



Chapter 7

Ridership, Fare Revenue and Cost Database

To help determine the feasibility of commuter rail service in the New Haven – Hartford – Springfield corridor, a comparative review will be made of service options in this corridor with commuter rail services around the United States. If service in this corridor does not demonstrate ridership, fare revenue and costs that are competitive with other services, it is unlikely that funding could be procured from FTA. This chapter is an inventory of how other commuter rail systems perform, and will serve as a baseline for evaluation of service in the study corridor.

7.1 Overview of Commuter Rail Systems

To compare ridership, service characteristics, and performance for a New Haven-Hartford-Springfield commuter service, information was collected from other agencies that operate commuter rail service. Data was collected from a range of agencies operating a range of commuter rail services from a large network such as Metro North or Long Island Railroad, to smaller systems such as Shore Line East in Connecticut. A summary of transit agencies surveyed, listed in alphabetical order, is shown in Table 7.1-1.

Caltrain

The Caltrain system serves the metropolitan areas of San Francisco and San Jose, CA. The Caltrain system, in its current form, has been operating the service since 1992; although service along this corridor has been in existence since 1863. The system comprises of one line running between the cities of San Francisco and Gilroy, CA with a total of 75 route-miles of service. There are 34 stations, some that serve nearby airports and sports arenas. In 2000, Caltrain experienced a ridership of over 9.8 million passengers.

Long Island Railroad

Long Island Railroad is one of the largest and busiest commuter rail systems in the United States. The 683 route mile system consists of nine rail lines serving Long Island, NY, a major suburban zone for greater New York. Commuter rail service has existed on Long Island since 1834. The network serves 124 stations throughout Long Island, and is operated by the Metropolitan Transportation Authority. The service operates seven days



**Table 7.1-1
Summary of Commuter Rail Systems Surveyed**

Commuter Rail System	Operating Agency	Metro Area Served	Total Annual Passengers (2000)
Caltrain	Caltrain	San Francisco/San Jose, CA	9,821,725
Long Island Railroad	Metropolitan Transportation Authority	New York/Long Island, NY	105,148,000
MARC Commuter Rail	Mass Transit Administration, MD Dept. of Transportation	Baltimore, MD/Washington, DC	5,317,006
MBTA Commuter Rail	Massachusetts Bay Transportation Authority	Boston, MA	36,416,816
Metra Commuter Rail	Northeast Illinois Commuter Railroad Corporation	Chicago, IL	72,342,624
Metrolink	Southern California Regional Rail Authority	Los Angeles, CA	6,978,588
Metro North	Metropolitan Transportation Authority	New York, NY	71,735,218
New Jersey Transit	New Jersey Transit Corporation	New Jersey	63,894,352
San Diego Coaster	North San Diego County Transit Development Board	San Diego, CA	1,206,839
SEPTA	Southeastern Pennsylvania Transportation Authority	Philadelphia, PA	29,774,426
Shore Line East	Connecticut Dept. of Transportation	New Haven, CT	285,427
Sounder Commuter Rail	Central Puget Sound Regional Transit Authority	Seattle, WA	100,360
Trinity Rail Express	Dallas Area Rapid Transit Authority	Dallas/Ft. Worth, TX	667,577
Tri-Rail	Tri-County Commuter Rail Authority	South Florida	2,232,497
Virginia Rail Express	Virginia Rail Express	Washington, DC/Northern VA	2,014,339

Source: National Transit Database

a week, including holidays. The total annual ridership in 2000 was in excess of 105 million passengers.

MARC

The MARC system is comprised of three lines with a total of 373 route-miles serving suburban Baltimore, MD, and the northern suburbs of Washington, DC. The service is operated by the Maryland DOT's Mass Transit Administration. It has existed in its current form since 1983, but service on each of the lines has existed since the mid-1800s. There are 40 train stations in the network, which includes the heavily traveled Northeast Corridor Amtrak line. Service is available to a dedicated station at Baltimore/Washington International Airport. The MARC system operates all day, Monday to Friday. The 2000 total annual ridership on MARC was 5.3 million passengers.



MBTA

The MBTA Commuter Rail system serves Boston, MA and its suburbs. There are 12 rail lines serving 119 stations. The system in its current form has been in existence since the early 1970s, although rail had played a part of the development of this region many years before this. The network radiates from Boston, serving suburbs in all directions, with 400 route-miles of service. The service is operated by the Massachusetts Bay Transportation Authority, and runs seven days a week. In 2000, the MBTA commuter rail system had an annual ridership of almost 36.5 million passengers.

Metra

Metra is commuter rail service which operates in metropolitan Chicago, IL. There are 12 lines, and 230 stations in the network covering an area of 495 route-miles. It is one of the more established networks surveyed. The service runs seven days a week on most lines, and is operated by the Northeast Illinois Commuter Railroad Corporation. Year 2000 annual ridership on Metra was 72.3 million passengers.

Metrolink

Opened in 1991, Metrolink is operated by the Southern California Regional Rail Authority and serves the Los Angeles, CA metropolitan area. The system is smaller than those in cities of comparable size. It consists of seven rail lines and 51 stations in service. The network encompasses a total of 507 route-miles. The service runs Monday through Friday on all lines, with selected weekend service. Almost 7 million people used Metrolink in 2000.

Metro North

The Metro North system, part of the Metropolitan Transportation Authority, serves the suburbs to the north of New York City, including southwestern areas of Connecticut. Metro North, in its current form, has been in existence since 1983; however rail service has been a part of this region since the mid 1800s. It is the second largest commuter rail system in the United States, with 5 major lines consisting of over 500 route-miles of service. There are a total of 199 stations served by Metro North in New York, New Jersey, and Connecticut. The service runs seven days a week. Year 2000 annual ridership was almost 72 million passengers.

New Jersey Transit

New Jersey Transit operates seven days a week on 12 lines. The system serves the New Jersey suburbs of New York City, with an additional line from Philadelphia to Atlantic City, NJ. New Jersey Transit has operated commuter rail service since 1983; however, rail service has been a major part of this region's infrastructure for many more years. There are over 1,100 route-miles of service throughout the system. New Jersey Transit



has a station with direct access to the terminals at Newark International Airport. In 2000, the system experienced a total annual ridership of 68.9 million passengers.

San Diego Coaster

The San Diego Coaster is a one-line service that provides service from downtown San Diego, CA to its northern suburbs. Commuter rail service began here in 1995. There are eight stations on the 45 route mile Coaster network. The system is operated by the North San Diego County Transit Development Board, and service operates from Monday to Saturday. The Coaster had a total of over 1.2 million passengers in 2000.

SEPTA

The SEPTA commuter rail system is operated by the Southeastern Pennsylvania Transportation Authority. It serves greater Philadelphia, PA, and operates seven days a week. The SEPTA system is one of the more established commuter rail services in the nation. Rail service has been a part of the Philadelphia area's development since the 1800's. Among the 13 lines and 400 route-miles of service, there are dedicated stops serving the terminals at Philadelphia International Airport. Year 2000 ridership on SEPTA commuter rail was on the order of 29.8 million passengers.

Shore Line East

The Shore Line East service, operated by Amtrak for the Connecticut Department of Transportation, is a one-line system which serves the New Haven area and the Connecticut shoreline. The service began operation in the early 1990s, and runs along the heavily traveled Amtrak Northeast Corridor. Shore Line East operates Monday through Friday with stops at 11 stations from New London to Stamford. 2000 total annual ridership was in excess of 285,000 passengers.

Sounder

The Sounder commuter rail service is operated by the Central Puget Sound Regional Transit Authority, and serves the Seattle, WA area. Opened in September 2000, it is one of the newest commuter rail systems. Currently, it is a one-line service with 7 stations, but future expansion is underway. The service runs Monday to Friday. In its first year of service, over 100,000 people used the Sounder. Because the Sounder is still in its infancy, its data and measures of efficiency were not considered as comparative tools for this study.

Trinity Rail Express

Trinity Rail Express is a one-line commuter rail service operated by the Dallas Area Rapid Transit Authority, and serves Dallas and Fort Worth, TX. This system began operation in 1996. It has 29 route-miles of service and stops at nine stations. The service



operates from Monday to Saturday. In 2000, annual ridership was in excess of 650,000 passengers.

Tri-Rail

Created in 1989, Tri-Rail is operated by the Tri-County Commuter Rail Authority, and serves South Florida, including the cities of Miami and Fort Lauderdale. It is a one-line system with 140 route-miles of service and 18 stations. The commuter rail service runs seven days a week. Ridership was approximately 2.2 million passengers in the year 2000.

Virginia Rail Express

Virginia Rail Express began commuter rail operation in 1992. It consists of two lines with service to 18 stations. The system serves the Northern Virginia suburbs and Washington, DC. There are 177 route-miles of service, and trains operate Monday through Friday. Year 2000 ridership was just over 2 million passengers.

7.2 Overview of Commuter Rail Ridership

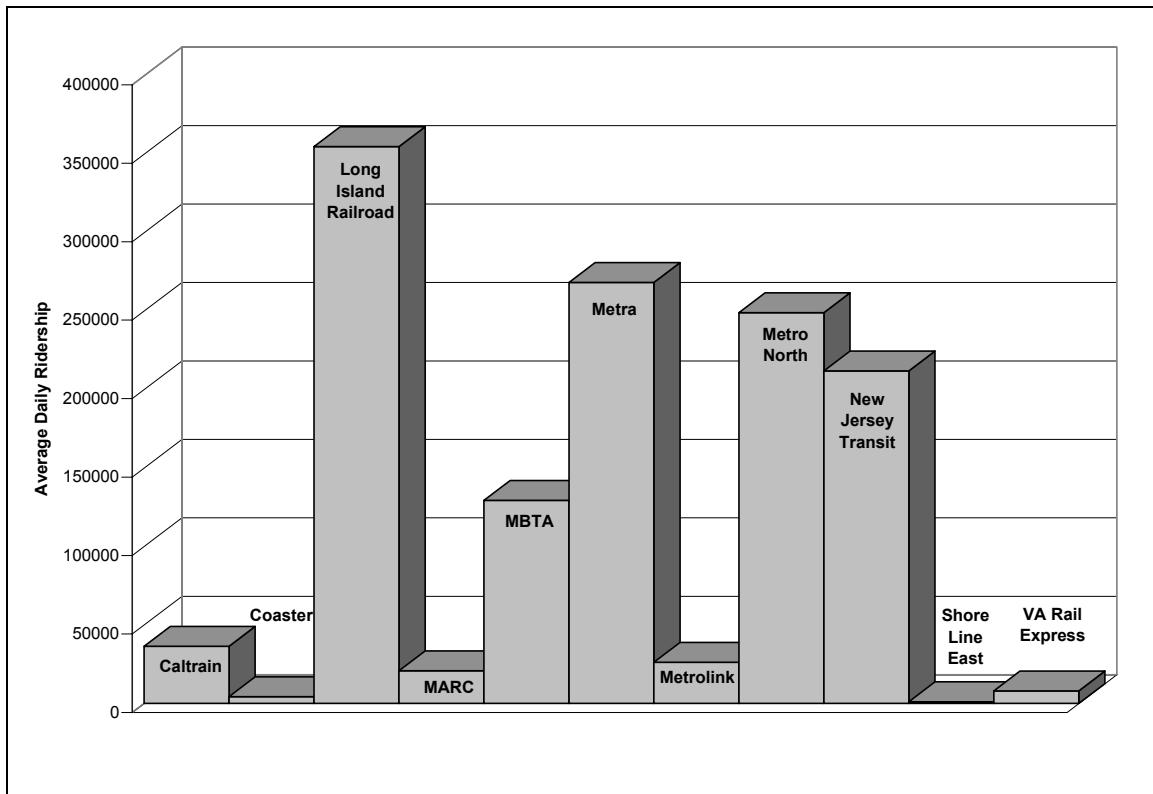
The commuter rail systems inventoried represent a wide range of services from a single rail line, to a network of several lines serving a major metropolitan area. A key statistic that highlights the size of a commuter rail network is ridership. Table 7.2-1 shows the average daily ridership among commuter rail systems, and this data is shown graphically for selected systems in Figure 7.2-1.

**Table 7.2-1
Summary of Daily Ridership on Commuter Rail Systems Surveyed**

Commuter Rail System	2000 Average Daily Ridership
Caltrain	39,290
Long Island Railroad	355,000
MARC	20,851
MBTA	129,474
Metra	268,381
Metrolink	26,300
Metro North	249,142
New Jersey Transit	212,037
San Diego Coaster	4,327
SEPTA	104,232
Shore Line East	1,115
Sounder	1,120
Trinity Rail Express	2,369
Tri-Rail	7,381
Virginia Rail Express	8,057

Source: National Transit Database

Figure 7.2-1
Average Year 2000 Daily Ridership for Selected Commuter Rail Systems



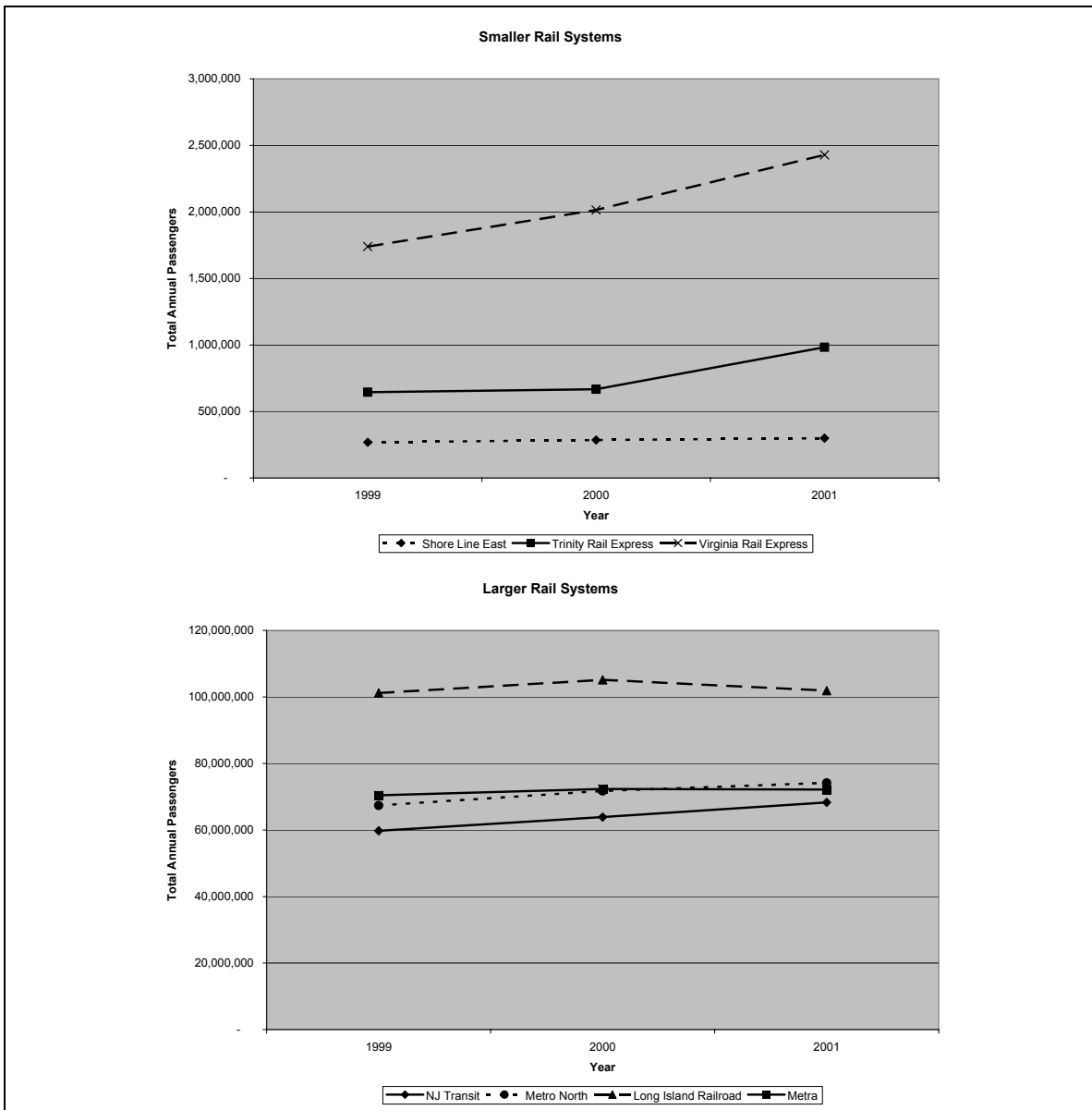
Source: National Transit Database

As shown in the above figure, the range of daily ridership in systems surveyed varies greatly, from just over 1,000, to over 350,000 passengers per day. The smallest system surveyed was Shore Line East in Connecticut, with a year 2000 average daily ridership of 1,115. The largest system surveyed was Long Island Railroad in New York, with a year 2000 average daily ridership of 355,000.

In addition to daily passenger data, annual ridership numbers were obtained. Figure 7.2-2 shows annual ridership trends for several commuter rail systems from 1999 to 2001. The reason that results are displayed separately for smaller and larger commuter rail systems is for clarity of scale in the chart, and to illustrate smaller trends.



**Figure 7.2-2
Annual Ridership per Year**



Source: National Transit Database

As shown above, all of the commuter rail systems had an overall increase in ridership from 1999 to 2001. Between 2000 and 2001, Metra and Long Island Railroad showed a slight decrease. Some systems such as Virginia Rail Express and Trinity Rail Express have shown a fairly substantial rise in ridership from 1999 to 2001. Other systems such as Shore Line East and New Jersey Transit have experienced a more modest increase over the same period.



7.3 Data Collection Methods

Aside from ridership, other significant statistics obtained from transit agencies include operating costs, fare revenue, revenue train miles, and passenger miles per year. As with the above ridership numbers, these statistics have a strong relationship with the size of the commuter rail system. Year 2000 operating costs on the Long Island Railroad, for example, were \$695,966,560, while Shore Line East operating costs were \$6,081,910.

Data was collected from 15 transit agencies that operate commuter rail service and was assembled, where available, for the years 1999, 2000, and 2001. Data was collected by way of the National Transit Database (NTD), a program sponsored by the Federal Transit Administration (FTA), and by contacting the specific transit agency where necessary. The NTD is a large compilation of data reported by agencies nationwide that operate various modes of transit including commuter rail. More specific information on types of data obtained for purposes of this study is discussed below.

The specific information collected from each agency includes the following:

- Total annual passengers – the total number of fare paying passengers boarding a service vehicle in a fiscal year
- Average daily ridership – the average daily number of fare paying passengers boarding commuter rail service vehicles in a fiscal year
- Passenger miles per year – the total distance each fare paying passenger travels on passenger carrying vehicles per fiscal year
- Total annual fare revenue – the total amount of revenue received by a transit agency for a given service each year from fare paying passengers
- Annual revenue train miles – the total number of miles per year each entire commuter train travels with fare paying passengers aboard
- Annual revenue vehicle miles – the total number of miles per year each passenger carrying vehicle in a commuter rail system travels with fare paying passengers aboard
- Annual operating costs – the total amount of money per year required to operate and maintain a transit service

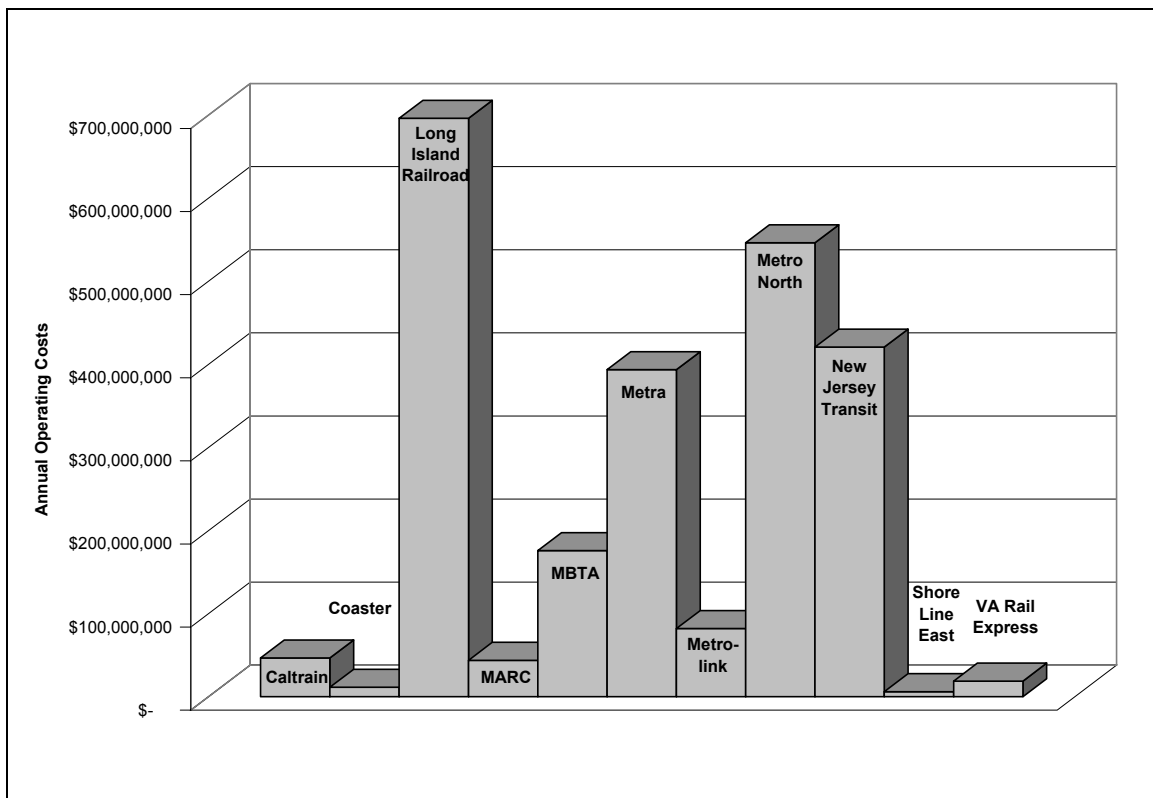
A greater explanation of operating costs associated with a commuter rail service is explained in the following section.

7.4 Explanation of Operating Costs

The operating costs associated with commuter rail service are far-reaching. Equipment operation and maintenance, as well as staffing of trains are just some of the expenses related to operating a commuter rail service. Operation and maintenance of passenger facilities such as stations, ticket offices, and parking areas also contribute to operating costs. Whether or not the operating agency is responsible for track maintenance, there

may be related costs associated with keeping the track in operation. Other infrastructure operation includes operation and maintenance of switches, signals, overhead wires, and third rail electrification where applicable. Finally, there are also the costs associated with administration, public relations, and general operation of a large agency. Operating costs for the commuter rail agencies surveyed range from as low as \$4 million during the Seattle Sounder's inaugural year of operation in 2000, to as high as Long Island Railroad's \$700 million in costs for the same year. A summary of operating costs on selected commuter rail systems is shown in Figure 7.3-1.

Figure 7.4-1
Year 2000 Annual Operating Costs for Selected Commuter Rail Systems



Source: National Transit Database

7.5 Performance Measures

The ridership, revenue, and cost data assembled from the various transit agencies can be evaluated in a manner such that the relationship between cost and revenue shows certain performance measures. These measures include; revenue per passenger mile, operating cost per passenger mile, operating cost per train mile, farebox recovery ratio, and productivity ratio. Revenue per passenger mile is determined by the ratio of total fare revenue per year to total passenger miles per year. An average figure for this performance measure is approximately 12 cents per mile. Operating costs per train mile



and per passenger mile are determined by similar ratios. Average costs are approximately \$45 per mile and 30 cents per mile respectively. The farebox recovery ratio is given by the ratio of total fare revenue to total operating costs. It is a measurement of how much of a passenger fare goes toward the costs associated with operating a transit system. This ratio is usually found to be between 20% and 40%. Finally, an overall productivity ratio measures annual passenger miles against annual vehicle miles. The result of this productivity ratio yields an average of the number of passengers per vehicle. A summary of performance measures for the commuter rail systems surveyed is found in Table 7.5-1.



Table 7.5-1
Year 2000 Annual Operating Costs for Selected Commuter Rail Systems

Rail System	Year	Revenue per Passenger Mile	Operating Cost per Train Mile	Operating Cost per Passenger Mile	Farebox Recovery Ratio	Productivity
Caltrain	1999	\$0.13	\$42.82	\$0.25	51%	24.89
	2000	\$0.13	\$44.95	\$0.23	58%	48.27
	2001	\$0.14	\$48.62	\$0.26	54%	45.41
Long Island Railroad	1999	\$0.16	\$92.70	\$0.32	51%	37.66
	2000	\$0.15	\$95.00	\$0.29	51%	41.95
	2001	\$0.17	\$103.95	\$0.36	47%	37.05
MARC	1999	\$0.11	\$48.51	\$0.29	39%	33.32
	2000	\$0.12	\$48.63	\$0.27	44%	35.29
	2001	\$0.12	\$54.67	\$0.28	42%	39.48
MBTA	1999	\$0.10	\$46.65	\$0.24	41%	32.62
	2000	\$0.10	\$47.86	\$0.25	40%	32.75
	2001	\$0.11	\$47.53	\$0.23	49%	35.72
Metra	1999	\$0.12	\$59.57	\$0.25	49%	43.79
	2000	\$0.12	\$62.67	\$0.25	48%	43.95
	2001	\$0.12	\$64.98	\$0.26	46%	42.70
Metrolink	1999	\$0.12	\$45.84	\$0.30	39%	37.75
	2000	\$0.12	\$47.19	\$0.32	39%	39.54
	2001	\$0.13	\$40.41	\$0.27	48%	40.53
Metro North	1999	\$0.17	\$79.75	\$0.30	57%	39.23
	2000	\$0.16	\$76.37	\$0.27	61%	41.57
	2001	\$0.16	\$79.28	\$0.26	59%	44.22
New Jersey Transit	1999	\$0.18	\$51.32	\$0.31	57%	27.75
	2000	\$0.18	\$52.48	\$0.31	57%	29.62
	2001	\$0.18	\$53.42	\$0.31	56%	29.94
San Diego Coaster	1999	\$0.08	\$72.37	\$0.44	19%	32.34
	2000	\$0.09	\$54.18	\$0.33	28%	31.97
	2001	\$0.11	\$56.90	\$0.35	30%	31.62
SEPTA	1999	\$0.18	\$29.29	\$0.36	40%	28.56
	2000	\$0.19	\$30.25	\$0.38	41%	28.43
	2001	\$0.21	\$30.52	\$0.42	41%	25.77
Shore Line East	1999	\$0.13	\$35.60	\$0.99	14%	12.59
	2000	\$0.14	\$46.03	\$1.03	13%	16.17
	2001	\$0.16	\$37.94	\$1.14	14%	11.85
Trinity Rail Express	1999	\$0.91	\$49.76	\$1.20	76%	20.71
	2000	\$0.83	\$59.57	\$1.41	59%	20.37
	2001	\$0.47	\$42.80	\$1.00	47%	21.19
Tri-Rail	1999	\$0.08	\$31.30	\$0.29	27%	35.94
	2000	\$0.08	\$33.92	\$0.31	25%	36.88
	2001	\$0.08	\$36.14	\$0.29	27%	38.26
Virginia Rail Express	1999	\$0.16	\$66.94	\$0.34	46%	40.50
	2000	\$0.13	\$57.93	\$0.28	47%	43.76
	2001	\$0.14	\$59.28	\$0.29	49%	43.43



As shown above, the amount of revenue a commuter rail service can expect per mile from each fare paying passenger can vary from \$0.08 on the Tri-Rail system for the 1999 fiscal year to as much as \$0.91 for Trinity Rail Express for the same year. On some of the larger systems such as Metro North and Long Island Railroad, revenue per passenger mile was anywhere from \$0.15 to \$0.17. For the Shore Line East service revenue per passenger mile was \$0.13 in the fiscal year 1999, and rose to \$0.16 in 2001.

The cost of operating commuter rail service per train mile was also found to have a wide range. SEPTA was found to have the lowest cost per train mile at \$30.52 in the fiscal year 2001. For the same year, Long Island Railroad cost \$103.95 per train mile to operate service. The cost per train mile in 2001 on Shore Line East was \$37.94.

Cost per passenger mile is an effective way of looking at the relationship between ridership and the cost to operate a commuter rail service. This value was found to be as low as \$0.23 in 2001 on the MBTA system, to as high as \$1.14 on Shore Line East for the same year. Those same values for Metro North and Long Island Railroad were \$0.26 and \$0.36 per passenger mile respectively.

The farebox recovery ratio was found to have a fairly large variation from one rail system to another. The value was as low as 13% for Shore Line East to as high as 61% for Metro North in 2000. The overall trend shows that the larger commuter rail networks had a higher farebox recovery ratio, meaning that their fares went further toward operating costs.

The productivity ratio also showed a significant variance among commuter rail systems. Shore Line East, for example, had a productivity ratio of just over 16 passengers per vehicle in 2000. In the same year, Caltrain had a productivity ratio of over 42 passengers per vehicle.