Chapter 4 Comparison of Nashville MTA with Peers

In order to examine how Nashville MTA performs in a national context, a peer review was undertaken. This involved several steps:

1. Selection of peers based on MTA suggestions, TranSystems recommendations and use of a list of top transit cities from the National Transit Database (NTD)

2. Peer comparison in service performance

3. Peer comparison in funding

Following is a presentation of the findings.

Selection of Peers

The selection of peers included several different peer sets. These included transit agencies in the state of Tennessee, transit agencies serving state capital cities with their attendant workforces of state employees, transit agencies serving metropolitan areas in the southeast or south-central area of similar size, and transit agencies located throughout the United States serving cities of similar size and/or density.

One list used to generate peers was the 2006 NTD list of top 100 transit cities by passengers served per capita. In this list, Nashville's urbanized area (UZA) ranks 48th in population—so right in the middle of this list. In terms of density, Nashville/Davidson County ranks as 85 out of 100 and 74 out of 100 in terms of passengers served per capita, or just above the last quartile. Peers were selected from this list of "Top 100 Transit Cities" that had similar populations or service areas.

The difficulty with selecting peers is that each community or region is unique. As will be seen in the comparisons, Nashville is less dense than many communities of similar size or with similar transit systems. However, as long as care is used in interpreting peer results, such analyses can be helpful in providing insight into the challenges and successes of transit provision in the Nashville/Davidson area.

Table 4-1 provides some background information on the peers selected for comparison with MTA. The data come from the NTD in 2006. Note that population in Table 4-1 is defined as the population in the area served by the transit agency, and is usually not the same as the census definition of the UZA.

Table 4-1: Characteristics of Nashville and Selected Peer Agencies (from NTD 2006)

Agency Name	Location	Service Area Population	Vehicle Hours (Fixed Route)	Peak Vehicles	Passengers	Persons per Square Mile
Nashville Metropolitan Transit Authority	*Nashville*	*573,294*	*324,303*	*114*	*7,708,840*	*1,184*
Memphis Area Transit Authority (MATA)	Memphis	888,627	470,978	144	10,519,005	3,086
Chattanooga Area Regional Transportation Authority (CARTA)	Chattanooga	155,554	153,185	49	2,580,793	538
Knoxville Area Transit	Knoxville	180,130	233,750	67	3,388,099	1,749
Transit Authority of River City (Louisville)	Louisville	754,756	639,857	199	14,669,924	2,667
Greater Richmond Transit Company	Richmond	449,572	470,171	138	13,449,342	1,980
Charlotte Area Transit System*	Charlotte	681,310	859,835	263	20,407,190	1,531
Capital Metropolitan Transportation Authority (Austin)*	Austin	988,671	1,128,475	337	34,464,085	1,772
Hillsborough Area Regional Transit Authority (Tampa)	Tampa	578,252	608,430	165	11,914,287	2,277
Indianapolis and Marion County Public Transportation (IndyGo)	Indianapolis	791,926	464,068	122	9,694,417	2,123
Niagara Frontier Transportation Authority (Buffalo)	Buffalo	1,182,165	841,561	280	18,042,628	751
Southwest Ohio Regional Transit Authority (Cincinnati)	Cincinnati	845,303	911,536	325	25,294,117	3,226
Greater Dayton Regional Transit Authority*	Dayton	559,062	404,694	131	7,857,361	2,040
Connecticut Transit - Hartford Division	Hartford	851,535	530,671	189	12,974,403	1,282
Jacksonville Transportation Authority	Jacksonville	827,453	637,053	179	10,489,396	3,419
Central Oklahoma Transportation and Parking Authority (Oklahoma City)	Oklahoma City	650,221	195,993	59	2,841,449	2,665
Capital Area Transit (Raleigh)	Raleigh	347,729	176,855	48	3,937,310	2,782
Pioneer Valley Transit Authority (Springfield MA)	Springfield	551,543	329,514	129	9,552,233	1,826
Peer Average		663,753	532,743	166	14,947,626	1,734

* Bolded Systems have dedicated funding

In terms of population served, Nashville/Davidson County is smaller than the average of the peers in Table 4-1. In population ranking, it is 12th out of the 18 transit agencies in Table 4-1. In terms of population density, Nashville is 16th out of the 18 agencies shown. It's population density is 68 percent of the average for the peers.

Peer Performance Comparisons

Public transportation is a public service and is not a profit making organization. Thus, the performance of a transit agency is not based on profit measures but rather on measures of its level of service and cost to the community. There are three different categories of performance measures normally considered in the industry—service effectiveness, cost effectiveness and cost efficiency.[i] These measures are computed as ratios to allow comparisons between agencies of different sizes.

Following are the three performance measures and the methods for computation of the measures.

■ *Service effectiveness*: service effectiveness is a measure of the end result of the provision of transit—the rides provided to transit customers. A good measure of service effectiveness is:

   o *Passengers per vehicle hour* . This measure divides ridership over a fixed period of time by the total number of hours of service provided. This number includes all hours that bus drivers work, including time to pull buses in and out of the garage and layover time at the beginning and end of a route. Layover time is time allowed at the end of a route for buses to get back on schedule when they are running behind due to traffic, heavy ridership or other reasons. In comparing systems, a higher value of passengers per hour is preferable to a lower value, and indicates that service is being placed where it is well used. However, caution has to be exercised in comparing one route versus another since this value will drop when service is added, say, to correct overcrowding. Whenever there is a service change, time should be allowed for ridership to adjust before evaluating the service effectiveness. Passengers per vehicle mile is another common measure of service effectiveness.

■ *Cost effectiveness: Cost effectiveness is a measure of how much it costs a transit agency to provide rides to its customers. It can be measured by:*

   o *Cost per passenger* . This measure is the cost of the MTA service for a period of time divided by the number of rides provided for that same period of time. For example, the NTD data provide summaries of cost per passenger per year. Generally, the smaller the cost per passenger, the better. Cost per passenger can be computed for different types of transit service by allocating costs between different types of service. This analysis focuses on costs for the fixed route service.

   o *Net cost per passenger*. This measure is the cost of the MTA service for a period of time less the fare revenues divided by the passengers carried. This is the cost that must be paid by other funding sources, such as local, state and federal sources.

■ *Cost efficiency*: Cost efficiency is a measure of the cost of the resources provided by a transit agency (i.e. hours or miles of service). Cost efficiency is measured by:

   o *Cost per vehicle hour*. This is a simple measure of the cost to provide service divided by the hours of service provided measured over a period of time. The NTD provides yearly summaries of cost per hour. Cost per hour is a key measure of transit agency efficiency because most service costs are labor costs. Generally, the smaller the cost per vehicle hour, the better. Another common measure of cost efficiency is cost per mile.

There are other important measure which don't fit into the above categories including measures of cost recovery and per capita measures of service.

- Other measures
    - *Fare recovery ratio* (fare revenues/cost of service). This is the total sum of fares collected over a fixed period of time divided by the cost of the service provided over that same period of time. The higher the fare recovery ratio, the lower the net cost of service.
    - *Passenger trips per capita.* This is computed as the total ridership in a fixed period (usually a year) divided by the number of people living in the service area.
    - *Vehicle hours per capita.* This is computed as the total number of vehicle hours provided in a fixed period (usually a year) divided by the number of people living in the service area. This measure indicates the quantity of transit service provided to the service area.

Performance comparisons are helpful in providing clues to where a transit agency is doing well and where it might look to improve. A few states (North Carolina and New York, for example) use performance measures as part of a funding formula—so that better performing systems are rewarded. There are tradeoffs between some of these measures. For example, it is possible to be very cost efficient in the short-run by employing low paid workers, foregoing maintenance and so forth. But this is likely to reduce ridership and thus reduce passengers per capita over time. Also a transit agency should generally try to maximize ridership, but shouldn't provide service beyond what it can afford.

Table 4-2 shows how Nashville ranks among peer agencies on the selected performance measures for fixed route service as well as how its measure compares with the average. In Table 4-2, the ranking goes from 1 (best score) to 18 (worst score).

Table 4-2: Nashville Rank for Performance Measures (from 2006 NTD)

Performance Measure	MTA Rank out of 18 (1 is best)	Nashville MTA Value	Peer Average
Passengers per vehicle hour	6	*23.8*	*22.3*
Cost per passenger	10	$3.58	$3.38
Net cost per passenger	5	$2.48	$2.80
Cost per vehicle hour	16	$85.07	$73.78
Fare recovery ratio	4	28%	18%
Passenger trips per capita	13	13.4	17.1
Service hours per capita	15	0.5	0.7

A summary of all of the service performance measures for Nashville and the peer agencies is shown in Table 4-3.

**Table 4-3: Service Performance Measures for Nashville and Peer Agencies (from NTD 2006)**

Agency Name	Passengers per Vehicle Hour	Cost per Passenger	Cost per Vehicle Hour	Fare Recovery Ratio	Passengers per Capita	Service Hours per Capita
Nashville Metropolitan Transit Authority	*23.8*	*$3.58*	*$85.07*	*28.0%*	*13.4*	*0.5*
Memphis Area Transit Authority (MATA)	22.3	$3.58	$79.95	20.9%	11.8	0.5
Chattanooga Area Regional Transportation Authority (CARTA)	16.8	$4.17	$70.33	14.2%	16.6	0.8
Knoxville Area Transit	14.5	$3.82	$55.37	7.7%	18.8	1.2
Transit Authority of River City (Louisville)	22.9	$3.34	$76.68	13.3%	19.4	0.8
Greater Richmond Transit Company	28.6	$2.28	$65.32	28.4%	29.9	1.0
Charlotte Area Transit System*	23.7	$3.26	$77.33	17.0%	30.0	1.2
Capital Metropolitan Transportation Authority (Austin)*	30.5	$2.97	$90.83	4.8%	34.9	1.1
Hillsborough Area Regional Transit Authority (Tampa)	19.6	$3.91	$76.55	20.6%	20.6	1.0
Indianapolis and Marion County Public Transportation (IndyGo)	20.9	$3.47	$72.57	22.9%	12.2	0.5
Niagara Frontier Transportation Authority (Buffalo)	21.4	$4.18	$89.58	25.9%	15.3	0.6
Southwest Ohio Regional Transit Authority (Cincinnati)	27.7	$2.88	$79.93	33.0%	29.9	1.0
Greater Dayton Regional Transit Authority*	19.4	$4.13	$80.26	18.2%	14.1	0.7
Connecticut Transit - Hartford Division	24.4	$3.20	$78.23	28.5%	15.2	0.6
Jacksonville Transportation Authority	16.5	$5.14	$84.59	13.6%	12.7	0.7
Central Oklahoma Transportation and Parking Authority (Oklahoma City)	14.5	$5.25	$76.10	14.8%	4.4	0.3
Capital Area Transit (Raleigh)	22.3	$3.08	$68.59	16.0%	11.3	0.5
Pioneer Valley Transit Authority (Springfield MA)	29.0	$2.41	$69.94	20.9%	17.3	0.6
Peer Average	23.4	$3.38	$79.13	19.1%	18.8	0.7

* Bolded Systems have dedicated funding

A clearer picture of the peer comparisons can be seen with a graphical presentation. The following graphs show how Nashville MTA compares to the peer group in terms of population density as well as the six performance measures. In each of the graphs, Nashville's measure is shown in red, and the peer average is shown in yellow. A red horizontal line shows Nashville's measure for easy comparison with each of the peers. Transit systems with dedicated funding are indicated with an asterisk.

As can be seen in Figure 4-1, and as discussed previously, Nashville is among the least dense of the peer systems. Systems coming close to Nashville in density include Hartford (CT) and Charlotte (NC). Only Buffalo (NY) and Chattanooga (TN) are less dense within their service areas than Nashville. Density is important for transit because higher density of population means that more people can be within walking distance of transit service. Nashville MTA is thus more challenged than most of the peers due to the lack of density.

Figure 4-1: **Population Density Comparison (persons/square mile)**
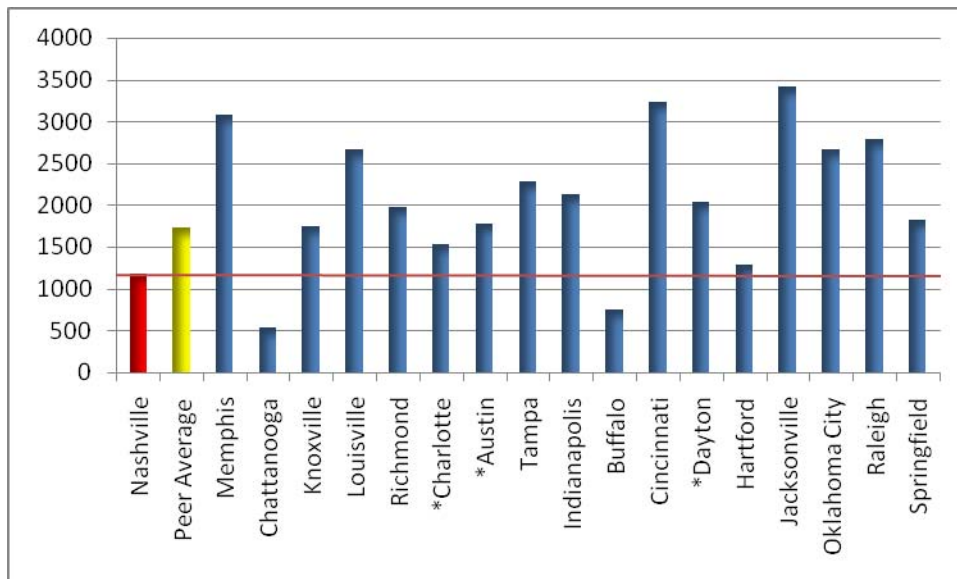
The Nashville MTA has been effective in putting service where there is demand for it as shown in Figure 4-2, which shows passengers per vehicle hour. This chart shows that Nashville has a higher level of service effectiveness than many systems that serve denser communities. For example, Nashville has a higher level of utilization than systems with much denser service areas such as Memphis (TN), Austin (TX), Tampa (FL), Indianapolis (IN), Cincinnati (OH) and Jacksonville (FL).

Figure 4-2: Passengers per Vehicle Hour
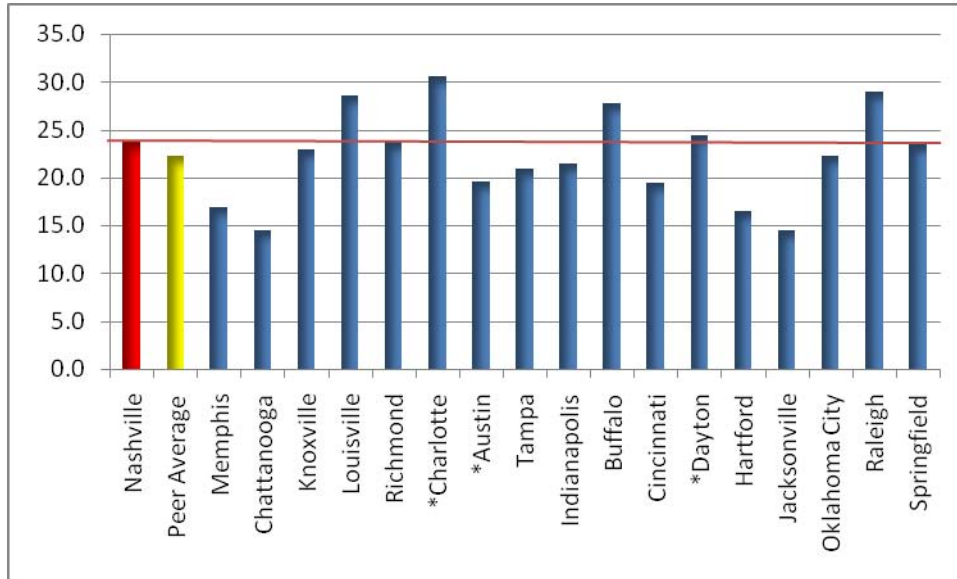
The MTA's cost per vehicle hour is among the highest of the peers (16 out of 18). This may be the cost of quality employees that help to bring about ridership growth and service effectiveness. Figure 4-3 shows the cost per vehicle hour comparison.

Figure 4-3: Cost per Vehicle Hour
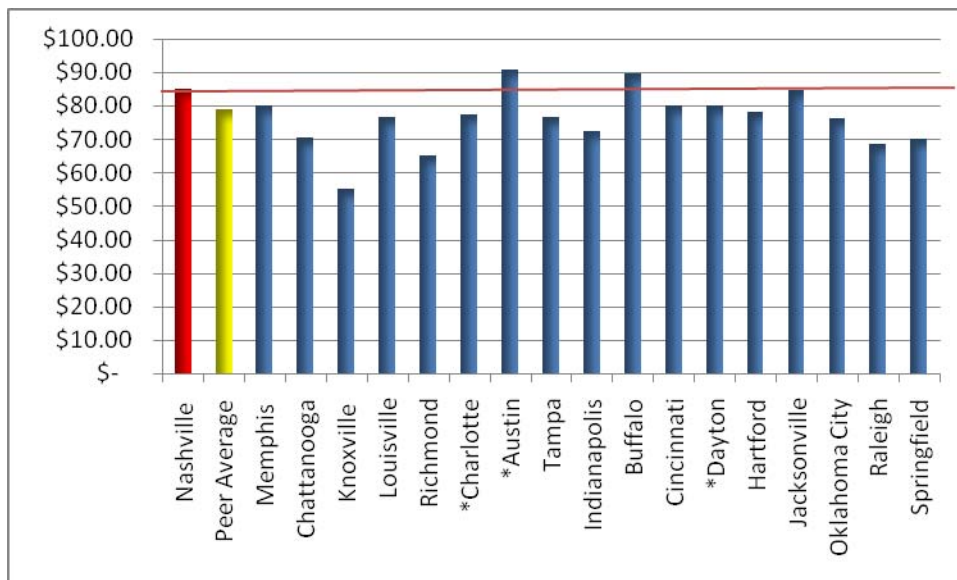
The combined result of better than average service effectiveness (measured by passengers per vehicle hour) and higher than average costs per vehicle hour is a slightly higher average cost per passenger. The MTA average cost

per passenger is around 6 percent above its peers. Referring back to Table 4-2, it comes close to the in the middle of the ranking (10 out of 18). Figure 4-4 shows this graphically.

**Figure 4-4: Cost per Passenger**
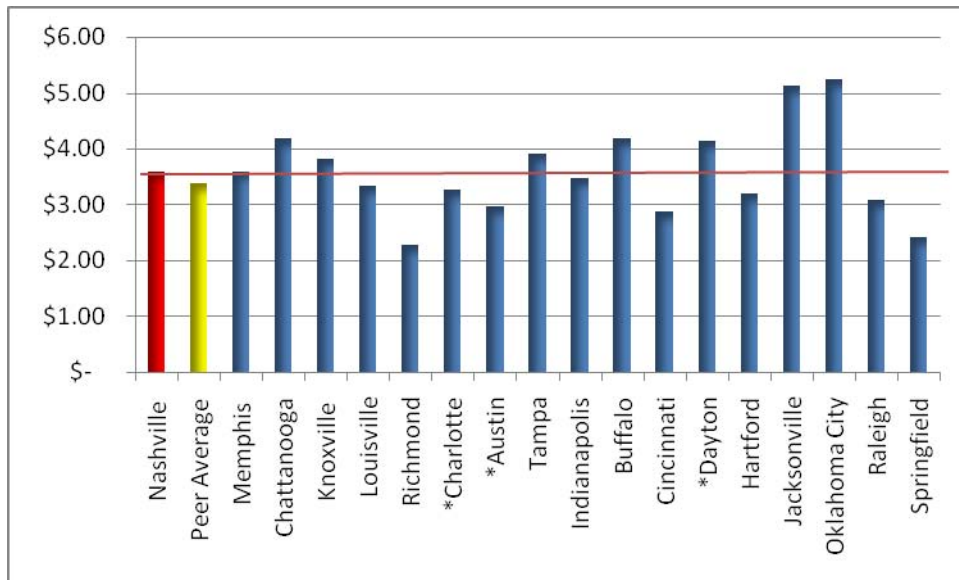
The MTA collects a higher percent of its cost of service in fares from passengers than its peers. On average it collected 28 percent of the cost of service in 2006 in fares versus 18 percent for its peers. Figure 4-5 shows this fare recovery ratio comparison.

Figure 4-5: Fare Recovery Ratio
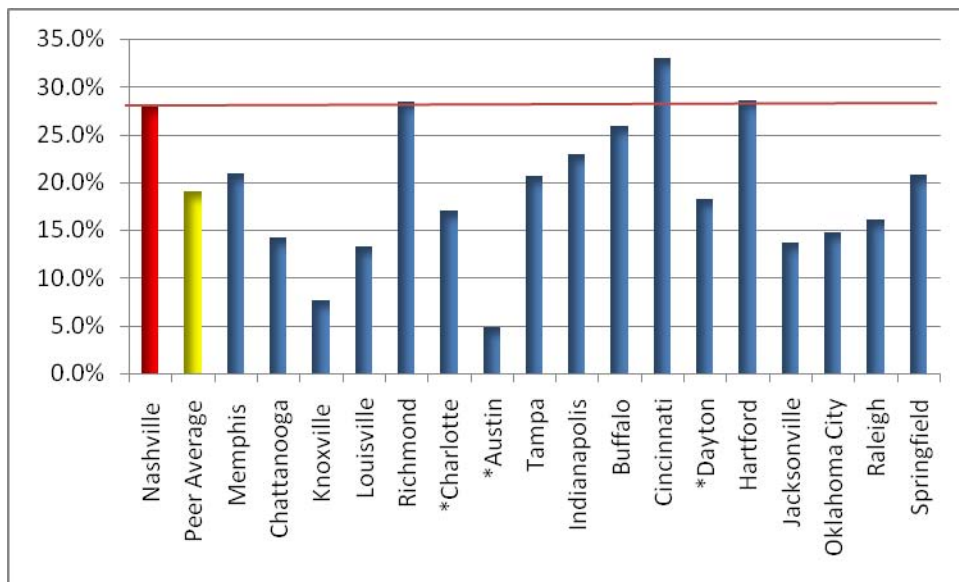
The result of the higher fare recovery ratio means that the MTA's net cost per passenger is lower than the majority of its peers (ranked 5 out of 18). This means that the proportion of the cost of service that has to be subsidized by taxpayers is less in Nashville/Davidson County than in peer areas. Figure 4-6 shows the net cost of service per passenger comparison.

Figure 4-6: Net Cost per Passenger
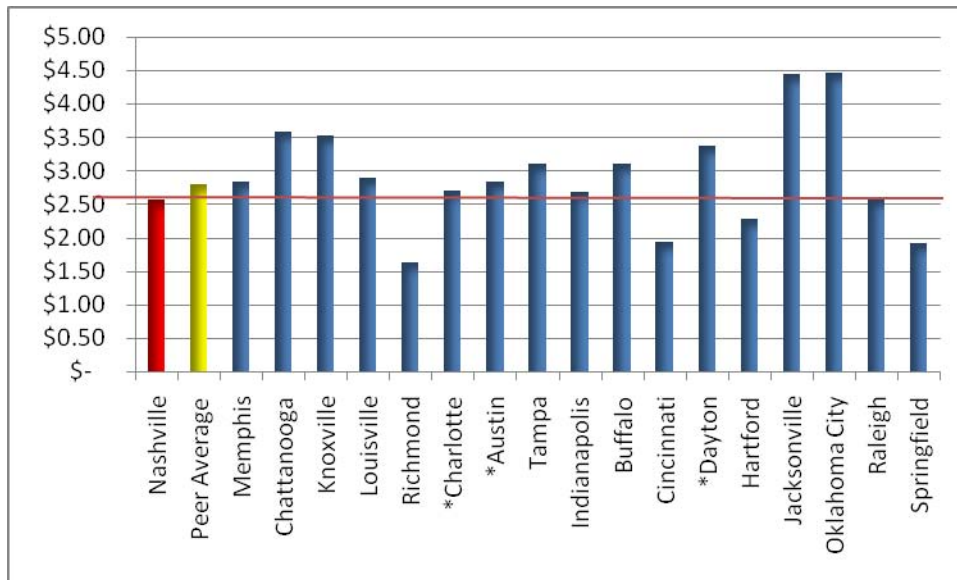
While the MTA does a good job with the service it does provide, its offerings are limited by budgetary considerations. Compared to peer areas, the MTA ranks only 15 out of 18 in terms of hours of service provided per person in the service area. Its peers on average provide 40 percent more hours of service per person than the MTA. Figure 4-7 shows this comparison.

Figure 4-7: Service Hours per Capita
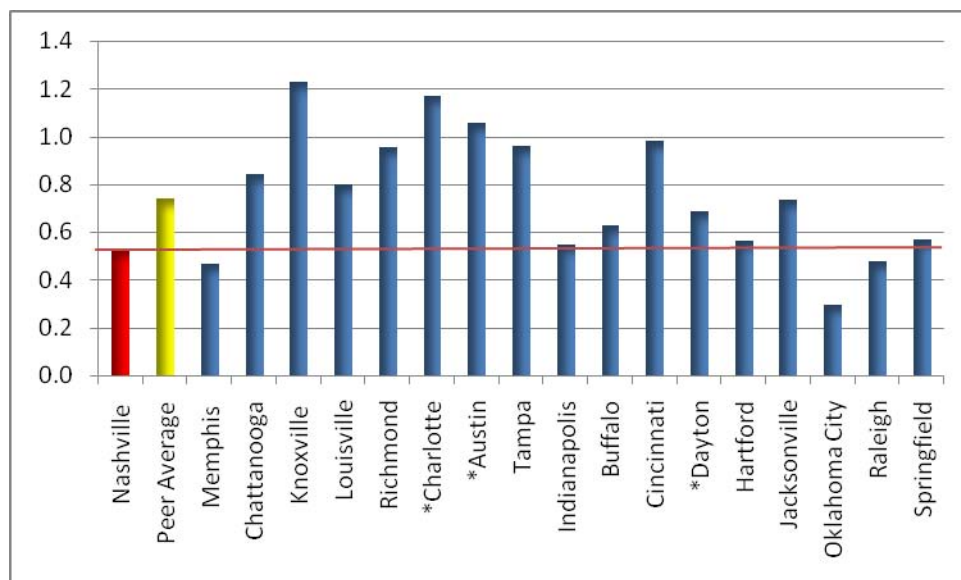
Because the MTA puts service where it is best utilized, it's ranking in passenger trips per capita is higher than its ranking in service hours per capita. It ranks 13 out of 18 in passenger trips per capita. It's peers provide around 28 percent more rides per person in the service area than does the MTA. Figure 4-8 shows this comparison.

Figure 4-8: Passenger Trips per Capita
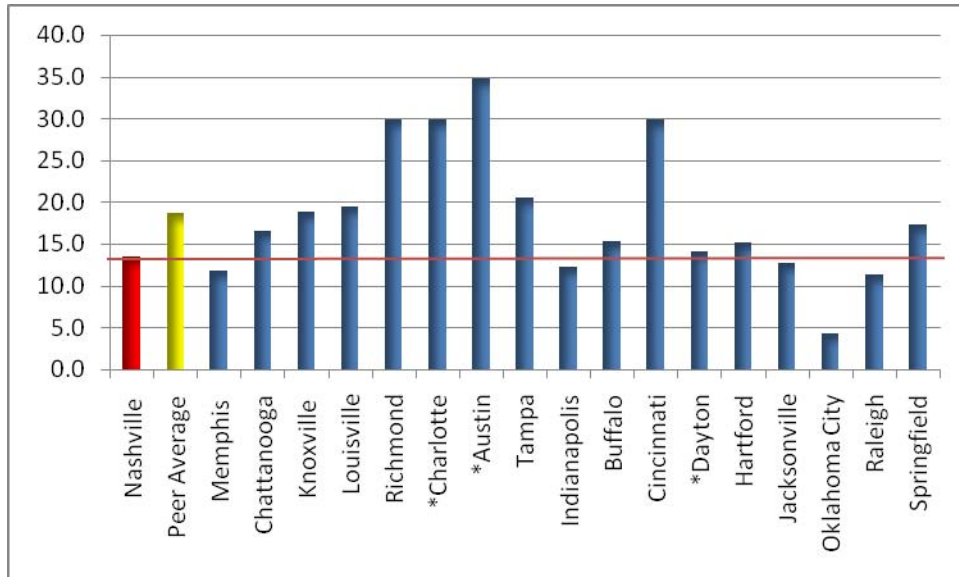
Peer Funding Comparisons

The NTD can also be used to compare funding of transit in different areas around the United States. The data provide detail on funding coming from various sources as well as the fare revenues. Table 4-4 shows the funding amounts by source for Nashville and its peer agencies. By normalizing the information by the number of people in the service area, the tax burden of local funding sources can be seen. At the same time, these graphs show the tax benefit coming to the area for public transportation from state and federal sources. Note that the funding information is for all services provided including both fixed route and paratransit services. Note that in Table 4-4 and Figure 4-9 Charlotte shows no federal funding for operations as it is using all of its federal funding for capital investment. Also note that the sum of fares, local, state and federal sources do not necessarily equal the total cost of operations. In addition to these sources there are other sources of funds, and there may be operating surpluses or deficits.

Table 4-4: Funding for Operations by Source for Nashville and Peer Agencies on a Per Capita Basis

Agency Name	Fares per Capita	Local Funding per Capita	State Funding per Capita	Federal Funding per Capita	Total Operating Cost Per Capita
Nashville Metropolitan Transit Authority	$14.75	$29.83	$7.18	$8.71	$62.56
Memphis Area Transit Authority (MATA)	$10.24	$20.67	$9.72	$10.50	$51.71
Chattanooga Area Regional Transportation Authority (CARTA)	$21.80	$22.58	$14.40	$16.65	$82.27
Knoxville Area Transit	$6.03	$33.50	$11.71	$18.09	$79.82
Transit Authority of River City (Louisville)	$9.53	$49.48	$1.27	$16.49	$78.70
Greater Richmond Transit Company	$18.19	$26.64	$16.83	$15.81	$79.94
Charlotte Area Transit System*	$18.52	$90.93	$18.41	$0.00	$145.07
Capital Metropolitan Transportation Authority (Austin)*	$5.60	$92.23	$0.00	$13.40	$130.64
Hillsborough Area Regional Transit Authority (Tampa)	$13.52	$52.16	$5.97	$11.91	$89.07
Indianapolis and Marion County Public Transportation (IndyGo)	$10.53	$18.44	$11.54	$13.01	$55.77
Niagara Frontier Transportation Authority (Buffalo)	$20.72	$30.19	$27.23	$9.55	$88.46
Southwest Ohio Regional Transit Authority (Cincinnati)	$29.00	$48.15	$2.70	$13.07	$96.33
Greater Dayton Regional Transit Authority*	$15.19	$62.06	$1.15	$21.30	$103.50
Connecticut Transit - Hartford Division	$13.91	$0.00	$33.23	$0.66	$48.75
Jacksonville Transportation Authority	$25.52	$55.47	$5.90	$9.14	$98.79
Central Oklahoma Transportation and Parking Authority (Oklahoma City)	$3.76	$10.80	$0.95	$10.64	$26.28
Capital Area Transit (Raleigh)	$5.67	$17.59	$6.10	$6.79	$36.70
Pioneer Valley Transit Authority (Springfield MA)	$9.69	$10.71	$28.53	$8.34	$56.35
Peer Average	$14.50	$39.49	$11.60	$10.66	$80.63

* Bolded Systems have dedicated funding

Figure 4-9 provides a picture of the funding per capita by source for the Nashville MTA and the peers on average, as well as for each of the peers. Figure 4-9 makes clear the advantage of having a dedicated source of local funding. The top three agencies in terms of total funding per capita and local funding per capita have a dedicated local sales tax. Austin (TX) has a dedicated 1 cent sales tax; Charlotte (NC) has a ½ cent sales tax; and Dayton (OH) has a ½ cent sales tax. The MTA's peers have around a third more local funding per capita than the MTA.

Figure 4-9: Funding per Capita by Source
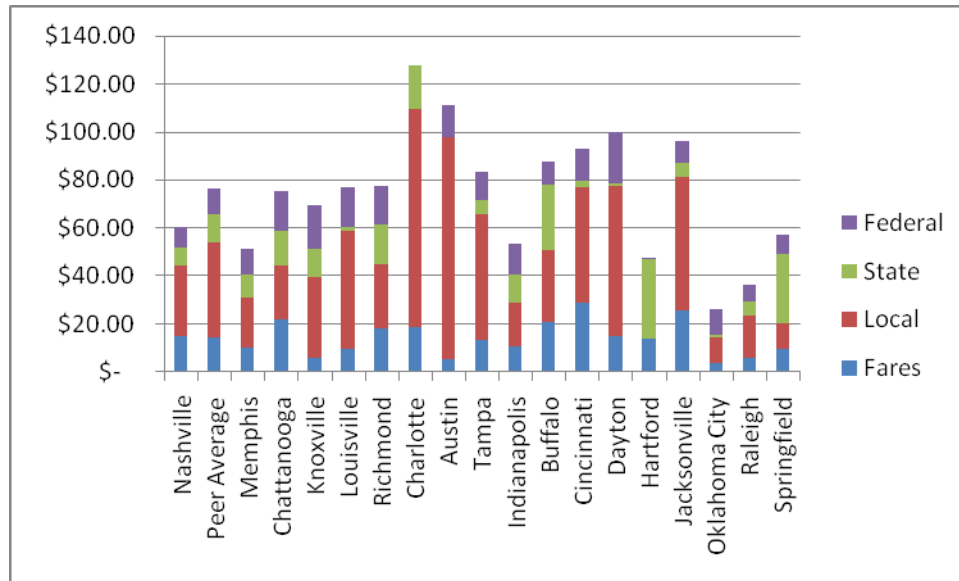
Summary of Findings

The peer analysis provides insight into the performance challenges and successes of MTA. Nashville MTA is challenged due to the lower density of population in our service area compared to many of ithe 17 peer agencies and compared to many of the top 100 transit agencies in the United States. MTA is also challenged due to the lower level of funding per capita compared to many of our peers. This lower funding level means that MTA provides less service (as measured by service hours per capita) than peer agencies taken together.

On the other hand, MTA has done a good job of putting service where it can be best used. The result is that MTA provides a higher level of service effectiveness than the peer average as measured by passengers per vehicle hour. Passengers have also been paying a higher percentage of the cost of service in Nashville/Davidson County than those in peer regions. The cost per hour of MTA service is higher than the peers, but since MTA carries a higher number of passengers per hour and those passengers pay a higher fare on average, the subsidy cost per passenger is less than the average for the peers.

Overall, the peer comparison shows that Nashville MTA is effectively using available resources, but that there is much more room to grow service overall. Nashville is a growing metropolitan area and our transit system will need to grow significantly in order to provide a better level of service (and alternative to the automobile) for the citizens of Nashville/Davidson County and the larger region.

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[i] Based on a conceptual model developed by Fielding, G. J., R. Glauthier and C Lowe, "Performance Indicators for Transit Management," Transportation, 1978, Vol. 7. No 4, pp. 365-378.