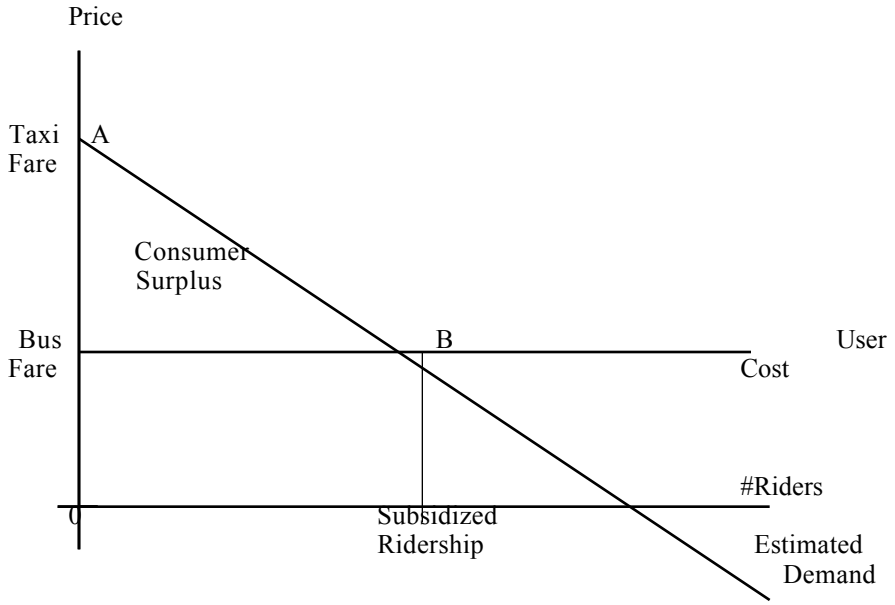
APPENDIX B

Methodology for Calculating Value to Riders

Consumer Surplus

1. The method uses the economist's technique of calculating consumer surplus, which is the value gained by consumers from purchasing a good at the market price instead of the higher price they would be willing to pay in the absence of market pricing. See, e.g., Varian, 1996, pp.246 and 259, for the definition and a generalized method of calculation. The method used below takes advantage of the linearity of the estmated demand curve and computes consumer surplus as the amount represented by the triangular area below the demand curve and above the cost curve.

DIAGRAM OF CONSUMER SURPLUS CALCULATION



2. Points A and B are observed and determine the estimated demand curve.

   A is the taxicab fare for an average-length trip in the transit system's market area. It represents a superior alternative to bus rides and is therefore a choke price or upper limit on riders' willingness to pay for bus rides (Walters, 1979, p.325.)

   B is the subsidized equilibrium price where riders' demand for transit services intersects their (marginal) user cost[5] schedule. The corresponding quantity is the observed total annual ridership for the system. (Boardman, et al, 1996, p. 295.)

3. Two consumer surplus amounts, one for the elderly and disabled riders, the other for all other riders, are calculated for each transit system. The total transit consumer surplus is the sum of all 38 individual calculations.

   Ridership, fare, and passenger miles source: ODOT, 1996.

   Taxicab fare sources: telephone calls to cab companies in each transit systems service area; fares varied among the three urban systems; the rural fare is $1.25/mile, a reasonable estimate based on surveying cab companies around the state.

Income Distributional Weighting

1. In addition, the total consumer surplus is multiplied by a weighting factor to compensate for the fact that Oklahoma's average personal income is well below the national average. This weighting is based on the principle of computing net benefit on a "one-man-one-vote" basis (Pearce, 1983, chap. 5.) Consumer surplus is calculated from riders' estimated willingness to pay; but willingness to pay is largely a function of riders' incomes. To give Oklahoma transit riders' consumer surplus a "vote" as if it were from an average-income American, the calculated surplus is multiplied by the following weighting factor:

$$\left(\frac{\bar{Y}}{Y}\right)^{E} = 1.586$$

2. $\bar{Y}$ is U.S. national median family income (U.S. Department of Commerce, 1996, Table 717.)

3. Y is an estimate of the median family income of Oklahoma transit riders. The estimate is calculated from American Public Transit Association (December 1992, Table 7.) The income distribution for systems in urban areas of 500,000 to 1 million population was used. The resulting national transit average was multiplied by 82.5%, reflecting Oklahoma's percentage of U.S. average household income (U.S. Department of Commerce, 1996, Table 716.)

4. E is the income elasticity of demand for a change in income from the Oklahoma transit rider's average family income to the U.S. median.

   If Oklahoma riders had higher, i.e., U.S.-median incomes, they probably would spend more on public transportation, but not necessarily the same percentage of their income. Therefore, the income ratio should be adjusted by the income elasticity of demand for public transportation.

   The elasticity is computed from data in U.S. Department of Labor (1993, Table 3) for the income interval $25,000 to $35,000, the midpoints of the two relevant income ranges.

ENDNOTES

[1] Source:ODOT, 1996. Washita Valley Transit, main office in Chickasha, was established October 1997 and is too new to have generated data for this report.

[2] It must be acknowledged that, were there no transit programs, the federal, state, and local governments would engage in other expenditures, possibly of comparable magnitude. This, too, would lead to a multiplier effect and a significant impact. The point here is not that transit expenditures are the only way to generate economic impact and that the absence of them would create a permanent "hole" in the state's economy. Rather, the point is to measure their impact or the size of the role that they play in the economy.

[3] U.S. Department of Commerce, 1997, contains explanations of multiplier-impact methodology.

[4] Expenditure data for fiscal years 1993, 1994, 1995, 1996, 1997 are reduced by 6% to account for that portion of observed transit expenditure that corresponds to revenue is induced, i.e. that only results from direct revenue but is not itself direct transit revenue.

[5] User cost calculations include only bus fares; they do not evaluate the time-cost of trips to users or other user costs.

REFERENCES

American Public Transit Association. "Americans in Transit: A Profile of Public Transit Passengers." Washington, DC, December 1992.

Boardman, Anthony E., et al. Cost Benefit Analysis: Concepts and Practice. Upper Saddle River, NJ: Prentice Hall: 1996.

Economic Report of the President 1996. Washington, DC: U.S. Government Printing Office.

Federal Reserve System. Federal Reserve Bulletin. Washington, DC, December 1997.

Krugman Paul. Development, Geography, and Economic Theory, Cambridge. MA: MIT Press, 1995.

LaRue, Kenneth. Manager, Transit Programs, Oklahoma Department of Transportation. Provided to Joseph Johnson, 10 October 1997.

Metropolitan Tulsa Transit Authority, memo to Joseph Johnson, 22 January 1998.

Metro Transit - Norman, memo to Joseph Johnson, 9 January 1998.

Metro Transit - Oklahoma City, memo to Joseph Johnson, 9 January 1998.

Oklahoma Department of Transportation, Transit Programs, 1996 Public Transportation Directory.

Oklahoma Department of Transportation, Transit Programs, memo to Joseph Johnson, 8 January 1998.

Pearce, D. W. Cost-Benefit Analysis. New York: St. Martin's Press, 1983.

Strawn, David. Oklahoma Department of Commerce, Research Division. Telephone with Joseph Johnson,16 December 1997.

U.S. Department of Commerce. Statistical Abstract of the United States 1996. Washington, DC: U.S. Government Printing Office.

U.S. Department of Commerce, Bureau of Economic Analysis. Regional Multipliers: A User Handbook , 3rd edition. Washington, DC: U.S. Government Printing Office, 1997.

U.S. Department of Labor. Consumer Expenditure Survey, 1992-93. Washington, DC: U.S. Government Printing Office.

Varian, Hal R. Intermediate Microeconomics. New York: W. W. Norton:1996.

Walters, A. A. "The Benefits of Minibuses: The Case of Kuala Lumpur." Journal of Transport Economics and Policy, September 1979.