GEORGIA DOT RESEARCH PROJECT 18-14

FINAL REPORT
VOLUME 1

ECONOMIC IMPACT ANALYSIS OF GEORGIA'S RURAL AND SMALL URBAN TRANSIT SYSTEMS

OFFICE OF PERFORMANCE-BASED MANAGEMENT AND RESEARCH

600 W PEACHTREE ST. NW
ATLANTA, GA 30308

1. Report No. FHWA-GA-21-1814	**2. Government Accession No.** N/A	**3. Recipient's Catalog No.** N/A	
4. Title and Subtitle Economic Impact Analysis of Georgia's Rural and Small Urban Transit Systems, Volume 1		**5. Report Date** December 2020	
		6. Performing Organization Code N/A	
7. Author(s) Shatakshee Dhongde, Laurie A. Garrow		**8. Performing Organ. Report No.** RP 18-14	
9. Performing Organization Name and Address Georgia Institute of Technology 790 Atlantic Drive Atlanta, GA 30332-0355		**10. Work Unit No.** N/A	
		11. Contract or Grant No.: PI#0016121	
12. Sponsoring Agency Name and Address Georgia Department of Transportation Office of Performance-Based Management and Research 600 W Peachtree St. NW Atlanta, GA 30308		**13. Type of Report and Period** Final Report (August 2018–December 2020)	
		14. Sponsoring Agency Code N/A	
15. Supplementary Notes Prepared in cooperation with the U.S. Department of Transportation, Federal Highway Administration.			

16. Abstract

On March 30, 2017, the Georgia Legislature passed House Resolution 848 to create a Commission on Transit Governance and Funding. The Commission's mission is to "study and assess the needs for and means of providing a system of mass transportation…in the state and [identify] potential methods of funding such systems" (HR 848). Currently, the State of Georgia has 21 distinct Federal Transit Administration (FTA) grant recipients that provide transit service to 14 urban areas and 114 counties with rural populations. GDOT is responsible for administering and providing oversite for FTA grants received by small urban areas with a population less than 200,000 and rural counties.

The establishment of the Commission shines a spotlight on transit in Georgia. To justify additional funding for transit, the Commission will need information on the economic impact of the provision of transit services on the State's economy. The final report for this project is divided into two volumes. Volume 1 quantifies these economic impacts in the rural and small urban areas that fall under GDOT's responsibility. Volume 2 conducts an analysis of mobility and accessibility in rural areas in Georgia using a database of rural transit trips and provides a high-level assessment of costs of expanding and initiating service from 6 AM – 4 PM Monday through Saturday in all Georgia counties with rural populations. The analysis shows that expansion and initiation of service at the proposed level would increase ridership by 400,000 (or 38 percent from FY 2018 levels) and costs by $9M (or about 21 percent from FY 2018 levels). Further, many of the areas in which service would be initiated are in counties with the lowest levels of accessibilities.

17. Key Words Rural transit; Benefit-cost analysis		**18. Distribution Statement** No Restrictions	
19. Security Classification (of this report) Unclassified	**20. Security classification (of this page)** Unclassified	**21. Number of Pages** 54	**22. Price** Free

Form DOT 1700.7 (8-69)

GDOT Research Project 18-14

Final Report

ECONOMIC IMPACT ANALYSIS OF GEORGIA'S RURAL AND SMALL URBAN TRANSIT SYSTEMS

Volume 1

By

Shatakshee Dhongde, Ph.D.
Associate Professor of Economics

Laurie Anne Garrow, Ph.D.
Professor of Civil and Environmental Engineering

Contract with
Georgia Department of Transportation

In cooperation with
U.S. Department of Transportation Federal Highway Administration

December 2020

TABLE OF CONTENTS

LIST OF TABLES

LIST OF SYMBOLS AND ABBREVIATIONS

APTA	American Public Transportation Association
DHS	Department of Health and Human Services
FTA	Federal Transit Administration
FY	Fiscal Year
GDOT	Georgia Department of Transportation
IMPLAN	Impact Analysis for Planning
MARTA	Metropolitan Atlanta Regional Transit Authority
NTD	National Transit Database
RER	Regional Express Rail
RIMS	Regional Input–Output Modeling System

EXECUTIVE SUMMARY

This report is based on the findings of a project funded by GDOT entitled *Economic Impact Analysis of Georgia's Rural and Small Urban Transit Systems*. The project findings are summarized in two reports, Volume 1 and Volume 2. Each report is intended as both a standalone document and as a component of a larger effort to improve transit statewide in close collaboration with GDOT. In Volume 1 of this report, the research team estimated the economic costs and benefits of rural and small urban transit in Georgia.

Scope:

- The analysis covered more than 80 transit agencies, which provide service to 114 rural counties and 9 counties in small urban areas in Georgia.
- The researchers compiled data from the National Transit Database (NTD) for the three most recent years (FY 2016, FY 2017, and FY 2018) and presented the average values of economic costs and benefits.
- The researchers conducted a comprehensive review of literature on rural and urban transit systems and found their estimates to be consistent and within the range of values found in this literature.
- The researchers estimated economic costs and associated benefits separately for both operating costs and capital costs and for rural and small urban transit.

Economic Costs:

- On average, annual total operating costs were $32 million for the rural transit system and $52 million for the small urban transit system.

- Compared to rural transit's annual capital costs of about $5.7 million, capital costs for small urban transit were nearly three times greater and amounted to more than $14.5 million, on average.

Model:

- The developed economic impact analysis model assumed 90 percent of the operating costs and 50 percent of capital costs were spent locally.
- The researchers used statewide multipliers to estimate how expenditure on rural transit expenditure led to an increase in total output; employment; wages; value-added; and local, state, and federal tax revenues.

Economic Benefits:

- The researchers estimated that, on average, $85.5 million were spent annually by rural and small urban transit systems in Georgia. The economic impact analysis model estimated that this expenditure resulted in a total of $175.6 million in economic benefits. Thus, for every dollar invested in transit, $2.05 were generated in economic benefits.
- Results showed that of the total economic benefit of $175.6 million, about $10.1 million were generated as a direct impact of the transit expenditure, about $121.6 million resulted from the indirect impact of transit expenditure, and the remaining $43.9 million were due to the induced impact of transit expenditure. Thus, a significantly large amount, almost 70 percent of the economic benefit, was generated through the indirect benefit of transit.

- In addition to the increase in total output, the research team estimated that rural and small urban transit led to the creation of nearly 2,600 jobs within Georgia. Of these, 1,654 jobs resulted from small urban transit and 946 resulted from rural transit expenditure. Many jobs were created in the transportation sector, but jobs were also created in related sectors such as insurance agencies, building services, real estate, maintenance and construction, wholesale trade, and restaurants.
- Economic benefits from rural and small urban transit led to $5.9 million annually in state and local taxes and $12.5 million in federal taxes. State and local taxes benefited largely from an increase in sales tax revenue, whereas federal tax revenue was generated from additional household income.

CHAPTER 1 INTRODUCTION

Transit services play an important role in providing daily access to work, school, health care, and other activities. According to a study by the American Public Transportation Association (APTA; Litman 2017), from 2007 to 2015 America's small town and rural public transit ridership have increased by nearly 8 percent (i.e., 7.8 percent) even though the rural population declined by more than half a million people during that time. Over the last two decades, rural public transit agency funding, vehicle revenue-miles, and passenger trips also increased (Mattson and Hough 2015). However, some types of public transportation, particularly intercity bus services, have declined in recent years (BTS 2011), resulting in many rural communities losing scheduled intercity transport (Litman 2017).

Public transit helps rural and small urban communities become more efficient and equitable, since it provides increased mobility to those without other modes of transport. Therefore, it helps ensure that all residents, including non-drivers, enjoy independent mobility and receive a fair share of public spending on transportation facilities and services. Provision of transit can result in multiple benefits, such as: economic (e.g., increase in output and employment); social (e.g., savings in transportation costs); environmental (e.g., improved air quality); and health (e.g., access to health care facilities). This study focuses on an economic impact evaluation of transit systems operating in rural and small urban areas in the State of Georgia.

Rural Transit in Georgia

According to the Federal Transit Association (FTA 2018), rural areas are defined as those that have a contiguous population of 50,000 or less. In Georgia, according to the 2018 U.S. Census, 17 percent of the total population live in rural areas.

Rural populations tend to be older. The *2017 Rural Transit Fact Book* (Mattson 2017) notes that an aging population in rural areas presents a number of transportation challenges. Throughout the United States, the median age is 44 years in rural areas and 37 in urban areas. Approximately 18 percent of residents in rural areas are 65 years or older, compared to 14 percent of those in urban areas. In Georgia, the median age is 40.5 years in rural areas and 35 in urban areas. Around 16.8 percent of residents in rural areas are 65 years or older, compared to 10.7 percent of those in urban areas (American Community Survey 2017).

Rural transit systems are defined as those receiving Section 5311 Non-Urbanized Area (Rural) Formula Program funding and that report to the Rural National Transit Database (Rural NTD). A national report on rural transit found that among rural transit providers, 58 percent operate five or fewer vehicles (Godavarthy et al. 2015).

The rural transit system in Georgia operates as demand-responsive bus systems; there is no provision of a fixed-route transit system in rural Georgia. A recent report by Garrow et al. (2018) noted that in FY 2017 Georgia had 83 rural transit providers—the most of any state in the nation. In FY 2017, all but four of these transit providers were managed by individual counties.[1] The 83 transit providers delivered service to 114 counties, which is 71.7 percent

[1] The regional commissions that operate transit systems are Three Rivers, Southwest Georgia, and Coastal Regional Commissions; Lower Chattahoochee is a Transit Authority.

of all counties in Georgia. Except for transit systems operated by regional commissions, all other systems operated in counties with populations ranging from 1,884 to 235,896 (American Community Survey 2017).

Small Urban Transit in Georgia

Small urban transit agencies are defined as those receiving Section 5307 Urbanized Area Formula Program funding and serving areas with a population between 50,000 and 200,000. Following Garrow et al. (2018), this study will focus on nine counties that receive FTA urban funds and are not part of the Atlanta Regional Commission.[2] Note that a county can have a mix of rural, small urban, or urban areas and, thus, receive different types of funding from the FTA (e.g., Hall and Richmond Counties in Georgia). The nine counties, the principle cities they service, and the categories of their service are shown in table 1. All counties except Hinesville provide both fixed bus route service and demand-response service; Hinesville County provides only fixed bus route service.[3]

[2] To make this study comparable with Garrow et al. (2018), Bartow County is not included.
[3] Since FY 2019, Hinesville has added demand-response service.

Table 1. Small urban transit location and type.

City	County	Fixed Bus Route Service	Demand-Response
Albany	Dougherty	Yes	Yes
Athens	Clarke	Yes	Yes
Augusta	Richmond	Yes	Yes
Columbus	Muscogee	Yes	Yes
Gainesville	Hall	Yes	Yes
Hinesville	Liberty	Yes	No
Macon	Bibb	Yes	Yes
Rome	Floyd	Yes	Yes
Savannah	Chatham	Yes	Yes

Source: Garrow et al. 2018.

FTA Funding and Grants Program

The Federal Transit Administration provides funding for the construction, operation, and maintenance of public transportation systems. The State of Georgia is included in Region 4 of the 10 regions defined by the FTA.[4] FTA funding for public transit in rural and small urban areas in Georgia is administered by the Georgia Department of Transportation (GDOT). In addition to the FTA programs described below, the Department of Health and Human Services (DHS), the state government, and local counties also provide funding for rural transit.

Urbanized Area Formula Program (5307): This program makes federal resources available to urbanized areas and to governors for transit capital and operating assistance in

[4] Region 1: Connecticut, Massachusetts, Maine, New Hampshire, Rhode Island, and Vermont; Region 2: New York and New Jersey; Region 3: Delaware, District of Columbia, Maryland, Pennsylvania, Virginia, and West Virginia; Region 4: Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina, Tennessee, The Commonwealth of Puerto Rico, and the United States Virgin Islands; Region 5: Illinois, Indiana, Minnesota, Michigan, Ohio, and Wisconsin; Region 6: Arkansas, Louisiana, New Mexico, Oklahoma, and Texas; Region 7: Iowa, Kansas, Missouri, and Nebraska; Region 8: Colorado, Montana, North Dakota, South Dakota, Utah, and Wyoming; Region 9: Arizona, California, Hawaii, Nevada, Guam, American Samoa, and North Marianas; Region 10: Alaska, Idaho, Oregon, and Washington; FTA website: https://www.transit.dot.gov/

urbanized areas and for transportation-related planning. For urbanized areas under 200,000 in population, the funds are apportioned to the governor of each state for distribution.

Rural Formula Program (5311): The Formula Grants for Rural Areas program provides capital, planning, and operating assistance to states to support public transportation in rural areas with populations of less than 50,000, where many residents often rely on public transit to reach their destinations. These funds are apportioned to states based on a formula that includes land area, population, revenue vehicle miles, and low-income individuals in rural areas.

Enhanced Mobility of Seniors and Individuals with Disabilities (Section 5310): This program provides formula funding to states for assisting private nonprofit groups in meeting the transportation needs of older adults and people with disabilities when the transportation service provided is unavailable, insufficient, or inappropriate to meeting these needs.

Job Access and Reverse Commute Program (5316): This program has been repealed. It was established to address the unique transportation challenges faced by welfare recipients and low-income persons seeking to obtain and maintain employment.

New Freedom Formula (5317): This program has expired and eligible funding is made available through Section 5310. This formula grant program aimed to provide additional tools to overcome existing barriers faced by Americans with disabilities seeking integration into the workforce and full participation in society.

CHAPTER 2 REVIEW OF LITERATURE

In recent years, interest in evaluating public transit has grown from both policy-makers and researchers. These analyses are conducted at various geographic scales, including studies assessing the national picture (Burkhardt et al. 1998; Burkhardt 1999; Weisbrod et al. 2014; Godavarthy et al. 2015); statewide studies (Peng and Nelson 1998; Southworth et al. 2004; Penet 2010; Ferrell 2015; Mattson and Hough 2015; Godavarthy et al. 2015); studies comparing different metropolitan areas (Baum-Snow and Kahn 2000); and studies focused on a single metropolitan area (Bollinger and Ihlanfeldt 1997; Clarke et al. 2012; Mayer and Trevien 2017). Table 2 classifies some of this literature and its findings.

Most of the studies estimate economic impacts by using input–output models, such as the Impact Analysis for Planning (IMPLAN) model (Southworth et al. 2004; Penet 2010; Clarke et al. 2012; Weisbrod et al. 2014) and the Regional Input–Output Modeling System (RIMS) (Peng and Nelson 1998; Godavarthy et al. 2015). As detailed in Weisbrod et al. (2014), spending on public transit typically leads to economic benefits through three channels: (1) *direct effects*, via workers and business engaged in the manufacturing of vehicles and control equipment, construction of station facilities, and operation of public transit services; (2) *indirect effects*, via supporting industries that supply goods and services to enable the direct spending, including workers in industries supplying the engines; equipment parts; and the steel, concrete, wood, and plastic materials that are needed for building vehicles and station facilities; and (3) *induced effects*, via re-spending of worker income on consumer goods and services, including food, clothing, recreation, and personal

services. The resulting benefits include increasing employment, boosting business sales and the economy as a whole, and generating additional tax revenue.

The employment benefits arising from public transit are important, since public transit does not only provide *transit-related work*, but also commutes people *to work* (Bollinger and Ihlanfeldt 1997; Southworth et al. 2004; Penet 2010; Clarke et al. 2012; Weisbrod et al. 2014; Godavarthy et al. 2015; Mayer and Trevien 2017). In 1998, in the State of Tennessee, Southworth et al. (2004) estimated that the gross economic impact of urban transit expenditures was about $80 million and 2,600 new jobs. Weisbrod et al. (2014) found a national average of 21,800 jobs was generated per billion dollars of investment, and these jobs consisted of two parts: 15,900 per billion dollars of capital investment, and 24,200 per billion dollars of operations investment. Clarke et al. (2012) estimated that the Metropolitan Atlanta Regional Transit Authority's (MARTA's) capital budget supports 7,000 to 15,000 jobs in the service area each year. Mayer and Trevien (2017) took advantage of a natural experiment provided by the opening and progressive extension of the Regional Express Rail (RER) between 1970 and 2000 in the Paris metropolitan region and found that employment rose by 8.8 percent in connected municipalities over the 1975–1990 period. However, not all studies found a large employment benefit from public transit. Bollinger and Ihlanfeldt (1997) studied the economic impacts of Atlanta's MARTA rail transit system and found no discernible impact on employment in station areas. Penet (2010) and Godavarthy et al. (2015) observed that rural and small urban areas tend to capture fewer economic and employment benefits from transit services. Chu (2013) showed that the economic impacts of the same amount of spending could vary significantly between local areas if the pattern of their funding and spending differ. If outside funds are

spent on goods and services produced outside the area, there will be no economic impact. If outside funds are spent within the local area, there will be a positive effect. If local funds are spent locally, the effect will approximately be zero because those funds could also be spent locally for non-transit purposes; and if local funds are spent outside the area, there will be a negative effect. In his study of central Florida, Chu found that the rate of return is much higher for operations and maintenance spending than for capital spending because a much higher percentage of funds spent on capital expenditures, such as vehicle purchases, was spent outside the local area.

Economic benefits arise when people spend out-of-pocket cost savings on other goods and services, as well as when the operation and maintenance of public transit spurs direct, indirect, and induced economic activity (Penet 2010; Godavarthy et al. 2015; Weisbrod et al. 2014). Penet (2010) analyzed the economic impacts of public transit expenses by impact metric and by transit agency in South Dakota. His results showed that statewide, the spending of out-of-pocket cost savings generated $7.6 million in total output in 2010, including $4.4 million in total value added. Chu (2013) estimated a total gross sales (output) worth $221.67 million, and a value added from total transit spending of $99.07 million. For small urban transit systems, the spending of out-of-pocket cost savings generated $1.45 million in business output in 2010, including $844 thousand in total value added. Godavarthy et al. (2015) found that every $1 invested in public transportation results in $1.35 in output, $0.57 in value added, and $0.37 in earnings. Similarly, Weisbrod et al. (2014) showed an average of $3.00 impact on business output per dollar of public transportation spending, including an average of $1.70 in value added.

Table 2. Summary of economic benefits of public transit in sample of literature.

Author(s)	Scope of the Study	Job Creation	Total Output	Tax Revenues
Southworth 2004	Statewide urban, Tennessee	2,600 jobs statewide	$1: $1.14	—
Penet 2010	Statewide urban and rural, South Dakota	530 jobs statewide	$1: $1.90	$1: $0.06 operating costs $1: $0.25 capital costs
Clarke et al. 2012	Urban metropolitan area, Atlanta	7,800 jobs in the service region, 6,000 jobs elsewhere from operating costs; 7,000 to 15,000 jobs in the service region from capital costs	$1: $3.25	
Chu 2013	Urban counties, Central Florida	1,909 jobs in 8 counties	$1: $1.37	
Weisbrod et al. 2014	National, the U.S.		$1: $3.10 operation cost $1: $2.90 capital costs	$1: $0.50 operating costs $1: $0.27 capital costs
Godavarthy et al. 2015	National, the U.S.; statewide, North Dakota		$1: $1.35	

Note: Total output can be read, for instance as, every $1 invested as capital cost or every $1 spent as operating cost led to $1.14 in net value added to the economy. Similarly, tax revenue shows that for every $1 invested as capital cost or every $1 spent as operating cost resulted, for instance, in $0.25 as tax revenue.

Economic benefits also include fiscal impact, which is generated because of additional labor income and is a consequence of additional business activity (Peng and Nelson 1998; Penet 2010; Weisbrod et al. 2014). Peng and Nelson (1998) found that although the fiscal revenue impact of rural transit service varies depending on the availability and the amount of federal transit subsidy, its impact is positive and is larger than 1.0 for the State of Georgia as a whole. In Weisbrod et al. (2014), a national average of $0.42 impact on overall tax revenue per dollar of public transit spending was estimated, which was further broken down as $0.27 on federal tax revenues, and $0.16 on state and local tax revenues.

CHAPTER 3 DATA

According to the FTA (2018), Congress established the National Transit Database (NTD) to be the Nation's primary source for information and statistics on the transit systems of the United States. The statute requires that recipients or beneficiaries of grants from the FTA under the Urbanized Area Formula Program (5307) or Other than Urbanized Area (Rural) Formula Program (5311) submit data to the NTD. The NTD records the financial, operating, and asset conditions of transit systems. For instance, variables measuring how much each county received from federal funds, local funds, fare revenue, and contract revenue to cover operating and capital costs are included in the data. Additionally, data on annual vehicle revenue miles and hours, and number of passenger trips are also provided in the NTD.

In this analysis, data for Georgia's rural and small urban transit systems were compiled for the three most recent years, namely FY 2016, FY 2017, and FY 2018. Since operating and capital costs tend to vary from one year to another, an average of the three years was taken. A total of 83 rural transit agencies and 9 small urban transit agencies were included. For rural transit systems, the researchers directly obtained the annual data from the rural NTD. The operating funds consist of federal 5310 funds, 5311 funds, 5316 funds, and 5317 funds as well as local funds, actual fare box, contract revenues, and partially allocated costs. The capital funds consist of 5311 funds, 5316 funds, and 5317 funds from federal, state, and local. Furthermore, the research team calculated the operating cost per trip and operating cost per mile by the total miles and total trips that the NTD provides. For small urban transit systems, data were compiled from their annual agency profiles that are recorded in the

NTD. According to their profiles, both their operating costs and capital costs mainly consist of fare revenue, local funds, state funds, and federal funds.

CHAPTER 4 RURAL TRANSIT: ECONOMIC COSTS

Operating costs refer to costs typically consumed within the year to operate services. Capital costs are associated with long-term transit agency assets. Table 3 and table 6 compile data on operating and capital costs for rural transit by funding programs. As shown in the tables, both operating and capital costs were covered by federal, state, and local governments.

Operating Costs

Operating costs include costs of labor, fringe benefits, materials and supplies (e.g., fuel), maintenance, office space, equipment, and administrative costs. Total operating costs for rural transit in Georgia amounted to $30–32 million. A large share (i.e., 40 percent) of the operating costs was covered by funds from federal and local governments. A majority of federal funds supporting operating costs came from the Rural Formula Program (5311) and the Enhanced Mobility of Seniors and Individuals with Disabilities Program (5310). Contract revenue and fare revenues accounted for about 5 percent of the total operating costs. Of note, in FY 2016, the local government's share of operating costs was only about 25 percent and contract revenue accounted for nearly 20 percent of the costs; however, in FY 2017 and FY 2018, the local government's share increased to almost 45 percent. This particular increase was largely because of changes in accounting that helped more clearly identify contracts and local revenues.

Table 3. Sources of operating costs of rural transit.

	FY 2016		FY 2017		FY 2018		Average	
	Costs ($)	%	Costs ($)	%	Costs ($)	%	Costs ($)	%
Federal	13,499,724	43.65	13,819,052	43.00	14,052,015	42.89	13,790,264	43.25
5316	93,645		19,948		13,304		42,299	
5317	30,779		17,270		11,237		19,762	
5311	12,673,380		12,901,228		13,208,049		12,927,552	
5310	701,920		880,606		819,425		800,650	
Local	8,105,035	26.21	14,077,819	44.00	14,461,393	44.14	12,214,749	38.31
Fare Revenue	1,822,000	5.89	1,619,055	5.00	1,381,469	4.22	1,607,508	5.04
Contract Revenue	6,340,195	20.50	1,807,940	5.66	2,525,322	7.71	3,557,819	11.16
Partially Allocated Cost	1,161,990	3.76	644,045	2.01	344,937	1.05	716,991	2.25
Total	30,928,944	100	31,967,911	100	32,765,136	100	31,887,330	100.00

Source: Rural National Transit Database

Table 4 summarizes operating costs per mile and the fare box recovery ratio for the three years. On average, rural transit users took 1,777,400 rides per year and traveled approximately 17,210,790 miles. The operating expense per trip was $17.97, and the operating expense per mile was $1.85. The fare box recovery ratio of a passenger transportation system is the fraction of operating expenses, which are met by the fares paid by passengers. It is computed by dividing the system's total fare revenue by its total operating expenses. The median fare box recovery ratio shows that fare revenues covered 5 percent of the operating costs.

Table 4. Operating costs and fare box recovery ratio for rural transit.

Total (Demand-Response Only)	FY 2016	FY 2017	FY 2018	Average
Total Rides (thousands)	1,849.33	1,761.51	1,721.35	1,777.40
Operating Expense per Trip (dollars)	16.72	18.15	19.03	17.97
Total Vehicle Miles (thousands)	17,670.53	17,062.87	16,898.96	17,210.79
Operating Expense per Mile (dollars)	1.75	1.87	1.94	1.85
Fare Box Recovery Ratio, Median	0.06	0.05	0.04	0.05

Source: Rural National Transit Database

Table 5 shows percentile rankings for operating costs per trip and per mile, and for the fare box recovery ratio for FY 2018 across rural counties in Georgia. The percentile rank is the percentage of transit agencies with values at or below the reported number. For example, 10 percent of transit agencies had operating costs per trip at or below $11.83 (e.g., Wayne County Transit), while 50 percent had an operating expense per trip at or below $17.85 (e.g., Tift Transit System), and 90 percent of transit agencies had operating costs at or below $30.97. Note that counties belonging to the different percentiles differ depending on the cost variable. For example, the Tift Transit System, which cost $15.99 per trip, $3.62 per mile, and had a fare box recovery ratio of 0.13 in FY 2018, belongs to the 50th percentile, 90th percentile, and 90th percentile in each category, respectively. Overall, as seen in table 5, when comparing the 90th with the 10th percentile, operating costs per trip and per mile almost tripled, and the fare box recovery was more than fivefold times higher, underscoring the fact that there is significant variation in operating costs across transit agencies.

Table 5. Operating costs and fare box recovery ratio for rural transit, percentile rankings.

Percentile Rank (Demand-Response Only)	Operating Expense ($)		Fare Box Recovery
	Per Trip	Per Mile	
10th	11.83	1.35	0.02
20th	13.22	1.51	0.03
50th	17.85	1.99	0.04
75th	25.59	2.43	0.07
90th	30.97	3.34	0.11

Source: Rural National Transit Database 2018

Capital Costs

Capital costs include expenses toward long-term acquisitions and leases of physical assets such as buses, garages, and maintenance facilities, as well as small purchases like computers and tablets. NTD defines capital expenses as costs exceeding $5,000 or any capitalization value established by the local government.

Total capital costs for rural transit amounted, on average, to $5 million or about one-sixth of the operating costs. A majority of capital costs (i.e., 80 percent) were provided by the federal funding agencies. The remaining were split evenly with 10 percent from the state FTA and 10 percent from the county FTA (see table 6). Programs such as the Job Access and Reverse Commute Program (5316) and the New Freedom Formula (5317) provided partial funds, but both of these programs have since expired. Significant federal, state, and local funds supporting capital costs came from the Rural Formula Program (5311).

Table 6. Sources of total capital costs of rural transit.

	FY 2016		FY 2017		FY 2018		Average	
	Costs ($)	%	Costs ($)	%	Costs ($)	%	Costs ($)	%
Federal	3,617,981	81.15	6,898,118	80.56	3,363,496	81.14	4,626,532	80.85
5316	341,092		323,506		364,043		342,880	
5317	139,427		99,996		0		79,808	
5311	3,137,462		6,474,616		2,999,453		4,203,844	
State	451,109	10.12	862,264	10.07	414,013	9.99	575,796	10.06
5316	41,504		40,438		39,081		40,341	
5317	17,428		12,499		0		9,976	
5311	392,177		809,327		374,932		525,479	
Local	389,347	8.73	802,163	9.37	367,900	8.87	519,803	9.08
5311	389,347		802,163		367,900		519,803	
Total	4,458,437	100	8,562,545	100	4,145,409	100	5,722,131	100.00

Source: Rural National Transit Database

Note that the NTD data used are available by the source of funding agency, and include data on total costs, as well as data by regional providers (see table 23 in the appendix). However, data were not available on how the operating cost or the capital expenses were disbursed. The rural NTD provides data for only the total amount of capital spending.

CHAPTER 5 TYPE OF ECONOMIC BENEFITS

Economic benefits are measured from rural transit by using several indicators. Economic activity is measured in terms of increase in total output, value added, jobs created, income generated, and resulting federal and state/local tax revenues. Rural transit generates three types of economic benefits, broadly classified as benefits occurring from direct spending, indirect spending, and induced economic activity.

Total Output

When capital expenditure is undertaken toward purchasing buses, for instance, there is a trickle down of different impacts on the total output in the economy. The first effect, also known as the *direct effect*, is due to the initial spending that is undertaken by the transit agencies. A simple example is an agency that purchases concrete blocks to build a garage in which to store buses when not in use. Second, the initial spending creates demand for goods and services among firms operating in the supply chains of related industries. For example, the manufacturing firm from whom the concrete blocks were purchased will spend money on purchasing raw materials such as gravel and sand. This demand is classified as the *indirect effect*. Finally, the direct and indirect spending effects result in additional compensation to workers. With the added income, workers undertake additional spending. Workers in the firm building the concrete blocks and workers using concrete blocks to construct the garage for the transit agency will all receive additional income, which they will spend on, for instance, meals, clothes, and other consumer goods. This additional spending is referred to as *induced effects*. In other words, each investment sets in motion secondary expenditures because contractors buy goods and services from

suppliers, hire subcontractors, and make payments to workers and suppliers. As suppliers, subcontractors, and workers spend portions of their income on other goods and services, new rounds of spending occur. The sum of these indirect and induced effects represents the multiplier effect of the spending on transit.

Value Added in Production

Value added is the output as measured by final sales minus the value of the intermediate goods and services required to create the new output. Value added measures the contribution to new economic output made by an individual producer, sector, or industry.

New Jobs Created

Transit agencies employ workers for day-to-day operations, and they employ additional workers when they undertake capital expenses, such as the purchase of vehicles or construction and maintenance of facilities. The new demand helps to sustain the existing workforce and typically results in an expansion of new hiring. *Jobs created* measures the number of new full- and part-time employees. When each of these workers who receives additional revenue further spends this revenue in the market, there is a chain effect often referred to as *indirect economic benefits*.

Household Income and Tax Revenue

The wage income paid to transit system workers leads to an increase in income tax. A boost to household income is generated when not only more output is produced but also when more workers are hired to fill the new jobs created. Additional tax revenues are derived

from the increase in final sales. The revenues come from sales and excise taxes, customs duties, property taxes, motor vehicle licenses, severance taxes, and special assessments.

Estimating Benefits with the IMPLAN Model

In this study, the research team estimated the above-listed benefits from transit using the model provided by the Impact Analysis for Planning model. Besides IMPLAN, previous studies have also used models from the Regional Input–Output Modeling System. The input–output model is based on a social accounting table with nearly 500 sectors. The model replicates industry supply chain linkages and patterns of household expenditures at the county or state level. Multipliers are used to estimate how expenditure on rural transit led to an increase in total output, employment, wages (household income), value-added (new value created at each stage of production), and tax receipts (county and state tax revenues). Multipliers reflect the interactions across all industries and sectors, and are updated as the conditions of the economy change over time. The researchers conducted this analysis using statewide multipliers, that is, they estimated the statewide impact of the transit costs. The estimated impact would be smaller if the analysis had been conducted at a county level because the multipliers at that level capture a smaller percentage of the economic activity.

CHAPTER 6 RURAL TRANSIT: ECONOMIC BENEFITS

This chapter first summarizes the total benefits resulting from the combination of operational costs and capital costs. The subsequent sections show these benefits separately for the operating and capital costs and discuss them in detail.

Total Benefits

Operating costs were treated as a change in the industry spending pattern since these consist of expenses for day-to-day operations and maintenance. Typically, not all capital costs are spent within the state, since they include the purchase of a new fleet of vehicles or equipment, construction of transit facilities, etc. Capital costs were treated as a change in industry investment.

The researchers made the following assumptions: (1) most (i.e., 90 percent) of operating expenses were spent within the state; (2) 50 percent of capital costs were spent within the state.[5] All costs were averaged over time, for FY 2016, FY 2017, and FY 2018. A total of $31,559,663 was spent annually on rural transit. With an estimated total benefit of $64,605,620 in terms of increase in output (see table 7), every dollar spent on rural transit translates to $2.05 in economic benefits.[6] This return on investment in rural transit lies within the range of $1.14 to $3.25 in economic benefits found in the literature. In terms of fiscal impact, a dollar spent on rural transit led to $0.14 in tax revenue, which is consistent with previous studies (see table 8).

[5] A later section in this chapter, Benefits from Capital Costs: Different Scenarios, analyzes two scenarios where 90 percent and 25 percent of capital costs were assumed to be spent within the state.
[6] Measured per dollar benefit as total benefit per unit of funds spent within the state.

Table 7. Economic impact of rural transit.

Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
Direct Effect	75.2	908,018	1,257,392	2,861,065
Indirect Effect	753	17,059,947	22,738,699	45,528,117
Induced Effect	114.1	5,151,976	9,551,344	16,216,438
Total Effect	*942.3*	*23,119,940*	*33,547,436*	*64,605,620*

Note: All dollar amounts are expressed in 2017 dollars.

Table 8. Fiscal impact of rural transit.

	Employee Compensation ($)	Proprietor Income ($)	Tax on Production and Imports ($)	Households ($)	Corporations ($)	Total ($)
State and Local Taxes	6,464	0	1,498,376	627,494	47,927	2,180,261
Federal Taxes	2,219,271	149,786	189,795	1,659,474	395,395	4,613,721

Note: All dollar amounts are expressed in 2017 dollars.

Next, economic benefits resulting from operating costs and from capital costs were measured separately. Capital costs lead to a one-time infusion of money into the economy when expenses are incurred toward purchasing assets such as buses, vans, restocking inventories, etc. Capital spending, thus, results in the generation of direct, indirect, and induced output. On the other hand, operating expenses are incurred daily on inputs such as labor, materials, equipment, and services. These operating and maintenance expenses, thus, do not spur direct but indirect and induced economic activity. The NTD data used are available by the source of funding agency; however, data are not available on how the operating cost or the capital expenses were disbursed.

Benefits from Operating Costs

Edrington et al. (2014) list four categories for transit agencies, which represent approximately 70 to 90 percent of a transit agency's operating costs. These include salaries and wages (about 50 percent), fringe benefits including health insurance (20 percent), services on maintenance costs (15 percent), and expenses on fuel and lubricants (15 percent). The research team assumed that most (i.e., 90 percent) operating expenses were incurred in the local area (Godavarthy et al. 2015). The average of the total annual operating costs for the three years was used to estimate their impact on the state's economy (see table 9).

Table 9. Economic impact of operation costs of rural transit.

Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
Indirect Effect	742.4	16,415,201	21,756,670	43,830,942
Induced Effect	104.3	4,707,686	8,727,635	14,818,075
Total Effect	*846.7*	*21,122,886*	*30,484,306*	*58,649,017*

Note: All dollar amounts are expressed in 2017 dollars.

The indirect and induced effects of the operating costs led to more than 800 new jobs and $21,122,866 in labor income. This income was, in turn, spent by the workers on the consumption of goods and services, which led to a multiplier effect in terms of increasing output by $43,830,942 (indirect effect). This increase in output led to further economic activity in other sectors (induced effect) and generated an additional $14,818,075 in output. Thus, the total output effect was equal to $58,649,017. Therefore, every dollar spent on operating costs resulted in an economic benefit of $2.04.

Table 10 lists the top 10 sectors where the operating costs had the most impact in terms of jobs. Apart from the transit and local transportation where the most jobs were created

(694.4), new jobs were also created in insurance agencies, services to buildings, real estate, wholesale trade, etc.

Table 10. Top 10 sectors with highest number of jobs created from operation costs of rural transit.

Sector	Employment	Labor Income ($)	Value Added ($)	Output ($)
Transit and ground passenger transportation	598.7	7,228,367	10,009,586	22,775,783
Local government passenger transit	50.7	3,373,759	2,880,150	5,820,911
Insurance agencies, brokerages, and related activities	13.2	969,670	1,294,031	2,520,544
Services to buildings	9.8	182,894	217,476	382,268
Real estate	8.1	161,036	1,061,587	1,511,662
Wholesale trade	7.6	668,225	1,287,498	1,857,244
Employment services	7.5	311,187	456,841	609,761
Management consulting services	7	595,716	536,632	837,935
Full-service restaurants	6.9	155,878	171,281	338,399
Limited-service restaurants	6.3	115,231	279,524	520,195

Note: All dollar amounts are expressed in 2017 dollars.

The fiscal impact of the increased economic activity is summarized in table 11. Operating costs generated $1.98 million in state and local tax revenue and $4.21 million in federal tax revenue. Most of the tax revenue at the state and local levels came from the production of goods and services. At the federal level, significant tax revenue was also generated from employee compensation and corporations. A dollar spent in operating costs resulted in $0.16 in tax revenue. The previous studies had found that operating costs resulted in tax revenue between $0.06 and $0.50.

Table 11. Fiscal impact of operation costs of rural transit.

	Employee Compensation ($)	Proprietor Income ($)	Tax on Production and Imports ($)	Households ($)	Corporations ($)	Total ($)
State and Local Taxes	5,929	0	1,357,362	573,128	42,952	1,979,371
Federal Taxes	2,035,512	134,057	171,933	1,515,698	354,350	4,211,550

Note: All dollar amounts are expressed in 2017 dollars.

Benefits from Capital Costs

Averaging capital costs over three years reveals that $5,722,131 were spent by the rural transit system. Typically, a majority of transit agencies purchase their vehicles, fare collection systems, and communications and information systems from outside the local economy. Hence, Scenario 1, discussed here in detail, assumes 50 percent of capital costs were spent within the state. Different scenarios are analyzed by assuming 90 percent and 25 percent of capital costs spent within the state (in the following section, Benefits from Capital Costs: Different Scenarios). Table 12 compiles the estimates of the impact of this spending on the state economy.

Table 12. Economic impact of capital costs of rural transit: Scenario 1.

Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
Direct Effect	75.2	908,018	1,257,392	2,861,065
Indirect Effect	10.6	644,746	982,029	1,697,175
Induced Effect	9.8	444,290	823,709	1,398,363
Total Effect	*95.6*	*1,997,054*	*3,063,130*	*5,956,603*

Note: All dollar amounts are expressed in 2017 dollars.

The direct effect of spending $2,861,065 was an increase in value added worth $1,257,392. Note that value added is a component of output and the two should not be added together. The direct effect also includes benefits from the creation of jobs, and for drivers, dispatchers, mechanics, etc. A total of 75.2 jobs (full-time/part-time) were created, and $908,018 were generated as labor income in the transit and ground transportation sector.

Similarly, the fraction of capital expenses spent within the state toward purchasing vehicles, equipment, maintaining inventories etc. has a multiplier effect in terms of generating more jobs and labor income. The indirect effects resulted from these are jobs created and labor income spent in industries that supply inputs to public transit, such as fuel, repairs, insurance, etc. The indirect effects led to the creation of an additional 10.6 jobs and generated $644,746 in labor income. The value added of the indirect output was equal to $982,029.

Induced economic activity resulted from the income generated through both the direct and indirect effects. When people who worked for the transit system or earned income by providing inputs to the transit agency spent their income, their spending helped create an additional 9.8 jobs in the economy. The induced output was worth $14,725,793, and the value added to the output was equal to $8,674,265. Adding the direct, indirect, and induced effects shows that the total economic benefit in terms of output is $5,956,603. This implies that for every dollar spent, the economic benefit resulted in $2.08.

The indirect and induced effects led to the creation of jobs mainly in the following industries: insurance agencies, services to buildings, maintenance and repair construction

of non-residential structures, employment services, management consulting services, real estate, and restaurants (see table 13).

Table 13. Top 10 sectors with highest number of jobs created from capital costs of rural transit: Scenario 1.

Sector	Employment	Labor Income ($)	Value Added ($)	Output ($)
Transit and ground passenger transportation	75.3	909,248	1,259,094	2,864,940
Insurance agencies, brokerages, and related activities	1.6	118,180	157,712	307,195
Services to buildings	1.1	20,980	24,947	43,850
Employment services	0.8	34,281	50,326	67,172
Management consulting services	0.8	69,668	62,758	97,995
Real estate	0.8	15,989	105,401	150,088
Full-service restaurants	0.7	15,079	16,569	32,735
Maintenance and repair construction of nonresidential structures	0.6	35,002	48,802	100,047
Limited-service restaurants	0.6	10,986	26,650	49,596
Wholesale trade	0.6	49,877	96,100	138,626

Note: All dollar amounts are expressed in 2017 dollars.

Table 14 compiles the estimated impact of capital costs of rural transit on the economy in terms of tax revenues. The direct effect of spending $2,861,065 in rural transit led to $402,171 in federal taxes and $200,890 in local and state taxes. Thus, for every dollar spent on capital costs, $0.11 were received in terms of tax revenue. The literature shows that a dollar spent on capital costs led to $0.25–$0.27 in tax revenues. A majority of federal tax

revenue was incurred as income tax on employee compensation, whereas a large share of the state tax revenue came from tax on production of goods and services.

Table 14. Impact of rural transit in terms of tax revenues: Scenario 1.

	Employee Compensation ($)	Proprietor Income ($)	Tax on Production and Imports ($)	Households ($)	Corporation ($)	Total ($)
State and Local Tax	535	0	141,014	54,366	4,975	200,890
Federal Tax	183,759	15,729	17,862	143,776	41,045	402,171

Note: All dollar amounts are expressed in 2017 dollars.

Benefits from Capital Costs: Different Scenarios

The previously discussed Scenario 1 assumes 50 percent of capital costs were spent within the state. This section considers two different scenarios and compares the extent to which economic benefits vary depending upon the assumptions made. Scenario 2 assumes that most of the capital costs (90 percent) were spent within the state, and Scenario 3 assumes the least, that is, only 25 percent of capital costs were spent within the state. Table 15 compares the estimated economic benefits from these different scenarios. The values in the table provide an upper and lower bound on the economic benefits from rural transit. Thus, direct spending on capital costs would result in the creation of 37 to 135 new jobs. Similarly, the total impact, that is, the sum of the direct, indirect, and induced effects, would range between $2.9 million and $10.7 million.

Table 15. Economic impact of capital costs of rural transit: Different scenarios.

Impact Type	Scenario 1 (50% spent in-state) Employment	Scenario 1 (50% spent in-state) Output ($)	Scenario 2 (90% spent in-state) Employment	Scenario 2 (90% spent in-state) Output ($)	Scenario 3 (25% spent in-state) Employment	Scenario 3 (25% spent in-state) Output ($)
Direct Effect	75.2	2,861,065	135.4	5,149,918	37.6	1,430,533
Indirect Effect	10.6	1,697,175	19.5	3,059,974	5.4	849,993
Induced Effect	9.8	1,398,363	18.1	2,518,569	5	699,602
Total Effect	*95.6*	*5,956,603*	*173*	*10,728,461*	*48*	*2,980,128*

Note: All dollar amounts are expressed in 2017 dollars.

CHAPTER 7 SMALL URBAN TRANSIT: ECONOMIC COSTS

As noted previously, small urban transit agencies are defined as those receiving Section 5307 Urbanized Area Formula Program funding. Small urban areas typically have a population between 50,000 and 200,000. This study focused on nine counties that received funding under small urban transit programs (see table 1). Similar to the rural transit costs, data on operating and capital costs were compiled using the NTD. Table 16 and table 17 provide data on operating and capital costs, respectively, for small urban transit. Both costs are greater for small urban transit when compared to rural transit. Since these costs tend to vary from one year to another, data are compiled for FY 2016, FY 2017, and FY 2018 and then averaged over time. Table 24 provides data on average operating and capital costs for each of the nine counties.

Operating Costs

Total operating costs for small urban transit in Georgia amounted to $52 million. These costs were much higher compared to the $30–32 million in operating costs for rural transit. Over time, operating costs for small urban transit have tended to increase. A large share (i.e., 57 percent) of the operating costs were covered by funds from the local government. The federal government covered about 23 percent of the operating costs, while fare revenue covered about 17 percent of these costs.

Table 16. Sources of operating costs of small urban transit.

	FY 2016		FY 2017		FY 2018		Average	
	Costs ($)	%	Costs ($)	%	Costs ($)	%	Costs ($)	%
Fare Revenue	8,348,058	17.03	9,213,790	17.43	9,250,478	17.12	8,937,442	17.20
Local	27,634,370	56.37	27,915,078	52.81	32,958,095	61.01	29,502,514	56.77
State	778,487	1.59	904,701	1.71	1,063,237	1.97	915,475	1.76
Federal	11,571,958	23.61	13,351,522	25.26	10,604,741	19.63	11,842,740	22.79
Other	686,324	1.40	1,477,924	2.80	148,083	0.27	770,777	1.48
Total	*49,019,197*	*100*	*52,863,015*	*100*	*54,024,634*	*100*	*51,968,949*	*100*

Source: National Transit Database

Capital Costs

Similar to operating costs, capital costs also increased over time. Compared to rural transit's capital costs of about $5 million, capital costs for small urban transit were nearly three times greater and amounted to almost $14.5 million on average. A majority of capital costs (i.e., 74 percent) were provided by the federal funding agencies. The local government covered about 22 percent of the costs.[7] The proportional share of funding from the federal government increased significantly, and that from local government declined over time. In fact, between FY 2016 and FY 2018, federal funds toward capital expenses of small urban transit more than doubled.

[7] Fare revenue changed from $0 in FY 2016 and FY 2017 to $282,032 in FY 2018 because two of nine small urban transit agencies, the Albany Transit System ($178,815) and the Chatham Area Transit Authority Agency ($103,217), reported costs covered by fare revenues in FY 2018.

Table 17. Sources of capital costs of small urban transit.

	FY 2016		FY 2017		FY 2018		Average	
	Costs ($)	%	Costs ($)	%	Costs ($)	%	Costs ($)	%
Fare Revenue	0	0.00	0	0.00	282,032	1.42	94,011	0.65
Local	3,531,208	33.43	2,199,904	17.10	3,670,583	18.43	3,133,898	21.69
State	470,087	4.45	707,125	5.50	413,287	2.07	530,166	3.67
Federal	6,562,128	62.12	9,957,879	77.40	15,554,304	78.08	10,691,437	73.99
Total	*10,563,423*	*100*	*12,864,908*	*100*	*19,920,206*	*100*	*14,449,512*	*100*

Source: National Transit Database

CHAPTER 8 SMALL URBAN TRANSIT: ECONOMIC BENEFITS

This chapter summarizes the total benefits resulting from operational costs and capital costs combined. Similar to Scenario 1 in the rural transit study, the research team assumed that 90 percent of operating expenses and 50 percent of capital costs for small urban transit were spent within the state. All costs were averaged over time, for FY 2016, FY 2017, and FY 2018.

A total of $53,996,810 on average were spent annually on small urban transit, which is an estimated total benefit of almost $111 million in terms of increase in output. Thus, every dollar spent on small urban transit translates to $2.06 in economic benefits. The unit benefit is similar in magnitude to rural transit, though, of course, the total effect of small urban transit ($110,981,930; table 18) is much larger than the total effect of rural transit ($64,605,620; table 7).

Table 18. Economic impact of small urban transit.

Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
Direct Effect	189.9	2,282,649	3,160,932	7,224,756
Indirect Effect	1,264.70	28,253,877	37,768,106	76,059,167
Induced Effect	199.2	8,754,939	16,230,976	27,698,007
Total Effect	*1,653.80*	*39,291,465*	*57,160,014*	*110,981,930*

Note: All dollar amounts are expressed in 2017 dollars.

In terms of employment, rural transit generated a total of 942 jobs, whereas small urban transit generated 1,653 jobs. In both rural and small urban transit, most jobs were created due to the indirect effect. The direct effect from transit leads to creation of jobs for drivers, dispatchers, mechanics, etc. The indirect effect is when jobs are created in sectors that

support the transit sector; for instance, jobs are created in industries that supply vehicles, equipment, fuel, insurance, etc. The labor income from the indirect effect of small urban transit (i.e., more than $28 million) helped create nearly 200 additional jobs and led to an additional $8 million in income. Table 19 lists the top 10 sectors where the operation costs had the most economic impact. Apart from the transit and local transportation where most jobs were created (1272.6), new jobs were also created in insurance agencies, services to buildings, real estate, wholesale trade, and restaurants.

Table 19. Top 10 sectors with highest number of jobs created from operation costs of small urban transit.

Sector	Employment	Labor Income ($)	Value Added ($)	Output ($)
Transit and ground passenger transportation	1,188.10	14,013,501	19,405,400	44,353,778
Local government passenger transit	84.5	5,475,244	4,674,171	9,783,908
Insurance agencies, brokerages, and related activities	26.1	1,870,344	2,495,988	4,892,337
Services to buildings	19.1	349,480	415,560	737,740
Real estate	15.5	301,468	1,987,353	2,826,378
Employment services	14.7	591,067	867,721	1,170,991
Wholesale trade	14.1	1,209,554	2,330,501	3,410,546
Management consulting services	13.8	1,141,664	1,028,433	1,612,578
Full-service restaurants	13.2	290,812	319,549	630,768
Limited-service restaurants	12	214,576	520,513	967,812

Note: All dollar amounts are expressed in 2017 dollars.

Table 20 compiles the estimated impact of operational and capital costs of small urban transit on the economy in terms of tax revenues. Expenses on small urban transit resulted

in $2,180,261 in local and state taxes and $2,219,271 in federal taxes. Thus, for every dollar spent, $0.08 were received in terms of tax revenue. Most of the federal tax revenue was generated from labor income, whereas most of the state and local tax revenue resulted from sales tax on the output generated.

Table 20. Fiscal impact of small urban transit.

	Employee Compensation ($)	Proprietor Income ($)	Tax on Production and Imports ($)	Households ($)	Corporations ($)	Total ($)
State and Local Taxes	6,464	0	1,498,376	627,494	47,927	2,180,261
Federal Taxes	2,219,271	149,786	189,795	1,659,474	395,395	2,219,271

Note: All dollar amounts are expressed in 2017 dollars.

CHAPTER 9 SUMMARY AND CONCLUSIONS

In this report, the researchers estimated the economic costs and benefits of rural and small urban transit in Georgia. Georgia has one of the largest networks of rural transit in the country, with more than 80 transit agencies providing service to 114 rural counties. On the other hand, small urban areas were fewer (only nine counties) but had larger populations (more than 50,000) and hence larger transit budgets. The rural transit system in Georgia operates as a demand-responsive bus service, whereas the small urban transit system provides both fixed-route and demand-responsive service.

Transit cost data were compiled from the National Transit Database. Since transit costs tend to vary from year to year, these included data for the most recent three years (FY 2016, FY 2017, and FY 2018) and used the average costs in the economic impact models. Operating costs include costs of labor, fringe benefits, materials and supplies, maintenance, office space, equipment, and administrative costs. For rural transit, a large share (more than 40 percent) of the operating costs were covered by federal funds via programs such as the Rural Formula Program (5311) and the Enhanced Mobility of Seniors and Individuals with Disabilities Program (5310). A large share (57 percent) of the operating costs for small urban transit were covered by funds from the local government. Capital costs cover investments in physical assets, small (e.g., computers) and large (e.g., buses, garages, and maintenance facilities). Typically, operating costs are spent within the economy, whereas capital costs are at least partially spent out-of-state. Economic benefits were estimated separately for both operating and capital costs and for rural and small urban transit systems.

The research team also estimated multiple scenarios, where 25, 50, and 90 percent of capital costs were spent within the state.

Using rigorous input–output models based on a social accounting table with nearly 500 sectors, the researchers estimated the impact of rural and small urban transit on the state's economy. The model provided estimates in terms of the direct, indirect, and induced effect of transit expenditures. A direct effect of a transit system is the production of output in terms of transport service, capital investment, and creation of jobs in the transportation section. The indirect and induced effects occur due to the multiplier effect. For instance, capital expenses spent within the state toward purchasing vehicles, equipment, etc. have a multiplier effect in terms of generating more jobs and labor income in industries that produce these vehicles and equipment. Total output increases indirectly when there is increased production of parts needed to manufacture buses and vans used in public transit. The indirect effect leads to a further increase in production, which is called the induced effects, when, for example, workers spend money on restaurants and groceries and help fuel further economic growth.

A total of $85.5 million were spent annually by rural and small urban transit systems in Georgia, assuming 90 percent of operating costs and 50 percent of capital costs were spent within the state. Table 21 shows the economic impact of rural and small urban transit combined. The economic impact analysis model estimated that this expenditure resulted in a total of $175.6 million in economic benefits. Of that total economic benefit, about $10.1 million were generated as a direct impact of the transit expenditure, about $121.6 million resulted from the indirect impact of transit expenditure, and the remaining $43.9 million were due to the induced impact of transit expenditure. Thus, for every dollar

invested in transit, $2.05 were generated in economic benefits. These estimates are consistent with the literature on transit benefits. In addition to the increase in total output, rural and small urban transit led to the creation of an estimated nearly 2,600 jobs annually within Georgia. Economic benefits from rural and small urban transit led to $5.9 million annually in state and local taxes and $12.5 million in federal taxes (see table 21).

Table 21. Economic impact of rural and small urban transit combined.

Impact Type	Employment	Labor Income ($)	Value Added ($)	Output ($)
Direct Effect	265.1	3,190,667	4,418,324	10,085,821
Indirect Effect	2,017.7	45,313,824	60,506,805	121,587,284
Induced Effect	313.3	13,906,915	25,782,320	43,914,445
Total Effect	*2,596*	*62,411,405*	*90,707,450*	*175,587,550*

Note: All dollar amounts are expressed in 2017 dollars.

Table 22. Fiscal impact of rural and small urban transit combined.

	Employee Compensation ($)	Proprietor Income ($)	Tax on Production and Imports ($)	Households ($)	Corporations ($)	Total ($)
State and Local Taxes	17,428	0	4,055,138	1,694,042	130,122	5,896,730
Federal Taxes	5,983,762	406,830	513,653	4,480,073	1,073,497	12,457,815

Note: All dollar amounts are expressed in 2017 dollars.

The fact that the analysis is limited by the scope and extent of data available should be underscored. For instance, the National Transit Database that was used was available by the source of the funding agency. The research team did not have data on how the operating cost or the capital expenses were disbursed. Thus, the estimated economic benefits were based on certain assumptions. Furthermore, based on the data available, economic benefits

(e.g., increase in output and employment) have been estimated, but social benefits (e.g., savings in transportation costs) or environmental benefits (e.g., improved air quality) from rural/small urban transit have not been estimated. For instance, in order to estimate travel time cost savings, data on average trip length and cost of alternative trips are needed, or to estimate environmental benefits, data on public transit emission costs are needed, and so on (see Godavarthy et al. 2015). This level of detailed data is not available currently for rural and small urban transit in Georgia. If including the social and environmental benefits, then a much higher impact of investment in rural and small urban transit could be expected. The values in the study, thus, can be treated as conservative estimates of the overall impact of rural and small urban transit in Georgia.

Finally, note that in 37 counties in Georgia, there is no transit service available. Volume 2 of this report discusses in detail this gap in current transit service in the state and offers some suggestions as to how to improve the transit coverage. If all counties in the state had transit available, the anticipated economic impact would definitely be of greater magnitude.

APPENDIX

Table 23. Average operating and capital costs for rural transit by provider.

Counties	Average Operating Costs ($)	Average Capital Costs ($)
Americus, City of	198,245	43,180
Bacon County	96,874	15,870
Baldwin County	124,983	45,003
Banks County	98,095	13,180
Bartow County	522,028	109,479
Ben Hill County	378,285	84,085
Berrien County	124,064	29,070
Bleckley County	114,787	26,298
Brantley County	44,235	12,847
Brooks County	266,933	14,020
Burke County	272,678	116,888
Catoosa County	558,823	101,091
Cedartown, City of	57,406	15,001
Chattooga County	146,761	22,502
Cherokee County	677,006	99,088
Clay County	293,085	62,488
Coastal Regional Commission	3,982,215	792,002
Columbia County Commission Transit	570,180	84,008
Cook County	366,498	45,866
Coweta County	407,470	45,761
Crawford County	120,485	0
Crisp County	447,128	78,142
Dade County	285,445	28,873
Dawson County	238,004	58,223
Dodge County	177,792	28,787
Dooly County	517,061	62,586
Elbert County	241,134	60,159
Fannin County	268,440	94,241
Forsyth County	379,269	15,001
Gilmer County	214,221	29,301
Glascock County	78,053	43,180
Gordon County	213,552	22,734
Greene County Commission Transit	318,442	65,767
Habersham County	99,019	28,189

Hall County	241,663	0
Hancock County	144,859	26,925
Haralson County	178,666	41,455
Hart County	110,170	22,959
Heard County	130,332	25,101
Henry County	925,827	99,271
Jackson County	212,698	41,402
Jefferson County	339,020	70,224
Jenkins County	49,265	15,466
Jones County	160,526	45,003
Lincoln County	80,071	0
Lower Chattahoochee Regional Transit Authority	977,786	279,400
Lowndes County	476,353	99,125
Lumpkin County	155,038	13,683
Macon County	159,501	30,002
McDuffie County Commission Transit	246,226	45,003
Morgan County	321,071	73,923
Murray County	278,421	98,476
Paulding County	260,023	123,691
Peach County	163,393	13,119
Pickens County	240,184	45,126
Pierce County	311,404	72,976
Pulaski County	63,740	0
Putnam County Commission Transit	218,392	31,179
Rabun County	179,463	28,181
Richmond County + City of Augusta	322,319	75,005
Southwest Georgia Regional Commission	5,428,863	932,746
Social Circle Area Transit	95,285	14,540
Talbot County	385,763	16,413
Taliaferro County Board of Commissioners	58,510	0
Taylor County	216,684	58,319
Telfair County	132,839	15,001
Thomas County	1,041,862	140,929
Three Rivers Regional Commission	1,150,049	288,117
Tift County	239,126	45,003
Towns County	89,489	15,001
Troup County	199,438	72,200
Turner County	153,948	28,162
Twiggs County	116,549	11,966
Union County	65,099	26,361
Walker County	573,324	65,793

Ware County	246,101	57,174
Warren County Commission Transit	109,377	13,129
Wayne County	414,610	127,423
Wheeler County	131,305	13,200
Whitfield County W.T.S.	662,030	48,973
Wilcox County	162,717	43,192
Wilkes County Commission Transit	186,793	43,180
Wilkinson County	182,463	22,502

Note: All costs are averaged over FY 2016, FY 2017, and FY 2018.

Table 24. Average operating and capital costs for small urban transit by cities.

City	County	Average Operating Costs ($)	Average Capital Costs ($)
Albany	Dougherty	3,530,165	2,465,218
Athens	Clarke	5,951,828	1,489,590
Augusta	Richmond	4,635,073	4,782,389
Columbus	Muscogee	4,299,441	2,351,677
Gainesville	Hall	1,371,701	48,466
Hinesville	Liberty	737,566	45,167
Macon	Bibb	6,599,451	575,545
Rome	Floyd	3,237,457	671,991
Savannah	Chatham	21,606,266	2,019,470

Note: All costs are averaged over FY 2016, FY 2017, and FY 2018.

ACKNOWLEDGMENTS

The authors thank the Georgia Department of Transportation (GDOT) for its support. The work conducted for this report was sponsored by the GDOT Office of Performance-based Management and Research and supported by the Intermodal Division under Research Project 18-14. The authors especially acknowledge the assistance provided by this group. The support and valuable inputs provided by Carol Comer, Nancy Cobb, Leigh Ann Trainer, Kaycee Mertz, Ryan Walker, Sunil Thapa, and Supriya Kamatkar in the course of this research project are highly appreciated. The authors also thank Xiaoyu Dong, who worked as a research assistant, and Sharon Dunn, who edited the report prior to submission.

REFERENCES

American Community Survey (ACS). (2017). American Community Survey Data. United States Census. Available online: https://www.census.gov/programs-surveys/acs/data.html.

Baum-Snow, N. and Kahn, M.E. (2000). "The Effects of New Public Projects to Expand Urban Rail Transit." *Journal of Public Economics,* 77(2), pp. 241–63.

Bollinger, C.R. and Ihlanfeldt, K.R. (1997). "The Impact of Rapid Rail Transit on Economic Development: The Case of Atlanta's MARTA." *Journal of Urban Economics*, 42, pp. 179–204.

Bureau of Transportation Statistics (BTS). (2011). "The U.S. Rural Population and Scheduled Intercity Transportation in 2010: A Five Year Decline in Transportation Access." Bureau of Transportation Statistics website. Available online: https://www.bts.gov/archive/publications/scheduled_intercity_transportation_and_the_us_rural_population/2010/entire

Burkhardt, J.E. (1999). "Economic Impact of Rural Transit Services." *Transportation Research Record: Journal of the Transportation Research Board*, 1666(1), pp. 55–64.

Burkhardt, J.E., Hedrick, J.L., and McGavock, A.T. (1998). *Assessment of the Economic Impacts of Rural Public Transportation.* TCRP Report 34, Washington, DC, National Academy Press. Available online: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_34.pdf.

Chu, X. (2013). *A Tool for Assessing the Economic Impacts of Spending on Public Transit.* Report No. CUTR-NCTR-RR-201-08, Center for Urban Transportation Research, University of South Florida, National Center for Transit Research. Available online: https://doi.org/10.5038/CUTR-NCTR-RR-2012-08.

Clarke, W., Kane, S., and Shepherd, T. (2012). *The Economic Impact of Metropolitan Atlanta Rapid Transit Authority on the Economy and Labor Mobility of the Region*. Carl Vinson Institute of Government, University of Georgia, Athens, GA.

Edrington, S., Brooks, J., Cherrington, L., Hamilton, P., Hansen, T., Pourteau, C., and Sandidge, M. (2014). *Guidebook: Managing Operating Costs for Rural and Small Urban Public Transit Systems.* Project 0-6694-P3, Texas A&M Transportation Institute, College Station, TX. Available online: https://d2dtl5nnlpfr0r.cloudfront.net/tti.tamu.edu/documents/0-6694-P3.pdf.

Federal Transit Administration (FTA). (2018). *2017 National Transit Summary and Trends*. National Transit Database, Office of Budget and Policy, Washington, DC. Available online: https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/ntd/130636/2017-national-transit-summaries-and-trends.pdf.

Ferrell, C.E. (2015). *The Benefits of Transit in the United States: A Review and Analysis of Benefit–Cost Studies*. Report WP 12-04, Mineta Transportation Institute, San Jose State University, San Jose, CA. Available online: https://transweb.sjsu.edu/sites/default/files/1425-US-transit-benefit-cost-analysis-study.pdf.

Garrow, L.A., Douthat, T.H., Yang, W., Nord, A., Rao, P., and Douglass, S. (2018). *Rural and Small Urban Transit Systems in Georgia*. Technical Report, Department of Civil & Environmental Engineering, Georgia Institute of Technology, Atlanta, GA. Available online: http://garrowlab.ce.gatech.edu/sites/default/files/201812%20Rural%20and%20Small%20Urban%20Transit%20in%20GA.pdf.

Godavarthy, R.P., Mattson, J., and Ndembe, E. (2015). "Cost–Benefit Analysis of Rural and Small Urban Transit in the United States." *Transportation Research Record: Journal of the Transportation Research Board*, National Research Council, Washington, DC, 2533(1), pp. 141–48.

Litman, T. (2017). *Public Transportation's Impact on Rural and Small Towns: A Vital Mobility Link*. American Public Transportation Association, Washington, DC. Available online: https://www.apta.com/wp-content/uploads/Resources/resources/reportsandpublications/Documents/APTA-Rural-Transit-2017.pdf.

Mattson, J. (2017). *Rural Transit Fact Book*. Report SURLC 17-007, Upper Great Plains Transportation Institute, North Dakota State University, Fargo, ND. Available online: https://www.ugpti.org/surcom/resources/transitfactbook/downloads/2017-rural-transit-fact-book.pdf.

Mattson, J. and Hough, J. (2015). *Identifying and Satisfying the Mobility Needs of North Dakota's Transit System*. Department Publication No. 280, Upper Great Plains Transportation Institute, North Dakota State University, Fargo, ND. Available online: https://www.ugpti.org/resources/reports/downloads/dp-280.pdf.

Mayer, T. and Trevien, C. (2017). "The Impact of Urban Public Transportation Evidence from the Paris Region." *Journal of Urban Economics*, 102(C), pp. 1–21.

Penet, B. (2010). *Costs and Benefits of Public Transit in South Dakota*. Final Report, Study SD2010-01-F, South Dakota Department of Transportation, prepared by HDR Decision Economics, Silver Spring, MD. Available online: http://www.sddot.com/transportation/transit/Docs/SDDOTPublicTransitResearchProject.pdf.

Peng, Z.R. and Nelson, A.C. (1998). "Rural Transit Services: A Local Economic and Fiscal Impact Analysis." *Transportation Research Record: Journal of the Transportation Research Board,* 1623, pp. 57–62.

Southworth, F., Vogt, D.P., and Curlee, T.R. (2004). "Estimation of Statewide Urban Public Transit Benefits in Tennessee." *Transportation Research Record: Journal of the Tranportation Research Board,* 1887(1), pp. 83–91.

Weisbrod, G., Cutler, D., and Duncan, C. (2014). *Economic Impact of Public Transportation Investment: 2014 Update*. American Public Transportation Association, Washington, DC. Prepared by Economic Development Research Group, Inc., Boston, MA. Available online: https://cdn.masstransitmag.com/files/base/cygnus/mass/document/2014/05/economic-impact-public-transpo_11465813.pdf.