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Industry Sector Jobs at Risk in Georgia and its Regions Due to New Technology

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Introduction

The rapid pace of technology and innovation has far-reaching and sometimes unpredictable effects. Although technology improves many aspects of people's lives, it also has the power to disrupt traditional ways of doing things. One such area of possible disruption caused by advanced technologies is in the area of labor markets and employment. Estimates of the impact of advanced computer technologies like artificial intelligence on the labor market vary considerably. Some reports estimate that roughly 10 percent of jobs in the United States will be highly susceptible to disappearing to advanced computer technologies (Arntz et al. 2016), while others suggest that almost 50 percent of U.S. employment is at risk (Frey and Osborne 2017). The COVID-19 pandemic may act to speed up this process (Muro et al. 2020).

BACKGROUND

Although estimates of potential job loss vary, there is more consensus on the types of occupations and skills that can be automated. The literature suggests there is a strong relationship between the occupations or skills that can be automated and an individual's income or education. The Council of Economic Advisors (2016) used the Frey and Osborne characterizations and found that jobs making less than $20 per hour had an 83-percent probability of automation. Jobs making over $40 per hour, on the other hand, only had a 4-percent probability of automation. Additionally, Arntz et al. (2016) find that in developed OECD countries, jobs that require a high school degree or less are much more likely to be automatable than jobs with a college or graduate degree.[1] When these changes may occur is not well defined in the literature, with terms like "the near future" being used. Frey and Osborne (2017) do offer some guidance, suggesting a period of perhaps 10-20 years for automation to have the impacts on the occupations estimated.

It is clear that advances in technology do not need to approach the level of artificial intelligence to have an impact on the labor force and job duties. Some of the changes may include modifications to tasks and duties of existing jobs or the possibility of consolidation of jobs, resulting in job loss. Although not all changes will result in job loss, the labor force will still be impacted by these changes, and workers may have to adjust and learn new skills. This adjustment is likely to have different impacts on different workers depending on their age, education and skill level. Younger workers that have more experience working with these technologies and those with more education will likely suffer less than older workers less familiar with new technologies or workers with lower levels of education.

This report examines the effects that advanced computer technologies might have on the labor force in the 12 Department of Community Affairs (DCA) regions of Georgia. Throughout this report, we use the term "advanced computer technologies" (ACT) as a catchall phrase for technologies that include computerization, automation, robotics and artificial intelligence.[2] The following section describes the

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[1] OECD: Organization for Economic Co-operation and Development
[2] Artificial intelligence is a frequently used term in the popular press as well as academic literature and can mean different things. Here it refers to technologies that enable computers to perform tasks traditionally thought to

methodology used in this analysis. To examine these impacts, we use the IMPLAN model of Georgia and transform the Frey and Osborne (2017) estimates of the occupations susceptible to automation into the equivalent estimates for the North American Industry Classification System (NAICS) codes using a U.S. Bureau of Labor Statistics (BLS) crosswalk.[3] The subsequent sections describe estimates of the potential ACT job loss in Georgia's regions by major sectors.

Methodology: Transforming Occupation ACT Risk to NAICS Industry Risk

To estimate how ACT changes will impact different regions of Georgia, we use the IMPLAN model that includes economic data for the 159 counties in the state. However, the industry data used in IMPLAN is organized by NAICS code rather than occupation. To convert IMPLAN-calculated effects to the occupation scale, we multiply Frey and Osborne's estimates of occupation risk by the share each occupation represents of a given NAICS code, as captured by the occupation-to-NAICS crosswalk for Georgia developed by BLS.[4]

Frey and Osborne estimate the relative risk of job loss in major occupations due to ACT. The risk of job loss due to ACT is relative to occupations Frey and Osborne deem to have zero chance of being replaced by new ACT in the relevant time period. They rely on the coding done in the O*NET data of occupations of the skills and abilities that each occupation requires.[5] Then, they assign a risk of ACT for each named skill and ability, which are combined to form the final occupation score.

For example, the two-digit NAICS codes associated with manufacturing (MFG 31-33) are composed of 17 different occupations in the BLS table. The most common occupation is production, with 55 percent of all manufacturing employment in this occupation (see Table 1). Frey and Osborne give this occupation an ACT risk score of 72 percent. The second most common employment occupation in the manufacturing NAICS is transportation and material moving occupations, with an ACT risk chance of 74 percent. For manufacturing, the occupations with highest employment associated with them have generally high ACT risk chances, thus the weighted average for manufacturing is high at 64 percent when ranking MFG NAICS codes, making them the fifth highest in risk out of all two-digit NAICS. Note that the accommodation and food services sector has the greatest likelihood of ACT disruption with 82 percent, while the educational services sector has the lowest with 30 percent.

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require human intelligence, such as visual perception, speech and pattern recognition, and decision-making. For a more thorough discussion of the digital landscape, see Andrew Young School of Policy Studies (2019).

[3] IMPLAN is a proprietary input-output software that aids in economic impact modeling.

[4] The BLS Occupational Employment Statistics (OES) program produces employment and wage estimates annually for over 800 occupations for specific industries. The 2016 Georgia estimates were used here.

[5] The Occupational Information Network (O*NET) is a free online database that contains hundreds of occupational definitions, developed in 2010. It is the successor to the Dictionary of Occupational Titles (DOT), last revised in 1991.

Table 1 shows all the two-digit NAICS codes, occupation codes and the top occupation by share for each NAICS. The risk that Frey and Osborne (2017) assign to it is also shown, along with the estimated NAICS risk we estimate as described above for manufacturing. The table is sorted by NAICS risk from highest to lowest. In the next section, we use the estimated risks below and the IMPLAN model to estimate the overall Georgia ACT job risk.

Table 1. Two-Digit NAICS Code, Major Occupations and ACT Risk Scores

2-DIGIT NAICS CODE	NAICS SECTOR	MAJOR OCCUPATIONS (OCC)	MAJOR OCC. SHARE	OCC. ACT RISK	NAICS ACT RISK
72	Accommodation and Food Services	Food Preparation and Serving Related Occupations	81%	87%	82.1%
11	Agriculture, Forestry, Fishing and Hunting	Farming, Fishing, and Forestry Occupations	55%	83%	76.1%
48-49	Transportation and Warehousing	Transportation and Material Moving Occupations	56%	74%	69.7%
44-45	Retail Trade	Sales and Related Occupations	55%	73%	68.7%
31-33	Manufacturing	Production Occupations	55%	72%	64.1%
42	Wholesale Trade	Sales and Related Occupations	25%	73%	63.3%
56	Administrative and Support and Waste Management and Remediation Services	Office and Administrative Support Occupations	19%	79%	63.2%
53	Real Estate and Rental and Leasing	Sales and Related Occupations	28%	73%	60.9%
23	Construction	Construction and Extraction Occupations	38%	63%	60.0%
52	Finance and Insurance	Office and Administrative Support Occupations	45%	79%	58.9%
71	Arts, Entertainment, and Recreation	Personal Care and Service Occupations	28%	50%	56.1%
81	Other Services (except Public Administration)	Personal Care and Service Occupations	19%	50%	55.9%
99	Federal, State, and Local Government (excluding state and local schools and hospitals)	Protective Service Occupations	23%	54%	47.8%
51	Information	Computer and Mathematical Occupations	22%	14%	41.0%
55	Management of Companies and Enterprises	Business and Financial Operations Occupations	25%	45%	40.7%
54	Professional, Scientific, and Technical Services	Office and Administrative Support Occupations	21%	79%	40.4%
62	Health Care and Social Assistance	Healthcare Practitioners and Technical Occupations	38%	12%	33.7%
61	Educational Services	Education, Training, and Library Occupations	62%	16%	29.9%

Source: Frey and Osborne (2017), Rockefeller Institute of Government, BLS OES and author's calculations.

Georgia Industry Estimates

Table 2 below summarizes Georgia's ACT risk by each two-digit NAICS industry sector codes. The table shows that many of the top sectors with large amounts of jobs at risk are relatively low paying, as the work of Frye and Osborne predicts.[6] It is estimated by multiplying the industry risk code in Table 1 by the number of jobs in Georgia in that NAICS from the IMPLAN model.[7] For instance, the top three sectors in terms of jobs at risk—accommodation and food service, retail trade and administrative support—have labor incomes per job of $21,000–$34,000. Two additional sectors with large numbers of jobs at risk, manufacturing and transportation and warehousing, had higher wages per job of $62,000 and $72,000, respectively.[8]

Table 2. Georgia Jobs and Labor Income at ACT Risk, by Two-Digit NAICS Code

2-DIGIT NAICS	NAICS SECTOR	JOBS AT RISK	LABOR INCOME PER AT RISK JOB	SHARE OF TOTAL GA ECONOMY	
				JOBS	LABOR INCOME
72	Accommodation and Food Services	396,213	$21,745	11.7%	4.9%
44-45	Retail Trade	392,448	$32,172	11.6%	7.2%
56	Administrative and Support and Waste Management and Remediation Services	301,328	$34,622	8.9%	6.0%
31-33	Manufacturing	269,761	$72,079	8.0%	11.1%
81	Other Services (except Public Administration)	235,296	$32,740	7.0%	4.4%
48-49	Transportation and Warehousing	208,666	$62,766	6.2%	7.5%
99	Federal, State and Local Government (excluding state and local schools and hospitals)	192,708	$77,411	5.7%	8.5%
62	Health Care and Social Assistance	191,300	$58,136	5.7%	6.4%
23	Construction	189,076	$55,352	5.6%	6.0%
54	Professional, Scientific and Technical Services	181,780	$80,350	5.4%	8.3%
52	Finance and Insurance	162,526	$70,866	4.8%	6.6%
42	Wholesale Trade	157,572	$85,591	4.7%	7.7%
53	Real Estate and Rental and Leasing	156,902	$26,074	4.7%	2.3%
61	Educational Services	133,807	$56,212	4.0%	4.3%
71	Arts, Entertainment and Recreation	59,951	$20,972	1.8%	0.7%

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[6] Frey and Osborne (2017) find that low paying occupations have a higher ACT risk, thus to the extent that industry sectors are primarily composed of low paying occupations, this result is to be expected.

[7] IMPLAN uses a 504-sector code system for industries in its computer model; however, the company offers a crosswalk that allows for these IMPLAN codes to be matched with a two-digit NAICS code.

[8] For an analysis of how ACT may impact the Georgia labor force by occupation code, see Chike and Wallace (2020).

2-DIGIT NAICS	NAICS SECTOR	JOBS AT RISK	LABOR INCOME PER AT RISK JOB	SHARE OF TOTAL GA ECONOMY	
				JOBS	LABOR INCOME
11	Agriculture, Forestry, Fishing and Hunting	57,964	$40,255	1.7%	1.3%
51	Information	56,245	$146,222	1.7%	4.7%
55	Management of Companies and Enterprises	29,848	$123,146	0.9%	2.1%
	Total	3,373,391	$51,917	55.6%	52.0%

Source: Frey and Osborne (2017), Rockefeller Institute of Government, BLS OES, IMPLAN 2017 and author's calculations.

These differences in labor income per job are further illustrated in Table 2 in the column showing the labor income share of Georgia's total economy. The top three sectors for total jobs at risk account for 32.3 percent of all jobs in Georgia, but only 18.1 percent all labor income. The manufacturing sector and transportation and warehousing sector together account for only 14.2 percent of all jobs in Georgia at risk, but 18.6 percent of all labor income.[9]

Georgia Regional Estimates

In the various DCA regions across the state, there is little difference in the distribution of jobs in the industry sectors in the top three industries: accommodation and food services; retail trade; and administrative and support and waste management and remediation services. Thus, these do not account for much of the variation in employment risk from the top five sectors shown in Table 3 below. However, the distribution of both manufacturing jobs and transportation and warehousing jobs vary across the regions and account for the variation we see in Table 3 in both employment share and wage income (Map 1) share at risk.

Table 3. Regional Share of Top Five Industries by ACT Employment and Labor Income Risk

DCA REGION	ACT EMPLOYMENT	LABOR INCOME
Northwest (Dalton)	56%	54%
Three Rivers (Carrollton)	54%	52%
Southwest (Albany)	51%	46%
Southern (Valdosta)	51%	49%
Mountains (Gainesville)	51%	41%
Coastal (Savannah)	50%	43%
Northeast (Athens-Clarke)	48%	41%
Middle (Macon)	46%	33%
Heart of Georgia (Mount Vernon)	45%	41%

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[9] We do not include the NAICS code 81 for other services, as this is a very broad category with a large variety of occupations and firm types.

DCA REGION	ACT EMPLOYMENT	LABOR INCOME
Atlanta Regional Commission	45%	34%
Central Savannah River (Augusta-Richmond)	43%	31%
River Valley (Columbus)	40%	28%
Georgia	**46%**	**37%**

Source: Frey and Osborne (2017), Rockefeller Institute of Government, BLS OES, IMPLAN 2017 and author's calculations.

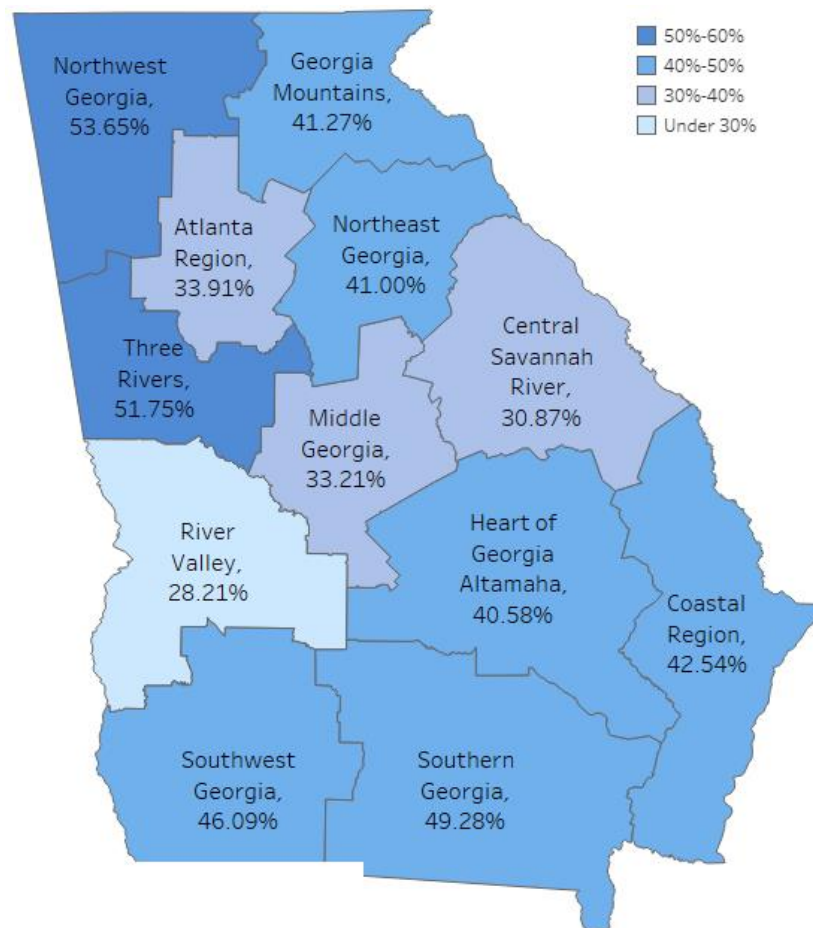## Map 1. Regional Share of Top Five Industries by ACT Labor Income Risk

Table 3 shows regions ordered by the greatest risk of disruption by share of employment in the top five industries. For instance, the Northwest (Dalton) region, has 56 percent of all at-risk employment in the top five industry sectors.[10] Those regions with higher shares of employment at risk also have a higher share of wage income at risk. For instance, in the Northwest (Dalton) region, 54 percent of all at-risk wage income is in the top five industries.

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[10] To help locate these regions in Georgia, a large regional city is included in parentheses. See the appendix for all the counties included in each DCA region.

For Georgia, the state-level average share for employment at risk in the top five industries is 46 percent, with the wage income at risk of 37 percent. As was previously shown, the Northwest (Dalton) region has the highest share of employment and wage income at risk for the top five industries. River Valley (Columbus) has the lowest share of employment and wage income at risk for the top five industries with 40 percent and 28 percent, respectively. As Map 1 shows, this difference in wage income at risk generally follows the share of jobs at risk in the higher paying manufacturing and transportation/warehousing. As there are more jobs at risk in the manufacturing sector, we will discuss that next.

MANUFACTURING SECTOR

As Table 4 shows, six of the Georgia regions have a greater than state average share of jobs in the manufacturing sector at risk due to ACT (Map 2). We focus on the leading manufacturing sectors in each region in terms of jobs. In the Northwest (Dalton) region, 21 percent of at-risk ACT employment is in the manufacturing sector. These at-risk jobs accounts for 31 percent of at-risk labor income. In the Northwest (Dalton) region, carpet and textile manufacturing are the leading employers, accounting for 50 percent of the 69,379 manufacturing jobs.[11]

Table 4. Regional Share of Manufacturing Sectors by ACT Employment and Labor Income Risk

REGION	JOBS AT RISK	LABOR INCOME/JOB	SHARE OF REGIONAL ACT AT RISK	
			EMPLOYMENT	LABOR INCOME
Northwest (Dalton)	44,466	$62,023	21%	31%
Three Rivers (Carrollton)	20,087	$65,562	15%	25%
Mountains (Gainesville)	28,119	$58,678	15%	18%
Heart of Georgia (Mount Vernon)	8,531	$49,568	12%	17%
Northeast (Athens-Clarke)	17,261	$68,195	10%	17%
Southern (Valdosta)	11,964	$53,986	10%	14%
Southwest (Albany)	10,468	$62,874	10%	16%
Middle (Macon)	11,695	$59,379	8%	11%
River Valley (Columbus)	8,653	$64,316	8%	11%
Coastal (Savannah)	17,030	$95,249	8%	16%
Central Savannah River (Augusta-Richmond)	10,086	$69,128	7%	11%
Atlanta Regional Commission	81,402	$89,004	5%	7%
Georgia	**269,761**	**$72,079**	**8%**	**11%**

Source: Frey and Osborne (2017), Rockefeller Institute of Government, BLS OES, IMPLAN 2017 and author's calculations.

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[11] This includes all textile-related manufacturing categories in the IMPLAN model with 100 or more jobs.

Map 2. Regional Share of Manufacturing Sectors by ACT Employment Risk
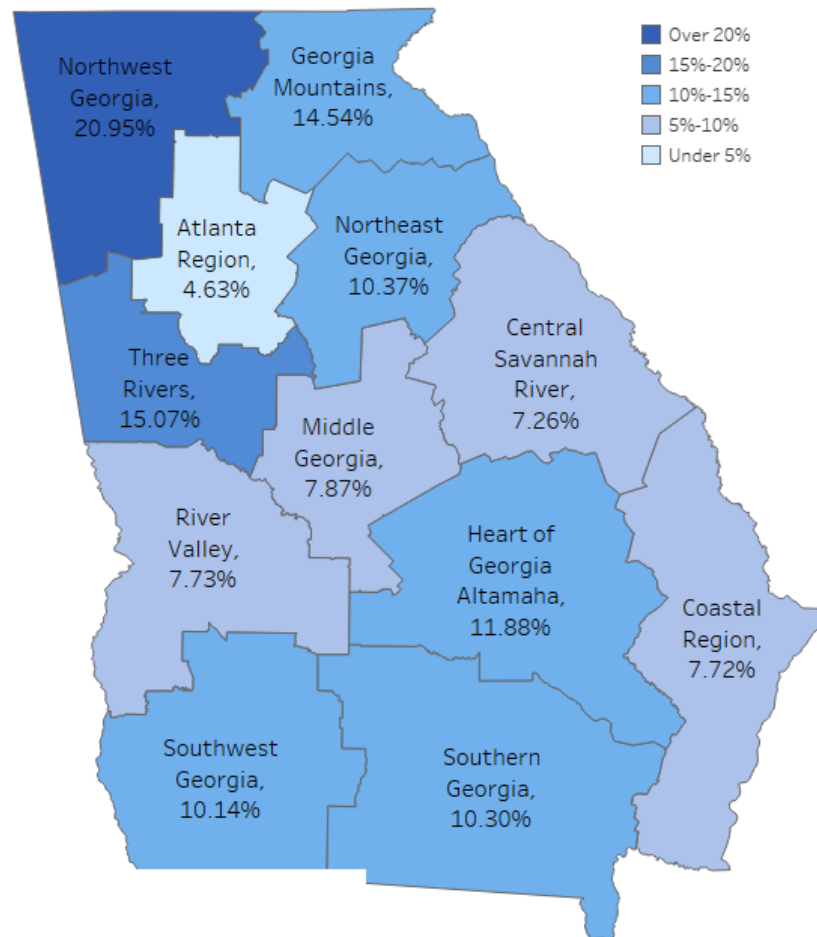
The Three Rivers (Carrollton) region has 15.1 percent of its at-risk ACT employment in the manufacturing sector, and this labor income accounts for 25.5 percent of all at-risk labor income. The key manufacturing industry here is automobiles, anchored by the West Point KIA plant in Troup County. All related motor vehicle manufacturing accounts for 30 percent of all manufacturing jobs in the region.[12]

The Mountains (Gainesville) region has 14.5 percent of affected employment in the manufacturing sector; that labor income accounts for 18.5 percent of affected labor income. Poultry processing is considered a manufacturing job and is one of the leading manufacturing sectors in the state with 33,130 poultry processing manufacturing jobs. The Mountains region is home to almost one half of them, with 14,105 poultry processing jobs.[13] Poultry processing is the dominant manufacturing sector in several more regions in Georgia with a high share of jobs at risk in manufacturing, including Heart of Georgia (Mount Vernon), Northeast (Athens-Clarke), Southern (Valdosta) and Southwest (Albany).

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[12] This includes all motor vehicle related manufacturing categories in the IMPLAN model with 100 or more jobs.
[13] The IMPLAN code is 92 for poultry processing.

Another leading manufacturing sector in Georgia is aircrafts and related industries. Several regions in the state that have lower shares of at-risk manufacturing jobs are home to these firms. These regions include River Valley (Columbus), Coastal (Savannah) and Atlanta Regional Commission.

Next, we focus on two industry structures that are not in the top five but are leaders in at-risk employment in several regions in Georgia: federal, state and local government and agriculture.

FEDERAL, STATE AND LOCAL GOVERNMENT SECTOR

Federal, state and local government is another sector that has a high share of jobs at risk due to ACT changes in several Georgia regions. These regions tend to have large military bases with both military and civilian employment. The labor income per job is generally above the state average of $52,000 per job at risk (Table 5, Map 3). Note that Map 1 showed that these three regions in the middle of the state, the River Valley, Middle Georgia and Central Savanah River, had lower shares of labor income at risk from the top five industries. As is shown here in Map 3, these regions have a larger share of employment in the federal state and local sectors, which is also vulnerable to ACT. The Atlanta region has the most federal, state and local government jobs at risk due to ACT with 59,282, but these jobs account for a small share (3 percent) of total ACT jobs at risk in the region. The Atlanta region is therefore not discussed in this section.
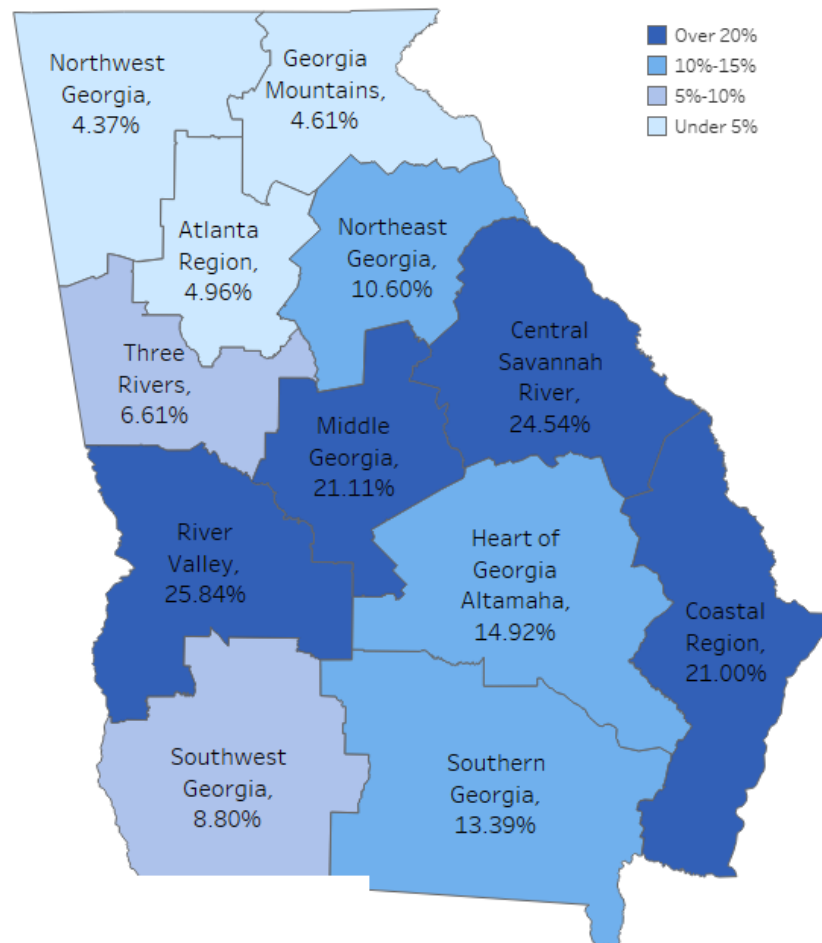
Table 5. Regional Share of Federal, State and Local Government by ACT Employment and Labor Income Risk*

REGION	JOBS AT RISK	LABOR INCOME/JOB	SHARE OF REGIONAL ACT AT RISK	
			EMPLOYMENT	LABOR INCOME
River Valley (Columbus)	17,536	$76,456	16%	26%
Central Savannah River (Augusta-Richmond)	20,257	$79,327	15%	25%
Coastal (Savannah)	26,574	$82,688	12%	21%
Middle (Macon)	15,546	$84,426	10%	21%
Heart of Georgia (Mount Vernon)	6,503	$58,344	9.0%	15%
Southern (Valdosta)	9,215	$65,223	8.0%	13%
Northeast (Athens-Clarke)	10,787	$66,802	6.0%	11%
Southwest (Albany)	5,696	$65,068	6.0%	9.0%
Three Rivers (Carrollton)	6,068	$56,325	5.0%	7.0%
Mountains (Gainesville)	7,616	$54,052	4.0%	5.0%
Northwest (Dalton)	7,628	$51,168	4.0%	4.0%
Atlanta Regional Commission	59,282	$88,472	3.0%	5.0%
Georgia	**192,708**	**$77,411**	**5.7%**	**8.5%**

*Excludes state and local schools and hospitals
Source: Frey and Osborne (2017), Rockefeller Institute of Government, BLS OES, IMPLAN 2017 and Author's calculations.

Map 3. Regional Share of Federal, State and Local Government by ACT Labor Income Risk

The River Valley (Columbus) region has the highest share of regional employment at risk in the federal, state and local government sector with 16 percent of all ACT at-risk employment. The share of labor income at risk is 26 percent of all ACT labor income at risk, and the labor income per job is $76,456. This region is home to Fort Benning, which has roughly 38,000 employees, both military and civilian personnel. In the Central Savannah River (Augusta-Richmond) region, the federal, state local government sector accounts for 14.6 percent of ACT at-risk employment and 24.5 percent of at-risk labor income. Labor income per job is also high at $79,327. Fort Gordon is located in this region and has military and civilian employment of 26,000.

The two other regions with high shares of employment and labor income at risk due to the federal, state and local government sector are the Coastal (Savannah) and Middle (Macon) regions. Both are home to large military bases. The Coastal (Savannah) region includes Kingsbay Naval Submarine Base and Fort Stewart-Hunter Army Airfield. In total, these bases employ roughly 31,500 military and civilian personnel. Finally, the Middle (Macon) region is home to the Robins Air Force Base, which employs roughly 26,000 civilian and military personnel.

AGRICULTURAL SECTOR

Table 6 and Map 4 below shows the share of jobs at risk in the agricultural forestry and fishing sector. Three regions—Heart of Georgia (Mount Vernon), Southwest (Albany) and Southern (Valdosta)—have the highest share of all ACT jobs at risk in this sector, between 8 percent and 11 percent. These regions also have a similar share of wage income at risk, between 8 percent and 12 percent.

Table 6. Regional Share of Agriculture, Forestry, Fishing and Hunting by ACT Employment and Labor Income Risk

REGION	JOBS AT RISK	LABOR INCOME/JOB	SHARE OF REGIONAL ACT AT RISK	
			EMPLOYMENT	LABOR INCOME
Heart of Georgia (Mount Vernon)	7,675	$32,783	11%	10%
Southwest (Albany)	9,732	$51,298	9%	12%
Southern (Valdosta)	9,764	$34,686	8%	8%
River Valley (Columbus)	4,476	$39,995	4%	3%
Central Savannah River (Augusta-Richmond)	3,934	$30,193	3%	2%
Northeast (Athens-Clarke)	3,685	$56,562	2%	3%
Three Rivers (Carrollton)	2,677	$27,961	2%	1%
Middle (Macon)	2,870	$32,748	2%	2%
Mountains (Gainesville)	3,536	$55,892	2%	2%
Northwest (Dalton)	3,374	$57,824	2%	2%
Coastal (Savannah)	2,809	$21,320	1%	1%
Atlanta Regional Commission	3,430	$33,837	0%	0%
Georgia	**57,964**	**$40,255**	**1.7%**	**1.3%**

Source: Frey and Osborne (2017), Rockefeller Institute of Government, BLS OES, IMPLAN 2017 and author's calculations.

Map 4. Regional Share of Agriculture, Forestry, Fishing and Hunting by ACT Employment
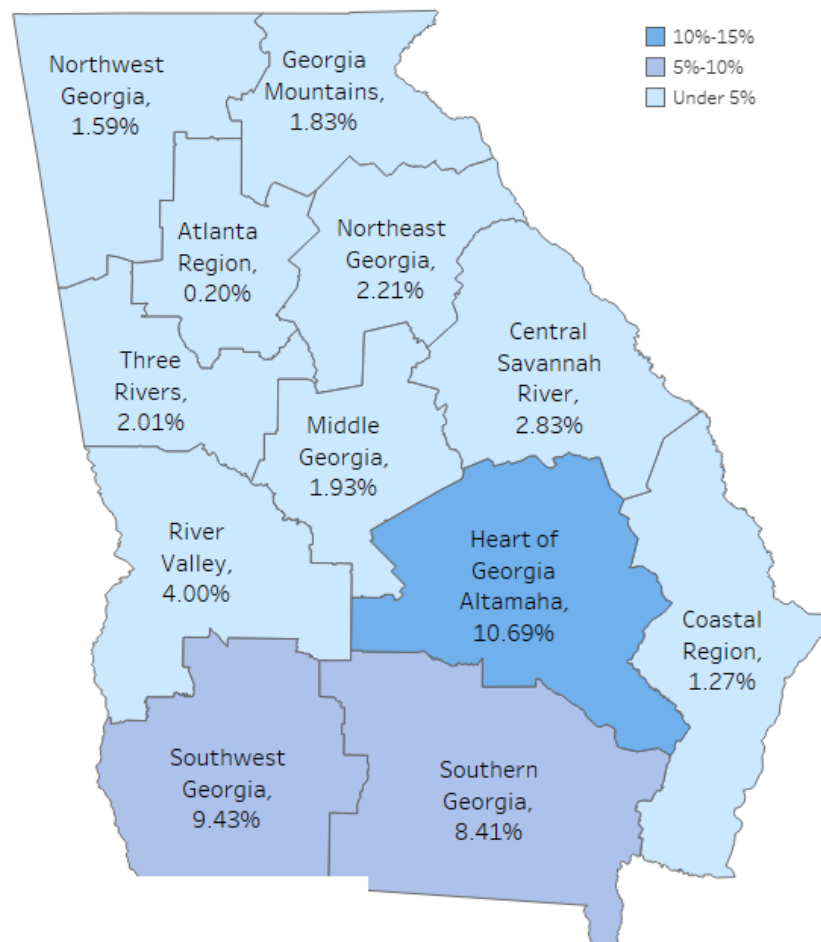
The River Valley (Columbus) region is the fourth-ranked region, and it has considerably lower shares: 4 percent of all ACT at risk employment and 3 percent of labor income. Note that Heart of Georgia (Mount Vernon), South West (Albany) and Southern (Valdosta) also have significant amounts of employment in poultry processing. As shown previously, poultry processing is a leading manufacturing sector in Georgia and is not coded under agriculture. Also notable, the Southern (Valdosta) region has roughly 1,000 jobs in the manufacturing sector of lumber mills.

Estimated Job Loss in Georgia

Table 7 illustrates the estimated job losses and labor income loss if Georgia's top five ACT at-risk industry sectors were to lose 2 percent of their employment in a year. This is roughly the annual rate of job loss the manufacturing sector has sustained from 2000-17 (Bluestone 2019). The table also includes the total impact on the Georgia economy, using IMPLAN's labor income multiplier of 1.29, which used here means for every $1 lost in labor income due to ACT, an additional 29 cents is lost in additional spending in the rest of Georgia's economy.

Table 7. Economic Impact of 2 Percent Jobs Loss in Top Five ACT Risk Sectors

NAICS SECTOR	2% CUT IN JOBS	LOST LABOR INCOME
72. Accommodation and Food Services	7,924	$172,316,242
44-45. Retail Trade	7,849	$252,513,358
56. Administrative and Support and Waste Management and Remediation Services	6,027	$208,653,853
31-33. Manufacturing	5,395	$388,883,800
48-49. Transportation and Warehousing	4,173	$261,944,916
Induced effects	7,887	$296,486,503
Total	39,255	$1,580,798,673

Source: Frey and Osborne (2017), Rockefeller Institute of Government, BLS OES, IMPLAN 2017 and Author's calculations.

Due to this loss of spending, total jobs lost would be 39,255, resulting in lost labor income of $1.58 billion. To put the estimated number of jobs lost in perspective, this represents 15 percent of all of the 270,713 jobs gained in Georgia from 2007-17. In addition, the average labor income per job lost is $41,600, the equivalent of a middle-income job in the state. Thus, job changes and job loss have the potential to further erode the struggling middle class in the Georgia—in regions of the state that have fought to regain their economic footing since the end of the Great Recession.

Conclusion

ACT will have an impact on both job quantity and the necessary job skills in Georgia in the future. However, predicting what that impact will be and when it will occur is difficult. As this report has shown, some regions of Georgia will likely feel the effects more than others, particularly those regions with large employment in the manufacturing industry. Additionally, regions that have large shares of regional employment in federal, state and local and agriculture may also be more susceptible to ACT job change or loss.

We have focused on the top five industries that have the highest ACT risk scores, as it seems most likely that any ACT changes to jobs will be felt in these industries first. As shown above, many jobs, particularly low-wage ones, are susceptible to ACT job change or loss. To maintain current levels of employment, workers currently in such jobs will likely need to learn new skills to adapt to the new demands in the labor market driven by ACT.

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Appendix: Regions
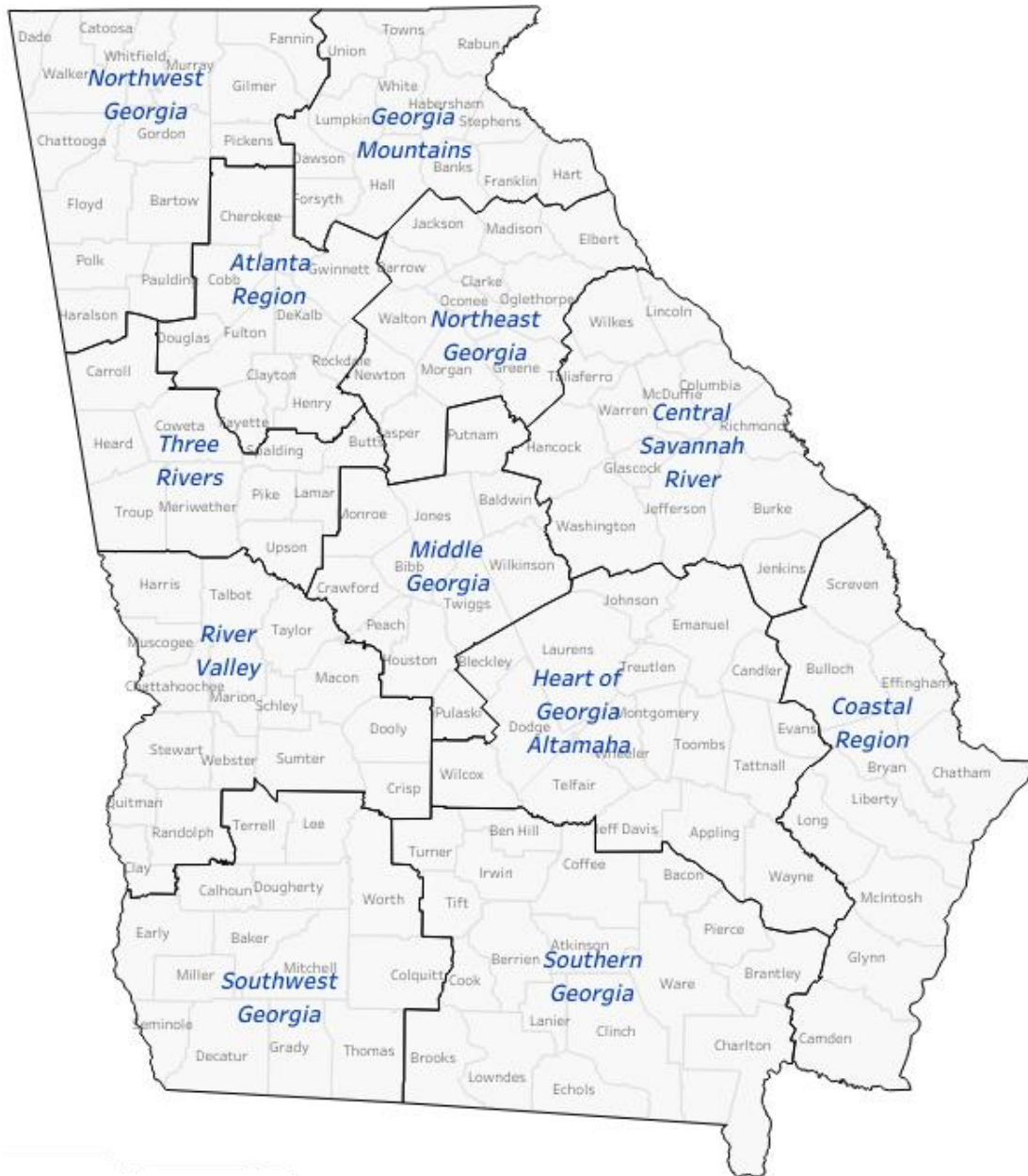
- Region 1: Northwest (Dalton)
  - Bartow, Catoosa, Chattooga, Dade, Fannin, Floyd, Gilmer, Gordon, Haralson, Murray, Paulding, Pickens, Polk, Walker, and Whitfield
- Region 2: Mountains (Gainesville)
  - Banks, Dawson, Forsyth, Franklin, Habersham, Hall, Hart, Lumpkin, Rabun, Stephens, Towns, Union, and White
- Region 3: Atlanta Regional Commission
  - Cherokee, Clayton, Cobb, DeKalb, Douglas, Fayette, Fulton, Gwinnett, Henry, and Rockdale
- Region 4: Three Rivers (Carrollton)
  - Butts, Carroll, Coweta, Heard, Lamar, Meriwether, Pike, Spalding, Troup, and Upson
- Region 5: Northeast (Athens-Clarke)
  - Barrow, Clarke, Elbert, Greene, Jackson, Jasper, Madison, Morgan, Newton, Oconee, Oglethorpe, and Walton
- Region 6: Middle (Macon)
  - Baldwin, Bibb, Crawford, Houston, Jones, Monroe, Peach, Pulaski, Putnam, Twiggs, and Wilkinson
- Region 7: Central Savannah River (Augusta-Richmond)
  - Burke, Columbia, Glascock, Hancock, Jefferson, Jenkins, Lincoln, McDuffie, Richmond, Taliaferro, Warren, Washington, and Wilkes
- Region 8: River Valley (Columbus)
  - Chattahoochee, Clay, Crisp, Dooly, Harris, Macon, Marion, Muscogee, Quitman, Randolph, Schley, Stewart, Sumter, Talbot, Taylor, and Webster
- Region 9: Heart of Georgia (Mount Vernon)
  - Appling, Bleckley, Candler, Dodge, Emanuel, Evans, Jeff Davis, Johnson, Laurens, Montgomery, Tattnall, Telfair, Toombs, Treutlen, Wayne, Wheeler, and Wilcox
- Region 10: Southwest (Albany)
  - Baker, Calhoun, Colquitt, Decatur, Dougherty, Early, Grady, Lee, Miller, Mitchell, Seminole, Terrell, Thomas, and Worth
- Region 11: Southern (Valdosta)
  - Atkinson, Bacon, Ben Hill, Berrien, Brantley, Brooks, Charlton, Clinch, Coffee, Cook, Echols, Irwin, Lanier, Lowndes, Pierce, Tift, Turner, and Ware
- Region 12: Coastal (Savannah)
  - Bryan, Bulloch, Camden, Chatham, Effingham, Glynn, Liberty, Long, McIntosh, and Screven

About the Author

Peter Bluestone is a senior research associate with the Center for State and Local Finance. His research spans urban economics, static and dynamic economic impact modeling, and state and local fiscal policy. His recent publications include reports on the effects of charter schools on property values and the property tax base available for a group of Georgia cities interested in funding a regional transit system. His expertise also includes modeling state and local impacts of policy changes and economic development using various economic models, including IMPLAN and Regional Economics Models Incorporated (REMI). Dr. Bluestone has served on the technical advisory committee for the Atlanta Regional Commission. He received his Ph.D. in economics from Georgia State University. 404-413-0264 | pbluestone@gsu.edu

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