REGIONAL FREIGHT TRANSPORTATION PLAN UPDATE

ECONOMIC DEVELOPMENT MARKET ASSESSMENT

FEBRUARY 9, 2023

CORE
COASTAL REGION MPO

Regional Freight Transportation Plan Update

Economic Development Market Assessment

Prepared for

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1 INTRODUCTION

The Coastal Region Metropolitan Planning Organization (CORE MPO) region serves a gateway for global trade and for freight movement in the Southeast, due in large part to the Port of Savannah – the nation's 4th largest container port. In addition to the Port of Savannah, the region contains a comprehensive multimodal network of freight railroads and railyards, major highways, cargo-serving airports, as well as a substantial warehousing/distribution/logistics industry to manage freight movements over that network. In addition, the region is an emerging manufacturing hub for businesses looking to create and ship a diverse portfolio of finished products to clients around the globe. Overall, goods movement in the Savannah region has a major impact on the regional and state economy.

In support of the region's multimodal freight network and the people and businesses that rely on it, the CORE MPO is conducting an update of its Regional Freight Transportation Plan. The purpose of this technical memorandum is to review and analyze the region's population and economic trends, identify major freight-related (or freight-intensive) industries and understand how they contribute to the economic health of the region, and investigate how various national and international trends may impact these industries. These trends represent external threats and opportunities to the region and should are useful for developing freight-focused economic development strategies and investment plans.

The remainder of the memorandum is organized as follows:

- Section 2 – Identify and discuss macro-level trends in population change for the region.
- Section 3 – Identify and discuss macro-level trends in employment, personal income, output, and gross regional product change for the region.
- Section 4 – Identify major freight-intensive industries in the region; examine employment and economic output by industry sector; investigate worker commuter patterns with neighboring counties and regions.
- Section 5 – Identify and assess the impacts of a few select trends in the national and international economy on the region's freight industry.
- Section 6 – This section summarizes the information presented in section 2 – 5.

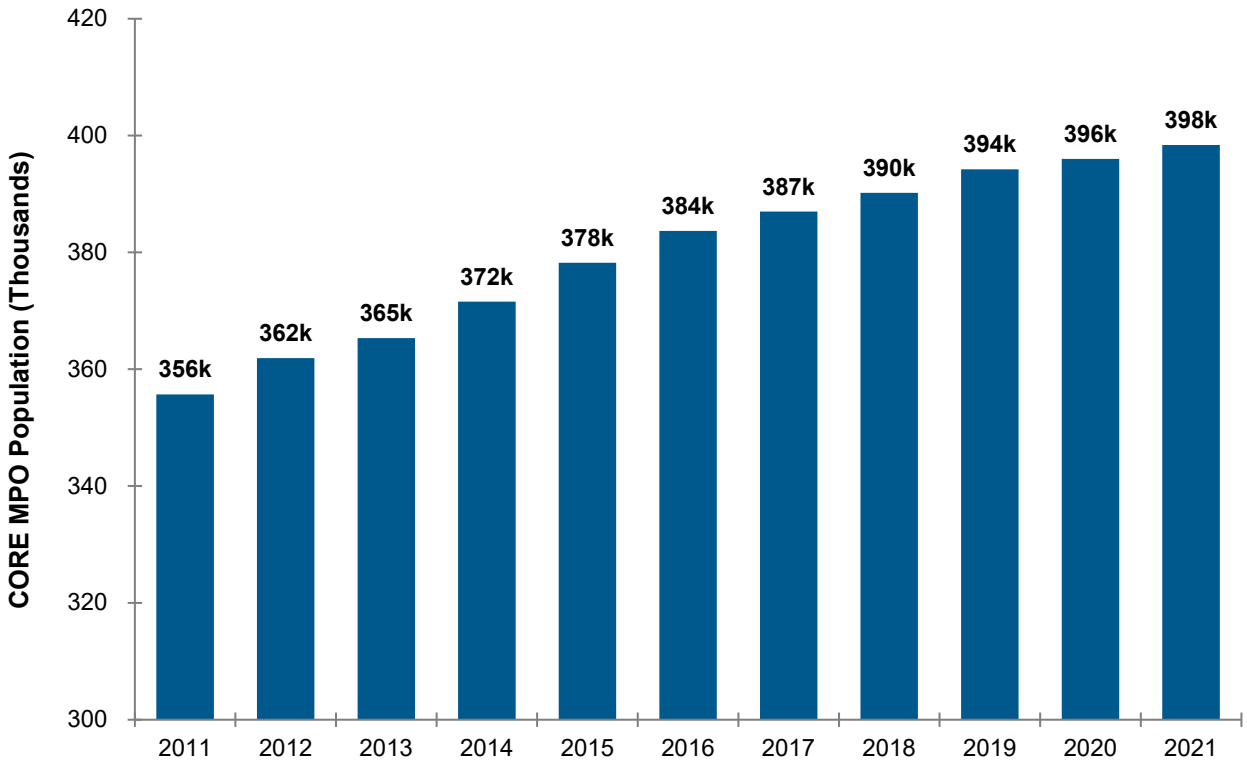
2 MACRO-LEVEL TRENDS IN POPULATION IN THE REGION

This section presents the historical and forecasted population for the CORE MPO region and compares the changes in population in the region with state and national level population changes. Multiyear data is interpreted as growth trends, which are expected to inform and drive economic variables relevant to this analysis (e.g., GRP, employment, etc.).

2.1 Historical Population

During the last decade, the population in the CORE MPO region has grown steadily, reaching almost 400,000 residents in 2021 (**Figure 2.1**). This represents an increase of 12.0 percent or 42,000 residents since 2011. On average, this population increase equals to a 1.1-percent annual growth rate over the 2011 to 2021 period.

FIGURE 2.1 CORE MPO REGION—HISTORICAL POPULATION, 2011 TO 2021



Source: Regional Economic Models, Inc. (REMI) TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

Comparatively, **Table 2.1** shows how the population in Georgia grew at a slightly slower pace during the last decade, comprising a 10.5-percent change from 2011 to 2021. The implied 1.0-percent average annual growth rate of population at the State level, as a whole, highlights the nature of CORE MPO as a growth center for the State. When compared to the U.S., in turn, the difference is even larger. The nation increased

its population by only 6.3 percent between 2011 and 2021, which represented an average annual growth rate of 0.6 percent. Such faster growth rates for the CORE MPO region and Georgia are aligned with the faster demographic expansion many southern States have been experiencing.[1,2]

TABLE 2.1 CORE MPO REGION, GEORGIA AND THE U.S.—HISTORICAL POPULATION CHANGES AND GROWTH, 2011 TO 2021

Item	2011	2021	Change (%), 2011 – 2021	CAGR[1], 2011 – 2021
CORE MPO Region	355,674	398,366	12.0%	1.1%
State of Georgia	9,803,630	10,833,927	10.5%	1.0%
U.S.	311,583,637	331,179,090	6.3%	0.6%

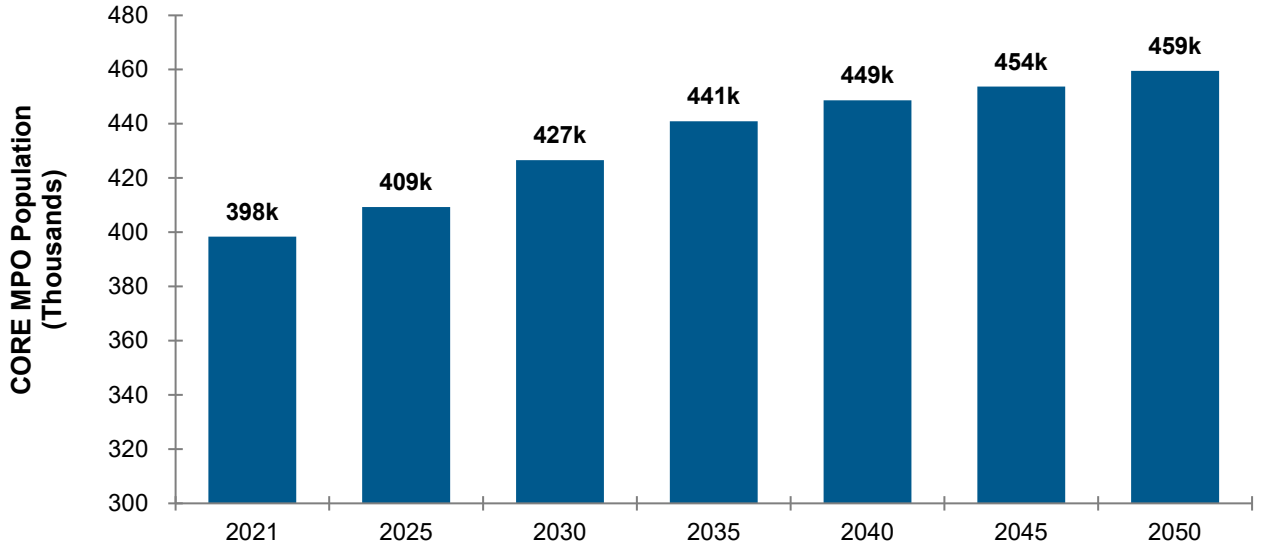
Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

[1] CAGR—Compound Annual Growth Rate.

2.2 Future Population

Population growth forecasts in the CORE MPO region are consistent with the historical growing trend, yet at slower rates, as shown in **Figure 2.2**. Population in the MPO region is expected to reach almost 430,000 by the end of the next decade, representing a 7.9-percent increase or an average annual growth rate of 0.8 percent over the 2021 to 2031 period. By 2050, however, the population in the MPO region is expected to grow by 15.3 percent compared to 2021, representing an average annual growth of 0.5 percent, or roughly a 1-percent increase every 2 years, over the 2021 to 2050 period.

FIGURE 2.2 CORE MPO REGION—FUTURE POPULATION PROJECTIONS, 2021 TO 2050



Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

[1] https://www.pewtrusts.org/en/research-and-analysis/articles/2022/04/25/a-third-of-states-lost-population-in-2021.

[2] https://concreteproducts.com/index.php/2022/02/11/census-population-figures-confirm-southern-states-momentum/.

Population forecasts at the State and national levels (**Table 2.2)** indicate that Georgia and the U.S., as a whole, are expected to experience smaller growth rates over the next 10 years. From 2021 to 2031, Georgia's population is expected to increase by 6.9 percent, and the U.S. population is expected to increase by 5.2 percent. By 2050, Georgia's population is estimated to grow faster than that of the CORE MPO region. In this longer term, the State's population would increase by 18.3 percent in total, outpacing the metropolitan area's 15-percent population growth. On average, population in all three geographies (MPO, State, and the U.S.) would grow roughly 1 percent every 2 years.

TABLE 2.2 CORE MPO REGION, GEORGIA AND THE U.S.—FORECAST POPULATION CHANGES AND GROWTH, 2021 TO 2050

Item	2021	2031	2050	Change (%), 2021 – 2031	CAGR, 2021 – 2031	Change (%) 2021 – 2050	CAGR, 2021 – 2050
CORE MPO Region	398,366	429,927	459,489	7.9%	0.8%	15.3%	0.5%
State of Georgia	10,833,927	11,582,986	12,816,337	6.9%	0.7%	18.3%	0.6%
U.S.	331,179,090	348,562,800	371,258,363	5.2%	0.5%	12.1%	0.4%

Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

3 ECONOMIC MACRO-LEVEL TRENDS IN THE REGION

To provide context for understanding the CORE MPO region transportation challenges, this section describes and analyzes economic trends within the three-county area using the following economic indicators:

- **Employment** comprises estimates of the number of full-time plus part-time jobs by place of work. Full-time and part-time jobs are counted at equal weight. Employment is affected by changes in business output and labor productivity. Therefore, an increase in employment can result from an increase in business output, or a decrease in labor productivity.

- **Personal Income** corresponds to the income received by persons from all sources. An increase in personal Income can result from an increase in wage and salary disbursements, or a decrease in contributions for government social insurance.

- **Output** is the amount of production, including all intermediate goods purchased, as well as value added (compensation and profit). It also can be described as sales or supply. The components of output are self-supply and exports. Therefore, an increase in output is caused by an increase in Demand, an increase in market share, or an increase in international exports.

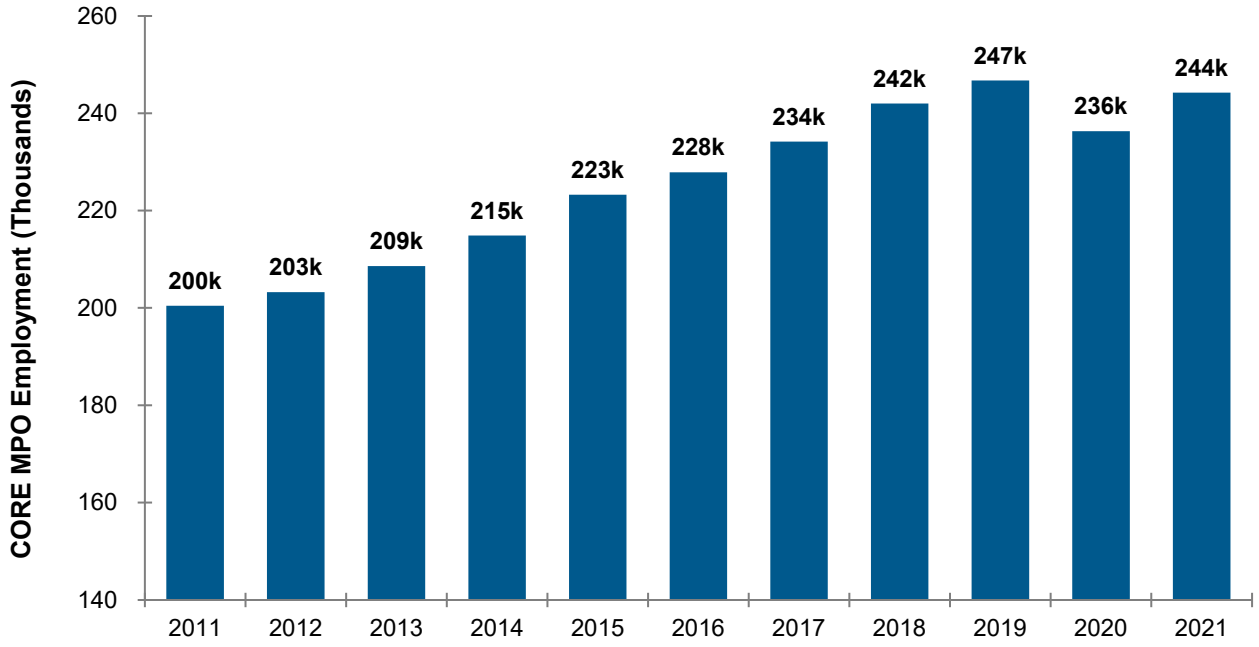
- **GRP** as a value-added concept is analogous to the national concept of Gross Domestic Product (GDP). It is equal to output minus intermediate inputs and represents compensation and profit. In other words, it is the wealth created by industry activity. GRP as a final demand concept includes all types of commodities consumed as personal consumption, by government, by businesses as capital investment, and as exports. GRP is affected by changes in demand. Therefore, an increase in GRP is caused by an increase in demand.

The health of the CORE MPO region's economy, measured in terms of employment, personal income, GRP, and economic output, provides context for understanding the CORE MPO region transportation challenges. Further analysis on how industry mix influences the usage of the transportation network can be found in Section 4.

3.1 Historical Economic Conditions

The total number of employees in the CORE MPO region between 2011 and 2021 is shown in **Figure 3.1**. From 2011 to 2019, the total number of employees in the region increased by 23.1 percent as compared to a 10.8 percent increase in the region's population over the same period. As expected, the COVID-19 pandemic in 2020 and the associated recession in 2021 that caused global business disruptions had an unprecedented impact on the regional employment levels in 2020 and 2021.

FIGURE 3.1 CORE MPO REGION—HISTORICAL EMPLOYMENT, 2011 TO 2021

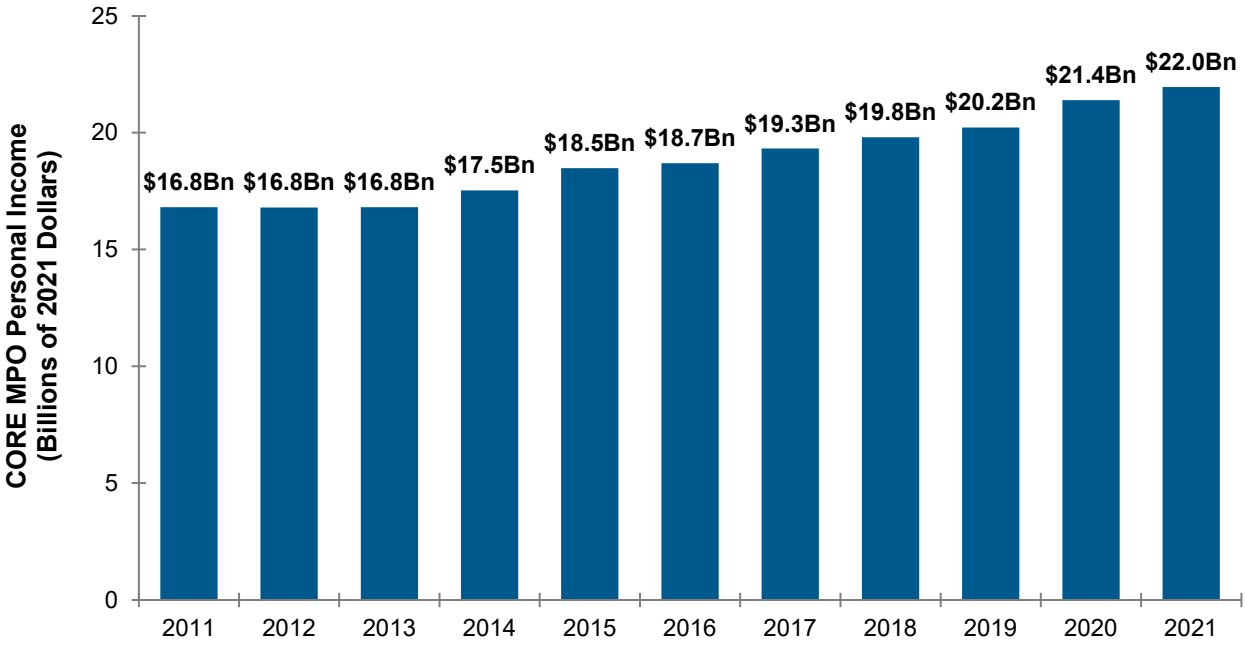


Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

Personal income in the CORE MPO region between 2011 and 2021 is shown in **Figure 3.2**. During that period, the regional personal income increased by 30.6 percent. Personal income kept growing during the COVID-19 pandemic in 2020 and the associated recession in 2021, which is an exceptional trend among the economic variables analyzed in this report. The fiscal stimulus package implemented by the Biden Administration, as part of the American Rescue Plan Act of 2021 to help households and businesses weather the pandemic and boost economic activity, helps explain this positive trend.[3] The stimulus package, which included Federal aid paychecks, contributed to regional personal income implying wealth distribution rather than wealth generation (i.e., such trend was not observed for GRP or economic output at any of the analyzed geographies, as shown in **Table 3.2**).

[3] https://www.cbpp.org/research/poverty-and-inequality/robust-covid-relief-achieved-historic-gains-against-poverty-and.

FIGURE 3.2 CORE MPO REGION—HISTORICAL PERSONAL INCOME, 2011 TO 2021

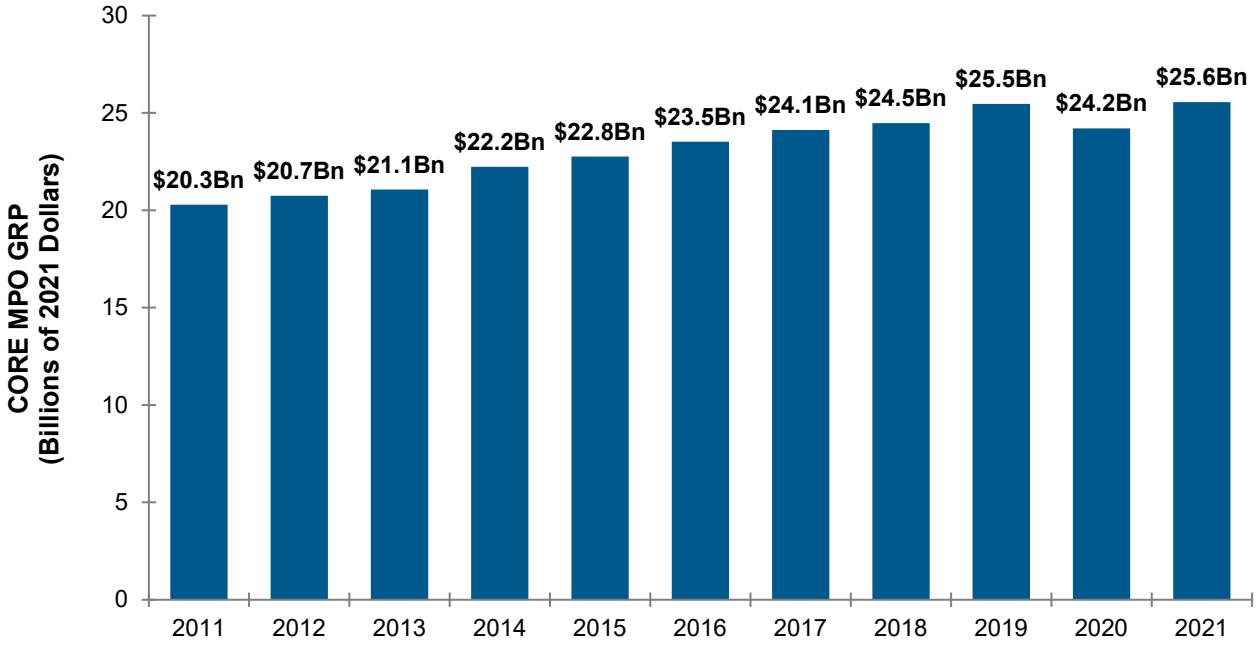


Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

GRP and economic output in the CORE MPO region between 2011 and 2021 are shown in **Figure 3.3** and **Figure 3.4**, respectively. From 2011 to 2019, the regional GRP and economic output increased by 25.5 percent and 26.1 percent, respectively. Global business disruptions caused by the COVID-19 pandemic and its associated recession have been challenging for most national economies. This is reflected in the 2020 to 2021 performance of the of the U.S. and the CORE MPO regional economic. While the regional GRP has barely overcome the negative effects of the COVID-19 pandemic on global supply chains, the regional economic output is still below its 2019 watermark.

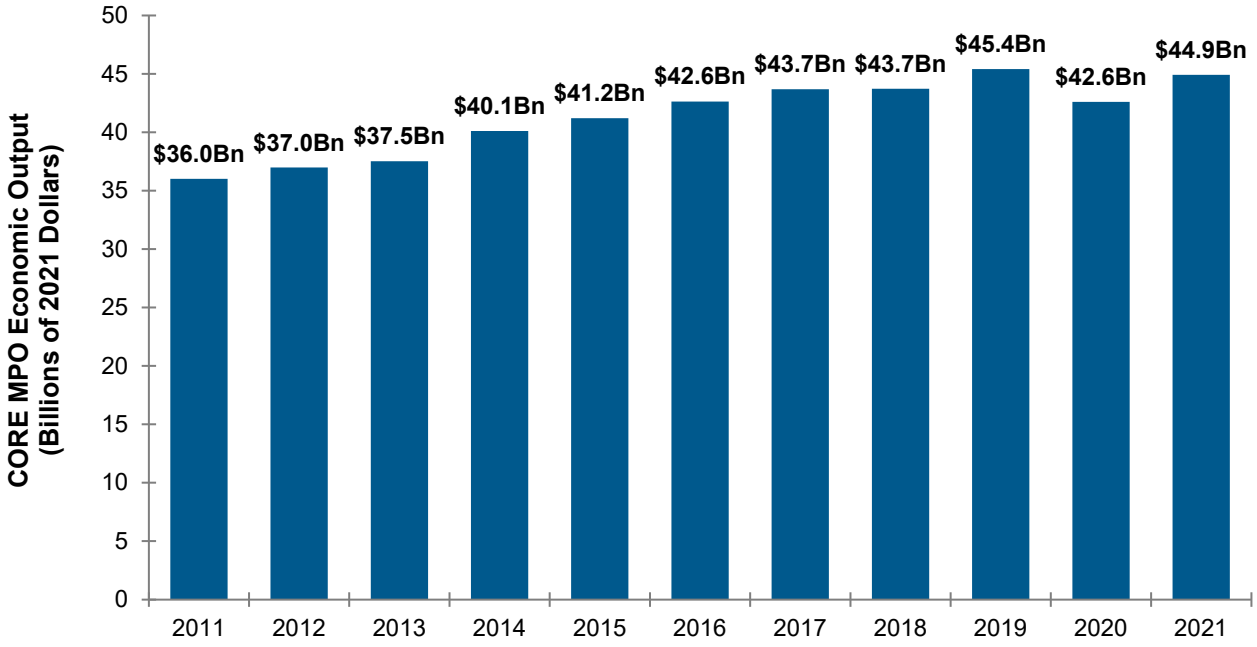
Table 3.1 summarizes the regional employment, personal income, GRP, and economic output in selected years. It also presents percentage changes and average annual growth rates between 2011 and 2019, 2019 and 2020, and 2020 and 2021. The 10-year time series was split into three separate periods because of the specificity of the COVID-19 pandemic and its associated recession. The first period consists of the trend between 2011 and 2019. Its annualized growth is then contrasted to a second and a third one-year-long periods: the economic downturn from 2019 to 2020 due to the pandemic, and the expected recovery from 2020 to 2021, respectively. The region experienced a positive growth in employment, personal income, GRP, and economic output from 2011 to 2019. In 2020, the regional employment, GRP, and economic output decreased due to the unprecedent impact of COVID-19 on businesses, while the personal income increased due to the fiscal stimulus package.

FIGURE 3.3 CORE MPO REGION—HISTORICAL GROSS REGIONAL PRODUCT, 2011 TO 2021



Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

FIGURE 3.4 CORE MPO REGION—HISTORICAL ECONOMIC OUTPUT, 2011 TO 2021



Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

TABLE 3.1 CORE MPO REGION—ECONOMIC HISTORICAL TRENDS, 2011 TO 2021

Item	2011	2019	2020	2021	Change (%), 2011 – 2019	CAGR, 2011 – 2019	Change (%), 2019 – 2020	Change (%), 2020 – 2021
Total Employment (Thousands)	200	247	236	244	23.1%	2.6%	-4.2%	3.3%
Personal Income (Billions of 2021 Dollars)	$16.8	$20.2	$21.4	$22.0	20.3%	2.3%	5.8%	2.6%
GRP (Billions of 2021 Dollars)	$20.3	$25.5	$24.2	$25.6	25.5%	2.9%	-4.9%	5.6%
Economic Output (Billions of 2021 Dollars)	$36.0	$45.4	$42.6	$44.9	26.1%	2.9%	-6.2%	5.4%

Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

In comparing the CORE MPO region with State- and national-level economic performance (**Table 3.2**), the following can be concluded:

- **Employment—**The CORE MPO region experienced stronger growth in employment from 2011 to 2019 and a milder recession in 2020. Although the rest of Georgia exhibited a stronger 2021 employment recovery growth rate than the CORE MPO region, the region has returned closer to its 2019 baseline than the state overall.
- **Economic Output—**The CORE MPO region also increased its economic output at a faster rate than Georgia and the U.S. between 2011 - 2019. However, since 2020 the statewide recovery rate has been higher than the region.
- **Personal Income—**The trend for personal income shows that the State has consistently had a highest growth rate than the region and the nation; and this held true before, during, and after the COVID-19 pandemic.
- **GRP—**The CORE MPO region led the 2011 – 2019 period in terms of growth, but then suffered both the largest drop in 2020 and the mildest recovery in 2021 among all three geographies. The national gross domestic product had the most robust performance during the 2019 – 2020 period, while Georgia had the fastest growth during the 2020 – 2021 period.

TABLE 3.2 CORE MPO REGION, GEORGIA, AND THE U.S.—HISTORICAL ECONOMIC CHANGES AND GROWTH, 2011 TO 2021

	2011	2019	2020	2021	Change (%), 2011 – 2019	CAGR, 2011 – 2019	Change (%), 2019 – 2020	Change (%), 2020 – 2021
Total Employment (Thousands)								
CORE MPO Region	200	247	236	244	23.1%	2.6%	-4.2%	3.3%
State of Georgia	5,199	6,299	5,969	6,206	21.2%	2.4%	-5.2%	4.0%
U.S.	175,966	201,546	190,643	196,451	14.5%	1.7%	-5.4%	3.0%
Personal Income (Billions of 2021 Dollars)								

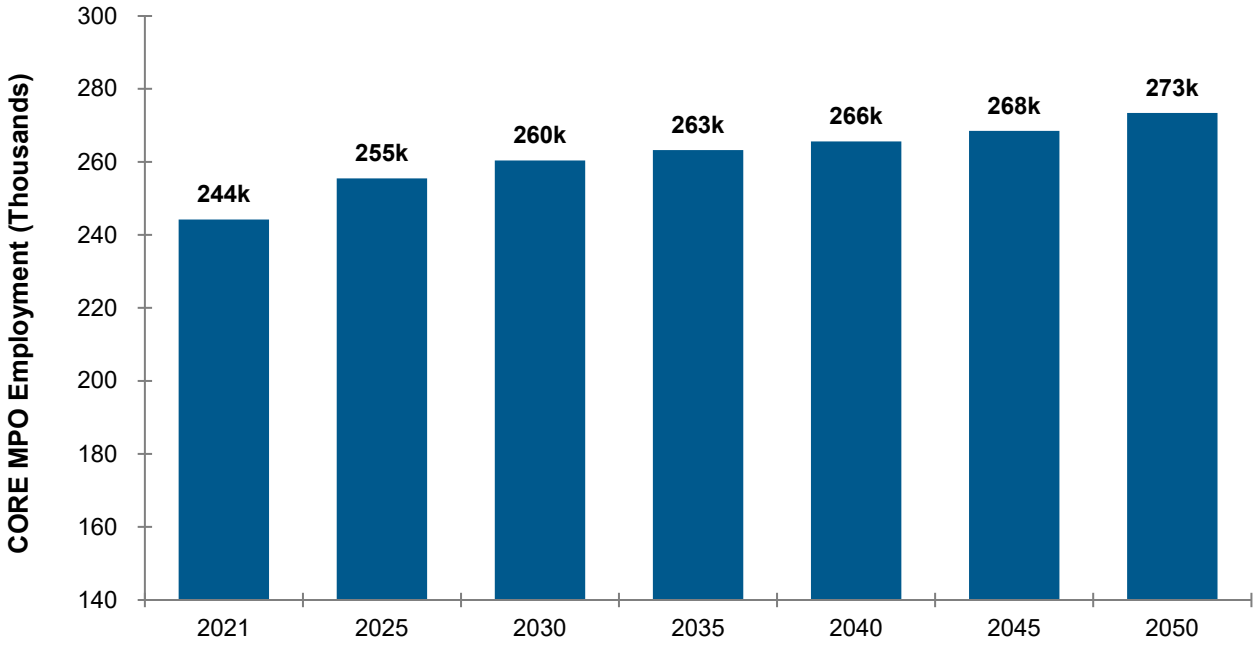
	2011	2019	2020	2021	Change (%), 2011 – 2019	CAGR, 2011 – 2019	Change (%), 2019 – 2020	Change (%), 2020 – 2021
CORE MPO Region	$16.8	$20.2	$21.4	$22.0	20.3%	2.3%	5.8%	2.6%
State of Georgia	$423.0	$534.9	$566.8	$588.4	26.4%	3.0%	6.0%	3.8%
U.S.	$15,684.0	$19,324.9	$20,350.2	$21,008.7	23.2%	2.6%	5.3%	3.2%
GRP (Billions of 2021 Dollars)								
CORE MPO Region	$20.3	$25.5	$24.2	$25.6	25.5%	2.9%	-4.9%	5.6%
State of Georgia	$527.2	$653.9	$629.4	$670.2	24.0%	2.7%	-3.8%	6.5%
U.S.	$18,677.6	$22,314.5	$21,565.1	$22,787.1	19.5%	2.2%	-3.4%	5.7%
Economic Output (Billions of 2021 Dollars)								
CORE MPO Region	$36.0	$45.4	$42.6	$44.9	26.1%	2.9%	-6.2%	5.4%
State of Georgia	$941.4	$1,139.9	$1,094.2	$1,163.7	21.1%	2.4%	-4.0%	6.3%
U.S.	$33,249.9	$39,354.3	$37,929.2	$40,026.4	18.4%	2.1%	-3.6%	5.5%

Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

3.2 Future Economic Conditions

Forecast employment in the CORE MPO region in selected future years is shown in **Figure 3.5**. Employment in the MPO region is expected to reach 273,000 by 2050, representing a 12.0-percent increase or an average annual growth rate of 0.4 percent over the 2021 to 2050 period. The employment forecasts are conservative, with growth rates that albeit positive, are anticipated to diminish in future years. Future employment growth is expected to occur at a slower rate (12.0 percent between 2021 and 2050) than population growth (15.3 percent between 2021 and 2050).

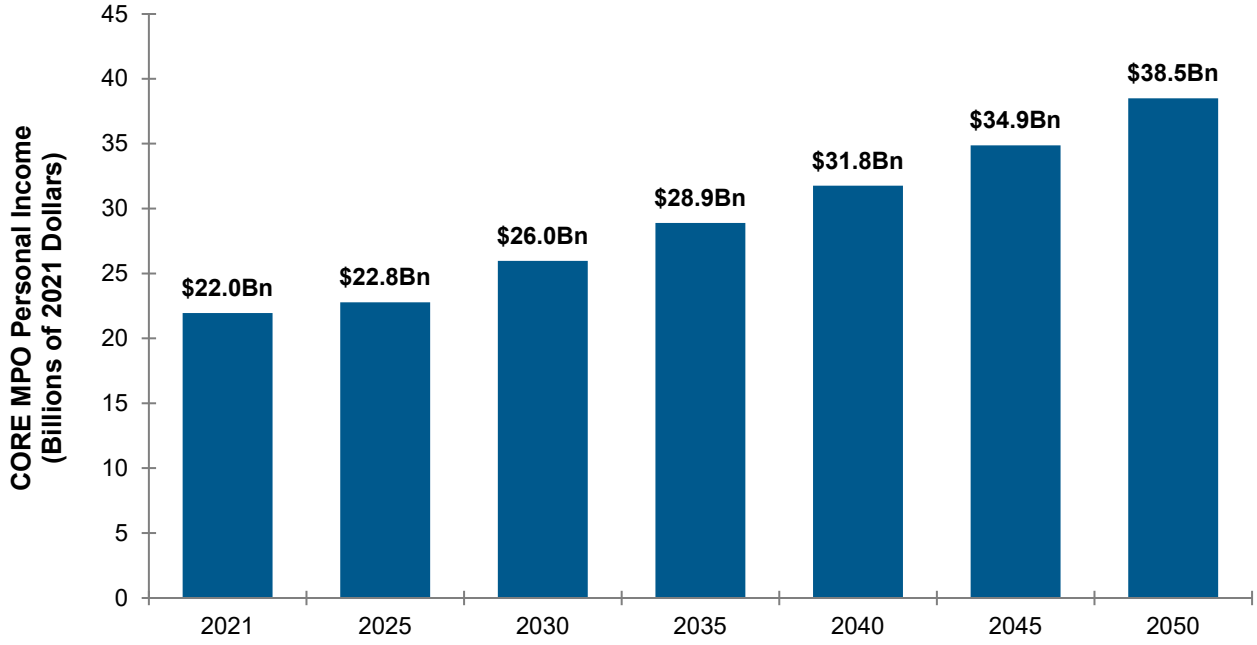
FIGURE 3.5 CORE MPO REGION—FORECAST EMPLOYMENT, 2021 TO 2050



Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

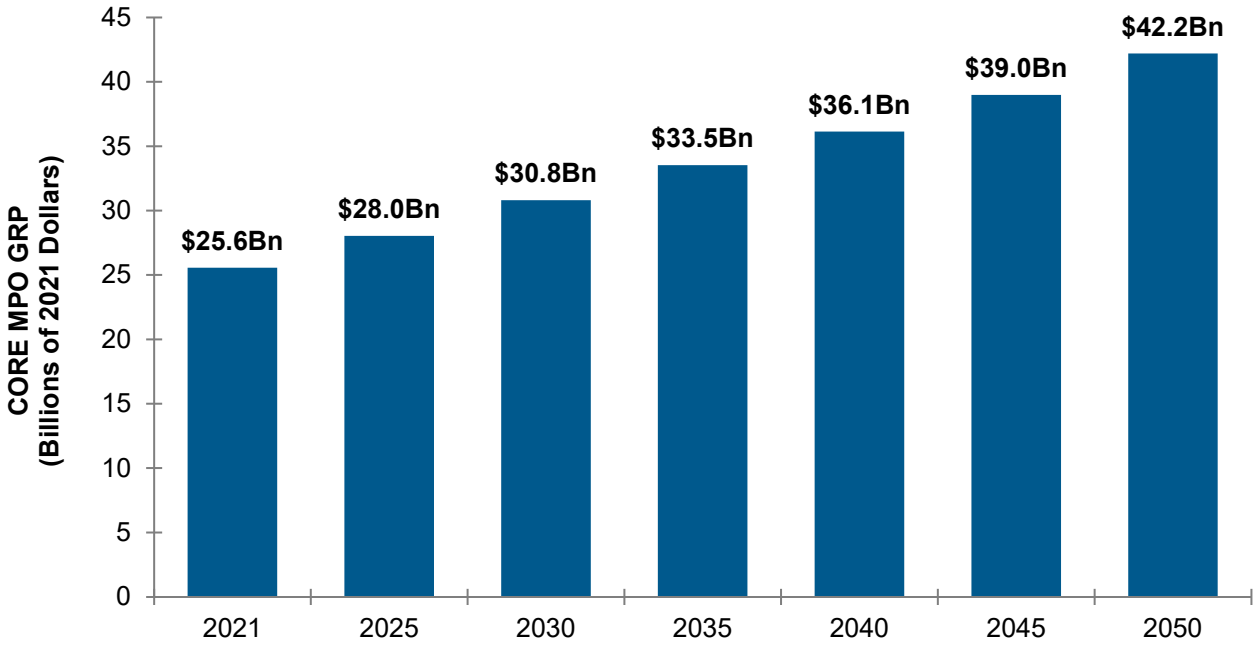
Forecast personal income, GRP, and economic output in the CORE MPO region in selected future years are shown in Figure 3.6, Figure 3.7, and Figure 3.8, respectively. Personal income in the MPO region is expected to total $38.5 billion by 2050, representing a 75.3-percent increase or an average annual growth rate of 2.0 percent over the 2021 to 2050 period. GRP in the MPO region is expected to total $42.2 billion by 2050, representing a 65.1-percent increase or an average annual growth rate of 1.7 percent over the 2021 to 2050 period. Economic output in the MPO region is expected to total $73.1 billion by 2050, representing a 62.8-percent increase or an average annual growth rate of 1.7 percent over the 2021 to 2050 period. While the TranSight economic model predicts modest population and employment expansions, it expects a more substantial economic expansion. All three economic indicators (i.e., personal income, GRP, and economic output) are expected to grow by at least 60 percent by 2050.

FIGURE 3.6 CORE MPO REGION—FORECAST PERSONAL INCOME, 2021 TO 2050



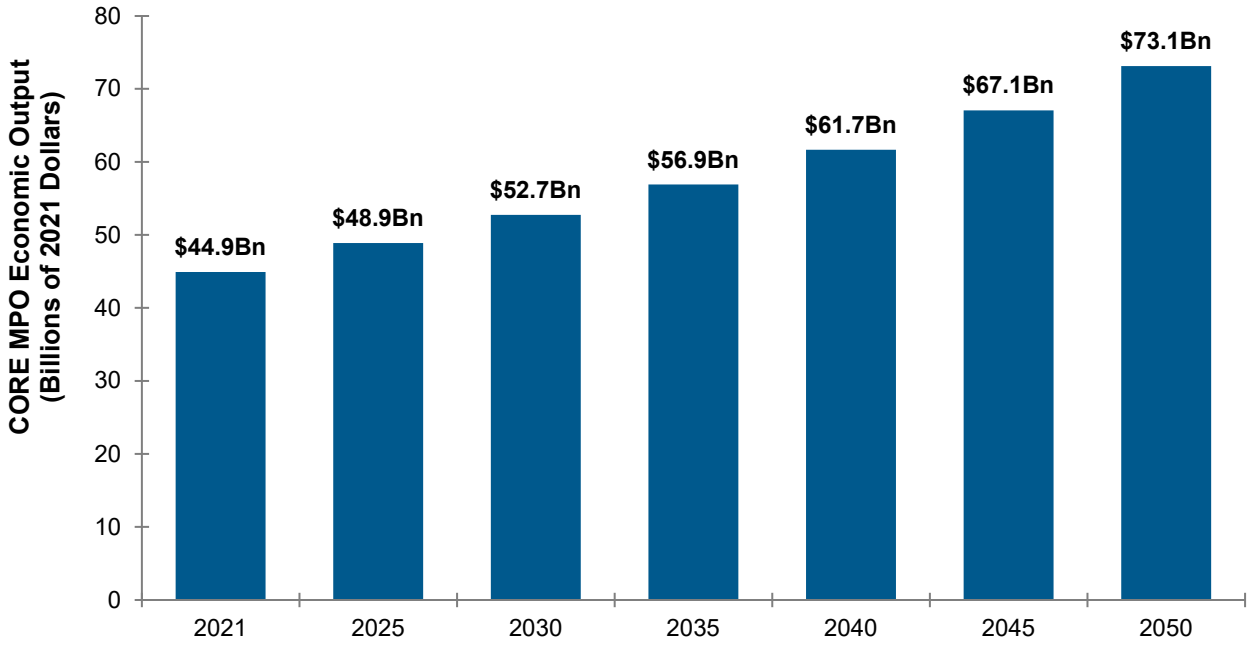
Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

FIGURE 3.7 CORE MPO REGION—FORECAST GROSS REGIONAL PRODUCT, 2021 TO 2050



Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

FIGURE 3.8 CORE MPO REGION—FORECAST ECONOMIC OUTPUT, 2021 TO 2050



Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

The future growth of the economic indicators was analyzed separately for two timeframes (**Table 3.3**): the 2021 – 2031 upcoming 10-year period and the 2021 – 2050 period, where 2050 corresponds to the analysis horizon year. This comparative analysis indicates the following:

- All economic indicators are expected to grow less between 2021 and 2031 than they did between 2011 and 2021 (**Table 3.1**). Similarly, 2021 – 2031 forecasted average annual growth rates are greater than their 2021 – 2050 counterparts, except for personal income, maintaining the increasingly slower growth trend.

- For personal income in the region, a 1.9-percent rate is anticipated for the former timeframe, and a 2.0-percent rate is expected for the latter timeframe. Personal income behaving differently when compared to GRP and economic output suggests that salary, dividends, and other kinds of income could change their share over the total economic output generated in the future; also referred to as an increase in the return on labor.

TABLE 3.3 CORE MPO REGION—FORECAST ECONOMIC CHANGES AND GROWTH, 2021 TO 2050

Item	2021	2031	2050	Change (%), 2021 – 2031	CAGR, 2021 – 2031	Change (%), 2021 – 2050	CAGR, 2021 – 2050
Total Employment (Thousands)	244	261	273	7.0%	0.7%	12.0%	0.4%
Personal Income (Billions of 2021 Dollars)	$22.0	$26.6	$38.5	21.3%	1.9%	75.3%	2.0%
GRP (Billions of 2021 Dollars)	$25.6	$31.4	$42.2	22.9%	2.1%	65.1%	1.7%
Economic Output (Billions of 2021 Dollars)	$44.9	$53.6	$73.1	19.2%	1.8%	62.8%	1.7%

Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

When looking at the economic indicators' growth by geography for the 2021 – 2031 upcoming 10 years and the 2021 – 2050 future 29 years in **Table 3.4**, the following can be concluded:

- **Employment—**National employment growth for 2021 – 2031 is projected to slightly outpace growth at the regional level. Statewide employment growth is expected to be higher than both national and regional growth over the longer term (2021 – 2050). Average annualized growth in employment is expected to remain below 1 percent in all cases.

- **Personal income-**Personal income growth is forecasted to be higher for the CORE MPO region during the 2021 – 2031 period. Average annual growth rates are expected to be near 2 percent for both 2021 – 2031 and 2021 – 2050 periods, in all three geographies (i.e., the CORE MPO region, Georgia, and the U.S.).

- **GRP—**The CORE MPO region is expected to have the largest growth rates for GRP between 2021 and 2031 while the state is expected to lead growth over the 2021 – 2050 longer-term period. Differences between average annual growth rates are, however, expected to be small, close to 1.8 percent.

- **Economic Output—**The CORE MPO region is expected to have the largest growth rates for economic output, as it did for the 2011 – 2021 period, when comparing trends between 2021 and 2031. However, according to forecasted values, the CORE MPO region is likely to be displaced by Georgia in the longer-term 2021 – 2050 period, as a whole. Nevertheless, average annual growth rates are expected to remain similar across geographies and periods, roughly at 1.7 or 1 8 percent.

TABLE 3.4 CORE MPO REGION, GEORGIA AND THE U.S.—FORECAST ECONOMIC CHANGES AND GROWTH, 2021 TO 2050

	2021	2031	2050	Change (%), 2021 – 2031	CAGR, 2021 – 2031	Change (%), 2021 – 2050	CAGR, 2021 – 2050
Employment (Thousands)							
CORE MPO Region	244	261	273	7.0%	0.7%	12.0%	0.4%
State of Georgia	6,206	6,613	7,273	6.6%	0.6%	17.2%	0.5%
U.S.	196,451	211,020	227,831	7.4%	0.7%	16.0%	0.5%
Personal Income (Billions of 2021 Dollars)							
CORE MPO Region	$22.0	$26.6	$38.5	21.3%	1.9%	75.3%	2.0%
State of Georgia	$588.4	$699.9	$1,054.2	18.9%	1.7%	79.1%	2.0%
U.S.	$21,008.7	$25,174.9	$36,711.9	19.8%	1.8%	74.7%	1.9%
GRP (Billions of 2021 Dollars)							
CORE MPO Region	$25.6	$31.4	$42.2	22.9%	2.1%	65.1%	1.7%
State of Georgia	$670.2	$804.9	$1,128.7	20.1%	1.8%	68.4%	1.8%
U.S.	$22,787.1	$27,558.1	$37,938.9	20.9%	1.9%	66.5%	1.8%
Economic Output (Billions of 2021 Dollars)							
CORE MPO Region	$44.9	$53.6	$73.1	19.2%	1.8%	62.8%	1.7%
State of Georgia	$1,163.7	$1,357.4	$1,935.3	16.6%	1.6%	66.3%	1.8%
U.S.	$40,026.4	$46,989.3	$65,732.2	17.4%	1.6%	64.2%	1.7%

Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

3.3 Employment by Industry and Growth Trends

Employment by industry (at the 2-digit NAICS level) in the CORE MPO region in 2011 and 2021 is shown in **Table 3.5**. Based on employment, the top 3 fastest growing industries in the CORE MPO region are Transportation and Warehousing (with a 5.1-percent average annual growth rate); Administrative, support, waste management, and remediation services (with a 3.9-percent average annual growth rate); and Professional, Scientific, and Technical Services (with a 3.1-percent average annual growth rate). In absolute values, the top 3 employing industries in 2021 are Public Administration (30,076 jobs); Retail Trade (26,516 jobs); and Health Care and Social Assistance (25,080 jobs). The job contribution of these three industries represented 33.4 percent of the total regional employment in 2021.

TABLE 3.5 CORE MPO REGION—EMPLOYMENT BY INDUSTRY AND INDUSTRY GROWTH, 2011 TO 2021

Industry (NAICS Code)	Employment, 2011	Employment, 2021	CAGR, 2011 – 2021
Agriculture, Forestry, Fishing, and Hunting (NAICS 11)	771	944	2.0%
Mining, Quarrying, and Oil and Gas Extraction (NAICS 21)	122	109	1.1%
Utilities (NAICS 22)	476	612	2.5%
Construction (NAICS 23)	8,843	11,368	2.5%
Manufacturing (NAICS 31 – 33)	14,793	18,195	2.1%
Wholesale Trade (NAICS 42)	6,008	6,964	1.5%
Retail Trade (NAICS 44 – 45)	20,927	26,516	2.4%
Transportation and Warehousing (NAICS 48 – 49)	12,700	20,881	5.1%
Information (NAICS 51)	2,041	2,332	1.3%
Finance and Insurance (NAICS 52)	7,009	7,294	0.4%
Real Estate and Rental and Leasing (NAICS 53)	8,329	10,588	2.4%
Professional, Scientific, and Technical Services (NAICS 54)	8,331	11,305	3.1%
Management of Companies and Enterprises (NAICS 55)	1,812	1,133	4.6%
Administrative, Support, Waste Management, and Remediation Services (NAICS 56)	14,682	21,603	3.9%
Educational Services (NAICS 61)	5,523	5,286	0.4%
Health Care and Social Assistance (NAICS 62)	21,236	25,080	1.7%
Arts, Entertainment, and Recreation (NAICS 71)	3,807	4,774	2.3%
Accommodation and Food Services (NAICS 72)	20,287	24,977	2.1%
Other Services (Except Public Administration) (NAICS 81)	12,249	14,182	1.5%
Public Administration (NAICS 92)	30,496	30,076	0.1%
Total Employment	**200,442**	**244,218**	**2.0%**

Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

3.4 Economic Output by Industry and Growth Trends

Economic output by industry (at the 2-digit NAICS level) in the CORE MPO region in 2011 and 2021 is shown in **Table 3.6**. Based on economic output, the top 3 fastest growing industries in the CORE MPO region are Mining, Quarrying, and Oil and Gas Extraction (with a 36.6-percent average annual growth rate); Agriculture, Forestry, Fishing, and Hunting (with a 6.3-percent average annual growth rate); and Construction (with a 6.1-percent average annual growth rate). In absolute values, the top 3 contributors to economic output in the CORE MPO region are Manufacturing ($8.7 billion); Public Administration ($5.4 billion); and Real Estate and Rental and Leasing ($5.4 billion). The contribution of these 3 industries represented 43.4 percent of the total regional economic output in 2021.

TABLE 3.6 CORE MPO REGION—ECONOMIC OUTPUT BY INDUSTRY AND INDUSTRY GROWTH, 2011 TO 2021

Industry (NAICS Code)	Economic Output (Millions of 2021 Dollars), 2011	Economic Output (Millions of 2021 Dollars), 2021	CAGR, 2011 – 2021
Agriculture, Forestry, Fishing, and Hunting (NAICS 11)	$68.7	$126.8	6.3%
Mining, Quarrying, and Oil and Gas Extraction (NAICS 21)	$1.4	$31.4	36.6%
Utilities (NAICS 22)	$1,489.8	$1,390.3	-0.7%
Construction (NAICS 23)	$1,302.4	$2,344.9	6.1%
Manufacturing (NAICS 31 – 33)	$7,072.3	$8,707.0	2.1%
Wholesale Trade (NAICS 42)	$1,557.3	$2,552.8	5.1%
Retail Trade (NAICS 44 – 45)	$1,640.3	$2,780.5	5.4%
Transportation and Warehousing (NAICS 48 – 49)	$2,347.8	$2,890.2	2.1%
Information (NAICS 51)	$525.3	$662.0	2.3%
Finance and Insurance (NAICS 52)	$2,426.6	$2,423.8	0.0%
Real Estate and Rental and Leasing (NAICS 53)	$3,967.9	$5,370.4	3.1%
Professional, Scientific, and Technical Services (NAICS 54)	$1,057.8	$1,421.1	3.0%
Management of Companies and Enterprises (NAICS 55)	$426.3	$239.7	-5.6%
Administrative, Support, Waste Management, and Remediation Services (NAICS 56)	$987.7	$1,728.3	5.8%
Educational Services (NAICS 61)	$606.3	$494.6	-2.0%
Health Care and Social Assistance (NAICS 62)	$2,616.3	$3,272.8	2.3%
Arts, Entertainment, and Recreation (NAICS 71)	$233.2	$250.9	0.7%
Accommodation and Food Services (NAICS 72)	$1,512.5	$2,036.1	3.0%
Other Services (Except Public Administration) (NAICS 81)	$747.2	$790.2	0.6%
Public Administration (NAICS 92)	$5,424.4	$5,400.2	0.0%
Total Economic Output	**$36,011.4**	**$44,913.8**	**2.2%**

Source: REMI TranSight model for Georgia regions, Atlanta, and the rest of the U.S.

3.5 Commuter Patterns of the CORE MPO Region

Table 3.7 shows commute trips by movement type in the CORE MPO region in 2011 and 2019 using data from the U.S. Census Bureau Longitudinal Employer-Household Dynamics (LEHD) program. Inbound commute trips are those that originate outside of the CORE MPO region and terminate in the region. Outbound commute trips correspond to those that originate in the CORE MPO region and terminate elsewhere. Intra-commute trips are trips that originate and terminate within the CORE MPO region.

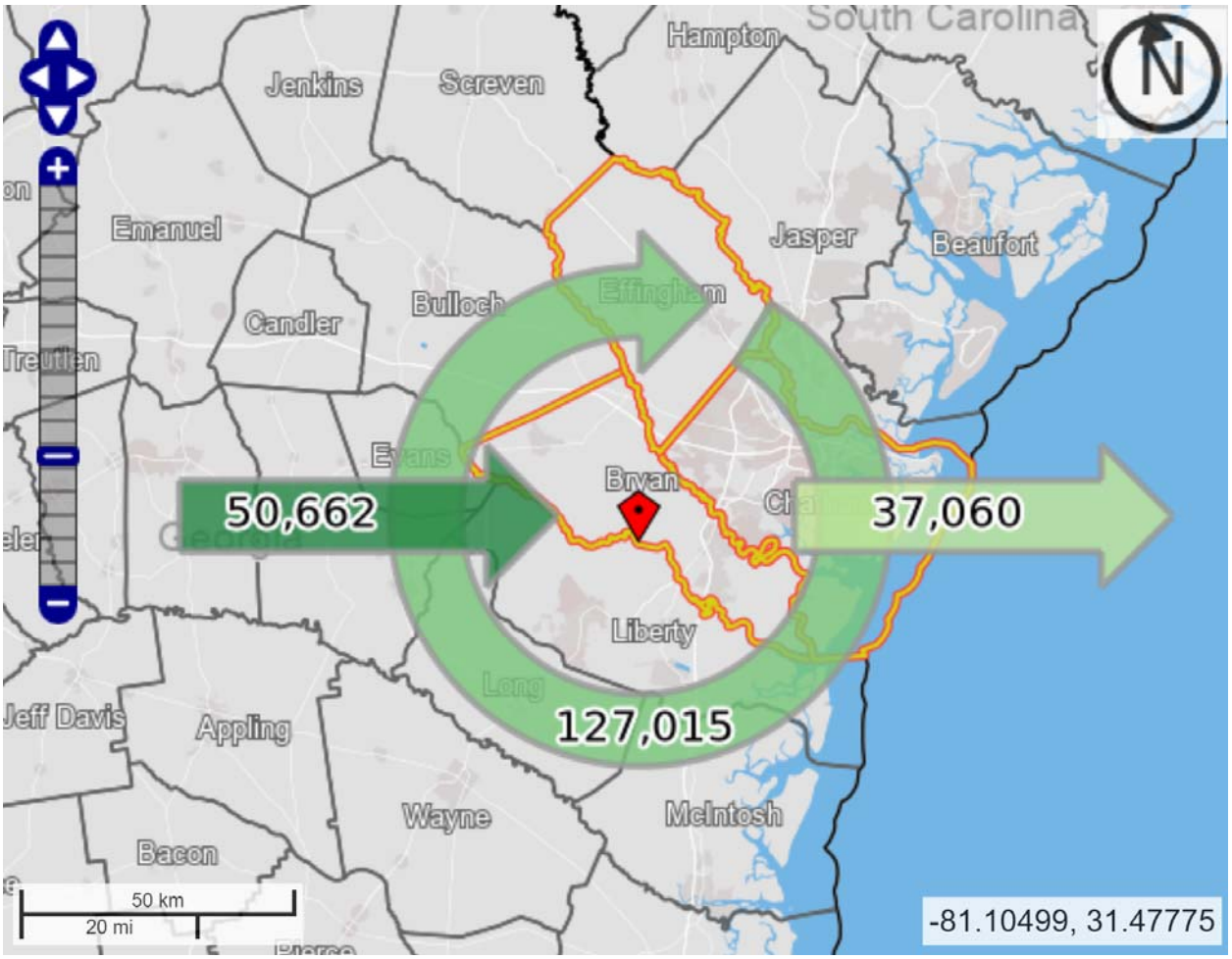
Among the three types of movements, intra-commute trips are the largest comprising almost 60 percent of the total commute trips. In terms of changes between 2011 and 2019, the movement that has experienced the most atypical growth is outbound commute trips, which have grown nearly three times as fast when compared to inbound and intra-movements. **Figure 3.9** features a diagram of the three-county area summary statistics for inbound trips (left-hand-side arrow going into the CORE MPO region); outbound trips (right-hand-side arrow coming out of the CORE MPO region); and intra-commute trips (the central, circular arrow in the CORE MPO region).

TABLE 3.7 CORE MPO REGION—COMMUTE TRIPS CHANGES AND GROWTH, 2011 TO 2019

Commute Trips by Direction	2011	2019	Change (%), 2011 – 2019	CAGR, 2011 – 2019
Inbound Commute Trips	44,028	50,662	15.1%	1.8%
Outbound Commute Trips	26,029	37,060	42.4%	4.5%
Intra-commute Trips	109,409	127,015	16.1%	1.9%
Total	**179,466**	**214,737**	**19.7%**	**2.2%**

Source: U.S. Census Bureau, 2022, Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (2002 – 2019), Washington, DC: U.S. Census Bureau, LEHD Program, accessed on November 17, 2022, at https://onthemap.ces.census.gov, LODES 7.5.

FIGURE 3.9 CORE MPO REGION—COMMUTE TRIPS DIAGRAM, 2021



Source: U.S. Census Bureau, 2022, LEHD Origin-Destination Employment Statistics (2002 – 2019), Washington, DC: U.S. Census Bureau, LEHD Program, accessed on November 17, 2022, at https://onthemap.ces.census.gov, LODES 7.5.

Table 3.8 focuses on commute trips between the CORE MPO region and its four neighboring counties in Georgia (i.e., Screven, Bulloch, Evans, and Liberty). Inbound commute trips are trips that originate in the combined Georgia neighboring counties and terminate in the CORE MPO region. Outbound commute trips are those that originate in the CORE MPO region and terminate in the combined Georgia neighboring counties.

TABLE 3.8 COMMUTE TRIPS BETWEEN THE CORE MPO REGION AND THE COMBINED GEORGIA NEIGHBORING COUNTIES, 2011 TO 2019

Commute Trips by Direction	2011	2019	Change (%), 2011 – 2019	CAGR, 2011 – 2019
Inbound Commute Trips	9,598	12,786	33.2%	3.6%
Outbound Commute Trips	4,667	5,562	19.2%	2.2%
Total	**14,265**	**18,348**	**28.6%**	**3.2%**

Source: U.S. Census Bureau, 2022, LEHD Origin-Destination Employment Statistics (2002 – 2019), Washington, DC: U.S. Census Bureau, LEHD Program, accessed on November 17, 2022, at https://onthemap.ces.census.gov, LODES 7.5.

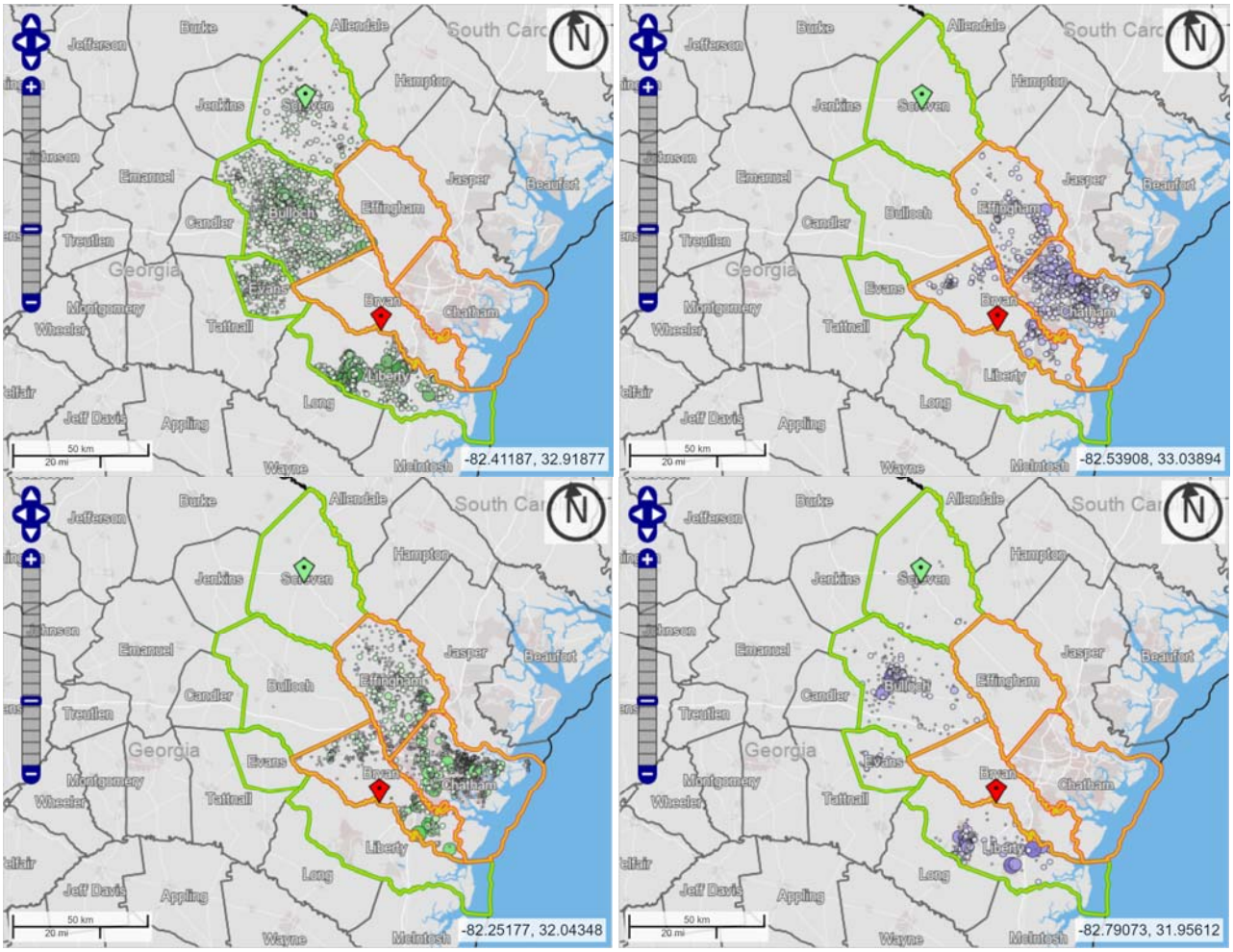
Note: The CORE MPO region neighboring counties are Screven, Bulloch, Evans, and Liberty.

Given that the CORE MPO region is the economic center of southeast Georgia, there are more inbound commute trips than outbound commute trips. Note that the growth in outbound commute trips attributed to these counties is much less than the values reported in **Table 3.7**. This means that counties other than Screven, Bulloch, Evans, and Liberty are driving the growth in commuter trips. Similarly, the number of inbound commute trips involving the combined Georgia neighboring counties (or 12,786 inbound commute trips) was only about one-quarter of total inbound commute trips in 2019 (or 50,662 inbound commute trips). Moreover, the number of outbound commute trips involving the combined Georgia neighboring counties (or 5,562 outbound commute trips) was not even one-sixth of all outbound commute trips at the CORE MPO region in 2019 (or 37,060 outbound commute trips). These results suggest that the CORE MPO region has a significant, but not exclusive, interaction with these counties; and most interregional commute trips have other origins or destinations.

Figure 3.10 shows the origin and destination of commute trips between the CORE MPO region and its neighboring counties in Georgia. From left to right, from top to bottom, this figure reveals the following:

- **Trip Production—**Inbound trips, showing where residents of neighboring counties who commute to the CORE MPO region live.
- **Trip Attraction—**Inbound trips, showing where residents of neighboring counties who commute to the CORE MPO region work.
- **Trip Production—**Outbound trips, showing where residents of the CORE MPO region who commute to the neighboring counties live.
- **Trip Attraction—**Inbound trips, showing where residents of the CORE MPO region who commute to the neighboring counties work.

FIGURE 3.10 COMMUTE TRIPS BETWEEN THE CORE MPO REGION AND GEORGIA NEIGHBORING COUNTIES, 2021



Source: U.S. Census Bureau, 2022, LEHD Origin-Destination Employment Statistics (2002 – 2019), Washington, DC: U.S. Census Bureau, LEHD Program, accessed on November 17, 2022, at https://onthemap.ces.census.gov, LODES 7.5.

4 FREIGHT-INTENSIVE INDUSTRIES

Freight-intensive industries (see **Table 4.1**) are those that are major producers and/or consumers of goods in the CORE MPO region, or industries that provide either storage or carry services for freight production and freight attractions in the region. Historically, the region has been very successful in attracting freight-intensive industries in the Transportation and Warehousing sector. There has been significant development of warehouses, distribution centers, and other logistics-focused firms near the Port of Savannah. The region has also historically performed well in attracting industries in transportation equipment manufacturing (i.e., aerospace), chemical manufacturing, paper manufacturing, and forestry and logging. Recently, the region has experienced additional success in the manufacturing sector as the Hyundai Motor Company is currently developing a major assembly plant in the region. The development of the plant in the CORE MPO region has already begun to attract automotive parts suppliers who will consume some of the available land, which is a departure from warehousing/distribution center development which has historically been most prevalent in the region.

This section of the report examines freight-intensive industries and their impact on the CORE MPO region. Specifically, it investigates the employment level trends of these industries and the implications of those trends for the industries (e.g., strengthening, weakening, growing, shrinking, etc.). The employment level trends by freight-intensive industry are useful for identifying clusters of industries that could support freight-focused economic development. For example, freight-intensive industries that are strengthening or growing may be better targets for economic development initiatives than those that are growing or shrinking. However, it is important to note that recent developments (such as the forthcoming Hyundai assembly plant and the multiple suppliers that have announced investments in the region) are not reflected in the data for this analysis given the timing of the data.

TABLE 4.1 CORE MPO REGION—FREIGHT-INTENSIVE INDUSTRIES

Industry Sector (NAICS Code)	Freight-Intensive Industry Description
Agriculture, Forestry, Fishing, and Hunting (NAICS 11)	• Forestry and Logging; Fishing, Hunting, and Trapping • Support Activities for Agriculture and Forestry • Farm
Mining, Quarrying, and Oil and Gas Extraction (NAICS 21)	• Oil and Gas Extraction • Mining (except Oil and Gas) • Support Activities for Mining
Utilities (NAICS 22)	• Utilities
Construction (NAICS 23)	• Construction
Manufacturing (NAICS 31 – 33)	• Wood Product Manufacturing • Nonmetallic Mineral Product Manufacturing • Primary Metal Manufacturing • Fabricated Metal Product Manufacturing • Machinery Manufacturing • Computer and Electronic Product Manufacturing • Electrical Equipment, Appliance, and Component Manufacturing • Motor Vehicles, Bodies and Trailers, and Parts Manufacturing • Other Transportation Equipment Manufacturing • Furniture and Related Product Manufacturing • Miscellaneous Manufacturing • Food Manufacturing • Beverage and Tobacco Product Manufacturing • Textile Mills; Textile Product Mills • Apparel Manufacturing; Leather and Allied Product Manufacturing • Paper Manufacturing • Printing and Related Support Activities • Petroleum and Coal Products Manufacturing • Chemical Manufacturing • Plastics and Rubber Products Manufacturing
Transportation and Warehousing (NAICS 48 – 49)	• Air Transportation • Rail Transportation • Water Transportation • Truck Transportation • Couriers and Messengers • Pipeline Transportation • Warehousing and Storage

Source: Cambridge Systematics Analysis.

4.1 Employment by Freight-Intensive Sector

In 2021, freight-intensive industries provided nearly 45,000 jobs throughout the CORE MPO region. This accounted for approximately 18 percent of all jobs. This is an increase of over 2 percentage points compared to the 2011 freight-intensive industry share of total employment. It demonstrates that these industries are an increasingly important source of jobs for the region. More detailed information on employment in the freight-

intensive industries in the CORE MPO region in 2011 and 2021 is shown in **Table 4.5**. This data indicates the following:

- The top three employment generators in 2021 were Construction, Other Transportation Equipment Manufacturing, and Truck Transportation, representing 23,771 jobs or 53 percent of the total employment under the freight-intensive industries in the region.
- In the 2011 – 2021 period, a total of four freight-intensive industries created over one thousand jobs in the CORE MPO region, including the following:
  - Couriers and Messengers grew to over 3,000 employees.
  - Construction, which added 2,500 employees to surpass the 10,000 milestone.
  - Warehousing and Storage, which almost doubled its number of employees reaching over 4,500.
  - Truck Transportation, which surpassed the 5,000 jobs milestone with the addition of 1,300.
- Other remarkable growing regional industries, albeit less massive, are the following:
  - Water Transportation, which has quadrupled its size.
  - Apparel Manufacturing, Leather, and Allied Product Manufacturing.
  - Machinery Manufacturing; considering that both grew just below 300 percent for the whole period.
  - Textile Mills, Textile Product Mills, which grew threefold.
  - Printing and Related Support Activities, which went beyond doubling its employment numbers.

TABLE 4.2 CORE MPO REGION—EMPLOYMENT IN THE FREIGHT-INTENSIVE INDUSTRIES, 2011 TO 2021

Industry Sector	Freight-Intensive Industries	Employment, 2011	Employment, 2021	CAGR (%), 2011 – 2021
Agriculture, Forestry, Fishing, and Hunting	Forestry and Logging; Fishing, Hunting, and Trapping	355	415	1.6%
	Support Activities for Agriculture and Forestry	93	144	4.5%
	Farm	323	385	1.8%
Mining, Quarrying, and Oil and Gas Extraction	Oil and Gas Extraction	119	21	-16.0%
	Mining (except Oil and Gas)	3	80	38.8%
	Support Activities for Mining	–	8	N/A
Utilities	Utilities	476	612	2.5%
Construction	Construction	8,843	11,368	2.5%
Manufacturing	Wood Product Manufacturing	382	308	-2.1%
	Nonmetallic Mineral Product Manufacturing	548	823	4.2%
	Primary Metal Manufacturing	7	3	-8.2%
	Fabricated Metal Product Manufacturing	802	1,077	3.0%

Industry Sector	Freight-Intensive Industries	Employment, 2011	Employment, 2021	CAGR (%), 2011 – 2021
	Machinery Manufacturing	233	899	14.5%
	Computer and Electronic Product Manufacturing	38	30	-2.4%
	Electrical Equipment, Appliance, and Component Manufacturing	203	248	2.0%
	Motor Vehicles, Bodies And Trailers, and Parts Manufacturing	244	361	4.0%
	Other Transportation Equipment Manufacturing	6,489	7,313	1.2%
	Furniture and Related Product Manufacturing	126	236	6.5%
	Miscellaneous Manufacturing	91	140	4.4%
	Food Manufacturing	1,290	1,409	0.9%
	Beverage and Tobacco Product Manufacturing	68	81	1.8%
	Textile Mills; Textile Product Mills	108	330	11.8%
	Apparel Manufacturing; Leather and Allied Product Manufacturing	177	661	14.1%
	Paper Manufacturing	2,529	2,119	-1.8%
	Printing and Related Support Activities	208	555	10.3%
	Petroleum and Coal Products Manufacturing	273	497	6.2%
	Chemical Manufacturing	953	1,082	1.3%
	Plastics and Rubber Products Manufacturing	24	22	-0.7%
Transportation and Warehousing	Air Transportation	145	131	-1.0%
	Rail Transportation	435	300	-3.6%
	Water Transportation	44	178	15.0%
	Truck Transportation	3,785	5,091	3.0%
	Couriers and Messengers	3	3,141	100.4%
	Pipeline Transportation	176	64	-9.6%
	Warehousing and Storage	2,352	4,638	7.0%
All Freight-Intensive Industries		**31,945**	**44,771**	**3.4%**
All Freight-Intensive Industries (% of Total Employment)		**15.9%**	**18.3%**	

Source: Cambridge Systematics Analysis.

Economic output generated by the freight-intensive industries in the CORE MPO region in 2011 and 2021 is shown in **Table 4.3**. In 2021, freight-intensive industries accounted for approximately 32 percent of the region's economic output, a slight increase over 2011 values. This data indicates the following:

- The top economic output generators in 2021 were Other Transportation Equipment Manufacturing, Construction, and Utilities, representing $7.55 billion or 53 percent of the total economic output created by the freight-intensive industries in the region.
- Only two industries created more than $1 billion in additional economic output during the 2011 – 2021 period. These industries are Other Transportation Equipment Manufacturing and Construction.
- Both Machinery Manufacturing and Truck Transportation created more than $300 million in additional economic output between 2011 and 2021.
- All three mining-related industries (Oil and Gas Extraction, Mining—Except Oil and Gas, and Support Activities for Mining) had little economic activity in 2011, but by 2021 these industries, although still modest, experienced relative growth in the region. Although Couriers and Messengers had a similar trend, its employment and output performances have been aligned, which has not been the case for mining-related industries, remaining less labor intensive in their development.
- Other industries that showed strong relative growth and resonate with employment statistics are Machinery Manufacturing; Apparel Manufacturing, Leather, and Allied Product Manufacturing; and Printing and Related Support Activities (fourfold in the case of the first two, and threefold for the last one).

TABLE 4.3 CORE MPO REGION—ECONOMIC OUTPUT IN THE FREIGHT-INTENSIVE INDUSTRIES, 2011 TO 2021

Industry Sector	Freight-Intensive Industries	Economic Output (Millions of 2021 Dollars), 2011	Economic Output (Millions of 2021 Dollars), 2021	CAGR (%), 2011 – 2021
Agriculture, Forestry, Fishing, and Hunting	Forestry and Logging; Fishing, Hunting, and Trapping	$44.4	$68.5	4.4%
	Support Activities for Agriculture and Forestry	$1.8	$3.9	8.3%
	Farm	$22.5	$54.4	9.2%
Mining, Quarrying, and Oil and Gas Extraction	Oil and Gas Extraction	~ $0.0	$14.8	295.6%
	Mining (except Oil and Gas)	$1.4	$16.4	28.4%
	Support Activities for Mining	~$0.0	$0.2	17.9%
Utilities	Utilities	$1,489.8	$1,390.3	-0.7%
Construction	Construction	$1,302.4	$2,344.9	6.1%
Manufacturing	Wood Product Manufacturing	$109.7	$181.2	5.1%
	Nonmetallic Mineral Product Manufacturing	$185.2	$318.1	5.6%
	Primary Metal Manufacturing	$5.4	$0.7	-18.0%
	Fabricated Metal Product Manufacturing	$193.7	$320.6	5.2%
	Machinery Manufacturing	$87.9	$415.0	16.8%
	Computer and Electronic Product Manufacturing	$8.1	$10.0	2.2%

Industry Sector	Freight-Intensive Industries	Economic Output (Millions of 2021 Dollars), 2011	Economic Output (Millions of 2021 Dollars), 2021	CAGR (%), 2011 – 2021
	Electrical Equipment, Appliance, and Component Manufacturing	$93.0	$174.7	6.5%
	Motor Vehicles, Bodies And Trailers, and Parts Manufacturing	$180.3	$334.8	6.4%
	Other Transportation Equipment Manufacturing	$2,745.0	$3,817.5	3.4%
	Furniture and Related Product Manufacturing	$27.1	$62.2	8.7%
	Miscellaneous Manufacturing	$16.8	$44.8	10.3%
	Food Manufacturing	$645.0	$584.3	-1.0%
	Beverage and Tobacco Product Manufacturing	$73.6	$38.5	-6.3%
	Textile Mills; Textile Product Mills	$25.5	$66.5	10.0%
	Apparel Manufacturing; Leather and Allied Product Manufacturing	$9.6	$44.8	16.6%
	Paper Manufacturing	$1,615.0	$1,117.6	-3.6%
	Printing and Related Support Activities	$32.0	$106.4	12.8%
	Petroleum and Coal Products Manufacturing	$415.6	$645.2	4.5%
	Chemical Manufacturing	$599.5	$421.6	-3.5%
	Plastics and Rubber Products Manufacturing	$4.2	$2.6	-4.9%
Transportation and Warehousing	Air Transportation	$53.4	$123.6	8.8%
	Rail Transportation	$181.8	$139.4	-2.6%
	Water Transportation	$50.0	$97.1	6.9%
	Truck Transportation	$473.7	$787.6	5.2%
	Couriers and Messengers	$0.6	$200.9	77.6%
	Pipeline Transportation	$101.7	$50.9	-6.7%
	Warehousing and Storage	$603.1	$359.2	-5.0%
All Freight-Intensive Industries		**$11,399**	**$14,359**	**2.3%**
All Freight-Intensive Industries (% of Total Economic Output)		**31.7%**	**32.0%**	

Source: Cambridge Systematics Analysis.

4.2 Freight-Intensive Industries Concentration and Growth

This component of the analysis uses two different techniques, location quotient (LQ) analysis and shift-share (SS) analysis, to identify clusters of industries where employment data indicate that the regional competitive position is improving for these industries relative to State and national performance. Industries in which the

region's competitive position is improving may be better targets for freight-focused economic development efforts than industries in which the region's competitive position is not growing. Furthermore, identifying these industry clusters provides a basis for understanding the freight transportation needs associated with these sectors and the types of investments needed to support growth.

Location-Quotient (LQ) Analysis

A highly useful approach in reviewing the current economic trend of the freight-intensive industries in the CORE MPO region is via an employment LQ analysis. The analysis identifies strong and weakening industry clusters in the CORE MPO region by comparing the region and State employment concentrations (and the region and U.S. employment concentrations) in the selected historical years 2011 and 2021.

The employment LQ for the freight-intensive industries in the CORE MPO region compared to the State in 2011 and 2021 are shown in Table 4.4. The employment LQ for the freight-intensive industries in the CORE MPO region compared to the U.S. in 2011 and 2021 are shown in Table 4.5. The LQ can quickly indicate if the industry employment share is greater in the CORE MPO region compared to the State (or compared to the U.S.). If the ratio is greater than 1.0, then it is considered a strong cluster with local production able to satisfy local consumption, and any excess can be exported. If the ratio is less than 1.0, then it is considered a relative weaker cluster, where the industry cannot satisfy local consumption, and the industry requires imports. If the ratio equals 1.0, then local production can satisfy local demand, but there is no excess for export.

TABLE 4.4 FREIGHT-INTENSIVE INDUSTRY CONCENTRATION IN THE CORE MPO REGION COMPARED TO THE STATE, 2011 AND 2021

Industry Sector	Freight-Intensive Industry	Employment LQ, 2011	Employment LQ, 2021
Agriculture, Forestry, Fishing, and Hunting	Forestry and Logging; Fishing, Hunting, and Trapping	0.97	1.07
	Support Activities for Agriculture and Forestry	0.18	0.24
	Farm	0.16	0.17
Mining, Quarrying, and Oil and Gas Extraction	Oil and Gas Extraction	1.29	0.38
	Mining (except Oil and Gas)	0.02	0.44
	Support Activities for Mining	0.00	0.32
Utilities	Utilities	0.59	0.74
Construction	Construction	0.87	0.83
Manufacturing	Wood Product Manufacturing	0.60	0.36
	Nonmetallic Mineral Product Manufacturing	0.92	1.34
	Primary Metal Manufacturing	0.03	0.01
	Fabricated Metal Product Manufacturing	0.90	0.81
	Machinery Manufacturing	0.29	0.99
	Computer and Electronic Product Manufacturing	0.11	0.09
	Electrical Equipment, Appliance, and Component Manufacturing	0.48	0.53

Industry Sector	Freight-Intensive Industry	Employment LQ, 2011	Employment LQ, 2021
	Motor Vehicles, Bodies and Trailers, and Parts Manufacturing	0.40	0.34
	Other Transportation Equipment Manufacturing	6.73	7.49
	Furniture and Related Product Manufacturing	0.39	0.51
	Miscellaneous Manufacturing	0.22	0.26
	Food Manufacturing	0.52	0.53
	Beverage and Tobacco Product Manufacturing	0.46	0.41
	Textile Mills; Textile Product Mills	0.06	0.19
	Apparel Manufacturing; Leather and Allied Product Manufacturing	1.14	2.17
	Paper Manufacturing	3.42	2.68
	Printing and Related Support Activities	0.44	1.22
	Petroleum and Coal Products Manufacturing	7.77	9.77
	Chemical Manufacturing	1.18	1.12
	Plastics and Rubber Products Manufacturing	0.03	0.02
Transportation and Warehousing	Air Transportation	0.09	0.10
	Rail Transportation	1.62	1.35
	Water Transportation	2.02	8.22
	Truck Transportation	1.41	1.38
	Couriers and Messengers	0.00	1.39
	Pipeline Transportation	10.40	2.48
	Warehousing and Storage	1.99	1.89

Source: Cambridge Systematics Analysis.

TABLE 4.5 FREIGHT-INTENSIVE INDUSTRY CONCENTRATION IN THE CORE MPO REGION COMPARED TO THE U.S., 2011 AND 2021

Industry Sector	Freight-Intensive Industry	Employment LQ, 2011	Employment LQ, 2021
Agriculture, Forestry, Fishing, and Hunting	Forestry and Logging; Fishing, Hunting, and Trapping	1.45	1.44
	Support Activities for Agriculture and Forestry	0.13	0.16
	Farm	0.11	0.12
Mining, Quarrying, and Oil and Gas Extraction	Oil and Gas Extraction	0.17	0.04
	Mining (except Oil and Gas)	0.01	0.30
	Support Activities for Mining	0.00	0.03
Utilities	Utilities	0.73	0.85
Construction	Construction	0.89	0.85
Manufacturing	Wood Product Manufacturing	0.87	0.56

Industry Sector	Freight-Intensive Industry	Employment LQ, 2011	Employment LQ, 2021
	Nonmetallic Mineral Product Manufacturing	1.21	1.55
	Primary Metal Manufacturing	0.02	0.01
	Fabricated Metal Product Manufacturing	0.50	0.60
	Machinery Manufacturing	0.18	0.65
	Computer and Electronic Product Manufacturing	0.03	0.02
	Electrical Equipment, Appliance, and Component Manufacturing	0.47	0.51
	Motor Vehicles, Bodies and Trailers, and Parts Manufacturing	0.30	0.31
	Other Transportation Equipment Manufacturing	8.45	8.36
	Furniture and Related Product Manufacturing	0.29	0.44
	Miscellaneous Manufacturing	0.12	0.15
	Food Manufacturing	0.75	0.65
	Beverage and Tobacco Product Manufacturing	0.30	0.22
	Textile Mills; Textile Product Mills	0.37	1.19
	Apparel Manufacturing; Leather and Allied Product Manufacturing	0.70	1.46
	Paper Manufacturing	5.69	4.70
	Printing and Related Support Activities	0.34	1.04
	Petroleum and Coal Products Manufacturing	2.05	3.35
	Chemical Manufacturing	1.02	0.98
	Plastics and Rubber Products Manufacturing	0.03	0.02
Transportation and Warehousing	Air Transportation	0.26	0.19
	Rail Transportation	1.96	1.51
	Water Transportation	0.53	1.98
	Truck Transportation	1.69	1.74
	Couriers and Messengers	0.00	1.40
	Pipeline Transportation	3.51	0.97
	Warehousing and Storage	2.79	2.25

Source: Cambridge Systematics Analysis.

Based on the results of the LQ analysis, the CORE MPO freight-intensive industries are classified in one of the following categories:

- **Lower Concentration and Growing—**The industry has an LQ less than 1.0 in 2021, but the LQ has increased between 2011 and 2021. This industry may be a potential for focusing economic targeting efforts.
- **Strong Concentration and Growing—**The industry has an LQ greater than 1.0 in 2021, and the LQ has increased between 2011 and 2021. This industry is a potential cluster for economic growth and should be the focus of targeting efforts.
- **Lower Concentration and Declining—**The industry has an LQ less than 1.0 in 2021, and the LQ has declined between 2011 and 2021. This industry generally should not be considered a potential cluster.
- **Strong Concentration and Declining—**The industry has an LQ greater than 1.0 in 2021, but the LQ has declined between 2011 and 2021. This industry might be considered at risk and deserving special consideration to understand why it is a strong concentration, but declining. The decline of strong concentrated industries presents a potential risk to the regional economy.

The freight-intensive industry concentration and growing/declining trends in the CORE MPO region compared to the State are shown in **Table 4.6**. The results indicate the following:

- When compared to their counterparts across the state, 20 out of the 35 analyzed industries increased their LQ between 2011 and 2021. Consolidated industries that continued to expand their specialization level (i.e., “Strong Concentration and Growing”) include the following:
  - Forestry and Logging, Fishing, Hunting and Trapping from the Agriculture, Forestry, Fishing, and Hunting sector.
  - Printing and Related Support Activities; Apparel Manufacturing, Leather and Allied Product Manufacturing; Nonmetallic Mineral Product Manufacturing; Petroleum and Coal Products Manufacturing; and Other Transportation Equipment Manufacturing from the Manufacturing sector.
  - Water Transportation and Couriers and Messengers from the Transportation and Warehousing sector.
  - The most concentrated industry in 2021 was Petroleum and Coal Products Manufacturing (with an LQ of 9.77).
  - The industry with the largest LQ growth in this category was Couriers and Messengers (from an LQ barely greater than 0.00 in 2011 to an LQ of 1.39 in 2021).
- On top of the 8 consolidated industries that continued to expand their specialization level, other 12 industries improved their relative concentration as compared to Georgia, although they remain overall less concentrated locally when compared to the State (i.e., “Lower Concentration and Growing”), including the following:
  - One industry from the Agriculture, Forestry, Fishing, and Hunting sector (i.e., Support Activities for Agriculture and Forestry, and Farm activity).
  - Two industries from the Mining, Quarrying, and Oil and Gas Extraction sector (i.e., Mining, except Oil and Gas, and Support Activities for Mining).
  - One industry considered as the Utilities sector overall.

  - Six industries from the Manufacturing sector (i.e., Machinery Manufacturing; Textile Mills, Textile Product Mills; Furniture and Related Product Manufacturing; Miscellaneous Manufacturing; Electrical Equipment, Appliance, and Component Manufacturing; and Food Manufacturing).

  - One industry from the Transportation and Warehousing sector (Air Transportation).

  - The most concentrated manufacturing industry in this category and, thus, the closest to an LQ of 1.0 was Machinery Manufacturing (with an LQ of 0.99 in 2021).

  - The industry with the largest LQ growth in this category was Mining, except Oil and Gas (from an LQ of 0.02 in 2011 to an LQ of 0.44 in 2021).

- At the opposite end in terms of performance, the industries with the largest downfall (i.e., "Lower Concentration and Declining" and "Strong Concentration and Declining") between 2011 and 2021 were the following:

  - Primary Metal Manufacturing within the Manufacturing sector (from an LQ of 0.03 in 2011 to an LQ of 0.01 in 2021) among the least concentrated industries.

  - Pipeline Transportation within the Transportation and Warehousing sector (from an LQ of 10.40 in 2011 to an LQ of 2.48 in 2021) among the most concentrated ones.

TABLE 4.6 FREIGHT-INTENSIVE INDUSTRY CONCENTRATION AND GROWING/ DECLINING TREND IN THE CORE MPO REGION COMPARED TO THE STATE

Lower Concentration and Growing	Strong Concentration and Growing
• Support Activities for Mining • Mining (except Oil and Gas) • Machinery Manufacturing • Textile Mills; Textile Product Mills • Support Activities for Agriculture and Forestry • Furniture and Related Product Manufacturing • Utilities • Miscellaneous Manufacturing • Air Transportation • Electrical Equipment, Appliance, and Component Manufacturing • Farm • Food Manufacturing	• Couriers and Messengers • Water Transportation • Printing and Related Support Activities • Apparel Manufacturing; Leather and Allied Product Manufacturing • Nonmetallic Mineral Product Manufacturing • Petroleum and Coal Products Manufacturing • Other Transportation Equipment Manufacturing • Forestry and Logging; Fishing, Hunting, and Trapping
Lower Concentration and Declining	**Strong Concentrating and Declining**
• Construction • Fabricated Metal Product Manufacturing • Beverage and Tobacco Product Manufacturing • Motor Vehicles, Bodies And Trailers, and Parts Manufacturing • Computer and Electronic Product Manufacturing • Plastics and Rubber Products Manufacturing • Wood Product Manufacturing • Primary Metal Manufacturing • Oil and Gas Extraction	• Truck Transportation • Chemical Manufacturing • Warehousing and Storage • Rail Transportation • Paper Manufacturing • Pipeline Transportation

Source: Cambridge Systematics Analysis.

The freight-intensive industry concentration and growing/declining trends in the CORE MPO region compared to the State are shown in **Table 4.7**. The results indicate the following:

- At the local versus national level, 19 out of the 35 analyzed industries increased their LQ between 2011 and 2021. Cluster industries that continued to expand in the region relatively to the U.S. (i.e., “Strong Concentration and Growing”) include:
  - Textile Mills, Textile Product Mills; Printing and Related Support Activities; Apparel Manufacturing, Leather and Allied Product Manufacturing; Nonmetallic Mineral Product Manufacturing; and Petroleum and Coal Products Manufacturing from the Manufacturing sector; and
  - Water Transportation; Truck Transportation; and Couriers and Messengers from the Transportation and Warehousing sector.
  - The most concentrated industry in 2021 was Petroleum and Coal Products Manufacturing (3.35).
  - The industry with the largest LQ growth was Couriers and Messengers (from a value barely greater than 0.00 to 1.40).

- On top of those eight industries, other 11 improved their relative concentration as compared to the U.S., although they remain overall less specialized locally when compared to the country as a whole (i.e., “Lower Concentration and Growing”). The list includes:
  - Two industries from the Agriculture, Forestry, Fishing, and Hunting sector (Support Activities for Agriculture and Forestry, and Farm activity).
  - Two industries from the Mining, Quarrying, and Oil and Gas Extraction sector (Mining, except Oil and Gas, and Support Activities for Mining)
  - One industry considered as the Utilities sector overall.
  - Six industries from the Manufacturing sector (Machinery Manufacturing; Fabricated Metal Product Manufacturing; Furniture and Related Product Manufacturing; Miscellaneous Manufacturing; Electrical Equipment, Appliance, and Component Manufacturing; and Motor Vehicles, Bodies and Trailers, and Parts Manufacturing).
  - From this second category, the most specialized industry and thus the closest to an LQ of 1.0 was Utilities (0.85).
  - The industry with the largest LQ growth among this group was Mining, except Oil and Gas (from 0.01 to 0.30).
- At the opposite end in terms of performance, the industries with the largest downfall between 2011 and 2021 belonged to the Transportation and Warehousing sector, featuring the following:
  - Pipeline Transportation (from 3.51 to 0.97) among the least specialized industries.
  - Warehousing and Storage (from 2.79 to 2.25) among the most specialized ones.

TABLE 4.7 FREIGHT-INTENSIVE INDUSTRY CONCENTRATION AND GROWING/ DECLINING TREND IN THE CORE MPO REGION COMPARED TO THE U.S.

Lower Concentration and Growing	Strong Concentration and Growing
• Support Activities for Mining • Mining (except Oil and Gas) • Machinery Manufacturing • Furniture and Related Product Manufacturing • Support Activities for Agriculture and Forestry • Miscellaneous Manufacturing • Fabricated Metal Product Manufacturing • Utilities • Farm • Electrical Equipment, Appliance, and Component Manufacturing • Motor Vehicles, Bodies and Trailers, and Parts Manufacturing	• Couriers and Messengers • Water Transportation • Textile Mills; Textile Product Mills • Printing and Related Support Activities • Apparel Manufacturing; Leather and Allied Product Manufacturing • Petroleum and Coal Products Manufacturing • Nonmetallic Mineral Product Manufacturing • Truck Transportation
Lower Concentration and Declining	**Strong Concentrating and Declining**
• Chemical Manufacturing • Construction • Food Manufacturing • Plastics and Rubber Products Manufacturing • Computer and Electronic Product Manufacturing • Beverage and Tobacco Product Manufacturing • Air Transportation • Wood Product Manufacturing • Primary Metal Manufacturing • Pipeline Transportation • Oil and Gas Extraction	• Forestry and Logging; Fishing, Hunting, and Trapping • Other Transportation Equipment Manufacturing • Paper Manufacturing • Warehousing and Storage • Rail Transportation

Source: Cambridge Systematics Analysis.

Shift-Share (SS) Analysis

An SS analysis is another method for analyzing changes in a regional economy by taking a retrospective look at how the regional economy has changed in relation to a larger based geographic area or economy. The SS analysis recognizes that some industries in a region are likely to be growing at a faster rate when compared to the nation, while others are shrinking. The analysis also sheds light on what is behind the net change in employment, and which industries in the regional economy are competitive in comparison to the national economy in selected historical years.

The SS analysis examines several of the factors that contribute to the growth or decline in the regional economy, breaking the actual change into three parts:

1. The **National Growth Component** is the expected industrial employment if the regional industry grew at the same pace as the national average. Comparing this result to the actual change in industrial employment in the CORE MPO region gives insight whether the industry grew at a faster or slower national pace.

2. The **Industrial Mix Component** depicts the change in national industry growth beyond the national average. It represents the portion of the CORE MPO industrial growth that is due to the national industry growth after accounting for the overall national growth. For example, between 2011 and 2021, the national employment growth was 11.6 percent, but the Warehousing and Storage industry grew faster, at 111.7 percent in the United States. This faster growth (by over 100 percentage points) attributes 2,901 employment growth in the CORE MPO region in the Warehousing and Storage industry. If the Industrial Mix Component is greater than zero, then the regional industry outperformed the nationwide economy, while an Industrial Mix Component less than zero suggests the opposite.

3. The **Competitive Share** describes the CORE MPO industrial employment change compared to the national industry average. Here, this component considers a particular industry's nationwide change in employment to the change in employment for the same industry in the CORE MPO region. If the Competitive Share is greater than zero, it suggests the CORE MPO industry changed at a higher pace compared to the nationwide industry average, while a Competitive Share less than zero suggests the opposite.

The results of the SS analysis that compares the CORE MPO economy relative to the State economy over the 2011 – 2021 period are shown in **Table 4.8**. The results of the SS analysis that compares the CORE MPO economy relative to the U.S. economy over the 2011 – 2021 period are shown in **Table 4.9**.

TABLE 4.8 CORE MPO REGION FREIGHT-INTENSIVE INDUSTRIES COMPETITIVENESS BASED ON SHIFT SHARE ANALYSIS RESULTS (COMPARED TO THE STATE)

Freight-Intensive Industry	State Growth Component	State Growth Component, Jobs	Industrial Mix Component %	Industry Mix, Jobs	Competitive Share %	Competitive Share
Forestry and Logging; Fishing, Hunting, and Trapping	19.4%	69	-15.5%	-53	12.5%	44
Support Activities for Agriculture and Forestry	19.4%	18	-7.8%	-7	43.5%	40
Farm	19.4%	63	-8.6%	-28	8.5%	27
Oil and Gas Extraction	19.4%	23	-60.5%	-72	-41.4%	-49
Mining (except Oil and Gas)	19.4%	1	-30.3%	-1	>500%	77
Support Activities for Mining	19.4%	-	147.3%	-	>500%	8
Utilities	19.4%	92	-19.3%	-92	28.4%	135
Construction	19.4%	1,712	11.5%	1,020	-2.3%	-207
Wood Product Manufacturing	19.4%	74	14.6%	56	-53.2%	-203
Nonmetallic Mineral Product Manufacturing	19.4%	106	-18.1%	-99	49.0%	269
Primary Metal Manufacturing	19.4%	1	-11.7%	-1	-65.2%	-5
Fabricated Metal Product Manufacturing	19.4%	155	26.7%	214	-11.7%	-94
Machinery Manufacturing	19.4%	45	-7.5%	-17	273.8%	638

Freight-Intensive Industry	State Growth Component	State Growth Component, Jobs	Industrial Mix Component %	Industry Mix, Jobs	Competitive Share %	Competitive Share
Computer and Electronic Product Manufacturing	19.4%	7	-23.6%	-9	-17.4%	-7
Electrical Equipment, Appliance, and Component Manufacturing	19.4%	39	-9.6%	-19	12.5%	25
Motor Vehicles, Bodies And Trailers, and Parts Manufacturing	19.4%	47	48.0%	117	-19.5%	-47
Other Transportation Equipment Manufacturing	19.4%	1,256	-20.2%	-1,309	13.5%	877
Furniture and Related Product Manufacturing	19.4%	24	23.2%	29	44.7%	56
Miscellaneous Manufacturing	19.4%	18	9.3%	8	24.7%	23
Food Manufacturing	19.4%	250	-13.8%	-178	3.6%	47
Beverage and Tobacco Product Manufacturing	19.4%	13	15.0%	10	-14.5%	-10
Textile Mills; Textile Product Mills	19.4%	21	-27.1%	-29	213.4%	230
Apparel Manufacturing; Leather and Allied Product Manufacturing	19.4%	34	72.7%	129	181.1%	321
Paper Manufacturing	19.4%	490	-14.8%	-373	-20.8%	-526
Printing and Related Support Activities	19.4%	40	-24.8%	-52	172.5%	359
Petroleum and Coal Products Manufacturing	19.4%	53	22.5%	61	40.1%	110
Chemical Manufacturing	19.4%	185	-2.1%	-20	-3.7%	-35
Plastics and Rubber Products Manufacturing	19.4%	5	7.1%	2	-33.3%	-8
Air Transportation	19.4%	28	-42.4%	-62	13.3%	19
Rail Transportation	19.4%	84	-38.2%	-166	-12.1%	-53
Water Transportation	19.4%	9	-21.7%	-10	307.4%	135
Truck Transportation	19.4%	733	14.8%	560	0.3%	13
Couriers and Messengers	19.4%	1	86.7%	3	>500%	3,135
Pipeline Transportation	19.4%	34	30.1%	53	-113.0%	-199
Warehousing and Storage	19.4%	455	84.3%	1,983	-6.5%	-153

Source: Cambridge Systematics Analysis.

TABLE 4.9 CORE MPO REGION FREIGHT-INTENSIVE INDUSTRIES COMPETITIVENESS BASED ON SHIFT SHARE ANALYSIS RESULTS (COMPARED TO THE U.S.)

Freight-Intensive Industry	National Growth Component	National Growth Component, Jobs	Industrial Mix Component %	Industry Mix, Jobs	Competitive Share %	Competitive Share
Forestry and Logging; Fishing, Hunting, and Trapping	11.6%	41	-3.4%	-12	8.7%	31
Support Activities for Agriculture and Forestry	11.6%	11	-1.3%	-1	44.7%	42
Farm	11.6%	38	-11.6%	-38	19.2%	62
Oil and Gas Extraction	11.6%	14	-37.3%	-44	-56.8%	-68
Mining (except Oil and Gas)	11.6%	-	-28.5%	–1	>500%	77
Support Activities for Mining	11.6%	-	-47.0%	–	>500%	8
Utilities	11.6%	55	-10.5%	-50	27.4%	130
Construction	11.6%	1,029	11.0%	974	5.9%	522
Wood Product Manufacturing	11.6%	44	2.8%	11	-33.7%	-129
Nonmetallic Mineral Product Manufacturing	11.6%	64	-4.3%	-23	42.9%	235
Primary Metal Manufacturing	11.6%	1	-21.6%	-2	-47.6%	-3
Fabricated Metal Product Manufacturing	11.6%	93	-8.8%	-71	31.5%	253
Machinery Manufacturing	11.6%	27	-11.0%	-26	285.0%	664
Computer and Electronic Product Manufacturing	11.6%	4	-13.5%	-5	-19.8%	-8
Electrical Equipment, Appliance, and Component Manufacturing	11.6%	24	-7.4%	-15	18.0%	37
Motor Vehicles, Bodies And Trailers, and Parts Manufacturing	11.6%	28	19.8%	48	16.4%	40
Other Transportation Equipment Manufacturing	11.6%	755	-7.3%	-475	8.4%	543
Furniture and Related Product Manufacturing	11.6%	15	0.8%	1	74.9%	94
Miscellaneous Manufacturing	11.6%	11	-0.9%	-1	42.7%	39

Freight-Intensive Industry	National Growth Component	National Growth Component, Jobs	Industrial Mix Component %	Industry Mix, Jobs	Competitive Share %	Competitive Share
Food Manufacturing	11.6%	150	2.9%	37	-5.3%	-69
Beverage and Tobacco Product Manufacturing	11.6%	8	41.0%	28	-32.8%	-22
Textile Mills; Textile Product Mills	11.6%	13	-25.2%	-27	219.2%	237
Apparel Manufacturing; Leather and Allied Product Manufacturing	11.6%	21	52.1%	92	209.5%	371
Paper Manufacturing	11.6%	294	-18.6%	-470	-9.2%	-234
Printing and Related Support Activities	11.6%	24	-30.8%	-64	186.2%	387
Petroleum and Coal Products Manufacturing	11.6%	32	-9.5%	-26	79.9%	218
Chemical Manufacturing	11.6%	111	-3.5%	-34	5.4%	52
Plastics and Rubber Products Manufacturing	11.6%	3	0.4%	0	-18.9%	-5
Air Transportation	11.6%	17	4.6%	7	-26.0%	-38
Rail Transportation	11.6%	51	-29.6%	-129	-13.1%	-57
Water Transportation	11.6%	5	-13.2%	-6	306.6%	135
Truck Transportation	11.6%	441	7.8%	293	15.1%	572
Couriers and Messengers	11.6%	0	112.4%	3	>500%	3,134
Pipeline Transportation	11.6%	20	9.5%	17	-84.8%	-149
Warehousing and Storage	11.6%	274	111.7%	2,627	-26.2%	-615

Source: Cambridge Systematics Analysis.

Freight Industry Classification Based on LQ and SS Analyses

The results of the LQ and SS analyses can be combined through industry classifications to offer a quick synopsis of individual industries, which is categorized in a matrix. Based on the combined results, the industries are classified in one of the following categories:

- **Opportunity—**The industry has an LQ less than 1.0, and the competitive share is greater than zero. This industry may be a potential for focusing economic targeting efforts.
- **Strong—**This industry has an LQ greater than 1.0, and the competitive share is greater than zero. This industry is a potential cluster for economic growth and should be the focus of targeting efforts.

- **Weaker—**The industry has an LQ less than 1.0, and the competitive share is less than zero. This industry generally should not be considered a potential cluster.

- **Threatened—**The industry has an LQ greater than 1.0, and the competitive share is less than zero. This industry might be considered at risk and deserving more research to understand why it is a strong concentrate, but negative competitive share.

The results shown below were developed for both state- and national-level comparisons. This is important as the classification for an industry (i.e., opportunity, strong, weaker, or threatened) can change depending on if a state or national baseline is used. In cases where an industry is weaker or threatened when a state-level baseline is used but is an opportunity or strong when a national-level baseline is used, the results indicate that the State as a whole is competitive for this industry but that the region has lagged. The opposite is true in cases where an industry is an opportunity or strong when a state-level baseline is used but is a weaker or threatened when a national-level baseline is used.

National-Level Results

Table 4.10 presents the CORE MPO region freight-intensive industry classification based on the combined results from the LQ and SS analyses that compared the region against the U.S. The industry classification is based on the LQ from 2021 shown in **Table 4.5**, and the results of the SS analysis that compares the CORE MPO economy relative to the U.S. economy over the 2011 – 2021 period shown in **Table 4.9**. The results indicate the following:

- **Opportunity Industries** are those that are relatively less concentrated locally as compared to the U.S. but have grown at a faster rate.

  - The most remarkable industry in this group is Mining (except Oil and Gas). Its LQ grew from 0.01 to 0.30 between 2011 and 2021 and its competitive effect was above 2,500 percent – offsetting an expected 17-percent decrease.

  - Opportunity industries also include Support Activities for Agriculture and Forestry and Farm Activities, Support Activities for Mining, Utilities, and Construction.

  - Seven industries from the Manufacturing sector are also included in opportunity industries. These include Machinery Manufacturing (which came second in terms of competitive effect); Furniture and Related Product Manufacturing; Miscellaneous Manufacturing; Fabricated Metal Product Manufacturing; Electrical Equipment, Appliance, and Component Manufacturing; Motor Vehicles, Bodies and Trailers, and Parts Manufacturing; and Chemical Manufacturing.

- **Strong Industries** are those that are more concentrated at the CORE MPO region than in the U.S., as a whole, and still managed to deepen this performance by growing faster at the local level than what was expected by the SS analysis. These represent actual or potential clusters that can lead the area's economic growth and development.

  - Two examples worth highlighting include Couriers and Messengers and Water Transportation, both from the Transportation and Warehousing sector. The former had its LQ almost by the zero-bound in 2011 and managed to become a possible cluster after its growth and specialization (1.40 in 2021). The latter was not quite concentrated but proved to have some margin for expansion (reached 1.98 in 2021).

  - Other industries had more modest SS competitive effects than those two, and include Forestry and Logging, Fishing, Hunting, and Trapping, from the Agriculture, Forestry, Fishing, and Hunting sector.

  - More significantly, six Manufacturing industries: Textile Mills, Textile Product Mills; Apparel Manufacturing, Leather and Allied Product Manufacturing; Printing and Related Support Activities;

Petroleum and Coal Products Manufacturing; Nonmetallic Mineral Product Manufacturing; and Other Transportation Equipment Manufacturing.

- Truck Transportation, also from the Transportation and Warehousing sector, was another industry falling under this category.

- **Weaker Industries** are less concentrated at the regional level than at the national level and have grown less than expected by national-level variables when conducting an SS analysis. Economic development initiatives should consider that the region's competitive position for these industries is not as strong as other locations in the U.S.

  - Pipeline Transportation, from the Transportation and Warehousing sector, ended the 2011 – 2021 ten-year period with an LQ of 0.97 after an almost 85-percent competitive effect decrease, having departed from 3.51 in 2011.

  - Other industries falling under the same category were Oil and Gas Extraction, from the Mining, Quarrying, and Oil and Gas Extraction sector.

  - Six Manufacturing industries (Primary Metal Manufacturing; Wood Product Manufacturing; Beverage and Tobacco Product Manufacturing; Computer and Electronic Product Manufacturing; Plastics and Rubber Products Manufacturing; and Food Manufacturing).

  - Air Transportation, also from the Transportation and Warehousing sector.

- **Threatened Industries** define activities that are more concentrated locally than at the national level but have grown less than expected by national-level factors through the lens of SS methodology.

  - Warehousing and Storage was identified as a threatened industry. Though this industry is still relatively concentrated, with an LQ of 2.25 in 2021, it faced a negative competitive effect of 26 percent when contrasted nationally. This result may reflect a level of saturation experienced by the region as development in this sector has been prevalent. Based on feedback from local economic development agencies, the region has begun to shift its economic development initiatives to focus on manufacturing and other freight-intensive sectors as opposed to warehousing and storage.

  - Other industries in this category include Rail Transportation and Paper Manufacturing. Historically, Paper Manufacturing has been a large industry in the CORE MPO region with firms such as International Paper and Georgia-Pacific being among the largest employers in the region. In this case, this result may reflect challenges associated with growth for such a resource-intensive industry as opposed to a threatened industry for the region.

TABLE 4.10 CORE MPO REGION FREIGHT-INTENSIVE INDUSTRY CLASSIFICATION BASED ON THE RESULTS FROM THE LQ AND SS ANALYSES (COMPARED TO THE U.S.)

Opportunity	Strong
• Mining (except Oil and Gas) • Machinery Manufacturing • Furniture and Related Product Manufacturing • Support Activities for Agriculture and Forestry • Miscellaneous Manufacturing • Fabricated Metal Product Manufacturing • Utilities • Farm • Electrical Equipment, Appliance, and Component Manufacturing • Motor Vehicles, Bodies and Trailers, and Parts Manufacturing • Construction • Chemical Manufacturing • Support Activities for Mining	• Couriers and Messengers • Water Transportation • Textile Mills; Textile Product Mills • Apparel Manufacturing; Leather and Allied Product Manufacturing • Printing and Related Support Activities • Petroleum and Coal Products Manufacturing • Nonmetallic Mineral Product Manufacturing • Truck Transportation • Forestry and Logging; Fishing, Hunting, and Trapping • Other Transportation Equipment Manufacturing
Weaker	**Threatened**
• Food Manufacturing • Plastics and Rubber Products Manufacturing • Computer and Electronic Product Manufacturing • Air Transportation • Beverage and Tobacco Product Manufacturing • Wood Product Manufacturing • Primary Metal Manufacturing • Oil and Gas Extraction • Pipeline Transportation	• Paper Manufacturing • Rail Transportation • Warehousing and Storage

Source: Cambridge Systematics Analysis.

State-Level Results

Table 4.11 presents the CORE MPO region freight-intensive industry classification based on the combined results from the LQ and SS analyses that compared the region against the State. The industry classification is based on the LQ from 2021 shown in **Table 4.4**, and the results of the SS analysis that compares the CORE MPO economy relative to the State economy over the 2011 – 2021 period shown in Table 4.10.

- **Opportunity Industries** are those that are relatively less concentrated locally as compared to the State but have grown at a faster rate. These are strong industries for focusing economic targeting efforts.
  - Like the national-level results, Mining (except Oil and Gas) is included in this category. Its LQ grew from 0.02 to 0.44 between 2011 and 2021 and its competitive effect was above 2,500 percent – offsetting an expected 11-percent decrease.
  - The list of opportunity industries also includes Support Activities for Agriculture and Forestry and Farm Activities, Support Activities for Mining, Utilities, and Air Transportation.

  - Six industries from the Manufacturing sector, which include Machinery Manufacturing; and Textile Mills, Textile Product Mills (which came second and third in terms of competitive effect, respectively); Furniture and Related Product Manufacturing; Miscellaneous Manufacturing; Electrical Equipment, Appliance, and Component Manufacturing; and Food Manufacturing.

- **Strong Industries** are those that are more concentrated at the CORE MPO region than in Georgia, and still managed to increase their relative concentration by growing faster locally than what was expected by the SS analysis. Because of this, these industries are particularly strong for targeting as part of economic development initiatives.

  - Both Couriers and Messengers and Water Transportation were categorized as strong industries. The Couriers and Messengers industry had its LQ below 1.00 in 2011 and managed to become a possible cluster after its growth and concentration in 2021. The Water Transportation industry was already strong but proved to have some margin for expansion.

  - Other industries have more modest SS competitive effects but are still categorized as strong. This includes Forestry and Logging, Fishing, Hunting, and Trapping.

  - Five industries from the Manufacturing sector are also included. These include Apparel Manufacturing, Leather and Allied Product Manufacturing; Printing and Related Support Activities; Nonmetallic Mineral Product Manufacturing; Petroleum and Coal Products Manufacturing; and Other Transportation Equipment Manufacturing.

  - Truck Transportation, also from the Transportation and Warehousing sector, completes the list, although its 2011 – 2021 competitive effect was barely positive (0.3 percent) when compared to Georgia, as a whole.

- **Weaker Industries** are less concentrated in the region than at the State level and have grown less than expected by State-level changes in employment when conducting an SS analysis. These industries do not necessarily have poor performance in the CORE MPO region, but rather are clustered in other locations in Georgia and may be difficult for the region to compete.

  - Primary Metal Manufacturing ended the 2011 – 2021 10-year period with an LQ of 0.01 and a competitive effect of a 65-percent decrease.

  - Another example is Wood Product Manufacturing – a negative SS competitive effect of 53.2 percent and an LQ which changed from 0.60 in 2011 to 0.36 in 2021.

  - Manufacturing industries that fell into this category include Plastics and Rubber Products Manufacturing; Motor Vehicles, Bodies and Trailers, and Parts Manufacturing; Computer and Electronic Product Manufacturing; Beverage and Tobacco Product Manufacturing; and Fabricated Metal Product Manufacturing). However, regarding Motor Vehicles manufacturing the planned Hyundai assembly plant and the multiple suppliers that have announced upcoming investments in the region would not be captured in this analysis.

- **Threatened Industries** are more concentrated locally than at the State level but have grown less than expected by State-level changes in employment through the lens of SS methodology.

  - The most threatened industry is Pipeline Transportation. This industry used to have an LQ greater than 10 points, but after a negative 113-percent SS competitive effect, it has dropped to 2.48 in 2021.

  - Other industries from the Transportation and Warehousing sector fell under this category, such as Rail Transportation and Warehousing and Storage.

- Two industries from the Manufacturing sector, Paper Manufacturing and Chemical Manufacturing, are also in this category. Historically, these have been large industry sectors in the CORE MPO region. In this case, this result may reflect challenges associated with growth for resource-intensive industries as opposed to threatened industries for the region.

TABLE 4.11 CORE MPO REGION FREIGHT-INTENSIVE INDUSTRY CLASSIFICATION BASED ON THE RESULTS FROM THE LQ AND SS ANALYSES (COMPARED TO THE STATE)

Opportunity	Strong
• Mining (except Oil and Gas) • Machinery Manufacturing • Textile Mills; Textile Product Mills • Furniture and Related Product Manufacturing • Support Activities for Agriculture and Forestry • Utilities • Miscellaneous Manufacturing • Air Transportation • Electrical Equipment, Appliance, and Component Manufacturing • Farm • Food Manufacturing • Support Activities for Mining	• Couriers and Messengers • Water Transportation • Apparel Manufacturing; Leather and Allied Product Manufacturing • Printing and Related Support Activities • Nonmetallic Mineral Product Manufacturing • Petroleum and Coal Products Manufacturing • Other Transportation Equipment Manufacturing • Forestry and Logging; Fishing, Hunting, and Trapping • Truck Transportation
Weaker	**Threatened**
• Construction • Fabricated Metal Product Manufacturing • Beverage and Tobacco Product Manufacturing • Computer and Electronic Product Manufacturing • Motor Vehicles, Bodies and Trailers, and Parts Manufacturing • Plastics and Rubber Products Manufacturing • Oil and Gas Extraction • Wood Product Manufacturing • Primary Metal Manufacturing	• Chemical Manufacturing • Warehousing and Storage • Rail Transportation • Paper Manufacturing • Pipeline Transportation

Source: Cambridge Systematics Analysis.

5 TRENDS IMPACTING FREIGHT IN THE REGION

Understanding the trends driving the demand for freight transportation, as well as those that impact how freight operates, is critical to projecting and addressing future needs and challenges on the region's multimodal freight network. This section of the report identifies significant trends that may impact the freight network and the freight-intensive industries that depend on it. This information helps the CORE MPO and its local, state, and federal partners to develop freight transportation policies and investment priorities in light of a changing freight landscape.

5.1 E-Commerce

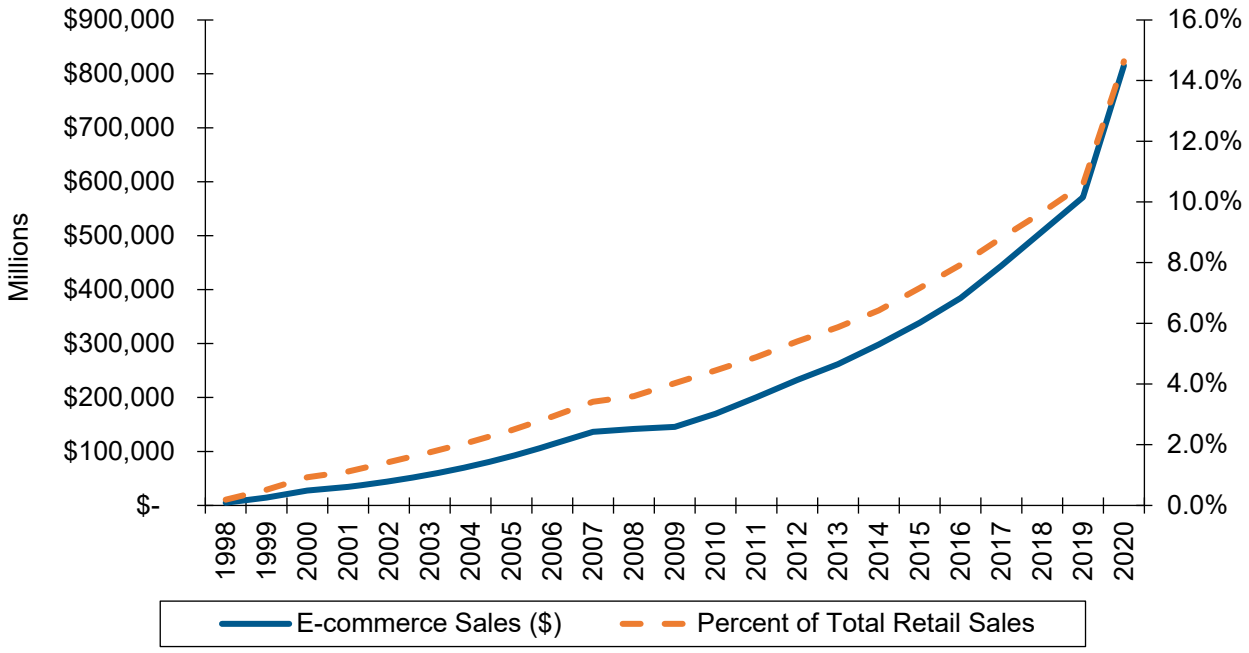
E-commerce is a strategy for business-to-consumer (B2C) and business-to-business (B2B) sales that leverage digital platforms instead of brick-and-mortar marketplaces. E-commerce increased from about 4 percent of total retail activity in 2010 to nearly 15 percent of total retail sales, over $815 billion, in 2020 as shown in Figure 5.1.[4] Growth in e-commerce demand appears to have been accelerated over the short term by the COVID-19 pandemic which is evident in the U.S. Census Bureau's e-commerce sales data. Shelter-in-place orders in the U.S. began late in the first quarter of 2020 with California issuing the first order in the U.S. on March 19, 2020[5]. There was a sharp increase in e-commerce retail sales as a percentage of total retail sales in 2020. Preliminary data from 2021 indicates that e-commerce sales have continued to rise with the share of total retail sales being consistent with 2020 values (about 14.6 percent).[6]

[4] U.S. Census Bureau, "Estimated Annual U.S. Retail Trade Sales – Total and E-Commerce: 1998-2020," Annual Retail Trade Survey: 2020.

[5] Executive Department, State of California, Executive Order N-33-20, https://www.gov.ca.gov/wp-content/uploads/2020/03/3.19.20-attested-EO-N-33-20-COVID-19-HEALTH-ORDER.pdf.

[6] Retail Indicators Branch, U.S. Census Bureau, Estimated Quarterly U.S. Retail Sales (Adjusted): Total and E-commerce, 2nd Quarter 2022, https://www.census.gov/retail/index.html.

FIGURE 5.1 ANNUAL U.S. E-COMMERCE RETAIL TRADE SALES, 1998-2020



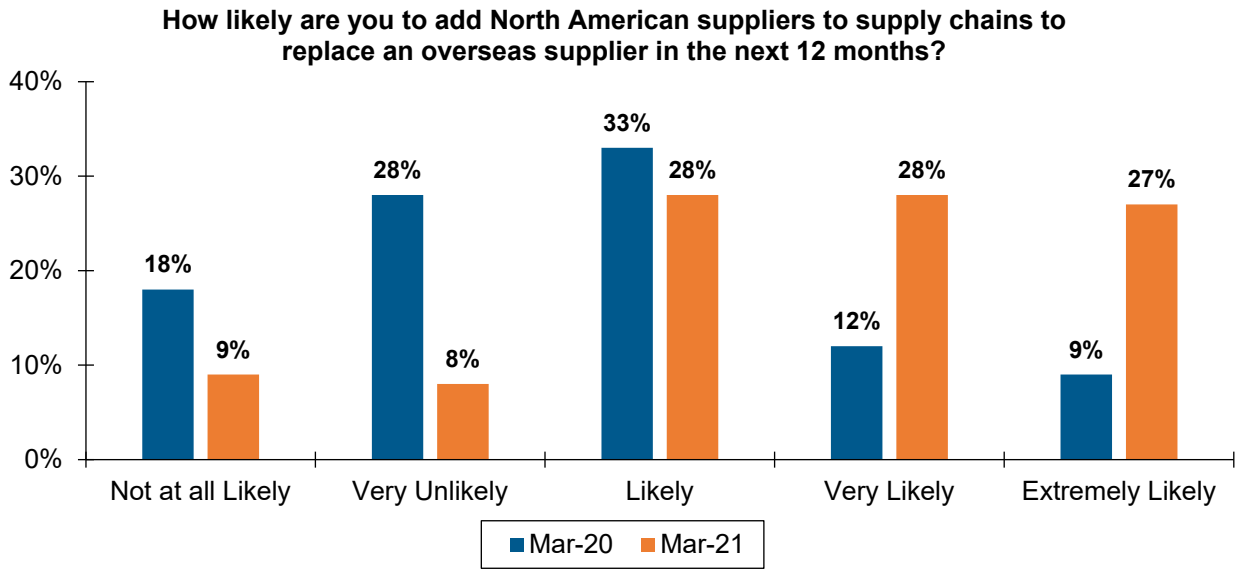
Source: U.S. Census Bureau, Annual Retail Trade Survey.

The steady growth of e-commerce as a preferred method for purchasing consumer goods has impacted freight traffic and land use patterns in metropolitan regions such as Savannah. Specifically, the Savannah region has experienced an influx of warehousing and distribution center developments. Growth in e-commerce is a key driver of these developments as they are needed to serve freight shipments associated with consumer goods and retail items. Furthermore, the presence of the Port of Savannah, access to two Class I rail carriers, and access to the Interstate highway system make the Savannah region ideal as a hub to serve nearby large population centers such as Metro Atlanta and Jacksonville.

5.2 Near-Shoring and Distributed Manufacturing

The COVID-19 pandemic exposed major weaknesses in supply chains for manufactured items, resulting in prolonged shortages of essential goods. The pandemic hastened efforts that were already underway for businesses to re-examine their supply chains to make them more resilient. This is evident from the results of the 2021 State of Manufacturing Report, an annual survey of manufacturers conducted by the Thomas Company which provides product sourcing, supplier selection, and digital marketing solutions to manufacturers. The 2021 survey of more than 300 manufacturers found that attitudes about sourcing had significantly changed from 54 percent to 83 percent likely to extremely likely to consider North American suppliers as a resilience strategy (March 2020 to March 2021).

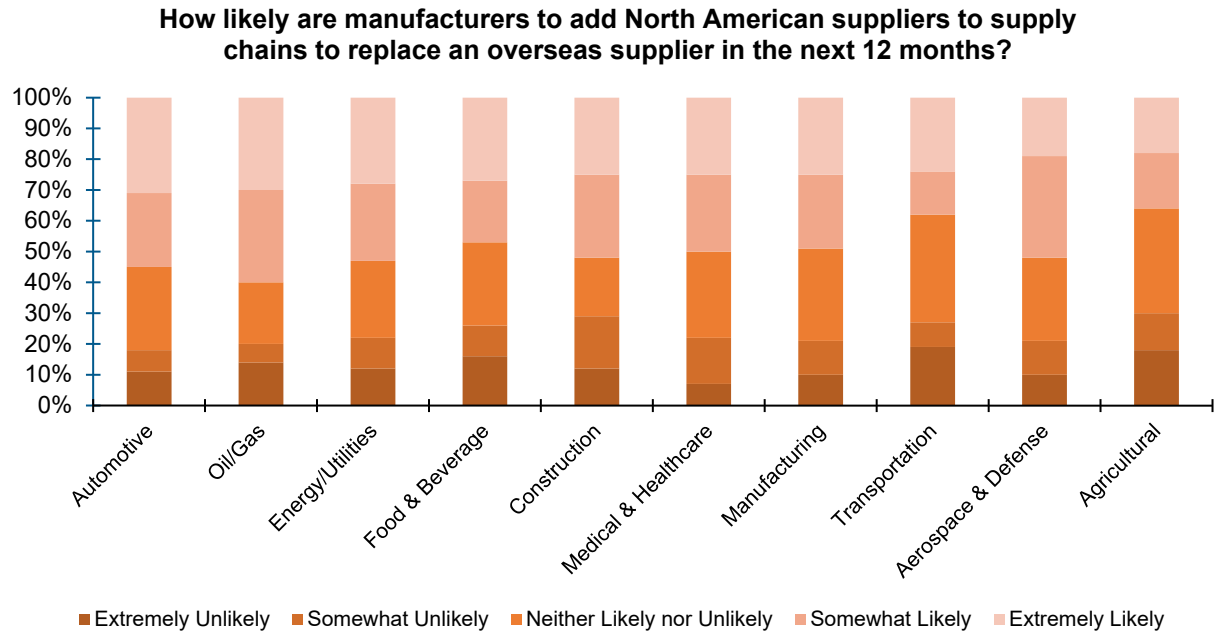
FIGURE 5.2 SURVEY OF MANUFACTURERS ABOUT NEAR-SHORING, 2021



Source: Thomasnet.com. (2021). State of North America Manufacturing 2021 Annual Report. Fifth Ed. https://f.hubspotusercontent00.net/hubfs/242200/UA%20Files/State%20of%20North%20American%20Manufacturing%202021%20Annual%20Report%20v1.3.pdf.

When broken down by industry, the survey results showed that automotive manufacturers indicated the highest willingness to add North American manufacturers to their supply chains. As shown in Figure 5.3, about 31 percent of automotive manufacturing respondents indicated that they are "extremely likely" to add North American suppliers to their supply chains while about 24 percent indicated they are "somewhat likely."

FIGURE 5.3 SURVEY OF MANUFACTURERS BY INDUSTRY ABOUT NEAR-SHORING, 2021



Source: Thomasnet.com. (2021). State of North America Manufacturing 2021 Annual Report. Fifth Ed. https://f.hubspotusercontent00.net/hubfs/242200/UA%20Files/State%20of%20North%20American%20Manufacturing%202021%20Annual%20Report%20v1.3.pdf.

A related trend to near-shoring is renewed interest in distributed or decentralized manufacturing. Distributed manufacturing refers to the practice of spreading production across several (typically smaller) facilities, enabling manufacturers to produce products closer to their customers.[7] Furthermore, activities at these facilities are coordinated using information technology such as cloud manufacturing software and they may also employ non-traditional manufacturing techniques such as 3-D printing.[8] This is in contrast to traditional manufacturing models in which manufacturers produce large quantities of products at a single, centralized facility (often in countries with low production costs) before distributing them to warehouse or other facilities. Distributed manufacturing allows producers to respond to an expanding market, increasing demand and to reduce supply chain risks – especially in light of the COVID-19 pandemic. If a single supply chain fails or there is restricted access to a key facility due to travel restrictions, a manufacturer's operations come to a stop. Distributing manufacturing across several factories in different locations enables producers to reduce these risks through a decentralized production model that can more easily adapt to changing circumstances.

The trends of near-shoring and distributed manufacturing could impact land use and freight flows in the Savannah region. They would also contribute to the region's strengthening manufacturing sector, which is an opportunity industry sector based on the analysis presented in section 4. Automotive manufacturers indicated the highest willingness to add North American manufacturers to their supply chains based on the 2021 State of Manufacturing Report survey. Given the pending development of the Hyundai assembly plant in Bryan County, suppliers may choose or be encouraged to locate proximate to the new facility. Furthermore, automotive manufacturers in other parts of the state (such as Kia in West Point or the pending Rivian facility in Walton and Morgan Counties) could be served by suppliers in the Savannah region. In terms of land use, these trends would likely hasten the transformation of formerly rural areas into industrial centers. Regarding freight flows, they would result in larger amounts of freight traffic on the region's multimodal freight network, especially highways.

5.3 International Trade

Mexico and Canada are Georgia's two largest trading partners accounting for nearly $11.3 billion and $15.5 billion in trade (i.e., imports and exports) in 2021[9]. Together, Mexico and Canada account for about 16 percent of Georgia's total trade in terms of total value of imports and exports. On July 2, 2020, the new United States-Mexico-Canada Agreement (USMCA) replaced the 25-year-old North American Free Trade Agreement (NAFTA), becoming the governing statute for commerce across North America. The goal of NAFTA was to eliminate trade barriers between the three nations, including reducing—and in some cases eliminating—tariffs and protecting intellectual property rights (IPR) and investments, with special provisions on trade and investment in the North American automotive industry, textiles and apparel, energy and petrochemicals, trade in agricultural products, telecommunication and financial services, sanitary measures, customs procedures, government procurement, labor protections, and environmental protection.

[7] https://www.fastradius.com/resources/distributed-manufacturing-benefits/

[8] https://katanamrp.com/blog/distributed-manufacturing/

[9] U.S. Census Bureau, Economic Indicators Division USA Trade Online, U.S. Import and Export Merchandise Trade Statistics.

The new USMCA is important to the CORE MPO region because the updated trade agreement dictates overall trade in North America and impacts the national economy, particularly the automotive sector (which is steadily growing in Georgia) and the agricultural sector (which is state's largest industry). Regarding the automotive industry, manufacturers including Kia, Hyundai, and Rivian have existing or planned major expansions within the state. Regarding agriculture, the value of Georgia's agricultural exports has increased from about $1.3 billion in 2000 to over $3.2 billion in 2020.[10] In fiscal year 2021, Georgia exported over $234 million of poultry and $38.4 million of eggs to Canada and Mexico.[11] Furthermore, the Port of Savannah is the largest U.S. Southeast port for agricultural exports.[12]

Major USMCA changes pertaining to the automotive and agriculture industries that could impact freight and freight-intensive industries in the CORE MPO region include the following:

- **Rules of Origin for Automobile Production.** Preferential rules of origin were established under the North American Free Trade Agreement (NAFTA) to ensure that only eligible goods received preferential tariff benefits if the products were made entirely or in large part within North America.[13] Certain products were also required to have a minimum level of North American content in addition to undergo a tariff shift. [14] The NAFTA tariff shift rule required that non-originating materials used in the making of the finished product undergo a qualifying change in tariff classification. The USMCA contains new and stricter auto rules of origin than NAFTA, which will have important implications for the automotive industry in the U.S. and North America. [15,16] Examples include a higher overall vehicle regional value content (RVC) threshold; different RVC thresholds for certain parts of the vehicle; a new labor value content (LVC) requirement; and a new steel and aluminum RVC requirement. Overall, the implications of these changes for the CORE MPO region are that the USMCA encourages increased domestic sourcing of labor and materials for automobile production. Combined with the region's ongoing economic development initiatives to increase its manufacturing base, greater amounts of automobile production and associated freight traffic may be centered on the CORE MPO region.

- **Poultry and Egg Products.** NAFTA facilitated the integration of the agricultural sectors of the U.S., Mexico, and Canada with the gradual elimination of almost all tariffs and improved cooperation for the application and enforcement of sanitary and phytosanitary measures. In 2021, U.S. farm and food products exports totaled $177 billion, and Mexico and Canada were the second and third largest markets, respectively, for U.S. agricultural and food exports. Specifically for poultry and egg products (which are two major Georgia agricultural exports), USMCA improves market access for U.S. poultry and egg products to the Canadian market by an increase in the tariff rate quota – the amount of goods that can be exported from the U.S. to Canada at a reduced duty rate. The implication of this for the CORE

[10] USDA, Economic Research Service (ERS); USDA, Foreign Agricultural Service, Global Agricultural Trade System. Table: U.S. agricultural exports, State detail by commodity: calendar years 2000-2021; https://www.ers.usda.gov/data-products/state-agricultural-trade-data/.

[11] USDA, Economic Research Service (ERS); USDA, Foreign Agricultural Service, Global Agricultural Trade System. Table: Top 5 U.S. agricultural export commodities by State (fiscal year); https://www.ers.usda.gov/data-products/state-agricultural-trade-data/.

[12] https://gaports.com/blog/savannah-now-the-top-us-port-for-ag-exports/

[13] U.S. Customs and Border Protection. Rules of Origin-General. Chapter 4 of the NAFTA.

[14] Ibid.

[15] Covington Alert. *Uniform Regulations Detail U.S.-Mexico-Canada Agreement's Rules of Origin*. June 15, 2020.

[16] Center for Strategic International Studies (CSIS). *The Impact of Rules of Origin on Supply Chains. USMCA's Auto Rules as a Case Study*. April 2019.

MPO region, is that it enables Georgia poultry producers to export greater volumes of poultry and egg products through the Port of Savannah to Canada and Mexico.

5.4 Electric and Alternative Fuel Commercial Vehicles

The advancement of commercial vehicles that use alternative fuels – primarily electric but also natural gas, biodiesel, and propane – is viewed as central to U.S. climate change goals. The widespread adoption of alternative fuel commercial vehicles can lead to substantial reductions in greenhouse gas (GHG) emissions as transportation is one of the primary sources of GHG emissions, accounting for about 29 percent of all U.S. emissions.[17] Transportation's outsized impact on GHG emissions is due to its reliance on fossil fuels which produce carbon dioxide when combusted. Thus, replacing those fuels with alternatives with lower GHG emissions is central to achieving climate change goals.

Electric-powered vehicles are viewed as a key technology-based strategy for reducing the impacts of the transportation sector on emissions and the environment. The Bipartisan Infrastructure Law (BIL) established the National Electric Vehicle Infrastructure (NEVI) Formula Program to provide funding to states to strategically deploy electric vehicle (EV) charging infrastructure and to establish an interconnected network to facilitate data collection, access, and reliability. Freight is a central component of the NEVI program as it requires USDOT to designate national EV charging corridors to support freight and goods movement along major national highways, the National Highway Freight Network, and at freight hubs (including ports, intermodal centers, and warehousing locations).[18]

The inclusion of a freight-specific component in the NEVI program reflects that electric-powered medium- and heavy-duty trucks can work to reduce the overall environmental impact of the transportation sector. While medium- and heavy-duty vehicles represented only about 5 percent of registered vehicles in 2018, they were responsible for over 26 percent of the U.S. transportation sector's fuel consumption[19] and 23 percent of the sector's greenhouse gas (GHG) emissions[20]. In addition, electric trucks are also seen as a way to reduce fuel costs for motor carriers. Studies have estimated that the total cost of ownership of battery electric day cab tractors is lower than their diesel counterparts over the long term.[21,22] Day cabs for regional operations (i.e., an operating range of 250 to 300 miles) are expected to be the first application for electric trucks. Several operators of private (e.g., Walmart and Amazon) and for-profit fleets (e.g., Knight-Swift, and

[17] United States Environmental Protection Agency, "Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2019," Washington DC, 2021. https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2019.

[18] Federal Highway Administration, National Electric Vehicle Infrastructure Formula Program, https://www.fhwa.dot.gov/bipartisan-infrastructure-law/nevi_formula_program.cfm, Accessed October 19, 2022

[19] FHWA, Table VM-1 - Highway Statistics 2018 – Policy: Federal Highway Administration, https://www.fhwa.dot.gov/policyinformation/statistics/2018/pdf/vm1.pdf.

[20] Environmental Protection Agency – Office of Transportation and Air Quality, Fast Facts: U.S. Transportation Sector Greenhouse Gas Emissions 1990-2018, https://nepis.epa.gov/Exe/ZyPDF.cgi?Dockey=P100ZK4P.pdf.

[21] California Air Resources Board, "Advanced Clean Trucks Total Cost of Ownership Discussion Document: Preliminary Draft for Comment," February 22, 2019, https://ww2.arb.ca.gov/sites/default/files/2020-06/190225tco_ADA.pdf.

[22] Phadke, A. et al., "Why Regional and Long-Haul Trucks are Primed for Electrification Now," March 2021, Lawrence Berkeley National Laboratory, https://eta-publications.lbl.gov/sites/default/files/updated_5_final_ehdv_report_033121.pdf.

Dependable Highway Express) have made investments to achieve electric and zero-emission fleets due to their potential positive economic and environmental impacts.[23]

Despite the potential economic and environmental benefits of heavy-duty vehicle electrification, there are challenges. Some of the key barriers include:

- **Higher Upfront Vehicle Costs.** The high vehicle purchase price is perceived as one of the largest barriers to freight electrification. Electric trucks may be as much as 3.5 times the average cost of a diesel truck.[24] Despite the potential long-term cost savings, the initial cost may be too much for some carriers.

- **Costly and Complex Charging Infrastructure Processes.** The planning and installation of electric vehicle infrastructure are some of the largest barriers to deploying an electric truck fleet. Electric vehicle charging stations vary in the speed (and subsequently cost) with which they can fully charge a vehicle. Aside from selecting and purchasing the stations, motor carriers must deal with the complexity and cost associated with siting, planning, commercial utility interconnection requirements, construction permitting, and final installation.

- **Concerns with Grid Resiliency.** Electric trucks have very high electrical demand requirements, and their widespread deployment would create large new demand for electricity. There is concern that without significant investments in utility upgrades to current grid infrastructure, local grid networks may be pushed beyond their current distribution capacity. This can create disruptions to services or a slowdown of fleet electrification efforts.

- **Impact of Increased Curb Weight on Infrastructure Condition.** Due to the weight of their batteries, electric vehicles are generally heavier than their internal combustion engine counterparts. Though the weight difference is more pronounced in non-commercial vehicles, this is also true for electric versus fossil fuel powered heavy duty trucks. Furthermore, federal regulations allow for electric or natural gas-powered to exceed gross vehicle weight limits on the power unit by up to 2,000 pounds (up to a maximum gross vehicle weight of 82,000 pounds).[25] Widespread adoption of electric vehicles could result in increased strain on pavements and bridges, resulting in higher maintenance costs over the long term.

Besides electricity, there are other alternative fuels that could potentially impact how freight moves and the overall demand for freight transportation.

- **Natural Gas.** Natural gas vehicles (NGVs) include vehicles that are powered by compressed natural gas (CNG) or liquefied natural gas (LNG). They can provide small to moderate reduced GHG emissions over conventional diesel and gasoline fuels, especially if blended with biomethane. Medium- and heavy-duty NGVs are available from original equipment manufacturers (OEMs) as well as from qualified system retrofitters. Because of limited fueling infrastructure, NGVs are better suited for high-mileage, centrally located fueled fleets that stay within a region (e.g., delivery vehicles operating out of a central distribution

[23] Ronan, D., "Trucking Industry Making Strides Toward Electrification," Transport Topics, March 11, 2021, https://www.ttnews.com/articles/trucking-industry-making-strides-toward-electrification.

[24] This estimate is based on 2018 average capital costs for heavy-duty diesel and electric trucks presented in the 2019 California Air Resources Board "Advanced Clean Trucks Total Cost of Ownership Discussion Document: Preliminary Draft for Comment" report.

[25] 23 U.S. Code § 127, https://www.govinfo.gov/app/details/USCODE-2015-title23/USCODE-2015-title23-chap1-sec127

center, drayage trucks performing trips to and from the Port of Savannah). Fleets would need to make trips within range of adequate fueling stations to be efficient.

- **Biodiesel.** Biodiesel is a renewable, biodegradable fuel manufactured from vegetable oils, animal fats, or recycled restaurant grease. Almost all medium- and heavy-duty diesel vehicles are capable of running on biodiesel blends. Biodiesel blends range from 5 percent to 20 percent biodiesel blended with petroleum diesel. B20 (i.e., 20 percent biodiesel blended with petroleum diesel) and lower-level blends can be used in many diesel vehicles without any engine modification.

- **Propane.** Propane, or liquefied petroleum gas (LPG), has long been used as a vehicle fuel. It is stored as a liquid, and propane fueling infrastructure is widespread. Many propane vehicles are used in fleet applications such as school buses and shuttles. Propane engines and fueling systems are also available for heavy-duty vehicles, such as step vans and school buses, including some prep-ready engines from OEMs. Propane fuel has a lower carbon content than conventional gasoline and diesel fuel and as a result, can provide life cycle GHG emissions reductions over conventional fuels.

Alternative fuel vehicles have multiple implications for freight in the CORE MPO region and its freight-intensive industries. One implication is the need for the development of fueling infrastructure to supply the alternative fuel. Georgia and other states have begun to consider this need more strategically as it pertains to electric vehicles as part of the federal NEVI program. To the extent that other alternative fuels become viable options for heavy trucks, those would also need to be considered as part of long-range planning efforts. For freight-intensive industries that operate dedicated fleets and want to switch to an alternative fuel, they would need to invest in fueling infrastructure at their fleet terminals.

Another implication of alternative fuel vehicles is the need to re-visit pavement and other infrastructure design standards to accommodate heavier vehicles. Electric vehicles are generally heavier than gasoline- and diesel-powered engines which could accelerate the rate of pavement deterioration. Alternative fuel vehicles could also impact freight in the region through changes to freight flows as the raw materials to produce alternative fuel vehicles and the fuel to power them differs from gasoline- and diesel-powered vehicles.

5.5 Connected and Autonomous Vehicles

Connected vehicle (CV) technology utilizes short-range communications (commonly referred to as V2X or vehicle-to-everything) to sense what other travelers are doing and to identify potential hazards. Vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) allow for vehicles to have an awareness of each other's location. The Society of Automation Engineers' automation levels classification scheme is the industry standard in terms of measuring the degree of automation in a vehicle. Levels one (1) through three (3) include Advanced Driver Assistance Systems (ADAS), which consist of features such as blind-spot monitoring, lane centering, and adaptive cruise control. Levels four (4) and five (5) are more commonly referred to as autonomous vehicles, with systems referred to as Automated Driving Systems (ADS). These vehicles are driverless under certain conditions, with higher levels referring to the degree to which the driver must assume control of the vehicle. For instance, level three would require driver intervention under certain weather conditions or roadway configurations, but level five vehicles are designed without any need for driver intervention.

The benefits of greater vehicle automation to the trucking industry are substantial given ongoing industry challenges to attract new drivers and the continued need to improve safety. Fuel and labor are the two

highest operational costs for the trucking industry on a per-mile basis. Connected and autonomous trucks can yield fuel cost savings through the potential to deploy trucks in platoons. Truck platoons use vehicle-to-vehicle (V2V) communications and autonomous vehicle control technology to electronically "tether" tractor-trailers together in a convoy formation. Platooning can yield greater fuel efficiency due to reduced aerodynamic drag on the following vehicle(s). One study estimated that the lead truck may experience fuel savings of up to nearly 5 percent while trailing trucks may experience savings of up to nearly 10 percent.[26]

Connected and autonomous trucks can yield labor cost savings through the potential to operate trucks under certain conditions without drivers. For example, some companies have been testing systems that automate the freeway portion of a truck's journey and allow the driver to take over to navigate the more complex local roads. Others have been performing depot-to-depot test runs in various cities.[27] Both approaches are designed to enable truck drivers to complete more journeys per day while spending less time driving. In addition to private sector investment, there has been considerable federal and state investment in the form of pilot projects and policy guidance.[28] Examples include the Ann Arbor Connected Vehicle Environment, Connected Vehicle Pilots Program, and the Advanced Transportation and Congestion Management Technologies Deployment Program.[29]

Regarding safety, connected and autonomous vehicles have the potential to remove some of the opportunity for human error while also improving infrastructure for connectivity among vehicles. Connected vehicle technology includes vehicle-to-infrastructure (V2I) communications which are vehicles equipped with transceivers that communicate with roadside infrastructure. Along with other potential benefits, this concept can improve safety by notifying trucks of abrupt stops ahead, curves, wrong-way drivers, or other safety hazards. Even without V2I communications, an increasing number of trucks are already equipped with other autonomous technologies (specifically Levels 1 to 3) for lane departure warning, automatic emergency braking, and other safety applications.

The implication of connected and autonomous vehicle technologies for the CORE MPO region is that their successful implementation has the potential to significantly enhance safety, which has a secondary benefit of reducing regional congestion. Resulting decreases in crash rates would allow for reductions in associated congestion, emissions, and fuel costs at the regional level. Though it is unlikely that autonomous trucks could operate within a port given the complexity of the environment and close proximity of people and equipment, conceivably they could perform trips to and from staging areas outside the port, where the trucks are then handed off to human drivers to perform the last mile. Such a development would further impact land use around the region as well as truck traffic patterns.

[26] Lammert, M., Duran, A., Diez, J., Burton, K. et al., "Effect of Platooning on Fuel Consumption of Class 8 Vehicles Over a Range of Speeds, Following Distances, and Mass," SAE Int. J. Commer. Veh. 7(2):2014, doi:10.4271/2014-01-2438.

[27] Ackerman, E. "This Year, Autonomous Trucks Will Take to the Road With No One on Board," IEEE Spectrum, January 4, 2021.

[28] U.S. DOT. (December 2019) *Ensuring American Leadership in Automated Vehicle Technologies.* https://www.transportation.gov/sites/dot.gov/files/2020-02/EnsuringAmericanLeadershipAVTech4.pdf.

[29] https://www.transportation.gov/sites/dot.gov/files/docs/policy-initiatives/automated-vehicles/320711/preparing-future-transportation-automated-vehicle-30.pdf.

6 SUMMARY

This memorandum reviewed and analyzed the region's economic structure and major industries. It identified and discussed macro-level trends in population and employment change for the region; identified major freight-intensive industries in the region; examine employment by and economic output by industry sector; and investigated commuter patterns with neighboring counties and regions. In addition, the memorandum identified and assessed the impacts of a few select trends in the national and international economy on the region's freight industry.

- During the last decade, the population in the CORE MPO region has grown steadily, reaching almost 400,000 residents in 2021. This represents an increase of 12.0 percent or 42,000 residents since 2011. On average, this population increase equals to a 1.1-percent annual growth rate over the 2011 to 2021 period. By 2050, however, the population in the MPO region is expected to grow by 15.3 percent compared to 2021, representing an average annual growth of 0.5 percent, or roughly a 1-percent increase every 2 years, over the 2021 to 2050 period.

- From 2011 to 2019, the total number of employees in the region increased by 23.1 percent as compared to a 10.8 percent increase in the region's population over the same period. The COVID-19 pandemic in 2020 and the associated recession in 2021 negatively impacted regional employment levels as employment in those years dropped relative to 2019 values. Gross regional product (GRP) likewise dropped in 2020 and 2021, but personal income for the region improved.

- All of the economic indicators point to growth for the CORE MPO region. Employment is expected to reach 273,000 by 2050, representing an average annual growth rate of 0.4 percent. Personal income in the region is expected to total $38.5 billion by 2050 (an average annual growth rate of 2.0 percent). GRP is expected to total $42.2 billion by 2050 (an average annual growth rate of 1.7 percent). Economic output is expected to total $73.1 billion by 2050 (an average annual growth rate of 1.7 percent).

- In 2021, freight-intensive industries provided nearly 45,000 jobs throughout the CORE MPO region. This accounted for approximately 18 percent of all jobs. This is an increase of over 2 percentage points compared to the 2011 freight-intensive industry share of total employment. The top three freight-intensive industry sectors for employment in 2021 were Construction, Other Transportation Equipment Manufacturing, and Truck Transportation. These industries represented 23,771 jobs or 53 percent of the total employment under the freight-intensive industries. Overall, the results demonstrate that freight-intensive industries are an increasingly important source of jobs for the region.

- The analysis of freight-intensive industries revealed that there are multiple clusters of industries within the CORE MPO region that represent opportunities for freight-focused economic development. "Opportunity" industries are those that are relatively less concentrated locally as compared to the State but have grown at a faster rate. "Strong" industries are those that are more concentrated locally compared to the State, but still managed to increase their relative concentration by growing faster than what was expected. Based on engagement with the region's economic development agencies, several of these "opportunity" and "strong" industries are already the focus of the region's economic development initiatives. Examples include Machinery Manufacturing; Miscellaneous Manufacturing; Electrical Equipment, Appliance, and Component Manufacturing; Farming; Forestry and Logging; and Truck Transportation.