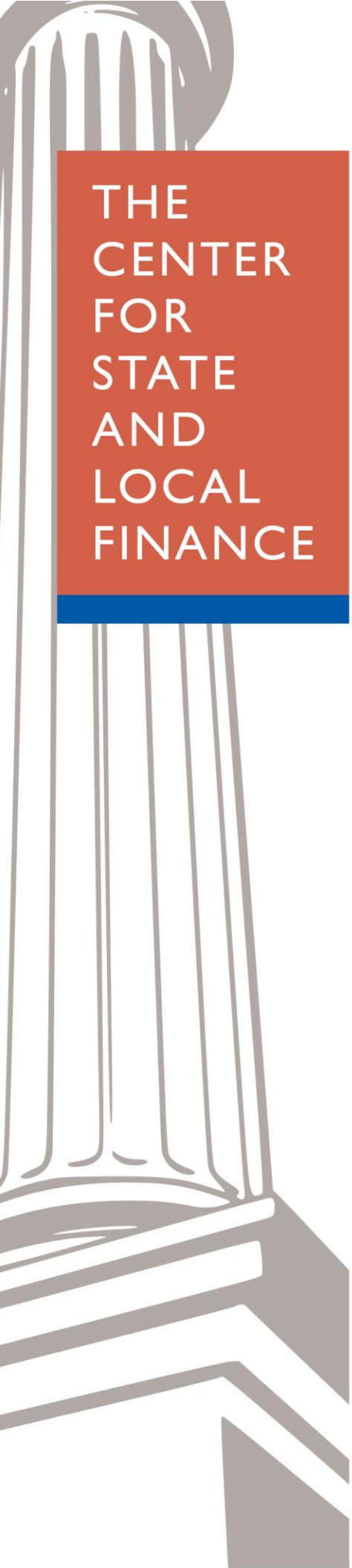

THE CENTER FOR STATE AND LOCAL FINANCE

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The Impact of Artificial Intelligence on the Labor Force in Georgia

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Background

The use of artificial intelligence (AI) in the workplace has been a source of speculation for years. The long-term potential of AI as a factor of production is vast; however, many of the earlier forecasts of AI permeating the economy—self-driving cars and robot teachers, for example—have fallen short. Focused analysis of which activities have been turned over to AI demonstrates that routine activities (e.g., responses to predictable questions, standard bookkeeping procedures, etc.) are more likely to be automated than work that entails complex decision making (e.g., evaluating patients' receptivity to treatment options), although the latter is only a matter of time. The rise in AI's presence in some sectors of the economy has created tension and could cause vast changes in the labor force. Looking forward, this may call for a reshaping of skills, career opportunities and the distribution of workers among industries and occupations in the United States.[1]

A recent study published by the Brookings Institute stated that, ultimately, almost no occupation will be unaffected by technological change in the AI era (Muro, Maxim and Whiton, 2019). Several other research reports support the same general hypothesis, with varying estimates of the magnitude. For example, McKinsey Global Institute (MGI) estimates that, while less than 5 percent of all occupations can be automated entirely using currently demonstrated technologies, about 60 percent of all occupations have at least 30 percent of constituent activities that could be automated. In the near term, automation is expected to increase global productivity by 0.8 to 1.4 percent annually (MGI, 2017).

The OECD Employment Outlook (2019) estimated that on average, 14 percent of jobs in OECD countries are at high risk of automation. Meanwhile, MGI (2017) found that by 2055, one half of today's work activities—for which individuals are paid almost $15 trillion in wages—will be automated. This reflects 2,000 work activities across 800 occupations. In the United States, Schultz (2018) discovered that 56 percent of workers face threats from current and future automation. Clearly, it is expected that the United States will be among the top countries affected by automation. However, AI has the potential to foster economic growth and create new job opportunities across various industries. Questions remain: How can policymakers, higher education and industry sectors adapt to technology to enhance labor stability and job and economic growth?

Notwithstanding that automation and AI will take place virtually everywhere, its impact on the labor force will be felt differently across various U.S. regions, states and cities because of differences in their economic makeup. For example, based on current analyses, 53 percent of jobs in New York (Schultz, 2018) and roughly 63 percent in the Riverside, San Bernardino, Ontario California metro area (Mason, 2018) are at risk of automation. The focus of this report is on Georgia:

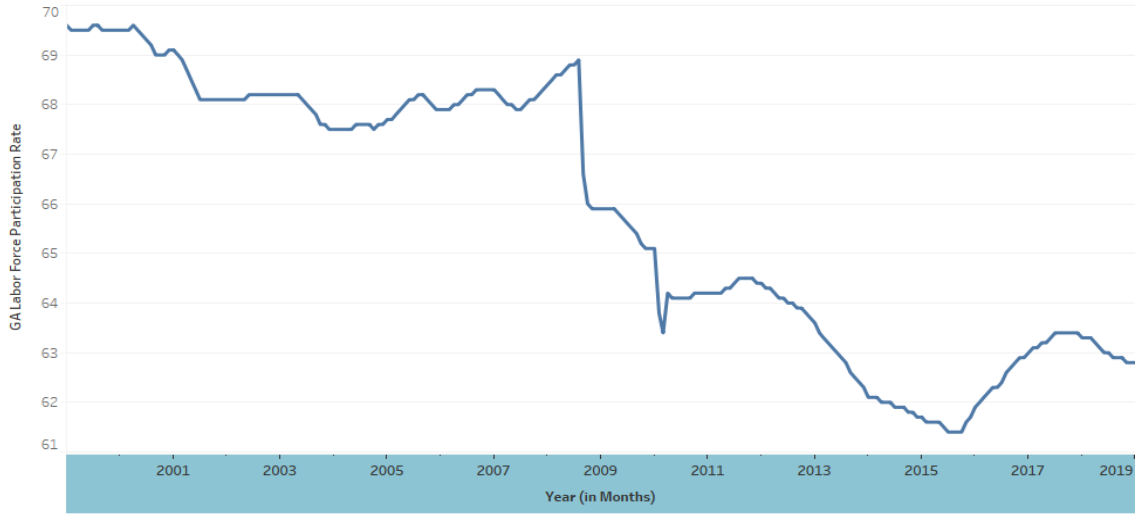
- What percentage of jobs in Georgia will be affected by AI and automation?
- Which job skills are most likely to be affected?
- What policy responses can mitigate the impacts of the automation?

[1] For a summary of the implications of the changing landscape, see Andrew Young School of Policy Studies, 2019.

Overview of Georgia's Labor Force

The state of Georgia is ranked eighth in U.S population with 10.62 million people and 5.2 million in the labor force. The majority of Georgia's workforce (64.2 percent) are low-skilled workers with high school diplomas/equivalent, while 24.9 percent and 10.9 percent have a bachelor's degree or associate/post-college education, respectively (Georgia Department of Labor, 2019). Since 1999, there has been a decline in the labor force participation in Georgia (see Figure 1), most dramatically during and after the Great Recession. Since 2015, labor force participation has picked up, but has not returned to the levels seen in early 2000s.

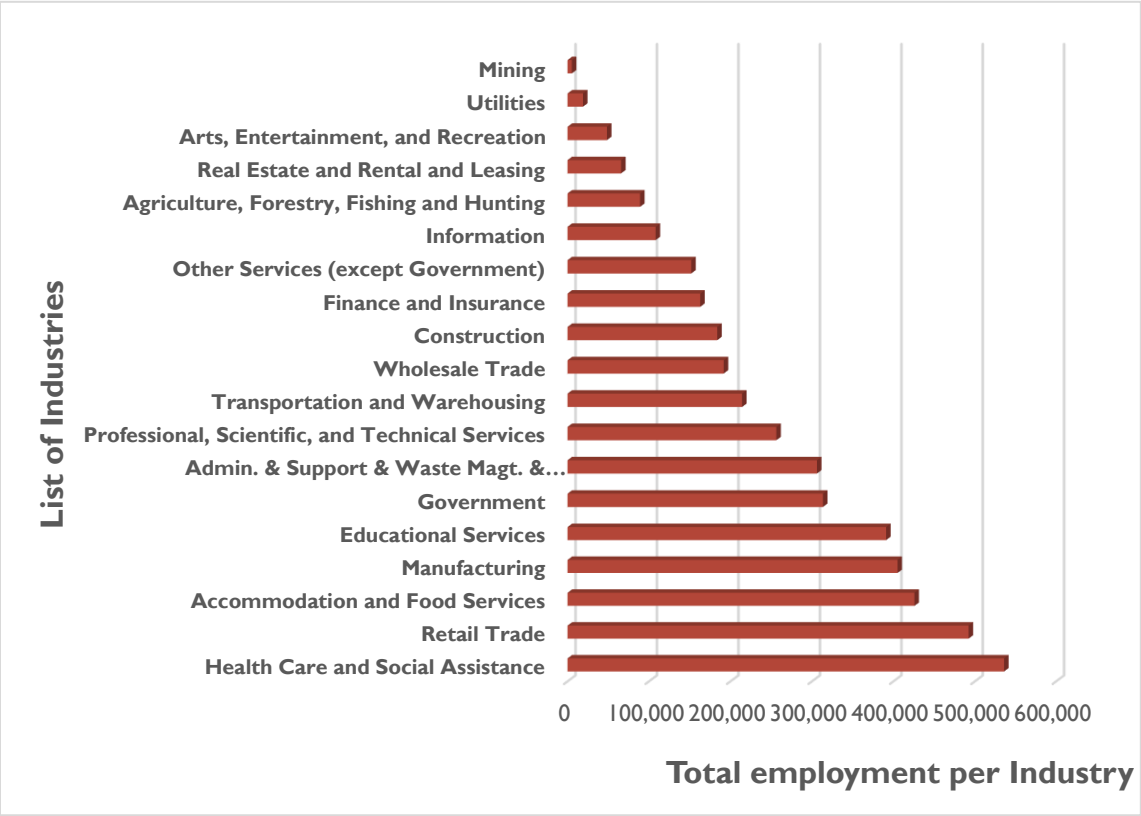
Figure 1. Labor Force Participation Rate (Seasonally Adjusted) January 1999 – January 2019



Source: US Bureau of Labor Statistics, 2019

Georgia's labor force is concentrated in several industries. As shown in Figure 2, the largest concentration of employment in Georgia is in the health care and social assistance industries, followed by retail trade.

Figure 2: 2018 Employment in Georgia by Industry



Source: Data Collected from Georgia Department of Labor, 2019

When we look at occupations in Georgia, we see a concentration in office and administrative support (14.6 percent of the employed labor force), sales (10.7 percent), food preparation and serving (9.5 percent) and so on (Figure 3).

Figure 3: 2018 Employment by Occupation in Georgia

Source: Data Sourced from U.S Bureau of Labor, 2019

Growth of Artificial Intelligence

One view of Artificial Intelligence (AI) is as a set of various technologies that enables a machine (computer) to sense, comprehend and perform tasks that mirror human behavior. Recently, there had been rapid innovation and technological advancement. Schultz (2018) observed that cost reductions from data processing, computing power, information technology and sensors have led to the integration of AI in various sectors and the application of automation in various ways. As a result, there has been a paradigm shift in automation of tasks that were once the domain of humans: In the banking sector, instead of visiting banks during business hours, ATMs and then mobile banking apps were developed to deposit checks, make transfers, pay bills, etc. Mobile orders have replaced interactions with cashiers. Ride sharing now allows drivers and passengers to meet as needed in real time, and some cars are automated and driverless. In car assembly plants, robots have long been used to assemble cars.

Over time, occupations may adapt rather than be automated away, and about 60 percent of all occupations have at least 30 percent of constituent activities that could be automated (MGI, 2017). A recent study by Southern Regional Education Board (2019) confirmed the findings by McKinsey Global Institute, MGI (2017) that 5 percent of jobs are completely automatable and added that 44 percent of all work activities have automation potential. The activities that are more susceptible to automation are mostly physical activities in highly structured and predictable environments. In the United States, this

accounts for 51 percent of jobs with almost $2.7 trillion in wages. Meanwhile, another study by researchers from McKinsey Global Institute added that AI might also affect senior executives' system of leadership (Dewhurst and Willmot, 2014). According to the study, as information gets better and machines get smarter, senior executives can therefore spend less time on daily management issues, trusting report signals from automated machines to take appropriation action to help their organizations.

A recent report by McKinsey Global Institute noted that automation could be a positive disruption that improves everyone's lives (MGI, 2020). They emphasized that automation could enhance healthcare, education, traffic and emergency response. However, three challenges stand in the way of this opportunity: a shortage of skills, inequality and a potential backlash against automation. Hence, a deeper understanding of the impact of AI on jobs and industries can help governments and higher education adapt to provide needed skills in the transition to automation.

Meanwhile, it is noteworthy that the speed and degree of automation depends on various economic, technical and social factors as well as labor force dynamics. Currently, the cost of automating some activities might be very high and might not be profitable at current compensation. Some activities are technically, computationally and emotionally demanding, and social and regulatory acceptance will affect the pace and scope of automation in addition to the science of AI.

Adaptation to AI will require workers to acquire various skills to work together with machines. Many of the newer jobs will require interaction with AI—from basic computer-based interaction to oversight and evaluation of AI-produced outputs. These changes to the way we work will be a challenge, especially for individuals who have less opportunity to "tool up" due to lack of access to technology and training, baseline capacity, or physical or mental challenges. Such populations may be marginalized, or further marginalized, as the economy increases the use of AI as an input in the production chain.

Impact of Automation on Georgia's Labor Force

We adopted the methodology of Frey and Osbourne (2017) to estimate the potential employment disruption of AI in Georgia. Frey and Osbourne (2017) developed a methodology to estimate the probability of computerization of 702 occupations in the near future based on the specific tasks associated with the 702 occupations using O*NET and Bureau of Labor Statistics (BLS) data. The details are available in their paper, but intuitively, they use information on the tasks performed within the 702 occupations and expert information on which tasks within an occupation may be automated in full or in part.

We use this methodology to assess the likelihood of various occupations being automated in Georgia. For example, Frey and Osborne estimate that there is a 0.0028 probability that recreational therapy occupations will be automated in the near future. We use the same probability for recreational therapy occupations in Georgia. For the occupations that have been created since Frey and Osbourne did their analysis, we found a comparable occupation and applied the same likelihood of automation. For example,

for Computer Network Architects—a new occupation classification—we used the Frey and Osbourne value of Network and Computer Systems Administrators. In 53 cases, we had to make these imputations.

The result of our analysis suggests that 49 percent of employment in Georgia is in the high risk of computerization/automation category (a high-risk category meaning greater or equal to 70 percent chance of automation) using the Frey and Osborne methodology. This implies that approximately one half of the jobs in Georgia are very likely to be transformed by computerization in the coming years. Other jobs have lower but not insignificant probabilities of automation as well.

Table 1 presents employment by occupation in Georgia from the largest employment concentration to the least. It also shows the likelihood of automation for each occupation as a percentage from 0 (low probability) to 1 (highest probability). The top occupations in terms of employment (office and administrative support, sales and related, food preparation and serving, transportation and material moving and production) have high probabilities of automation: over a 70-percent chance of automation. These five occupations account for over 50 percent of total employment in the state. Food preparation and serving occupations have the highest probability of automation (87 percent) while community and social service occupations have the lowest chance of some automation (9 percent).[2]

Table 1: Occupations and Likelihood of Automation in Georgia

	TOTAL EMPLOYMENT	PROBABILITY OF AUTOMATION
Office and Administrative Support	643,490	76%
Sales and Related	472,320	81%
Food Preparation and Serving	418,900	88%
Transportation and Material Moving	385,080	73%
Production	311,820	81%
Education, Training, and Library	270,530	12%
Management	248,840	14%
Healthcare Practitioners and Technical	247,850	16%
Business and Financial Operations	242,400	50%
Installation, Maintenance, and Repair	182,390	56%
Computer and Mathematical	148,690	21%
Construction and Extraction	147,410	63%
Building and Grounds Cleaning and Maintenance	112,340	73%
Personal Care and Service	108,110	44%
Protective Service	106,440	42%
Healthcare Support	103,640	23%
Architecture and Engineering	62,570	18%
Arts, Design, Entertainment, Sports, and Media	61,040	20%
Community and Social Service	50,540	9%

[2] For estimates by industry sector codes (NAICS codes) of the impact of AI and other advanced technologies on employment and labor income for Georgia and its regional economies, see Bluestone (2020).

Legal	33,410	35%
Life, Physical, and Social Science	25,580	28%
Farming, Fishing, and Forestry	11,350	72%

Source: Author's design using Frey and Osborne methodology and data from the U.S. Bureau of Labor Statistics, 2019

The impact on occupations in the state's metro regions mirrors that for the state as a whole (Table 2). As a share of total employment, 51 percent of all employment is in the high-risk category in the Atlanta-Sandy Springs-Roswell Metro, 43 percent in the Augusta-Richmond Metro and 39 percent in the Savannah Metro. These differences reflect the differences in the underlying economic base among metro areas.

Table 2. Occupations at Most Risk in Three Metro Regions in Georgia

OCCUPATIONS	TOTAL EMPLOYMENT	PROBABILITY OF AUTOMATION
Atlanta-Sandy Springs-Roswell Metro Region		
Food Preparation and Serving Related	250,410	87%
Building and Grounds Cleaning and Maintenance	63,790	74%
Sales and Related	298,880	72%
Office and Administrative Support	396,700	76%
Production	137,460	77%
Transportation and Material Moving	234,400	71%
Augusta-Richmond Metro Region		
Food Preparation and Serving Related	20,980	87%
Building and Grounds Cleaning and Maintenance	6,830	72%
Sales and Related	22,490	83%
Office and Administrative Support	31,220	75%
Transportation and Material Moving	15,250	74%
Savannah Metro Region		
Food Preparation and Serving Related	20,530	83%
Building and Grounds Cleaning and Maintenance	5,700	72%
Sales and Related	17,940	82%
Office and Administrative Support	23,890	74%

Conclusions

The advancement in artificial intelligence has continued to affect jobs in the labor force. AI has and will continue to change the nature of work across industries and occupations over time. In this report, we implemented the methodology of Frey and Osborne (2017) to estimate the exposure of jobs in Georgia to computerization. More than one half of Georgia's current employment has a high probability of computerization in the next several years. Jobs that require high levels of rote tasks are more likely to be subject to AI replacement. As AI evolves, it will replace jobs that require more sophisticated "thinking" and tasks that require more adaptation, but that is not the focus of this current report.

Understanding the scope of transformation of occupations is a critical step to supporting and transforming the labor force to take advantage of these changes. Low-probability computerization jobs are characterized by soft skills including management, counseling and the arts. Of course, computer-skilled labor will help to shape AI and jobs in the future—people can complement AI as well as be replaced by it. Teaching and learning alongside AI can help identify complementarities and define new occupations, goods and services, while supporting soft skills development. Although many have discussed these innovations in education, adapting new ways of learning and teaching at all levels takes time, leadership, cooperation and money. Allen (2019) provides a high-level summary of the possible changes in education, and Carnegie Mellon University (Jahanian, 2020) provides thought leadership in the type of learning and teaching needs in higher education. While there is not a single model that fits all institutions, Carnegie Mellon's idea of a "T-shaped" education where depth and breadth are the focus may help develop soft skills in a rapidly changing hard-skills landscape. That needs to start early in the education system.

References

Andrew Young School of Policy Studies. (2019). "Identifying the Landscape of New Technology: Report of the Policy in the Digital World Task Force," Georgia State University February 2019. aysps.gsu.edu/digital-landscape/landscape-new-technology/

Allen, John R. (2019). Why We Need to Rethink Education in the Artificial Intelligence Age. Retrieved from: www.brookings.edu/research/why-we-need-to-rethink-education-in-the-artificial-intelligence-age/

Bluestone, Peter. (2020). "Industry Sector Jobs at Risk in Georgia and its Regions Due to New Technology," CSLF Report, Publication No. XX

Freya, C. B. and Osborne, M. (2017). The future of Employment: How susceptible are jobs to computerisation? Technological Forecasting & Social Change, 254-280.

Georgia Department of Labor. (2019). Labor Market Explorer. Retrieved from Georgia Department of Labor and Workforce Statistics & Economic Research: explorer.gdol.ga.gov/gsipub/index.asp?docid=386

Jahanian, F. (2020). How Higher Education Can Adapt to the Future of Work. Carnegie Mellon University Report – World Economics Forum. Retrieved from www.weforum.org/agenda/2020/01/how-can-higher-education-adapt-to-a-constantly-evolving-future-of-work/.

Mason, M. (2018, October 14). Millions of Californians' Jobs Could Be Affected by Automation — A scenario the next governor has to address. Retrieved from Los Angeles Times - Next California Part IV: www.latimes.com/projects/la-pol-ca-next-california-work/

MGI. (2017). A Future That Works: Automation, employment and productivity. McKinsey & Company.

MGI. (2017). Jobs lost, Jobs Gained: Workforce transition in a time of automation. McKinsey & Company.

Muro, M., Maxim, R., and Whiton, J. (2019). Automation and Artificial Intelligence: How machines are affecting people and places. Washington DC: Brookings Institute.

OECD Employment Outlook. (2019). The Future of Work. Organisation for Economic Co-operation and Development.

Schultz, L. (2018, November 13). The Impact of Artificial Intelligence on the Labor Force in New York State. Retrieved from Rockefeller Institute for Government Research: rockinst.org/blog/the-impact-of-artificial-intelligence-on-the-labor-force-in-new-york-state/

Southern Regional Education Board. (2019). The Potential Impact of Automation and AI. The Southern Regional Education Board Region's Economic Outlook.

U.S Bureau of Labor Statistics. (2019, July). Civilian Labor Force and Unemployment by State. Retrieved from Economic News Release: www.bls.gov/news.release/metro.t01.htm

World Economic Forum. (2020). Retrieved from: www.weforum.org/agenda/2020/01/how-can-higher-education-adapt-to-a-constantly-evolving-future-of-work/

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