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Race and Jobs at Risk of Being Automated in the Age of COVID-19*

Testimony submitted to
Select Committee on Economic Disparity and Fairness in Growth

"Our Changing Economy: The Economic Effects of Technological Innovation, Automation and the Future of Work"

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Dr. Kristen Broady: Written Congressional Testimony, November 2021

Good morning, Chairman Himes and members of the Select Committee on Economic Disparity and Fairness in Growth. I am Kristen Broady, and I am a fellow in the Brookings Metropolitan Policy Program.

Thank you for the opportunity to appear before you to discuss race and jobs at risk of being automated in the age of COVID-19. Today, I will briefly discuss how automation impacts workers by race, and how automation has been accelerated by the COVID-19 pandemic.

Jobs Most and Least Susceptible to Automation

Research by McKinsey Digital (Chui, Manyika, and Miremadi 2015) suggests that "few occupations will be automated in their entirety in the near or medium term," but that "certain activities are more likely to be automated." One example in recent years is the redefinition of the cashier's job with the advent of self-checkout. Hence, automation will necessitate education and training for workers whose jobs will be redefined.

While automation is taking the place of some occupations, offshoring has forced employment declines in other occupations. Employment in middle-skilled occupations (those that require specialization in routine labor tasks) has declined significantly in the United States in the past 30 years due to automation and offshoring (Mandelman 2017). Middle-skilled occupations typically consist of blue-collar manufacturing jobs associated with assembly and machine operation, and white-collar occupations that involve routine office and administrative duties such as bookkeepers, cashiers, and telephone operators (Bresnahan 1999). In both cases, these occupations focus on the execution of a daily routine that can be easily broken down into a set of smaller tasks that a computer could be programmed to complete (Mandelman 2017).

High-skill and what are often referred to as "low-skill" jobs—but are actually low-wage jobs that require optimizing time trade-offs, quality control, emotional intelligence and project skills (August 2019)—continue to be less susceptible to automation. High-skill jobs can include highly skilled accountants and expert finance professionals who execute nonroutine cognitive tasks and thus are at less risk of automation because they generally require creativity, managerial skills, and flexibility, although this does not protect them from the risk of offshoring (Mandelman 2017). Low wage jobs have been relatively sheltered from automation and offshoring for several reasons. Jobs in childcare and in nonmedical in-home care for the elderly require the skills needed to deal with unpredictable human behavior. Other low-wage jobs, including gardeners and construction laborers, require detailed manual handling and cannot yet be automated or sent offshore. In summary, low-wage and high-skilled jobs have a lower risk of automation relative to middle-skilled jobs.

Jobs at High Risk of Being Automated

The COVID-19 pandemic has created an ongoing health and economic crisis. The contagious nature of the virus necessitated physical distancing and led to an economic shutdown in early 2020. The resulting increases in unemployment disproportionately impacted Black and Latino workers who are overrepresented in jobs that cannot be done remotely and in jobs considered to be frontline or essential, putting them at higher risk both of being laid off and of being exposed to the virus.

The pandemic has and is likely to continue to accelerate the automation of jobs and the emergence of the network economy: a network of internet-connected people and devices, "as employers invest in technology to adapt the production process to safeguard against current and potential future pandemics" (Chernoff and Warman 2020; Carson 2020). Thus far, automation and "advancing technologies have mainly replaced the routine tasks of low-wage workers, while the incomes robots and algorithms generate flow to wealthier capital owners" (Bloom and Prettner 2020). While the COVID-19 pandemic is likely to reinforce this trend in the near-term, automation will continue to have vastly different effects for various industries, educational institutions, and workers of different educational, income, and racial and ethnic backgrounds.

Advances in artificial intelligence and automation have contributed to achievement gaps in the workplace, with employers reporting a deficit of skilled workers to meet their needs (Danaher and Nyholm 2020; Grob-Zakhary and Hjarrand 2017). There are labor shortages in specialized sectors such that many American businesses are currently unable to find qualified workers to fill available jobs. Automation without strategic intervention will increase the skills gap, the wage gap, and economic inequality. Black and Latino communities will face unique challenges in labor transitions as a result of automation. Both advances in automation and the economic impact of the COVID-19 pandemic disproportionately affect Black and Latino workers. These workers are more likely to be employed in jobs that are at high risk of being automated in the next two decades and that cannot be done remotely.

The 30 jobs with the highest automation risk scores that employ the highest number of U.S. workers (more than 300,000 workers) employ 36.3 million American workers, and make up 23 percent of the white employed workforce, 24 percent of the Black employed workforce, 19 percent of the Asian employed workforce, and 30 percent of the Hispanic employed workforce. Compared to white workers, the data show that Black and Hispanic workers are more likely to be concentrated in occupations at high risk of being automated, whereas Asian workers are more likely to be in occupations at low risk.

Black and Latino workers account for 13 percent and 18 percent of the U.S. labor force (BLS 2020b) but are overrepresented in jobs with a high risk of being eliminated or significantly changed by automation. Black workers are overrepresented in 11 of the 30 jobs that employ the most Americans and are at high risk of being automated, including taxi drivers and chauffeurs (where 29.5 percent of taxi drivers and chauffeurs are Black); industrial truck and tractor operators (25.8 percent); laborers and freight, stock, and material movers (19.8 percent); food preparation and serving workers (19.6 percent); cooks (18.1 percent); cashiers (17.9 percent); couriers and messengers (17.4 percent); production workers, and others (16.1 percent);

receptionists and information clerks (15.4 percent); first-line supervisors of housekeeping and janitorial workers (15 percent); and office clerks, general (13.6 percent).

Latino workers are overrepresented in 13 occupations at high risk of being automated. In addition to the positions where Black workers are overrepresented, Latino workers are also overrepresented in food preparation occupations (28.1 percent) and dining room and cafeteria attendants and bartenders (34.2 percent). The positions listed are at high risk of being automated in the next 10 to 20 years. In 2019 they employed 6.4 million Black and Hispanic workers. Furthermore, Black workers tend to be employed in jobs at the lower end of the pay scale, with only half of the top 10 jobs that Black workers typically hold paying above the federal poverty guidelines for a family of four, or $25,750 annually (Cook et al. 2019).

Jobs at Low Risk of Being Automated

Now I'd like to talk about jobs at low risk of being automated. The 30 jobs that employ the most American workers and have the lowest automation risk scores employ 22.1 million American workers or 14.5 percent of the white employed workforce, 11.6 percent of the Black employed workforce, 15 percent of the Asian employed workforce, and 7.8 percent of the Hispanic employed workforce.

Black workers are overrepresented in just 5 of the 30 positions at low risk of being automated: preschool and kindergarten teachers (where 15.7 percent of preschool and kindergarten teachers are Black), logisticians (15.5 percent), training and development specialists (15.4 percent), education administrators (15.3 percent), and dietitians and nutritionists (15.2 percent). These five positions employ 311,985 Black workers. Hispanic workers are not overrepresented in any of the 30 positions.

Strategic Adjustments

During the pandemic automation has become one way to reduce transmission and protect employees and customers from COVID-19. Black workers are more than one and a half times more likely to be cashiers, cooks, food preparation and serving workers, production workers, laborers, and material movers. They are also more than three times more likely to be security guards, bus drivers, and taxi drivers or chauffeurs, all of which are jobs at high risk for automation in the future (Broady 2017). But the current lack of automation in these sectors, however, may have led to fewer work-at-home options for those essential workers and an increase in their potential exposure to COVID-19.

The overrepresentation of Black and Latino workers in these sectors might have contributed to the increase in COVID-19 cases among Black and Latino populations. If this is the case, automation in the form of self-checkout, pickup lockers, and other forms of retail automation could have decreased the health impact of COVID-19 on these workers' communities. The fear of job losses has led to protectionist measures against automation, but if these jobs were automated, workers could be upskilled to perform higher-skilled and better-paying jobs.

In an industry report titled “The Future of Jobs Report,” the World Economic Forum estimates that globally “75 million jobs may be displaced by a shift in the division of labor between humans and machines, while 133 million new roles may emerge that are more adapted to the new division of labor between humans, machines and algorithms” (World Economic Forum 2018). Thus, technological innovation will likely result in more job growth, but training and upskilling will be necessary to ensure workers are prepared for these new opportunities.

A report from McKinsey & Company (Cook et al. 2019) found that fewer years of educational attainment, on average, is a contributing factor in the increased risk of job disruption from automation for Black workers. Indeed, the projected displacement risk drops significantly for both Black and white workers who have a bachelor’s degree. Hence, investments in higher education, particularly in historically Black colleges and universities (HBCUs) and minority serving institutions (MSIs), can increase educational attainment and lower displacement risk from automation.

Investing in HBCUs is an efficient route to helping Black students. According to the United Negro College Fund (UNCF 2019b), HBCUs account for only 3% of the nation’s colleges and universities but enroll 10 percent of all Black students and produce almost 20% of all Black graduates. HBCUs are also more affordable: according to the UNCF, “the cost of attendance at an HBCU is 28% less than attending a comparable non-HBCU” (UNCF 2019c). HBCUs produce 25% of Black STEM graduates, preparing them for careers in jobs that are less susceptible to automation.

In addition to investing in HBCUs and MSIs, the higher education sector should focus on retention, graduation, and placement of Black and Hispanic students. The need to equip students with the knowledge and skills necessary for the future of work with automation—including a functional understanding of technology, theory, and soft skills—can be a challenge for most educational institutions. The challenges are magnified for HBCUs and many MSIs, however, with lower endowments than predominately white institutions. Hence, increased funding for technical infrastructure at HBCUs and MSIs is critical to mitigating disparities in access to employment that is less sensitive to automation risk. In addition, initiatives to increase connections between educators and employers could create pipelines from school to employment, for students and for workers in lower-skilled occupations.

*Content for this written testimony was derived from several pieces that were authored or co-authored by the witness

TABLE 1.

The Subset of the 30 Jobs with the Highest Automation Risk Scores that Employ the Highest Number of U.S. Workers

	Total Number Employed	Total Percentage Employed	Percentage of White Workforce	Percentage of Black Workforce	Percentage of Asian Workforce	Percentage of Hispanic Workforce	Automation Risk Score (Percent)
Cashiers	3,164,000	2.01	1.79	2.92	2.26	2.75	97.00
Retail salespersons	3,105,000	1.97	2.00	1.99	1.36	2.09	92.00
Secretaries and administrative assistants	2,688,000	1.71	1.87	1.21	0.92	1.30	96.00
Laborers and freight, stock, and material movers	2,235,000	1.42	1.32	2.28	0.59	1.86	85.00
Construction laborers	2,051,000	1.30	1.43	0.91	0.32	3.45	88.00
Waiters and waitresses	2,038,000	1.29	1.26	1.17	1.51	1.72	94.00
Cooks	2,031,000	1.29	1.17	1.90	1.23	2.69	81.00
Accountants and auditors	1,964,000	1.25	1.24	0.86	2.30	0.63	94.00
Office clerks, general	1,355,000	0.86	0.82	0.95	1.14	1.02	96.00
Receptionists and information clerks	1,288,000	0.82	0.80	1.02	0.58	1.01	96.00
Sales representatives, wholesale and manufacturing	1,281,000	0.81	0.93	0.39	0.49	0.50	85.00
Grounds maintenance workers	1,273,000	0.81	0.89	0.54	0.11	2.00	95.00
Production workers, all other	1,141,000	0.72	0.69	0.95	0.64	1.01	92.00
Real estate brokers and sales agents	1,095,000	0.70	0.76	0.45	0.56	0.42	92.00
Food preparation workers	1,079,000	0.68	0.65	0.74	0.87	1.09	87.00
Bookkeeping, accounting, and auditing clerks	1,015,000	0.64	0.71	0.36	0.54	0.48	98.00
Miscellaneous agricultural workers	866,000	0.55	0.65	0.12	0.10	1.69	87.00
Inspectors, testers, sorters, samplers, and weighers	802,000	0.51	0.51	0.48	0.42	0.51	98.00
Taxi drivers and chauffeurs	790,000	0.50	0.36	1.20	1.01	0.67	89.00
Property, real estate, and community association managers	780,000	0.50	0.53	0.36	0.34	0.36	81.00
Insurance sales agents	595,000	0.38	0.39	0.31	0.33	0.29	92.00
Industrial truck and tractor operators	571,000	0.36	0.32	0.76	0.09	0.65	93.00
Billing and posting clerks	459,000	0.29	0.31	0.24	0.21	0.26	96.00
Paralegals and legal assistants	444,000	0.28	0.28	0.27	0.29	0.28	94.00
Couriers and messengers	402,000	0.26	0.24	0.36	0.17	0.31	94.00
Operating engineers and other construction equipment operators	375,000	0.24	0.26	0.17	0.03	0.20	95.00
Combined food preparation and serving workers, including fast food	372,000	0.24	0.21	0.38	0.20	0.27	92.00
First-line supervisors of housekeeping and janitorial workers	352,000	0.22	0.23	0.27	0.11	0.35	94.00
Dining room and cafeteria attendants and bartender helpers	338,000	0.21	0.21	0.22	0.20	0.42	91.00
Hosts and hostesses, restaurant, lounge, and coffee shop	322,000	0.20	0.20	0.14	0.13	0.21	97.00
Total/Average	**36,271,000**	**23.02**	**23.03**	**23.91**	**19.05**	**30.50**	**92.02**

Source: U.S. Bureau of Labor Statistics (BLS), 2020a authors' calculations; Frey and Osborne (2017).

Note: This table reflects data for a subset of the 220 occupations for which the BLS provides gender and race statistics and for which Frey and Osborne (2017) provide an automation risk score.

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TABLE 2.

The Subset of the 30 Jobs with the Lowest Automation Risk Scores that Employ the Highest Number of U.S. Workers

	Total Number Employed	Total Percentage Employed	Percentage of White Workforce	Percentage of Black Workforce	Percentage of Asian Workforce	Percentage of Hispanic Workforce	Automation Risk Score (Percent)
Elementary and middle school teachers	3,604,000	2.29	2.49	1.90	0.92	1.33	0.44
Registered nurses	3,242,000	2.06	2.01	2.07	2.91	0.84	0.90
Chief executives	1,602,000	1.02	1.16	0.34	0.91	0.36	1.50
First-line supervisors of office and admin. support	1,306,000	0.83	0.86	0.90	0.47	0.63	1.40
Marketing and sales managers	1,184,000	0.75	0.83	0.37	0.65	0.38	1.30
Physicians and surgeons	1,098,000	0.70	0.65	0.46	1.93	0.30	0.42
Other teachers and instructors	1,017,000	0.65	0.65	0.61	0.61	0.43	0.95
Secondary school teachers	1,015,000	0.64	0.72	0.38	0.33	0.32	0.78
Education administrators	958,000	0.61	0.62	0.76	0.31	0.41	1.32
First-line production supervisors, operating workers	844,000	0.54	0.55	0.53	0.31	0.52	1.60
Medical and health services managers	677,000	0.43	0.44	0.44	0.38	0.29	0.73
Computer systems analysts	663,000	0.42	0.37	0.33	1.31	0.20	0.65
Preschool and kindergarten teachers	655,000	0.42	0.41	0.53	0.33	0.35	0.74
Engineers, all other	582,000	0.37	0.34	0.16	1.17	0.21	1.40
Social and community service managers	470,000	0.30	0.31	0.30	0.15	0.18	0.67
Clergy	413,000	0.26	0.27	0.26	0.24	0.11	0.81
Mechanical engineers	351,000	0.22	0.23	0.09	0.40	0.11	1.10
Pharmacists	341,000	0.22	0.18	0.18	0.73	0.03	1.20
Human resources managers	321,000	0.20	0.20	0.18	0.22	0.12	0.55
First-line mechanics supervisors, installers, repairers	272,000	0.17	0.19	0.14	0.04	0.16	0.30
Psychologists	234,000	0.15	0.17	0.07	0.08	0.09	0.43
Securities, commodities, and financial services sales	231,000	0.15	0.16	0.06	0.17	0.10	1.60
Speech-language pathologists	180,000	0.11	0.14	0.04	0.04	0.04	0.64
Lodging managers	162,000	0.10	0.11	0.06	0.15	0.09	0.39
Logisticians	154,000	0.10	0.10	0.12	0.04	0.05	1.20
Occupational therapists	136,000	0.09	0.08	0.07	0.16	0.05	0.35
Dietitians and nutritionists	128,000	0.08	0.08	0.10	0.07	0.04	0.39
Training and development specialists	125,000	0.08	0.08	0.10	0.05	0.05	1.40
First-line supervisors of police and detectives	83,000	0.05	0.06	0.03	0	0.02	0.44
Public relations and fundraising managers	73,000	0.05	0.05	0.03	0	0	1.50
Total/Average	**22,121,000**	**14.04**	**14.51**	**11.65**	**15.08**	**7.79**	**0.90**

Source: U.S. Bureau of Labor Statistics (BLS), 2020a authors' calculations; Frey and Osborne (2017).

Note: This table reflects data for a subset of the 220 occupations for which the BLS provides gender and race statistics and for which Frey and Osborne (2017) provide an automation risk score.

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