



InMotion

A STUDY OF GEORGIA'S
LOGISTICS INDUSTRY IN 2021

SELIG CENTER FOR ECONOMIC GROWTH
TERRY COLLEGE OF BUSINESS
UNIVERSITY OF GEORGIA
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Economic Growth
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InMotion

A Study of Georgia's
Logistics Industry in 2021



PROLOGUE

Executive Summary

In Motion analyzes the size and scope of Georgia's logistics industry and its economic impact on the state. It also discusses the industry's employment growth, occupations, and prospects for growth. The analysis includes only those industries involved in the moving and storing of cargo, as well as related operations and services.

The fundamental finding is that Georgia's logistics industry is a substantial and dependable source of jobs, economic activity, and economic growth. Logistics providers in the private and public sectors are pillars and drivers of Georgia's economy that generate jobs, income, sales, greater production of goods and services, and higher tax collections. The large number of economic development announcements over the last few years strongly implies that the prospects for Georgia's logistics industry are very good.

Industry Size and Scope

Based on Mergent Intellect data pulled in August 2021, the transportation and logistics industry employed 251,772 people across Georgia, comprising 5.5 percent of total nonfarm employment in the state—about one in twenty jobs. The private sector accounted for 86 percent of transportation and logistics employment with the public sector accounting for the rest. At just over 14 percent, the proportion of these transportation and logistics government jobs was on-par with the overall proportion of government jobs in the state.

The Atlanta Service Delivery Region (SDR 3) ranked number one by employment in all transportation subsectors categories except water transportation. Nearly two-thirds of Georgia's transportation and logistics employment was in SDR 3. The Coastal SDR (SDR 12) accounted for about 7 percent and ranked number one in water employment. Northwest Georgia was the

third largest SDR by employment and ranked second in road transportation employment.

Of the four transportation and logistics sectors defined by the Selig Center, transportation was the largest with 177,161 private sector jobs. Delivery services and warehousing services were the second- and third largest by private employment with 20,227 jobs and 18,249 jobs, respectively. Logistics services was the smallest sector with 2,085 jobs.

Within the transportation industry, road transportation had the largest number of employees in Georgia, making up 52 percent of private transportation employment. Air and freight transportation arrangement each comprised around 20 percent. Rail accounted for nearly 8 percent and water made up the smallest proportion of transportation jobs at with just over 1 percent.

Economic Impact

The logistics industry's operations generate substantial economic impacts for those who live, work, and do business in Georgia. The total output impact of Georgia's logistics industries was \$83.4 billion in 2021. Of the \$83.4 billion output impact, \$43.3 billion (52 percent) was direct spending by logistics providers, while \$40.1 billion (48 percent) was the indirect and induced re-spending impact (or the multiplier effect). On average, every dollar of initial/direct spending generated an additional 93 cents for Georgia's economy. Georgia's logistics providers generated a value-added impact of \$46.6 billion which accounts for 56 percent of the \$83.4 billion output impact (with domestic and foreign trade comprising the remaining 44 percent of the output impact). The logistics industry generated \$2.2 billion in tax revenues for the state and \$2.3 billion in tax revenues for local governments.

Georgia's logistics providers generated a

labor income impact of \$29.5 billion in 2021. The labor income received by Georgians represents 63 percent of the value-added impact and 8 percent of Georgia's total labor income. In 2021, Georgia's logistics industry, including both the private and public sectors, supported 495,064 jobs, or about one in ten jobs in Georgia. Of the 2021 total employment impact, 239,406 jobs represent direct employment; 255,655 jobs constitute indirect and induced effect of direct employment (spending), or the multiplier (re-spending) impact. For every direct job in the logistics industry, 1.11 additional jobs exist in other industries because of spending related to logistics providers.

Employment Trends

Employment growth in transportation and logistics in Georgia outpaced the nation over both the five- and ten-year periods leading up to 2020. Georgia's five-year employment growth significantly outpaced the nation in road transportation, freight transportation arrangement, and warehousing services. Warehousing services alone constituted more than a third of Georgia's transportation and logistics employment and grew by just under 140 percent from 2010 to 2020. Warehousing services employment was 37 percent more concentrated in Georgia than in the U.S. Within warehousing and storage, farm product and refrigerated warehousing and storage were particularly more concentrated here than in the U.S., reflecting Georgia's strong agricultural and food manufacturing industries.

E-commerce was not found to be a primary driver of employment in the transportation and warehousing sector, but it appears to have a significant influence on couriers and messengers and warehousing and storage. Both industries experienced an upward inflection in employment growth in 2015 as online sales crossed 6 percent of total retail sales in the U.S. Couriers and messengers also began to experience seasonality in its employment in 2013 as e-commerce became

more popular for holiday shopping.

The pandemic recession had a varied effect on industry sectors in the U.S. and Georgia. Arts, entertainment, and recreation suffered the greatest drop in employment followed by accommodation and food services. Across the country and in Georgia, the transportation and warehousing sector lost less than 10 percent of its jobs at the height of shutdowns, and quickly rebounded to net employment growth as of October 2020. As of December 2021, employment in transportation and warehousing was 21 percent above its pre-pandemic peak in Georgia and 16 percent above its national pre-pandemic peak.

Occupational Employment and Wages

The Occupational Employment and Wage Statistics (OEWS) survey categorizes employees by job title rather than by industry of employer. Our analysis focused on occupations involved in the movement or storage of freight and cargo. The OEWS produced the largest total employment of all sources examined in this report. OEWS category Transportation and Materials Moving Occupations accounted for one in ten, or 441,910 jobs in Georgia. Georgia ranked eighth in the nation by concentration of these jobs.

Occupations in transportation and logistics as defined by the Selig Center was slightly broader (e.g., added couriers and messengers and postal service workers) and expanded the total to 475,890 jobs, or 11 percent (one out of every nine jobs in Georgia). This was a significantly higher proportion of jobs than our estimate from Mergent Intellect, where the transportation and logistics comprised 5.5 percent of Georgia's total employment. Across all occupations in Georgia, average annual wages were \$51,940. Transportation and materials moving occupations made significantly less at \$36,650. There was a wide variation in average wages across different occupations. Air traffic controllers had the highest annual average wages (\$144,450) while packers and packagers, and couriers and messengers had

the lowest annual pay at \$25,430 and \$26,800 respectively.

Industry Prospects

Although Georgia's transportation and logistics industry generally rises and falls with the overall economy, we expect it to grow faster than the overall economy thanks to the abundance of projects in the pipeline. Higher spending by U.S. consumers on American-made goods as well as traded goods will increase demand for transportation and logistical services. There is a strong possibility that the pandemic caused a structural shift in consumers' spending patterns that favors goods over services, and the consumption of goods is more transportation intensive. Oil price shocks and other effects of the war in Ukraine increase the risk of recession to at least 40 percent, but it is very likely that the U.S. economic expansion will continue and business conditions for providers of transportation and logistical services should be conducive to growth.

Construction is one of the most transportation-intensive sectors of the economy. Residential and non-residential construction activity will increase, especially construction of public-funded projects. Local specialized freight trucking firms will benefit from higher construction activity due to their focus on moving construction materials short distances.

The digitization of the freight brokerage process is a disruptor, however. Digital freight matching platforms that use web-based platforms and mobile apps to match shippers with carriers are replacing many of the traditional manual processes. With venture capital's increased attention, well-funded startups are developing and will support the growth of digital freight matching.

High fuel prices will strongly favor rail and water transportation. The Georgia Port Authority's recent efficiency and capacity additions will be put to immediate use because higher demand for consumer goods, the need to replenish inventories, increases in industrial production,

and the build out of new economic development projects will increase shipments through Georgia's ports. One long-term risk is protectionism that could reduce the volume of imports and exports. Because maritime commerce constitutes a larger part of Georgia's economy than the nation's economy, a perpetual, more intense trade war would be especially problematic for Georgia and its prospects for growth.

About the Sources

Multiple data sources were used in this analysis, and we selected an appropriate data source for each of the five sections. This approach allowed each source's strengths to be leveraged and its limitations considered based on the purpose of each section. Consequently, the statistics and totals derived from the source utilized in one section do not match those from other sections based on another source. Because of this, sections should be viewed as complementary with each examining a different aspect of Georgia's transportation and logistics sector.

Mergent Intellect

The Mergent Intellect database is the primary source for the Industry Size and Scope and Economic Impact sections. Strengths of this subscription database include up-to-date information and level of detail. Establishment data is provided at the 6-digit North American Industry Classification System (NAICS) and 8-digit Standard Industrial Classification (SIC) industry code levels, allowing more precise targeting and counting of relevant industries.

Another feature of Mergent Intellect's dataset is that it includes geographic information as specific as street addresses, allowing for determination of an establishment's Service Delivery Region (SDR). The establishments data are available without major exclusions related to the size, ownership, or legal form of organization, and include government-owned operations within the transportation and logistics sector. The dataset does not allow for comparisons over time, however.

U.S. Bureau of Labor Statistics

• Quarterly Census of Employment and Wages

The publicly available Quarterly Census of

Employment and Wages (QCEW), published by the U.S. Bureau of Labor Statistics, is the source we relied on for employment trends. Since the transportation and logistics sector is subject to seasonal employment changes, we chose to examine QCEW's annual averages rather than quarterly data. The QCEW publishes measures of employment and wages of workers covered by state unemployment insurance laws, and federal workers covered by the Unemployment Compensation for Federal Employees program. QCEW data excludes proprietors, and many self-employed workers, domestic and farm workers, as well as railroad workers covered by the railroad unemployment insurance system, and many elected federal officials. The data are reported by employers and cover over 95 percent of U.S. jobs.

In addition, QCEW provides a location quotient statistic (LQ). Throughout this section we reference LQs that reflect the concentration—or relative size—of employment in Georgia versus the U.S. In some cases, LQ was not provided by the QCEW, and Selig Center performed the calculation. For example, an LQ of 1.0 indicates that the industry's relative size to Georgia's overall employment is equal to that of the nation. An LQ greater than 1.0 indicates that the industry is more concentrated in Georgia than the U.S.; an LQ less than 1.0 indicates that employment in the industry is less concentrated in Georgia than in the U.S.

• Occupational Employment and Wages Survey

The QCEW and NES cover all employees in establishments classified under industries that fall within the scope of this study. This includes employees directly involved in movement of materials (drivers, equipment operators, air traffic controllers), as well as employees with indirect involvement (office managers and IT specialists). Conversely, neither dataset includes workers who

perform movement of materials tasks but are employed in other industries, such as truck drivers employed in retail, wholesale, or manufacturing establishments. To capture these workers, we used the Occupational Employment Statistics, supplied by the US. Bureau of Labor Statistics. As such, the number of employees presented in this part of the report is larger than the numbers presented in other sections.

Like QCEW, data from self-employed persons are not collected and are not included in the estimates. Individual occupational employment and wage estimates may be withheld from publication for several reasons, including failure to meet BLS quality standards or the need to protect the confidentiality of survey respondents.

Since 2018, OEWS renamed and reclassified several occupations based on changes to the Standard Occupational Classification System (SOC). One example is “Stockers and order fillers”, which was renamed from “Stock Clerks and order fillers” and reclassified from “office and administrative support” to “transportation and materials moving” occupations. Due to reclassifications, the total number of transportation and materials moving occupations cannot be compared between the 2018 and 2021 reports.

• **Current Employment Statistics**

The Bureau of Labor Statistics Current Employment Statistics (CES) program produces detailed industry estimates of employment, hours, and earnings of workers on nonfarm payrolls. Like QCEW, establishments are classified in an industry based on their principal product or activity in accordance with NAICS. Establishments are included based on Unemployment Insurance (UI) administrative records, so workers who are not covered by UI will not be captured. We utilized seasonally unadjusted monthly employment figures at the state and national level to examine the impact of the COVID-19 recession on transportation and logistics employment.

Federal Reserve

• **FRED E-Commerce**

To examine the effect of e-commerce on transportation and logistics employment, we utilized the FRED e-Commerce Retail Sales as a Percentage of Total Sales, Not Seasonally Adjusted (ECOMPCTNSA) data. Updated quarterly, e-commerce sales are defined by the FRED as sales of goods and services where the buyer places an order, or the price and terms of the sale are negotiated on the internet. Payment may or may not be made online. Based on this definition, sales on eBay, Amazon, or other online retailers are obviously included, but this also includes buy online, pickup in-store options offered by retailers like Walmart.

SECTION 1

Industry Size and Scope

Based on Mergent Intellect data pulled in August 2021, the transportation and logistics industry employed 251,772 people in Georgia. This comprised 5.5 percent of total nonfarm employment in the state, or about one in twenty jobs and included both private and government employees. About 14 percent of transportation and logistics employment (34,050 jobs) was within government and the remaining 86 percent (217,722 jobs) was private. The proportion of transportation and logistics government jobs was on-par with the overall proportion of government jobs in the state (14.7 percent).

The Selig Center categorized government employment into three groups: transportation regulation and administration, postal service, and airport operations. The first group constituted 45.3 percent of government transportation and logistics employment in Georgia (15,423 jobs). The postal service constituted 41.9 percent (14,268 jobs) and airport operations had 4,359 jobs (12.8 percent). Within transportation regulation and administration, the largest proportion of employment was at the state government level with 10,742 jobs; the second-largest proportion was at the federal level with 2,972 jobs. County, city, and other government employment made up the remaining 1,709 jobs.

Private transportation and logistics employment fell into one of four sectors: transportation, delivery services, warehousing services, and logistics services. Transportation was the largest sector by far, with 177,161 jobs or 81.4 percent. Delivery and warehousing were the second- and third-largest sectors by employment with 20,227 jobs (9.3 percent) and 18,249 jobs (8.4 percent), respectively. Logistics services was the smallest sector with 2,085 jobs or about 1 percent.

Within transportation, road had the largest

number of employees in Georgia, making up 52.2 percent of private transportation employment. Air had the second-largest number of employees with 20.7 percent, followed by freight transportation arrangement with 18.1 percent and rail with 7.9 percent. Water made up the smallest proportion of transportation jobs at 1.1 percent. Average employment per establishment differed significantly based on the mode of transportation. Air had the highest number of employees per establishment at 29, while road had the lowest at four employees per establishment. This reflects the structure of the subsectors. Air transportation requires heavy investment into equipment and maintenance, concentrating employment into fewer, larger establishments that can maintain the scale needed to be profitable. On the opposite side of the spectrum, road establishments are often self-employed truckers who own a single truck.

The Atlanta Service Delivery Region (SDR 3) ranked first by employment in all transportation subsectors categories except water. Just under two-thirds (63.5 percent) of all Georgia transportation and logistics employment was in SDR 3. The Coastal SDR (SDR 12) made up 6.8 percent of employment in the state and ranked first in water employment. Northwest Georgia was the third largest SDR by employment with 5.3 percent and ranked second in road employment.

Table 1
Private Establishments and Employment
in Georgia's Logistics and Transportation Industry

<u>Sector / Subsector</u>	<u>Number of Establishments</u>	<u>Private Employment</u>
Totals by Sector		
Transportation	28,707	177,161
Logistics services	370	2,085
Delivery services	1,390	20,227
Warehousing services	1,623	18,249
Total	32,090	217,722
Transportation		
Air	1,262	36,719
Road	20,717	92,426
Rail	1,726	13,942
Water	363	2,031
Freight transportation arrangement	4,639	32,043
Logistics Services		
Transportation consultants	35	73
Materials management	335	2,012
Delivery Services		
Couriers and express delivery services	1,269	19,361
Local messengers and local delivery	121	866
Warehousing Services		
Farm product warehousing and storage	1,341	14,754
General warehousing and storage	102	1,873
Refrigerated warehousing and storage	76	482
Packing, crating, and containerization	10	30
Other warehousing operations	94	1,110

Source: Mergent Intellect, 2021.

Figure 1
Transportation and Logistics Employment by Sector

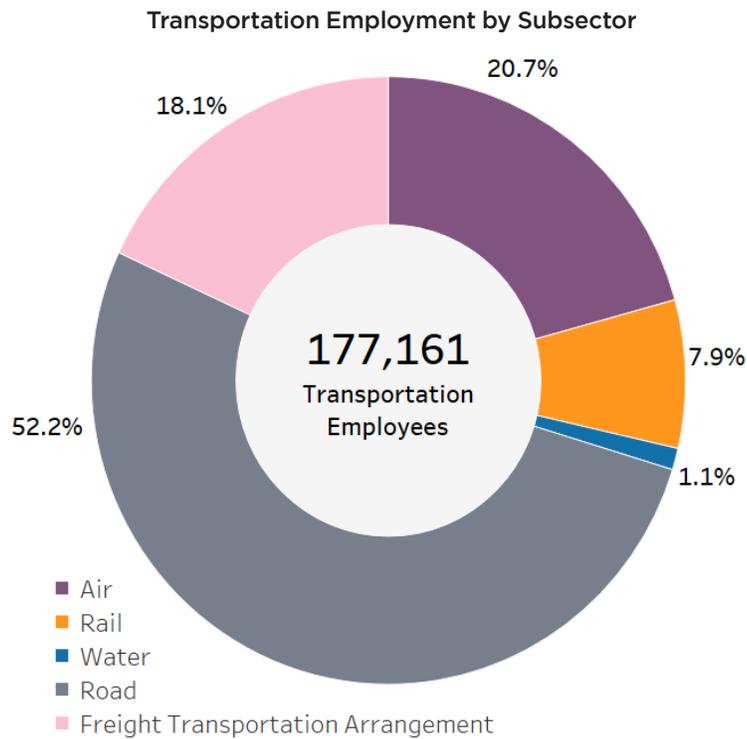
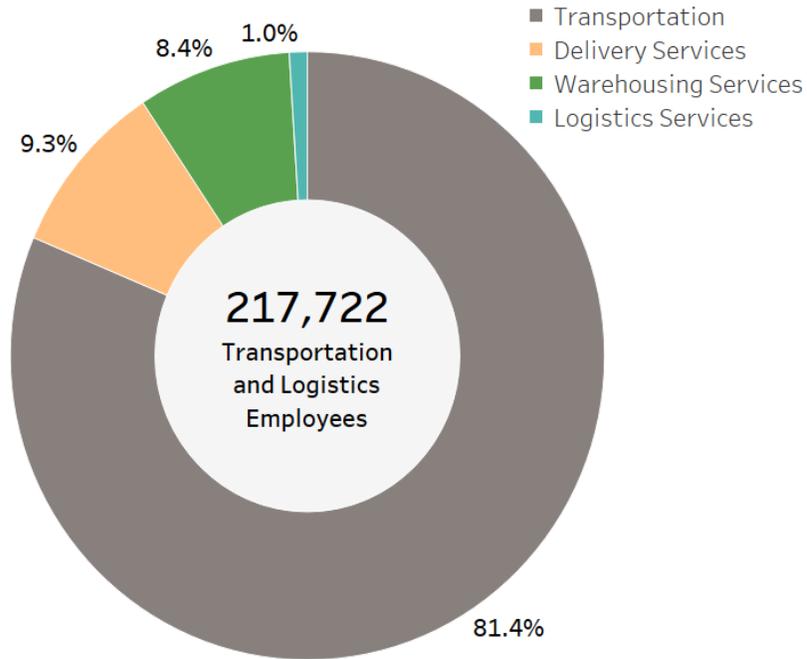


Table 2
Air Industry Establishments and Employment
in Georgia

<u>Industry / Group</u>	<u>Number of Establishments</u>	<u>Private Employment</u>
Air freight transportation	50	28,115*
Air supporting operations	945	5,650
Air supporting services	267	2,954
Total	1,262	36,719
Air Freight Transportation		
Air cargo carriers, scheduled	42	27,894*
Air cargo carriers, nonscheduled	8	221
Air Supporting Operations		
Air freight handling	14	226
Airport control tower operation	2	7
Airport flying field and services	920	5,360
Hangar operations and aircraft storage services	7	49
Other airport operation services	2	8
Air Supporting Services		
Aircraft cleaning, upholstery repairs	44	244
Aircraft maintenance, repair and servicing	203	2,174
Road and airport lot maintenance services	20	536

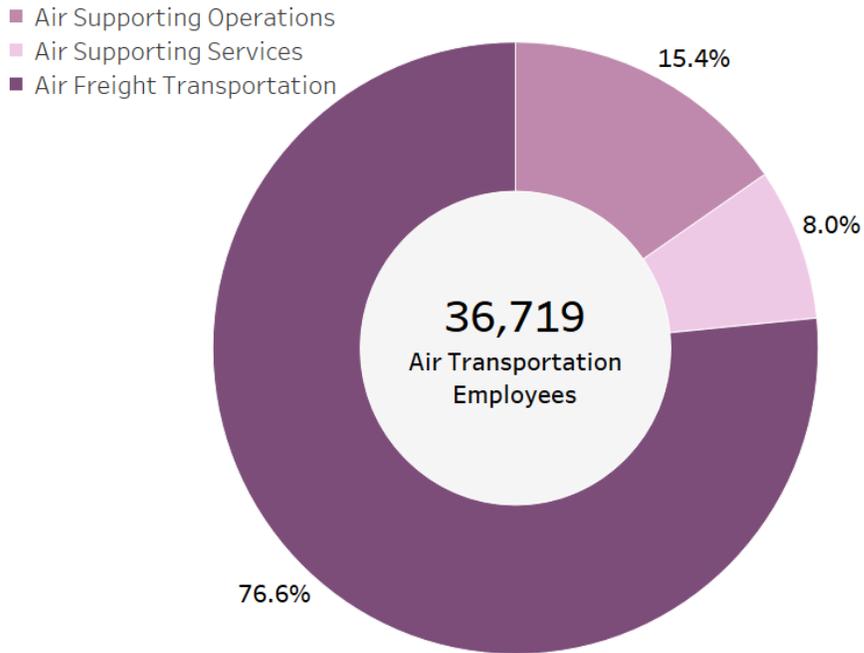
Top 3 Service Delivery Regions by Employment

- 1 SDR 3
- 2 SDR 12
- 3 SDR 6

*Delta attributed 27,100 employees to the SIC code 45129901 "Air cargo carrier, scheduled." We are aware that this number is likely Delta's statewide employment, including passenger air. Since most air cargo travels in the cargo hold of passenger planes, we left this number as-is.

Source: Mergent Intellect, 2021.

Figure 2
Air Transportation Employment by Industry



Air Transportation Employment by Subsector

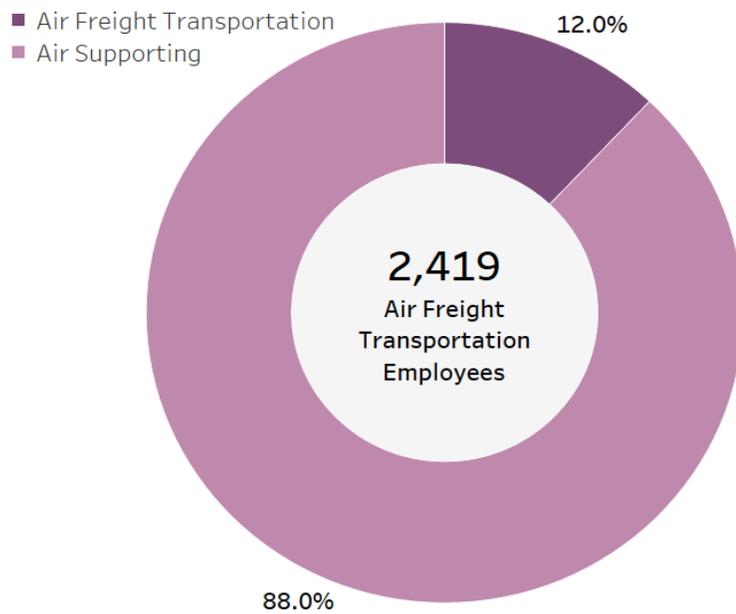


Table 3
Road Transportation Industry Establishments and Employment
in Georgia

<u>Industry / Group</u>	<u>Number of Establishments</u>	<u>Private Employment</u>
Local road transportation	15,010	52,471
Long distance road transportation	5,356	38,704
Road supporting operations	310	1,000
Road supporting services	41	251
Total	20,717	92,426
Local Road Transportation		
Dump truck	397	1,701
Farm and animal	34	177
Liquids	28	270
Lumber and timber	57	187
Trucking and delivery	14,438	49,572
Other road transportation	56	564
Long Distance Road Transportation		
Automobiles	278	1,877
Building materials	20	288
Heavy hauling and heavy machinery	299	1,774
Liquid	17	366
Long distance trucking	4,587	33,702
Mobile homes	93	341
Refrigerated products	41	249
Trailer or container	21	107
Road Supporting Operations		
Inspection services	66	142
Toll, weighing, terminal facilities	244	858
Road Supporting Services		
Other road transportation services	41	251
Top 3 Service Delivery Regions by Employment		
1 SDR 3		
2 SDR 1		
3 SDR 12		

Note: Mergent Intellect appears to better capture the local and long-distance road transportation industry. When summed, local and long-distance road transportation employ 91,175 truckers according to the 2021 Mergent Intellect data. This is an 89.9 percent increase over the 48,022 truckers from the 2018 Dun and Bradstreet data. The Mergent Intellect 2021 employment total for local and long-distance road transportation comes much closer to the May 2020 OES estimate of 93,530 heavy and light truck drivers in Georgia.

Source: Mergent Intellect, 2021.

Figure 3
Road Transportation Employment by Industry

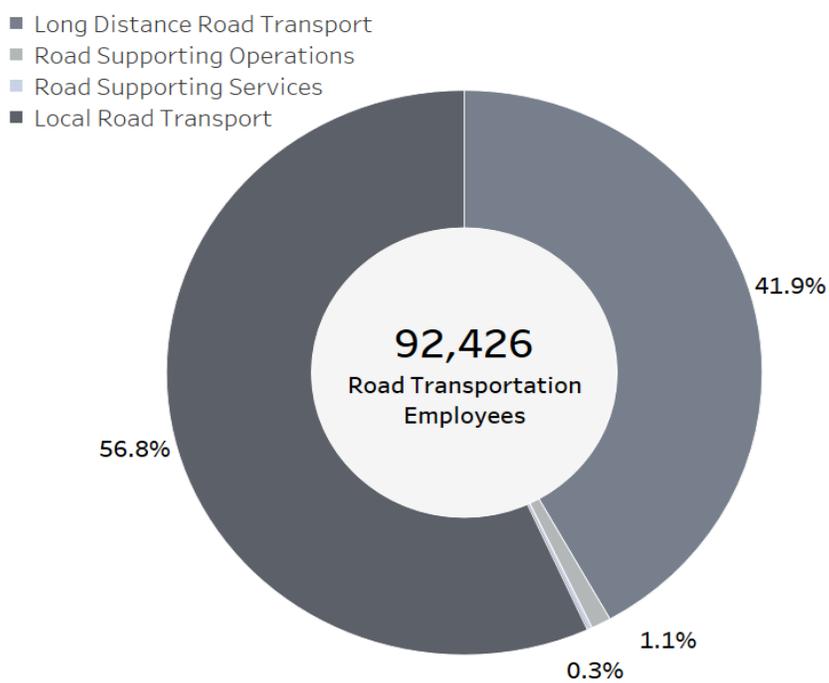


Table 4
Rail Transportation Establishments and Employment
In Georgia

<u>Industry / Group</u>	<u>Number of Establishments</u>	<u>Private Employment</u>
Rail transportation	204	3,901
Rail transportation support operations	1,488	9,259
Rail transportation support services	34	782
Total	1,726	13,942
Rail Transportation		
Belt line railroads	1	3
Railroads, line-haul operating	195	3,812
Interurban railroads	8	86
Rail Transportation Support Operations		
Railroad cargo services, loading, unloading	1,464	8,418
Railroad terminals and switching services	24	841
Rail Transportation Support Services		
Rail car cleaning, temp control, ventilation, repair, maintenance	34	782

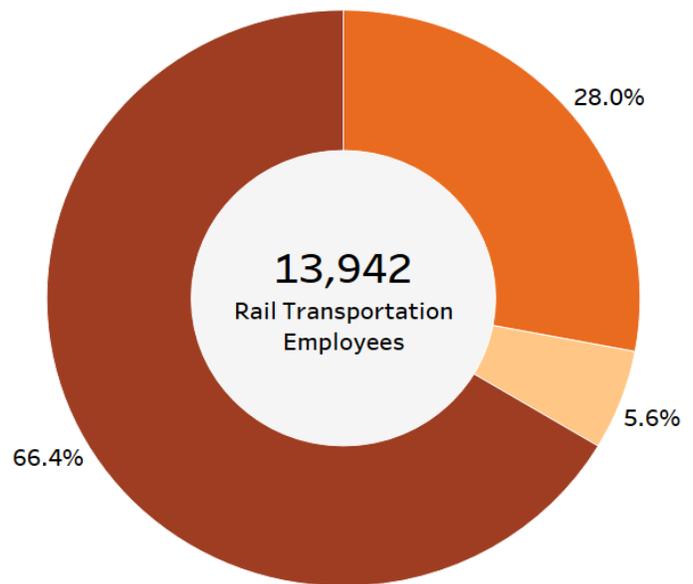
Top 3 Service Delivery Regions by Employment

- 1 SDR 3
- 2 SDR 12
- 3 SDR 6

Source: Mergent Intellect, 2021.

Figure 4
Rail Transportation
Employment by Industry

- Rail Transportation
- Rail Support Services
- Rail Support Operations



**Table 5
Water Transportation Establishments and Employment
In Georgia**

<u>Industry / Group</u>	<u>Number of Establishments</u>	<u>Private Employment</u>
Water transport	251	928
Water transport support operations	105	1,078
Water transport support services	7	25
Total	363	2,031
Water Transport		
Coastal and great lakes freight transportation	37	176
Deep sea freight transportation	25	140
Inland water freight transportation	189	612
Water Transport Support Operations		
Marine cargo handling	31	771
Marine surveying, salvaging, piloting and other services	24	105
Port and harbor operations	11	32
Towing, tugboat, docking, shifting	39	170
Water Transport Support Services		
Cleaning services	7	25

Top 3 Service Delivery Regions (SDRs) by Employment

- 1 SDR 12
- 2 SDR 3
- 3 SDR 6

Source: Mergent Intellect, 2021.

**Figure 5
Water Transportation
Employment by Industry**

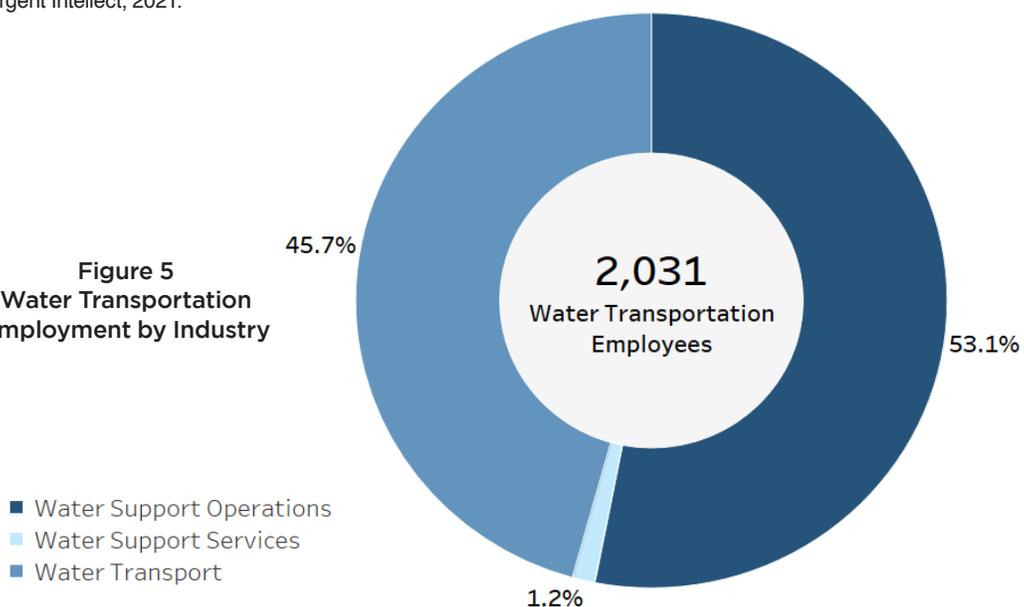


Table 6
Freight Services Establishments and Employment
in Georgia

<u>Industry / Group</u>	<u>Number of Establishments</u>	<u>Private Employment</u>
Freight forwarding	1,262	12,995
Freight transportation arrangement	3,342	18,827
Freight arrangement, other	35	221
Total	4,639	32,043
Freight Forwarding		
Freight forwarding, foreign, domestic	1,262	12,995
Freight Transportation Arrangement		
Customhouse brokers	57	393
Shipping agents and brokers	2,450	14,544
Transportation agents and brokers	835	3,890
Other Freight Arrangement		
Customs, freight consolidation, documents preparations, etc.	35	221

Top 3 Service Delivery Regions by Employment

- 1 SDR 3
- 2 SDR 12
- 3 SDR 2

Source: Mergent Intellect, 2021.

Figure 6
Freight Services
Employment by Industry

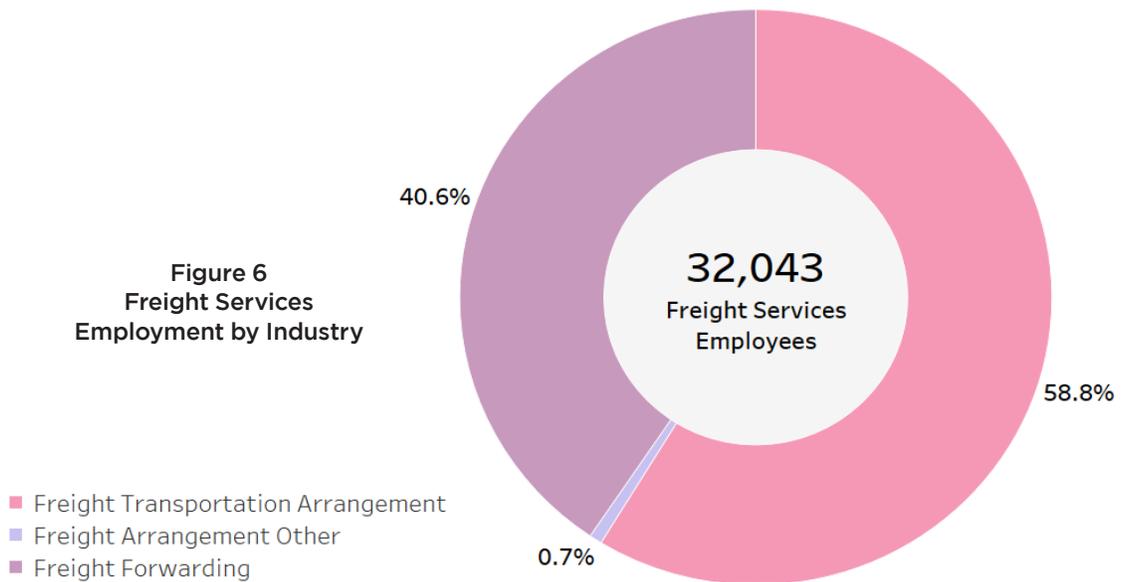


Table 7
Logistics Services Establishments and Employment
in Georgia

<u>Industry / Group</u>	<u>Number of Establishments</u>	<u>Private Employment</u>
Materials Management	35	73
Transportation Consultants	335	2,012
Total	370	2,085

Top 3 Service Delivery Regions by Employment

- 1 SDR 3
- 2 SDR 12
- 3 SDR 2

Source: Mergent Intellect, 2021.

Figure 7
Logistics Services Employment by Industry



Table 8
Delivery Services Establishments and Employment
in Georgia

<u>Industry / Group</u>	<u>Number of Establishments</u>	<u>Private Employment</u>
Couriers and express delivery	1,003	6,132
Local messengers and delivery	387	14,095
Total	1,390	20,227
Couriers and Express Delivery		
Air courier services	115	853
Courier services	888	5,279
Local Messengers and Delivery		
Other local delivery services	6	13
Package, parcel delivery, vehicular	381	14,082

Top 3 Service Delivery Regions by Employment

- 1 SDR 3
- 2 SDR 12
- 3 SDR 4

Footnote: United Parcel Service (UPS), one of the largest employers in Georgia, was largely excluded from the 2018 Dun & Bradstreet data. In the 2021 Mergent Intellect data, the Headquarters location of UPS was listed as having 69,716 employees, which the Selig Center believes is erroneous. To correct this, we used the UPS employment total (14,594) from the 2018-2019 Metro Atlanta Top Employers list, published by the Metro Atlanta Chamber, and confirmed this figure with the UPS corporate office. We then subtracted the 2021 Mergent Intellect sum of employees listed at all other locations in Georgia (6,000 employees) from 14,594, thus correcting the entry for the Georgia UPS Headquarters location in Atlanta to 8,594 employees.

Source: Mergent Intellect, 2021.

Figure 8
Delivery Services
Employment by Industry

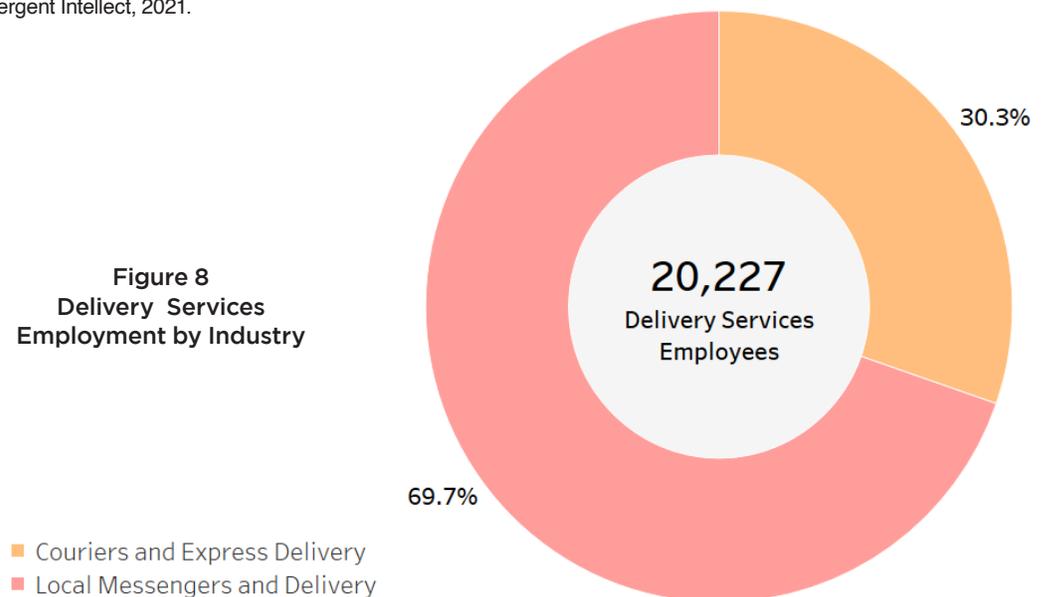


Table 9
Warehousing Services Establishments and Employment
in Georgia

<u>Industry / Group</u>	<u>Number of Establishments</u>	<u>Private Employment</u>
Farm Products Warehousing and Storage	76	482
General Warehousing and Storage	1,341	14,754
Refrigerated Warehousing and Storage	102	1,873
Packing, Crating, and Containerization	94	1,110
Other Warehousing	10	30
Total	1,623	18,249

Top 3 Service Delivery Regions (SDRs) by Employment

- 1 SDR 3
- 2 SDR 1
- 3 SDR 12

Source: Mergent Intellect, 2021.

Figure 9
Warehousing Services Employment by Industry

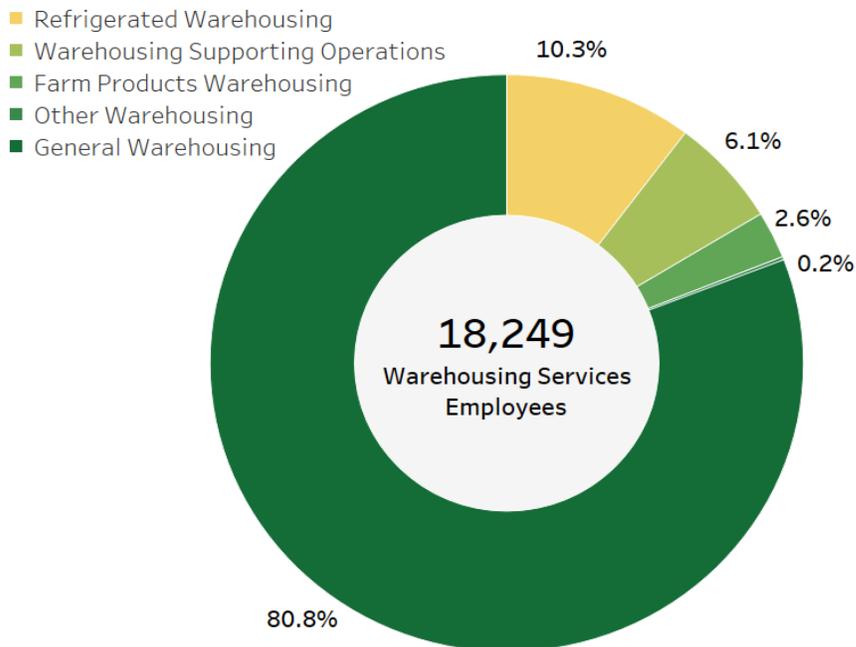


Table 10
Government Employment in Transportation and Logistics
in Georgia

<u>NAICS</u>	<u>Category</u>	<u>Number of Establishments</u>	<u>Public Employment</u>
Total		998	34,050
48-49 Government			736
18,627			
488111	Air traffic control	41	4,151
488119	Other airport operations	3	208
491110	Postal service	692	14,268
92 Government		262	15,423
926120	Regulation and Administration of Transportation Programs		
	Federal	38	2,972
	State	141	10,742
	County	41	1,075
	City	23	549
	Other	19	85

Source: Mergent Intellect, 2021.

SECTION 2

Economic Impact

The logistics industry's operations are reliable sources of employment and spending which generate substantial economic impacts for those who live, work, and do business in Georgia. Logistics providers in both the public and private sector generate jobs, income, sales, greater production of goods and services, and higher tax collections for all levels of government. This section of the analysis reports the economic impacts on the state as well as on each of the state's twelve service delivery regions.

In 2021, the statewide economic impacts of Georgia's logistics industry were:

- **239,406 direct jobs;**
- **495,064 total jobs in all industries (10 percent of all jobs in Georgia);**
- **\$83.4 billion in output/sales (7 percent of Georgia's total output/sales);**
- **\$46.6 billion in state GDP (7 percent of Georgia's total GDP);**
- **\$29.5 billion in labor income (8 percent of Georgia's total labor income);**
- **\$2.2 billion in tax revenues for state government; and**
- **\$2.3 billion in tax revenues for local governments.**

Output/Sales Impact

Measured in the simplest and broadest possible terms, the total output impact of Georgia's logistics industries was \$83.4 billion in 2021. Output is gross receipts or sales, plus or minus inven-

tory. Of the \$83.4 billion output impact, \$43.3 billion (52 percent) was direct spending by logistics providers, while \$40.1 billion (48 percent) was the indirect and induced re-spending impact or the multiplier effect (i.e., the difference between the total output impact and direct spending). The multiplier captures the regional economic repercussions of the flows of re-spending that take place throughout Georgia until the initial spending has completely leaked from the state. The average multiplier value for the state's logistics providers was 1.93, obtained by dividing the total output impact (\$83.4 billion) by direct spending (\$43.3 billion). On average, every dollar of initial/direct spending generated an additional 93 cents for Georgia's economy. Thus, for all logistics industries, the output impact was 1.93 times greater than initial/direct spending. The output multipliers vary among the state's logistics industries, ranging from a high of 2.23 for freight transportation arrangement to 1.62 for air transportation, but most logistics industries had multiplier values close to the overall average of 1.93. In general, the output multipliers were higher for the private sector than for the public sector.

Value-Added Impact

In 2021, Georgia's logistics providers generated a value-added impact of \$46.6 billion, which accounts for 56 percent of the \$83.4 billion output impact (with domestic and foreign trade comprising the remaining 44 percent). The \$46.6 billion value-added impact represents 7 percent of Georgia's 2021 GDP. State GDP is value added, which consists of employee compensation, proprietor income, other property income, and indirect business taxes. It is the state-level counterpart of the nation's gross domestic product (GDP). Because state GDP impacts only include production that occurs in Georgia (and exclude expenditures re-

METHODOLOGY

The Selig Center used the IMPLAN Online software system to estimate the economic impacts based on direct employment by providers of transportation and logistics services. Mergent Intellect was the primary data source for 2021 employment in Georgia's transportation and logistics industries. We built regional models for Georgia and each of its twelve service delivery regions using the most recent IMPLAN Online data files. Because Mergent Intellect employment counts were reallocated to industrial sectors recognized by the IMPLAN model, the IMPLAN industry classifications are not the same as used elsewhere in this report. Using the IMPLAN Online models and Type SAM multipliers, indirect and induced economic impacts (the multiplier effects) associated with direct employment were estimated in terms of employment, output, GDP (value added), labor income, and tax collections by state and local governments. All dollar amounts are in 2021 dollars.

Total industry output is gross receipts or sales, plus or minus inventory, or the value of production by industry (including households) for a given period. Total output impacts are the most inclusive, largest measures of economic impact. Because of their size, output impacts usually receive all the attention. One problem, however, is that it includes the value of inputs produced by other industries, which means that there inevitably is some double counting of economic activity. The other measures of economic activity (value added, labor income, and employment) are free from double counting and provide a much more realistic measure of the true economic impact.

The sum of the direct, indirect, and induced economic impacts is the total economic impact. The multiplier effect refers to the indirect and induced economic impacts and is a concept common to most economic impact studies. Multipliers measure the response of the local economy to a change in demand or production. In essence, multipliers capture the impact of the initial round of spending plus the impacts generated by successive rounds of re-spending of those initial dollars. The magnitude of a particular multiplier depends upon what proportion of each spent dollar leaves the region during each round of spending. Multipliers therefore are unique to the region and to the industry.

The multiplier traces the flows of re-spending that occur throughout the region until the initial dollars have completely leaked to other regions. Multiplier effects within large, self-sufficient areas are typically larger than those in small, rural, or specialized areas that are less able to capture spending for necessary goods and services. It is not surprising that the multipliers for Georgia are larger than the multipliers for its service delivery regions.

lated to foreign and domestic trade), they are a better measure of the actual economic production by businesses in Georgia than the more inclusive output impacts.

Labor Income Impact

Labor income is all forms of employment income, including wages, salaries, and proprietors' income, and Georgia's logistics providers gener-

ated a labor income impact of \$29.5 billion (8 percent of Georgia's labor income). The labor income received by Georgians represents 63 percent of the value-added impact.

Total Employment Impact

The economic impact of Georgia's logistics industry probably is most easily understood in terms of employment. In 2021, Georgia's logistics

industry, including both the private and public sectors, supported 495,064 jobs (about 10 percent) of all the nonfarm jobs held by Georgians. Of the total, 239,406 jobs represent direct employment in the logistics industries or the direct economic impact; 255,655 jobs constitute indirect and induced effect of direct employment (spending), or the multiplier (re-spending) impact. Dividing the total job impact (495,064) by the direct job impact (239,406 jobs) yields an average multiplier value of 2.11. On average, for every direct job in the logistics industry, 1.11 additional jobs exist in other industries because of logistics-related spending and indicates a relatively high degree of interaction between the industry and the state's overall economy.

Private sector logistics companies account for 93 percent of the total employment impact of Georgia's logistics industry, or 460,211 of the 495,064 jobs. Within the private sector, truck transportation companies account for the largest employment impact (180,590 jobs), followed by air transportation (82,674 jobs) and freight transportation arrangement (68,981 jobs). The public sector accounts for 7 percent of the total employment impact, or 34,853 of the 495,064 jobs.

Employment includes total wage and salary employees as well as self-employed individuals. It encompasses both full- and part-time jobs and is expressed in annual average jobs. The direct employment impact is slightly smaller than the Mergent Intellect total because state and local government jobs are excluded.

Tax Revenue Impacts

In 2021, Georgia's logistics industry generated \$2.2 billion in tax revenues for the state and \$2.3 billion in tax revenues for local governments. Although not the largest industry in terms of employment, output, state GDP, or labor income, the air transportation industry is the primary contributor to tax revenues for state and local governments. The truck transportation industry is the second largest contributor.

Regional Economic Impacts

The economic impact of Georgia's transportation and logistics industry on the state's service delivery regions reflects both the number and types of providers in each region as well as differences in regional economic multipliers. In general, the largest, most economically diverse service delivery regions had the largest economic impacts.

Service delivery region 3, which comprises the core of the Atlanta MSA, is the state's largest region and had the largest economic impact as well as the largest multipliers. This is due to the presence of the international airport, three major interstates, and Atlanta's critical role as an inland port among other factors. Service delivery region 12, which includes the coastal counties and several contiguous counties, had the second largest economic impact, reflecting the presence of the ports at Savannah and Brunswick and the I-95 corridor. Service delivery region 1 which comprises counties in northwest Georgia had the third largest impact, thanks to the vital I-75 corridor and the success of the Appalachian Regional Port— an inland container port that opened in 2018.

Note that due to differences in multipliers as well as the inclusion or exclusion of various governments, the sum of the economic impacts for the state's twelve service delivery regions does not and should not equal the total statewide economic impact.

Table 11
Employment Impact, 2021
 (number of jobs)

IMPLAN's Industry Classification	Mergent Intellect Employment	Direct Employment Impact	Indirect and Induced Employment Impact	Total Employment Impact
Private Sector, Total	217,722	217,722	242,486	460,211
Transportation, Total	178,301	178,301	219,093	397,396
Air	28,115	28,115	54,559	82,674
Rail	3,901	3,901	8,418	12,320
Water	950	950	4,317	5,268
Truck	91,175	91,175	89,365	180,540
Support Activities	22,117	22,117	25,496	47,613
Freight Transport Arrangement	32,043	32,043	36,938	68,981
Delivery Services	20,227	20,227	9,446	29,674
Warehousing	17,109	17,109	11,662	28,771
Logistics Services	2,085	2,085	2,285	4,370
Public Sector, Total	34,050	21,684	13,169	34,853
Grand Total	251,772	239,406	255,655	495,064

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

Table 12
Output Impact, 2021
 (2021 dollars)

IMPLAN's Industry Classification	Direct Output Impact	Indirect and Induced Output Impact	Total Output Impact
Private Sector, Total	40,700,942,477	37,995,605,342	78,696,547,815
Transportation, Total	37,110,358,539	34,231,194,530	71,341,553,067
Air	13,882,459,423	8,553,562,119	22,436,021,542
Rail	1,744,533,474	1,520,143,515	3,264,676,989
Water	590,947,187	682,435,468	1,273,382,654
Truck	13,155,106,899	13,982,092,538	27,137,199,437
Support Activities	3,159,640,319	3,876,584,490	7,036,224,809
Freight Transport Arrangement	4,577,671,237	5,616,376,400	10,194,047,636
Delivery Services	1,675,897,344	1,502,353,167	3,178,250,510
Warehousing	1,591,453,607	1,905,242,139	3,496,695,746
Logistics Services	323,232,987	356,815,506	680,048,492
Public Sector, Total	2,625,144,578	2,065,049,133	4,690,193,710
Grand Total	43,326,087,055	40,060,654,475	83,386,741,525

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

Table 13
GDP and Labor Income Impact, 2021
(2021 dollars)

<u>IMPLAN's Industry Classification</u>	<u>GDP Impact</u>	<u>Labor Income Impact</u>
Private Sector, Total	42,824,731,874	26,649,538,548
Transportation, Total	38,793,585,021	23,919,288,946
Air	13,759,160,894	6,790,330,838
Rail	1,779,990,376	996,409,086
Water	458,979,497	288,203,568
Truck	14,019,662,871	9,376,720,352
Support Activities	3,583,718,206	2,641,145,945
Freight Transport Arrangement	5,192,073,177	3,826,479,157
Delivery Services	1,778,880,801	1,132,593,213
Warehousing	1,839,912,073	1,282,920,860
Logistics Services	412,353,979	314,735,529
Public Sector, Total	3,743,638,326	2,881,039,497
Grand Total	46,568,370,200	29,530,578,045

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

Table 14
Output and Employment Multipliers, 2021

<u>IMPLAN's Industry Classification</u>	<u>Employment Multiplier</u>	<u>Output Multiplier</u>
Private Sector, Total	2.11	1.93
Transportation, Total	2.23	1.92
Air	2.94	1.62
Rail	3.16	1.87
Water	5.55	2.15
Truck	1.98	2.06
Support Activities	2.15	2.23
Freight Transport Arrangement	2.15	2.23
Delivery Services	1.47	1.90
Warehousing	1.68	2.20
Logistics Services	2.10	2.10
Public Sector, Total	1.61	1.79
Grand Total	2.07	1.92

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

Table 15
State and Local Government Tax Revenues, 2021
(2021 dollars)

<u>IMPLAN's Industry Classification</u>	<u>State Government Tax Revenues</u>	<u>Local Government Tax Revenues</u>
Private Sector, Total	2,070,290,582	2,229,330,795
Transportation, Total	1,931,801,861	2,117,946,394
Air	857,092,942	1,079,458,570
Rail	72,226,462	73,153,631
Water	21,956,857	23,391,480
Truck	641,889,062	652,660,250
Support Activities	138,287,007	118,132,575
Freight Transport Arrangement	200,349,531	171,149,888
Delivery Services	63,232,810	54,238,278
Warehousing	62,180,574	48,336,538
Logistics Services	13,075,337	8,809,585
Public Sector, Total	105,719,131	58,103,554
Grand Total, including Post Office	2,176,009,713	2,287,434,349

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

Table 16
Employment Impact,
by State Service Delivery Regions, 2021
(number of jobs)

<u>Service Delivery Region</u>	<u>Mergent Intellect Employment</u>	<u>Direct Employment Impact</u>	<u>Indirect and Induced Employment Impact</u>	<u>Total Employment Impact</u>
Region 1	13,446	13,319	7,701	21,020
Region 2	8,579	8,567	5,308	13,876
Region 3	154,221	153,903	151,385	305,289
Region 4	8,524	8,355	5,218	13,574
Region 5	8,144	8,115	4,840	12,955
Region 6	7,729	7,213	5,728	12,941
Region 7	8,137	7,876	5,014	12,891
Region 8	4,785	4,723	2,824	7,547
Region 9	5,811	5,810	3,199	9,008
Region 10	6,743	6,726	4,754	11,479
Region 11	7,482	7,412	4,927	12,339
Region 12	18,171	17,897	15,076	32,972

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

Service Delivery Regions



Table 17
Output Impact,
by State Service Delivery Regions, 2021
(2021 dollars)

<u>Service Delivery Region</u>	<u>Direct Output Impact</u>	<u>Indirect and Induced Output Impact</u>	<u>Total Output Impact</u>
Region 1	1,681,026,337	1,033,267,936	2,714,294,274
Region 2	1,128,860,804	749,206,333	1,878,067,137
Region 3	31,478,179,975	24,619,865,864	56,098,045,841
Region 4	1,183,397,507	670,688,690	1,854,086,198
Region 5	979,699,093	610,189,544	1,589,888,637
Region 6	990,618,128	749,478,431	1,740,096,559
Region 7	1,063,880,255	684,796,571	1,748,676,826
Region 8	623,063,124	377,298,782	1,000,361,906
Region 9	834,204,268	442,606,480	1,276,810,748
Region 10	935,657,210	634,865,759	1,570,522,970
Region 11	1,008,538,785	649,522,601	1,658,061,385
Region 12	2,764,067,798	2,109,732,000	4,873,799,797

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

Table 18
GDP and Labor Income Impact,
by State Service Delivery Regions, 2021
(2021 dollars)

<u>Service Delivery Region</u>	<u>GDP Impact</u>	<u>Labor Income Impact</u>
Region 1	1,360,294,868	1,006,112,746
Region 2	1,018,100,080	769,989,859
Region 3	32,980,153,927	20,430,620,690
Region 4	982,152,715	732,736,786
Region 5	772,509,931	567,816,197
Region 6	901,941,985	639,702,001
Region 7	896,227,851	634,340,624
Region 8	514,781,379	371,046,797
Region 9	668,729,321	467,526,341
Region 10	815,516,467	577,482,782
Region 11	912,502,342	657,170,603
Region 12	2,634,494,895	1,865,164,851

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

Table 19
Employment and Output Multipliers,
by State Service Delivery Regions, 2021

Service Delivery Region	Employment Multiplier	Output Multiplier
Region 1	1.58	1.61
Region 2	1.62	1.66
Region 3	1.98	1.78
Region 4	1.62	1.57
Region 5	1.60	1.62
Region 6	1.79	1.76
Region 7	1.64	1.64
Region 8	1.60	1.61
Region 9	1.55	1.53
Region 10	1.71	1.68
Region 11	1.66	1.64
Region 12	1.84	1.76

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

Table 20
State and Local Government Tax Revenues,
by State Service Delivery Regions, 2021
(2021 dollars)

Service Delivery Region	State Government Tax Revenues	Local Government Tax Revenues
Region 1	53,605,164	50,011,885
Region 2	37,293,053	36,535,318
Region 3	1,437,163,558	1,560,999,815
Region 4	36,623,709	34,404,563
Region 5	30,942,311	29,930,063
Region 6	43,096,725	34,791,443
Region 7	36,635,743	396,671,716
Region 8	20,087,595	23,338,244
Region 9	28,319,665	29,844,948
Region 10	36,181,145	33,176,103
Region 11	39,493,581	32,077,689
Region 12	98,292,014	102,361,424

Source: Estimated by the Selig Center for Economic Growth, Terry College of Business, University of Georgia, 2022.

SECTION 3

Economic Growth

According to QCEW's 2020 annual data, private companies in transportation and logistics employed 173,247 Georgians. Between 2010 and 2020, corresponding nationwide employment grew by nearly 57 percent, but Georgia outpaced the nation, growing at a rate of over 70 percent. Of all the logistics subsectors, only air freight transportation declined in employment over this period, and this was attributable to the pandemic recession. Focusing on the most recent years—2015 to 2020—Georgia's transportation and logistics employment growth outpaced the nation, growing 37.8 percent versus 30.9 percent nationwide. During this five-year period, Georgia experienced employment growth in three subsectors that lost jobs nationwide: rail transportation (21.3 percent growth), water transportation (up 6.3 percent), and other support activities for transportation (up 42 percent). Georgia's employment growth significantly outpaced the nation in road transportation (10.5 in Georgia versus 2.1 percent in U.S.), freight transportation arrangement (41.4 versus 13.5 percent) and warehousing services (92.8 versus 80.3 percent). While the state's delivery services subsector experienced strong employment growth of 46.5 percent, it was eclipsed by nationwide growth rate of 60.2 percent.

Employment in some industries is more concentrated in one geographical area than in another area. For example, in a landlocked state with no port, one would imagine that only a small number of workers are employed in the water transportation, whereas in a coastal state, these jobs are more abundant. The QCEW expresses this idea by way of location quotient (LQ). [See the "About the Sources" section for an explanation of how location quotient is calculated.]

In 2020, Georgia's transportation and logistics employment had an LQ of 1.22, indicating that its employment was 22 percent more con-

centrated in this state compared to the nation. On its own, LQ does not indicate a major impact, but the combination of high LQ and many employees does. While Georgia's other support activities for transport subsector had a high LQ of 1.92, it only contributes 730 jobs to the state. Warehousing services' 1.37 LQ, and over 61,000 employees indicated that employment in this subsector was 37 percent more concentrated in Georgia and had a definite impact. Of the transportation and logistics subsectors, rail transportation, water transportation, road transportation, freight transportation arrangement, other support activities and warehousing services had LQs of 1.2 or greater. Warehousing services and road transportation had total employment of over 30,000. Freight transportation arrangement employed over 13,000 and water transportation employed over 4,800.

Air Freight Transportation

Air freight transportation employed about 2,400 Georgians in 2020—about 1.4 percent of the state's total private logistics sector employment. Although employment grew between 2010 and 2015; by 2020, it had fallen nearly 20 percent below 2010 levels. Between 2015 and 2020, Georgia's employment in this subsector fell by over 50 percent, while it grew by 5.2 percent in the U.S. Some of this may be explained by Georgia's large commercial airline industry, and the subsector's tendency to utilize cargo space within passenger aircraft. States whose air freight firms have looser ties to air travel are less affected by fluctuations in demand for commercial air travel. States that are home to dedicated air freight firms—whose cargo moves in dedicated air freight cargo planes—likely suffered less during the pandemic's downturn in air passenger travel.

METHODOLOGY

Our review of employment growth in Georgia’s transportation and logistics industries was based on the Quarterly Census of Employment and Wages (QCEW), which is produced and made publicly available by the U.S. Bureau of Labor Statistics (BLS). The QCEW publishes measures of employment and wages of workers and covers over 95 percent of U.S. jobs.

We also explored trends in e-commerce’s share of retail sales, and how it may have impacted employment in the transportation and warehousing Industry. For this analysis we utilized nationwide e-commerce data from Federal Reserve Economic Data (FRED) and non-ag employment data from the BLS Current Employment Statistics (CES).

For the purposes of this report, we defined transportation and logistics as establishments within industries directly involved in the moving and storing of cargo. This includes air freight transportation, rail transportation, water transportation, road transportation, other support activities for transport, couriers and messengers, warehousing services, and logistics consulting services.

QCEW categorizes jobs under the North American Industry Classification System (NAICS). Where detailed industry data were available, the sectors are narrowed down to the sum of NAICS industries that meet the scope of the project. In some cases, the detail provided by the NAICS category was insufficient to remove jobs not directly involved in moving or storing cargo. In air freight transportation, lines between transport of people and cargo are sometimes blurred, particularly since freight is frequently carried in the holds of commercial aircraft. However, since the primary business of these large airlines, like Delta, is transport of people, some large employers’ impact on employment and wages has been excluded from this analysis.

Demand for movement of cargo is seasonal, and this has a significant impact on employment from quarter-to-quarter. To eliminate the effects of seasonality, we examined annual averages instead of quarterly or monthly data. At the time this report was written, the latest available annual data for the QCEW series was 2020.

Rail Transportation

Known for its efficiency with both fuel and labor, rail transportation jobs composed just under 1 percent of all private transportation and logistics employment in Georgia. A typical 40-foot shipping container loaded on a truck needs a driver in the cab, while a train can move many hundreds more containers with a two-person crew. Although the subsector employs relatively few Georgians, it has experienced recent growth and is poised for more. The 2020 average employment was 1,667, having grown by over 85 percent since 2010. Between 2015 and 2020, nationwide employment in rail transportation fell, but in Georgia it grew by over 21 percent. This subsector’s outpacing of the

nation increased its LQ to 1.62, indicating that, as of 2020, rail transportation was 62 percent more concentrated in Georgia than it was nationwide. Rising fuel prices and increased use of Georgia’s inland and coastal ports bode well for this trend.

Water Transportation

In 2020, over 4,800 Georgians held water transportation jobs—about 2.8 percent of private logistics sector employment in Georgia. Like rail transportation, water transportation employed a relatively small number of people compared to its outsized importance to the transportation and logistics sector. That said, water transportation saw steady growth in employment from 2010 to 2020,

Table 21
Private Employment in Transportation and Logistics in Georgia, 2020

NAICS	Average Annual Employment			Location Quotient 2020
	2010	2015	2020	
Total	101,797	125,698	173,247	1.22
Air Freight Transportation	3,006	4,910	2,419	0.58
481112 Scheduled Freight Air Transportation	326	212	219	0.69
481212 Nonscheduled Air Freight Chartering	75	45	72	0.25
488111 Air Traffic Control	--	358	--	--
488119 Other Airport Operations	--	1,477	--	--
488190 Other Support Activities -- Air Transport	2,605	2,818	2,128	0.60
Rail Transportation	898	1,374	1,667	1.62
482111 Line-haul Railroads	-	--	--	--
482112 Short Line Railroads	-	--	--	--
488210 Support Activities	898	1,374	1,667	1.62
Water Transportation	3,841	4,559	4,846	1.23
483111 Deep Sea Freight Transportation	242	174	184	0.62
483113 Coastal and Great Lakes Freight Transport	40	55	47	0.17
483211 Inland Water Freight Transportation	--	--	8	0.01
488310 Port and Harbor Operations	--	40	58	0.29
488320 Marine Cargo Handling	3,115	3,978	4,200	2.37
488330 Navigational Services to Shipping	444	238	227	0.46
488390 Other Support Activities	-	74	122	0.53
Road Transportation	40,896	48,919	54,032	1.23
484110 General Freight Trucking, Local	2,862	3,312	6,386	0.77
484121 Long-distance (full load)	18,558	20,725	20,397	1.30
484122 Long-distance (partial load)	10,726	13,470	14,553	1.88
484220 Other Specialized Trucking, Local	4,645	4,707	5,049	0.74
484230 Other Specialized Trucking, Long-distance	2,946	4,213	6,095	1.49
488490 Other Support Activities	1,159	2,492	1,552	1.30
488510 Freight Transportation Arrangement	6,725	9,450	13,336	1.85
488999 All Other Support Activities for Transport	554	514	730	1.92
Delivery Services	18,396	21,677	31,749	1.06
492110 Couriers and Express Delivery Services	17,521	20,375	28,697	1.13
492210 Local Messengers and Local Delivery	875	1,302	3,052	0.68
Warehousing Services	25,803	31,827	61,372	1.37
493110 General Warehousing and Storage	21,881	26,969	54,696	1.31
493120 Refrigerated Warehousing and Storage	3,216	3,647	4,967	2.41
493130 Farm Product Warehousing and Storage	404	718	1,172	3.48
488991 Packing and Crating	302	493	537	0.85
541614 Process and Logistics Consulting Services	1,678	2,468	3,096	0.75

Source: U. S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

climbing by over 6 percent between 2015 and 2020, and 26 percent between 2010 and 2020. Considering that nationwide water transportation lost nearly 11 percent of its jobs between 2015 and 2020, its performance in Georgia is particularly striking. In Georgia, the majority—4,200—fell under marine cargo handling, which had an LQ of 2.37, probably due to the increased utilization of Georgia's ports in Savannah and Brunswick.

Road Transportation

According to QCEW annual averages for 2020, road transportation employed more than 54,000 Georgians, accounting for over 30 percent of the state's transportation and logistics employment. But this belies a likely undercount of the subsector's truckers because sole proprietorship is common among truckers, resulting in the omission of a large number from the QCEW totals. Regardless, in 2020, nearly two-thirds of Georgia's road transportation employment could be described as long-distance, general freight trucking. These nearly 35,000 jobs comprised about two-thirds of Georgia's road transportation employment and 20 percent of the state's entire transportation and logistics employment. Georgia's road transportation employment also outpaced the nation's, growing by 32 percent (compared to 18 percent nationwide) between 2010 and 2020, and climbing by 10.5 percent (compared to only 2.1 percent nationwide) between 2015 and 2020.

Freight Transportation Arrangement

These establishments are primarily engaged in brokering between shippers and carriers. They are often called freight forwarders, shipping agents or customs brokers. Although freight transportation arrangement consists of a single 6-digit NAICS (488510) it is significant to Georgia's employment. In 2020, over 13,000 Georgians held these jobs, which accounted for 7.7 percent of the transportation and logistics labor force. With an LQ of 1.85, these jobs were 85 percent more concentrated in Georgia compared to

the nation. In addition, freight transportation arrangement nearly doubled its number of employees between 2010 and 2020. In Georgia, its employment growth outpaced the nation, growing at a rate approximately three times higher than the U.S. in both five- and ten-year periods between 2010 and 2015 and 2010 and 2020. While employment in can be expected to grow in Georgia in the short-term, fewer employees may be needed in the future if technological advancements in digital freight forwarding and artificial intelligence bring consolidation and automation to the industry.

Other Support Activities

Other support activities for transportation consisted of a single, 6-digit NAICS (488999). Annual averages for 2020 indicated that it employed 730 people, comprising a meager 0.4 percent of Georgia's employment in transportation and logistics. Although it shed 40 jobs between 2010 and 2015, it added over 200 between 2015 and 2020.

Delivery Services

Delivery services employed nearly 32,000 Georgians in 2020, accounting for over 18 percent of the state's transportation and logistics employment. Delivery services is composed of two, 6-digit NAICS industries: couriers and express delivery services (492110) and local messengers and local delivery (492210). The first is distinguished by delivery of parcels and documents from one metropolitan area to another, sometimes crossing borders of states and countries, and includes some employees of companies like FedEx and DHL Express. The latter serves within a single metropolitan area and includes grocery delivery and restaurant meal delivery services. According to QCEW annual average for 2020, local messengers and local delivery employment is about one-tenth the size of its couriers and express delivery services counterpart. However, it should be noted that many workers who handle local deliveries are "gig workers" (drivers for companies like

UberEats, Doordash, Instacart, etc.), who do not fall under state unemployment insurance rules, and as such are not counted by the QCEW. While Georgia saw very strong growth in delivery services employment, nationwide employment in the subsector outpaced the state. Between 2015 and 2020, employment grew by 46 percent compared to the nationwide rate of 60 percent. While Georgia's employment in the sector grew 72 percent between 2010 and 2020, nationwide it grew by 86 percent. The sector's LQ in Georgia is 1.06, indicating that employment concentration is on par with that of the nation. Should some large companies be compelled to recognize "gig workers" as employees, as opposed to independent contractors, a dramatic increase in employment would show in QCEW results.

Warehousing Services

With over 61,000 workers, warehousing services made up the largest share—more than a third—of Georgia's transportation and logistics employment and experienced the fastest rate of growth at both the state and national levels, growing by just under 140 percent between 2010 and 2020. More recently, Georgia outpaced the nation. Between 2015 and 2020, employment nearly doubled, at 93 percent, compared to the nationwide employment growth rate of 80 percent. The subsector's LQ for 2020 was 1.37, indicating its employment was 37 percent more concentrated in Georgia than the rest of the nation.

As defined by the Selig Center, warehousing services includes four industries: general warehousing and storage, refrigerated warehousing and storage, farm product warehousing and storage, and packing and crating. Most employees (89 percent) held jobs in general warehousing and storage, an industry that saw the fastest rate of growth between 2015 and 2020, more than doubling in size. Refrigerated warehousing and storage employed around 5,000 Georgians in 2020. Between 2015 and 2020 its employment grew at a rate of 36 percent in Georgia, compared to a na-

tionwide rate of 20 percent. Farm product warehousing and storage employment nearly tripled in Georgia between 2010 and 2020, rising to nearly 1,200 workers. The exceptionally high LQs of farm product and refrigerated warehousing and storage—2.4 and 3.5, respectively—reflect Georgia's strong food manufacturing and agriculture industries.

Logistics Consulting Services

Consisting of a single industry, logistics consulting services (NAICS 541614) employment accounted for less than 2 percent of Georgia's transportation and logistics jobs in 2020. Its average employment in the state in 2020 was just over 3,000, up from 1,600 in 2010. With an employment LQ of 0.75, Georgia ranked 24 while Virginia had the highest employment concentration (3.95). No other state's LQ exceeded 2.0. Often, services offered by these firms are related to federal customs and tariff rates, which explains the industry's concentration near the nation's capital. Georgia's neighbors Tennessee and Alabama occupy the second and fourth spots, respectively. Because the very nature of consulting allows employees to work in different states than their clients, job growth in Georgia has climbed at a rate twice that of the nation since 2010 but has slowed in recent years.

Public Sector Employment

Georgia's public sector transportation and logistics employment is composed of industries at the state and federal levels of government. State-level employment includes two industries—air traffic control and transportation program administration. Federal-level employment includes the same two industries plus the U.S. Postal Service. In 2020, state and federal government accounted for just under 28,000 transportation and logistics employees in Georgia—about one-sixth the size of the state's private transportation and logistics employment.

At both the state and federal levels, annual av-

Table 22
Private Employment in Transportation and Logistics in Georgia and the U.S.,
2010 - 2020
(percent change)

NAICS	2015-2020		2010-2020	
	Georgia	U.S.	Georgia	U.S.
Total	37.8	30.9	70.2	56.8
Air Freight Transportation	-50.7	5.2	-19.5	25.2
481112 Scheduled Freight Air Transportation	3.3	-12.7	-32.8	-3.3
481212 Nonscheduled Air Freight Chartering	60.0	17.5	-4.0	25.4
488111 Air Traffic Control	--	-30.7	--	-37.5
488119 Other Airport Operations	--	-0.6	--	35.5
488190 Other Support Activities	-24.5	11.7	-18.3	24.0
Rail Transportation	21.3	-2.5	85.6	48.6
482111 Line-haul Railroads	--	-61.3	--	-44.7
482112 Short Line Railroads	--	5.5	--	0.0
488210 Support Activities	21.3	-1.6	85.6	50.7
Water Transportation	6.3	-10.7	26.2	-2.8
483111 Deep Sea Freight Transportation	5.7	-13.7	-24.0	-17.2
483113 Coastal and Great Lakes Freight Transport	-14.5	-23.3	17.5	-12.5
483211 Inland Water Freight Transportation	--	-7.1	--	3.6
488310 Port and Harbor Operations	45.0	-67.9	--	-63.9
488320 Marine Cargo Handling	5.6	16.2	34.8	36.8
488330 Navigational Services to Shipping	-4.6	-14.9	-48.9	-15.8
488390 Other Support Activities	64.9	-12.2	--	-24.0
Road Transportation	10.5	2.1	32.1	18.1
484110 General Freight Trucking, Local	92.8	10.9	123.1	31.5
484121 Long-distance (full load)	-1.6	0.8	9.9	9.4
484122 Long-distance (partial load)	8.0	0.7	35.7	23.1
484220 Other Specialized Trucking, Local	7.3	-0.3	8.7	16.2
484230 Other Specialized Trucking, Long-distance	44.7	-2.1	106.9	22.8
488490 Other Support Activities	-37.7	3.0	33.9	23.0
488510 Freight Transportation Arrangement	41.1	13.5	98.3	37.2
488999 All Other Support Activities for Transport	42.0	-4.8	31.8	35.0
Delivery Services	46.5	60.2	72.6	86.0
492110 Couriers and Express Delivery Services	40.8	50.2	63.8	72.4
492210 Local Messengers and Local Delivery	134.4	158.0	248.8	238.8
Warehousing Services	92.8	80.3	137.8	139.0
493110 General Warehousing and Storage	102.8	88.1	150.0	153.7
493120 Refrigerated Warehousing and Storage	36.2	20.4	54.4	38.0
493130 Farm Product Warehousing and Storage	63.2	5.0	190.1	27.4
488991 Packing and Crating	8.9	5.9	77.8	21.9
541614 Process and Logistics Consulting Services	25.4	23.2	84.5	42.2

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

Relative Employment Concentration of Transportation and Logistics Industries in Georgia

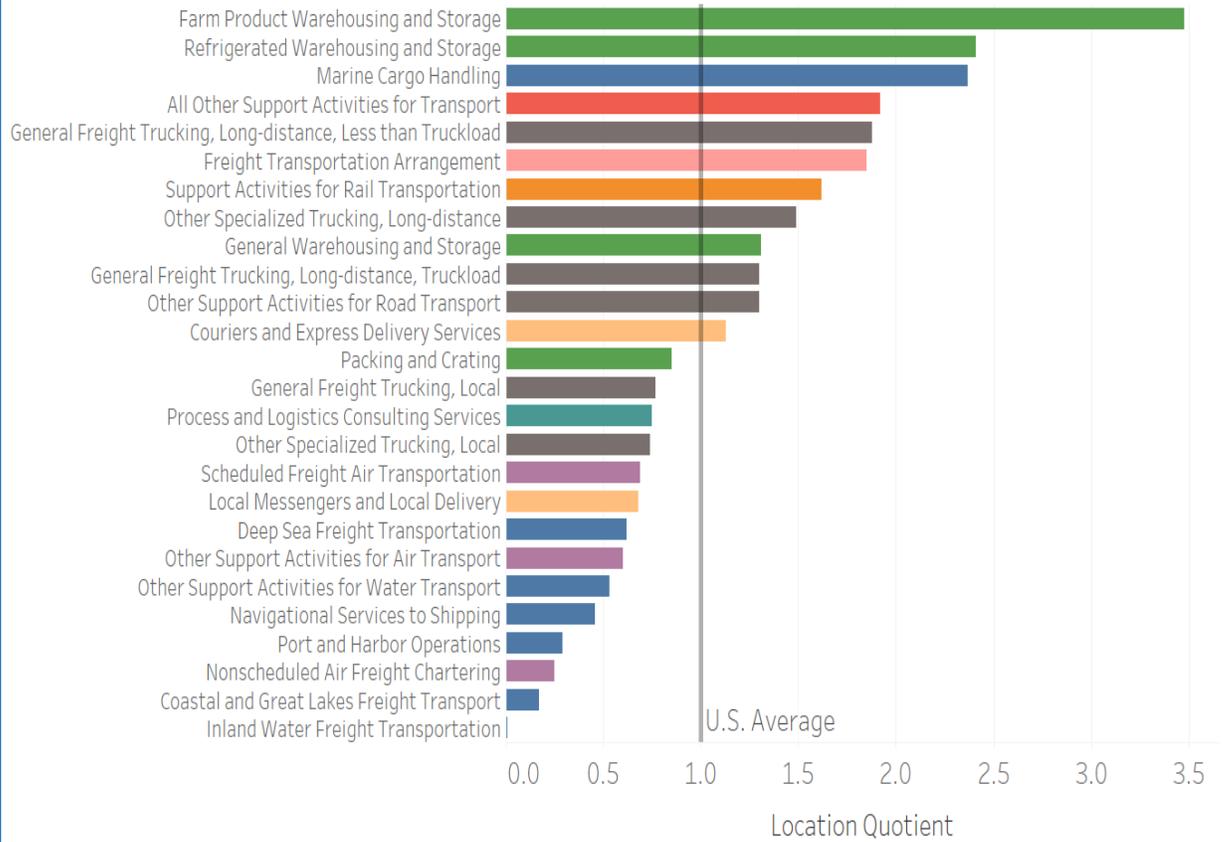


Table 23
Government Employment in Transportation and Logistics in Georgia,
2010-2020

<u>NAICS</u>	<u>Average Annual Employment</u>			<u>Location Quotient</u>
	<u>2010</u>	<u>2015</u>	<u>2020</u>	<u>2020</u>
Total	28,884	26,744	27,943	1.00
Federal Government	22,484	20,707	22,095	0.99
488111 Air Traffic Control	336	324	383	1.08
491110 Postal Service	18,067	16,509	17,269	0.93
926120 Transportation Program Administration	4,081	3,874	4,443	1.32
State Government	6,400	6,037	5,848	1.03
488111 Air Traffic Control	4,979	4,265	3,896	32.05
926120 Transportation Program Administration	1,421	1,772	1,952	0.35

Source: U.S Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

Table 24
Government Employment in Transportation and Logistics in Georgia and the U.S.,
2010 - 2020
(percent change)

<u>NAICS</u>	<u>2015-2020</u>		<u>2010-2020</u>	
	<u>Georgia</u>	<u>U.S.</u>	<u>Georgia</u>	<u>U.S.</u>
Total	4.5	0.9	-3.3	-7.0
Federal Government	6.7	1.2	-1.7	-7.0
488111 Air Traffic Control	18.2	4.7	14.0	-2.1
491110 Postal Service	4.6	0.9	-4.4	-8.2
926120 Transportation Program Administration	14.7	2.4	8.9	0.2
State Government	-3.1	-0.2	-8.6	-6.9
488111 Air Traffic Control	-8.7	-8.7	-21.8	-49.3
926120 Transportation Program Administration	10.2	0.0	37.4	-5.1

Source: U.S. Bureau of Labor Statistics, Quarterly Census of Employment and Wages.

verage employment fell between 2010 and 2020. Georgia's public transportation and logistics employment fared better than the U.S., falling by only 3.3 percent, compared to nationwide contraction of 7 percent. Public transportation and logistics employment fared better in more recent years as Georgia and the nation gained jobs between 2015 and 2020. Again, Georgia outperformed the nation, gaining 4.5 percent during this period, while the nation gained less than 1 percent. Georgia's gains can be attributed primarily to a rise in federal employment. Between 2015 and 2020, the postal service and federal transportation program administration employed an additional 760 and 569 Georgians, respectively. During this time, state-level government logistics employment shrank by 189 jobs. The primary driver of state-level employment in Georgia was air traffic control, which is not surprising considering the presence of Hartsfield-Jackson International Airport combined with other significant airports in the state. Although state employment of air traffic controllers declined by more than 20 percent between 2010 and 2020, nearly 4,000 Georgians held these jobs in 2020, and the industry's LQ indicated that its employment was 32 times more concentrated in Georgia.

Rise of E-Commerce

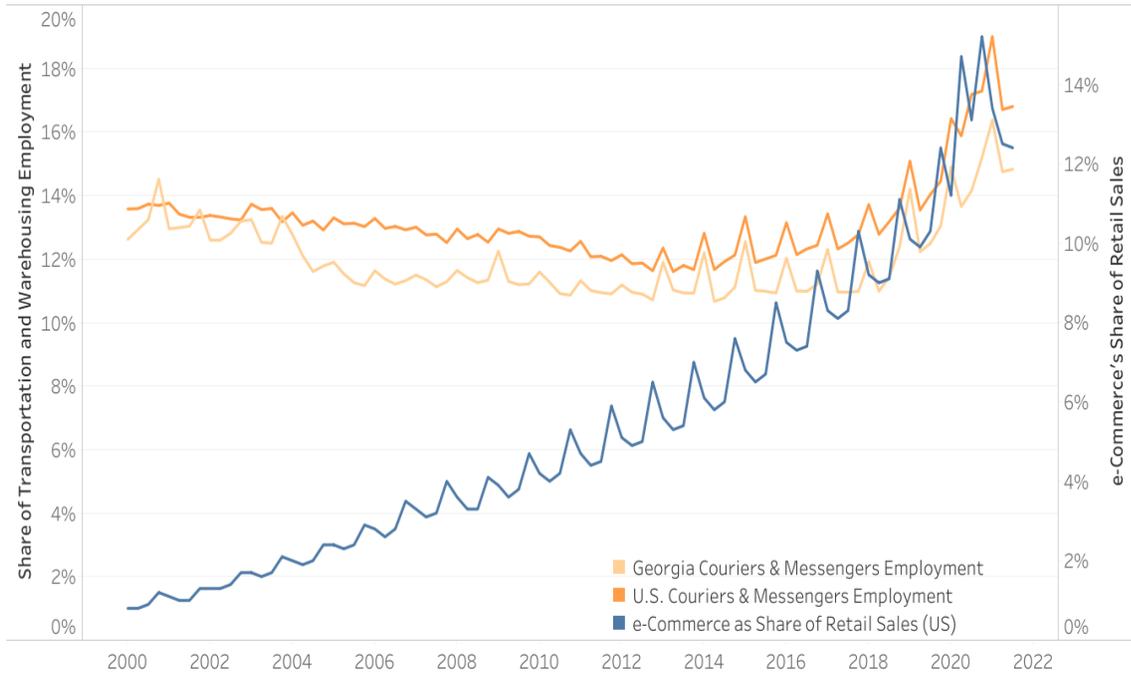
State-level e-commerce sales data are not available, so Selig Center explored nationwide e-commerce sales as a share of all retail sales. Since 2000, e-commerce's share of retail sales increased from less than 1 percent to more than 12 percent in 2021. In the fall of 2020, it exceeded 15 percent.

We compared trends in employment at both the state and national levels to growth of e-commerce. Noticeable growth in transportation and warehousing's share of total non-ag employment became evident beginning in 2015 for both Georgia and the nation. Transportation and warehousing (T&W) comprised a larger share of total non-ag employment in Georgia than in the U.S.

Although share of T&W employment grew in both Georgia and the U.S., Georgia slightly outpaced the nation, surpassing 4 percent in late 2014, a mark that the U.S. did not reach until late 2020. Looking at some of T&W's specific components provides additional insight. As a share of total non-ag employment, Georgia's warehousing and storage (W&S) maintained a significantly higher proportion than the U.S. The opposite was true for couriers and messengers (C&M), but to a much lesser degree. At both the state and national levels, share of C&M trended downward until about 2013. At this time, e-commerce sales exceeded 5 percent. In addition to reversing the downward trend, C&M began to exhibit seasonality. While W&S's share of total non-ag employment began to increase significantly at this same time, it did so more steadily than C&M without expressing exaggerated seasonality.

Seasonality of the data can be visualized as the relative distance between annual Q4 peaks and Q2 troughs. The Selig Center chose to measure seasonality of e-commerce as percent change between peaks and troughs: $(Q4-Q2)/Q2$. By this metric, e-commerce's seasonality has grown at an increasingly rapid rate, exceeding 1 percent for the first time in 2009, 1.5 percent in 2011, 2 percent in 2016, and 2.5 percent in 2019. The lone deviation from this pattern occurred in response to the pandemic when e-commerce sales spiked twice in a single year. In 2020, e-commerce as a share of retail sales broke 14 percent in Q2 and 15 percent in Q4.

Couriers and Messengers' Share of Transportation and Warehousing Employment, and E-Commerce's Share of Total Retail Sales



Impact of Covid-19

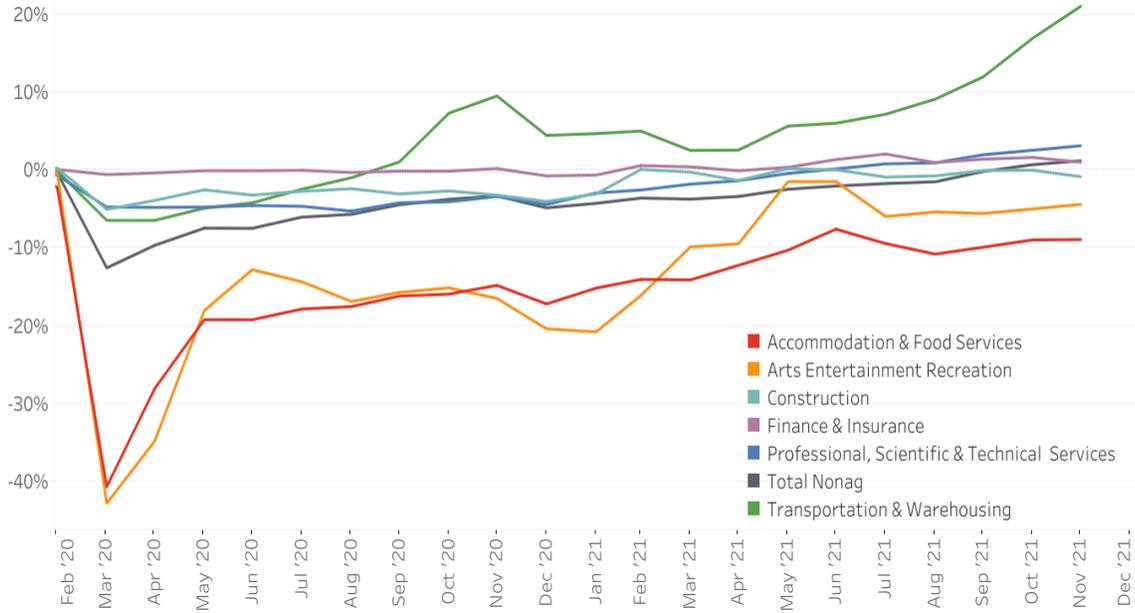
The covid recession hit industry sectors very differently. We examined the percent change in employment across all NAICS sectors (2-digit) starting in February 2020—the last month before the pandemic. Georgia was the first state to reopen amid the pandemic and some sectors bounced back sooner than they did across the U.S. The hardest-hit sectors in both the U.S. and Georgia were arts, entertainment, and recreation; accommodation and food services; and other services. In Georgia, arts, entertainment, and recreation lost 43 percent of its jobs from February 2020 to April 2020. In the U.S., this sector was hit even harder, losing 49 percent of jobs. As of December 2021, Georgia employment in arts, entertainment, and recreation was still 4 percent below February 2020 levels. Accommodation and food services lost 39 percent of jobs in Georgia and 45 percent of jobs in the U.S. from February 2020 to April 2020. In Georgia, this sector remained 7 percent below pre-pandemic levels as of December 2021.

The sectors in the state least affected by the pandemic recession were finance and insurance;

professional, scientific, and technical services; and construction. In the U.S., the sectors least affected by the pandemic recession were finance and insurance; management of companies and enterprises; and professional, scientific, and technical services. Most jobs lent themselves well to work-from-home, so employment did not suffer large losses during pandemic shutdowns. Construction was less affected in Georgia as its operations were deemed safe due to the largely outdoor and socially distant nature of the jobs.

Transportation and warehousing employment dropped by only 6 percent in Georgia and 10 percent in the U.S. between February 2020 and April 2020, and fully recovered in terms of employment as of October 2020 in both the U.S. and Georgia. As of December 2021, the sector experienced 21 percent employment growth in Georgia and 17 percent employment growth nationally compared to February 2020. In both the U.S. and Georgia, transportation and warehousing was one of the only sectors that appeared to benefit from the pandemic recession, largely due to the e-commerce boom.

Covid-19's Impact on Employment in Selected Industries (percent change from February 2020)



SECTION 4

Logistics Occupations

This section covers only occupations involved in the movement or storage of freight/cargo. It excluded transportation occupations such as drivers of ambulances, taxis, and buses as well as flight attendants, ferry captains, etc. Even so, the Occupational Employment and Wage Statistics (OEWS) survey produced a much larger total employment in Georgia than any of the other sources utilized in this report.

According to the OEWS, 2020 employment across all occupations in Georgia was about 4.3 million. Transportation and materials moving occupations as defined by the OEWS totaled to 441,910 in Georgia, making up 10.3 percent of all occupations in the state. Two of these made the top ten list in Georgia by employment size. laborers and freight, stock, and material movers (by hand) was the second largest occupation and heavy truck and tractor-trailer drivers was the tenth largest.

The Selig Center removed passenger transportation occupations and added other occupations related to transportation and logistics, including couriers and messengers and postal service workers. The 475,890 occupations in transportation and logistics as defined by the Selig Center made up 11 percent of all occupations in Georgia. This was a significantly higher proportion of jobs than our estimate from Mergent Intellect, where transportation and logistics comprised 5.5 percent of total employment.

Of 475,890 occupations in transportation and logistics, those employees whose occupations we classified as involved in freight movement made up 85 percent of the total, with other logistics-related occupations representing the remaining 15 percent. Laborers and freight, stock, and material movers were by far the largest occupation by employment with 123,620 workers across the state. Heavy truck and tractor-trailer drivers were the

second-largest occupation with 62,390, followed closely by stockers and order fillers (61,060).

Across all occupations in Georgia, average annual wages were \$51,940. Transportation and materials moving occupations made significantly less at \$36,650. There was a wide variation in average wages across different occupations. Air traffic controllers earned the most money (\$144,450 annual average) followed by transportation, storage, and distribution managers at \$109,020. These were the only two occupations that topped \$100,000 in annual wages. The occupations with the lowest average annual wages were packers and packagers at \$25,430 and couriers and messengers at \$26,800.

Georgia ranked eighth in the U.S. by concentration of transportation and materials moving occupations, which was a 17 percent higher than the average state. Kentucky was top with a 36 percent higher concentration than the average state, followed by Tennessee at 31 percent, and New Jersey at 28 percent. The occupations with the highest concentration in Georgia were aircraft service attendants and all other transportation workers (87 percent more concentrated than the average state), machine feeders and off-bearers (76 percent more concentrated), and industrial truck and tractor operators (67 percent more concentrated).

When categorized by occupation, the number of transportation and logistics workers in Georgia was almost twice as high as when categorized by industry. Most of these workers were involved in freight movement and made significantly lower wages than the state average across all occupations, but this keeps the cost of doing business here very low.

Table 25
Occupational Employment and Wage Estimates
for Georgia's Logistics Occupations in 2020

Occupational Title	Employment	Annual Mean Wage	Location Quotient
AII OCCUPATIONS IN GEORGIA	4,308,600	51,940	1.00
ALL TRANSPORTATION AND MATERIAL MOVING OCCUPATIONS	441,910	36,650	1.17
TRANSPORTATION AND LOGISTICS OCCUPATIONS	475,890	--	--
Involved in Freight Movement	404,290	--	--
Aircraft cargo handling supervisors	230	58,860	0.75
First-line supervisors of transportation and material moving workers, exc. aircraft cargo handling supervisors	17,970	55,200	1.22
Airline pilots, copilots, and flight engineers	4,260	--	1.65
Commercial pilots	990	--	0.86
Air traffic controllers	1,020	144,450	1.49
Airfield operations specialists	--	64,590	--
Driver/sales workers	15,140	30,260	1.16
Heavy truck and tractor-trailer drivers	62,390	47,990	1.12
Light truck or delivery services drivers	31,140	39,050	1.08
Motor vehicle operators, all other	1,860	33,570	1.17
Locomotive engineers	--	63,730	--
Rail yard engineers, dinkey operators, and hostlers	220	44,320	1.58
Railroad conductors and yardmasters	930	67,410	0.67
Sailors and marine oilers	--	42,680	--
Captains, mates, and pilots of water vessels	610	79,020	0.71
Ship engineers	--	79,860	--
Automotive and watercraft service attendants	3,920	25,730	1.12
Traffic technicians	260	39,860	1.14
Transportation inspectors	1,150	88,910	1.36
Aircraft service attendants and all other transportation workers	1,940	35,260	1.87
Conveyor operators and tenders	--	40,610	--
Crane and tower operators	1,280	53,530	0.94
Excavating and loading machine and dragline operators	33,080	37,340	1.67
Industrial truck and tractor operators	8,830	26,120	0.83
Cleaners of vehicles and equipment	123,620	30,860	1.42
Laborers and freight, stock, and material movers, hand	3,510	35,800	1.76
Machine feeders and offbearers	23,590	25,430	1.27
Packers and packagers, hand	61,060	28,540	0.89
Pump operators, except wellhead pumpers	--	42,710	--
Refuse and recyclable material collectors	3,660	28,990	0.98
Tank car, truck, and ship loaders	450	49,600	1.16
Material moving workers, all other	1,180	39,970	1.45

(continued)

Table 25 (Continued)
Occupational Employment and Wage Estimates
for Georgia's Logistics Occupations in 2020

<u>Occupational Title</u>	<u>Employment</u>	<u>Annual Mean Wage</u>	<u>Location Quotient</u>
OTHER LOGISTICS-RELATED OCCUPATIONS	71,600	--	--
	4,710	109,020	1.15
Transportation, storage, and distribution managers	8,170	68,440	1.43
Logisticians	30	70,380	0.26
Transit and railroad police	1,520	43,320	1.05
Transportation security screeners	2,960	46,400	0.99
Cargo and freight agents	2,390	26,800	1.09
Couriers and messengers	5,160	42,820	0.88
Dispatchers, except police, fire, and ambulance	2,460	51,890	0.91
Postal service clerks	10,510	52,860	1.02
Postal service mail carriers			
Postal service mail sorters, processors, and processing machine operators	2,640	51,720	0.81
Shipping, receiving, and inventory clerks	31,050	35,110	1.38

Since 2018, OEWS renamed and reclassified several occupations. One example is "Stockers and order fillers", which was re-named from "Stock Clerks and order fillers". The Occupational code for this job changed from 43-5081 to 53-7065, reclassifying the occupation from "office and administrative support" to "transportation and materials moving" occupations. Due to reclassifications, the total number of transportation and materials moving occupations cannot be compared between 2018 and 2020.

Source: Selig Center for Economic Growth, Terry College of Business, University of Georgia. Based on estimates of employment, annual mean wage, and location quotients provided by the U.S. Department of Labor, March 2021.

SECTION 5

Industry Prospects

Georgia's transportation and logistics industry typically fluctuates with the overall economy. Before Russia invaded Ukraine, the risk of a U.S. recession beginning in 2022 was low, but the oil price shock and other deleterious effects of the war on supply chains and financial markets increase the risk of recession to at least 40 percent. Nonetheless, we believe that it is still slightly more likely than not that the U.S. economic expansion continues which means that business conditions for providers of transportation and logistical services should be conducive to growth. We expect the transportation and logistics industry to grow faster than either U.S. or Georgia's GDP.

Growth in the demand for transportation and logistics services coupled with limited increase in the industry's capacity will keep rates high. Tight capacity strongly favors the industry's margins as well as its bottom line. Shortages of workers—especially truck drivers—will raise labor costs and pressure profit margins but will simultaneously help keep capacity tight and carriers' pricing power strong. Fuel prices will be very high, but carriers should be able to pass most of these increases onto shippers. In all, carriers' profit margins will be wider than they were before the covid-19 recession. Nonetheless, volatile fuel prices will strongly favor some modes of transport (e.g., the railroads) over others (e.g., long-haul truckers).

Assuming the Russia-Ukraine war does not cause a U.S. recession, many favorable developments will help Georgia's transportation and logistics industry grow faster than the state's overall economy. Georgia's economic development pipeline is full of projects. Consumers' higher spending on domestically produced goods, and businesses' need to replenish depleted inventories will increase demand for transportation and logistical services. The recent surge in e-commerce logistics—especially final-mile delivery—is another

good sign. Georgia's expanding role as a logistics and distribution center is both a short- and long-term plus for the industry. Boosted by the state's above-average population growth, more homebuilding and real estate development will support higher demand for the services the industry provides. In addition, greater investment in transportation infrastructure by federal, state, and local governments will provide the capacity the industry needs to grow.

Because it often takes many years to build out the typical economic development project, many of the projects announced over the last several years will continue to provide a substantial tailwind. For example, Rivian will invest \$5 billion to build an electric vehicle manufacturing facility in Stanton Springs that will create approximately 7,500 jobs. Intuitive, a manufacturer of robotic-assisted surgical systems, announced a 1,200 job-expansion in Gwinnett County. Amazon plans to build a fulfillment center in Savannah that will use robotic technology and bring 1,000 full-time jobs. Visa expects to open a fintech hub in Midtown Atlanta that will create about 1,000 jobs over several years. The FanDuel Group, a sports-tech entertainment company, will open a technology campus in Atlanta, with over 900 jobs. Remington Arms will locate its global headquarters and an advanced manufacturing facility in LaGrange, creating 856 jobs over five years. Cisco will build a high-tech talent and collaboration center in midtown Atlanta that will create 700 jobs. Vanderlande Industries, a materials handling and logistics company, will expand its North American headquarters in Marietta, creating 500 new jobs.

Georgia's largest manufacturing industry is food processing, and production is expected to increase substantially, which bodes well for shipments of raw commodities and processed foods. The state's vehicle parts manufacturing industry

will benefit from higher domestic demand for vehicles, but supply chain problems will limit the gains in 2022 and 2023. Political pressures that encourage foreign manufacturers to invest more in U.S. production facilities and to buy automotive parts from American manufacturers will help to increase shipments of auto parts and finished vehicles. In addition, there are more assembly plants in the Southeast now. When it comes to both distribution and consumer markets, Georgia is in the sweet spot in the middle of the Southern Auto Corridor with proximity to major assembly plants, major suppliers, interstates, ports, and rail.

Effective economic development policies coupled with rising wages and production costs in China and elsewhere are factors that support Georgia's manufacturing sector, and in turn, Georgia's transportation and logistics industry. Concerns about trade policies, product quality and management of the risks associated with increasingly complex, time-sensitive supply chains also make manufacturing in Georgia more attractive than manufacturing overseas and that's good for shipments of inputs and finished products.

Many transportation and logistics projects will be building out, too. In 2021, Amazon announced that it would build a new fulfillment center in Savannah that would create 1,000 full-time jobs. Freshly, Inc. announced that it would build a new distribution center in Clayton County that would employ 665 workers. That follows on the heels of an announcement earlier in the year that Freshly would build a new distribution facility in Austell that would employ 250 workers. Global logistics company Vanderlande Industries plans a 500-job expansion of its North American headquarters in Marietta. In late 2021, the multinational cargo shipping company Hapag-Lloyd selected Dunwoody for the location of its North American headquarters that would create 250 jobs. Bluestem Brands announced an expansion of their e-commerce distribution center in Eatonton that would add 130 jobs. Steves & Sons announced that it would locate an advanced distribution and light manu-

facturing facility in Turner County that will create 200 new jobs. Finally, Lineage Logistics, the world's largest temperature-controlled industrial REIT and logistics solutions provider will open a new storage facility near the Port of Savannah that will create 65 jobs.

Georgia's transportation and logistics industry will benefit from the passage of the \$1 trillion Infrastructure Investment and Jobs Act in November 2021, which will provide about \$550 billion in "new" spending above current policy. About \$450 billion is simply re-authorization of spending under current policy. Of the "new" spending about \$110 billion is for roads and bridges, \$56 billion is for passenger and freight rail, and \$42 billion is for airports, ports, and water ways.

Covid-19, protectionism (e.g., the trade war), Russia's invasion of Ukraine, sanctions, simmering problems in the European Union, modest growth in many emerging markets, and a strong U.S. dollar against major currencies are some factors that will limit the amount of support that the foreign sector provides to American exports and, in turn, to Georgia's transportation and logistics industry. With respect to Russia's invasion of Ukraine, Georgia has very little direct trade with either country, but oil price shocks, supply chain disruptions, and financial market volatility reduce immediate prospects for economic growth and increase the chances that a recession will begin in 2022. With respect to the trade war, we assume that the higher tariffs enacted in 2018-19 will remain in place and will be an economic headwind for Georgia's logistics industry. We do not expect the U.S.-led trade war to escalate, but support for protectionist trade policies will be prevalent domestically and globally, which is unfavorable for the transportation and logistics industry.

Truckers

Strong growth in truck freight and the severe shortage of drivers means tight capacity for the trucking industry is likely to persist unless the U.S. economy experiences another recession. Truck

utilization will be close to 100 percent, pricing power will be strong, and profit margins will be elevated. The shortage of drivers will push up wage and salaries, especially for the more labor-intensive partial load segment of the market. In addition to raising drivers' compensation, carriers will focus on improving working conditions, providing more parking, and reducing wait times to pick up or unload cargo—efforts that will help retain current drivers and attract others to the profession.

Because their pricing power is strong, trucking firms should be able to raise rates enough to offset substantially higher fuel and labor costs. Net profit margins will remain wide. Fuel surcharges will help guard against oil price volatility, but high fuel prices will handicap long-haul truckers in their competition with the railroads.

Trucking firms will continue to benefit from businesses' outsourcing of their transportation and logistics needs, but tight capacity will force some businesses to build or expand their in-house trucking capabilities. There will be more emphasis on regional rather than global supply networks. The trucking industry's growth will focus on port cities, especially those with large, multi-modal distribution capacity, such as Savannah.

In 2022, credit will be available but less affordable, which will allow more carriers to add new trucks. In addition, record fuel prices and strict emissions requirements will spur replacement purchases, but the driver shortage will limit the extent of any fleet expansion. Another headwind is the 12 percent federal excise tax on new truck purchases.

Although the shortage of truck drivers predates the pandemic, the pandemic worsened it. Truck drivers are much older than workers in many other industries, so many retired due to concerns about covid-19 and due to the sudden drop in traffic as the economy partially shut down. The closing of many training and licensing centers during the pandemic emptied the pipeline of new drivers and made it more difficult for experienced drivers to renew licenses. A related problem is that not

enough young adults are entering the profession because truck drivers must be 21 before they are eligible to become interstate cargo haulers.

Before the pandemic, several trends encouraged trucking companies to expand, but strong market conditions in the wake of the pandemic have encouraged drivers to strike out on their own, resulting in industry fragmentation. This diffusion of capacity does not add much new capacity and reduces overall operating efficiency. Fragmentation will continue until market conditions soften, but the trend will not be sustained over the long term for several reasons. For example, complex supply chains favor carriers that can manage domestic and global distribution. Large retailers and manufacturers often prefer to deal with firms that offer the broadest range of services. Large trucking companies can achieve economies of scale in distribution, especially when it comes to managing far-flung supply chains, and they are better at recruiting new drivers.

Trucking companies face several challenges beyond just the shortage of drivers. High insurance costs and high deductibles are an ongoing problem, especially for firms that transport hazardous materials. Volatile fuel prices are almost a given, but the increased usage of fuel surcharges will better shield margins from swings in diesel prices. Of course, railroads pose still competition. New hybrid and electric trucks would help, but they are expensive.

Digital Freight Brokerage

The digitization of the freight brokerage process is a new, scalable disruptor for the traditional freight brokerage industry. Digital freight matching platforms that use the internet and mobile apps to match shippers with carriers are replacing many of the manual processes in the traditional truck brokerage industry. The challenges and complexities involved with integrating manual processes and relationships between the many firms involved in a single shipment of goods has historically shielded traditional freight brokerage

from venture capital-funded technology startups, but this is changing dramatically. Supply chain technology startups raised more than \$15 billion in venture capital in 2020 and \$41 billion in 2021.

Shipping goods internationally involves multiple companies along the way, each with different expertise. Startups offering digital platforms will streamline the process of arranging shipment-related services, allow monitoring of those shipments in real time, and provide price transparency. These attractive qualities will allow successful startups to take market share from traditional freight brokers, including third-party logistics providers and loadboards. Digital capacity to match shippers with carriers therefore is poised to grow much faster than the volume of shipments. Consequently, after a period of rapid growth in the number of digital freight matching companies, the industry will experience substantial consolidation. A small number of digital freight brokerage companies will achieve scale that will allow them to prosper. Other companies will succeed by either by focusing on a local market or on specialty freight lines such as heavy equipment or e-commerce fulfillment. Many small firms will be forced out of the market altogether.

Railroads

Georgia's rail network is the largest in the Southeast and business conditions are good. Demand growth will exceed capacity growth in 2022. Package and e-commerce shippers are moving more intermodal freight on the railroads. These growth dynamics will push rates and margins up. Growth in rail traffic that exceeds growth in GDP combined with higher rates and recent cost cuts suggests that overall profits will increase. Margins also will benefit from significant improvements in productivity stemming from recent capital investments. In addition, high fuel prices favor this energy-efficient mode of transportation, especially when it comes to long-distance shipments of bulky or containerized cargo.

The success of Georgia's ports is a big plus

for Georgia's railroads. In addition, now that the wider, deeper Panama Canal is open, East Coast ports that are ready to service the bigger ships are seeing substantial increases in container traffic, which will benefit railroads and truckers. The Mason Mega-Rail Terminal at the Port of Savannah is open and provides more frequent and faster rail services to Midwestern cities like Memphis, St. Louis, Chicago, and cities in the Ohio Valley. The terminal doubles rail capacity at the port, which now has the largest on-dock rail terminal at any port in North America.

Domestic inter-modal shipping of consumer goods, construction materials, light industrial products, communications equipment, and agricultural products will grow, but coal is the rail industry's largest source of shipments and a major contributor to its profits. Restrictions on carbon emissions will encourage utilities to become much less dependent on coal to generate electricity, but over the short-term the war between Russia and Ukraine may encourage more use of coal. Nonetheless, over time, coal's contribution to the rail industry's total revenues and profits will diminish as electric utilities switch to generating technologies with smaller carbon footprints.

Air Cargo

Because time to market is important, the prospects for Georgia's air cargo industry are good. Air cargo will grow faster than air passenger traffic. Air cargo—much of which flies in the cargo holds of commercial planes—will increase due to shorter restocking cycles and more production of high-value, time- and temperature-sensitive goods. The growth of e-commerce strongly favors providers of air cargo services. Barring a major step back from globalization, air cargo volumes are likely to grow faster in the next decade, boosting the share of the airline industry's overall revenues contributed by air cargo operations. Airport congestion, protectionism, and greater interest in onshore manufacturing are threats to Georgia's air cargo industry, however.

International shipments of air cargo will increase strongly, thanks to improving economic conditions abroad, easing of visa restrictions, shrinking product cycles, diversification of sourcing from far-flung markets for raw materials and products, and a shift towards exporting smaller, more expensive goods. Of course, more protectionist trade policies and/or strict visa requirements would reduce these prospects.

Ports

The unprecedented surge in goods consumption in the wake of the pandemic recession generated huge increases in demand for port services that Georgia's ports struggled to meet. In 2021, the Port of Savannah handled a record 5.6 million twenty-foot-equivalent container units (TEUs), which was almost 1 million more than in 2020, a 20 percent increase. Although wait times increased, the Georgia Ports Authority accommodated the increased cargo volume by opening five pop-up container yards located near manufacturing and distribution centers in Savannah, Atlanta, Statesboro, the Appalachian Regional Port, and Rocky Mount, NC to expedite cargo flow at the Port of Savannah. In addition, the Ports Authority's "Peak Capacity" project will deliver 820,000 TEUs of additional annual capacity by March 2022.

Georgia's rapidly expanding manufacturing, warehousing, distribution, logistics, and consumer sectors will generate demand for substantially more container handling capacity. Plans announced by the Ports Authority call for further expansion of the Port of Savannah's container capacity from 6 million TEUs to 9.5 million TEUs by 2025. Long-term plans call for the construction of a new terminal on Hutchinson Island.

The superb performance of Georgia's ports relative to other economic sectors and other U.S. ports reflects strong comparative advantages that allow them to expand their share of regional and national waterborne cargo traffic. The Port of Savannah is the largest single container terminal in North America and the fourth busiest U.S. con-

tainer port, behind only Los Angeles, Long Beach, and New York/New Jersey. It is the second busiest for the export of American goods by tonnage, behind only the Port of Los Angeles.

The Port of Brunswick specializes in non-containerized trade and is the second busiest port in the US in terms of transporting new automobiles and heavy machinery. To accommodate and encourage additional growth, the Ports Authority is doubling its capacity for cars and heavy machinery, adding 360,000 square feet of new warehouses and 85 additional acres for auto processing, increasing the Colonel's Island annual terminal capacity to 1.4 million vehicles. Scheduled for completion in 2023, these improvements should provide port capacity that is well ahead of current demand.

The Georgia Ports Authority is aggressively expanding its inter-modal rail service with a strategic focus on securing substantial additional traffic from across the Southeast and Midwest. The focus on the mid-American arc is likely to succeed because: (1) Savannah is the first port of call for many Panama Canal shipping services, which enhances on-time arrival of shipments; (2) Norfolk Southern and CSX provide double-stack container trains between Savannah and the Midwest; (3) Savannah is 1,000 miles from Chicago by rail, which is comparable to other ports that are north of Savannah but also farther east; (4) the port can move most cargo from ship to rail within 24 hours and guarantees that for priority shipments; (5) Savannah offers the fastest westward transit times in the South Atlantic region; and (6) 25 trains per week already go to/from Midwest locations.

The successful Appalachian Regional Port near Dalton is helping the Port of Savannah tap into new markets and will help developers bring more projects to Georgia. Cargo volumes handled by the inland port are surging, boosting Dalton's transportation and logistics industry. Based on this success, a second inland container port near I-985 in Gainesville will be built for Norfolk Southern trains.

Warehousing and Storage

Warehousing and storage employment is growing faster here than the U.S. with Georgia's five-year (2015 to 2020) employment growth standing at 92.8 percent versus 80.3 percent for the nation. Over the past six years, the state's share of employment as a portion of the transportation and warehousing sector has grown from 20 percent to just under 30 percent though efficiency advancements such as automation will slow future growth.

The heavy concentration of these jobs in Georgia will likely intensify as regional population growth increases demand for warehouse space. In terms of total square footage, Georgia is home to 900 million square feet of warehouse distribution space with Atlanta accounting for two thirds of it. Georgia has 36 warehouses with over 1 million square feet of space. An Amazon distribution center under construction in Appling will be the largest warehouse in Georgia at 2.8 million square feet when completed, followed by JC Penney in Forest Park at 2.2 million, and Target in Savannah at 2 million. Total warehouse and distribution center space will continue to grow as the state's low cost of doing business, convenient network of rails and highways, and access to international ports draw new companies and expansions of existing ones.

Sector employment has grown significantly since 2016 when e-commerce sales breached 8 percent of total retail sales in the U.S. Traditional retailers could backstock products onsite, but online sellers needed warehouses and distribution hubs convenient to major highways, airports, rail lines, and ports. The pandemic accelerated the shift even more.

All major retailers are shifting to accommodate e-commerce, with some big traditional retailers experiencing much faster growth in online sales than in-store sales. In 2020, Walmart, the second-largest e-commerce retailer in the nation, saw online sales jump by 97 percent while in-store purchases only increased by 5.2 percent. It also

is investing heavily in supply chain improvements and automation, hoping to take market share from Amazon.

Delivery Services

Employment grew more slowly with Georgia's five-year and ten-year growth rates were below U.S. rates. Delivery services jobs constituted about 18 percent of transportation and logistics employment in Georgia, and was only 6 percent more concentrated here than in the U.S.

Couriers and express delivery services includes employees of UPS, FedEx, and other private package carriers. Employment in Georgia grew significantly since 2010 but ramped up even more in the past five years as pandemic shut-downs boosted the need for local deliveries. We expect that employment levels have dropped over the past two years and growth will likely slow to a more sustainable rate as the effects of covid-19 on commerce wane.

Unless Georgia's population grows significantly, the share of delivery services employment and its rate of growth likely will remain the same. This contrasts with our predictions for most other transportation subsectors, which are expected to grow faster in Georgia than the U.S. due to Georgia's investment into coastal and inland ports, growth of warehouse space, and corporate relocations and expansions.



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