

# Understanding the Changing Nature of Work: Implications for Research and Evaluation to Inform Programs Serving Low-Income Populations



OPRE Report #2021-178  
October 2021

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Contract Number: HHSP2332015000771

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## Overview

The Office of Planning, Research, and Evaluation (OPRE), within the Administration for Children and Families (ACF) at the U.S. Department of Health and Human Services, has a long history of supporting rigorous research and evaluation on the broad range of human services programs that fall under ACF's auspices. Many of ACF's programs have components aimed at supporting employment among low-income populations, and, consequently, OPRE regularly supports numerous evaluations of employment and training programs for low-income populations, which the office's Division of Economic Independence oversees. Studies that OPRE sponsored played a key role in the policy debate surrounding welfare reform in the 1990s and since then have contributed to the large, growing body of research that informs policymakers and practitioners in designing and delivering programs to increase work and earnings among low-income families.

OPRE funded MEF Associates, in partnership with MDRC, to organize and facilitate a roundtable and prepare a series of white papers to explore future research topics related to employment and training programs for low-income populations. The first white paper built on those roundtable discussions, focused on a summary of research findings and knowledge gaps in the field, and highlighted a set of potential questions to guide ongoing research and evaluation efforts for OPRE, other federal agencies, and the broader field of researchers and practitioners. The second in the series, this paper discusses several ongoing trends in the labor market and their potential effects on the nature of work over the next 10 to 15 years for low-income populations. The trends are used to highlight potential questions to inform research and evaluation agendas on this topic. A final section discusses potential implications for labor market trends and ongoing research of the COVID-19 pandemic.

### A. Primary Research Questions

1. What are ongoing trends in three broad areas affecting the labor market: automation and technology, alternative work arrangements, and the regional differences—including differences between urban and rural areas—in these factors?
2. How might these trends affect the nature of work overall and for low-income populations?
3. What are the implications of these trends for research and evaluation in the program areas of job search and career counseling; education and training; and income, reemployment, and “making work pay”?

### B. Purpose

This white paper seeks to document key trends in the labor market and how they might change the nature of work over the next 10 to 15 years, with a focus on low-income populations. The goal is to suggest a set of potential research questions informed by these findings that can help define future research opportunities and inform directions for OPRE's and other federal

agencies' research and evaluation portfolios and for the broader field of researchers and practitioners.

## C. Key Findings and Highlights

This white paper highlights several important trends in the labor market that continue to affect the nature of work. Some jobs likely will be eliminated by technology and automation, for example, but many of the remaining jobs will be changed in some way, with fewer routine and automatable tasks and more tasks requiring analytical, social, and creative skills. The abundance of job market data and methods to analyze these data will create the potential to better track emerging jobs and the skills they require. A small but growing number of individuals work in alternative arrangements, such as gig work or in jobs with uncertain schedules. Each of these factors will likely play out differently across regions of the country and for cities versus less urban areas. In addition, the COVID-19 pandemic has led to a dramatic increase in unemployment rates, an increase in telework, and reductions in financial wellbeing and physical and mental health.

Given these trends, the paper presents several potential research topics within each of the following program areas.

### Job Search and Career Counseling

1. Using data and technological advances to aid in job search, to identify declining and emerging occupations, and to identify jobs' changing skills requirements.
2. Using data and technology to identify jobseekers' relevant skills and effectively demonstrate those skills to match individuals to potential employers.
3. Understanding individuals' use of alternative work arrangements and their effects on wellbeing and future employment.

### Education and Training

1. Using data and technological advances to stay abreast of jobs' changing skills requirements, to inform skills requirements for training, and to support skills acquisition.
2. Understanding the best way to help workers access training continuously over their careers.
3. Exploring ways to increase digital literacy and to use technology to increase access to training.
4. Using online learning tools to increase training completion.

### Income, Reemployment, and Making Work Pay

1. Exploring the best way to support workers who lose jobs, because of technology or other factors, via income support, retraining, and reemployment services.

2. Exploring the best way to support workers earning low wages and individuals working outside the traditional employer-employee model, including gig workers and workers with uncertain and varying schedules.

Finally, although the COVID-19 pandemic's long-term effects are difficult to predict, they have raised several areas for further research. For example, research can examine whether the pandemic has accelerated the trend toward job tasks automation, focusing on jobs with a high risk of viral transmission. The rise of telework can be explored, including its effects on lower-skilled workers and its effects on job task content. Finally, the relief policies enacted during the pandemic highlight the need for effective income and reemployment support.

## D. Methods

The study gathered and reviewed literature relating to the following labor market factors: automation and technology (including artificial intelligence), alternative work arrangements, and differences by regions and urbanicity. These terms, intersected with jobs and labor markets, were used as keywords to identify relevant publications. The search included peer-reviewed publications in economics and other social science journals and other publications from foundations or research organizations. The review prioritized literature published within the past 10 years, although earlier studies were included when relevant. The study also reviewed findings from past and ongoing evaluations in each of the three program areas, using the earlier white paper as a starting point.

## E. Suggested Citation

Miller, Cynthia. 2021. "Understanding the Changing Nature of Work: Implications for Research and Evaluation to Inform Programs Serving Low-Income Populations." OPRE Report 2021-178. Washington, D.C.: Office of Planning, Research, and Evaluation, Administration for Children and Families, U.S. Department of Health and Human Services.

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## Executive Summary

The labor market has changed significantly over the past several decades, with rising wage inequality, declining and emerging industries, and an increase in individuals working outside a traditional job. These changes reflect several trends, such as international trade, domestic outsourcing, and automation and technology, that will continue to impact the nature of work in the coming years. A key question is what those impacts will be. For example, will further technological advances lead to a mass displacement of workers as more jobs are automated? What new jobs will these advances create, and how will the remaining jobs change? Will growing numbers of individuals work as independent contractors, with little or no connection to a formal employer?

Although answering these questions definitively is difficult, understanding possible changes is important for public policy in general and, specifically, for programs and policies designed to help low-income populations. This white paper discusses potential changes in the labor market and nature of work over the next 10 to 15 years, with a focus on how these changes might impact low-wage, less-skilled workers and individuals facing barriers to work. Key factors considered include technology and automation; alternative work arrangements; and varying regional economies. The paper's purpose is to provide recommendations for future research and evaluation that could help inform the design of policies and programs to support workers' economic wellbeing.

The paper is part of the *Next Steps for Employment and Training Research* project, funded by the Office of Planning, Research, and Evaluation (OPRE), within the Administration for Children and Families (ACF) at the U.S. Department of Health and Human Services (HHS). Many of ACF's programs have components aimed at supporting employment among low-income populations, and, consequently, OPRE regularly supports numerous evaluations of employment and training programs for these populations, which the office's Division of Economic Independence (DEI) oversees. As part of the project, in January 2019, OPRE organized a roundtable, including policymakers, employers, researchers, and practitioners, to discuss the status of and future directions for research on improving the economic prospects of low-income populations. Roundtable discussions focused on specific interventions (e.g., career pathways, sectoral strategies) and research methodology (e.g., assessing program implementation, testing program components' effectiveness). The first white paper in the project built on those discussions and focused on a summary of research findings and knowledge gaps in the field, highlighting a set of potential questions to guide ongoing research and evaluation efforts for OPRE, other federal agencies, and the broader field of researchers and practitioners. This paper is the second in the series.

### A. Potential Changes in the Nature of Work

The paper considers several factors that might affect the nature of work going forward, specifically automation and technology, alternative work arrangements, and diverging regional economies. This set is not an exhaustive list of relevant factors and the discussion does not consider potential policy responses.



## Automation and Technology

Considerable research has been conducted over the past several years on the implications of technological advances for the labor market. The findings suggest that many jobs are at high risk of being automated in the coming years, although estimates vary across studies, from 10 percent to nearly 50 percent of all jobs.<sup>1</sup> In addition, low-skill, low-wage jobs likely will be hardest hit. Countering the potential for large job loss, however, is the fact that technology will also create new jobs over time, within the technology sector (e.g., network analyst) and outside it (e.g., jobs in fulfillment centers, with the rise of online commerce). More of the research agrees that technology will affect most jobs in some way, by changing the specific tasks that make up a given job. In particular, many jobs will involve fewer routine tasks that a computer could do and more tasks requiring analytical, creative, and social skills, which might be less susceptible to automation. Finally, technological advances have also generated an abundance of data on the labor market and created tools to analyze these data, increasing the ability to more fully monitor technological advances and their effects on the labor market and economy.

## Alternative Work Arrangements

This paper examines research on workers in alternative arrangements, defined broadly as work outside a traditional worker-employer relationship, such as independent contractors, including online gig workers, or individuals who work via online platforms (e.g., ridesharing apps); offline gig workers (e.g., construction workers); contract (outsourced) workers; individuals working part-time because they are unable to find full-time work; and workers subject to varying and uncertain work schedules.

A small increase has occurred over time in most of these arrangements, although they still constitute a relatively small share of all employment. For example, the share of independent contractors or contract workers is fewer than 10 percent but has increased by about 2 percentage points since 2000.<sup>2</sup> Similarly, the rate of involuntary part-time (IPT) work has increased over time.<sup>3</sup> Although a small increase in gig work has occurred, the research has commonly found that this work is mostly used to supplement or smooth income during reduced earnings periods rather than as a primary job. Finally, many of these trends affect low-wage, less-skilled workers disproportionately, given the types of jobs involved, such as retail and hospitality jobs for IPT work and varying schedules as well as janitorial and security jobs for contract work.

## Different Trends by Geography

Growing research documents economic disparities across regions of the country and between large cities and less urban areas. Parts of the Midwest, for example, are economically distressed and suffer from high rates of disability and opioid use and high rates of mortality.<sup>4</sup> Although geographic mobility has helped to narrow regional disparities in the past, a decline in mobility

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1 Frey and Osborne, 2013; Nedelkoska and Quintini, 2018; and Arntz, Zierahn, and Gregory, 2017.

2 Katz and Krueger, 2019b; BLS 2018.

3 Golden, 2016.

4 Austin, Glaeser, and Summers, 2018.



beginning in the 1980s has reduced the rate at which they are diminishing. The differences suggest that programs and policies might target these areas but also that they might have larger, positive effects than they would have in other areas.

Another reason to consider geography is that the effects of technology and automation are likely to differ, as well, given differences in the types of workers and the types of jobs. Large, coastal cities, for example, generally have more educated and younger populations than suburban and rural areas and face lower risks of job automation. In contrast, workers in smaller cities and in suburban and rural areas in parts of the Midwest might be especially hard hit by advances in technology and automation, given a higher prevalence of more easily automated jobs in transportation and manufacturing. Finally, research documents that fewer good job opportunities for less-skilled workers might exist in large cities because technology has reduced the number of middle-wage jobs available to workers lacking a college education.<sup>5</sup>

## COVID-19 Pandemic

The COVID-19 pandemic led to a rapid increase in unemployment rates, up to levels that had not been seen since the Great Depression. Unemployment rates were initially higher for women than for men, owing to the types of jobs they held and to school closures, and higher for Black and Hispanic individuals, in part because of their overrepresentation in certain industries. Beyond rising rates of unemployment and rising rates of material hardship, the pandemic might affect the labor market in other ways. First, as has been the case in previous economic downturns, the recession caused by the pandemic might hasten the push toward automation, particularly for occupations that have a high risk of virus transmission. Second, an increase in teleworking has occurred as employers have closed workplaces. But more educated and higher income workers are more able to work from home than are other workers. Finally, the increased demand for home delivery of goods led to an increase in delivery service gig jobs.

## B. Implications of Trends for Research

The paper considers the implications of these trends for research and evaluation, organized around three types of programs and policies designed to increase employment and economic wellbeing among low-income populations: job search and career counseling; education and training; and income, reemployment, and “making work pay” through supplements to earnings. Within each area, the discussion considers issues of data, technology, alternative work arrangements, and geography.

### Job Search and Career Counseling

- **Using data and labor market information to inform job search and development.** The abundance of data from online job boards and other sources has made job search less costly, but barriers to using these data might exist among jobseekers and program staff. Research could examine how both groups search for jobs and consider ways to help them do so more effectively. Evaluations of public-private partnerships might prove

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<sup>5</sup> Autor, 2019.

valuable, as well, given private firms' ability to obtain and analyze big data on online job postings, jobseekers' profiles, and resumes.

- **Increasing access to technology.** The digital divide has been well documented, with low-income families and low-income areas having much less access to broadband Internet and computers.<sup>6</sup> Research could examine how low-income jobseekers and program staff could better access and use technology to search for jobs, provide services remotely, and stay updated on emerging and declining occupations.
- **Identifying required job skills and improving job search effectively.** Both jobseekers and program staff must also monitor jobs' changing skill content. Ongoing research has used data from job boards and other sources to track skills required, but this research could be updated and focused on occupations available to low-income workers. Research could also examine methods for helping jobseekers demonstrate in-demand skills they have acquired through work experience, particularly skills less susceptible to automation, such as social perception and creativity, to either help them find jobs or move to higher-wage jobs.
- **Researching the prevalence and effects of alternative work arrangements.** Given the growing prevalence of alternative work arrangements, understanding more about this type of work for low-income individuals is important. Research could examine what types of workers are more likely to work in alternative arrangements and the effects of this type of work on economic wellbeing, skill acquisition, and longer-term career advancement.
- **Researching differences by geography.** Any effort to help individuals perform job search and program staff conduct career counseling more effectively must acknowledge the important differences in context across regions and by urbanicity. Research could examine efforts to help jobseekers and staff use data to track emerging job openings and in-demand skills at the local level. Tracking differential effects of technology and automation might also suggest different policies for different regions. Finally, research could examine how program effects vary across different economic contexts.

## Education and Training

- **Using data to inform skills requirements for training and to support skills acquisition.** As technology transforms the labor market, both individuals and training programs must stay abreast of changing skills requirements. Research is needed on effective ways to help both jobseekers and program staff use available data, and one option might be through public-private partnerships. These data could also be used to offer training relevant to multiple occupations to help guard against the potential loss of jobs to technology. Related research could examine the extent to which programs can help individuals strengthen or acquire skills less susceptible to automation, such as social intelligence and communication. Finally, the pace of technological change calls for research on the best way to help workers access training throughout their careers, such

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<sup>6</sup> Anderson and Kumar, 2019.

as through shortened or accelerated training programs or vouchers or financial aid to cover training costs.

- **Using technology in training.** Technological advances provide new opportunities in the provision of training. Computer-assisted learning, for example, is being used and tested in K–12 classrooms and could be evaluated in workforce training programs. Research could also examine the ability of online tools to increase access to training (for individuals in underserved areas), reduce its cost, and increase completion rates. The use of technology also increases the need to identify effective approaches for training individuals on digital literacy and use of existing technology.
- **Researching differences by geography.** To guide the effective provision of education and training, ongoing research will be needed on the changing skills requirements across regions, documenting emerging and declining occupations and in-demand skills. Research could also examine whether and how online, remote training can increase access for individuals in distressed areas. As noted earlier, research could examine, as well, how the effects of training programs differ across regions and for cities compared with less urban areas.

### Income, Reemployment, and “Making Work Pay”

- **Supporting workers displaced by technology.** Although uncertainty exists about the number of jobs at high risk for automation, it seems clear that worker displacement and need for assistance with income and reemployment will occur. In addition, the pace of displacement might happen more quickly than anticipated in the wake of the COVID-19 pandemic if it hastens employers’ incorporation of technology into the workplace. Research could examine the effectiveness of proposed policies, including universal basic income, a federal jobs guarantee, or a subsidized jobs program targeting either individuals facing severe barriers to employment or targeting highly distressed areas. Alternatively, an adjustment assistance program might offer benefits and training to help workers find new jobs. Research could examine the effects of these programs on individuals’ eventual transition to work. Cost-benefit analyses would be useful, given the costs of bringing these interventions to scale.
- **Supporting workers earning low wages.** As noted earlier, research suggests that advances in technology and automation likely will disproportionately affect less-skilled jobs, putting continued downward pressure on wages at the lower end of the labor market. Research could examine effective ways to supplement these workers’ earnings—or make work pay—ensuring that individuals who work full-time do not live in poverty. Policies most typically mentioned include changes to the Earned Income Tax Credit, such as more generous credits provided to all family types, frequency with which credits are paid out, or taxing of credits provided to workers with higher earnings.
- **Supporting workers in alternative work arrangements.** A small but growing share of U.S. workers have a limited or informal connection to an employer, are unable to find full-time work, or have unpredictable schedules. More research is needed to document the prevalence and effects of these arrangements on workers and their families. Research could also consider effective ways to provide these workers with benefits they

do not receive from employers (e.g., health insurance). Although evaluating these types of policies would be challenging and is beyond ACF's typical scope of research, considering their effects on workers' wellbeing, persistence in alternative work arrangements, and career advancement would be important.

- **Researching differences by geography.** Research has documented the declining economies of parts of the Midwest compared with the coastal regions and for many suburban and rural areas compared with cities. Advances in technology and automation likely will exacerbate these differences. Ongoing research on the potential and actual job loss due to technology might help identify locations that could benefit from programs to make work pay or support individuals while unemployed. More broadly, research could also assess whether these programs have larger effects in more economically distressed areas, leading to larger effects on employment, income, and wellbeing for individuals in these communities.

Finally, substantial research has been conducted regarding the current effects of the COVID-19 pandemic on family wellbeing, for example, labor market outcomes, and educational attainment. Although predicting its long-term effects is difficult, several potential areas of research relate to changes in the nature of work. For example, research should track the pace at which jobs are automated, with a particular focus on jobs that have a high risk of virus transmission, studying what and where those jobs are and whether they are held largely by certain demographic groups. Research should also examine the rise in telework, studying the amount that persists after the pandemic, for which groups, and how it affects the skills required for jobs. Similarly, research should continue monitoring the gig economy, whether the increase in delivery gig work persists and its implications for those workers. The rise in hardship during the pandemic also highlighted the need for effective income and reemployment support policies. Research should continue on the best way to provide support to workers and families, including the study of policies enacted in response to the pandemic to inform policy going forward.

## I. Introduction

The labor market has changed in many ways over the past several decades. Wages have increased substantially for the most educated workers, for example, while stagnating or even falling for individuals with lower education levels. The occupational mix has also shifted over time, with declining employment in manufacturing and more jobs in healthcare. A small but growing number of individuals also work outside a traditional job, either employed through contract firms or as independent contractors, in some cases offering their services via online platforms.

These changes reflect multiple forces, such as increased international trade and technological advances, that will continue to impact the labor market in the coming decades. A key question is how they will affect the nature of work going forward. For example, will further technological advances lead to a mass displacement of workers as more jobs are automated? What new jobs will these advances create, and how will the remaining jobs change? Will growing numbers of individuals work as independent contractors, with little or no connection to a formal employer?

This white paper discusses potential changes in the labor market and the nature of work over the next 10 to 15 years, with a focus on how these changes might impact low-wage, less-skilled workers and individuals facing barriers to work. The potential impacts will depend, in part, on the design of policies and programs intended to support these workers. The paper aims to provide recommendations for research and evaluation that could help inform the design of such policies and programs to support the economic wellbeing of workers amidst the changing nature of work.

The paper is part of the *Next Steps for Employment and Training Research* project, led by MEF Associates in partnership with MDRC and funded by the Office of Planning, Research, and Evaluation (OPRE), within the Administration for Children and Families (ACF), U.S. Department of Health and Human Services (HHS). OPRE has a long history of supporting rigorous research and evaluation on the broad range of human services programs that fall under ACF's auspices. Many of ACF's programs have components aimed at supporting employment among low-income populations, and, consequently, OPRE regularly supports numerous evaluations of employment and training programs for low-income populations, which the office's Division of Economic Independence (DEI) oversees (see Box 1 for further background). OPRE-sponsored

### Box 1: DEI's Research and Evaluation Portfolio on Employment and Training Programs

OPRE studies ACF programs and the populations they serve through rigorous research and evaluation projects. These projects include evaluations of existing programs, evaluations of innovative approaches to helping low-income children and families, research syntheses, and descriptive and exploratory studies. OPRE aims to build and disseminate knowledge about effective approaches to helping low-income children and families.

DEI is one of four divisions at OPRE. Centered on welfare and family self-sufficiency research, DEI's portfolio is designed to expand knowledge about effective programs to promote employment, self-sufficiency, and economic wellbeing among low-income families. This white paper is informative for two of DEI's research focus areas: 1) employment and the labor market and 2) education and training.

studies played a key role in the policy debate surrounding welfare reform in the 1990s and since then have contributed to the large, growing body of research that informs policymakers and practitioners in designing and delivering programs to increase work and earnings among low-income families.

The *Next Steps for Employment and Training Research* project began with a roundtable in January 2019, which brought together policymakers, employers, researchers, and practitioners to discuss the status of and future directions for research on improving the economic prospects of low-income populations. A series of white papers is building on these roundtable discussions. The first paper focused on a summary of research findings and knowledge gaps in the field and highlighted a set of potential questions to guide ongoing research and evaluation efforts for OPRE, other federal agencies, and the broader field of researchers and practitioners.<sup>7</sup> This paper is the second in the series.

The paper first presents a brief background on the changes in the labor market over the past few decades. The next section looks forward, examining several trends expected to lead to further changes in the nature of work. The paper concludes with a discussion of potential directions for further research and evaluation in three broad areas covering programs and policies designed to increase employment and economic wellbeing: 1) job search and career counseling, 2) education and training, and 3) income, reemployment, and making work pay. These areas were selected to follow the research areas presented in the earlier white paper.<sup>8</sup>

Much of the paper was written before the COVID-19 pandemic, which has led to a dramatic increase in unemployment rates and disproportionately affected low-wage and less-skilled workers. How the pandemic will likely affect the labor market and the nature of work and training in the long-term is yet unclear. Although the paper does not discuss these potential effects in depth, the final section presents a brief review of potential implications of the pandemic for the labor market and ongoing research and evaluation.

## II. Background on Key Labor Market Changes: Rising Wage Inequality and the Decline in Middle-Skills Jobs

One of the most documented and visible changes in the U.S. labor market has been an increase in earnings inequality since the mid-1970s.<sup>9</sup> Wages have risen over time at the top of the distribution and have stagnated or even fallen at the bottom. This widening has been occurring for the past 40 years, although it has taken different forms over specific periods.

Exhibits 1 and 2 present inflation-adjusted wage rates by education level and by wage percentile, respectively, based on Economic Policy Institute data. The figures show a sharp rise in inequality beginning in the 1980s, with a big increase in the return to higher education. The trends changed starting in the 1990s, with the rapid increase in the college wage premium (or college graduates' wages relative to high school graduates' wages). Also beginning in the 1990s,

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<sup>7</sup> Fishman, Bloom, and Elkin, 2020.

<sup>8</sup> The program areas presented here collapse some of the earlier white paper's categories. The current paper includes "retention and advancement" in "job search and career counseling" and "income and reemployment" with "making work pay."

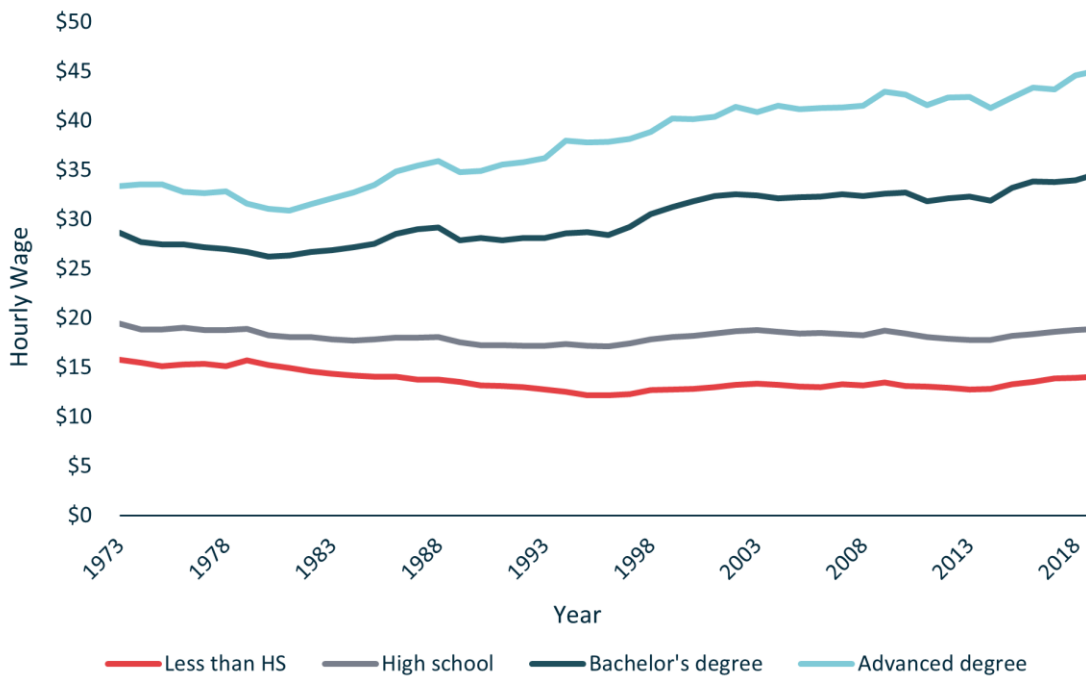
<sup>9</sup> Autor, Katz, and Kearney, 2008; Autor, 2014.

wage inequality began increasing more rapidly in the upper part of the earnings distribution, shown by the upward trend in earnings at the 95th percentile. At the bottom of the distribution, for workers with a high school education or less, wages fell from 1973 to 2019. The decline in wages for these groups was driven entirely by a decline in wages for less educated men (not shown).<sup>10</sup>

Several factors are thought to have driven these changes at both ends of the labor market, including technological advances, increased international trade, a rise in both international and domestic outsourcing, and a weakening of labor protections, such as unions and minimum wages.<sup>11</sup> The impact of technology, in particular, has been studied extensively in recent years.<sup>12</sup>

Technological progress can either complement or substitute for workers' tasks. The sharp rise in wages during the 1980s for college-educated workers, relative to individuals with a high school diploma, is thought to be the result of technology (e.g., computerization) augmenting the productivity of more educated (higher skilled) workers relative to less educated workers, increasing the demand for college-educated workers over this period.

**Exhibit 1: Trends in Wages by Education Level**



Source: Economic Policy Institute, *State of Working America Data Library*, 2019.

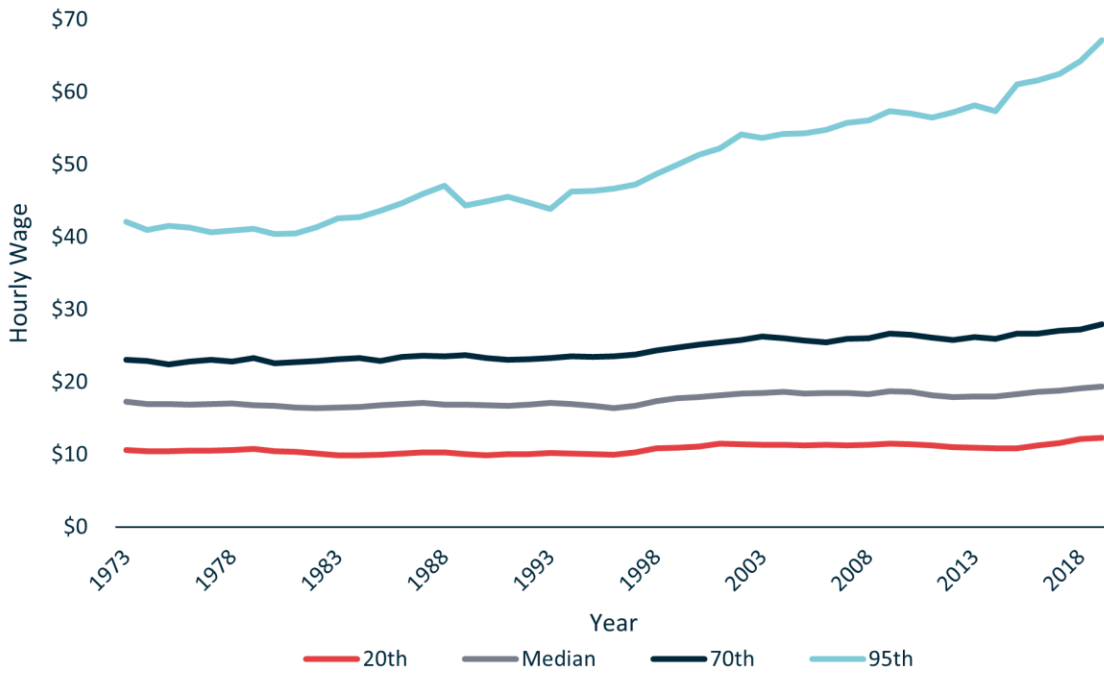
<sup>10</sup> Economic Policy Institute, 2020.

<sup>11</sup> Katz and Autor, 1999; Goldin and Katz, 2007.

<sup>12</sup> Autor, Katz, and Kearney, 2008; Autor, Levy, and Murnane, 2003; Frey and Osborne, 2013.



**Exhibit 2: Trends in Wages by Wage Percentile**



Source: Economic Policy Institute, *State of Working America Data Library*, 2019.

Beginning in the 1990s, however, technological advances began affecting different types of workers. As first documented by Autor, Katz, and Kearney (2006), technology began substituting relatively more for middle-skill (middle-wage) jobs, leading to a reduction in these types of jobs, or a “polarization” of the labor market. Their study built on an earlier analysis by Autor, Levy, and Murnane (2003) that characterized jobs by their task content rather than by the education level they required. Using the Dictionary of Occupational Titles,<sup>13</sup> they divided jobs into four task types: routine manual, routine cognitive, nonroutine manual, and nonroutine cognitive. Exhibit 3 shows an example of each type of job. As the examples illustrate, the classification of routine versus nonroutine does not map directly into low-, middle-, and high-wage jobs or into jobs defined by the education level required.

**Exhibit 3: Examples of Categories of Occupations in Autor, Levy, and Murnane (2003)**

	<b>Routine</b>	<b>Nonroutine</b>
<b>Manual</b>	Production line	Personal care services
<b>Cognitive</b>	Record keeping	Legal writing

Both routine manual and routine cognitive jobs are the most susceptible to automation, given their heavy reliance on repetitive tasks that require precise, well-understood rules that can be

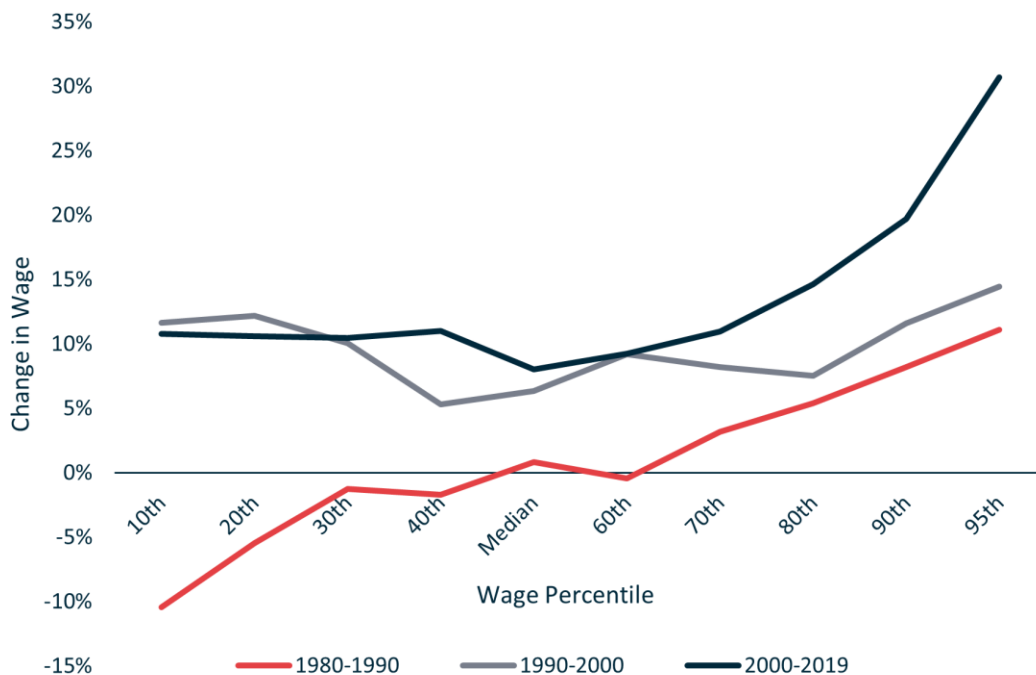
<sup>13</sup> See National Research Council (1980) for a review and <https://occupationalinfo.org/>.

carried out by a computer. The authors document a decline between 1990 and 2000 in the employment shares of these types of routine jobs.

In contrast, technology had smaller effects on nonroutine jobs, including a wide range of low-paying jobs, such as retail, food service, and personal care jobs. These jobs are less susceptible to automation given that they include tasks such as unstructured physical activity and social interaction. A 2014 study updates these changes, showing that the share of employment in routine jobs (either cognitive or manual) fell from 58 percent to 44 percent between 1981 and 2011. In contrast, employment in nonroutine manual jobs increased from 13 percent to 17 percent, and employment in nonroutine cognitive jobs increased from 29 percent to 39 percent.<sup>14</sup>

Exhibit 4 shows the wage effects of these changes in employment demand, plotting wage changes for workers at different points in the wage distribution. Between 1980 and 1990, for example, wages increased linearly with skill level. Low-wage workers had the smallest gains and high-wage workers had the largest gains, reflecting technology’s effect on increasing demand for higher-skilled jobs. Between 1990 and 2000, however, the figure shifted to a U-shape, with wage gains at the low and high ends relative to the middle, reflecting a reduced demand for middle-skills jobs. The most recent period (2000 to 2019) is a flattened U-shape, with the highest gains at the top of the wage distribution.

**Exhibit 4: Percentage of Changes in Wages by Percentile, over Selected Periods**



Source: Economic Policy Institute, *State of Working America, Data Library*, 2019

<sup>14</sup> Cheremukhin, 2014.

### III. How Might the Labor Market Change over the Next 10 to 15 Years?

The labor market trends discussed in Section II have meant that many workers with a high school education or less likely will earn less today than they did in the 1970s and probably not enough to support a family.<sup>15</sup> The polarization of the labor market has also meant that fewer middle-wage jobs are available to less-skilled workers. This section considers several factors that might affect the nature of work going forward, specifically automation and technology, alternative work arrangements, and diverging regional economies. The list is not intended to be exhaustive of relevant factors and does not consider potential policy responses, such as tariffs to limit trade or legislation to support collective bargaining.

As context for a discussion of these trends, Exhibit 5 presents a high-level view of potential changes in the labor market as provided by employment projections from the Bureau of Labor Statistics (BLS). It lists the 15 occupations projected to add the most jobs to the economy (more than 4 million jobs in total) through 2028.<sup>16</sup> The top five occupations are in healthcare and food services, and four of the five are low paying. Annual pay is low across all 15 occupations, with 10 of the 15 paying below the median earnings of all jobs in the United States, or less than \$40,000.

**Exhibit 5: The 15 Occupations Projected to Add the Most Jobs between 2018 and 2028**

Occupation	Number of new jobs (1,000s)	Median earnings
Personal care aides	881.0	\$24,020
Combined food preparation and serving workers, including fast food	640.1	\$22,140
Registered nurses	371.5	\$73,300
Home health aides	304.8	\$24,200
Cooks, in restaurants	299.0	\$27,790
Software developers, applications	241.5	\$103,620
Waiters and waitresses	170.2	\$22,890
General and operations managers	165.0	\$100,780
Janitors and cleaners, except maids and housekeeping cleaners	159.8	\$27,430
Medical assistants	154.9	\$34,800
Construction laborers	148.1	\$36,860
Laborers and freight, stock, and material movers, manual	144.0	\$29,510
Market research analysts and marketing specialists	139.2	\$63,790
Nursing assistants	135.4	\$29,660
Management analysts	118.3	\$85,260

Source: Occupational Employment Statistics program, U.S. Bureau of Labor Statistics.

<sup>15</sup> The poverty threshold in 2019 for a family of two adults and two children, for example, was \$25,926. An individual working full-time, year-round at \$15 per hour would earn just above that amount, at approximately \$30,000.

<sup>16</sup> See <https://www.bls.gov/news.release/pdf/ecopro.pdf>.

BLS projections also identify occupations expected to decline in number (not shown in Exhibit 5), such as sales and related jobs, owing to growing online sales, which will in turn increase employment in the transportation and warehouse industries. Similarly, employment in office and administrative support jobs is expected to decline, with continued advances in technology and automation.

The BLS projections are based on detailed models incorporating population projections, labor force participation rates, and macroeconomic trends in output and productivity. But as the above examples illustrate, they are also based on certain assumptions about the effects of technology and automation. Different assumptions can lead to different projections, as illustrated by Levy (2018), who considers the implications of technological advances on selected occupations. For example, for the occupation of “customer services representatives,” he predicts more rapid technological advances (e.g., in speech recognition and language processing) than the BLS. As a result, he projected no job growth in this occupation through 2024, compared with 5 percent growth projected by the BLS. Beyond estimates about the number of jobs, however, the projections fail to address more nuanced ways in which jobs might change, such as the skills required and whether the individuals performing those jobs will be formal employees or contract workers.

## A. Automation and Technology

As noted in Section II, considerable research has been conducted over the past several years on the implications of technological advances for the labor market. A major focus of the research is determining the number of jobs at risk of automation, the implications for jobs not fully automated, and the types of jobs that will be affected. Will advances continue to reduce demand for middle-skills jobs, as discussed earlier, or will more recent advances affect jobs throughout the skill distribution?

This research builds on the initial work by Autor, Levy, and Murnane (2003) on job tasks and moves beyond characterizing them only by whether they are routine or nonroutine and manual or cognitive. Given computers’ rapidly expanding capabilities, more recent research considers manual dexterity, social perceptiveness, and other such factors.<sup>17</sup> Other research includes case studies of particular industries or even individual companies to examine in more detail how technology has changed job task content.<sup>18</sup>

Although uncertainty exists around technology’s ultimate effects, the research suggests that technology will lead to some job displacement for less-skilled workers in the near term and might limit wage growth at the lower end of the labor market. Whether technology and its effects also create new jobs for these workers, either in adjacent or unrelated industries, remains to be seen. What seems more certain is that technology will change the nature of jobs and their skill requirements, increasing the use of and demand for creativity, social skills, analytical skills, and other such skills that cannot be automated. It will be important to determine how to help less-skilled workers strengthen and demonstrate these skills.

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<sup>17</sup> Frey and Osborne, 2013; Nedelkoska and Quintini, 2018; and Arntz, Zierahn, and Gregory, 2017.

<sup>18</sup> Levy, 2018; Autor, Levy, and Murnane, 2002.

- **Variation exists in estimates of the number of jobs at high risk for elimination because of automation.**

Concerns over automation have raised the threat of computers or robots taking over a large number of jobs (at all skill levels).<sup>19</sup> Indeed, this line of thinking has been behind some proposals for a universal basic income, to address mass job displacement caused by technology.<sup>20</sup> Early research addressing the potential displacement came from Frey and Osborne (2013). They document technology’s rapidly expanding capabilities, such as use of big data<sup>21</sup> and machine learning in healthcare diagnostics, where millions of patient records and text from journal articles are used to diagnose and create treatment plans for individuals, or use of robots in agriculture to assess and sort produce. They start by focusing on tasks that computers are yet unable to perform, or “bottleneck tasks,” such as those that involve social and creative intelligence, perception, and manipulation. Using Occupational Information Network, or O\*NET, data to compile detailed information on tasks for more than 700 occupations, they estimate that 47 percent of occupations are at high risk of automation, with high-risk sectors including transportation, logistics, construction, and services.<sup>22</sup> Examples of occupations with a high risk of automation include machine setters, payroll clerks, and meter readers; conversely, examples of low-risk occupations include occupational therapists, orthodontists, and industrial engineers. As noted below, occupations with a high risk of automation tend to be lower wage than other occupations.

However, more recent estimates suggest that the share of occupations at risk of automation is potentially much less than 47 percent. Arntz et al. (2017) and Nedelkoska and Quintini (2018) use data from the Survey of Adult Skills to capture the variation in tasks across jobs within the same occupational category.<sup>23</sup> As an example provided by Arntz et al. (2017), in the occupation of “Numerical and Material Recording Clerks,” the median job in this category, as indicated by the occupation-level data from O\*NET, has a high risk of automation. The individual-level data from the Survey of Adult Skills, however, show that many jobs within this occupation specialize in tasks such as giving presentations and problem solving and, thus, are at lower risk of automation. Using the survey data to define task content reduces to about 10 percent the number of jobs estimated to be at high risk of automation.

Finally, Muro, Maxim, and Whiton (2019) use alternative data and methods and arrive at an estimate somewhere among the estimates of Frey and Osborne; Arntz et al.; and Nedelkoska and Quintini. They use data from a McKinsey study that documents the automation potential of more than 2,000 job tasks. Using these data along with industry and occupation data from labor

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19 See, for example, Alex Williams, December 11, 2017, “Will Robots Take Our Children’s Jobs?” *The New York Times*.

20 Sadowski, 2016.

21 Big data refers to the large amounts of data collected by organizations each day in the course of doing business. The data are often so large and complex that traditional methods of data processing cannot be used for analysis.

22 O\*NET is an online, publicly available database, constructed with funding from the U.S. Department of Labor, which contains hundreds of standardized and occupation-specific features on nearly 1,000 occupations covering the entire U.S. economy.

23 Fielded in more than 40 countries, the Survey of Adult Skills measures respondents’ proficiency in a range of skills and obtains information on the ways they use these skills at home, at work, and in the community. The survey is conducted as part of the Programme for the International Assessment of Adult Competencies, managed by the Organisation for Economic Co-operation and Development.

market analytic firms, they estimate that 25 percent of jobs in the United States are at high risk for automation.<sup>24</sup>

- **Technology's larger effect will be a change in the task content of many jobs, requiring skills unsusceptible to automation.**

The McKinsey analysis referred to previously estimates that 60 percent of jobs could have a substantial share of their tasks (more than 30 percent) automated by 2030. Thus, although most jobs are at lower risk for being fully automated, a much higher percentage of jobs will be affected by technology in some way. A commonly cited example is the effect of ATMs on bank tellers' jobs. Rather than eliminating their jobs, ATMs changed their jobs' content, reducing the conduct of basic transactions and increasing tasks that require the use of marketing and social skills.<sup>25</sup>

More broadly, the research examining the risk of automation has also documented jobs' changing task content, with an increase in use of analytical and social tasks within occupations. For example, Nedelkoska and Quintini document such an increase in analytical and social tasks within occupations for Germany and the United Kingdom. Autor and Price (2003) similarly find an increase in the use of nonroutine analytical and interpersonal skills across U.S. employment in general, although the authors do not examine the incidence of tasks within specific occupations or for low-wage or low-skill occupations.

At an even more disaggregated level, the response to technological advances can also vary across firms within the same industry or even across departments within the same firm. This result is illustrated by Autor, Levy, and Murnane (2002), who present a case study examining how jobs and tasks were reallocated in two departments of a large bank in response to the advent of automatic check reading. As certain tasks became automated, such as machine reading of check amounts, one department (i.e., check processing) divided the remaining tasks that were not automated into narrower jobs (e.g., removing staples and clips before feeding checks into the machine reader, accounting for a discrepancy between the calculated total and the deposit slip). Some jobs now required less skill (and paid less), while others required more skill. In contrast, the other department (i.e., exceptions processing) bundled the unautomated tasks into one job and made employees responsible for all these tasks for blocks of bank accounts. The resulting multifunction jobs (e.g., verifying signatures, handling overdrafts, instituting stop payments) required more skill and, as a result, paid more. On net, in both departments, technology substituted for less-educated workers and led to an increase in the share of college-educated workers.

- **The next wave of technology likely will affect low-skill, low-wage jobs disproportionately.**

Although some disagreement exists regarding the number of jobs that will be lost to automation, more agreement exists in the research that low-wage occupations are especially at risk.<sup>26</sup> Most studies identify the types of jobs at risk of automation as jobs that require no

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24 Manyika et al. 2017.

25 Bessen, 2015.

26 Frey and Osborne, 2013; Nedelkoska and Quintini, 2018; Muro, Maxim, and Whiton, 2019.

specific training and are low-wage, including food preparation, laborers, and selected service jobs. This trend contrasts with the reduction in middle-skills jobs that occurred in the 1990s and suggests that reduced demand for these types of low-wage jobs might put downward pressure on wages at the lower end of the wage distribution.

- **Technological advances will also create more and different kinds of jobs.**

However, the net effect on employment and wages for less-skilled workers is unclear because one of technology's effects is to create jobs. Claims that technological advances will eliminate jobs are overblown, argues Autor (2015), given that typical discussions focus on only their effect of substituting for labor, such as industrial robots displacing production line workers. However, increased productivity in a given sector, because of technological advances or other factors, will also spur increased demand and employment in adjacent sectors or sectors providing goods or services to the affected industry. Technological advances might also increase employment in the affected sector. In the example mentioned earlier, Besson (2015) found that ATMs, in addition to changing the content of teller jobs, reduced the costs of operating a bank branch, which led to an increase in the number of branch offices and an increased demand for tellers.

Additionally, increases in productivity, from technology or other sources, can lead to increased employment more generally. If the prices of products made by improved technology fall, for example, consumers will have more disposable income to spend on other goods and services, which will lead to increased employment in other sectors. Dauth et al. (2017) find, for example, that the increased use of industrial robots in Germany led to a fall in manufacturing jobs but an offsetting increase in the number of nonmanufacturing jobs. However, the effects varied by education level, with lower-skilled workers losing the most jobs in manufacturing and gaining the fewest jobs in other sectors.

Technological advances will also lead to the creation of entirely new types of jobs. Mandel (2017) estimates that the rise in e-commerce, although leading to a reduction of employment in brick-and-mortar stores, led to a much larger increase in fulfillment center employment, or warehouse jobs. Using Census Occupational Code data, Lin (2009) documents the emergence of new occupations that derive directly from technological innovation. Under the broader occupation of "network systems and data communication analysts," for example, new occupations include chat room host or monitor, computer networks consultant, network engineer, internet developer, and web designer. The number of these new jobs accessible to less-skilled workers is unclear.

- **Technological advances have also generated an abundance of data on the labor market and created tools to analyze these data.**

As Mitchel and Brynjolfsson (2017) note, the new information age has led to an exponential increase in data on the labor market and economy. Although these data include public sources, such as O\*NET, much of the data comes from the private sector, such as from job market databases (e.g., Indeed, Burning Glass Technologies, LinkedIn). Along with the advent of big data, many new analysis methods have arisen, such as predictive analytics and machine learning, in which predictive algorithms can be updated and improved over time using new



information. These data and methods could be leveraged to more fully monitor technological advances and their effects on the labor market and economy.

## B. Changes in the Employer-Worker Relationship: Alternative Work, Part-Time Jobs, and Varying Schedules

Technological advances have also contributed to work's changing nature via the advent of the online gig economy, wherein work is arranged via a digital platform.<sup>27</sup> Gig work is one of several types of alternative work arrangements that this subsection considers. These work arrangements are described as "alternative" because they are not what is typically regarded as a traditional employer-employee relationship, defined as one in which the worker might have a long-term connection with a given employer, work full-time, and work consistent and predictable hours. Many of these workers receive key benefits from their employers and are eligible for other statutory benefits that come from being an employee, such as Unemployment Insurance (UI) and Workers Compensation.

In contrast, many of the new alternative work arrangements put much of the risks of doing business on the workers, potentially leaving them with an unreliable source of income. This subsection discusses trends showing a small increase in alternative arrangements, increases in involuntary part-time (IPT) work, and many workers in industries subject to unpredictable schedules. Examples of the types of workers that this subsection considers to be in alternative work arrangements include the following, as defined in the research discussed below.

- **Independent contractor.** Provides services to customers on his or her own as an independent contractor, freelancer, or consultant, sometime via online platforms (online gig workers)
- **Outsourced (contract) worker.** Works for a firm that contracts out its services to other firms
- **IPT worker.** Works part-time for economic reasons (e.g., unfavorable business conditions, inability to find full-time work, seasonal declines in demand)
- **Workers with uncertain or varying schedules.** Works varying hours each period, is given no advance notice of schedule, or both

In sum, a small but increasing share of work has evolved outside the traditional employer-employee relationship, largely because of an increase in online gig work and outsourcing. Most gig work is not a primary job but rather used to supplement income. However, as some researchers argue, this fact should not reduce concern over the prevalence of this type of work because it might indicate underlying problems with individuals' primary jobs.<sup>28</sup> For example, a growing number of workers can find only part-time hours, and a large share of workers have varying and unpredictable schedules, both of which have negative effects on family wellbeing.<sup>29</sup>

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<sup>27</sup> Examples of digital platforms include Uber, Lyft, and TaskRabbit.

<sup>28</sup> Abraham and Houseman, 2019.

<sup>29</sup> Schneider and Harknett, 2019.

- **A small increase has occurred over time in alternative work arrangements, in the form of independent contractors, outsourced employees, and workers in the online gig economy.**

Recent estimates suggest that about 10 percent of workers are in alternative work arrangements and that this share has increased by 1 to 2 percentage points since 2000.<sup>30</sup> Katz and Krueger (2019b) show that most of the increase in alternative arrangements was driven by an increase in the number of independent contractors and contract workers.<sup>31</sup> As noted above, independent contractors include the category of gig workers, who work online via digital platforms (e.g., ride-share services) and offline (e.g., many types of construction workers). These findings are roughly consistent with findings using Internal Revenue Service tax data, which show small increases in independent contractor work (measured using 1099 filings, which firms are required to submit documenting payments to self-employed independent contractors).<sup>32</sup> Collins et al. (2019) find that the increase in 1099 filings was driven largely by an increase in online gig work, although the incidence of that type of work remains low, at 1 percent of the workforce.

In terms of contract workers, other research has similarly documented an increase in the rate of domestic outsourcing, or firms' use of outside contractors or temporary staffing agencies to provide services that formal employees would have provided previously. Dorn et al. (2018), for example, document a notable increase since 2000 in the percentage of individuals who work for business service firms, with especially large increases for food, cleaning, security, and logistics occupations. As an example, the share of individuals in cleaning and janitorial occupations working for business service firms increased from 2 percent in 1950 to 25 percent by 2015. Although these workers are still considered employees of the business service firms, outsourced workers tend to earn less than their non-outsourced counterparts, and they are less likely to be offered employer-provided health insurance.<sup>33</sup>

Although limited analysis exists of the characteristics of workers in these alternative arrangements, some indication suggests they tend to be lower income. Jackson, et al. (2017) and Collins et al. (2019), for example, show that gig workers and independent contractors generally have lower average incomes than other workers. In addition, the types of occupations affected by domestic outsourcing (e.g., janitors, security guards) suggest that this trend disproportionately affects the low-wage labor market.

Less research has been conducted regarding the continuity of these trends, although they will be driven in part by the composition of employment across occupations and industries. As noted, the prevalence of domestic outsourcing varies by occupation, and BLS analysis shows that the prevalence of alternative work more broadly varies by industry (BLS, 2018). Neumark and Reed (2004) examine the relationship between jobs in the fastest growing industries and

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30 Katz and Krueger, 2019b; BLS 2018.

31 Katz and Krueger's initial analysis (2019a) using the RAND-Princeton Contingent Worker Survey suggested a larger increase than obtained from BLS, using the BLS Contingent Worker survey. A subsequent analysis by Katz and Krueger (2019b) found that the diverging estimates arose from differences in the timing of the surveys, survey methods, and sampling. Adjusting for these differences brought the RAND findings closer to the BLS findings.

32 Jackson, Looney, and Ramnath, 2017; Collins, et al. 2019.

33 Dorn, et al. 2018; Dube and Kaplan, 2010.

alternative work and find that, between 1995 and 2001, workers in these industries were significantly more likely to work in alternative arrangements than workers in other industries. This increase is driven in part by construction and personnel services.

Other research suggests that the strength of the economy will also affect trends in alternative work. Katz and Krueger (2019a) suggest that a tighter labor market is associated with lower rates of alternative work. Similarly, an analysis using bank account data and deposits from online platforms suggests that online work is negatively associated with the availability of other, more traditional jobs (Farrell and Greig, 2016). Thus, the dramatic increase in unemployment rates in the wake of the COVID-19 pandemic, increasing from 3.6 percent in January 2020 to a high of 14.7 percent in April 2020 and falling to 8.4 percent in August 2020, might lead to an increase in online gig work and alternative work more generally.

- **Although prevalent among workers, gig work (both offline and online) is pursued mainly to supplement or smooth income rather than as a primary job. However, it is an important income source for many low-income families.**

According to 2016 tax data, for example, more than half of individuals who had online gig income earned less than \$2,500 from that work over the year.<sup>34</sup> Farrell and Greig (2016) report a high turnover rate in online gig work—more than half of gig workers in their sample had left gig work within a year. However, they also found that workers with the lowest incomes tended to stay in gig work longer.

Abraham and Housemen (2019) capture gig work in their study of informal work, defined as occasional work or side jobs not part of a primary job. They find that in 2017 more than one quarter of adults reported performing informal work in a given month. Less educated and lower-income respondents were equally likely as others to engage in informal work, but they were more likely to report that it was an important source of family income.

In addition, the types of gig work these adults performed differed. Less educated adults, for example, were more likely to engage in offline gig work (e.g., childcare, elder care, home maintenance) and less likely to engage in online gig work. Thus, focusing only on the online gig economy disregards a significant share of informal employment for low-income workers.

- **IPT employment has increased.**

The Current Population Survey classifies individuals who indicate they work part-time for economic reasons (e.g., unfavorable business conditions, inability to find full-time work, seasonal declines in demand) as IPT workers.<sup>35</sup> Using that definition, Golden (2016) shows that the incidence of IPT employment has increased since 2000. In that year, just more than 2 percent of all workers were considered IPT. The rate increased to more than 6 percent by 2010 and fell back to just more than 4 percent by 2016, representing nearly 6 million workers.

The elevated level of IPT employment in 2016, compared with pre-2008 recession levels, raises the question of whether the increase is due in part to structural, rather than cyclical, changes in the economy. Valetta et al. (2018) estimate that some part of the increase from prerecession

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<sup>34</sup> Collins et al. 2019.

<sup>35</sup> See <https://www.bls.gov/cps/definitions.htm#ptcr>.

levels is structural, owing to changing employment shares across industries, for example, shifts over time into leisure and hospitality and education and health services, which have relatively higher rates of IPT employment. In fact, Golden documents that these two sectors, plus retail trade and professional and business services, account for 85 percent of the growth in IPT employment since 2000. Employment in these sectors generally increased over time, with the rate of IPT employment within these sectors also increasing. BLS data suggest that employment in these industries (except retail trade) will increase over the next 10 years, suggesting that IPT employment rates likely will remain elevated and might even increase in the longer-term.<sup>36</sup>

Finally, data on the characteristics of workers show that Black and Hispanic workers and less-educated workers have disproportionately high rates of IPT employment. IPT workers also earn lower hourly wages than other workers, have lower incomes, and are more likely to have irregular work schedules.<sup>37</sup>

- **Many low-wage workers face considerable schedule uncertainty.**

From the employer’s point of view, “just-in-time” scheduling, where employees are given a tentative work schedule and called in depending on the amount of work available, can save on labor costs by varying labor input with customer demand. However, this practice shifts the burden of these changes onto the worker, leading to income instability. Golden (2015) estimates that about 17 percent of all U.S. workers have unstable work schedules, defined as “irregular or on call” or “split or rotation,” with a rate of 20 percent for low-income workers. Lambert et al. (2014) used survey questions to examine several types of uncertainty—whether hours varied in the previous month, amount of advance notice of their schedule workers are given, and amount of control workers have over their hours and schedule. Using these metrics, they find that 38 percent of young workers (ages 26 to 32) are given one week or less notice of their schedule, and about 75 percent of these workers reported some variation in their work hours in the prior month.<sup>38</sup> Scheduling uncertainty is higher for hourly paid workers and for those in low-wage jobs. It is also higher for part-time workers and for workers in retail and food service jobs.

The Shift Project at the Harvard Kennedy School is an effort to document schedule variability through surveys of employees in retail and food service occupations.<sup>39</sup> Findings from that project show similarly high rates of schedule uncertainty for these workers, with especially high rates for Black and Hispanic workers.<sup>40</sup>

## C. Different Trends by Geography

In their argument for place-based policies, Austin et al. (2018) document the growing economic disparities between regions of the country, comparing the high-income coasts and the western part of the Midwest with the distressed eastern part of the Midwest. The latter region, which includes Ohio, Michigan, and Kentucky, suffers from high non-employment (or the percentage

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<sup>36</sup> See <https://www.bls.gov/emp/tables/employment-by-major-industry-sector.htm>.

<sup>37</sup> Golden, 2016.

<sup>38</sup> The authors’ analysis focused on only workers within this age range.

<sup>39</sup> See <https://shift.hks.harvard.edu/>.

<sup>40</sup> Storer et al. 2019.

of working-age adults who are not employed), high rates of disability and opioid use, and high rates of mortality. Although geographic mobility has helped to narrow regional disparities in the past, a decline in mobility beginning in the 1980s has reduced the rate at which they are diminishing.<sup>41</sup>

The authors present evidence suggesting that employment elasticities are higher in economically distressed areas, meaning that those areas would expect to see larger increases in employment rates in response to an increase in the economic payoff to working. In this case, “a dollar spent fighting non-employment in a high not-working-rate area will do more to reduce non-employment than a dollar spent fighting non-employment in a low not-working-rate area.”<sup>42</sup>

In addition to these more obvious differences in economies across areas, a few other trends have been described. The research notes large, and likely enduring, differences in economic conditions among regions of the country and between cities and less urban areas. Large coastal cities, for example, have more educated and younger populations than suburban and rural areas and face lower risks of job automation. In contrast, workers in smaller cities and suburban and rural areas in parts of the Midwest might be especially hard hit by advances in technology and automation.

- **The prevalence and effects of technology vary by region and urbanicity.**

Key differences exist across areas that shape how technological advances impact them. First, college graduates, whose jobs are less likely to be eliminated by automation, are increasingly concentrated in cities.<sup>43</sup> Although recent data show that net in-migration to large cities has fallen, as more individuals move to suburban or smaller cities, this decline has been larger for less educated workers, given high housing costs in big cities and, as noted later, declining middle-wage job opportunities.<sup>44</sup>

Second, regions vary in their industry mix, and jobs in certain industries are more at risk of being automated than jobs in other industries. Muro et al. (2019) find, for example, that fewer jobs are at risk of automation in the West and the Northeast coast regions, given the lower prevalence in these regions of routine occupations in manufacturing and transportation. Similarly, Levy (2018) notes that most software application developers are concentrated in coastal cities, while heavy and tractor-trailer truck drivers, at relatively higher risk of automation, are concentrated away from the coasts in less densely populated areas.

In Lin’s study of emerging occupations, mentioned earlier, he finds that new occupations are more likely to emerge in cities with high concentrations of college graduates and more industry variety. The concentration of skills and economic activity makes these areas better able to attract this new work. Similarly, Collins et al. (2019), find that online gig work tends to be concentrated in large cities, given that the higher density leads to a larger customer market.

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41 Ganong and Shoag, 2017; Molloy et al. 2011.

42 Austin, Glaeser, and Summers, 2018, p. 223.

43 Diamond, 2016.

44 Frey, 2020; Ganong and Shoag, 2017.

- **Middle-wage opportunities for less-skilled workers in cities are declining.**

In the past, less educated workers were able to earn more in cities than they were in suburban and rural areas. However, Autor (2019) documents a striking fall in this urban wage premium. According to Autor, leading up to the 1970s, cities had an abundance of middle-skills jobs for workers lacking a college education. After that, however, the reduction in the number of these jobs that occurred because of technological change was concentrated in urban areas. As a result, less educated workers in cities were pushed into low-wage jobs in services, transportation, and manual labor industries.<sup>45</sup>

Autor argues that the declining inflow of less educated workers to cities reflects these reduced opportunities and, by reducing the labor supply, might eventually increase wages in the low-skills jobs that remain. At the same time, because suburban and rural areas tend to have older populations, demand might increase in these areas for low-skill workers, which might increase wages for such jobs in these areas, as well.

#### **D. Trends Related to the Aging of the Population and the Economic Downturn**

Multiple factors will affect the labor market over the next decade, and this subsection briefly discusses two additional trends. First, the aging of the large baby boomer generation (72 million individuals, or 22 percent of the population) is contributing to the overall aging of the population.<sup>46</sup> By 2030, for example, the entire baby boomer generation will be over age 65. Although older individuals are staying in the labor force for longer periods, their eventual retirement will reduce the growth rate of the labor force, leading to more jobs than workers to fill them. In addition, their retirement in some parts of the country will lead to an excess demand for college-educated workers. In California, for example, the baby boomer generation is more educated than younger cohorts.<sup>47</sup>

The aging of the population will also affect the growth of certain occupations and industries. An increase in the demand for healthcare services is the most obvious example and is apparent in the BLS labor market projections. Also, as noted earlier, this change might be more pronounced in suburban and rural areas, which might increase wages for these types of jobs in those areas.

Second, toward the end of 2019, slowing economic growth in the United States and abroad raised questions about an imminent recession.<sup>48</sup> In the wake of the COVID-19 pandemic, the primary questions now are how deep the economic downturn will be and how long it will last. Likely low-wage and less-skilled workers have been disproportionately affected, given their concentration in the hard hit retail and leisure and hospitality industries and in jobs for which remote work is less feasible.<sup>49</sup> In the long-term, how the pandemic will affect the nature of work is unclear, although much speculation exists that it will accelerate jobs automation.<sup>50</sup>

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45 The passage of higher minimum wages in many cities might serve to attenuate the fall in earnings for non-college educated workers.

46 See <https://www.census.gov/data/tables/time-series/demo/popest/2010s-national-detail.html>.

47 Johnson et al. 2015.

48 Nunn, Parsons, and Shambaugh, June 6, 2019.

49 See <https://www.bls.gov/news.release/empsit.toc.htm> for unemployment rates by education level and other characteristics.

50 Corkery and Gelles, *The New York Times*, April 10, 2020.

Research on policies and services for less-skilled and low-income populations must consider the context of high unemployment for the near future.

## IV. Implications for Research on Programs Supporting Low Income Workers

Sections II and III identified several ways in which the labor market has changed over the past few decades and ways in which it might change over the next 10 to 15 years. First, technological advances have already changed the nature of work and will continue to do so, eliminating some jobs entirely and changing the task content of others. Unlike the elimination of middle-skills jobs in the past, low-wage jobs are thought to be most at risk for automation in the coming years. Second, the nature of the employer-employee relationship will continue to change over time, although at what pace is unclear. Contingent work has increased and might continue to increase in the wake of the COVID-19 pandemic; IPT work has increased; and many workers, particularly low-income workers, face uncertain schedules. Further, the effects of each of these trends might vary depending on where individuals live. The risk of job loss because of automation, for example, varies by region and urbanicity. Finally, other trends will affect the nature of work, including the aging of the population and the economic downturn resulting from the COVID-19 pandemic.

This section considers the implications of these trends for research and evaluation, organized around three broad types of programs and policies designed to increase employment and economic wellbeing among low-income populations: job search and career counseling; education and training; and income, reemployment, and making work pay. Within each subsection, the discussion starts with a brief background on research, followed by potential areas for further research, including relevant research questions. The discussion is typically organized around issues of data, technology, alternative work arrangements, and geography.

### A. Job Search and Career Counseling

Findings on the effects of job search and career counseling services have been mixed. For example, the ongoing OPRE Job Search Assistance Strategies Evaluation is testing the relative effectiveness of several job search services provided to Temporary Assistance for Needy Families (TANF) applicants and recipients. Services include training on workplace skills and behaviors, resume development, interview skills, and assistance with contacting employers.<sup>51</sup> Programs also use job developers, who develop relationships with employers, match participants to employers or specific jobs, and track the local labor market to identify job opportunities. Evaluation findings from three programs, which implemented services roughly from 2015 to 2018, have found no effects on employment and earnings.<sup>52</sup>

The U.S. Department of Labor (DOL)–funded Workforce Investment Act Adult and Dislocated Worker Programs Gold Standard Evaluation *did* find effects of more intensive services offered

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<sup>51</sup> Job search is considered a key work-related activity in most state TANF programs (see Hahn et al. 2017).

<sup>52</sup> Martinson et al. 2019a, 2019b, 2020.



to customers at American Job Centers. That study, which enrolled individuals between 2011 and 2013, compared individuals who were allowed to access “core services,” (mostly online, self-service job search tools) with individuals who had access to “intensive services,” which included skills assessments, job search workshops, resource rooms with internet access, and one-on-one assistance. The latter group was found to have higher employment rates and earnings through 30 months after study entry.<sup>53</sup> Finally, the Employment Retention and Advancement demonstration also provided job search assistance, career and job retention counseling, and reemployment assistance to welfare recipients and other groups of low-income individuals. The evaluation, which enrolled study participants between 2000 and 2004, found that most programs did not have effects on employment or earnings.<sup>54</sup>

Coupled with the trends documented earlier in this white paper, these findings suggest that there is more to learn about effective job search and career counseling services, particularly as the labor market changes in response to technology. Programs might be strengthened in several ways, such as through using the large amounts of labor market data available to inform their efforts, helping jobseekers take advantage of technology to find jobs and to move into better paying jobs, and documenting the skills employers require and ways in which they align with the skills jobseekers already have.

## **Using Data and Labor Market Information to Inform Job Search and Development**

An important first step in helping jobseekers take advantage of technology is documenting how low-income individuals and staff in job search programs search for and identify potential jobs. The advent of online job boards and labor market data has made job search less costly. But barriers to using these data might occur if access to technology is limited or if limited cognitive bandwidth exists to deal with potentially overwhelming online sites.<sup>55</sup>

These issues are relevant to individual jobseekers and program staff. For individual jobseekers, Kuhn and Mansour (2011) find that, although internet search does speed up time to employment, its use by jobseekers is highly correlated with education level and home internet access. An update to that work would be useful, given the proliferation of online job boards and search engines over the last decade. One key question is whether many low-wage jobseekers are using the online job boards ineffectively, for example, or if lack of access to the Internet is still an important barrier. Understanding how individuals search for jobs might help identify potential interventions tailored to address the most notable barriers.

For staff, anecdotal evidence suggests that job developers in many workforce programs rely on personal connections established after years working in the community instead of on available labor market data. Although employer connections are invaluable, augmenting them with current and timely data (labor market information collected by state agencies but also data from online job boards) would provide more opportunities for clients. An investigation into how

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53 Fortson et al. 2017.

54 Hendra et al. 2010.

55 Mullainathan and Shafir, 2013.

staff search for jobs would go beyond anecdotes, illustrate how staff might be using available data, and suggest areas for intervention.

One type of intervention worth assessing is public-private partnerships, given the ability of many private firms to obtain and analyze big data on online job postings, jobseekers' profiles, and resumes. For example, the Missouri Economic Research Information Center within the Missouri Department of Economic Development has partnered with Burning Glass Technologies, a software analytics firm that collects data from millions of job posts to provide up-to-date information on jobseekers and in-demand occupations and skills. These data provide state agencies with real-time data to match job vacancies to the jobseekers' skills.<sup>56</sup> In another public-private partnership, Burning Glass Technologies is working with the U.S. Department of Commerce and an IT trade association to create a tool that enables users to identify jobs in cybersecurity, by skills required and location.<sup>57</sup>

***Relevant research questions: Using data and labor market information to inform job search***

- How do low-income jobseekers and program staff search for jobs?
- What are effective approaches to use data in job search?
- Can public-private partnerships help in the effort to use data in job search?
- What are effective ways to help jobseekers and program staff learn about new and growing occupations?

## **Increasing Access to Technology**

Any discussion about the use of data and technology must address the issue of access to technology. The digital divide has been well documented, with low-income families and low-income areas having much less access to broadband Internet and computers.<sup>58</sup> One theme echoed in much of the research is that technological advances will lead to further increases in inequality unless access is made equally available to everyone. Given the increasing availability of educational and informational resources online, and the forced movement to online interaction as a result of the COVID-19 pandemic, a program to increase access to technology would likely, by itself, have important effects on low-income families.

Access to and ability to use technology is also important for the programs that serve these families, increasing their ability to provide job search and training, offer services remotely, and stay up to date on emerging and declining occupations.

***Relevant research questions: Supporting job search through increased access to technology***

- How does access to technology vary for low-income populations?
- What are effective methods to increase jobseekers and program staff's access to and use of technology?

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<sup>56</sup> Council of Economic Advisors, July 2018.

<sup>57</sup> See [Cyberseek.org](http://Cyberseek.org).

<sup>58</sup> Anderson and Kumar, 2019.

## Methods to Effectively Identify Required Job Skills and Improve Job Search

Researchers have already begun tracking jobs' skill content, through data sources such as O\*NET, but data from online job boards could also be used to track emerging jobs and their skill content. This work must be ongoing and with a focus on occupations available to low-skilled workers and on regional and urbanicity differences.

One challenge is to help individuals demonstrate relevant skills to potential employers. Such skills include technical skills, but also social, analytical, and creative skills, which will be increasingly in demand, given that they are less susceptible to automation as discussed earlier. How might a childcare worker, for example, indicate the social perception skills she has acquired on the job that might be relevant for other jobs?

In many cases, workers might also be unaware that, through work experience, they already possess the skills needed to move to better jobs. Blair et al. (2020) document this concept for workers without college degrees. They use O\*NET data to define jobs' skill content and determine how similar they are (measured by "skill distance") to other jobs.<sup>59</sup> They define STARs (Skilled Through Alternative Routes) as low-wage workers who have the skills to move to a higher paying job, given that only a small skill distance exists between their current job and a job that pays higher wages. Their analysis indicates that nearly half of workers lacking a college education have the skills needed to move into jobs that pay much more than their current jobs.

Although some job search programs might be doing this type of skill matching informally, assessing the effects of more formal efforts that use available data would be beneficial. Such a program might work with low-income individuals (including individuals without work, working in traditional employer settings, and working informally) and consider their skill profiles and matches with potential jobs. These data could also be used to track what types of workers (e.g., from what occupations) pursue different types of jobs, offering more insight into skill portability.

Another approach to test to demonstrate worker's skills is providing individual performance ratings to employers. For example, Pallais (2014) reports findings from a randomized controlled trial that provided young individuals on a freelance job board with a short-term job and a rating for that work. Providing this additional information on performance increased the rate at which these individuals were hired for subsequent jobs and their average wages.

An additional informative line of research might be to conduct audit studies (field experiments) of employer hiring practices, to help programs determine how best to market jobseekers. One of the early examples of audit studies documented racial bias in hiring practices.<sup>60</sup> A more recent example is Farber et al. (2018), who submitted fictitious resumes with randomly varying characteristics to online job postings. They found, for example, that callback rates were lower for younger jobseekers and individuals who are currently employed. One could test the effects of different methods of articulating experience and skills to help low-income jobseekers best represent themselves to employers and increase their chances of employment.

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59 The skill distance between two jobs was calculated as the sum of squared differences (or the Euclidian difference) of 35 values for each job. The values measure the intensity in that job of 35 specific skills.

60 Bertrand and Mullainathan, 2004.

Related to demonstrating skills is ensuring a good match between jobseekers and employers. Efforts could be tested for low-income jobseekers, and the advent of data from job boards and computing power could help match the jobseeker's skills with skills in demand. For example, Horton (2016) analyzed data from a randomized controlled trial on a large online labor market platform,<sup>61</sup> in which a treatment group of employers who posted jobs was offered computer-generated recommendations from the jobseekers pool. The recommendations were based on the overlap between the jobseeker's skills and the skills required for the job, the jobseeker's ability (based on skills test scores and ratings from previous employers), and the jobseeker's availability. Offering these recommendations to employers reduced their hiring costs and increased hiring, relative to employers in the control group that received no recommendations. These models that predict a good employee-employer fit could also be updated over time, using information on job performance and retention.

Any effort to help individuals find jobs must also acknowledge that, even within narrowly defined industries, some firms pay better than others. Haltiwanger et al. (2018), for example, use the Longitudinal Employer-Household Dynamics (LEHD) data to demonstrate that one way in which low-wage workers advance is by moving from low-wage firms to high-wage firms, where high-wage firms are defined relative to other firms within the same industry.<sup>62</sup> As Barth et al. (2014) note, it is not just a worker's skill level that determines his or her earnings, but where he or she works. These findings call for additional research to identify higher paying firms within a given industry, the means by which workers find and move into these higher wage firms, and the factors driving the implementation of these firms' hiring and pay policies.

### ***Relevant research questions: Using data to identify job skills to improve job search and matching***

- How do low-income jobseekers and program staff learn about jobs' skills requirements?
- What are effective ways to help jobseekers and program staff use data to learn about the skills required for specific jobs?
- What are effective ways to help jobseekers demonstrate existing skills, including technical, social, and creative skills less susceptible to automation?
- What are effective ways to help low-income workers use existing skills to move to higher wage jobs?
- How can programs achieve good matches between jobseekers and employers?

## **Research on the Prevalence and Effects of Alternative Work Arrangements**

Given the growing prevalence of alternative work arrangements, understanding more about this type of work for low-income individuals is important. For example, what types of workers

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<sup>61</sup> The platform was oDesk, now known as Upwork.

<sup>62</sup> The LEHD data consist of quarterly worker-level earnings reported by employers to state Unemployment Insurance systems, linked to establishment-level data collected for the Quarterly Census of Employment and Wages (QCEW) program.

are more likely to work in these arrangements? What types of jobs are more likely to be outsourced, offer varying schedules, or have large numbers of part-time workers? Understanding more about these issues might help to better tailor job search assistance to certain types of individuals and provide guidance about types of occupations to pursue.

Conducting further research on how low-income workers use alternative work arrangements would also be informative. Assessing the extent to which these jobs help workers smooth and supplement income might guide whether staff make efforts to facilitate access to this type of work. Research could also examine whether staying in these jobs inhibits movement into higher paying, higher quality jobs and eventual career advancement.

Relatedly, future research could examine whether the skills acquired through informal jobs, including social, creative, and analytical skills, could be used to move into higher paying formal jobs. The findings from such research might inform career counseling in terms of whether to steer individuals away from certain types of occupations or industries or to encourage them as a short-term solution. Many of these questions are difficult to assess experimentally, although research might be able to take advantage of differences in the incidence of gig work across areas or assess the effects of a program designed to help gig workers move to more formal employment.

#### ***Relevant research questions: Understanding how alternative work arrangements affect low-income workers***

- What is the prevalence and duration of alternative work arrangements for low-income populations?
- What types of low-income individuals are more likely to work in alternative arrangements, and in what industries and occupations are these types of jobs more prevalent?
- What are the effects of these arrangements on formal employment and career advancement?
- How can skills acquired via informal or gig work help individuals move into formal employment?

### **Research on Differences by Geography**

Any effort to help individuals and program staff conduct job search and career counseling more effectively must acknowledge the important differences in context across regions and by urbanicity. The effect of technology and automation will likely vary across different parts of the country, owing to differences in occupation and industry. More jobs are at risk of automation in the Midwest, for example, than in coastal areas, while new types of jobs emerging from technology are likely to be concentrated in large cities. The types of jobs and opportunities for advancement might vary, as well, given the declining middle-wage opportunities in larger cities, for example, and the growing proportion of aging populations outside large cities.

All these differences highlight the importance of tracking data at the local level to consider whether different strategies are warranted for different areas. Programs in areas with many jobs at high risk for automation, for example, might consider strategies for accessing virtual job opportunities or putting additional effort into identifying emerging local jobs. In addition, the same strategies might have different effects across areas, suggesting that studies might want to be deliberate in site selection to provide different economic contexts.

### **Relevant research questions: Considering geography in job search**

- How should the design of local job search and career counseling programs vary in response to the effects of technology and automation?
- How can local program staff use available data to monitor job openings and job skills?
- How do the effects of interventions in the area of job search assistance and career counseling vary across regions and by urbanicity?

## **B. Education and Training**

Education and training initiatives evaluated several decades ago generally failed to produce lasting effects on employment and earnings, most likely because the training was general and loosely tied to local employer demand.<sup>63</sup> These findings led to the more recent focus on sectoral training programs, which have shown promise. The WorkAdvance demonstration, run between 2011 and 2013, built on the encouraging findings from the Sectoral Employment Impact Study, launched in 2003, which found large earnings gains for participants in three sector programs. WorkAdvance found positive effects on employment and earnings between four to eight years after study entry, although these effects were driven largely by effects in one site.<sup>64</sup>

More recent studies are testing career pathways approaches, which connect education, training, and related supports in a pathway that is intended to lead to employment in a specific sector or occupation or to further training. These studies include ACF's Pathways for Advancing Careers and Education (PACE) project, launched in 2007, and impact evaluations of the Health Profession Opportunity Grants (HPOG) program.<sup>65</sup> Although effects on employment and earnings have yet to be assessed for most PACE sites, most programs produced positive impacts on short-term education and training outcomes.<sup>66</sup> Early findings from HPOG showed positive impacts on educational progress and employment in healthcare but no significant gains in earnings three years after random assignment.<sup>67</sup> Common themes across several of these programs revealed that most individuals participated in short-term training opportunities, which typically lead to lower-wage jobs, and few participated in more than one training.

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63 Hendra et al. 2011; Miller et al. 2012.

64 Schaberg and Greenberg, 2020.

65 HPOG provides education and training to TANF recipients and other low-income individuals for occupations in the healthcare field that pay well and are expected to either experience labor shortages or be in high demand. There have been two rounds of grant awards—one in 2010 (referred to as HPOG 1.0) and one in 2015 (referred to as HPOG 2.0). ACF's impact evaluation of HPOG 1.0 started in 2011, and the impact evaluation of HPOG 2.0 launched in 2015.

66 Gardiner and Juras, 2019.

67 Peck et al. 2019.

Further research in this area could focus on how to encourage individuals to participate in training throughout their careers, to stay ahead of the changing skills requirements of jobs and advance to higher-wage jobs. Technology might also be used to increase access to and completion of training courses. Staff of career pathways programs must also monitor skills employers require because job tasks might change over time; future research could explore effective approaches for staff to do so.

## **Using Data to Inform Skills Requirements for Training and to Support Skills Acquisition**

As technology transforms the labor market, both individuals and training programs must stay abreast of changing skills requirements. Many training programs do so already by working closely with local employers in designing curricula. This work could be augmented and adjusted to be more future oriented by using government data on skills requirements or data from privately run online job boards that document how job skills are changing. This information might also be gained from case studies of employers.

Further research is also needed on how programs can best help workers strengthen or acquire the types of skills that will be in demand in the coming years; the types of skills less likely to be automated, including skills related to communication, social intelligence, and creative intelligence; or both. In addition, given that many skills might be transferable to other occupations, further research is needed to identify occupations with similar skill requirements (or minimal skill distance, as described earlier), to inform the provision of training so it is relevant to multiple occupations. Such training could support low-wage workers seeking to enter the labor market as well as displaced workers hoping to retrain relatively quickly for adjacent occupations.

Another theme identified in the first part of this white paper is the need for workers to remain agile over their careers and retrain as needed to adapt to changing skill requirements. This theme underscores the importance of efforts to encourage and help workers pursue training at several points in their careers. A variety of approaches could be tested as part of this effort, including lifelong training accounts, funded by individuals, government, and potentially employers;<sup>68</sup> voucher programs, used in many other countries, in which private placement agencies receive public payment for successfully placing jobseekers;<sup>69</sup> and increased financial support for training, such as broadening eligibility for Pell grants to include individuals pursuing short-term training programs or disregarding some fraction of earnings for individuals who are training while employed.

Research could also assess the effects of shortened or accelerated training programs, such as boot camps used for coding. Muro et al. (2019) discuss the LaunchCode program, in which a group of nonprofits help individuals upskill through free coding boot camps, after which they are placed with one of the project's employer partners. Tests of these types of programs could

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68 Fitzpayne and Pollack, 2018.

69 Council of Economic Advisors, July 2018.



assess whether their effects depend on the creation of widely recognized skill-based credentials.

Another option is to test the effects of public-private partnerships, given the limited funding for the American Jobs Centers.<sup>70</sup> One example of such a public-private partnership is the Skillful Initiative, a collaboration between the Markle Foundation, LinkedIn, and the States of Colorado (Skillful Colorado) and Indiana (Skillful Indiana) to create an online tool to help workers access and find training for in-demand jobs. The initiative is focused on state residents without a four-year college degree.<sup>71</sup>

Potential approaches to implement and evaluate on the employer side include providing tax incentives for employers to offer more training to their existing workers, targeting lower-wage workers in the firm,<sup>72</sup> and providing technical assistance for training or online training tools to employers.

#### ***Relevant research questions: Promoting training in skills that will remain relevant***

- How do low-income individuals learn about and select training programs?
- How do program staff identify jobs' skills requirements?
- What are effective approaches to help programs or agencies use data to stay current on jobs' changing skills requirements?
- What are effective methods for helping individuals strengthen or acquire skills unsusceptible to automation, including creative, analytical, and social skills?
- How can workers be encouraged and supported to engage in training throughout their careers?
- How can employers be encouraged to provide more training to incumbent workers?

## **Using Technology in Training**

Technological advances provide new opportunities for education and training approaches. Computer-assisted learning is being used in K–12 classrooms, for example, to tailor coursework to individual students, and a recent review of findings suggests that these applications can improve performance, particularly in math.<sup>73</sup> Examining how to leverage this technology in workforce training programs is worthwhile as is conducting research on its effect on program cost, completion rates, and participant outcomes. The shift to online activity in the wake of the COVID-19 pandemic might provide an opportunity to learn about the effectiveness of online training strategies. Technology use also raises the need to identify effective approaches for training individuals on digital literacy and use of existing technology.

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70 Nie and Struby, 2011; Wandner, 2015.

71 See [www.skillful.com](http://www.skillful.com).

72 Fitzpayne and Pollack, 2017.

73 Escueta et al. 2017.

### ***Relevant research questions: Using technology in training***

- How can technology be used to improve access to and completion of training programs?
- Can online learning tools be used to reduce training costs and increase participant completion rates?
- What are effective methods for training individuals on digital literacy and use of existing technology?

## **Research on Differences by Geography**

Existing research has documented the changing fortunes and economies across areas, but updating these analyses and documenting these changes in skills needed at the local level will be important. Information on the effects of technology and automation across areas will help identify emerging and declining occupations, guiding the type and provision of training offered. Related, further research is warranted into how programs use existing data as well as into how the effects of interventions might vary across areas.

The availability of online, remote training has the potential to increase access for individuals in rural or underserved areas, many of which are economically distressed already and might be especially hard hit by continued automation. Examining how technology can be used to better serve these areas, via remote training and potentially connecting individuals to remote job opportunities, would be worthwhile.

### ***Relevant research questions: Increasing accessibility of education and training across different regions***

- How are skills requirements changing across regions and for cities compared with less urban areas?
- How can technology be used to increase access to training in rural or underserved areas?
- How do the effects of potential interventions in the areas of education and training vary by region and urbanicity?

## **C. Income, Reemployment, and Making Work Pay**

The trends outlined in Sections II and III of this white paper highlight several ways in which workers will need support, such as income while unemployed, help finding new work, earnings supplements for individuals in low-wage jobs, and assistance with benefits not provided through work. Recommendations for further research in this area include identifying the best approaches for providing this support.

Previous research in this area has focused largely on efforts to help people find new jobs and efforts to make work pay by supplementing the earnings of individuals working in low-wage jobs. Early studies, all conducted during the early to mid-1990s, include the welfare waiver experiments in Minnesota and Connecticut that tested the provision of more generous earnings disregards for welfare recipients, a similar program for benefit recipients in Canada, and a test of the provision of earnings supplements and other benefits for low-income workers in Milwaukee, Wisconsin. In general, the programs encouraged work and increased incomes although effects were larger for programs that included services and work requirements.<sup>74</sup> Nonexperimental research on the Earned Income Tax Credit (EITC) expansions suggests that they increased single mothers' employment rates; and a recent experimental evaluation of a more generous credit for workers without dependent children showed small, positive effects on employment and income.<sup>75</sup>

Subsidized employment programs typically target individuals with barriers to employment but might be one policy to help individuals who lose jobs because of automation or other factors. Recent evaluations include ACF's Subsidized and Transitional Employment Demonstration and DOL's Enhanced Transitional Jobs Demonstration, both launched in late 2010 and ended in 2020 and 2018, respectively. In general, the evaluations have found that most of these programs increase employment while the jobs are in place but not in the longer-term.<sup>76</sup>

Less research has been conducted around income support strategies. Family Rewards, the first conditional cash transfer program tested in the United States, between 2007 and 2010, was found to reduce poverty and material hardship. The program's effects on employment, however, were mixed; survey data indicated a slight increase in employment, but UI system data did not detect effects on employment.<sup>77</sup> In addition, the program led to a reduction in UI-reported employment for a subgroup of more disadvantaged participants.

Reduction in work effort is one concern with any income support program, including the EITC, and is often brought up in discussions of unconditional income transfer, such as a universal basic income (UBI). A UBI, or government-provided fixed income given to every adult regardless of his or her income level, has often been mentioned in the context of job loss to automation. The recent payments to families during the COVID-19 pandemic, along with greatly expanded UI benefits, have also raised the issue of basic income support. No findings are available yet from a small UBI pilot in Stockton, California, although other cities have expressed interest in conducting similar pilots.<sup>78</sup>

## Supporting Workers Displaced by Technology

Although most jobs appear to be at low risk for automation, uncertainty surrounds the existing estimates and more generally the pace of technological change beyond the near term.

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74 See Berlin (2000) and Michalopoulos (2005) for summaries of effects.

75 Nichols and Rothstein, 2016; Miller et al. 2018, Miller et al. 2020.

76 Cummings and Bloom, 2020.

77 Riccio, et al. 2013.

78 Emison, July 15, 2020 (*The New Yorker*).

Advances in technology and automation might come more rapidly than expected and might be incorporated quickly by employers in the wake of the COVID-19 pandemic.

Policymakers and researchers have put forth a variety of proposals for supporting individuals without work. Future research could assess the effects of a UBI on employment, education, and training, and whether it might target low-income families to reduce the cost. Another approach is a federal job guarantee, offering full-time employment paying above-poverty wages to any adult who needs a job.<sup>79</sup> Such a guarantee would lessen the effects of mass job displacement, and some analysts have recently discussed its potential use in the context of the dramatic increase in unemployment rates caused by the COVID-19 pandemic.<sup>80</sup> A variant of this approach might be a subsidized jobs program targeting high poverty areas<sup>81</sup> or individuals with more barriers to work.<sup>82</sup> For these jobs programs, a key question that future research could explore is how they can be improved to encourage a successful transition to unsubsidized work. Additionally, for both the UBI and jobs programs, a cost-benefit analysis would be important given the high costs of taking either of these policies to scale. Finally, another option to assess is wage loss insurance, in which displaced workers are given a subsidy to cover some fraction of the difference in earnings between their old and new jobs. The idea is that the subsidy would encourage quicker reentry into the labor market, even if the new job pays less than the old job. Such an approach could be compared with or provided in conjunction with training vouchers to help individuals reskill relatively quickly.

In terms of reemployment assistance, future research could explore the implementation and effects of an adjustment assistance program that offers displaced workers a package of benefits, such as wage insurance, health insurance, and help with job search and training.<sup>83</sup>

Lastly, research could also assess the role of public-private partnerships in supporting displaced workers, such as the Skillful Initiative mentioned earlier or the creation of a national reemployment web portal that leverages big data on the labor market.<sup>84</sup>

#### ***Relevant research questions: Supporting displaced workers***

- What is the best way to support individuals while they are not employed?
- What is the most effective approach to help individuals obtain new jobs after job loss?

## **Supporting Workers Earning Low Wages**

The EITC, a policy designed to “make work pay,” has proven one of the nation’s most effective antipoverty policies.<sup>85</sup> The Paycheck Plus demonstration, tested in two cities between 2013 and 2019, found that increasing the maximum benefit for adults without dependent children from about \$500 to \$2,000 can increase incomes and potentially lead to small increases in

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79 Paul, et al. 2018; Nunn et al. 2018.

80 Blackwell and Hamilton, May 9, 2020.

81 Neumark, 2018.

82 Cummings and Bloom, 2020.

83 Aldonas, et al. 2007; Muro et al. 2019.

84 Atkinson, 2018.

85 Nichols and Rothstein, 2016.

employment rates, without reducing work among individuals with higher earnings.<sup>86</sup> Other, nonexperimental evidence points to a higher EITC amount having a range of positive effects on families and children, such as maternal and child health and children’s schooling outcomes.<sup>87</sup>

Additional research could test the effects of a more generous EITC for all family types, defined by marital status and number of dependent children. Alternatively, research could evaluate a proposal from Burman (2019) to institute a Universal EITC (UEITC) that is more generous than the current credit and does not vary with family composition. The UEITC phases in at a rate of 100 percent with earnings up to a maximum benefit of \$10,000 and does not phase out with earnings. Future research could also assess a periodic EITC, which addresses the issue that the current EITC is an annual lump sum payment and does little to smooth income during the year. A small-scale study of the Chicago EITC Periodic Payment Pilot found that families who received half of their expected EITC amount in installments during the year had greater financial stability and reduced stress.<sup>88</sup> Future research could test this approach on a larger scale and in a different context.

#### ***Relevant research questions: Supporting workers with low wages***

- What are the effects on work, income, and wellbeing of offering a more generous EITC to workers?
- What are the effects of changes to the structure of the EITC, such as periodic payments?

### **Supporting Workers in Alternative Work Arrangements**

As noted in Section III of this white paper, a small but growing share of U.S. workers have a limited or informal connection to an employer (e.g., working as independent contractors), have unpredictable schedules, or both. More research is needed to document the prevalence and effects of these arrangements on workers and their families. Do ways exist to provide these workers with some of the benefits they do not receive from employers? Research could assess the direct provision of certain benefits or evaluate the implementation of labor laws that restore certain benefits for certain worker groups.

Harris and Krueger (2015), for example, propose legislation to create a new class of “independent worker,” who would qualify for many of the same benefits received by traditional employees, including collective bargaining rights, tax withholding, and employer contributions for payroll taxes. In 2019, the California State Assembly approved a bill requiring companies employing contract workers, such as Uber and Lyft, to treat these workers as employees, which would grant them a series of additional benefits. Other efforts at the local level include ordinances in many cities, such as San Francisco and Seattle, that require employers to provide employees with notice of schedules at least 14 days in advance.

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<sup>86</sup> Miller et al. 2018; Miller et al. 2020.

<sup>87</sup> Evans and Garthwaite, 2014; Hoynes, Miller, and Simon, 2015; Dahl and Lochner, 2012.

<sup>88</sup> Bellisle and Marzahl, 2015.

Although assessing effects of a local initiative is challenging, an evaluation of certain policies might be possible within a large employer that agreed to vary policies by location. Assessing, for example, how policies that require online workers to be treated as employees affect low-wage workers' employment and wages in those jobs, their movement into and out of other occupations, and their eventual advancement would be important. However, an evaluation of this type of policy might be beyond most federal agencies' scope of research.

***Relevant research questions: Supporting individuals working in alternative work arrangements***

- How do alternative work arrangements affect individuals' economic wellbeing and stability?
- To what benefits, such as health insurance and paid sick days, do individuals in alternative work arrangements have access, either through work or outside work? Are there ways to provide these workers with some of the benefits they do not receive from employers?
- What are the effects of methods to support workers in these arrangements?

## **Research on Differences by Geography**

The earlier discussion regarding differences by geography in this section highlights the ongoing divergence of regional economies and the likelihood that the effects of technology on job loss will vary by region and urbanicity. Regions in the Midwest, for example, have more jobs at risk of automation than other parts of the country and will experience greater need for programs that deal with job displacement. Ongoing research into the likely and actual job loss from technology will help for early identification of potential programs and locations to address the displacement in the most affected regions. As another example, middle-wage opportunities might fall for less educated workers in cities, suggesting an increased need to make work pay. Finally, assessing whether programs in each of these areas have larger effects in more economically distressed areas, leading to larger effects on employment, income, and wellbeing for individuals and communities, would be worthwhile.

***Relevant research questions: Providing support to workers in different regions***

- How does job loss because of technology vary across regions and localities?
- How does the prevalence of alternative work arrangements vary across region and localities?
- How do the effects of policies such as income support, reemployment support, and making work pay vary by region and urbanicity?

## V. Potential Implications of the COVID-19 Pandemic

The COVID-19 pandemic's onset, from the first confirmed cases in the United States in January 2020 to the widespread closing of nonessential businesses in March 2020, led to a rapid increase in unemployment rates, up to levels that had not been seen since the Great Depression. Unemployment jumped to nearly 15 percent in April 2020 and came down to just under 7 percent by December 2020.<sup>89</sup> The increase in unemployment affected different groups of workers differently. Unemployment rates were initially higher for women than for men, owing to the types of jobs they held and school closures, although the rates were similar by the end of the year.<sup>90</sup> Unemployment rates were also higher among Black individuals and were especially high for Hispanic individuals, in part because of their overrepresentation in industries and occupations that were the hardest hit.<sup>91</sup> Rates for these two groups fell after April, but they were still greater than 9 percent in December.

The fact that unemployment rates have fallen substantially from their levels in April and May 2020 indicates that a large fraction of job loss was “recall unemployment,” or individuals who were not working but on temporary layoff. However, the pandemic also led to an increase in “jobless unemployment,” or individuals not working for all other reasons, including permanent layoff, quitting, or entering or reentering the labor force. This rate remains elevated relative to pre-pandemic levels.<sup>92</sup> It is worth noting that unemployment rates do not account for individuals who have dropped out of the labor market, meaning that they are no longer actively looking for work. Labor force participation rates have fallen during the pandemic, particularly for Black and Hispanic workers.<sup>93</sup>

Despite expansions of UI and the Supplemental Nutrition Assistance Program (SNAP), the pandemic led to rising rates of material hardship, including increased rates of food insecurity and reduced mental and physical health.<sup>94</sup> In addition, the negative effects of the pandemic were strongest for low-income families, leading to a concern that the pandemic will exacerbate existing disparities.<sup>95</sup> On the other hand, anecdotal evidence suggest that employers have increased wages for numerous lower-wage occupations in the face of a shortage of interested applicants; however, it is not clear whether these gains will persist as the economy continues to re-open.<sup>96</sup>

Beyond the immediate reductions in employment and income caused by the pandemic, it is likely to affect workers and their families for years to come. First, persistent negative effects of entering the labor market during an economic downturn occur, suggesting long-term effects for young adults. Research documents, for example, that individuals entering the labor market during a recession start at smaller firms and with lower wages than individuals who enter at other times. In addition, the size and persistence of the earnings loss is greater for more

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<sup>89</sup> <https://www.bls.gov/charts/employment-situation/civilian-unemployment-rate.htm>

<sup>90</sup> Alon, et al. 2020.

<sup>91</sup> Fairlie, et al. 2020.

<sup>92</sup> Hall and Kudlyak, 2020.

<sup>93</sup> <https://www.bls.gov/charts/employment-situation/civilian-labor-force-participation-rate.htm>

<sup>94</sup> Bitler, et al. 2020.

<sup>95</sup> Angelucci, et al. 2020.

<sup>96</sup> See, for example, Rosenberg, June 10, 2021, “These businesses found a way around the worker shortage: Raising wages to \$15 an hour or more,” *The Washington Post*.



disadvantaged entrants.<sup>97</sup> Second, the pandemic has led to a reduction in human capital accumulation, at all ages. College enrollment has fallen among low-income high school graduates,<sup>98</sup> and existing college students have delayed graduation, with larger effects among low-income students.<sup>99</sup> Research also documents poorer performance among college students during remote instruction.<sup>100</sup> At the K–12 education level, the pandemic has set back learning for all students, but particularly among students of color and lower-income students.<sup>101</sup> Access to workforce training for adults has also likely been reduced, given the closure of many American Jobs Centers, although many of them have responded by offering online training, via partnerships with virtual learning sites, virtual job fairs, and interaction via Zoom and social media.<sup>102</sup> Finally, the pandemic has led to negative effects on both mental and physical health, which can have lasting effects on labor market prospects.<sup>103</sup>

Thus, despite the rapid decline in unemployment rates from their levels in April and May 2020, programs and policies will be needed to address the pandemic’s long-term effects. This section discusses COVID-19’s potential implications for labor market trends and the considerations those trends raise for future research relevant to policies and programs that can support the economic wellbeing of low-income workers and their families. In particular, it considers potential effects on the automation of jobs and online jobs, the effects on telework, and the design of income support policies.

## A. Automation

The pandemic likely will accelerate the effort to automate jobs, for two main reasons. First, economic downturns have typically accelerated automation, so the recession caused by the pandemic is also likely to do so.<sup>104</sup> Second, a push to automate jobs at high risk for virus transmission likely will occur. The question that this second factor raises is which jobs have a high transmission risk and are also susceptible to automation.

Chernoff and Warman (2020) examine this issue using O\*NET data. They first identify jobs that have a high transmission risk, using job features such as physical proximity and face-to-face discussions. Jobs with high transmission risk include, for example, dental hygienists and nurse anesthetists. They then identify jobs at high risk for both transmission and automation, which include jobs such as retail salespeople and cashiers. This research is an important preview of new types of jobs that might be at higher risk for automation. Continued work in this area will be needed as technological advances lead to increased automation possibilities and as the development of safety measures might change the viral risk of certain jobs.

Another relevant finding from this research is that occupations that have high transmission risk are not typically co-located with jobs at risk for automation, with the result that the jobs at high risk on both fronts are not concentrated in particular regions of the country, as is the case for

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<sup>97</sup> Oreopoulos, et al. 2012.

<sup>98</sup> National Student Clearinghouse Research Center, 2020.

<sup>99</sup> Aucejo et al. 2020.

<sup>100</sup> Orlov et al. 2020.

<sup>101</sup> Dorn et al., 2020.

<sup>102</sup> Goger, 2020; National Governors Association, 2020.

<sup>103</sup> Arthi and Parman, 2021.

<sup>104</sup> Hershbein and Kahn, 2018.

jobs at high risk of automation. Instead, these jobs are concentrated in certain demographic groups, particularly women in jobs with low to medium pay. Thus, more must be learned about how these trends will affect jobs at the local level and for certain types of workers.

Increased automation can also be expected to change the tasks that make up a job. Automation, as discussed earlier, can increase jobs' skill content, reducing tasks requiring routine operations in favor of tasks requiring communication and social perception. Ongoing research should continue to document how jobs' task content and organization change in response to automation, including for low-wage workers, with increased attention to jobs that have a high risk of viral transmission.

## B. Telework

Teleworking has increased as employers have closed workplaces, and a recent study focusing on the early months of the pandemic found that 35 percent of workers switched to working from home in April 2020, while 37 percent reported that they were still commuting.<sup>105</sup> The likelihood of switching to remote work falls with a worker's age and varies by occupation, with workers in management and professional occupations more likely to switch. Dingell and Neiman (2020) estimate that up to 37 percent of jobs can be performed from home, but that the ability to work from home is positively correlated with income and education. Occupations with a high share of jobs that can be conducted remotely, for example, include legal occupations, business and financial occupations, and managements occupations. However, they also include office and administrative support occupations, which are more typically middle-skilled jobs.

The long-term consequences of the shift to remote work are uncertain. As Brynjolfsson et al. (2020) note, once employers invest in the fixed costs of remote work, including technology, organizational processes, and required human capital, they might decide to continue with it in the long-term. In addition, as more jobs are conducted remotely, they might be at higher risk of being outsourced. Ongoing research could document the persistence of remote work for middle- and lower-skilled workers and occupations and their risk of automation and outsourcing.

The move to telework has the potential to fundamentally change the organization of work, altering the way employees interact. Recent research has documented that change during the pandemic with samples of teleworkers.<sup>106</sup> It finds, for example, that teleworkers engage in more meetings per day, but shorter meetings and with more people in attendance, suggesting a change in the way that information is communicated. These types of changes could put an even greater premium on communication, social interaction skills, and digital literacy. In addition, as with automation, telework might change the task content of certain jobs; employers might bundle together tasks that can be done remotely into jobs separately from those tasks that require in-person attendance.<sup>107</sup> Ongoing research should continue to document how jobs' task content and organization change in response to both automation and telework and how these

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<sup>105</sup> Brynjolfsson, et al. 2020.

<sup>106</sup> DeFilipis, et al. 2020.

<sup>107</sup> Brynjolfsson, et al. 2020.

changes affect jobs' skills requirements. The example of the two banking departments discussed in Section III illustrates how employers can respond to these types of changes by reallocating jobs in different ways, creating new jobs that are higher-skilled and higher pay or new jobs that are lower-skilled and lower pay.<sup>108</sup>

Increase in telework might have implications for workers with lower levels of access to technology. The paper earlier documented diverging regional economies, differences that have not narrowed over time given a decline in rates of migration. The dramatic increase in telework can potentially lessen these regional differences if the jobs can migrate to the individuals. The ability to pursue remote jobs, however, will depend on access to technology and broadband Internet. Bacher-Hicks et al. (2021) examined the prevalence of online search efforts for learning resources in the wake of the pandemic. They found that search intensity varied by geography, with higher search rates on the coasts, and by socio-economic status, with higher search rates in areas with higher income and education levels.

### C. Online (Gig) Work

Although no nationally reported data exists on the prevalence of gig work during the pandemic (the last BLS contingent worker survey was administered in 2017), data from other sources suggest an increase in this type of work. Offsetting large declines in drive-sharing work (e.g., Uber, Lyft) has been an increase in delivery services, driven by increased demand for home delivery of food and other essential goods.<sup>109</sup> Instacart, for example, nearly doubled its workforce during the pandemic's early months.<sup>110</sup>

Whether the increase in gig work will last as the economy recovers is difficult to predict, although some preference for delivery of essential goods might persist. Continued monitoring of the prevalence of gig work for low-income populations will be important to assess, for example, whether these jobs supplement income or serve as workers' primary earnings. As noted in Section IV, research must examine effective ways to provide these workers with key benefits they might not receive from employers.

### D. Income and Reemployment Support

Finally, the pandemic has highlighted the limits of the safety net in the United States. Several policies designed to alleviate hardship were enacted in response to the pandemic. These included expansions of and extensions to UI—for example, allowing self-employed and gig-workers to claim UI and one-time payments made to families with incomes below a certain level—and a SNAP expansion. Nonetheless, existing programs largely have failed to alleviate the dramatic decline in material wellbeing, given that many of the current system's benefits are conditional on work. The American Rescue Plan (ARP), enacted in March 2021, provides additional benefits, including direct payments to households, changes to the child tax credit that expand eligibility and make it fully refundable, and expansions of the EITC for workers without dependent children. Changes to the child tax credit and EITC are temporary under the

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<sup>108</sup> Autor, Levy, and Murnane, 2002.

<sup>109</sup> Henderson, 2020; Perry, 2021.

<sup>110</sup> Sonnemaker, 2020.

ARP, suggesting the importance of research on the effects of these changes to inform policy in the long-term. More broadly, the experience of massive job loss and hardship caused by the pandemic points to the importance of testing effective methods to provide income support and reemployment support for individuals who might be unable to work, such as individuals who might have long-term health conditions, or for individuals who might be unable to find work if their jobs do not return.

## VI. Conclusion

The labor market will continue to change over the coming decades. Technology and other forces will reduce or eliminate certain occupations and increase demand in others. Skills needed for some jobs will change, and the demand for certain types of jobs that cannot be automated might increase. A small but growing number of individuals work in alternative arrangements, such as gig work or in jobs with uncertain schedules. Finally, each of these factors will likely play out differently across regions of the country and for cities versus less urban areas.

This white paper provides an overview of potential changes in the labor market and the nature of work, focusing on how these changes might impact low-wage, less-skilled workers and individuals facing barriers to work, to set the context for future research and evaluation. The paper includes a range of recommendations for future research in the three broad program areas of job search and career counseling; education and training; and income, reemployment, and making work pay. The recommendations center on several key issues:

- Study of methods for helping individuals and programs use technology and real-time data on the labor market to keep track of declining and emerging occupations and to monitor the changing skills requirements for jobs;
- Identification of effective methods for matching workers to employers and for demonstrating existing skills that are unsusceptible to automation and will be increasingly in demand over time; and
- Continued assessment of methods for supporting workers who earn low wages, are displaced by technology, or work in alternative arrangements.

Finally, much of the paper was written before the onset of the COVID-19 pandemic, which will likely have long-term effects on the labor market and the nature of work. Although uncertainty exists about the nature of these changes and their timing, the pandemic's potential effects raise several potential avenues for further research, focusing on accelerated automation in certain occupations, particularly those at high risk for viral transmission, the rise of telework and remote education and training, and the most effective ways to support individuals without work.

These recommendations can help guide ongoing research and evaluation efforts for OPRE, other federal agencies, and the broader field of researchers and practitioners, to support low-income individuals in navigating the changing nature of work and moving toward economic self-sufficiency.

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