WHAT THE NATIONAL TRANSIT DATABASE TELLS US ABOUT THE AATA

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30 July 2009

Summary

1. Various data for the AATA are compared with 20 other cities transit systems. The other cities are most comparable to the AATA in service-area population and bus ownership.

2. The AATA maintains more vehicles than most transit systems of its size – 29% more buses and 79% more demand-response vehicles than the average of the 20 comparable cities systems. Moreover, the AATA maintains these vehicles at a higher total cost per vehicle than the average of the comparable cities systems.

3. The differences in total costs between the AATA and other comparable cities systems are not caused by any great difference in the sources of the system's revenues.

4. If the operating costs per bus of the AATA were as low as the average of the 20 comparable bus systems, the AATA would have reduced its costs by $4.1 million in 2006 – a sum slightly larger than the total revenue the AATA collects in fares on all its transit services.

5. Obsolescence does not explain the higher costs of the AATA buses. The average age of the AATA buses is about a half year less than the average age of the 20 comparable cities buses.

6. Employee work-hours per bus are no higher for the AATA than for the 20 comparable bus systems. Inefficient labor allocation cannot explain the higher costs of the AATA buses.

7. Operating costs per work-hour are much higher for the AATA buses than for the average of the 20 comparable cities bus systems. AATA's total cost per work-hour is high for the blue-collar jobs (i.e. bus operation and maintenance) and is even higher for the white-collar jobs (non-bus maintenance and general administration). If AATA operating costs per work-hour had been reduced to the average of the 20 comparable cities, the AATA would have reduced its costs by $4.4 million in 2006 – an amount half a million dollars larger than all AATA fare collections.

8. The AATA also spends more (per bus-mile) on its purchases of materials and services than does the average of the 20 comparable cities. If the AATA expenditure on materials and services had been reduced to the average of the 20 comparable cities, the AATA would have reduced its costs by $1.1 million in 2006.

9. Depending on what statistic is used, the AATA demand-response services come out to be 20%-30% less costly than the average of the 20 comparable cities. But demand-response vehicles are more than five times as costly per rider as are fixed-route bus services ($19.20 versus $3.47) so that the AATA's greater provision of demand-response vehicles, relative to the 20 comparable cities, is another source of its higher overall cost per rider.

10. Whether the demand-response system is directly operated by the transit agency or privately transacted with existing transit companies does not seem to noticeably affect the costs, but our sample is small.

11. For the AATA demand-response activities, the cost per rider is about the same as the average for the comparable cities, but the cost per rider-mile is more than double the comparable cities average. (Curiously, in none of the 20 comparable cities does the average demand-response rider travel so few miles per trip as with the AATA.) The cost per vehicle, per vehicle-mile, and per vehicle-hour is slightly lower for the AATA demand-response vehicles than for the comparable cities average.

12. But the AATA picks up only 1.58 new riders per demand-response vehicle-hour, nearly one fewer new riders per vehicle hour than for the comparable cities average – this despite the fact that the AATA riders travel fewer miles. And the average number of riders in an AATA demand-response vehicle at any time is only 0.45, barely one third the average for the comparable cities. The average fare per rider-mile on the AATA demand-response vehicles is only $0.30, which seems awfully low until one notices that the average of the comparable cities is about that same.

13. Although it is not clear exactly how much subsidy is being given users of the demand-response vehicles, a $2.50 payment by the DR vehicle rider – the typical charge – represents no more than 30% of the operating cost of the DR vehicle.

14. To summarize the summary, examination of the NTD data suggests several places where the AATA is probably experiencing excessive costs. Only some of these excessive costs need to be only partly removed for the AATA to be able to lower its fixed-route bus fare to zero for all Ann Arbor riders. This would move a large number of people from their car commutes to the buses and greatly reduce Ann Arbor's pollution, congestion, and parking problems.

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Introduction

The National Transit Database (NTD) contains (in 2006) statistical information about the operation of some 657 bus systems across the United States, so it is possible to compare the data of the Ann Arbor Transportation Authority (AATA) with other transit systems in the country.[1]

[1] The NTD is collected by the Federal Transit Administration, and the data can be accessed – annually for the years since 1996 – at the following:
http://www.ntdprogram.gov/ntdprogram/data.htm
The 2007 data have become available since I began this research.

But these systems range from operating one or two buses up to operating thousands of buses, and clearly we cannot expect data comparability among systems of such different sizes. Here, we will compare the AATA data with the data of the ten transit systems with similar but slightly larger service-area populations and with the data of the ten transit systems with similar but slightly smaller service-area populations.[2]

We will be looking for areas where the AATA data differ greatly from the data of the 20 comparable cities transit systems. We begin by examining all the transit vehicles together.

The Data on All Transit Vehicles

We start by looking at the total number of transit vehicles and the service-area population these vehicles serve. This data is shown in Table 1. (The names and more detailed data about the population, service area, and number of vehicles of all 21 city systems are given in Appendix Table 1.)

The 20 other cities are of comparable population size, ranging from 207,000 to 542,000. But two sizable differences stand out:

1) The AATA maintains 29% more fixed-route buses per capita than the average of the other 20 cities. Only four of the other 20 cities maintain as many directly-operated buses as the AATA.[3]

2) The AATA maintains 79% more demand-response (DR) vehicles per capita than the average of the other 20 cities.[4] Only two of the other 20 cities provide as much demand-response service as the AATA. We shall explore the demand-response side of the AATA operation later in this paper.

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[2] By "similar" I mean that 1) the service-area populations (in the 2000 Census) are nearest to that of the AATA, 2) the agency has at least 25 buses, and 3) all (with one small exception) the agency's buses are directly operated by the agency. The AATA staff has pointed out to me that costs are expected to vary in different regions of the country and that "service-area" is a Census classification often bearing little relationship with the population actually served by the local transit system, but I could find no other simple way to classify cities without being more arbitrary. The AATA staff has selected a group of ten "peer cities" that the staff believes more accurately represents transit systems comparable to Ann Arbor's. See the Peer Cities Appendix to this report.

[3] I shall omit the words "directly operated" from here on since only 12 of the over 1,000 buses in this 21-city sample are rented from non-city sources.

[4] "Demand-response" means exactly what it says – these vehicles respond to (usually phoned-in) requests for a particular transport service. The NTD defines demand-response as: "A transit mode comprised of passenger cars, vans or small buses operating in response to calls from passengers or their agents to the transit operator, who then dispatches a vehicle to pick up the passengers and transport them to their destinations. A demand-response operation is characterized by the following a) the vehicles do not operate over a fixed route or on a fixed schedule except, perhaps, on a temporary basis to satisfy a special need, and b) typically, the vehicle may be dispatched to pick up several passengers at different pick-up points before taking them to their respective destinations and may even be interrupted en route to these destinations to pick up other passengers." (National Transit Database Glossary)

Table 1
Aspects of the Comparable Cities Transit Systems, 2006
Source: Appendix Table 1

	Service-Area Population	Number of Vehicles per 100,000 People	
		Fixed-Route	Demand-Response
Average of the 10 Larger Cities	364,544	13.2	6.6
Average of the 10 Smaller Cities	242,445	19.7	8.9
Average of All 20 Other Cities	303,495	15.8	7.5
Ann Arbor (AATA)	283,904	20.4	13.4
Ratio: AATA/20Other Cities	0.94	1.29	1.79

If the AATA operates too many fixed-route buses, its total costs are inevitably raised, but its total costs per vehicle may be lowered because of economies of scale – i.e. spreading relatively fixed costs of administration over a larger number of buses. We will shortly look into this possibility. The AATA also operates many more DR vehicles than other cities of its size, and such vehicles, as we shall later see, are much more expensive per rider than fixed-route buses. That the AATA maintains a greater number of vehicles than 20 comparable cities does not, by itself, mean that Ann Arbor has too many vehicles, for its culture and income may have put higher priority on the availability of mass transit -- and especially transit for the poor, disabled, and old a higher priority than in other cities.

Total Costs per Vehicle Too High?

The total costs of a transit system would be definitely raised if the number of vehicles were increased and the total cost per vehicle also rose. In Table 2, total operating costs of the transit systems are shown as total costs per various variables. Only total costs per rider and per rider-mile show the AATA in a cost-effective light. This happens because the AATA carries more riders for more rider-miles than the average of the 20 comparable systems. But most of the AATA's riders are carried in buses, and the major costs of buses are not caused by added riders or rider-miles.[5] Buses are usually filled to much less than capacity and when that is so, another rider is essentially costless. The major costs of buses are caused by the vehicle itself (maintenance), by vehicle-miles (fuel), and by vehicle-hours (drivers), and these total cost ratios are 12%, 17%, and 9% higher, respectively, than the average of the 20 comparable cities bus systems. With more vehicles and higher cost per vehicle, the AATA ends up with a total cost per (service area) capita that is 68% higher, and a total cost per (service area) square mile that is 59% higher than the 20 comparable cities average.

In short, the AATA both 1) maintains more vehicles than most transit systems of its service-area size, and 2) maintains them at a higher total cost per vehicle than do the transit systems of other comparably sized cities.

Table 2
Operating Cost Ratios of the Comparable Cities Transit Systems, 2006
Source: Appendix Table 2

Total Cost ($)						
per Capita	per Square Mile	per Vehicle	per Vehicle-Mile	per Vehicle-Hour	per Rider	per Rider-Mile

[5] DR vehicles carry fewer than 4% of the AATA riders or rider-miles (NTD, Table 19).

Average of the 10 Larger	45.78	112,707	199,024	4.45	60.86	4.17	1.15
Average of the 10 Smaller	47.36	103,167	212,072	5.05	70.79	4.66	1.31
Average of All 20 Other	46.57	107,937	205,548	4.75	65.82	4.41	1.23
Ann Arbor (AATA)	78.07	171,815	230,876	5.54	71.71	4.01	1.23
Ratio: AATA/20Other	1.68	1.59	1.12	1.17	1.09	0.91	1.00

Do Revenue Sources Matter?

Does the composition of revenue sources determine the numbers and costs of transit vehicles? Since the capital costs of the vehicles are largely, and often entirely, paid by the federal and state governments, greater success at negotiating with those governments might lead to an excessively vehicle-intensive transit system at the local level. But that does not seem to be the case with the AATA -- see Table 3. The AATA gets a slightly lower percentage of its total revenue from fares and a slightly higher percentage from state and federal governments. But the differences are not large enough to explain the big differences in the number of vehicles and the cost of vehicles. The small difference in local government contributions masks the fact that the AATA is the recipient of a dedicated local property tax that does not need to be begged for annually. Only three of the 20 comparable cities receive dedicated funds, and only one of those three receives more than the AATA.

Table 3
Revenue Sources of the Comparable Cities Transit Systems, 2006
Source: Appendix Table 3

	Percentage (%) of Total Revenue Received from			
	Fare Revenue	Federal + State Governments	Local Governments	Other Sources
Average of the 10 Larger	21.0	29.2	38.2	11.6
Average of 10 Smaller	18.1	33.7	46.5	1.7
Average of All 20 Other	19.5	31.5	42.4	6.6
Ann Arbor (AATA)	17.9	41.7	40.5	0.0
Ratio: AATA/20Other	0.92	1.12	0.96	0.00

Fixed-Route Buses Vs. Demand-Response Vehicles

What then is the cause of the higher AATA costs? Perhaps the cause has something to do with the fact that 40% of the AATA vehicles are demand-response while only 32% are demand-response for the average of the 20 comparable cities systems. And demand-response vehicles are inherently more costly per rider since their greater fuel efficiency comes nowhere near offsetting their smaller ridership. Let us leave the demand-response vehicles aside for a while and focus on the cost differences of the directly-operated fixed-route buses.

The Data on Fixed-Route Buses

The bus operating costs are shown in Table 4 below, for the total cost per bus and for three separate categories of costs. The total operating cost per bus is 28% higher for the AATA than for the average of the 20 comparable cities. But for the two categories representing the costs of using the buses – bus operation and bus maintenance – the AATA is only 22% and 25%, respectively, more costly than the average of the 20 comparable systems, while for the non-bus-use costs, the AATA is 51% more costly. [6]

[6] Non-bus-use maintenance includes such costs as maintenance of buildings, roadway, passenger stations, and fare-collection equipment.

Table 4
Operating Costs of the Comparable Cities Bus Systems, 2006
Source: Appendix Table 4

	Operating Cost ($000s) per Bus			
	Total	Bus Operation	Bus Maintenance	Non-Bus Maintenance + General Administration
Average of the 10 Larger	241.9	147.0	48.8	46.1
Average of 10 Smaller	255.8	151.8	46.7	57.3
Average of All 20 Other	248.9	149.4	47.7	51.7
Ann Arbor (AATA)	319.5	181.7	59.7	78.1
Ratio: AATA/20Other	1.28	1.22	1.25	1.51

How much do these excess cost per bus percentages add up to in real money? Consider first just the non-bus-use category (i.e. non-bus maintenance and general administration). The excess cost per bus is $26,344 (i.e. $78,089 minus $51,745), and $26,344 times 58 buses means a total excess operating cost of $1.53 million per year (2006). Then consider the bus-use categories (bus operation and bus maintenance). The excess cost per bus is $44,263 (i.e. $181,666 plus $59,712 minus $149,383 minus $47,732), and $44,263 times 58 buses means a total excess operating cost of $2.57 million per year. The sum of these two excess costs is $4.09 million.

In short, the excess costs of the AATA bus operation are slightly larger than the total fare revenues collected on all its transit services.

Why Are the AATA Bus Costs Higher?

Why are the AATA operating costs per bus so much higher than those of the 20 comparable cities bus systems? Three ideas suggest themselves: 1) the buses of the AATA are old and hence less efficient than the buses of the 20 comparable cities systems, 2) the AATA uses its labor inefficiently, and/or 3) the AATA incurs a high cost per work-hour. Fortunately, the NTD collects sufficient data that we can explore these ideas.

1. Obsolescence of Buses?

As Table 5 shows, the AATA buses are roughly comparable in age to the average age of the buses of the 20 comparable cities – the AATA has a slightly smaller percentage of young buses (i.e. aged 0-5 years) but a much smaller percent of old buses (i.e. aged 12 years and over). The average age of the AATA buses is about a half year less than the average age of the buses of the 20 comparable cities.

Table 5
Age of Buses of Comparable Cities Bus Systems, 2006
Source: Appendix Table 5

	Percent (%) of Buses by Age Group			Average Age of Buses (in Years)
	5 Years or Less	6 – 11 Years	12 Years or More	
Average of the 10 Larger	48	43	9	6.6
Average of the 10 Smaller	51	25	24	7.4
Average of All 20 Other	50	34	16	7.0
Ann Arbor (AATA)	42	58	0	6.4

Vehicle obsolescence cannot explain the high overall AATA costs.

2. Inefficient Use of Labor?

As Table 6 below shows, the employee work-hours per bus in the AATA are almost the same as the average of the 20 comparable cities. The total employee work-hours per AATA bus were 6,003 in year 2006, 3% less than the average of the 20 comparable cities. And the same small differences arise also when the work-hour

Table 6
Employee Work-Hours per Bus in Comparable Cities Bus Systems, 2006
Source: Appendix Table 6

	Total Employee Work-Hours per Bus			
	in Total	for Bus Operation	for Bus Maintenance	for Non-Bus Maintenance + General Administration
Average of the 10 Larger	6,538	4,648	1,115	775
Average of the 10 Smaller	5,841	4,048	962	832
Average of All 20 Other	6,190	4,348	1,039	804
Ann Arbor (AATA)	6,003	4,186	1,048	769
Ratio: AATA/20Other	0.97	0.96	1.01	0.96

allocations are broken down by function. If we can assume that the labor is allocated efficiently in the 20 comparable cities transit systems, then the AATA labor is also efficiently allocated. Wasteful use of labor cannot explain the high AATA total costs per bus.

3. High Costs per Work-Hour?

If total costs per bus are excessive, but work-hours per bus are not excessive, then we can logically conclude that total costs per work-hour must be high. Table 7 demonstrates this empirically, showing cost per work-hour, for the total operation and for three functional areas. The total cost per total work-hours is indeed well above – 31% above – the average of the 20 comparable cities.

Table 7
Cost per Work-Hour in Comparable Cities Bus Systems, 2006
Source: Appendix Table 7

	Cost ($) per Work-Hour			
	in Total	for Bus Operation	for Bus Maintenance	for Non-Bus Maintenance + General Administration
Average of the 10 Larger	37.62	32.08	45.59	69.08
Average of the 10 Smaller	43.54	37.53	48.29	74.74
Average of All 20 Other	40.58	34.80	46.94	71.91
Ann Arbor (AATA)	53.22	43.40	56.96	101.56
Ratio: AATA/20Other	1.31	1.25	1.21	1.41

But notice in Table 7 that the ratio of AATA costs per work-hour to the average of the 20 comparable cities is not the same for each of the three functional categories. For bus operation and bus maintenance – largely blue-collar functions – the AATA cost per work-hour is "only"

21% to 25% higher than the 20 comparable cities average. For the largely white-collar functions, non-bus maintenance and general administration, the AATA costs per work-hour are 41% higher than the 20 comparable cities average. In short, for the AATA, materials costs and/or labor costs must be very high in the blue-collar jobs (i.e. bus operation and maintenance), and they must be even higher in the white-collar jobs (i.e. non-bus maintenance and general administration).[7]

These are not minor differences. To illustrate, if the AATA costs per work-hour in non-bus maintenance and general administration were reduced to the average of the 20 comparable cities, the AATA would reduce its costs by $1.3 million (2006).[8] Saving $1.3 million would permit, for example, a reduction of fare revenue by one-third. If the AATA costs per work-hour were reduced for all of the functional areas to the average of the 20 comparable cities, the AATA would reduce its costs by $4.4 million.[9] In short, the AATA could do without any fare revenue at all if its excess costs per work-hour could be avoided.

A Different View of These Excess Costs

Table 8
Operating Cost per Bus in Comparable Cities Bus Systems, 2006
Source: Appendix Table 8

	Operating Cost ($000) per Bus in				
	Total	Bus Operator Wages	All Other Labor Payments	Materials Cost	All Other Costs
Average of the 10 Larger	241.9	65.8	112.8	46.0	17.3
Average of the 10 Smaller	255,8	68.3	135.8	36.1	15.6
Average of All 20 Other	248.9	67.0	124.4	41.1	16.4
Ann Arbor (AATA)	319.5	77.0	170.3	53.0	19.2
Ratio: AATA/20Other	1.28	1.15	1.37	1.29	1.17

High costs per work-hour can be caused by either (or both) of two things: 1) paying excessively high wages per work-hour, and/or 2) paying excessive amounts for the materials with which the employees work. The NTD provides the data to separate these two causes of high costs per work-hour. The NTD breaks down operating cost payments into wages (including salaries, fringes, and services), materials, and other (including utilities and insurance). These broad categories of operating cost are shown in Table 8. The AATA spends more per bus than the average of the 20 comparable cities in every category – overall, the AATA spends 28% more per bus (on operating costs).

Not only does the AATA spend more, in every category, on the operating costs per bus, but the different excess percentages vary considerably. Least favored in the excess are the bus operators, receiving only 15% more than the 20 comparable cities average. All other labor payments are the most favored, receiving 37% more. Table 7 told us that it was not the mechanics, who were treated very similarly to the operators. This again leaves the category

[7] Cost per work-hour could be high for either of two reasons: 1) the AATA buys too much material or pays too high a price for its material, or 2) the AATA pays too high a wage (we have already eliminated the possibility that the AATA employs too many workers). We shall shortly examine which of the two areas is to blame for the high AATA costs per work-hour.

[8] $1.3 million equals (101.56 – 71.91)(58)(769).

[9] $4.4 million equals (53.22 – 40.58)(58)(6003).

"non-bus maintenance and general administration" as the likely suspects. Curiously, materials and all other costs are 29% and 17%, respectively, above the 20 comparable cities average – we will next look more closely at these excess payments.

Why Does the AATA Pay Such High Prices?

If an organization has lots of money to spend, and is lightly supervised, one can understand that some of it may be diverted to staff and management wages, salaries, and perks. But we would not expect money to be given to strangers – namely, in the AATA case, to outside suppliers of fuel, tires, electricity, insurance, etc. Let's explore this hypothesis.

Table 9
Materials and Service Usage in Comparable Cities Bus Systems, 2006
Source: Appendix Table 9

	Cost per Bus-Mile ($) for			
	Fuel + Lube	Tires + Other Materials	Utilities	Insurance, Liabilities
Average of the 10 Larger	0.56	0.40	0.07	0.15
Average of the 10 Smaller	0.48	0.32	0.07	0.18
Average of All 20 Other	0.52	0.36	0.07	0.16
Ann Arbor (AATA)	0.69	0.52	0.15	0.18
Ratio: AATA/20Other	1.34	1.43	2.10	1.15

The NTD collects data for four breakdowns of material and services purchases: 1) fuel and lubrication; 2) tires and other materials; 3) utilities; and 4) insurance and damages compensation. These expenses are shown in Table 9, as a ratio to total bus-miles – on the grounds that a major determinant of such expenditures is the distance the buses travel. For each category of outside purchase, the AATA spends more -- sometimes much more – than the 20 comparable cities average. One wonders how the AATA could spend 34% more on fuel per bus-mile than the 20 comparable cities average – especially when it prides itself on its new bio-diesel hybrid buses. Or how it could spend even more lavishly (43% more) on tires and other materials. Or more than twice as much on utilities.

If the AATA had managed to achieve the cost per bus-mile of the average of the 20 comparable cities, it would have avoided $448,000 in fuel costs, avoided $397,000 in the costs of tires and other materials, avoided $198,000 in utilities costs, and avoided $51,000 in insurance and liabilities costs – a total saving of $1.1 million in 2006. The AATA's failure to use these monies more productively – or at least to divert them to the AATA's own family pockets – can only be attributed to inefficient purchasing procedures.

In short, the excess expenditures of the AATA are attributable 1) to generous wage – and even more generous salary, fringe, bonus, travel, etc. – allocations, and 2) to inefficient purchasing procedures.

The Data on Demand-Response Services

For most of these comparisons, we have been comparing the fixed-route buses of the AATA with the fixed-route buses of the 20 comparable cities. We can do this with confidence because fixed-route bus systems are quite similar from one city to another. When we turn to Demand-Response (DR) vehicle systems, we can no longer be sure that we are comparing similar systems – there are many kinds of DR services, and different cities choose different

combinations of them. Keeping in mind this possible incomparability of the composition or quality of DR services across cities, let us blast ahead and see what the NTD data show.

The Costs of Demand-Response Vehicles

Table 10A
Costs of the AATA and Comparable Cities Demand-Response Vehicles, 2006
Source: Appendix Table 10

		Operating Costs ($) of Demand-Response Vehicles				
	Number	per Vehicle	per Vehicle-Mile	per Vehicle-Hour	per Rider	per Rider-Mile
Average of the 10 Larger	22.3	94,589	2.59	39.71	17.98	2.35
Average of the 10 Smaller	21.6	118,435	3.44	49.39	23.75	3.21
Average of All 20 Other	22.0	106,502	3.01	44.55	20.86	2.78
Ann Arbor (AATA)	38	95,201	2.48	30.42	19.20	5.56
Ratio: AATA/20Other	1.73	0.89	0.82	0.68	0.92	2.00

Look first at the operating costs of the AATA's DR vehicles, relative to the costs of these vehicles in the 20 comparable cities – in Table 10A. The AATA shows lower operating costs per vehicle, per vehicle-mile, per vehicle-hour, and per rider than the average of the same operating cost statistic for the 20 comparable cities. – about 20-30% lower in each category. That the AATA cost per rider-mile is twice that of the comparable cities seems curious, but, for some reason, the average DR rider in the AATA area goes less than half as many miles as the average user in the other cities. All in all, the AATA seems not to be a high-cost DR provider, relative to these costs in the 20 comparable cities.

Before leaving Table 10A, we should also note again that the AATA maintains almost twice as many DR vehicles as does the average comparable city. Even though the cost per rider is no higher than that of comparable cities, the cost per rider of DR vehicles is always higher than that of fixed-route buses. Look back to Table 2 to see the average operating cost per rider of all the AATA vehicles is $4.01 per rider while the cost per rider of the DR vehicles is $19.20 (Table 10A) – nearly five times as high.[10] So having more DR vehicles will always raise the cost per rider on the overall transit system.

Some of the AATA DR statistics are alarming – see Table 10B. The AATA picks up only 1.58 new riders per DR vehicle-hour, nearly one fewer new riders per vehicle-hour than for the comparable cities average – this despite the fact that the AATA riders travel fewer miles on average. And the average number of riders in an AATA DR vehicle at any time is only 0.45, barely one third the average for the comparable cities. The fare per rider-mile on the AATA DR vehicles is only $0.30, which seems awfully low until one notices that the average of the comparable cities is also about that low.

Table 10B
Riders and Revenues of the AATA and Comparable Cities DR Vehicles, 2006
Source: Appendix Table 10

	Average			
	New Riders Per Vehicle-Hour	Number of Riders in Vehicle	Rider-Miles per Rider-Trip	Fare ($) per Vehicle-Mile
Average of the 10 Larger	2.95	1.32	7.74	0.32
Average of the 10 Smaller	2.13	1.12	7.68	0.35

[10] The operating cost of the fixed-route buses is only $3.47 per bus-rider.

Average of All 20 Other	2.54	1.22	7.71	0.34
Ann Arbor (AATA)	1.58	0.45	3.45	0.30 .
Ratio: AATA/20Other	0.62	0.37	0.45	0.88

Let's explore the implications of the AATA numbers in Table 10B. The 1.58 is consistent with the following scenario. The average AATA DR vehicle picks up a single passenger every 38 minutes (and hence 1.58 riders every hour). The 0.45 and the 3.45 are consistent with the following: this single passenger then goes 3.45 miles in 17 minutes (17 is 0.45 of 38) and disembarks; the driver then waits for another summons and drives without a rider for 21 (i.e. 38-17) minutes before picking up the next rider. Our initial rider went 3.45 miles, at a speed of 12 MPH (i.e. 3.45 times 60 divided by 17), and paid $1.04 (i.e. 3.45 times $0.30) for the trip.

The driver has collected $1.04 for 38 minutes work – a wage rate of $1.64 per hour. But there is fuel to consider. If the DR driver has to drive just as far to pick up a rider as to deliver a rider, then over the course of the 38 minutes, the vehicle will cover 6.90 (i.e. 2 times 3.45) miles, which means (at 20 MPG and $2.50 gasoline) a fuel cost of $0.86 per rider.

How Much Is the Subsidy To DR Vehicles?

Just a quick glance at Table 10C tells us that heavy subsidization is needed to put customers into the DR vehicles. On average for the AATA, only about 1½ customers get into a DR vehicle each hour; at any moment, there is only ½ a customer in the vehicle; and each customer travels only 3½ miles. As a result, while the DR vehicle costs $2.48 per vehicle-mile to operate (Table 10A) the fare revenue for that mile is only $0.30. The subsidy (i.e. the AATA loss) per vehicle-mile is $2.18. The AATA generated 1,460,800 DR vehicle-miles (in 2006), so the total subsidy to DR vehicles was $3.18 million per year.[11] How much is this as subsidy per DR rider? Since there were (again in 2006) 188,400 DR riders, the subsidy was $16.90 per rider-trip.

How does this compare with an ordinary rider using a Yellow Cab? The meter in that cab clicks to $3 when the rider gets in, and adds on $2.25 for each mile of the trip. If the average AATA rider were to use the Yellow Cab in this traditional fashion, and take a trip like the average DR trip (i.e. 3.45 miles), then the total cost of the trip would be $10.76. If the person qualifies for DR service, this same trip would typically cost $2.50, a personal saving of $8.26 per trip.[12]

Assuming the Ann Arbor taxi industry is competitive, the cab companies would require that the $8.26 be reimbursed by the AATA.[13] But the excess of the AATA cost per trip over the fare revenue collected per trip, as we have seen, is on average $16.90 – about double the $8.26 amount that the AATA needs to spend to compensate the taxis for their foregone revenue. Good question -- where does the rest go? – to which the entire answer cannot be the cost of

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[11] The data for demand-response vehicle-miles is from NTD, Table 19, as is the data for demand-response ridership in the next sentence.

[12] It is not quite the same trip. The AATA timing is less certain, and the vehicle may stop or detour in order to pick up or deliver other passengers.

[13] By "competitive" I mean that the fare-plus-subsidy just covers the marginal cost of operating the trip. By "marginal" I mean that depreciation and interest costs would occur anyway, whether the driver undertook an extra trip or not, and hence they are not included in the marginal cost of an extra trip.

administering the DR system. If the excess of $16.90 over $8.26 could all be saved with a more efficient operation (and there were still 188,400 rider-trips per year), then the AATA could reduce costs by $1.63 million per year.

Even if the AATA removed the excessive payments to privately contracted DR services – i.e. paid only the minimum necessary $8.26 for the average DR trip – this payment would still be much greater than what the average DR rider pays. The AATA subsidy to the average DR rider would still be something on the order of $5.76 per ride.[14] The AATA subsidy to the average DR rider is some 70% of the operating cost of the ride. And if the operating cost of DR vehicles really is $19.20 (see Table 10A), then a $2.50 payment by the rider represents only 13% of the average operating cost.

Does PT or DO Matter for DR Services?

Instead of dividing the comparable cities into larger and smaller than the AATA, let us divide them according to whether their DR vehicles are directly operated (DO) by the transit system or contracted out to private parties (PT). Table 10C does this.

Table 10C
Relative Costs of DO and PT Demand-Response Vehicles, 2006
Source: Appendix Table 10

	Number of Vehicle	Operating Costs ($) of DR Vehicles per Mile	per Vehicle-Hour	per Vehicle-Rider	per Rider-Mile	Vehicles
Average of 9 All DO	17.1	109,974	3.00	46.11	21.61	2.57
Average of 4 Both DO+PT	22.8	71,233	3.12	42.79	22.32	3.45
Average of 7 All PT	27.7	122,221	2.96	43.55	19.07	2.67
Ann Arbor (AATA, All PT)	38	95,201	2.48	30.42	19.20	5.56

Although these are small samples, and differences in many important determinants of cost are ignored, there appear to be no clear differences between the costs of DO and PT DR vehicles. And more importantly, there is no indication that the AATA PT vehicles are more costly than the DR vehicles of the other comparable cities that use the PT method – the cost per rider is about the same (i.e. $19.20 versus $19.07).

Brief Conclusions

The NTD data and comparisons with comparably-sized cities transit systems show that the AATA is an expensive operation. It is high-cost for three reasons: 1) its wages and salaries are high, especially for management, 2) its materials costs are high, and 3) its subsidies to demand-response vehicle usage are high. If these high costs could be reduced, millions of dollars would be saved each year. These dollars could be returned to the city (which would require a millage vote) for application to higher-priority uses. But I personally would rather see Ann Arbor make a concerted effort to get more people out of cars – that cause congestion, pollution, accidents, and parking problems. This could be achieved by reducing the fares of the inside-city fixed-route bus services of all Ann Arborites to zero and accommodating the additional ridership on popular routes by reducing the frequency (perhaps to zero) of bus service to distant houses with half-acre plots and three-car garages. The purpose of the AATA should be to get the maximum number of people into buses, subject only to a total cost constraint.

[14] $5.76 equals $8.26 minus $2.50.

Peer Cities Appendix

The AATA staff, a few years back, identified 29 other cities whose population size and density made them closely comparable to Ann Arbor. The AATA study of these "peer cities" was hampered by their inability to get information from the transit agencies of many of these cities. It ended up with a list of ten peer cities. These are listed below, together with the reason why those not on my list of comparable cities were omitted:

ID	City	Reason If Omitted
4002	Knoxville TN	
4007	Raleigh NC	
5005	Madison WI	More than 99 transit vehicles
5022	Toledo OH	More than 99 transit vehicles
5033	Grand Rapids MI	More than 99 transit vehicles
5035	Kalamazoo MI	Too small
5036	Lansing MI	More than 99 transit vehicles
5052	South Bend IN	
7010	Des Moines IO	More than 99 transit vehicles
8005	Colorado Springs CO	None of the buses were directly operated

The staff felt that this group of cities showed the AATA more favorably, but much of the comparison was not about costs, while this report is almost entirely about costs. The AATA peer cities research dwelt much more on service characteristics like "availability" – operating buses to late hours and on weekends was considered good, even if they carried few or no riders – and like "service delivery" – exceeding the requirements of the Americans with Disabilities Act and making more seniors eligible for subsidized demand- response transport was considered good, even if the cost was very high.

To see whether my choice of cities greatly altered the results that I obtained, I reworked Appendix Table 4 using the ten peer cities. It is on the next page and is titled Peer Table 4. Look at the bottom two rows of that table (The bottom row is copied from Appendix Table 4.). In every category of bus cost, the AATA cost exceeds the peer cities average, and it exceeds the peer cities average by even more than the AATA cost exceeded the comparable cities average. The choice of cities for comparison does not qualitatively affect the result (for this table at least – the reader is free to try other tables). It is the choice of success criteria that affects the result – my research dwells on cost, the AATA approach does not.