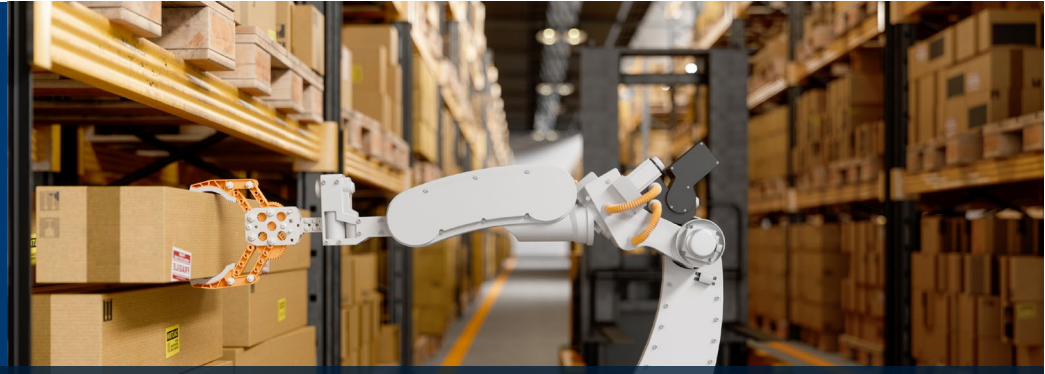
AIR®
AMERICAN INSTITUTES FOR RESEARCH®



Automation Risk and COVID-19 Job Losses: Implications for Economic Recovery and Reskilling Policy

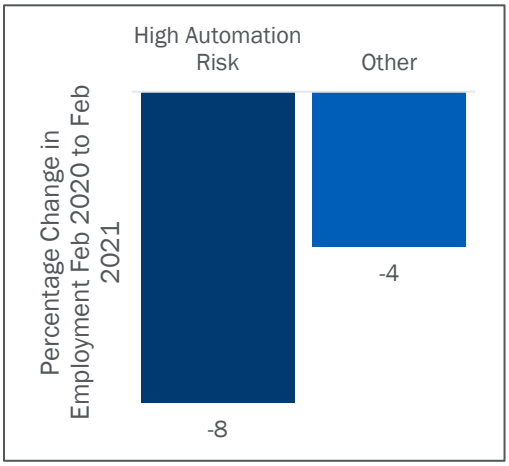
Heinrich Hock, PhD | Sami Kitmitto, PhD | Irma Perez-Johnson, PhD
Workforce Development and Economic Mobility and Prosperity Equity Initiative at AIR

April 2021

Key Insights: Jobs that were easy to automate were hit particularly hard by the COVID-19 pandemic and were slow to recover. The extended recovery period has meant further opportunities for automation; therefore, many of these jobs may be permanently lost. People in these jobs already were economically vulnerable and will need training and other targeted supports to regain their livelihoods through work.

The unprecedented job losses of 2020, stemming from the COVID-19 pandemic due to stay-at-home orders and the closure of the economy, cut across U.S. society in deeply inequitable ways. Differences in unemployment by education, race, ethnicity, and earnings are well documented.[1,2,3,4,5] This brief highlights another disparity stemming from the pandemic: mass layoffs of individuals in jobs that were easy to automate. Workers in these jobs were already economically vulnerable; they tended to have lower education levels and lower earnings before the pandemic. Additionally, these workers may not possess the skills needed to be hired for livable-wage jobs with lower risk for automation.

Exhibit 1. Employment in Jobs With High Risk for Automation Has Been Slow to Recover



An analysis conducted by the American Institutes for Research (AIR) shows that, since the month before the pandemic stay-at-home orders were issued, jobs with high automation risk have been slower to return (Exhibit 1). This could spell trouble for re-employment prospects given news reports suggesting that some employers decided to expedite the pace of automation when workers were forced to stay at home. Together, our findings suggest a greater urgency for **reskilling** as a way to help jobless people get back to

Acknowledgment

This brief and the work on which it is based were self-funded by AIR, with support from its Equity Initiative. The brief was developed under the Workforce Development and Economic Mobility Workgroup, which is co-led by Drs. Irma Perez-Johnson and Harry Holzer at AIR. The Workgroup advocates for stronger evidence- and field-building to achieve a future-ready and resilient workforce and economy, provide equitable access to opportunity, and restore economic mobility and shared prosperity in the U.S. Scott Estrada and Dionisio Garcia-Piriz provided valuable research assistance.

work, as well as to help those still in jobs with high automation risk find new employment that offers better economic security.

Automation Risk and Other Economic Vulnerabilities

Before the COVID-19 pandemic, analysts already had been focusing on automation as a risk factor for job displacement that could result in a stronger need for worker retraining. Occupational researchers have classified the specific tasks and skills needed for different types of jobs.[6] Some jobs involve tasks or skills that are easy to automate; these types of jobs were more likely to be permanently lost during the Great Recession of 2008.[i] Additionally, there are clusters of jobs that require similar skill sets and those jobs with a high risk for automation are often closely related to others with a similar level of risk.[7] By implication, workers who are in—or who recently lost—these jobs may need to invest in reskilling to move to new, lower risk jobs.

We used an "automation score," developed by experts who study the future of work.[8] This score is a skill-based measure of risk that a job will become automated over the coming decades (Box 1). We classified "high risk" jobs as those with a score greater than 80%. ***In February 2020, one-third of U.S. jobs were at high risk for automation.***[ii]

Going into the COVID-19 pandemic, workers in jobs with high risk for automation were economically vulnerable in other ways (Exhibit 2). For example, they were more likely to earn wages 130% below the poverty line for a family of three (qualifying for SNAP benefits and, in many states, Medicaid) and more often had a high school education or less. In addition, they already were likely to struggle to find new jobs given relatively high unemployment rates (by prepandemic standards).

Box 1. Jobs That Have the Highest and Lowest Risks for Automation in the Forthcoming Decades

Automation Risk Score: Reflects the extent to which a job's required skills can be easily computerized, and do not include skills such as dexterity, creative intelligence, social intelligence.

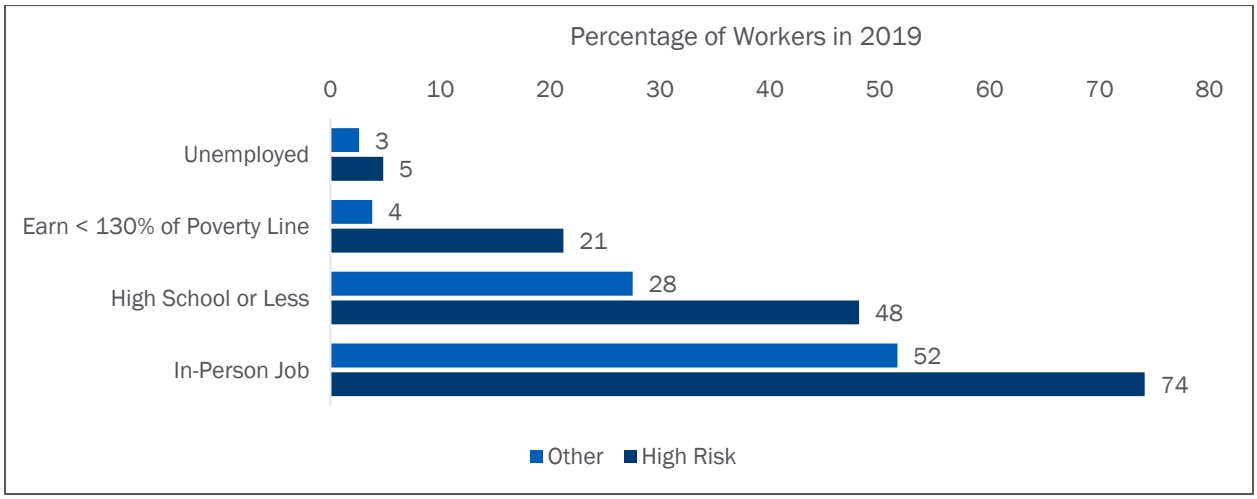
Examples of Highest Risk Jobs (score ≥ 95%): Includes cashiers, bookkeeping and accounting clerks, receptionists, office clerks, electronics assemblers, and packaging machine operators.

Examples of Lowest Risk Jobs (score ≤ 5%): Includes managers, computer systems analysts, engineers, counselors and social workers, teachers, doctors, and nurses.

[i] See https://www.philadelphiafed.org/-/media/frbp/assets/community-development/discussion-papers/discussion-paper_automation.pdf. We became aware of this research as we were preparing an initial draft of this brief. The authors take a deeper dive into early trends by automation in spring and summer 2020. We extend this analysis over a longer period and focus on the interplay of vulnerability to automation, other forms of economic vulnerability, and workforce development policy.

[ii] Authors' calculations based on standardized Current Population Survey microdata (Flood et al., 2020) and Frey & Osborne (2017) measure of occupation risk for automation.

Exhibit 2. Workers in High-Automation-Risk Jobs Were Vulnerable in Other Ways



Source: Authors' calculations based on standardized Current Population Survey microdata,[9] O*NET occupation classifications, and Frey & Osborne (2017) measure of occupation risk for automation.

The COVID-19 pandemic likely had the immediate effect of amplifying the economic vulnerability of workers in easily automatable jobs because, according to O*NET measures, telework options for these jobs were more limited. Before the pandemic, 74% of automatable jobs were likely to require an in-person presence compared to only 52% of other jobs. Stay-at-home orders had a much greater impact on jobs with in-person requirements. Between February and April 2020, overall job losses were 16%, but 22% for jobs that did not allow telework compared to 8% for those that did.[iii] While other factors (e.g., industry-level economic impacts, differences by education, essential services) also could have played a role, the net effect, as described in this brief, is that the pandemic produced stark differences in job losses based on automation risk.

Employment in Jobs With High Automation Risk During the Pandemic

Employment in jobs with high automation risk declined substantially more than in other jobs at the onset of the COVID-19 pandemic, and 1 year later employment was still lower as the economy saw some recovery (Exhibit 3). The shock to employment is seen in the April 2020 numbers: Employment in high-automation-risk occupations declined by 23% from February 2020 compared to a decline of 12% for other occupations. As states reopened and businesses adjusted over the subsequent months, recovery occurred for both groups. However, 1 year later, employment in high-risk occupations was down 8% compared to 4% for other occupations.

[iii] Authors' calculations based on standardized Current Population Survey microdata (Flood et al., 2020) and O*NET occupation classifications.

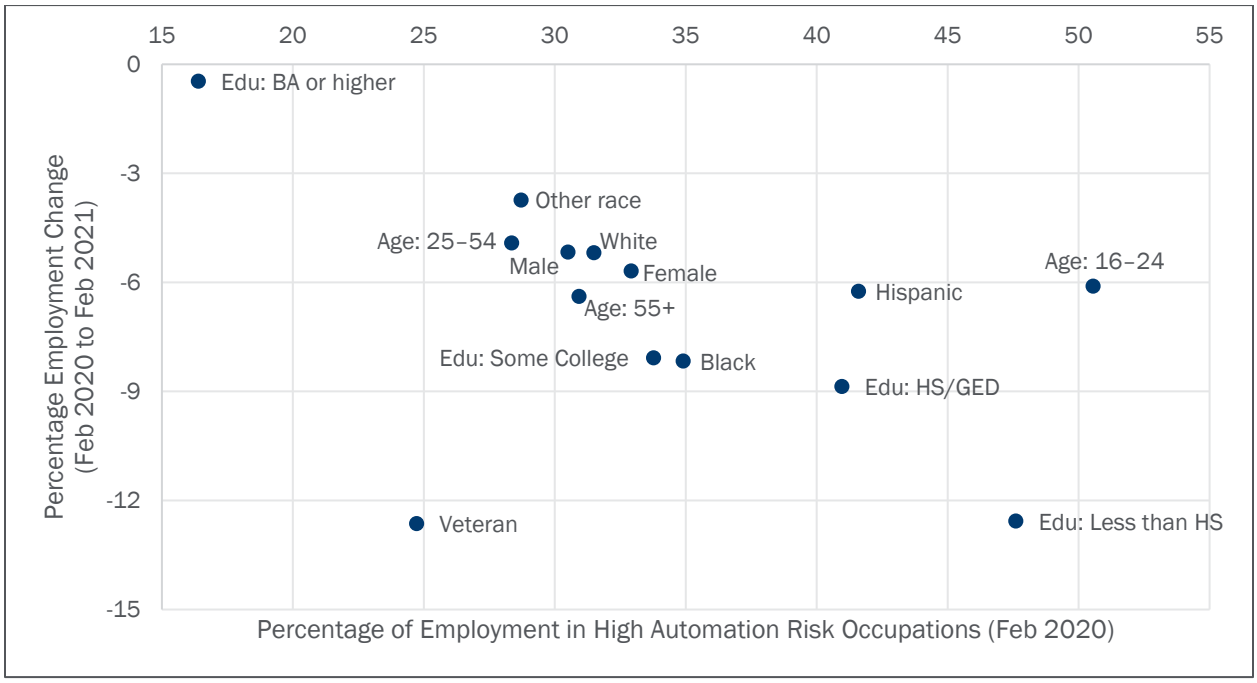
Exhibit 3. Workers in High-Automation-Risk Jobs Were Harder Hit by the Pandemic, and the Gap Persists

Source: Authors' calculations based on standardized Current Population Survey microdata (Flood et al., 2020) and Frey & Osborne (2017) measure of occupation risk for automation.

We know that the ability to telework has been crucial throughout the pandemic but especially during those first few months. ***The concern highlighted in this brief is that pre-existing risk posed by automation was exacerbated by the COVID-19 pandemic, and a large number of the jobs that were lost may never return.*** News reports have documented accounts of some employers turning to automated solutions or accelerated plans to automate their operations—for example, by deploying robots to clean grocery stores or relying on chatbots instead of call centers.[10,11,12] As the pandemic has drawn on, automation also has become more socially acceptable, providing businesses with more opportunities to replace jobs not directly subject to pandemic-related stress, such as jobs involving routine office tasks.[13] Laid-off workers face an uphill climb. Their jobs may have vanished, and their skills may not easily transfer to new jobs that are opening up.

Additionally, the longer term employment and earnings "scars" for workers affected by automation-driven job losses during the pandemic could amplify pre-existing disparities by race, ethnicity, and education. Before the start of the pandemic, groups with historically worse employment outcomes were concentrated in high-automation jobs (Exhibit 4). For example, 48% of workers with less than a high school education were in jobs with high risk for automation compared to 16% of workers with a bachelor's degree or higher. Among Hispanic workers, 42% were in high-risk jobs compared to 32% of white workers. These groups were also hit harder by pandemic-related job losses (February 2020 to February 2021). For example, employment for workers with less than a high school education was down 13% from the year before, while employment for those with a bachelor's degree or higher was down less than 1%. As employers increasingly turn to computers and artificial intelligence, these vulnerable groups are less likely to regain their jobs, making their climb back to economic security steeper.

Exhibit 4. Demographic Groups With High-Automation-Risk Jobs Have Had Larger Employment Losses



Source: Authors' calculations based on standardized Current Population Survey microdata (Flood et al., 2020) and Frey & Osborne (2017) measure of occupation risk for automation.

Policy Solutions

While a range of policies are designed to help displaced workers, the patterns of job losses in automatable fields during recent economic downturns suggest that workforce development investments should explicitly account for automation risk. Light-touch re-employment strategies aimed at rapid re-employment, such as job-search assistance, might be of limited value if they simply put workers into other jobs with high risk for automation. Public investments might prioritize longer term training for "automation dislocated" workers in much the same way that Trade Adjustment Assistance programs support workers who lose their jobs due to off-shoring. Further, a wide range of policies and programs that already emphasize demand-driven skill investments might focus more intentionally on helping people gain and maintain employment in jobs that have staying power in the era of rapid automation.

Workforce development strategies that buffer against automation also implicitly advance equity. Groups that historically have struggled or faced barriers in the labor market are also much more likely to hold jobs that are more easily automated. Helping workers in these groups train for more stable and better paying employment could help reduce long-standing disparities.

Community colleges may play a central role in these efforts. More than one million certificates and associate's degrees are awarded by community colleges each year.[iv] The federal workforce system also relies extensively on the community college system as a vehicle for investments in demand-driven worker training.[14,15] For example, between 2011 and 2018, the Trade Adjustment Assistance Community College and Career Training grant program released $1.9 billion dollars to help community colleges build industry-aligned reskilling and upskilling programs. Community colleges are also broadly accessible to workers from a range of socioeconomic backgrounds[16] and are, therefore, an important vehicle for amplifying equity in workforce investments.

[iv] Authors' calculations using the Integrated Postsecondary Education Data System (IPEDS) data tool for the 2017–18 school year: https://nces.ed.gov/ipeds/use-the-data.

Endnotes

[1] Brown, S. (2020, July 1). *The COVID-19 crisis continues to have uneven economic impact by race and ethnicity*. Urban Institute. https://www.urban.org/urban-wire/covid-19-crisis-continues-have-uneven-economic-impact-race-and-ethnicity

[2] Gould, E., & Wilson, V. (2020, June 1). *Black workers face two of the most lethal preexisting conditions for coronavirus—racism and economic equality*. Economic Policy Institute. https://www.epi.org/publication/black-workers-covid/

[3] Hershbein, B., & Holzer, H. J. (2021). *The COVID-19 pandemic's evolving impacts on the labor market: Who's been hurt and what we should do*. W. E. Upjohn Institute. https://research.upjohn.org/cgi/viewcontent.cgi?article=1360&context=up_workingpapers

[4] Parker, K., Minkin, R., & Bennett, J. (2020, September 24). *Economic fallout from COVID-19 continues to hit lower-income Americans the hardest*. Pew Research Center. https://www.pewresearch.org/social-trends/2020/09/24/economic-fallout-from-covid-19-continues-to-hit-lower-income-americans-the-hardest/

[5] Saenz, R., & Sparks, C. (2020, August 11). *The inequities of job loss and recovery amid the COVID-19 pandemic*. University of New Hampshire, Carsey School of Public Policy. https://carsey.unh.edu/publication/inequities-job-loss-recovery-amid-COVID-pandemic

[6] National Center for O*NET Development. (n.d.). O*NET OnLine. https://www.onetonline.org/

[7] Alabdulkareem, A., Frank, M. R., Sun, L., AlShebli, B., Hidalgo, C., & Rahwan, I. (2018). Unpacking the polarization of workplace skills. *Science Advances, 4*(7), eaao6030. https://advances.sciencemag.org/content/4/7/eaao6030

[8] Frey, C. B., & Osborne, M. A. (2017). The future of employment: How susceptible are jobs to computerisation? *Technological Forecasting and Social Change, 114*, 254–280.

[9] Flood, S., King, M., Rodgers, R., Ruggles, S., & Warren, J. R. (2020). Integrated Public Use Microdata Series, Current Population Survey (Version 8.0) [Data set]. https://cps.ipums.org/cps/

[10] Corkery, M., & Gelles, D. (2020, April 10). Robots welcome to take over, as pandemic accelerates automation. *The New York Times*. https://www.nytimes.com/2020/04/10/business/coronavirus-workplace-automation.html

[11] Loten, A. (2021, January 25). Software bots multiply to cope with 'stretched' resources. *The Wall Street Journal*. https://www.wsj.com/articles/software-bots-multiply-to-cope-with-stretched-resources-11611615504

[12] Semuels, A. (2020, August 6). Millions of Americans have lost jobs in the pandemic—and robots and AI are replacing them faster than ever. *Time*. https://time.com/5876604/machines-jobs-coronavirus/

[13] Roose, K. (2021, March 6). The robots are coming for Phil in accounting: Workers with college degrees and specialized training once felt relative safe from automation. They aren't. *The New York Times*. https://www.nytimes.com/2021/03/06/business/the-robots-are-coming-for-phil-in-accounting.html

[14] Eyster, L., Durham, C., & Anderson, T. (2016). *Federal investments in job training at community colleges*. Urban Institute. https://www.urban.org/sites/default/files/publication/86241/federal_investments_in_job_training_at_community_colleges.pdf

[15] Jacobs, J., & Worth, J. (2019). *The evolving mission of workforce development in the community college*. CCRC Working Paper No. 107. Community College Research Center, Teachers College, Columbia University.

[16] Opportunity America Working Group on Community College Workforce Education. (2016). *The indispensable institution: Reimagining community college*. https://opportunityamericaonline.org/wp-content/uploads/2020/06/Indispensable_Inst_FullReport.pdf

AIR®
AMERICAN INSTITUTES FOR RESEARCH®

1400 Crystal Drive, 10th Floor
Arlington, VA 22202-3289
202.403.5000

About the American Institutes for Research

Established in 1946, the American Institutes for Research® (AIR®) is a nonpartisan, not-for-profit organization that conducts behavioral and social science research and delivers technical assistance both domestically and internationally in the areas of education, health, and the workforce. AIR's work is driven by its mission to generate and use rigorous evidence that contributes to a better, more equitable world. With headquarters in Arlington, Virginia, AIR has offices across the U.S. and abroad. For more information, visit **www.air.org.**

14383_04/21