McKinsey Global Institute

The postpandemic economy

The future of work after COVID-19

February 2021

McKinsey Global Institute

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Preface

Over the past four years, the McKinsey Global Institute (MGI) has published a series of reports exploring aspects of the future of work in a time of technological change, including an analysis of jobs that could be displaced by automation and AI, likely sources of future labor demand, changes in occupations and skill requirements, and the geographic and social implications of these developments.

This report is the first of three MGI reports that examine aspects of the postpandemic economy—the future of work, consumer behavior, and the potential for a broad recovery led by enhanced productivity and innovation. The COVID-19 pandemic disrupted labor markets globally during 2020. The short-term consequences were sudden and often severe: Millions of people were furloughed or lost jobs, and others rapidly adjusted to working from home as offices closed. Many of those workers were deemed essential and continued to work in hospitals and grocery stores, on garbage trucks and in warehouses, yet under new protocols to reduce the spread of the novel coronavirus.

Here, we examine the long-term changes that COVID-19 may impose on work in the years ahead. One factor the pandemic has highlighted is the importance of physical proximity and level of human interactions across different occupations and workplaces; those with the highest levels have seen the most change. This report attempts to identify the lasting impact of the pandemic on labor demand, the mix of occupations, and workforce skills required, as well as the implications for business leaders, policy makers, and workers.

The research was led by Susan Lund and Anu Madgavkar, MGI partners based in Washington, DC, and Mumbai, respectively; James Manyika and Sven Smit, co-chairs of the McKinsey Global Institute based in San Francisco and Amsterdam, respectively; Kweilin Ellingrud, a senior partner at McKinsey & Company based in Minneapolis; and Mary Meaney, a senior partner at McKinsey & Company based in Paris.

The virtual global research team was led by Olivia Robinson, an engagement manager in London. Team members include E. B. Armstrong, Rishi Arora, Kanmani Chockalingam, Lionel Jin, Joh Hann Lee, Amy Lei, Jitesh Maiyuran, Marko Radenovic, Oliver Ried, Rukmi Sarmah, Khushboo Sadhwani, and Rebecca Stone. Gurneet Singh Dandona and Alok Singh supported the modeling in this report; additional research support was provided by Timothy Beacom, Jeffrey Condon, Pragun Harjai, Karen Jones, Ryan Luby, Shagun Narula, Jose Maria Quiros, and Vivien Singer.

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This report was edited and produced by MGI senior editor Stephanie Strom, together with Peter Gumbel, MGI editorial director; production manager Julie Philpot; and senior graphic designers Laura Brown, Marisa Carder, Richard Johnson, and Patrick White. Rebeca Robboy and Nienke Beuwer, MGI's communications directors, helped disseminate and publicize the report. Lauren Meling, MGI digital editor, ensured digital and social media diffusion. We are grateful to Dennis Alexander, Kaizeen Bharucha, Amanda Covington, Deadra Henderson, Bettina Lanz, Susan Muhlbach, Sarah Portik, Malgorzata Rusiecka, Simone Smeets, and Maciej Szymanowski for personnel and administrative support.

This report contributes to MGI's mission to help business and policy leaders understand the forces transforming the global economy. As with all MGI research, this research is independent and has not been commissioned or sponsored in any way by business, government, or other institution. We welcome your comments at MGI@mckinsey.com.

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In brief

The future of work after COVID-19

COVID-19 brought massive disruption to the workforce, highlighting the importance of physical proximity in work and spurring changes in business models and consumer behavior, many of which are likely to endure. This research examines the long-term impact of COVID-19 on work across several work arenas and in eight economies with diverse labor markets: China, France, Germany, India, Japan, Spain, the United Kingdom, and the United States. Key findings:

The physical dimension of work is a new factor shaping the future of work, brought to the fore by health and safety considerations. We group occupations in a novel way based on physical closeness, the frequency of human interactions, and where work is done. This analysis shows that the pandemic's short- and long-term impact is concentrated in four work arenas with high levels of proximity: leisure and travel venues (including restaurants and hotels) employing more than 60 million in the eight countries, on-site customer interaction including retail and hospitality (150 million), computer-based office work (300 million), and production and warehousing (more than 350 million). In less dense work arenas such as outdoor production sites, the pandemic's effects may fade quickly. Other work arenas such as medical care and personal care with high level of physical proximity may also see less change because of the nature of the occupations.

COVID-19 accelerated three trends that could persist to varying degrees after the pandemic with different implications for work. First, hybrid remote work could continue: 20 to 25 percent of workers in advanced economies and about 10 percent in emerging economies could work from home three to five days a week, mainly in the computer-based office work arena. That is four to five times the level before the pandemic and may reduce demand for mass transit, restaurants, and retail in urban centers. Second, the growth in share of e-commerce and the "delivery economy," which was two to five times faster in 2020 than before the pandemic, is likely to continue. This trend is disrupting jobs in travel and leisure and hastening the decline of low-wage jobs in brick-and-mortar stores and restaurants, while increasing jobs in distribution centers and last-mile delivery. Finally, companies have enlisted automation and AI to cope with COVID-19 disruptions and may accelerate adoption in the years ahead, putting more robots in manufacturing plants and warehouses and adding self-service customer kiosks and service robots in customer interaction arenas.

These trends will likely affect work arenas and countries in varying ways and raise new questions for cities. The four work arenas most affected by proximity account for about 70 percent of the workforce in the six advanced economies we looked at, whereas they amount to about 60 percent in China and just 40 percent in India, where more than half the workforce is engaged in outdoor work. Among advanced economies, too, there are variations. For example, computer-based office work is most prevalent in the United Kingdom and United States, whereas Germany has the highest indoor production from its large manufacturing base. This results in different potentials for remote work and job displacement. Large cities may feel the impact, as remote work reduces demand for transportation, retail, and food service, and smaller cities that were declining before the pandemic may benefit.

Workforce transitions may be larger in scale than we estimated before the pandemic, and the share of employment in low-wage job categories may decline. Depending on how extensively these trends stick, our scenarios suggest that more than 100 million workers in the eight countries may need to switch occupations by 2030, a 12 percent increase from before the virus overall and as much as 25 percent more in advanced economies. Workers without a college degree, women, ethnic minorities, and young people may be most affected. The share of employment in low-wage occupations may decline by 2030 for the first time, even as high-wage occupations in healthcare and the STEM professions continue to expand.

Businesses and policy makers can accelerate many of the future of work imperatives that were already clear before COVID-19. Companies have a new opportunity to reimagine how and where work is done, thinking through specific work arenas and occupational activities. Speedy and effective worker redeployment will be needed, for example by recruiting and retraining based on skills and experience rather than academic degrees. Policy makers might consider prioritizing equitable access to digital infrastructure as well as new ways of enabling occupational mobility. As the share of independent workers grows, more innovation may be required to secure benefits for them. The pandemic will eventually fade, but the agility and creativity of policy makers and businesses evident during the crisis will need to continue, to find effective responses to the looming workforce challenges.

The future of work after COVID-19

Trends accelerated by COVID-19

Remote work

20–25% of workers in advanced economies could work remotely 3+ days a week on a long-term basis

Digitization

2–5x growth in **e-commerce**, as a surge in digital platforms is underway

Automation

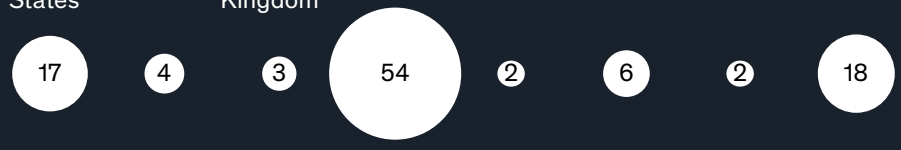
Uptick in use of robotics, robotic process **automation**, and AI

Work arenas with high physical proximity were most disrupted short term during COVID-19, and some will see enduring effects.

Occupation transitions may increase by as much as 25 percent by 2030

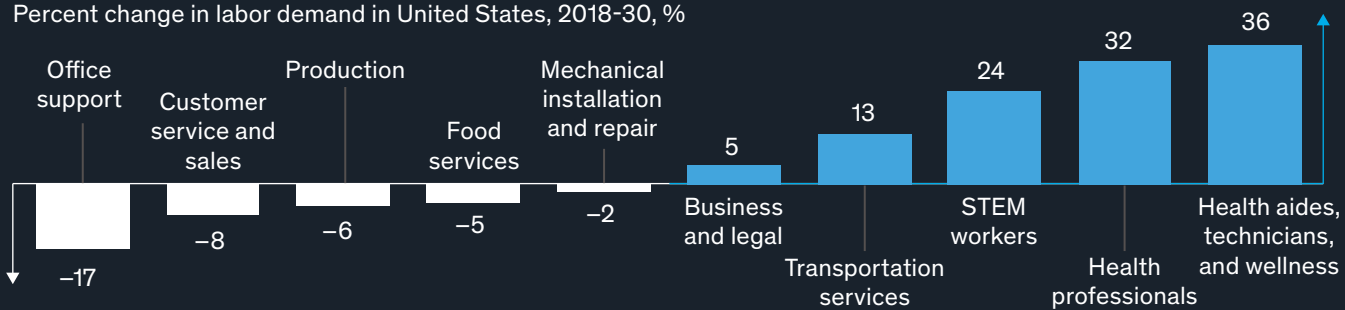
Increase in occupation transitions between pre- and post-COVID-19 scenarios by 2030, %

Total workers needing to make occupation transitions in post-COVID-19 scenario, millions



Labor demand will shift across occupations

Percent change in labor demand in United States, 2018-30, %



Business leaders and policy makers can build out digital infrastructure, enable faster reskilling, and innovate new worker benefits and support mechanisms.

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Executive summary

The impact of COVID-19 on work, the workforce, and the workplace will persist after the health crisis has subsided. This research examines how the trends accelerated by the pandemic may reshape work in the long term.[1] We explore these changes through 2030 in eight countries with diverse economic and labor market models: China, France, Germany, India, Japan, Spain, the United Kingdom, and the United States. Together, these eight countries account for almost half the global population and 62 percent of GDP.

The pandemic has, for the first time, elevated the importance of the physical dimension of work. In this research, we define ten work arenas that group occupations according to their proximity to coworkers and customers, the number of interpersonal interactions involved, and their on-site and indoor nature. We find that jobs in work arenas with higher levels of proximity are likely to see greater transformation after the pandemic, triggering knock-on effects in other work arenas as business models shift in response.

100M

workers may need to switch occupations by 2030 in the eight focus countries

COVID-19 accelerated three groups of consumer and business trends that are likely to persist: remote work and virtual interactions, e-commerce and digital transactions, and deployment of automation and AI. Our research suggests that the disruptions to work sparked by COVID-19 will be larger than we had estimated in our prepandemic research, especially for the lowest-paid, least educated, and most vulnerable workers. We estimate that more than 100 million workers in the eight countries we studied may need to switch occupations, a 12 percent increase compared to before the pandemic overall and a rise of as much as 25 percent in advanced economies. These workers will face even greater gaps in skill requirements. Across countries, we find that job growth may concentrate more in high-wage jobs while middle- and low-wage jobs decline. During the pandemic, policy makers, companies, and workers adapted to new ways of work more quickly than previously thought possible, out of sheer necessity. In the longer term, similarly agile and collaborative responses could lead to higher productivity growth and create career paths with upward mobility for workers. Businesses could respond by reimagining where and how work is done and finding new ways to hire, train, and redeploy workers with a focus on in-demand tasks rather than whole jobs. Policy makers could consider expanding digital infrastructure and enabling more labor market flexibility, for instance by removing barriers to worker mobility, equipping workers facing job transitions, and supporting workers in the gig economy.

COVID-19 has highlighted the importance of physical proximity as a factor shaping the future of work

Before the pandemic, the largest disruptions to work involved new technologies and growing trade links, and a large body of academic research examined their impact on employment and jobs.[2] COVID-19 has elevated the importance of a different aspect of work: its physical nature. Using data from O*NET OnLine, we quantify for more than 800 occupations five physical attributes: closeness to customers or coworkers, frequency of human interactions required, whether those interactions are with a small set of colleagues or an ever-changing stream of strangers, whether the work is indoors, and whether it requires on-site presence (see Box E1, “Our methodology”).

[1] This report builds on five years of McKinsey Global Institute research on the future of work. See *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*, November 2017; *The future of work in Europe*, June 2020; *The future of work in America: People and places, today and tomorrow*, July 2019.

[2] See, for instance, David Autor, David Mindell, and Elisabeth Reynolds, *The work of the future: Building better jobs in an age of intelligent machines*, MIT Task Force on the Work of the Future, November 2020; Acemoglu et al., *AI and jobs: Evidence from online vacancies*, National Bureau of Economic Research (NBER) working paper number 28257, December 2020, revised January 2021; Daron Acemoglu and Pascual Restrepo, *Automation and new tasks: How technology displaces and reinstates labor*, NBER working paper number 25684, March 2019.

Box E1.

Our methodology

This report builds on a large body of MGI research on the future of work.[1] To assess the potential impact of COVID-19 on the workforce in the long term, we offer three novel analyses that dissect occupations and work activities. We acknowledge the significant uncertainties involved in such an exercise but believe our approach is a useful way to frame and assess potential longer-term implications of COVID-19 on the future of work and how they might vary across work arenas and countries. For more details of our methodology, see the technical appendix.

Occupation clustering into work arenas, reflecting the proximity involved in work. Using data from O*NET OnLine and other sources, we quantify five characteristics for each of more than 800 occupations: physical closeness to customers or coworkers, frequency of human interactions required, whether those interactions are with a small set of colleagues or an ever-changing stream of strangers, whether work is indoors, and whether it requires on-site presence. We create a score for each characteristic and average them to create an overall physical proximity score for each occupation. We cluster the 800 occupations into ten work arenas based on commonality across the five metrics, calibrated by an assessment of the roles and work contexts involved in each. Our approach results in a different perspective on work than traditional sector classification, as occupations in sectors may fall into different work arenas.

Potential for remote work, based on the activities and tasks within occupations. We examine more than 2,000 work activities defined by O*NET OnLine. We assess whether an activity can be performed remotely in theory—or when required by a pandemic—and which activities can be performed remotely without a loss of productivity or effectiveness. Teaching, for instance, can theoretically be performed remotely through online classes, but for younger children it is less effective than in-person classes. Based on our estimates of time spent on each activity within 800 occupations from previous MGI research, we can calculate the amount of time that could be spent working remotely for each occupation. Because the data are available only for the United States, we assume that time spent within occupations in other countries is similar.

Scenarios for net labor demand and workforce transitions, before and after COVID-19. We model two scenarios for net labor demand for 800 occupations in each country. In the pre-COVID-19 scenario, we use the midpoint automation adoption scenario from MGI's previous research.[2] Results in this report may differ from those previously published because we have updated all data to the most recent available, including a baseline projection for GDP growth through 2030 (from Oxford Economics) and for labor force growth.[3] This scenario includes the impact of midpoint automation adoption on labor displacement and job creation stemming from seven macro drivers of labor demand, such as rising incomes, aging populations that require more healthcare, the shift to renewable energy, and other trends. In the post-COVID-19 scenario, we also include the impact of three broad groups of trends accelerated by the pandemic that may persist in the long term, albeit at somewhat lower levels than seen during 2020: the shift to remote work for some workers and a consequent reduction in business travel, the growth of e-commerce and online transactions that propels the delivery economy, and a potential long-term acceleration in automation adoption for some uses. Our model does not follow a dynamic equilibrium approach and therefore does not assess changes in wages or interest rates. We chose not to model some trends that could affect work but are less certain, such as a shift in globalization and trade flows.

This work is not meant to provide a forecast of labor demand through 2030. We assess various factors influencing the future level at which COVID-19 trends could settle to construct a plausible set of assumptions for the post-COVID-19 scenario. Our results and the view they provide of the future of work could be overstated for various reasons—for instance, if vaccinations accelerate and herd immunity is quickly achieved, if companies and workers choose to return to the office full-time, if consumers return fully to in-person shopping and dining patterns, and if the momentum around digital technologies and automation fades. Conversely, COVID-19 may disrupt the future of work even more if the virus mutates rapidly and requires continued physical distancing and other precautions for several more years; if fiscal measures are unable to prevent high rates of long-term unemployment, prompting people to leave the labor force; or if the economic recovery takes longer than our current scenario envisions.

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1 See MGI reports at McKinsey.com: *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*, December 2017; *Skill shift: Automation and the future of the workforce*, May 2018; *The future of work in America: People and places, today and tomorrow*, July 2019; *The future of work in Europe*, June 2020.

2 See *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*, McKinsey Global Institute, December 2017, McKinsey.com.

3 See chapter 4 and the technical appendix for more detail.

We then cluster occupations based on these five metrics into ten work arenas, shown in Exhibit E1. This results in a different view of work than traditional sector classifications. For instance, our medical care arena differs from the healthcare sector in that it includes only caregiving roles that interact closely with patients, such as doctors and nurses, not administrative staff (who fall into the computer-based office work arena), or lab roles (included in the indoor production work arena).

The short- and potential long-term disruptions to these work arenas from COVID-19 vary. During the pandemic, the virus most severely disrupted work arenas with the highest overall physical proximity scores: medical care, personal care, on-site customer service (in retail and hospitality), and leisure and travel, which includes many food service workers, hotel staff, and some airport jobs. Work in the computer-based office arena went almost entirely remote. In the longer term, work arenas with higher physical proximity scores are also likely to be more disrupted, although proximity is not the only explanation. We offer a few illustrations here:

— The on-site customer interaction arena includes frontline workers who interact with customers in retail stores, banks, and post offices, among other places. Work in this arena is defined by frequent interaction with strangers and requires on-site presence. Many venues in this work arena were shuttered during the pandemic. Some work migrated to e-commerce and ordering online, a behavioral change that is likely to stick.

— The leisure and travel arena is home to customer-facing workers in hotels, restaurants, airports, and entertainment venues. Workers in this arena interact daily with crowds of new people. COVID-19 forced most leisure venues to close in 2020 and airports and airlines to operate on a severely limited basis. In the longer term, the shift to remote work and reduction in business travel, as well as automation of some occupations, such as food service roles, may curtail demand for work in this arena.

— The computer-based office work arena includes offices of all sizes, corporate headquarters, and administrative workspaces in hospitals, courts, and factories. Work in this arena requires only moderate physical proximity to others and a moderate number of human interactions. A distinguishing feature of this work arena is that much of the work can be done remotely because it does not involve special equipment or in-person customer interactions. This is the largest work arena in advanced economies, accounting for roughly one-third of employment. Nearly all potential remote work is within this arena.

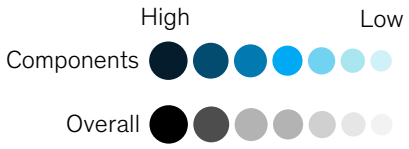
— The outdoor production and maintenance arena includes construction sites, farms, residential and commercial grounds, and other outdoor spaces. Work here requires low proximity and few interactions with others, and it takes place fully outdoors. Given these characteristics, COVID-19 had a limited impact on work in this work arena. This is the largest arena in China and India, accounting for 35 to 55 percent of their workforces, while in advanced economies less than 15 percent of the workforce is engaged in it.

Exhibit E1

Work arenas vary in overall physical proximity.

Overall physical proximity score by work arena (based on human interaction and work environment metrics)

Score out of 100



	Human interaction			Work environment		
Work arenas Example venues	Physical closeness	Frequency of interactions	Exposure to strangers	Indoor work	Site-dependent work	**Overall physical proximity score**
Medical care Hospitals, clinics	86	94	78	91	87	87
Personal care Hair salons, gyms	82	92	64	86	85	83
On-site customer interaction Retail stores, banks	69	91	80	80	63	76
Leisure and travel Restaurants, hotels	77	86	81	73	63	75
Home support Residential homes	66	82	44	65	87	70
Indoor production and warehousing Factories, kitchens, warehouses	57	87	48	70	79	70
Computer-based office work Offices, corporate headquarters	59	89	67	86	42	68
Classroom and training Schools, conference centers	57	91	60	88	45	68
Transportation of goods Trucks, rail yards	48	78	64	40	65	58
Outdoor production and maintenance Construction sites, farms	44	79	50	39	63	54

Note: Occupations grouped into ten work arenas based on overall physical proximity score that combines O*NET data for human proximity in the workplace, including for physical proximity, face-to-face discussions, and dealing with external customers, with O*NET data on types of work environments and work environment score (average of O*NET score for workplaces such as outdoor/indoor and environmentally controlled, and our assessment of site dependence of occupations based on various O*NET data).

Source: Employment and Training Administration, US Department of Labor;O*NET OnLine; McKinsey Global Institute analysis

COVID-19 has accelerated three broad trends that may reshape work even after the pandemic recedes

We consider potential enduring workforce effects by analyzing three groups of trends accelerated by COVID-19 that may persist after the pandemic recedes, disrupting how and where work is done. They are the shift to remote work and virtual interactions, the surge in use of e-commerce and other digital platforms, and the deployment of automation and AI. In each case, the pandemic pushed companies and consumers to rapidly adopt new behaviors. We consequently see a sharp discontinuity between the level of adoption before and during the pandemic. The extent to which these trends persist after the pandemic remains to be seen, but there is growing evidence that many of the new behaviors will persist, even if at somewhat lower levels than the peak. Exhibit E2 offers an illustration of the prevalence and usage of these trends before, during, and after the pandemic.

We aim not to be predictive but instead to identify a few key factors for each trend that might alter the trajectory of change and momentum in consumer and business behavior in the years to come. For example, the level at which remote work persists depends on companies' ability to devise work models that balance worker flexibility with the greater effectiveness of in-person work for several key activities. The potential acceleration of automation depends on whether firms continue to invest in those technologies to reconfigure work and capture broader opportunities after the pandemic. A set of assumptions on the possible trajectory for each trend, with country variations, forms the core of our post-COVID-19 scenario modeling.[3]

Remote work and virtual meetings are likely to continue, albeit less intensely than at the pandemic's peak, with knock-on effects for real estate, business travel, and urban centers

Perhaps the most obvious impact of COVID-19 on the labor force is the dramatic increase in employees working remotely. While telecommuting has been possible for many years, remote work during the pandemic was supported by rapid deployment of new digital solutions, such as videoconferencing, document-sharing tools, and expansion of cloud-based computing capacity. Countries quickly designated essential workers who had to be on-site and told everyone else to stay home. That experience proved some of the benefits of remote work, including greater flexibility for workers and more efficiency for businesses. How much will stick is uncertain, but employers and employees who can work from home agree that remote work—at least for part of a workweek—is here to stay.

To determine how extensively remote work might persist after the pandemic, we analyzed its potential in more than 2,000 tasks used in some 800 occupations across the eight focus countries.[4] The pandemic demonstrated that much more work could be done remotely than previously thought, including business sales calls, legal arbitration and trials, doctor visits, classroom learning, real estate tours, and even expert repairs of the world's most sophisticated machinery made with the help of virtual reality headsets.

We also found that some work that technically can be done remotely is best done in person. For instance, schooling went online during the crisis, but parents and teachers alike noted a loss of effectiveness, particularly in the instruction of young children and students with special needs.[5] Negotiations, critical business decisions, brainstorming sessions, providing sensitive feedback, and onboarding new employees are examples of activities that may lose some effectiveness when done remotely.

[3] For more detail, see Box E2, chapter 4, and the technical appendix.

[4] Susan Lund, Anu Madgavkar, James Manyika, and Sven Smit, "What's next for remote work: An analysis of 2,000 tasks, 800 jobs, and nine countries," McKinsey Global Institute, November 2020, McKinsey.com.

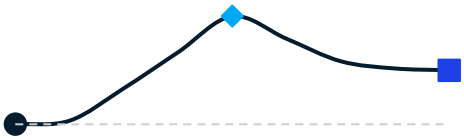
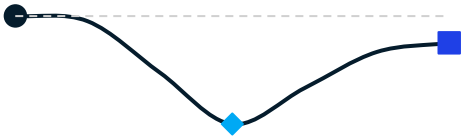
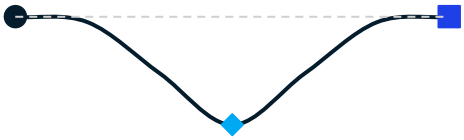
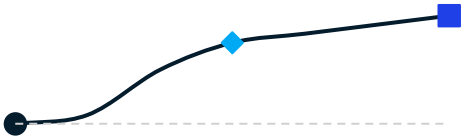
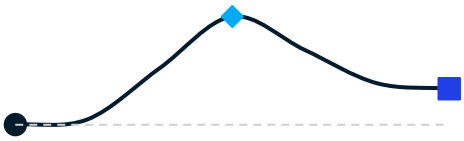
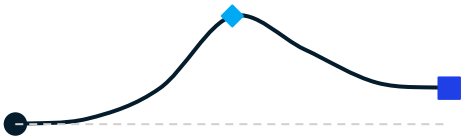
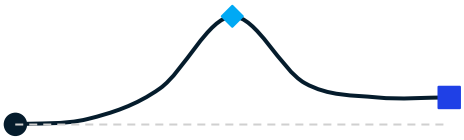
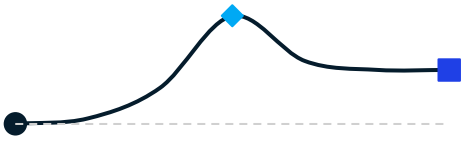
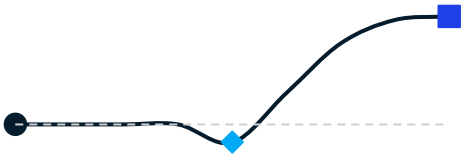
[5] Valerie Strauss, "Five concerns about the mass rush to online learning that shouldn't be ignored," March 30, 2020, *Washington Post*, washingtonpost.com; Rebecca Branstetter, *How teachers can help students with special needs navigate distance learning*, Greater Good Science Center, UC Berkeley, October 2020, greatergood.berkeley.edu.

Exhibit E2

COVID-19 has prompted consumer and business behavior shifts, many of which will persist to varying degrees in the long run.

Illustrative

● Before pandemic ◆ During pandemic ■ After pandemic

COVID-19 trend		Evolution of demand over pandemic period, illustrative	Reasons why trend may or may not stick after pandemic
Remote work, travel, and virtual meetings	Work from home		• Flexibility for workers • Cost savings for companies • But some tasks more effective in person
	Business travel		• Videoconferencing and other digital tools available as alternatives • Cost savings for companies • Carbon reduction goals of companies
	Leisure travel		• Streaming and virtual tourism inadequate substitutes • Leisure travel in China has surpassed prepandemic level
E-commerce and virtual transactions	E-commerce penetration		• Convenience for consumers • Surge in new users during pandemic • Rising adoption of digital payments during the pandemic
	Restaurant delivery		• Convenience for consumers, replacing some home cooking and meals out • But also return to dining in restaurants once health concerns wane
	Online grocery shopping		• Convenience for consumers • Surge in new users during pandemic • Efficiency for grocers • Some return to in-person shopping, such as handpicking and selecting produce
	Online education		• Corporate training and postsecondary education move to hybrid model • But online schooling ineffective for younger ages
	Telemedicine		• Convenience for patients and doctors • Surge in new users during the pandemic • Enabled by new personal digital health devices
Automation and AI	Automation adoption		• Reasons for potential acceleration: — Reduce workplace density — Cope with demand variability — Improve efficiency and speed — Offer contact-free services

Source: McKinsey Global Institute analysis

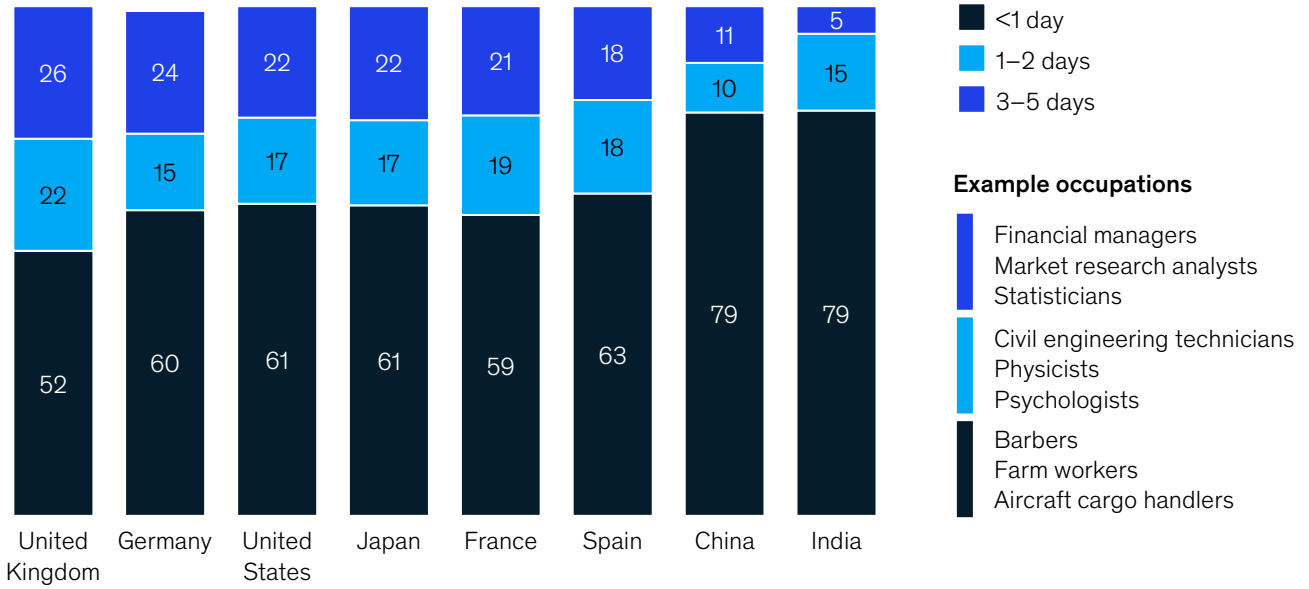
Considering only remote work that can be done without a loss of productivity, we find that about 20 to 25 percent of the workforces in advanced economies could work from home between three and five days a week. Advanced economies, with a greater share of jobs in the computer-based office arena, have a higher potential for remote work than emerging economies (Exhibit E3).

Exhibit E3

Potential for remote work is higher in advanced economies, yet only 20 to 25 percent of workers could work remotely three to five days a week.

Workforce with remote work potential by number of days per week

% of 2018 workforce



1. Theoretical maximum includes all activities not requiring physical presence on-site; effective potential includes only those activities that can be done remotely without losing effectiveness. Model based on more than 2,000 activities for more than 800 occupations.

Note: Figures may not sum to 100% because of rounding.

Source: McKinsey Global Institute analysis

Although those who can work from home three to five days a week are a minority, they represent four to five times more remote work than occurred before the pandemic, and the ripple effect of so many more employees working from home could have major implications for urban centers.[6] Demand for restaurants and retail in downtown areas and for public transportation may decline. Some companies are planning to shift even faster to flexible workspaces, reducing overall space needed if fewer workers on any given day are in the office. A survey of 278 executives by McKinsey in August 2020 found an average planned reduction in office space of 30 percent.[7] Increased remote work may also prompt a larger change in the geography of work, as individuals and companies shift out of the largest cities to suburbs and smaller cities (see Box E2, "Will COVID-19 change the geography of work?").

6 Santo Milasi, Ignacio González-Vázquez, and Enrique Fernández-Macías, *Telework in the EU before and after the COVID-19: Where we were, where we head to*, European Union Science for Policy Briefs, 2020, ec.europa.eu; Drew DeSilver, "Before the coronavirus, telework was an optional benefit, mostly for the affluent few," Pew Research Center, March 20, 2020, pewresearch.org.

7 McKinsey Corporate Business Functions Practice, "Reimagine: Preparing for SG&A in the next normal," November 2020, McKinsey.com.

Box E2.

Will COVID-19 change the geography of work?

Over the past decade, jobs concentrated in the world's largest cities and people flocked to them, but remote work could dampen or even reverse that migration. Prior to the pandemic, MGI research found that the largest cities in the United States and Europe accounted for a disproportionate share of job growth after the 2008 global financial crisis, while many smaller cities and rural areas fell behind.[1]

Some shifts are under way, although whether they persist after economies reopen remains to be seen. Office vacancy rates increased significantly across major cities in 2020: by 91 percent in San Francisco, 45 percent in Edinburgh, 32 percent in London, and 27 percent in Berlin, for instance. At the same time, office vacancy rates have declined in smaller cities such as Glasgow and Charlotte.[2] Some companies are discussing opening satellite offices in smaller cities, in part to attract talent there. Other smaller cities developed incentive programs to encourage remote workers to relocate.[3]

Residential rents in the United States show a similar pattern, with people moving to suburbs and smaller cities and away from urban centers (Exhibit E4). In Spain, rents decreased in large cities like Madrid, Barcelona, and Seville but rose in smaller cities such as Salamanca and Granada. We analyzed data from LinkedIn that show more of its members moved to smaller cities from larger cities in the United States in 2020 than in 2019. The results show that major metropolitan areas, such as New York City, the San Francisco Bay Area, Washington, DC, and Boston, had the greatest decline in inflow-outflow ratio of members, while smaller cities such as Madison, WI; Jacksonville, FL; and Salt Lake City had the greatest growth,

Whether this migration is permanent remains to be seen.[4] How the geography of work evolves will depend on multiple factors. City governments could tilt the balance with tax incentives for businesses and workers, and future investments in urban infrastructure and spaces could enhance the attractiveness of different locations. After the pandemic, individuals may reweigh their choices about cost of living and neighborhood density versus easy access to major travel, cultural, innovation, and recreational hubs.

1 See *The future of work in Europe: Automation, workforce transitions, and the future geography of work,* McKinsey Global Institute, June 2020; *The future of work in America: People and places, today and tomorrow,* McKinsey Global Institute, July 2019, McKinsey.com.
2 JLL office statistics, Q3 2020.
3 Tulsa, OK, for instance, offers remote workers who relocate to the city for at least a year $10,000 and access to coworking spaces. Tulsa Remote, tulsaremote.org.
4 "NEF spotlight: A pandemic reboot for cities," January 26, 2021, McKinsey.com.

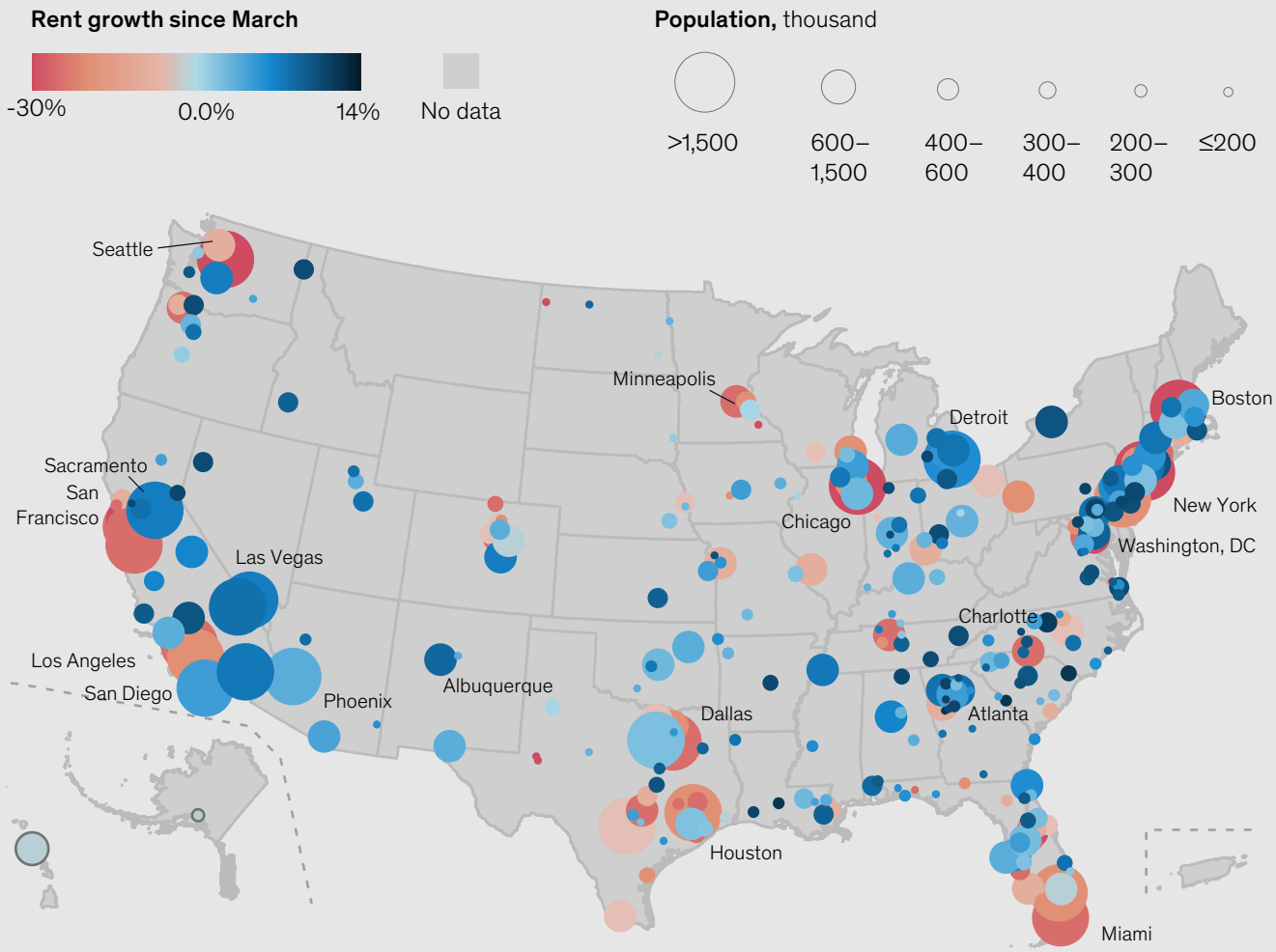
In addition, extensive use of videoconferencing during the pandemic has ushered in a new acceptance of virtual meetings and other aspects of work, which many companies expect to replace some business travel after the pandemic. While leisure travel and tourism will likely rebound when the pandemic ends, as it has in China already, business travel may take a different path. McKinsey's travel practice estimates that about 20 percent of business travel may not return after the pandemic.[8] This would have a significant knock-on effect on employment in commercial aerospace and airports, hospitality, and food service.

8 Also see Scott McCartney, "The Covid pandemic could cut business travel by 36 percent—permanently," *Wall Street Journal*, December 1, 2020, wsj.com.

Exhibit E4

Residential rents declined in the largest US cities but increased in suburbs and smaller cities.

Change in rent by county, March to November 2020



Source: Apartment List; McKinsey Global Institute analysis

E-commerce and other virtual transactions are booming, creating increased demand for gig work

Many consumers discovered the convenience of e-commerce, grocery delivery ordered by app, and other online activities during the pandemic. In 2020, share of e-commerce in retail sales grew at two to five times the rate before COVID-19, increasing its share of total retail sales by several multiples (Exhibit E5). Moreover, three-quarters of people using digital channels for the first time during the pandemic say they will continue using them when things return to "normal," according to McKinsey Consumer Pulse surveys conducted around the world.[9] Data from countries where the recovery is already under way, such as China, suggests some reversion to brick-and-mortar consumption but continued higher use of digital channels.

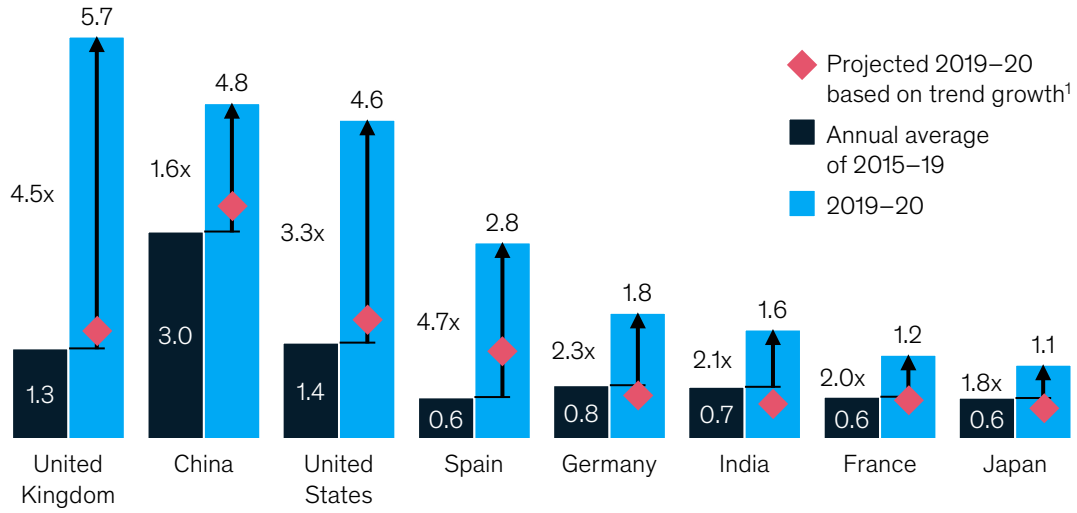
[9] See "Global surveys of consumer sentiment during the coronavirus crisis," October 2020, McKinsey.com.

Exhibit E5

E-commerce has grown two to five times faster than before the pandemic in every country.

Year-over-year growth of e-commerce as share of total retail sales

Percentage points



	United Kingdom	China	United States	Spain	Germany	India	France	Japan
2020 e-commerce sales as percentage of total retail sales	24	27	20	9	14	7	9	10

1. Based on linear trend of 2015–19 growth; 2017–19 trend used for India and Japan due to break in trend.

Source: Euromonitor International Retailing 2021 Edition; McKinsey Global Institute analysis

Other kinds of virtual transactions such as telemedicine, online banking, and streaming entertainment have also taken off. Online doctor consultations through Practo, a telehealth company in India, grew more than tenfold between April and November 2020.[10] In China, Ping An Good Doctor more than doubled revenue in its online healthcare business in the first half of 2020.[11] Use of telemedicine may decline somewhat as economies reopen but is likely to continue well above levels seen before the pandemic.

This shift to digital transactions has propelled growth in delivery, transportation, and warehouse jobs, while setting off declines among in-store retail jobs such as cashiers. As retail sales online have jumped, retailers are closing brick-and-mortar locations. Macy's and Gap are among the many retailers that have announced plans to close hundreds of stores across the United States. Meanwhile, Amazon hired more than 400,000 workers worldwide during the pandemic.[12] In China, e-commerce, delivery, and social media jobs rose by more than 5.1 million during the first half of 2020.[13]

Many of the jobs created in long-haul transportation and last-mile delivery come via the gig economy and independent contractors. The growth of e-commerce and other digital transactions may therefore imply a shift to gig jobs in the independent workforce.

10 *The Practo Blog,* "Building access to quality healthcare: COVID-19 & beyond," November 30, 2020, blog.practo.com.
11 *2020 Interim Report*, Ping An Healthcare and Technology Company, August 20, 2020.
12 Karen Weise, "Pushed by pandemic, Amazon goes on a hiring spree without equal," *New York Times*, November 27, 2020, nytimes.com.
13 Renhong Wang and Zirui Chu, "Alibaba provided more than 2 million flexible employment opportunities in the first quarter," People News, April 24, 2020; Mengling Chen, "Interview of Didi's CEO Wei Cheng," CCTV News, October 26, 2020; "2020 First half Meituan delivery rider employment report," Meituan Research Institute, July 20, 2020; "SF Express helped stabilize employment, providing 230,000 jobs in the first half of the year," Guangdong Provincial Postal Administration, July 27, 2020.

Independent work provides the flexibility that many workers with other commitments require, and during the pandemic it was a safety net for individuals furloughed from other jobs.[14] But independent work—particularly jobs on gig platforms—offers no clear career pathway for workers to follow to increase their skills and income. Independent workers in some countries also lack paid sick leave or other benefits. Policy makers extended some benefits to self-employed and gig workers for the first time during the pandemic, but more work will be required to make these programs permanent.

COVID-19 may propel faster adoption of automation and AI, especially in work arenas with high physical proximity

Experience has shown that in periods of recession, the share of jobs with mainly routine tasks declines as businesses seek to control their cost base while dealing with margin pressure and to mitigate uncertainty by improving efficiency. Two ways they have done this are adopting automation technologies and redesigning work processes.[15] When we look at the aftermath of the 2008 financial crisis, for example, we find a lasting decline in routine jobs across the United States and several European Union countries.

2/3

Proportion of executives expecting to increase investment in automation and AI

Although many companies have held back from increased spending during the pandemic, evidence is emerging that investment in automation may pick up during the recovery. In our global survey of 800 senior executives in July 2020, two-thirds said they were stepping up investment in automation and AI either somewhat or significantly.[16] Reflecting this, the share prices of global industrial robotics and AI companies rose much faster than the overall market in 2020. And while production figures for robotics in China dipped in early 2020, they exceeded prepandemic levels by June 2020.[17]

Our research suggests that faster adoption of automation, AI, and digital technologies is likely to be concentrated in specific use cases, reflecting company priorities related to COVID-19. One example seen anecdotally during the pandemic was deployment of technologies to cope with surges in demand. This included automation in warehouses and logistics that enabled companies to cope with higher volumes of e-commerce, or in manufacturing plants to ramp up production of items that saw demand spikes, such as food and beverage, consumer electronics, and masks and other personal protective equipment. Secondly, many companies used technology to reduce workplace density. For instance, meatpacking and poultry plants, which fall into the indoor production and warehousing arena, accelerated deployment of robotics.[18] Service robots have also been enlisted to deliver supplies in hospitals and room service orders in hotels. Companies deployed more self-checkout in grocery stores and pharmacies to meet customer demand for contactless service. Demand for apps for ordering in restaurants and hotels similarly surged. Finally, companies have shown more interest in using robotic process automation to handle paperwork and reduce density in office spaces. Some banks, for instance, adopted the technology to handle the surge in loan applications from government stimulus programs.

The common feature of these use cases of automation technology is their correlation with high scores on human interaction, a subset of our overall physical proximity score, including physical closeness to others, the frequency of interactions, and the level of exposure to strangers. Our research finds the work arenas with high levels of human interaction are also likely to see some of the greatest acceleration in adoption of automation and AI.

[14] We use the term independent work to include the broad range of independent contractors, temporary staffing agency workers, self-employed people, freelancers, and people working through digital platforms in the so-called gig economy. See *Independent work: choice, necessity, and the gig economy,* McKinsey Global Institute, October 2016, McKinsey.com.

[15] Lei Ding and Julieth Saenz Molina,"Forced automation by COVID-19?' Early trends from current survey population data," Federal Reserve Bank of Philadelphia, September 2020; Alexandr Kopytov, Nikolai Roussanov, and Mathieu Taschereau-Dumouchel, *Short-run pain, long-run gain? Recessions and technological transformation,* NBER working paper number 24373, March 2018; Nir Jaimovich and Henry E. Siu, *Job polarization and jobless recoveries,* NBER working paper number 18334, November 2018, nber.org.

[16] Susan Lund, Wan-Lae Cheng, André Dua, Aaron De Smet, Olivia Robinson, and Saurabh Sanghvi, "What 800 executives envision for the postpandemic workforce," McKinsey Global Institute, September 2020, McKinsey.com.

[17] National Bureau of Statistics of the People's Republic of China, stats.gov.cn.

[18] Megan Molteni, "COVID-19 makes the case for more meatpacking robots," *Wired*, May 2020, wired.com.

Work arenas vary widely in terms of the potential long-term impact of COVID-19
The trends accelerated by COVID-19 have the potential to significantly disrupt work, but the shifts they might prompt are likely to play out differently across work arenas. Exhibit E6 offers a view of the potential disruption these trends may have across different arenas, highlighting patterns and contrasts.

Virtual business meetings and digital collaboration among coworkers seemingly became the norm during COVID-19—but mainly in the computer-based office work arena. This arena has the lowest requirements for site-dependent work because the workers in it, such as accountants, financial managers, and legal secretaries, do not require special equipment, and human interactions can be conducted virtually. In this work arena, we estimate that 70 percent of time could be spent working remotely without losing effectiveness, compared to most other work arenas, where as little as 5 to 10 percent of work could be done remotely.

By contrast, digital interactions and transactions have risen much more uniformly across work arenas, although higher rates of adoption may occur in two arenas: on-site customer interaction, fueled by the rise of e-commerce and food delivery, and computer-based office work, where use of digital collaboration tools and digital channels has spiked. Even in medical care and classroom and training, both work arenas with high physical proximity, the use of digital tools has risen significantly during the pandemic. The medical care arena has seen a sharp acceleration in telemedicine. In education, the classroom migrated to the laptop during the pandemic, but that is likely to stick only in higher education and workforce training after the pandemic.

Greater deployment of robots, AI, and robotic process automation is also more marked in arenas with higher physical proximity. Potential acceleration of automation is most likely to occur in the on-site customer interaction and computer-based office work arenas, where we estimate that the share of workers possibly displaced will increase by 7 to 8 percentage points. Automation may also rise in the indoor production and warehousing arena as companies strive to maintain social distance, replace sick workers, and adjust to surges in demand for manufactured goods and delivery-based services from warehouses during and after the pandemic. In outdoor production and maintenance, we see very little likely increase in automation.

Overall, potential long-term work disruptions triggered by COVID-19 are perhaps best measured by changes in workforce transitions by 2030. We find that the most changes are likely in the four work arenas with relatively high physical proximity scores: on-site customer interaction, leisure and travel, computer-based office work, and indoor production and warehousing. We estimated changes in net labor demand and occupation transitions using a granular task- and activity-based framework, explained in detail in the next section, and found clear differentiation in the potential outcomes across our ten work arenas.

In the computer-based office work arena, 70 percent of time could be spent working remotely without losing effectiveness, compared to most other arenas, where as little as 5 to ten percent of work could be done remotely.

Exhibit E6

Trends accelerated by COVID-19 may play out differently across different arenas.

Potential change in impact of workforce trends due to COVID-19 in the United States

High disruption Low disruption

			Change compared to pre-COVID-19 scenario				
		Potential for remote work	Digital adoption[1]	Automation adoption	Labor demand growth	Occupation transitions	Overall disruption[2]
Work arena	% of workforce, US 2018	% of time that can be remote	Percentage point change in adoption of digital tools[1]	Percentage point change in share of workers displaced by 2030	Percentage point change in net labor demand growth by 2030	Percentage point change in share of workers changing occupations by 2030	
On-site customer interaction	12	12	18	8	-14	8	High
Leisure and travel	7	5	11	8	-10	4	
Computer-based office work	31	70	17	7	0	3	
Indoor production and warehousing	21	6	11	4	2	1	
Classroom and training	7	31	15	2	2	0	Moderate
Medical care	7	6	15	5	6	0	
Home support	3	13	10	0	16	0	
Personal care	2	11	10	3	8	-2	Low
Transportation of goods	3	10	13	4	14	-3	
Outdoor production and maintenance	8	3	7	1	6	-3	

1. Calculated based on McKinsey Global Institute's Digitization Index on level of digitization by sector mapped to work arena, including use of digital assets, digital usage, and digital workers, and adjusted for COVID-19 based on McKinsey surveys indicating consumer adoption of digital channels and platforms by sector.
2. Ranking based on occupation transitions column.

Note: Occupations grouped into ten work arenas based on overall physical proximity score that combines O*NET data for human proximity in the workplace, including for physical proximity, face-to-face discussions, and dealing with external customers, with O*NET data on types of work environments and work environment score (average of O*NET score for workplaces such as outdoor/indoor and environmentally controlled, and our assessment of site dependence of occupations based on various O*NET data).

Source: Employment and Training Administration, US Department of Labor;O*NET OnLine; US Bureau of Labor Statistics; McKinsey Global Institute analysis

The mix of occupations within economies may shift, with little or no job growth in low-wage occupations

Before the pandemic, we found that nearly all low-wage workers who lost jobs could move into other low-wage occupations; for instance, a data entry worker could shift into retail or home healthcare. But given the trends accelerated by COVID-19, now we estimate that to remain employed, more than half of the low-wage workers currently in declining occupations would need to shift to occupations in higher wage brackets that require different skills.

The trends accelerated by COVID-19 may displace more workers from jobs than our previous future of work scenarios implied, and in different occupations, while also creating more labor demand in some occupations. We model growth in net labor demand for different occupations in each country based on displacement related to automation, digitization, and the other trends the pandemic has accelerated, as well as macro trends that will spur job growth in the decade ahead: rising incomes as GDP recovers, aging populations, increased infrastructure investment, rising education levels, climate change and the transition to renewable energy, and the marketization of unpaid work.[19] We assume that economies will return to full employment based on the size of their workforce by 2030, so our results shed light on the mix of jobs in an economy rather than on overall employment rates. As noted earlier, we fully acknowledge the uncertainty of these assumptions but rely on a well-reasoned set of factors to construct a plausible scenario.

Our findings reveal that a markedly different mix of occupations may emerge after the pandemic. Exhibit E7 shows the change in employment share across occupation groups between 2018 and 2030. Although results vary across the eight focus countries, we generally find that the largest net growth is likely to be in healthcare, STEM, and transportation jobs, and the largest declines in customer service jobs in retail and hospitality, food service, production work, and office support roles. In India and China, we see declines in the share of agricultural occupations as well, in line with the longer-term structural transformation of the labor forces in those countries.

4.3M

Possible fall in customer service and food service jobs in the United States, compared to prepandemic estimates

Compared to our pre-COVID-19 estimates, we expect to see the largest negative impact of the pandemic falling on workers in food service and customer sales and service roles, as well as less-skilled office support roles. Jobs in warehousing and transportation may increase as a result of the growth in e-commerce and the delivery economy, but the increase in delivery and transportation jobs does not offset the many low-wage jobs that may decline. In the United States, customer service and food service jobs could fall by a total of 4.3 million, while transportation jobs could grow by nearly 800,000. Demand for workers in the healthcare and STEM occupations could grow more than before the pandemic, reflecting increased attention to health as populations age and incomes rise as well as the growing need for people who can create, deploy, and maintain new technologies.

Looking at changes in occupations across countries, a common trend is apparent: Declines in net job growth are likely to concentrate in low- and middle-wage positions, such as customer service jobs in retail, hospitality, and food service, while net job creation may occur primarily in high-wage jobs, such as health care and STEM (Exhibit E8). This trend is markedly different from the dynamics seen in many countries before the pandemic, when net job losses were concentrated in middle-wage occupations in manufacturing as automation took over routine tasks while growth continued in low- and high-wage jobs.[20] Then, we found that nearly all low-wage workers who lost jobs could move into other low-wage occupations—for instance, a data entry worker could move into retail or home healthcare. But given the trends accelerated by COVID-19, now we estimate that more than half of the low-wage workers currently in declining occupations may need shift to occupations requiring different skills in higher wage brackets to remain employed.

[19] See Technical Appendix for more detail.

[20] The decline of middle-skill and middle-wage jobs has been widely discussed in academic literature. See David H. Autor, and David Dorn, "The growth of low-skill service jobs and the polarization of the US labor market," *American Economic Review,* August 2013, Volume 103, Number 5; David Autor and Elisabeth B. Reynolds, *The nature of work after the COVID crisis: Too few low-wage jobs*, Brookings Institution, Hamilton Project essay number 2020-14, July 2020.

Exhibit E7

The mix of occupations may shift in all countries by 2030 in the post-COVID-19 scenario.

Estimated change in share of total employment, post-COVID-19 scenario, percentage points, 2018–30[1]

Increased share — Decreased share

Occupational category	Advanced						Emerging	
	France	Germany	Japan	Spain	United Kingdom	United States	China	India
Health aides, technicians, and care workers	1.6	1.9	1.4	1.5	1.4	2.2	2.7	1.0
Health professionals	0.8	0.7	0.9	1.0	0.7	1.2	1.3	0.5
Creatives and arts management	0.5	0.4	0.4	0.5	0.4	0.2	0.4	0.5
STEM professionals	1.0	1.2	1.0	0.9	1.0	1.0	1.2	0.8
Managers	0.7	0.6	0.4	0.7	0.9	0.6	0.5	0.6
Transportation services	0.3	0.6	0.1	0.3	0.1	0.3	0.9	0.4
Business and legal professionals	0.3	0.3	1.1	0.5	0.3	0.2	1.1	0.8
Community services	-0.3	-0.1	0.1	-0.1	-0.3	-0.2	0.8	0.2
Builders	-0.3	0.0	-0.2	-0.3	-0.3	-0.1	0.1	1.0
Educator and workforce training	0.0	0.4	-0.1	0.0	0.2	-0.1	0.4	0.7
Property maintenance	0.4	-0.2	-0.2	0.0	-0.2	0.1	0.5	-0.4
Food service	-0.6	-0.3	-1.1	-1.6	-0.7	-0.7	0.5	0.7
Customer service and sales	-0.9	-1.9	0.2	-0.5	-0.8	-1.1	1.3	0.3
Mechanical installation and repair	-0.2	-0.2	0.0	-0.2	-0.1	-0.2	-0.1	0.5
Office support	-2.1	-2.3	-2.2	-1.4	-2.2	-2.6	0.3	0.3
Production and warehousing work	-1.0	-1.0	-1.7	-0.9	-0.3	-0.7	-3.8	1.0
Agriculture	-0.2	-0.3	-0.3	-0.4	0.0	-0.1	-8.0	-8.9

1. Pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. Post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

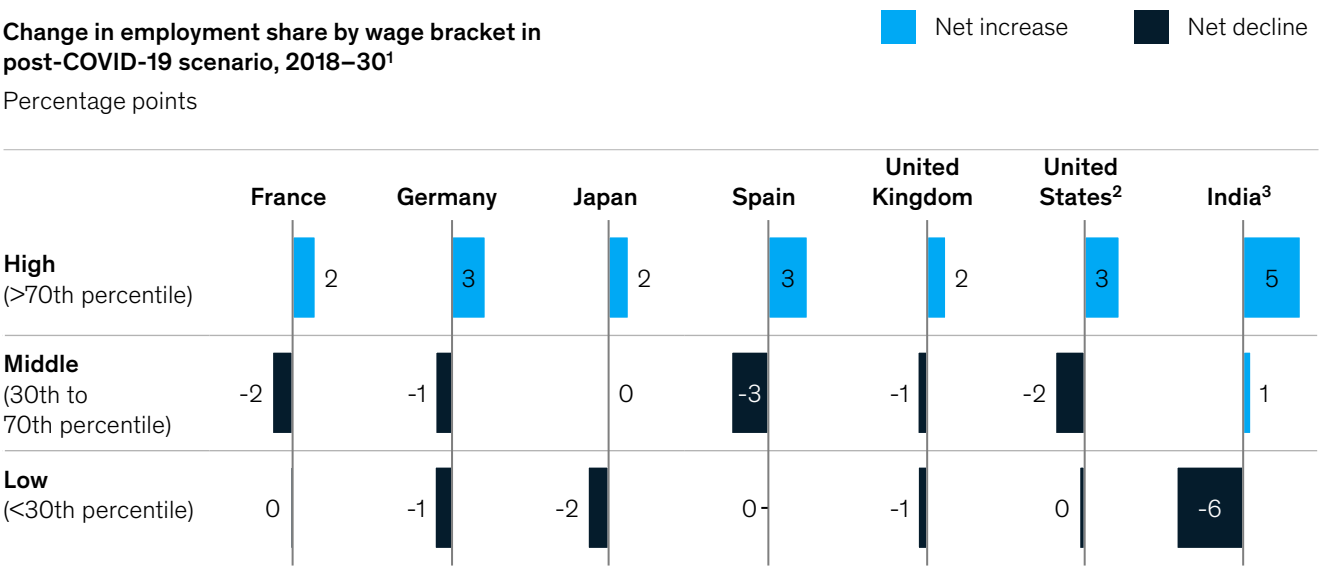
Source: McKinsey Global Institute analysis

Exhibit E8

In the post-COVID-19 scenario, almost all labor demand growth could be in high-wage occupations.

Change in employment share by wage bracket in post-COVID-19 scenario, 2018–30[1]

Percentage points



1. Annual wages calculated by multiplying hourly mean wage by number of working hours in a year. For occupations with no published hourly wage, annual wage calculated from reported survey data.
2. Uses data from 6-digit Standard Occupational Classification codes; results may differ from similar analysis that uses 2-digit SOC codes due to slightly different proportions of population captured in each wage tercile.
3. For India, low wage: occupations earning less than the 40th percentile of median annual wages; middle wage: 40th percentile to 80th percentile; high wage: higher than 80th percentile.

Note: China excluded due to limited data availability on income by occupation.

Source: McKinsey Global Institute analysis

Up to 25 percent more workers may need to switch occupations than before the pandemic, and the retraining challenge may be harder

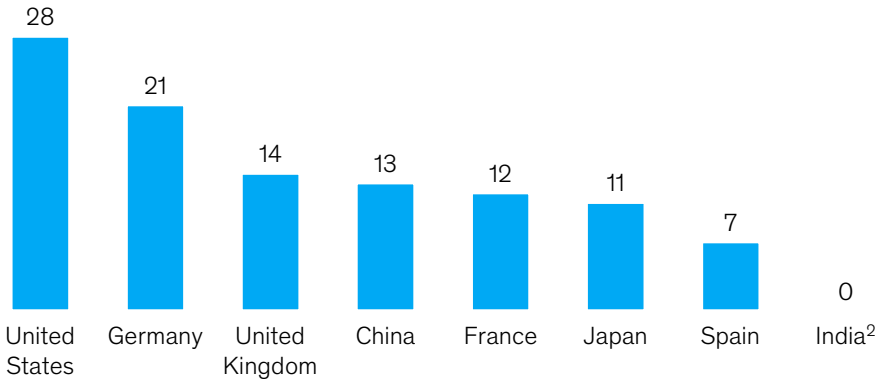
Given the concentration of job growth in high-wage occupations and declines in low-wage occupations, the scale and nature of workforce transitions required in the years ahead will be challenging, according to our research. Across the eight focus countries, 107 million workers, or 1 in 16, will need to find a different occupation by 2030 in our post-COVID-19 scenario. This is 12 percent more across countries than we estimated before the pandemic, and as much as 25 percent more in advanced economies (Exhibit E9).

Exhibit E9

In the post-COVID-19 scenario, occupation transitions may increase by as much as 25 percent across countries compared to before the pandemic.

Increase in the number of workers needing to change occupation between pre- and post-COVID-19 scenarios by 2030

%



	United States	Germany	United Kingdom	China	France	Japan	Spain	India[2]
Occupation transitions in post-COVID-19 scenario, % of 2030 workforce[1]	10	9	8	7	9	9	8	3
Occupation transitions in post-COVID-19 scenario, million[1]	17	4	3	54	2	6	2	18

1. Individuals need to transition occupation if they are in an occupation that sees net declining labor demand relative to 2030 baseline. The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.
2. Job transitions remain flat pre- and postpandemic because of fewer services jobs available into which low-wage construction workers could transition. Excludes transitions among farm workers; if farm jobs are included, transitions fall prepandemic compared to postpandemic as there are fewer transitions to secondary and tertiary sectors.

Source: McKinsey Global Institute analysis

Workers needing to make those transitions may require more significant training and acquisition of new skills to secure jobs in growing occupations. Our research suggests that between 60 and 75 percent of the workers needing to change occupations in advanced economies currently hold jobs in the lowest two wage quintiles. Before the pandemic, our modeling found that those workers could have expected to transition to a new occupation in the same wage group, while workers holding middle-wage jobs would need to learn skills to enable them to move up one wage quintile for a new position. In our post-COVID-19 scenario, we find not only that a larger share of workers will likely need to transition out of the bottom two wage quintiles but also that a majority of them will need new, more advanced skills to move to occupations that are one or even two wage quintiles higher. Overall, we find that just over half of workers in the lowest two wage quintiles who need to switch occupations will need move into occupations in higher wage quintiles. That compares to our prepandemic estimates of just 6 percent needing to move up.

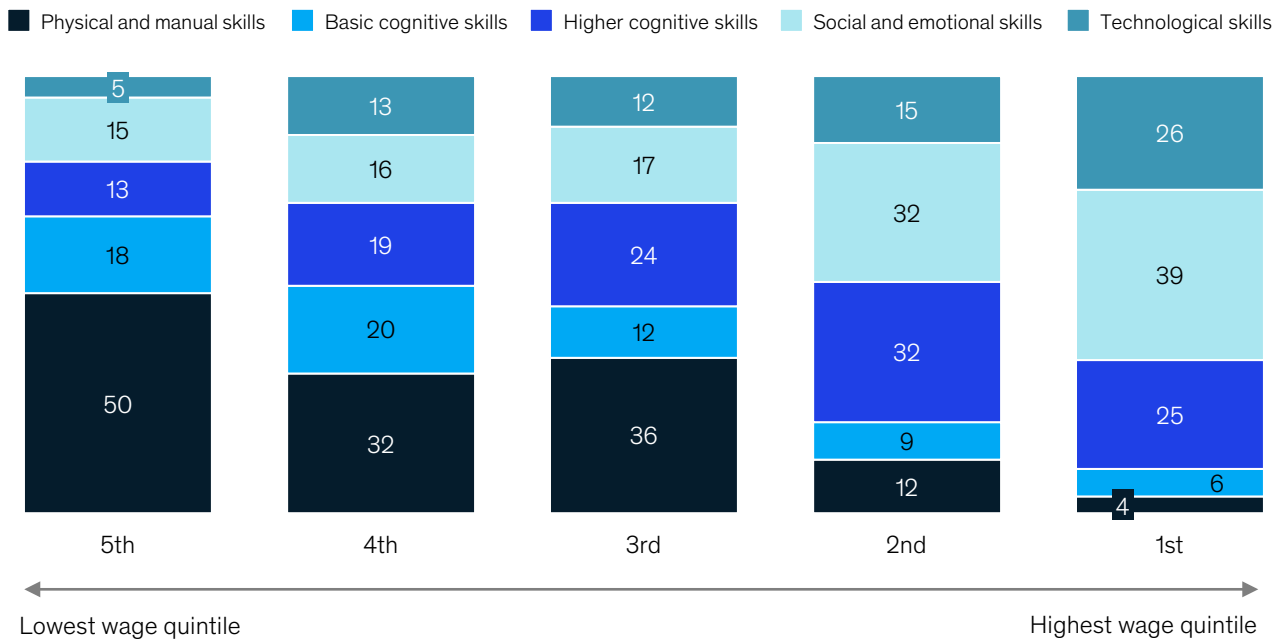
The skill mix required of the workforce going forward—and particularly among those changing occupations—differs from today. Exhibit E10 shows the predominant skills required by jobs in each wage quintile by share of time spent working. Workers in occupations in the lowest wage quintile, for instance, use basic cognitive skills and physical and manual skills 68 percent of the time, but in the middle quintile, use of these skills occupies 48 percent of time spent. In the highest two quintiles, those skills account for less than 20 percent of time spent .

Exhibit E10

Workers will need to learn more social and emotional skills, as well as technological skills, in order to move into occupations in higher wage brackets.

Time spent using skills in each skill category by wage quintile in the United States[1]

%



1. Using O*NET data, more than 2,000 work activities for more than 800 occupations were classified according to the primary skill used.

Source: Employment and Training Administration, US Department of Labor;O*NET OnLine; US Bureau of Labor Statistics; McKinsey Global Institute analysis

In Europe and the United States, workers with less than a college degree, members of ethnic minority groups, and women are more likely to need to change occupations after COVID-19 than before. In the United States, people without a college degree are 1.3 times more likely to need to make transitions compared to those with a college degree, and Black and Hispanic workers are 1.1 times more likely to have to transition between occupations than white workers. In France, Germany, and Spain, the increase in job transitions required due to trends influenced by COVID-19 is 3.9 times higher for women than for men.[21] Similarly, the increase in occupational changes will hit younger workers more than older workers, and individuals not born in the European Union more than native-born workers (Exhibit E11).

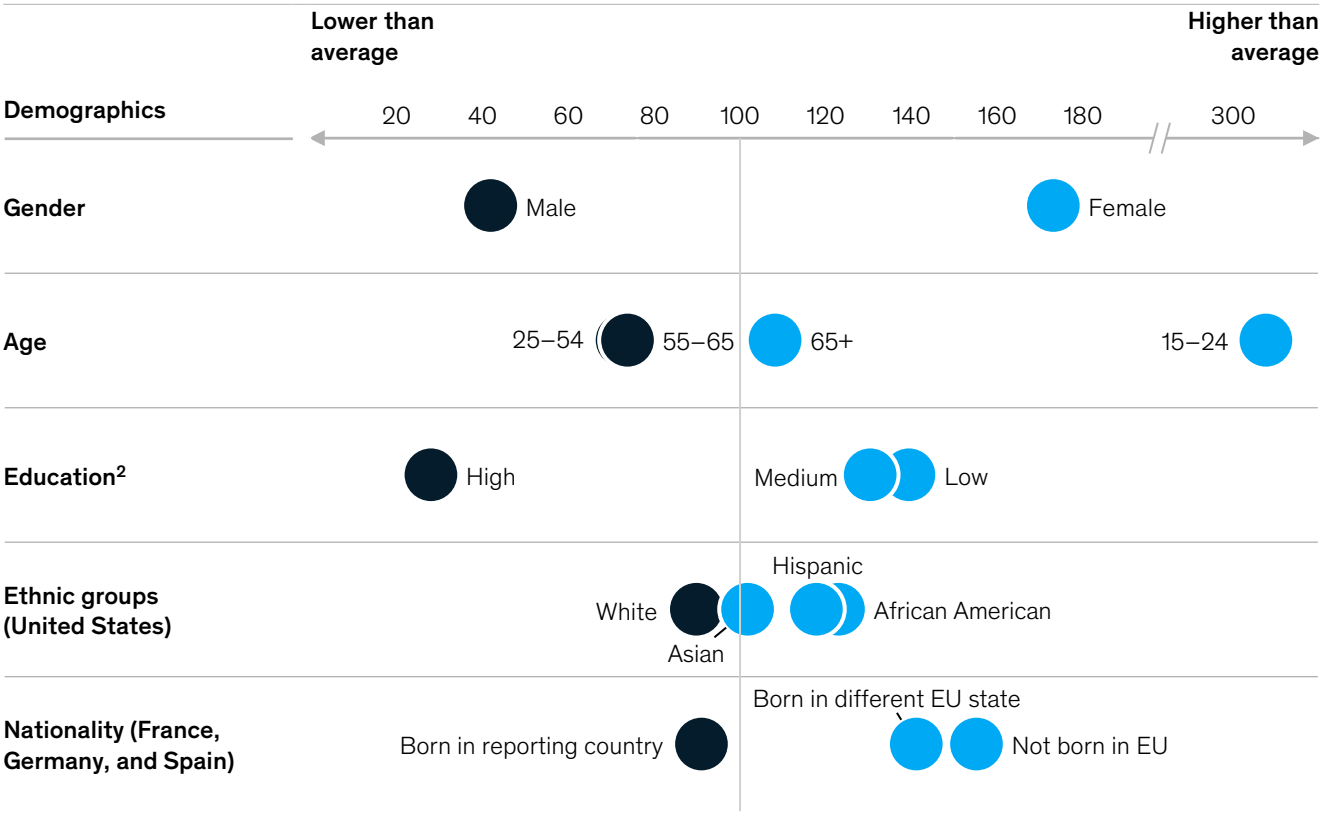
[21] See also "COVID-19 and gender equality: Countering the regressive effects," McKinsey Global Institute, June 2020, McKinsey.com.

Exhibit E11

Women, young, less-educated workers, ethnic minorities, and immigrants may need to make more occupation transitions after COVID-19.

Estimated percentage increase in number of occupation transitions between pre- and post-COVID-19

Indexed to overall percentage increase=100, weighted average of United States, France, Germany, and Spain[1]



1. Individuals need to transition occupation if they are in an occupation that sees net declining labor demand relative to 2030 baseline. The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.
2. For US: Low (less than high school), Medium (high school, some college or associate degree), High (Bachelors degree and above); for France, Germany, and Spain: Low (ISCED 0-2, primary and lower secondary), Medium (ISCED 3-4, upper secondary and postsecondary non-tertiary), High (ISCED 5-8, bachelors, masters, and doctoral degree).

Source: National statistics agencies; McKinsey Global Institute analysis

Companies and policy makers can help facilitate workforce transitions

Innovative and equitable actions taken by business leaders and policy makers could help workers make the big job transitions that we see as an enduring legacy of COVID-19. Already during the crisis, companies and governments made changes that suggest a path toward the future.

Businesses can reimagine where and how work is done and increase reskilling efforts

Businesses looking beyond the pandemic have an opportunity to reimagine how and where work is done. The crisis demonstrated that rapid changes in working practices and the jobs people do can be accomplished quickly. The key is to focus on the tasks and activities required rather than on whole jobs. Redesigning work in this way can streamline processes, increase efficiency, and enhance operational flexibility and agility.

Many employers are devising hybrid remote working strategies for the long term to expand access to talent, increase employee satisfaction, and reduce real estate costs. Doing so will require careful analysis to determine which activities can be done remotely without a loss of productivity, and then devising an intentional approach to when teams of workers are remote and when they are in the office together.[22] Maintaining a cohesive culture and developing practices and programs to keep employees connected and on a career path even at a distance will be key. Mentorship, development, and onboarding of new employees may be somewhat more complicated but not impossible in hybrid remote work models.

Even before the pandemic, many companies helped workers acquire skills they needed for new jobs and created career pathways with upward mobility. After the pandemic, the need for such programs will be more acute. Walmart operates internal academies to develop the best hourly workers into store managers and, more recently, supply chain professionals and technology specialists.[23] In 2020, IBM, Bosch, and Barclays started apprenticeship programs to train workers for tech jobs with career pathways.[24] Studies have found that retraining existing employees with proven track records is typically far more cost-effective than hiring new people.[25]

Other possible measures include changes in hiring practices to put the focus on skills rather than academic degrees. This can expand the pool of available candidates and increase diversity for companies while helping to ease the broad workforce transitions that will play out across all countries. Google, Hilton Hotels, Ernst & Young, and IBM are among a growing number of employers that have changed job postings to remove degree requirements and focus on skills; they have seen marked increases in new hires without college degrees for some roles.

Finally, companies could give greater consideration to diversity and inclusion to counter the regressive impact of COVID-19. Business leaders may increase their focus and innovation in hiring and retaining diverse groups.

Policy makers could focus on expanding digital infrastructure and supporting workers in transition

For policy makers, easing workforce transitions would be a way to avoid high unemployment or have workers drop out of the labor force. Expanding digital infrastructure is important, given the pandemic-fueled boost to the online economy. Even in advanced economies, 19 percent of households in rural areas, and 13 percent of households overall, lack access to internet service.[26] This precludes them from educational and work opportunities. In the United States, McKinsey research found that learning losses from the pandemic could

[22] See Andrea Alexander, Aaron De Smet, Mihir Mysore, "Reimagining the postpandemic workforce," July 2020, McKinsey.com.
[23] William Kerr, "Walmart's workforce of the future," July 2019, Harvard Business School, hbs.edu.
[24] Agam Shah, "Seeking Tech Talent, Companies Kickstart Apprenticeship Programs," January 2020, *The Wall Street Journa*l, wsj.com.
[25] Anand Chopra-McGowan and Srinivas B. Reddy, "What would it take to reskill entire industries?," Harvard Business Review, July 2020, hbr.org.
[26] International Telecommunication Union, "Measuring digital development," November 2020.

wipe out the equivalent of one year of salary on average—and more for underrepresented ethnic groups.[27]

Various options exist for policy makers to support workers during job transitions. In the early days of the pandemic, many countries extended financial assistance to workers who lost jobs, and data on personal income and spending in the United States in subsequent months confirmed that these actions supported consumption and helped to avoid more severe and sustained economic damage.[28] In an era in which midcareer workers may need to retrain and switch occupations, and during which lifelong learning may become a reality rather than just a catchphrase, new or expanded forms of income support could help ease the transition.

Revamping labor market policies and benefits for the growing independent workforce is another option. For the first time during the pandemic, many independent and gig workers were offered the same support extended to hourly wage employees in unemployment and other benefits.[29] So far in some countries, they were mostly temporary measures. Further work to craft permanent policies better suited to a modern labor market could help. For example, portable benefits that allow independent workers to work across gig platforms while accumulating medical and other benefits could enhance such jobs.

Licensing and certification requirements for many occupations could be reviewed. Licensing ensures that professionals have the requisite skills and training and protects consumers. But it can also limit competition and occupational mobility. During the pandemic, for instance, several US states and the federal government eased scope-of-practice restrictions on nurse practitioners and doctors to enable them to care for COVID-19 patients. Nurse practitioners were allowed to provide some care that only doctors could previously perform for patients insured by Medicare in nursing homes, and many states allowed doctors to provide care via telemedicine without needing a state license. Beyond healthcare, occupational licenses can pose barriers to new entrants into many jobs.[30]

Finally, local government leaders could consider the value proposition of their location. With more workers shifting to remote work and pondering where to set up home offices, smaller cities and areas left out of the boom over the past decade have a new opportunity to attract residents and revitalize local growth.

The impact of the pandemic on work with high physical proximity delivered a major shock to the workforce and will continue to influence its shape and direction in the years to come. Jobs that once helped offset labor displacement are among those most affected by the long-term repercussions of COVID-19, and workers will face unprecedented transitions requiring wholly new skills to advance into the more highly paid jobs being created. Businesses and policy makers have a role to play in rethinking retraining and finding new ways to help workers develop the skills they will need. If a robot can learn to flip hamburgers, then a shop clerk can learn to be a nurse practitioner, a cybersecurity analyst, or a wind turbine service technician—with the right support.

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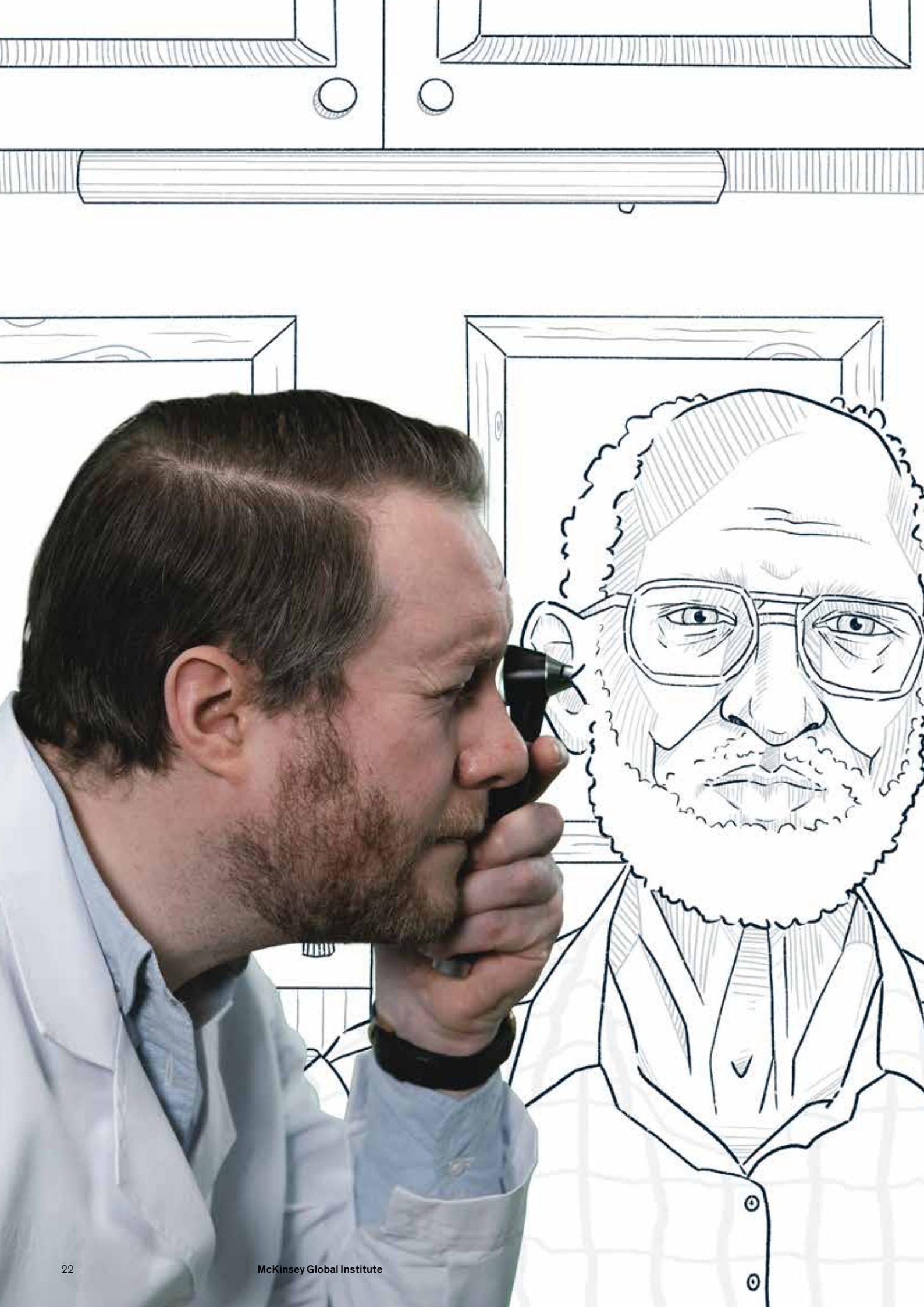
[27] See Emma Dorn, Jimmy Sarakatsannis, and Ellen Viruleg, "Covid 19 and student learning in the United States," June 2020, McKinsey.com.

[28] See, for example, "GDP first quarterly estimate, UK: July to September 2020," UK Office for National Statistics, November 2020, ons.gov.uk. Also see Scott Baker et al., *Income, liquidity and the consumption response to the 2020 economic stimulus payments,* NBER working paper number 27097, September 2020, nber.org.

[29] *What have platforms done to protect workers during the coronavirus (COVID-19) crisis?*, Organisation for Economic Co-Operation and Development (OECD), September 2020, oecd.org.

[30] "COVID-19 brings changes to NP scope of practice," *American Journal of Nursing,* August 2020, Volume 120, Issue 8, p. 14.



1. Physical proximity defines and shapes ten work arenas

COVID-19 elevated some elements often overlooked in work: the physical proximity of workers to one another and to customers, the level of human interactions required, and the physical environment in which work takes place. Physical space and how employees do their jobs within it came into sharp focus as companies considered how best to ensure the health and safety of the workforce and customers in the early days of the pandemic. Occupations that require more human interactions, physical proximity, and on-site work faced the most disruption during the pandemic, and our research finds that these factors also may partly determine changes in how and where work is done after the pandemic recedes.

To assess the degree of physical proximity in work, we create a score that measures the level of human interaction required based on physical proximity to others, frequency of interactions, and level of exposure to strangers, as well as whether the work must take place indoors and whether it is site dependent because it requires special equipment or machinery. We obtain data for these aspects of work for more than 800 occupations and define ten work arenas based on similarity of aspects across occupations.

Our research suggests that the more physical proximity required in a job, the more likely that it will be reshaped and affected in the short and long term by pandemic-influenced trends such as digitization, automation, and remote work. In subsequent chapters, we delve into a deeper discussion of each of the trends and their outcomes, but here we focus on the important linkage of our findings with the new dimension of physical proximity.

Ten work arenas group occupations by their physical proximity, human interactions, and work environment

Before the pandemic, the future of work was often framed in relation to the impact of technological change on occupations and sectors. COVID-19 has elevated the importance of the physical aspects of work: the proximity of work to customers or coworkers, the frequency of required human interactions, whether those interactions are with a small set of colleagues or an ever-changing stream of strangers, and whether the work is indoors or requires an on-site presence.

The more a job requires close proximity to other people in indoor spaces, particularly large numbers of new and different people, the more it was disrupted in the early days of the pandemic. For example, food servers in a restaurant must interact closely with many strangers every day. They can do virtually none of their job, which involves activities like taking orders, carrying plates of food, clearing dishes, and cleaning tables, outside the restaurant, and some of their tasks can be automated and digitized. During 2020, the demand for food servers declined as restaurants were forced to close to avoid placing people in physical proximity.[31] While demand for restaurants will return, many have already introduced new ways of working that may endure in the long term, such as increasing the use of QR codes to deliver menus and place orders in restaurants, online apps to place orders in advance, and eventually robots that may be able to serve food and clear tables.

[31] *The employment situation—December 2020,* US Bureau of Labor Statistics, January 2020, bls.gov.

To better understand how the physical aspects of jobs will affect work in the short and long term, we group occupations across sectors and industries into ten work arenas that are based on the physical attributes of work. Using data from O*NET OnLine, we quantify the level of physical proximity required for more than 800 occupations.[32]

For each occupation, we create an MGI physical proximity score using metrics from O*NET and making calibrations for specific occupations.

Level of human interaction required in an occupation, based on:

— **Physical closeness** to others assesses how closely an employee works with other people. For example, a hairstylist who must touch a client's hair has high physical proximity to others, whereas a gardener who is rarely required to interact closely with others experiences little physical proximity. We base this metric on the O*NET score for "physical proximity."

— **Frequency of interactions** describes how frequently a worker physically interacts with the same or different people. For example, a teacher spends most of his or her day interacting with other people and would score high on this metric. A dressmaker interacts less often with others. We base this metric on the O*NET score for "face-to-face interactions."

— **Exposure to strangers** measures how frequently a worker must interact with strangers in a job. A food server encounters numerous new people in one evening in a restaurant, while a biochemist typically works with the same people in a lab. We base this metric on the O*NET score for "dealing with external customers."

Work environment required for an occupation, based on:

— **Indoor work** accounts for whether an occupation is typically performed indoors. Working indoors in an enclosed space, as opposed to outdoors in open air, may enable a virus to spread more quickly. Indoor work is thus more likely to be disrupted by COVID-19 and other viruses. We base this metric on the O*NET score for "indoors, environmentally controlled."

— **Site-dependent work** is whether an occupation requires being on-site, either to use special equipment or machinery or to care for a building or other area. To perform their jobs, dental hygienists require special equipment, and security guards must be in a building. In contrast, a personal finance adviser could do her job without special equipment or needing to be at a specific site. We base this metric on an average of O*NET scores for "spends time using your hands to handle control or feel objects tools or controls" and "assisting and caring for others."

Our physical proximity score is a simple average of these five metrics and reflects the average degree of proximity required by occupations in a work arena. Based on the physical proximity score, we then group occupations with similar traits into ten work arenas: medical care, personal care, on-site customer interaction, leisure and travel, home support, indoor production and warehousing, classroom and training, computer-based office work, transportation of goods, and outdoor production and maintenance (Exhibit 1). In each work arena, the nature of work, level of human interaction needed, and work environment required differ markedly.

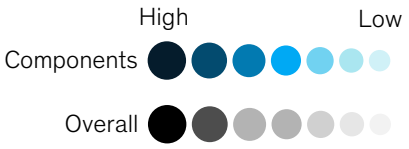
[32] The O*NET metric "physical proximity" is among the data we use to compile MGI's physical proximity scores.

Exhibit 1

Work arenas vary in overall physical proximity.

Overall physical proximity score by work arena (based on human interaction and work environment metrics)

Score out of 100



	Human interaction			Work environment		
Work arenas Example venues	Physical closeness	Frequency of interactions	Exposure to strangers	Indoor work	Site-dependent work	**Overall physical proximity score**
Medical care Hospitals, clinics	86	94	78	91	87	87
Personal care Hair salons, gyms	82	92	64	86	85	83
On-site customer interaction Retail stores, banks	69	91	80	80	63	76
Leisure and travel Restaurants, hotels	77	86	81	73	63	75
Home support Residential homes	66	82	44	65	87	70
Indoor production and warehousing Factories, kitchens, warehouses	57	87	48	70	79	70
Computer-based office work Offices, corporate headquarters	59	89	67	86	42	68
Classroom and training Schools, conference centers	57	91	60	88	45	68
Transportation of goods Trucks, rail yards	48	78	64	40	65	58
Outdoor production and maintenance Construction sites, farms	44	79	50	39	63	54

Note: Occupations grouped into ten work arenas based on overall physical proximity score that combines O*NET data for human proximity in the workplace, including for physical proximity, face-to-face discussions, and dealing with external customers, with O*NET data on types of work environments and work environment score (average of O*NET score for workplaces such as outdoor/indoor and environmentally controlled, and our assessment of site dependence of occupations based on various O*NET data).

Source: Employment and Training Administration, US Department of Labor;O*NET OnLine; McKinsey Global Institute analysis

The ten work arenas, ranked from highest overall physical proximity score to lowest:

— **The medical care arena**, home to workers in hospitals, outpatient centers, and clinics. Work in this arena is defined by high physical closeness between workers and patients; interactions with a large number of different people each day; densely populated indoor conditions; and the need to be on-site to perform the job (although during the pandemic, telemedicine took off, allowing some medical personnel to work from home, a practice likely to stick). As a result, during the pandemic, workers in this arena quickly adopted new protective equipment and distancing procedures to limit the spread of the virus. This work arena includes only the care providers in the healthcare system who work in hospitals or clinics and represents up to 7 percent of the workforce across countries.[33]

— **The personal care arena** encompasses hair salons, gyms, and spas. Like the medical care arena, it is defined by close proximity between workers and customers and by large numbers of interactions with different people each day. Unlike medical care, which requires specialized equipment on-site, many occupations in this work arena shifted to home-based delivery of services or online delivery. In the short term, COVID-19 highly disrupted jobs in this arena, due to mandatory closures of workplaces. Some of these occupations, including instructors of fitness classes, were able to pivot swiftly online. Others, like hairstyling, can be done outside the workplace, such as in people's homes, but still require close proximity to clients. This work arena accounts for up to 5 percent of the workforce in the eight countries.

— **The on-site customer interaction arena** includes workers who interact with customers in retail stores, banks, and post offices, among other places.[34] Work in this arena is defined by high levels of frequent interaction with strangers and requires on-site presence. But the physical distance between workers and customers is typically greater than for personal care, and new social distancing measures, such as transparent screens at store cash registers, have been put in place to increase worker safety. Many venues in this work arena were temporarily shuttered during the pandemic, and some work migrated to digital platforms and e-commerce, a behavioral change that is likely to persist. This arena accounts for 6 to 13 percent of the workforce across countries.

— **The leisure and travel arena** covers hotels and restaurants and other food service operations. Workers in this arena interact daily with crowds of new people and have higher frequency of interactions with customers compared to workers in the on-site customer interaction and personal care arenas. While the physical proximity required in this work arena is not as high as in the medical care and personal care arenas, establishing physical distancing measures to separate workers and customers, for example in a restaurant, sports stadium, or theater, is more difficult. COVID-19 forced most leisure venues to close and airports to operate on a severely limited basis, leaving many workers furloughed or laid off. This work arena accounts for 3 to 7 percent of the workforce across countries.

— **The home support arena** encompasses workers who clean houses, care for children or the elderly in their homes, and generally work in homes other than their own. Work is typically indoors and site dependent. The arena has moderate physical proximity and low frequency of interactions with strangers. Early in 2020, many workers in this arena were unable to work due to bans on visiting other people's houses; however, many countries quickly relaxed these restrictions on home support or declared it essential. After the pandemic, we expect work in this arena to continue much as it did before COVID-19, given growing demand due to aging populations. While automation can disrupt some work in this arena—for example, robot vacuums can do some housework—most tasks in it are not easily automatable. This work arena accounts for 1 to 5 percent of the workforce across countries.

[33] Other healthcare occupations fall into different work arenas. Caregiving roles that do not require special medical equipment and need not be done in a hospital, such as counselors, are included in the personal care arena. Caregiving roles that can be done in people's homes, such as home health aides, are included in the home support arena, while laboratory workers are included in the indoor production and warehousing arena.

[34] The back-office occupations in retail, banking, and other organizations are included in computer-based office work.

— **The indoor production and warehousing arena** includes factories, commercial kitchens, and research labs. Work here is defined by needing to be on-site and indoors because it requires special equipment or machinery. It is typically among the same teams on a daily basis. During the pandemic, many workplaces in this work arena were deemed essential, and companies quickly established physical distancing measures to keep workers farther apart. Some businesses quickly adopted automation in this work arena to cope with surging demand, for instance in packaged food processing. This is the second-largest work arena in number of workers, representing roughly 20 to 25 percent of the workforce across countries.

— **The classroom and training arena** is home to teachers in schools and universities as well as training operations.[35] Numerous interactions with a consistent set of people and minimal exposure to strangers characterize work in this arena. While work takes place indoors and can be done remotely, it differs from the computer-based office work arena in that interactions are often with a more consistent set of people. The immediate impact of COVID-19 was quite obvious in this work arena as governments closed schools and set up online learning to enable study from home. While corporate training programs and some postsecondary education may take place online in the long term, the notable drop in effectiveness of online learning for primary and secondary learning means remote teaching in such schools is unlikely to persist. This work arena accounts for 3 to 8 percent of the workforce across countries.

— **The computer-based office work arena** includes offices of all sizes, corporate headquarters, and administrative workspaces in hospitals, courts, and factories. Work in this arena requires only moderate physical proximity to others and a moderate number of human interactions. A distinguishing feature of this arena is that much of the work can be done remotely—it does not involve special equipment, and virtual tools can facilitate required interpersonal interactions. This is the largest work arena in advanced economies, accounting for 26 to 35 percent of the workforce. It represents 10 to 19 percent in developing economies.

— **The transportation of goods arena** encompasses work on trucks and loading docks and in rail and air depots. Work in this arena is defined by low physical proximity to others and not being conducted indoors, although it may require a moderate level of interaction with strangers. Burgeoning e-commerce, together with shifting global supply chains, has already driven demand for trucking and work on loading docks, among other workplaces. This work arena accounts for 2 to 3 percent of the workforce across countries.

— **The outdoor production and maintenance arena** includes construction sites, farms, and other outdoor spaces. Work here requires low proximity and few interactions with others. It takes place fully outdoors. It requires less interaction with strangers than the transportation of goods arena. In the short term, COVID-19 created displacement in some workplaces in this arena as construction stalled, but the virus had a limited impact in farms, parks, and other outdoor spaces. This is the largest work arena in China and India, accounting for 35 to 55 percent of the workforce, while in advanced economies it represents 8 to 14 percent of the workforce (Exhibit 2).

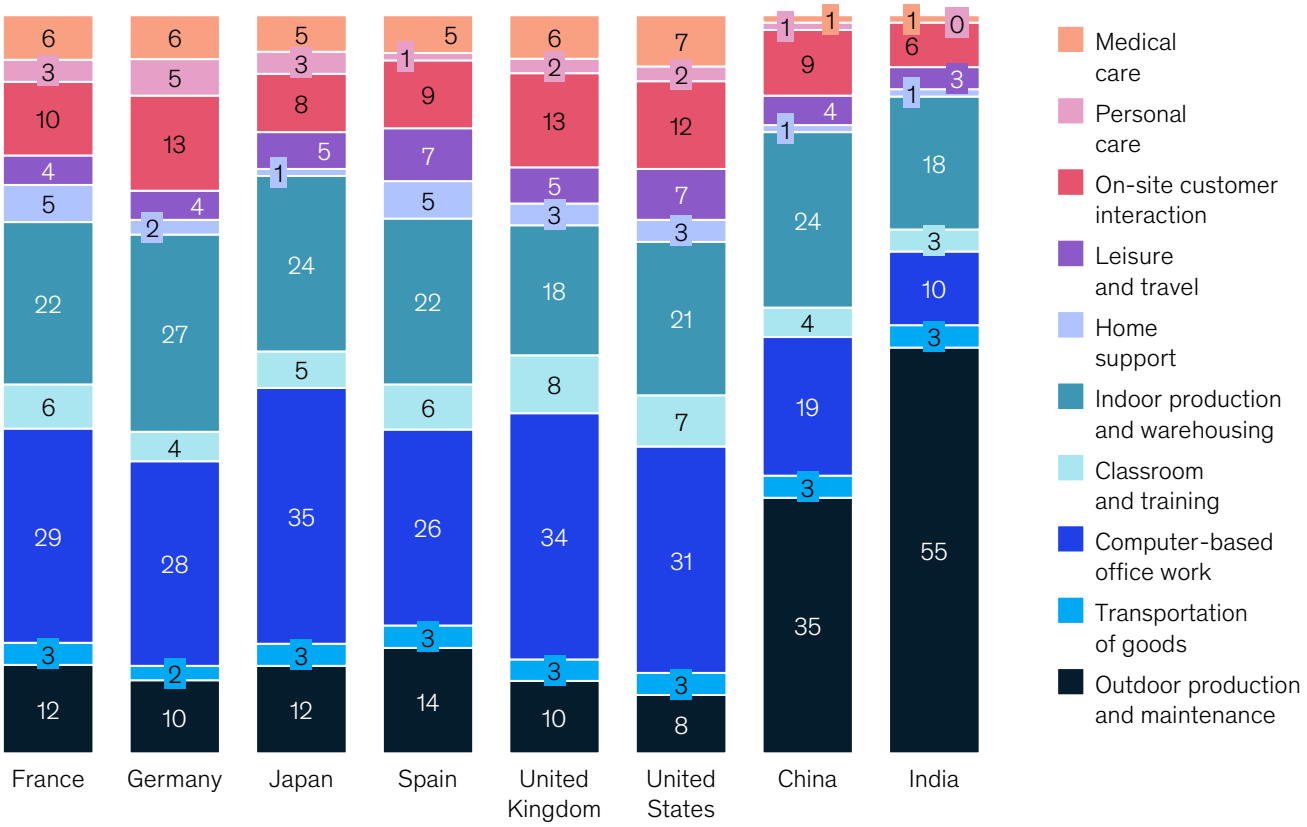
[35] Administrative roles in schools and training programs are included in the computer-based office support work arena.

Exhibit 2

Computer-based office work is the largest work arena in advanced economies, while outdoor production and maintenance is largest in China and India.

Proportion of workforce by work arena

% of 2018 workforce



Note: Figures may not sum to 100% because of rounding.

Source: McKinsey Global Institute analysis

COVID-19 is accelerating changes in work arenas with higher physical proximity and more human interactions

During the pandemic, the work arenas experiencing the greatest disruption—medical care, personal care, on-site customer service, and leisure and travel—also had the highest physical proximity scores. In some cases, workers in these arenas experienced layoffs and furloughs as soon as the pandemic broke out. In other cases, such as essential medical services, stringent protocols and practices transformed work almost overnight, while work deemed nonessential by policy makers simply halted or was substantially reduced. Shop clerks, hairstylists, waiters, flight attendants, and hotel receptionists were among the legions of workers who were sent home. Only a fraction of them returned to work, and for dramatically reduced amounts of time.

But the pandemic also triggered changes in consumer and business behaviors that will persist even after it fades. Initially introduced and embraced to reduce human proximity and the spread of the virus, some of these changes may stick because of the convenience, flexibility, or efficiency they offer. We explore these long-term changes in more detail in subsequent chapters of this report. In this chapter, we summarize five long-term outcomes in relation to each work arena: remote work potential, digital adoption, automation adoption, labor demand growth, and number of job transitions required (Exhibit 3).

Exhibit 3

Trends accelerated by COVID-19 may play out differently across different arenas.

Potential change in impact of workforce trends due to COVID-19 in the United States

High disruption Low disruption

			Change compared to pre-COVID-19 scenario				
		Potential for remote work	Digital adoption[1]	Automation adoption	Labor demand growth	Occupation transitions	Overall disruption[2]
Work arena	% of workforce, US 2018	% of time that can be remote	Percentage point change in adoption of digital tools[1]	Percentage point change in share of workers displaced by 2030	Percentage point change in net labor demand growth by 2030	Percentage point change in share of workers changing occupations by 2030	
On-site customer interaction	12	12	18	8	-14	8	High
Leisure and travel	7	5	11	8	-10	4	
Computer-based office work	31	70	17	7	0	3	
Indoor production and warehousing	21	6	11	4	2	1	
Classroom and training	7	31	15	2	2	0	Moderate
Medical care	7	6	15	5	6	0	
Home support	3	13	10	0	16	0	
Personal care	2	11	10	3	8	-2	Low
Transportation of goods	3	10	13	4	14	-3	
Outdoor production and maintenance	8	3	7	1	6	-3	

1. Calculated based on McKinsey Global Institute's Digitization Index on level of digitization by sector mapped to work arena, including use of digital assets, digital usage, and digital workers, and adjusted for COVID-19 based on McKinsey surveys indicating consumer adoption of digital channels and platforms by sector.
2. Ranking based on occupation transitions column.

Note: Occupations grouped into ten work arenas based on overall physical proximity score that combines O*NET data for human proximity in the workplace, including for physical proximity, face-to-face discussions, and dealing with external customers, with O*NET data on types of work environments and work environment score (average of O*NET score for workplaces such as outdoor/indoor and environmentally controlled, and our assessment of site dependence of occupations based on various O*NET data).

Source: Employment and Training Administration, US Department of Labor;O*NET OnLine; US Bureau of Labor Statistics; McKinsey Global Institute analysis

70%

Time spent in computer-based office work could be spent remotely without losing effectiveness

The potential for long-term remote work is highest in the office work arena but will also affect other arenas

Hybrid remote work models apply mainly to computer-based office work. This is the arena with the lowest requirements for site-dependent work, because workers such as accountants, financial managers, and legal secretaries do not need special equipment or to work in a specific building or venue. In this work arena, 70 percent of time could be spent working remotely without losing effectiveness. This estimate is based on our analysis of more than 2,000 work activities in more than 800 occupations to identify which activities and occupations have the greatest potential for remote work.[36] While nearly all of the tasks in this work arena can technically be done remotely, some are more effective when conducted in person where possible. These include coaching and counseling, building customer and colleague relationships, and negotiating and making critical decisions.

Some other arenas have moderate potential for remote work. For example, in the classroom and training arena, battalions of teachers and trainers have shifted to working remotely online since the outbreak of the pandemic, as schools and universities were forced to close in many countries. However, effectiveness is limited; parents and teachers of younger pupils say the quality of education has suffered as a result of going online, while many students in advanced and emerging economies lack sufficient digital tools and connectivity to learn effectively from home. In the long term, more postsecondary education may remain online after the pandemic.

In the medical care arena, telemedicine has surged, enabling some doctors to work remotely at least part of the time. However, the majority of a doctor's work still requires face-to-face interaction. The personal care arena has some remote work potential, principally among fitness trainers, counselors, and occupational therapists who can conduct sessions or appointments online. Even the transportation of goods arena has some remote work potential, with delivery drivers spending up to 10 percent of their time on activities such as arranging maintenance activities, recording details of deliveries or shipments, and maintaining financial or accounts records.

Digital technologies will transform work in many arenas

Adoption of a range of digital technologies—including online tools, virtual platforms, e-commerce, and videoconferencing—has already significantly risen across work arenas with high physical proximity as consumers and businesses sought to replace physical interactions with virtual ones where possible during the pandemic. To size the shift, we measured the level of digitization by work arena based on MGI's Digitization Index from before the pandemic, applying a multiplier to each arena based on the extent to which digital adoption accelerated following the outbreak of COVID-19, as reported in McKinsey surveys.[37] The Digitization Index is based on investment in digital assets, use of digital channels, and investment in digital training and skills. Increased digital technologies will in some cases change the jobs available—for instance, from retail stores to e-commerce distribution centers—but in many others, digital tools will change how work is done, complementing labor rather than substituting for or replacing it. It will have the most pronounced impact in four work arenas. In the customer interaction arena, jobs are already being disrupted by the growth of e-commerce and use of apps for ordering and delivery, among other digitization. This will shift jobs away from cashiers and shop clerks to warehouse pickers and delivery staff. In office settings, the shift to working remotely has unleashed a wave of new virtual collaboration tools to enable virtual meetings, document sharing, and new communication channels. These changes have the potential to make work more productive—and may reduce some business travel for internal meetings and even client interactions.

[36] See chapter 2 for a more detailed explanation of this methodology.
[37] *Digital America: A tale of the haves and have-mores*, McKinsey Global Institute, December 2015, McKinsey.com; McKinsey COVID-19 US Digital Sentiment Survey, April 2020.

Automation and AI may accelerate primarily in the on-site customer interaction, office work, and leisure and travel arenas

Our modeling suggests that adoption of automation and AI is likely to accelerate most in work arenas with higher physical proximity.[38] These arenas will thus be most susceptible to job displacement (Exhibit 4). For example, the on-site customer interaction arena, which employs 12 percent of the US workforce, includes jobs with high proximity requirements that are more vulnerable to accelerating automation and digitization and to declining labor demand. By 2030, we estimate that the proportion of workers potentially displaced by automation in this work arena in the United States could increase from 20 percent projected before the pandemic to 28 percent postpandemic. Occupations in this work arena, such as bank tellers, cashiers, and retail salespersons, had high automation potential before COVID-19, and this may have been exacerbated as organizations worked to reduce physical proximity by automating operations faster or shifting to more work to digital platforms. Similarly, we estimate that labor demand in the leisure and travel arena will decline; for example, in France, the proportion of workers potentially displaced by automation in this work arena by 2030 could increase from 23 percent in our prepandemic estimates to 28 percent post-COVID-19. While consumer demand for these services will rebound, roles such as counter attendants, subway and streetcar operators, and hotel desk clerks already had high automation potential before the pandemic. Where automation and AI have accelerated under COVID-19 to reduce physical proximity, such jobs may not return to prepandemic levels. Hotels that have turned to self-service check-in arrangements and restaurants that have increased the use of kiosks that allow customers to place orders directly are unlikely to stop using those devices when the pandemic is over.

To be sure, a high proximity score does not necessarily foreshadow an increase in job displacement from automation. The medical care arena, for example, has the highest physical proximity score of any work arena. Yet disruption for workers in that arena will likely be moderate over the next decade because many technologies used in it complement and support workers rather than substituting for them, and long-term trends such as aging populations and rising incomes will continue to increase demand for these services. In China, for example, we estimate that demand for workers in the medical care arena will rise by 121 percent, representing 13 million more workers than in 2018, while Germany is likely to require 324,000 more workers in the medical care arena, a 13 percent increase.

The personal care arena also has a high proximity score because most jobs in it require close interaction with clients in indoor spaces. However, demand for personal care services such as massage, hairdressing, and fitness trainers, as well as some healthcare services that take place outside of hospitals such as counseling and occupational therapy, are expected to increase, driven primarily by rising demand for all types of care services as populations age and people have more income. Such jobs also face little threat from automation. COVID-19 spread extensively in nursing homes, for example, and that may spur greater efforts to care for elderly people in private homes, which in turn will require more of the itinerant attendants who work in the home care arena.

Conversely, the computer-based office work arena has a relatively low physical proximity score but is likely to face greater long-term disruption. Most notably, the success of hybrid remote work has already prompted a broad rethinking about how and where work gets done. Technology is a big part of the solution. Many routine back-office jobs such as bookkeepers and administrative assistants can be done with robotic process automation and other AI, while at the same time, demand for the professional and STEM jobs in this work arena is likely to grow. In this area, therefore, we may see occupations disrupted by COVID-19 offset by other jobs for which the pandemic has increased demand.

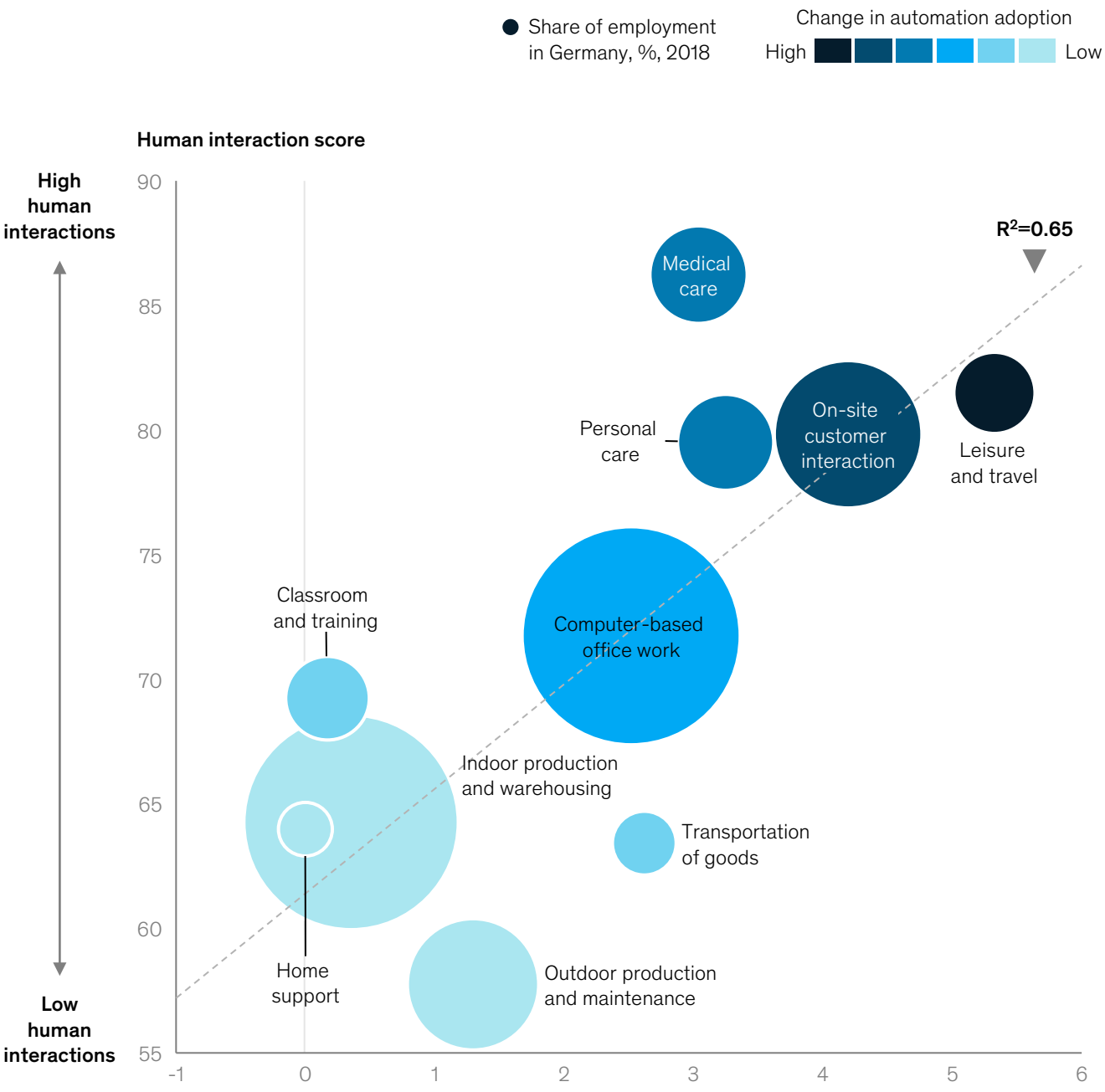
[38] We build on MGI's previous research on how automation and AI will transform work. See *Jobs lost, jobs gained: Workforce transitions in a time of automation*, McKinsey Global Institute, January 2017. In our current research, we estimate the potential acceleration of technology adoption based on more than 70 expert interviews and an executive survey, which we describe more fully in chapters 3 and 4.

Exhibit 4

Work arenas with more human interactions may see greater acceleration in automation.

Potential change in automation adoption by 2030 by work arena in Germany

Germany is illustrative; other countries show similar results



Change in automation adoption:
Difference between pre- and post-COVID-19 scenario automation adoption in 2030, percentage point change

Note: Pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. Post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Occupations grouped into ten work arenas based on overall physical proximity score that combines O*NET data for human proximity in the workplace, including for physical proximity, face-to-face discussions, and dealing with external customers, with O*NET data on types of work environments and work environment score (average of O*NET score for workplaces such as outdoor/indoor and environmentally controlled, and our assessment of site dependence of occupations based on various O*NET data). Human interactions are taken as average of adjusted O*NET scores for physical proximity, face-to-face discussions, and dealing with external customers.

Source: O*NET OnLine; US Bureau of Labor Statistics; McKinsey Global Institute analysis

Following the pandemic, net labor demand will decline most in the customer interaction and office work arenas and will increase most in transportation and home support

In general, work arenas with the highest proximity scores could see some of the largest declines in labor demand over the next decade. Our scenarios suggest that demand for jobs involving on-site customer interaction could decline by ten percentage points in Germany in the post-COVID-19 scenario compared to before the pandemic. Increased e-commerce is likely to displace cashiers and in-store sales representatives. Faster automation adoption in banks and retail stores, driven in part by a need to reduce physical proximity in the short term, will also affect workers in this work arena. In the leisure and travel arena, labor demand could decline by nine percentage points in Germany over the next decade because of COVID-19. While leisure travel is likely to bounce back, business travel is not expected to return to prepandemic levels, delivering far-reaching consequences for hotels, restaurants, and entertainment venues.[39]

Some longer-term trends also influence the size and shape of labor demand, and their effect may outweigh the impact of physical proximity. For example, aging populations and rising incomes create demand for workers in the medical care arena, which has one of the highest increases in labor demand over the next decade despite the required proximity of most healthcare jobs. With moderate physical proximity requirements, the home support arena also may see a large rise in labor demand, principally driven by healthcare-related and social assistance occupations such as home health aides and childcare workers. Jobs in the transportation of goods arena are set to grow by 8 percent in Japan by 2030 because of the rapid adoption of e-commerce—in other words, only indirectly because of proximity.

The number of workers needing to switch occupations will be highest in work arenas with high physical proximity

In general, work arenas with higher proximity scores are likely to see the most additional workers switch occupations over the next decade (Exhibit 5). For example, 15 percent of workers in the customer interaction arena in France may need to retrain or gain additional skills or education in order to transition to more secure occupations by 2030, compared to the 5 percent estimated before the pandemic. Workers in these arenas tend to be younger, less educated, and women, and many of them lost jobs during the pandemic, which has had the greatest impact on those demographics.

Some work arenas see little change in the number of necessary occupational changes required in the post-COVID-19 scenario. These tend to be the work arenas with the greatest labor demand growth over the next decade, and workers currently employed in these arenas are unlikely to need to transition to different occupations. For example, in the transportation of goods arena, which might have had a decline in labor demand in the pre-COVID-19 scenario, labor demand grows after the pandemic. Thus, fewer transitions will be required in that work arena. In Japan, the number of workers needing to change occupations in the transportation of goods arena is likely to decline by 2030.

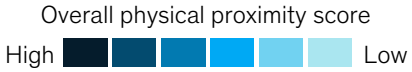
Work arenas with higher proximity scores are likely to see the most additional workers switch occupations over the next decade.

[39] Scott McCartney, "The Covid pandemic could cut business travel by 36 percent—permanently," *Wall Street Journal*, Wall Street Journal, December 1, 2020, wsj.com.

Exhibit 5

Workers in arenas with higher physical proximity may have more need to switch occupations.

Change in number of occupation transitions required by 2030 between pre- and post-COVID-19 scenarios by work arena[1]



Japan — **Change in number of occupation transitions required[2]**

	Percentage point change in share	Absolute number, thousand
On-site customer interaction	4.5	240
Leisure and travel	2.5	79
Indoor production and warehousing	1.0	153
Computer-based office work	1.0	230
Home support	0	0
Medical care	0	-2
Classroom and training	-0.1	-4
Personal care	-0.1	-3
Outdoor production and maintenance	-0.7	-58
Transportation of goods	-2.4	-40

1, The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.
2. An occupation transition is defined as the need for a worker to transition from their current occupation to a different one due to changes in labor demand.
Note: Occupations were grouped into ten work arenas based on an overall "physical proximity score" that combines O*NET data for human proximity in the workplace, including physical proximity, face-to-face discussions, and dealing with external customers, with O*NET data on types of work environments and a work environment score (average of O*NET score for workplaces such as outdoor/indoor and environmentally controlled, and our assessment of site dependence of occupations based on various O*NET data).
Source: Employment and Training Administration, US Department of Labor;O*NET OnLine; US Bureau of Labor Statistics; McKinsey Global Institute analysis

Work arenas are an important—although not the only—explanatory factor in how work will be transformed in the future. COVID-19 durably altered workplace trends by prompting a sharp increase in remote work and virtual meetings, an explosion in e-commerce and other virtual transactions, and a potential acceleration of automation in some parts of the economy. We explore each of these trends and its impact on work in more detail in subsequent chapters.

2. Remote work will continue, with implications for urban centers

Among some workers, COVID-19 will be forever remembered as the virus that turned their homes into office spaces. When the pandemic started, employees working remotely even part time were few and limited largely to advanced Western economies. Working from home was primarily something done when a child was sick or a household repair person was at work.

That changed almost overnight as governments issued stay-at-home orders early in the pandemic. Legions of workers cleared off their kitchen counters and dining room tables to make room for laptops, screens, and keyboards, while their employers scrambled to deploy digital tools to help them maintain the productivity they had in the office.

The transformation caused a behavioral change that is likely to stick.[40] The forced experiment proved a success for many workers and offered businesses a tutorial in the limitations and benefits of remote work. As offices reopen when the pandemic ebbs, many companies plan to allow some employees to work away from the office at least part time. The virus has overcome cultural and technological barriers that prevented remote work in the past and triggered a structural shift in where work takes place, at least for some people.

20–25%

Share of workforce in advanced economies that could work remotely three to five days a week without losing effectiveness

Building on the McKinsey Global Institute's body of work on automation, AI, and the future of work, we extend our models to consider where work gets done.[41] Our analysis finds that the potential for remote work is highly concentrated among highly skilled, highly educated workers in a handful of industries, occupations, and geographies and concentrated primarily in the computer-based office work arena. Roughly 20 to 25 percent of the workforce in advanced economies could be as effective working remotely three to five days a week as working from an office. If remote work took hold at that level, four to five times as many people would work from home at least part of the time compared to before the pandemic, which would have a profound impact on urban economies, transportation, and consumer spending, among other things.[42] In the years ahead, it is possible that a shift to remote work could slow or even reverse the historical trend of jobs and people concentrating in the largest and most dynamic cities, hollowing out smaller cities and towns.[43]

We also find, however, that roughly half of workers in advanced economies cannot work remotely at all. Some of their jobs require collaborating with others or using specialized machinery; other jobs, such as conducting CT scans, must be done on location; and some,

[40] Richard H. Thaler and Cass R. Sunstein, *Nudge: Improving decisions about health, wealth, and happiness*, revised and expanded edition, Penguin Books, 2009; *Up Front,* "Telecommuting will likely continue long after the pandemic," blog entry by Katherine Guyot and Isabel V. Sawhill, April 6, 2020, brookings.edu.

[41] See *Jobs lost, jobs gained: Workforce transitions in a time of automation,* McKinsey Global Institute, December 2017, McKinsey.com.

[42] Santo Milasi, Ignacio González-Vázquez, and Enrique Fernández-Macías, *Telework in the EU before and after the COVID-19: Where we were, where we head to,* European Union Science for Policy Briefs, 2020, ec.europe.eu; Drew DeSilver, "Before the coronavirus, telework was an optional benefit, mostly for the affluent few," Pew Research Center, March 20, 2020, pewresearch.org.

[43] See *The future of work in Europe: Automation, workforce transitions, and the future geography of work,* McKinsey Global Institute, June 2020; *The future of work in America: People and places, today and tomorrow,* McKinsey Global Institute, July 2019, McKinsey.com.

such as making deliveries, are performed while out and about. While the rise of remote work is notable, it is available mainly to white-collar workers in the computer-based office work arena.

Tasks and activities, rather than occupations, determine the potential for remote work

We used granular definitions of the activities and occupations that can be done from home to better understand the future staying power of remote work. We analyzed the potential for remote work—or work that doesn't require interpersonal interaction or a physical presence at a specific worksite—across the eight focus countries. We used MGI's workforce model based on data from O*NET OnLine to examine more than 2,000 activities in more than 800 occupations and identify which activities and occupations have the greatest potential for remote work.

That potential depends on the mix of activities undertaken in each occupation and on its physical, spatial, and interpersonal context. We first assessed the theoretical extent to which an activity can be done remotely. This depends on whether a worker needs to be physically present on-site to do a task, interact with others, or use location-specific machinery or equipment.[44]

Many physical or manual activities, as well as those requiring the use of on-site equipment, cannot be done remotely. These include using providing care, operating machinery, using lab equipment, and processing customer transactions in stores. In contrast, activities such as information gathering and processing, communicating with others, teaching and counseling, and coding data can theoretically be done remotely.

The pandemic also has shown that although some tasks can be done remotely in a crisis, they are much more effectively done in person. These activities include coaching, counseling, and providing advice and feedback; building customer and colleague relationships; bringing new employees into a company; negotiating and making critical decisions; teaching and training; and work that benefits from collaboration, such as innovation, problem solving, and creativity. If onboarding were to be done remotely, for instance, it would require significant rethinking to produce outcomes similar to those achieved in person.

Teaching is another example of an activity that can theoretically be done remotely but is more effective for some students in person. Parents and teachers alike say that the quality of education suffered during the pandemic lockdowns. Additionally, some families lack the digital tools and connectivity infrastructure to make the most of online education.[45] Similarly, legislatures have made provisions to allow courts to function remotely, and during the pandemic, Cisco built a system called Connected Justice to support court operations.[46] But lawyers and judges have raised concerns about legal rights and inadequate connectivity, among other things. In Spain, for instance, courts lack the technology that would enable communication between regions.[47]

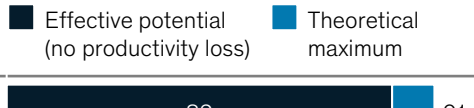
We have devised two metrics for remote work potential: the maximum potential, including all activities that theoretically can be performed remotely; and a lower bound for the effective potential for remote work, which excludes activities that have a clear benefit from being done in person (Exhibit 6).

[44] See the technical appendix for more detail on how we define activities that can be performed remotely.
[45] *COVID-19: Are children able to continue learning during school closures?*, UNICEF, August 2020, unicef.org; Tawnell D. Hobbs and Lee Hawkins, "The results are in for remote learning: It didn't work," *Wall Street Journal*, June 5, 2020, wsj.com.
[46] Steven Melendez, "Remote court is now in session. But will defendants get a fair trial?," *Fast Company*, December 4, 2020, fastcompany.com.
[47] Raphael Minder, "Spain's courts, already strained, face crisis as lockdown lifts," *New York Times*, May 25, 2020, nytimes.com.

Exhibit 6

Activities with the highest remote work potential include updating knowledge and interacting with computers.

Potential share of time spent working remotely for select activity categories in the United States, %



Activity	Effective potential (no productivity loss)	Theoretical maximum	Tasks that can be done remotely	Tasks that cannot be done remotely
Updating knowledge and learning	82	91	Attend online seminar	Attend surgical skills course
Interacting with computers	70	74	Create electronic data backup	Program robotic engineering equipment
Thinking creatively	43	68	Design layouts for print publications	Create physical prototypes
Communicating with and guiding colleagues	43	63	Discuss business strategies	Direct firefighting or fire prevention activities
Processing, analyzing, and interpreting information	54	62	Analyze industry trends	Analyze crime scene evidence
Providing consultation and advice	26	61	Advise others on financial matters	Counsel patients with substance abuse issues
Communicating in interpersonal relationships	29	57	Answer telephones	Develop relationships in treatment programs
Performing administrative activities	39	51	Arrange facility schedules	Operate cash registers
Assessing objects, services, and people	38	51	Assess financial status of clients	Diagnose physical condition of patients
Developing strategies and solving problems	26	48	Determine pricing or monetary policies	Diagnose medical conditions
Teaching, training, and coaching others	6	47	Instruct college students	Train food preparation personnel
Monitoring processes and surroundings	34	45	Monitor market trends	Patrol properties to maintain safety
Performing for or working directly with the public	44	45	Respond to customer inquiries	Operate gaming equipment
Selling or influencing others	24	40	Market products or events	Sell products or services during flight
Measuring characteristics of products or surroundings	24	33	Estimate construc-tion project costs	Measure level or depth of water
Identifying objects, actions, and events	21	27	Identify sustainable business practices	Apply identification labels or tags
Assisting and caring for others	8	12	Make travel plans for others	Provide first aid or rescue assistance in emergencies
Inspecting and operating equipment and machinery	2	2	Test software performance	Inspect cargo to identify potential hazards
Handling and moving objects	0		n/a	Collect dirty dishes or other tableware
Controlling and repairing machines and equipment	0		n/a	Operate heavy-duty construction equipment

Note: The theoretical maximum includes all activities not requiring physical presence on-site; the effective potential includes only those activities that can be done remotely without losing effectiveness. Model based on more than 2,000 activities across more than 800 occupations.

Source: McKinsey Global Institute analysis

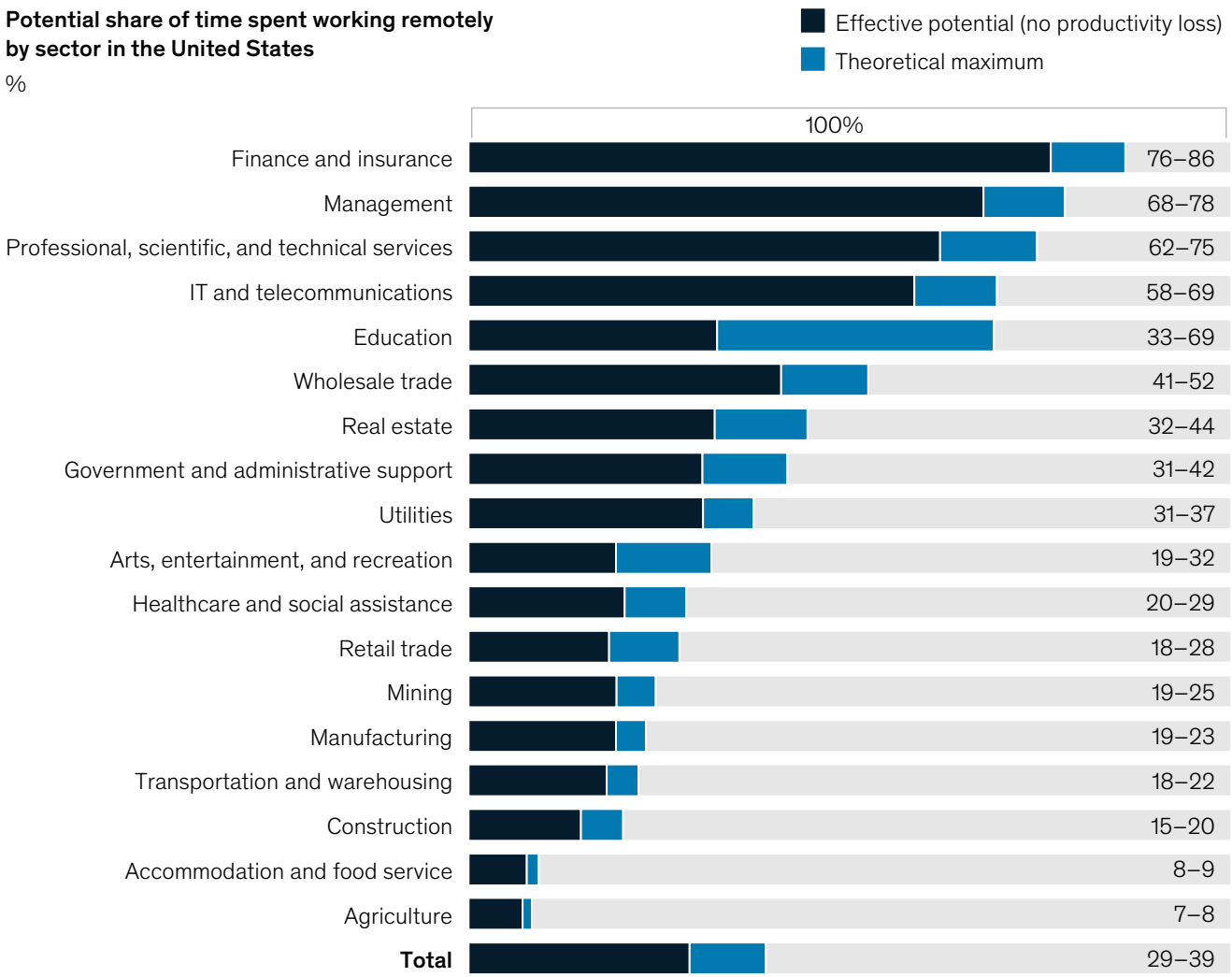
To determine the overall potential for remote work for jobs and sectors, we analyzed the time spent on different activities within occupations and found that remote work potential is concentrated in a few sectors. The finance and insurance sector has the highest potential, with three-quarters of time spent on activities that can be done remotely without a loss of productivity. Management, business services, and information technology have the next highest potential, with more than half of employee time spent on activities that could effectively be done remotely (Exhibit 7). A high share of employees in these sectors hold a college degree or higher.

Exhibit 7

The finance, management, professional services, and information sectors have the highest potential for remote work.

Potential share of time spent working remotely by sector in the United States

%



Note: The theoretical maximum includes all activities not requiring physical presence on-site; the effective potential includes only those activities that can be done remotely without losing effectiveness. Model based on more than 2,000 activities across more than 800 occupations.

Source: McKinsey Global Institute analysis

Remote work potential is higher in advanced economies

The potential for remote work varies across countries, a reflection of their sector, occupation, and activity mix. The United Kingdom has the highest potential for remote work among our eight countries, in large part because business and financial services in the computer-based office work arena represent a large share of its economy. Our model finds that 26 percent of the UK workforce could work remotely without losing effectiveness three to five days a week and just under half the workforce could do so one to five days a week (Exhibit 8).

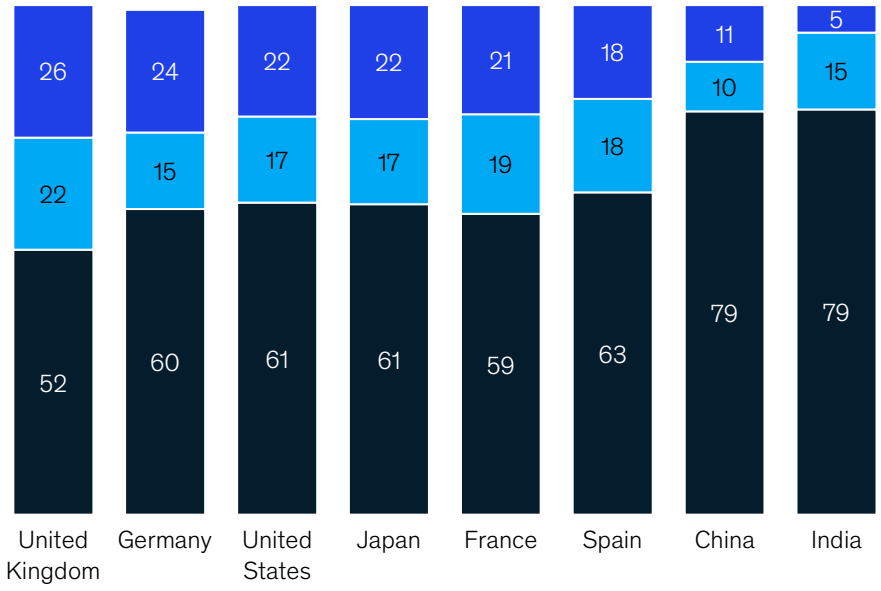
In emerging economies, conversely, employment is concentrated in occupations that require physical and manual activities in sectors like agriculture and manufacturing, which fall in the outdoor production and maintenance and the indoor production and warehousing arenas, respectively. With the current mix of occupations in India, for example, just 5 percent of the workforce could work remotely three to five days a week with no loss of productivity, and an additional 15 percent could effectively work remotely one to two days a week. Several of India's largest companies, including Tata Consultancy Services and Infosys, and the State Bank of India have stated intentions to continue with remote work after the pandemic. Still, the vast majority of its workforce of 464 million is employed in occupations like retail services and agriculture that cannot be done remotely.[48] Additionally, some Indian employees have weak or no internet connectivity at home and so prefer to work in offices.[49] In China, 11 percent of workers could do remote work three to five days a week with no loss of effectiveness.

Exhibit 8

Potential for remote work is higher in advanced economies, yet only 20 to 25 percent of workers could work remotely three to five days a week.

Workforce with remote work potential by number of days per week

% of 2018 workforce



Number of days per week of potential remote work without loss of effectiveness:

- <1 day
- 1–2 days
- 3–5 days

Example occupations

- Financial managers
  Market research analysts
  Statisticians
- Civil engineering technicians
  Physicists
  Psychologists
- Barbers
  Farm workers
  Aircraft cargo handlers

1. Theoretical maximum includes all activities not requiring physical presence on-site; effective potential includes only those activities that can be done remotely without losing effectiveness. Model based on more than 2,000 activities for more than 800 occupations.

Note: Figures may not sum to 100% because of rounding.

Source: McKinsey Global Institute analysis

[48] "How the State Bank of India is learning from crisis," *McKinsey Quarterly*, July 24, 2020, McKinsey.com; Sonal Khetarpal, "Infosys mulls permanent work from home for 33-50% employees," *Business Today*, August 20, 2020; Nevin John, "75% TCS staff to work from home by 2025, R&D to occupy vacant office space," *Business Today*, November 20, 2020; Periodic Labor Force Survey 2017–18, India Ministry of Statistics and Programme Implementation.

[49] Nandita Mathur, "WFH connectivity issues hamper IT services," Mint, April 12, 2020, livemint.com.

A hybrid model with some remote work is likely to persist for many jobs

For many workers, some activities during a typical workday can be done remotely, while the rest of their tasks require their on-site physical presence. In the United States, less than a quarter of the workforce can work remotely between three and five days a week without affecting productivity. In contrast, 61 percent of the workforce in the United States can work no more than a few hours a week remotely or not at all. The remaining 17 percent of the workforce could work remotely partially, one to two days per week.

Companies in the United States and elsewhere are therefore considering hybrid forms of remote work, determining which employees and which activities can be done outside an office. In a McKinsey survey of 278 executives in August 2020, 72 percent said they had already started adopting permanent remote working models for some employees.[50] But companies must be intentional in crafting these programs to avoid the pitfalls of past telecommuting efforts. According to our analysis, a chemical technician could work remotely only a quarter of the time because much of her work must be done in a lab housing the equipment she needs. Among healthcare occupations, general practitioners who can use digital technologies to communicate with patients have a much greater potential for remote work than surgeons and X-ray technicians, who need advanced equipment and tools to do their work. Thus, among health professionals overall, the effective remote work potential is 20 percent.

As a result of more people spending part of their time working remotely, companies are reconfiguring office spaces and reducing the floor space they need. In the survey of 278 executives, two-thirds said their companies have plans to reconfigure their office space away from desks and private offices toward more team spaces and conference rooms. On average, they planned to reduce office space by 30 percent.[51]

Hybrid remote work has important implications for urban economies

Only a small share of the workforce in advanced economies, typically between 5 and 7 percent, currently works from home regularly.[52] A shift of roughly 20 to 25 percent of workers spending more time at home and less in the office—although only a minority of the workforce—could still have profound impacts on urban and suburban economies as well as smaller cities. MGI's previous research documented that in the United States and Europe, job growth has been concentrated in a relatively small number of large, dynamic cities, while smaller cities and rural areas were falling behind. Before COVID-19, that pattern was expected to continue over the next decade. In the United States, just 25 cities could account for 60 percent of job growth, while in Europe, 48 cities could account for over 35 percent of job growth, far exceeding their shares of the population.[53]

Remote work may change that trend. More people working remotely means fewer people commuting between home and work every day or traveling to different locations for work. This could have wide economic consequences, including on demand for office and residential real estate, transportation, gasoline and auto sales, and restaurants and retail in urban centers, and other consumption patterns.

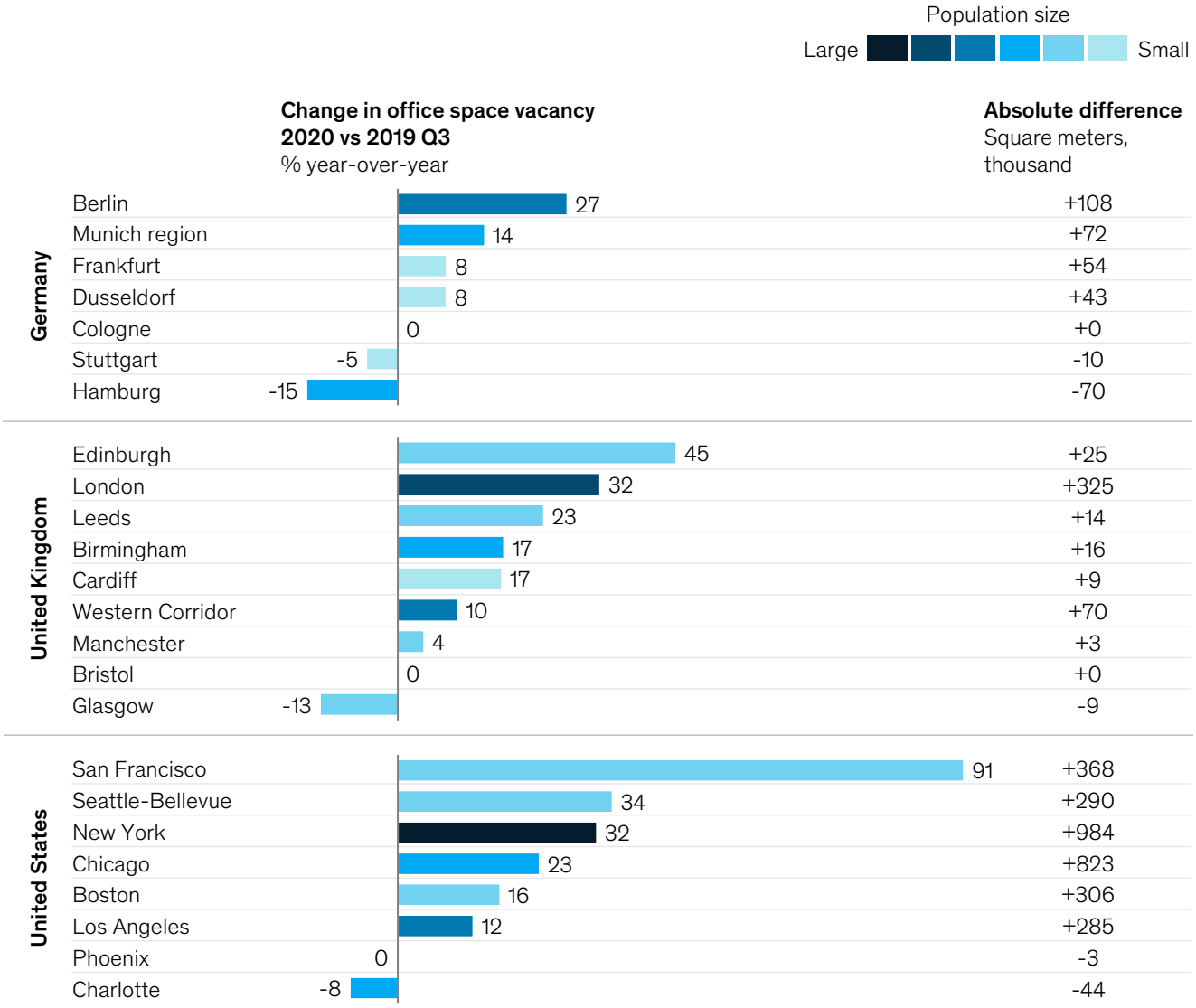
While no one is predicting the death of cities, evidence indicates that some shifts are under way. Office vacancy rates increased significantly across major cities in 2020: by 91 percent in San Francisco, 45 percent in Edinburgh, 32 percent in London, and 27 percent in Berlin. At the same time, vacancy rates have declined in some smaller cities such as Glasgow and

[50] McKinsey Corporate Business Functions Practice, "Reimagine: Preparing for SG&A in the next normal," November 5, 2020, McKinsey.com.
[51] Ibid.
[52] Santo Milasi, Ignacio González-Vázquez, and Enrique Fernández-Macías, *Telework in the EU before and after the COVID-19: Where we were, where we head to,* European Union Science for Policy Briefs, 2020, ec.europa.eu; Drew DeSilver, "Before the coronavirus, telework was an optional benefit, mostly for the affluent few," Pew Research Center, March 20, 2020, pewresearch.org.
[53] See *The future of work in Europe: Automation, workforce transitions, and the future geography of work,* McKinsey Global Institute, June 2020; *The future of work in America: People and places, today and tomorrow,* McKinsey Global Institute, July 2019, McKinsey.com.

Charlotte, North Carolina, implying that companies may be shifting operations away from larger cities toward smaller ones (Exhibit 9).[54]

Exhibit 9

Major cities in Europe and the United States had large increases in office vacancy in 2020 compared to the previous year.



Source: JLL; McKinsey Global Institute analysis

In the United States, Moody's Analytics estimated that office rents fell 10.4 percent nationally and by as much as 21 percent in cities like New York City in 2020.[55] In India, office space occupation in the Delhi National Capital Region, Mumbai, Bangalore, Chennai, Pune, and Hyderabad dropped to 13.7 million square feet in the first half of 2020, compared to 32 million square feet during the same period in 2019.[56] At the same time, workers are refurbishing home offices. Pepperfry, an online furniture business in India, reported a 250 percent increase in demand for study tables and 400 percent increase in demand for office chairs in August 2020 compared to prepandemic sales, suggesting that at least some remote workers in

[54] JLL office statistics, Q3 2020.
[55] "Moody's Analytics forecasts US office vacancy rates hitting historic high of 19.9 percent in 2021," Moody's Analytics, August 17, 2020, moodysanalytics.com.
[56] *India market watch office,* Savills India, August 2020, savills.asia.

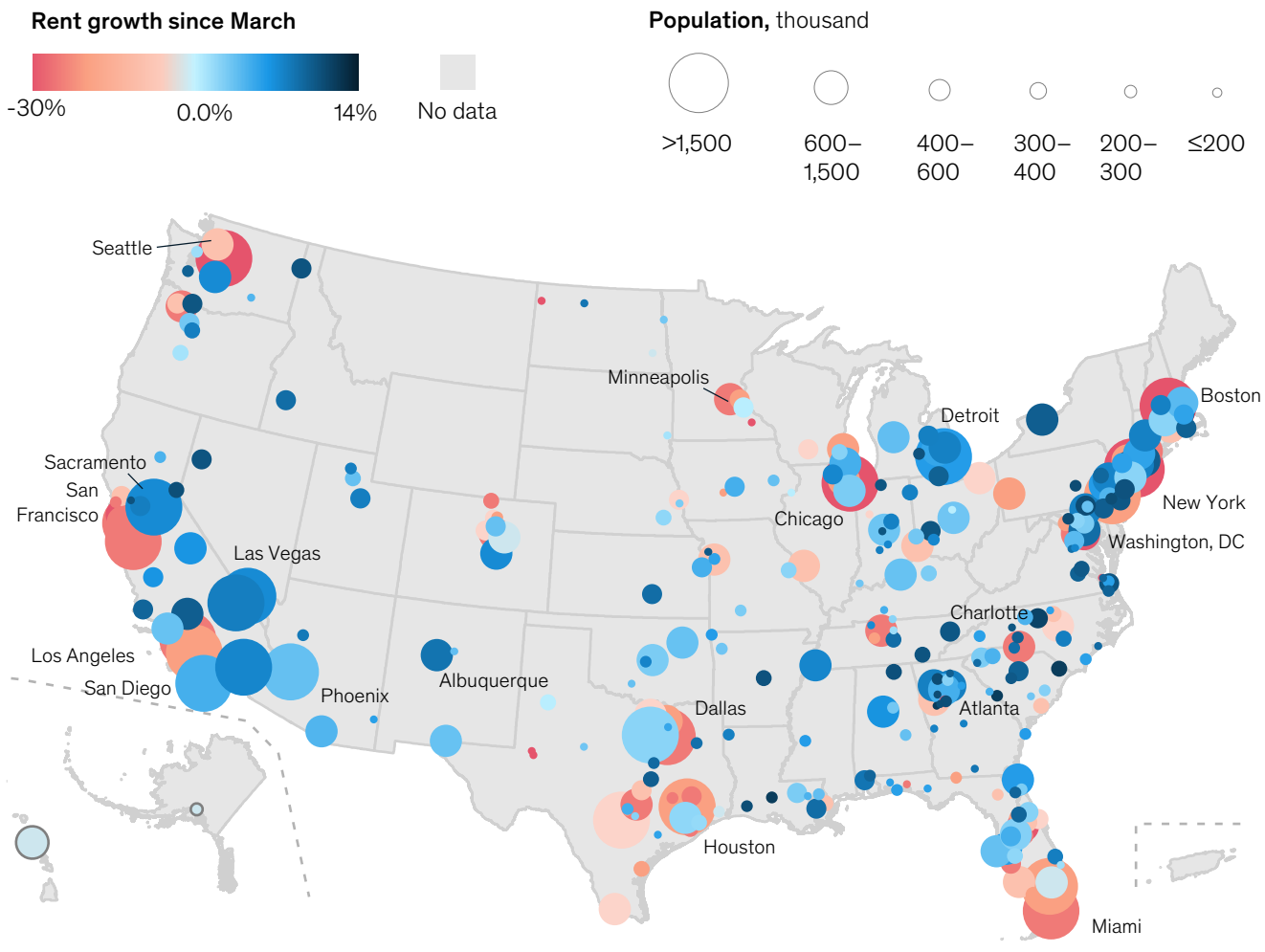
India plan to work more from home.[57] While we expect many people will return to work once the pandemic recedes, reversing some decline in vacancy rates, it is likely that the trend will persist in part.

Residential rents have also fallen across large cities in Europe and the United States, while growing in some smaller cities and suburban areas. In Spain, rents decreased in 2020 in large cities like Barcelona, Madrid, and Seville but rose in second-tier cities such as Granada, Ourense, and Salamanca.[58] In the United States, rents fell between March and November 2020 in major cities, including San Francisco, New York City, and Boston. Rents increased in smaller cities like Albuquerque, Phoenix, and Sacramento (Exhibit 10). The average rent for a one-bedroom apartment in San Francisco declined 24 percent over 2020, while the median rent in Manhattan dropped 12.7 percent from November 2019 to November 2020, even more

Exhibit 10

Residential rents declined in the largest US cities but increased in suburbs and smaller cities.

Change in rent by county, March to November 2020



Source: Apartment List; McKinsey Global Institute analysis

[57] Himadri Buch, "Demand for ergonomic furniture hits all-time high, but furniture firms refuse to disclose sales figures," Moneycontrol, December 7, 2020, moneycontrol.com.
[58] "Informe de precios en alquiler en España," Idealista, December 2020.

than rents dropped there during the Great Recession.[59] Outbound move requests from New York City recorded by United Van Lines were 52 percent higher at the end of August 2020 than the national average, while at the beginning of September 2020, outbound move requests in San Francisco were 128 percent higher than the national average.[60]

Some smaller cities developed incentive programs to encourage remote workers to relocate. Tulsa, Oklahoma, for instance, offers remote workers who relocate to the city for at least a year $10,000 and access to coworking spaces.[61] In Hawaii, the state and business and academic institutions created a program called "Movers and Shakas" to attract remote workers with free airfare, discounted hotel rooms, and coworking spaces, with one catch—required volunteer work.[62]

We analyzed data from LinkedIn that shows more workers moving to smaller cities and out of larger cities in the United States in 2020 compared to 2019. This analysis uses LinkedIn members changing their location on their profiles and is based on the total inflow of workers into an area divided by the total outflow. The results show that areas with larger populations, such as New York City, the San Francisco Bay Area, and Boston, had the greatest decline in inflow-outflow ratio. This could be driven either by a greater number of workers leaving these areas or by fewer people entering these areas in 2020 compared to 2019. Meanwhile, areas with smaller populations, such as Madison, Wisconsin, Jacksonville, Florida, and Salt Lake City, Utah, had the greatest growth in inflow-outflow ratio. This may be due to more workers entering these areas or fewer people leaving these areas compared to 2019 (Exhibit 11).

The impact of these shifts could reverberate through the restaurants and bars, public transportation services, shops, and service businesses that cater to office workers and will put a dent in some state and local tax revenues. New York City, for example, reported that its tax revenues would decline by $2.5 billion because of falling demand for commercial property.[63] Starbucks, the global coffee chain, announced plans to increase drive-through and curbside pickup options and to close 800 stores in 2021, mostly located in the United States, as part of its plans to evolve its footprint in dense metro centers.[64] Pret a Manger permanently closed 17 units in Boston and Chicago and 30 units in the United Kingdom as more business moved to online delivery platforms such as Just Eat, Uber, and Grubhub.[65]

[59] "San Francisco, CA rent prices," Zumper, zumper.com; Stefano Chen, Vivian Marino, and C.J. Hughes, "The real estate collapse of 2020," *New York Times*, December 25, 2020, nytimes.com.
[60] "Did COVID-19 prompt moving? United Van Lines reveals customer motivations for moving during the pandemic," United Van Lines, October 6, 2020, prnewswire.com.
[61] Tulsa Remote, tulsaremote.org.
[62] Mover and Shakas, moversandshakas.org.
[63] Dana Rubenstein and Jesse McKinley, "Virus siphons $2.5 billion in N.Y.C. property tax revenue," *New York Times,* January 14, 2020, nytimes.com.
[64] "Starbucks to transform U.S. store portfolio by building on the strength of digital customer relationships and the convenience of the Starbucks app," Starbucks, June 10, 2020, stories.starbucks.com.
[65] Danny Klein, "Pret A Manger permanently shutters 17 U.S. locations," *QSR,* July 2020, qsrmagazine.com; "Pret A Manger closes more UK shops, cuts more jobs as trading dips," Reuters, October 16, 2020, reuters.com

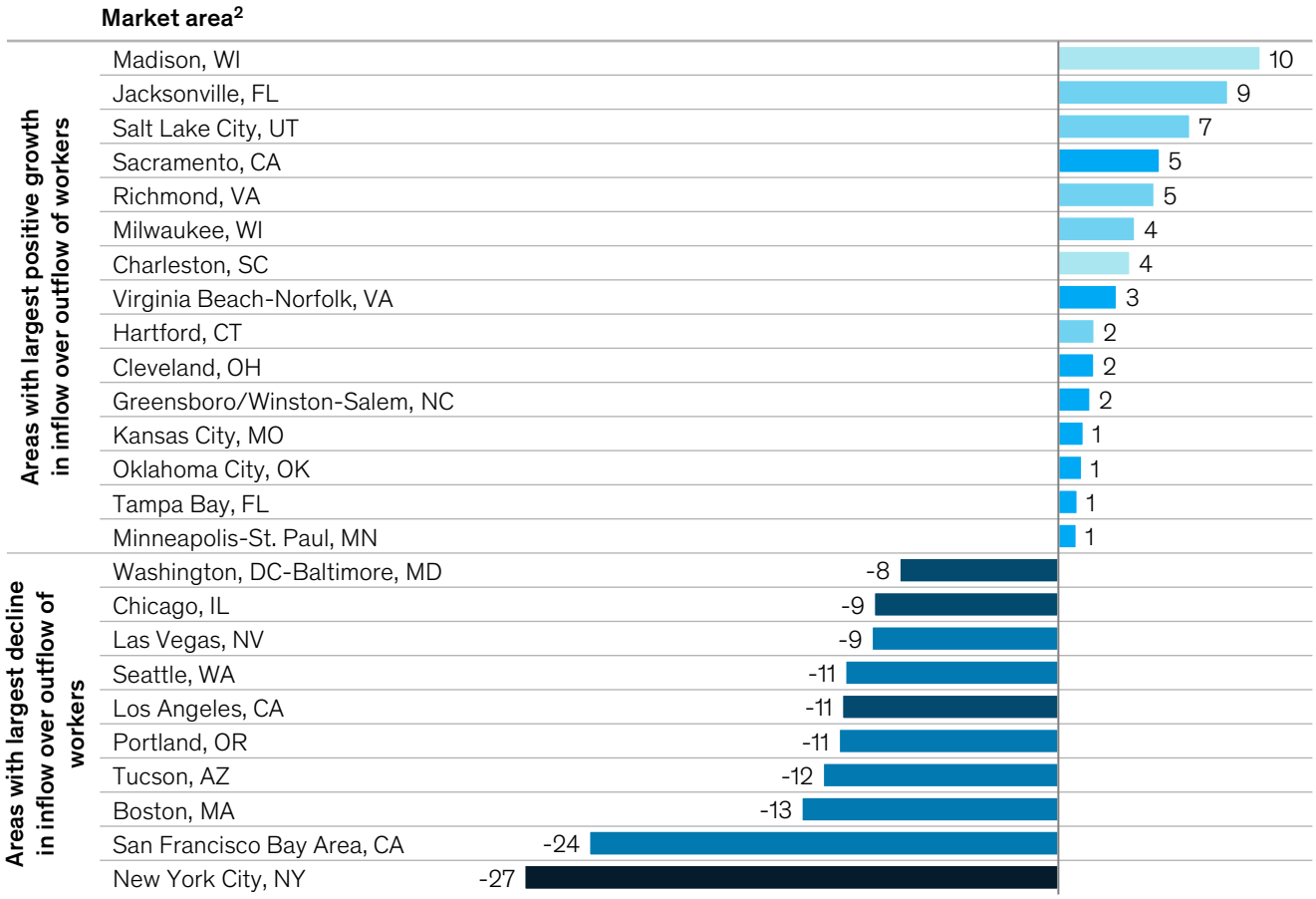
Exhibit 11

LinkedIn data show more workers moving to smaller US cities and away from larger cities in 2020 compared to 2019.

Change in location of LinkedIn members in the United States[1]

% change in inflow over outflow of workers, year-over-year April-Oct 2019 vs 2020

Population size: Large Small



1. The inflow-outflow ratio represents the number of people moving to a market area compared to those moving out, based on the locations LinkedIn members list on their profiles. Rankings reflect metro areas that exceeded a threshold of 10,000 overall moves in the period (Apr-Oct 2020 vs Apr-Oct 2019).
2. Includes top 15 areas with greatest increases and top 10 areas with greatest decreases in year-over-year change in inflow-outflow ratio.

Source: LinkedIn Economic Graph Research; McKinsey Global Institute analysis

In transforming physical proximity into a factor influencing the future of work, COVID-19 turned remote work into a trend that will affect the labor force as well as metropolises, suburbs, and smaller cities. While affecting a relatively small share of the workforce, the impact of remote work also will fall on workers who cannot work remotely, as their jobs shift to new locations or are displaced as a result of other trends. Companies can benefit from remote work, but only if they overhaul long-standing practices to incorporate and sustain remote workers. In the following chapter, we discuss other trends that could affect the future of work.


Self
Checkout
8
Self
Checkout
8

3. COVID-19 has accelerated digitization, e-commerce, and automation

By forcing consumers and businesses to rapidly adapt to the need for far less physical contact and human interaction during the pandemic, COVID-19 affected two trends in addition to remote work that will have lasting effects on the workforce: the use of digital tools for transactions, consultation, and collaboration; and the adoption of automation and AI technologies in the workplace. While these two trends were under way before the virus surfaced, COVID-19 has altered their trajectories in lasting ways.

E-commerce had increased at a fairly steady pace before the pandemic, and the use of videoconferencing and digital collaboration tools was growing, but gradually. COVID-19 gave all things digital what behavioral economists call a big nudge by turning proximity into a risk.[66] Consumers and businesses quickly grasped the convenience and efficiency delivered by digital practices and processes they had previously ignored. The pandemic thus expanded and secured digitization's reach, though it may recede somewhat as people return to more normal patterns of consumption and work after the pandemic. China, where e-commerce was already thriving when COVID-19 arrived, is a case in point: while it had contained the virus by spring 2020, consumers continued to order more groceries online, engage in more online medical consultations, and use more digital platforms to communicate with one another than in the past.[67]

Automation and deployment of AI did not accelerate significantly during the pandemic; if anything, the economic downturn caused by COVID-19 may have reduced corporate investment in those technologies. Nonetheless, there are several reasons to anticipate an acceleration in 2021 and beyond. That pattern of reduced investment in automation during economic downturns followed by sharp upticks as recoveries take hold is historic, and responses to surveys of executives suggest that the period after COVID-19 will be no different. Investors seem to think so, and stock prices of robotics companies have risen during the pandemic. Finally, anecdotes of companies relying on AI and automation to conduct business during lockdowns and quarantines finds new deployment in cleaning and sanitation and in stores, warehouses, factories, and other venues. Concerns about proximity and interaction are not likely to go away, and, as one economist noted, "Robots don't get sick."[68]

[66] Richard H. Thaler and Cass R. Sunstein, *Nudge: Improving decisions about health, wealth, and happiness*, revised and expanded edition, Penguin Books, 2009.
[67] *2020 interim report,* Ping An, August 2020; Ryan McMorrow, "Chinese food delivery giant Meituan bets on groceries," November 30, 2020, *Financial Times,* ft.com.
[68] Adair Turner, "Robots don't get sick: Accelerated automation in the post-COVID world," *Montrose Journal,* June 2020, montroseassociates.biz.

A rapid shift to e-commerce and other virtual interactions is likely to persist because of the convenience and efficiency they offer

E-commerce accelerated during the pandemic far beyond the most bullish forecasts, producing jobs in delivery that helped offset job losses in other occupations. Seeing the doctor became something one did online, as did taking classes (although the jury is still out on online learning across some segments of education). Videoconferencing boomed as people found they could do business via a screen, and tools like VR glasses suddenly became valuable ways of supporting work that previously was done only on-site.

E-commerce saw a sharp rise in 2020 across countries

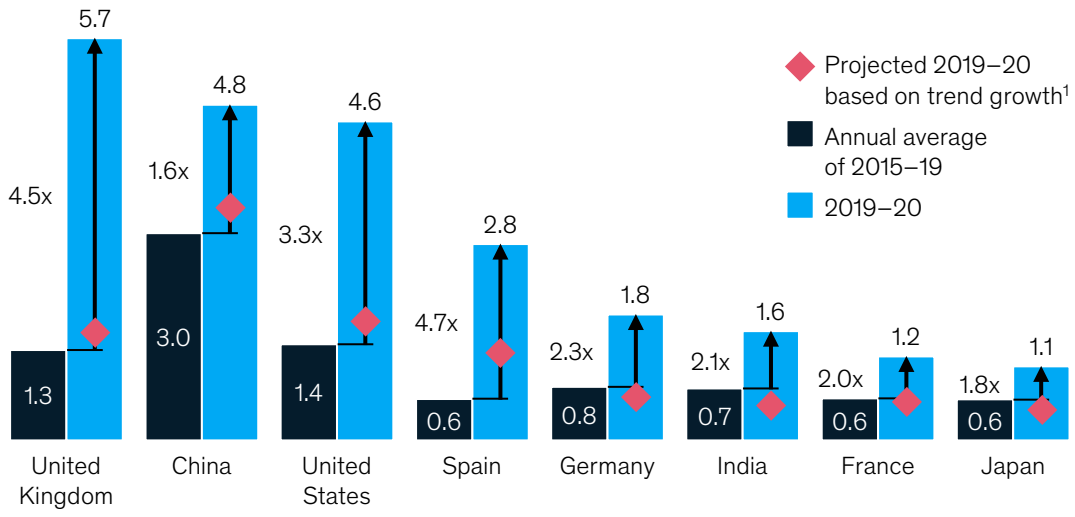
The rise of e-commerce during the pandemic augured the displacement of many retail sales and service workers, while creating escalating demand for workers in delivery- and technology-related services. In China, for example, the share of e-commerce in retail grew by 5 percentage points to 27 percent in 2020, compared to 3 percentage points every year on average over the last few years. India saw an even larger acceleration, with 2 percentage points growth compared to less than 1 percentage point previously, and the United States had 5 percentage points growth compared to less than 2 percentage points every year on average for some years before the pandemic.[69] Across the eight countries we studied for this report, the share of e-commerce in total retail sales was estimated to increase between two and five times as much in 2020 as it did on average over the previous five years (Exhibit 12). McKinsey research found that delivery of e-commerce orders over eight weeks during the pandemic equaled the level of deliveries over the entire previous decade.[70]

Exhibit 12

E-commerce has grown two to five times faster than before the pandemic in every country.

Year-over-year growth of e-commerce as share of total retail sales

Percentage points



2020 e-commerce sales as percentage of total retail sales	24	27	20	9	14	7	9	10

1. Based on linear trend of 2015–19 growth; 2017–19 trend used for India and Japan due to break in trend.

Source: Euromonitor International Retailing 2021 Edition; McKinsey Global Institute analysis

[69] Euromonitor International Retailing 2021 Edition.

[70] Victor Fabius, Sajal Kohli, Björn Timelin, and Sofia Moulvad Veranen, "How COVID-19 is changing consumer behavior—now and forever," July 2020, McKinsey.com.

The wave of e-commerce occurred most significantly in online marketplaces, groceries, and food delivery, a reflection of the most pressing needs of consumers during the pandemic. The number of daily average users of BigBasket, an Indian online grocery store, soared 44 percent between the first and second quarters of 2020, while Swiggy reported a 30 to 40 percent increase in spending per food delivery order in India from March to September.[71] Downloads of grocery order and delivery apps were on the decline in the United States when COVID-19 arrived in January, but by mid-March, downloads were more than twice what they had been in the previous month. Downloads of one app, Instacart, went up 218 percent.[72] COVID-19 reversed the fortunes of Meituan Dianping, China's largest online delivery company, which was losing money when 2020 started but by August was reporting strong profits.[73]

The increased demand for e-commerce is unlikely to fade. In a McKinsey survey in November 2020, an average of 56 percent of consumers in the eight focus countries said they intended to continue online grocery shopping once the pandemic subsides.[74] Consumers appreciate the convenience of e-commerce, and delivery companies have managed to keep up with demand with only minor glitches.

Sustained expansion of e-commerce will potentially lead to a significant shift in occupations, displacing store sales assistants and cashiers in the on-site customer interaction arena and adding jobs in the transportation and warehousing arena. Many in-store jobs are unlikely to return; in the United States, for example, retailers like Macy's and Gap announced plans to close hundreds of brick-and-mortar stores.[75] Amazon, in contrast, added more than 400,000 employees around the world, growing its workforce by about 50 percent in 2020 to meet the surge in e-commerce demand.[76] Many of those jobs were in Amazon's warehouses, but the company also added software and hardware engineers for its cloud computing, streaming services, and devices, which also experienced a spike in demand during the pandemic. In China, major digital companies in e-commerce, delivery, and other online platforms reported creating more than 5.1 million jobs during the first half of 2020.[77] Sales assistants, factory workers, and others displaced by COVID-19 found jobs as delivery drivers and livestream hosts there.

Consumer adoption of other forms of digital platforms has also soared

Beyond e-commerce, restrictions resulting from COVID-19 fueled other forms of digital interaction and virtual transactions across many sectors and countries, and consumers say they will continue to use them even after the pandemic recedes (Exhibit 13). In response to a McKinsey COVID-19 US Digital Sentiment Survey in April 2020, 75 percent of people using digital channels for the first time during the pandemic said they would continue to use them when things return to "normal."[78]

Telemedicine has boomed during the pandemic. Online doctor consultations via Practo, an Indian telehealth company, grew more than ten times between April and November 2020.[79] Demand for video appointments with doctors in the Mayo Clinic system, the largest US healthcare system, climbed 10,880 percent from mid-March to mid-April 2020 and continued

[71] Apptopia; Pratik Bhakta, "Zomato claims business back to pre-COVID levels, while Swiggy records total order values at 85%," Moneycontrol, October 13, 2020, moneycontrol.com.

[72] Apptopia, "Instacart and grocery delivery apps set consecutive days of record downloads," blog entry by Adam Blacker, March 16, 2020, blog.apptopia.com.

[73] Arjun Kharpal, "China's e-commerce giants get a boost as consumers continue to shift online after coronavirus," CNBC, August 24, 2020, cnbc.com.

[74] McKinsey & Company COVID-19 Consumer Pulse surveys: China, September 2020; France, Germany, India, Japan, Spain, United Kingdom, and United States, November 2020.

[75] Doug Whiteman, "These chains are permanently closing the most stores in 2020," MoneyWise.com, December 18, 2020, moneywise.com.

[76] Karen Weise, "Pushed by pandemic, Amazon goes on a hiring spree without equal," *New York Times*, November 27, 2020, nytimes.com.

[77] Renhong Wang and Zirui Chu, "Alibaba provided more than 2 million flexible employment opportunities in the first quarter," People News, April 24, 2020; Mengling Chen, "Interview of Didi's CEO Wei Cheng," CCTV News, October 26, 2020; "2020 First half Meituan delivery rider employment report," Meituan Research Institute, July 20, 2020; "SF Express helped stabilize employment, providing 230,000 jobs in the first half of the year," Guangdong Provincial Postal Administration, July 27, 2020.

[78] Aamer Baig, Bryce Hall, Paul Jenkins, Eric Lamarre, and Brian McCarthy, "The COVID-19 recovery will be digital: A plan for the first 90 days," May 14, 2020, McKinsey.com.

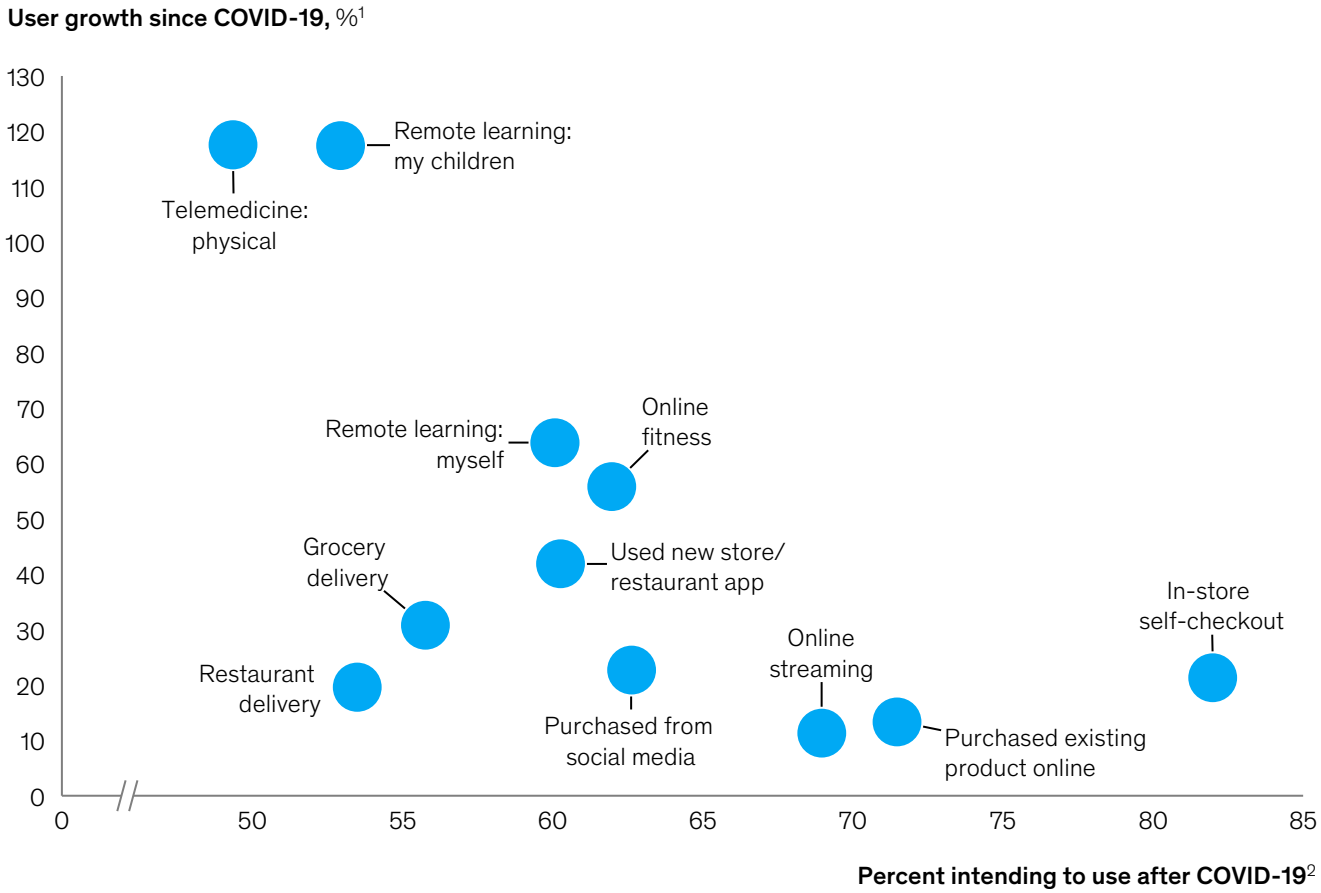
[79] *The Practo Blog,* "Building access to quality healthcare: COVID-19 & beyond," November 30, 2020, blog.practo.com.

to rise.[80] The French public health fund reported 1.2 million online medical consultations in September 2020, compared to 40,000 in February 2020.[81]

Exhibit 13

Digital platform use has surged and usage is likely to endure after the pandemic.

Increase in use of consumer digital channels since COVID-19 began in China, France, Germany, India, Japan, Spain, United Kingdom, and United States, Sept–Nov 2020



1. User growth is calculated as percent of respondents who said they are new users over percent of respondents who said they used product/service prepandemic.
2. Based on question, "Compared to now, will you do or use the following more, less, or not at all, once the coronavirus (COVID-19) situation has subsided?" Number indicates respondents who chose "will keep doing what I am doing now" and "will increase this" among new or increased users.

Source: McKinsey & Company COVID -19 Consumer Pulse surveys: China, September 2020; France, Germany, India, Japan, Spain, United Kingdom, United States, November 2020; n > 1,000 in each country, sampled and weighted by countries' population 18+ years; McKinsey Global Institute analysis

Online learning has also greatly expanded during the pandemic, though its staying power may vary across countries. The Chinese education app Zuoyebang reported that enrollments in its paid live streaming courses grew 390 percent in September 2020 compared to September 2019.[82] In India, the education app BYJU'S reported amassing a user base of 40 million students in over four years, which ballooned to 65 million users by September 2020, a 63 percent increase since the pandemic (Exhibit 14).[83]

80 Allison Marin, "Telemedicine takes center stage in the era of COVID-19," *Science,* November 2020, sciencemag.org.
81 Marie-Joëlle Gros, "Comment la teleconsultation boulverse la relation patient-médecin," *Le Monde,* October 9, 2020, lemonde.fr.
82 "China's largest K12 online education platform Zuoyebang sees 390% surge in paid users this summer," September 2020, Zuoyebang, prnewswire.com.
83 Manish Singh, "Indian decacorn Byju's CEO talks about future acquisitions, coronavirus, and international expansion," TechCrunch, September 15, 2020, techcrunch.com.

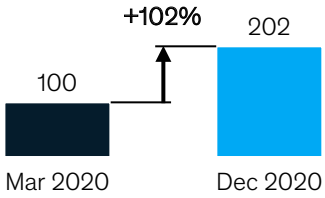
Exhibit 14

In India, use of e-commerce and other online platforms has surged.

Prepandemic usage indexed to 100

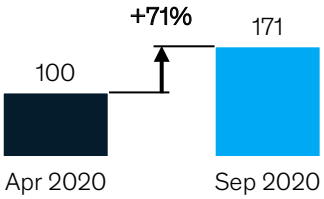
Online payments

UPI transactions value[1]



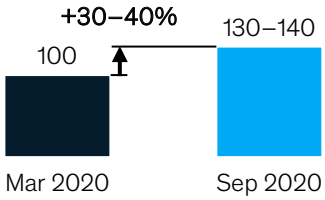
E-commerce

E-commerce gross merchandise value through Razorpay payments gateway



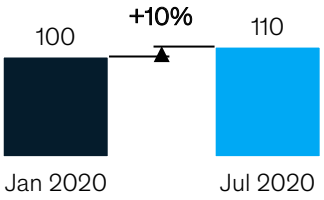
Food delivery

Spending per order, Swiggy



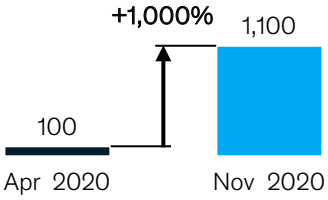
Grocery

Daily average app users[2]



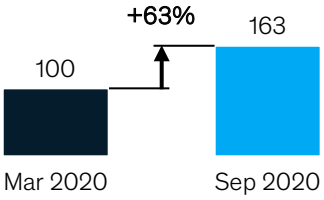
Telemedicine

Online doctor consultations, Practo



Online learning

Number of users, BJYU's



Note: Data across platforms presented for one of the months from January to April 2020, as indicated in each panel. In India, the first lockdown began March 25, 2020.
1. Unified Payments Interface (UPI) is an instant real-time payment system by National Payments Corporation of India facilitating interbank transactions. Interface is regulated by Reserve Bank of India and works by instantly transferring funds between two bank accounts on a mobile platform.
2. Daily average user data for online grocery application, Bigbasket, from Apptopia.

Source: Apptopia; "E-commerce market and trends: A report on how India sells and shops," Razorpay, November 2020; Moneycontrol; Practo; Techcrunch; UPI Product Statistics, National Payments Corporation of India; McKinsey Global Institute analysis

Videoconferencing has become the norm and will likely replace some business travel even after the pandemic

Companies rapidly integrated Zoom, Microsoft Teams, DingTalk, and other virtual platforms into their operations to facilitate communications and interactions with employees, customers, suppliers, and service providers. In a global survey of business executives in July 2020, 85 percent of respondents said their company had increased adoption of virtual communication and collaboration tools since the start of the pandemic.[84] Salespeople who may once have doubted their ability to close a deal over videoconference have found they can. Although developing new client relationships will still benefit from in-person connections, some routine B2B meetings are likely to continue virtually.

As a result, even after a vaccine is widely available and air travel resumes, some business travel may never return. Many travel experts expect personal leisure tourism to rebound gradually, starting with domestic travel, followed by a slower recovery of international vacations and tourism as people gain confidence in health and safety measures taken

[84] McKinsey Global Business Executives Survey, July 2020.

by the industry.[85] Tourism within China soared to new highs in the middle of 2020 after the pandemic was controlled. In China as a whole, hotel occupancy and domestic flight seat capacity rose to more than 90 percent of their 2019 levels at the end of August 2020.[86] Over the 2020 October Golden Week holiday, more than 600 million Chinese hit the road, about 80 percent of the 2019 figure.[87]

Business travel is likely to have a more subdued recovery, in part because many companies have benefited from reduced travel expenses. In 2018, business travel spending topped $1 trillion, accounting for more than 20 percent of the total spending in the hospitality and travel sector.[88] It also brings in a disproportionate share of business in some sectors, including 70 percent of revenue globally for high-end hotels, for example. After the pandemic, though, businesses are likely to have more questions about the necessity of business trips—and the answer may be not as much as before.

20%

Estimated decline in business travel compared to prepandemic estimates

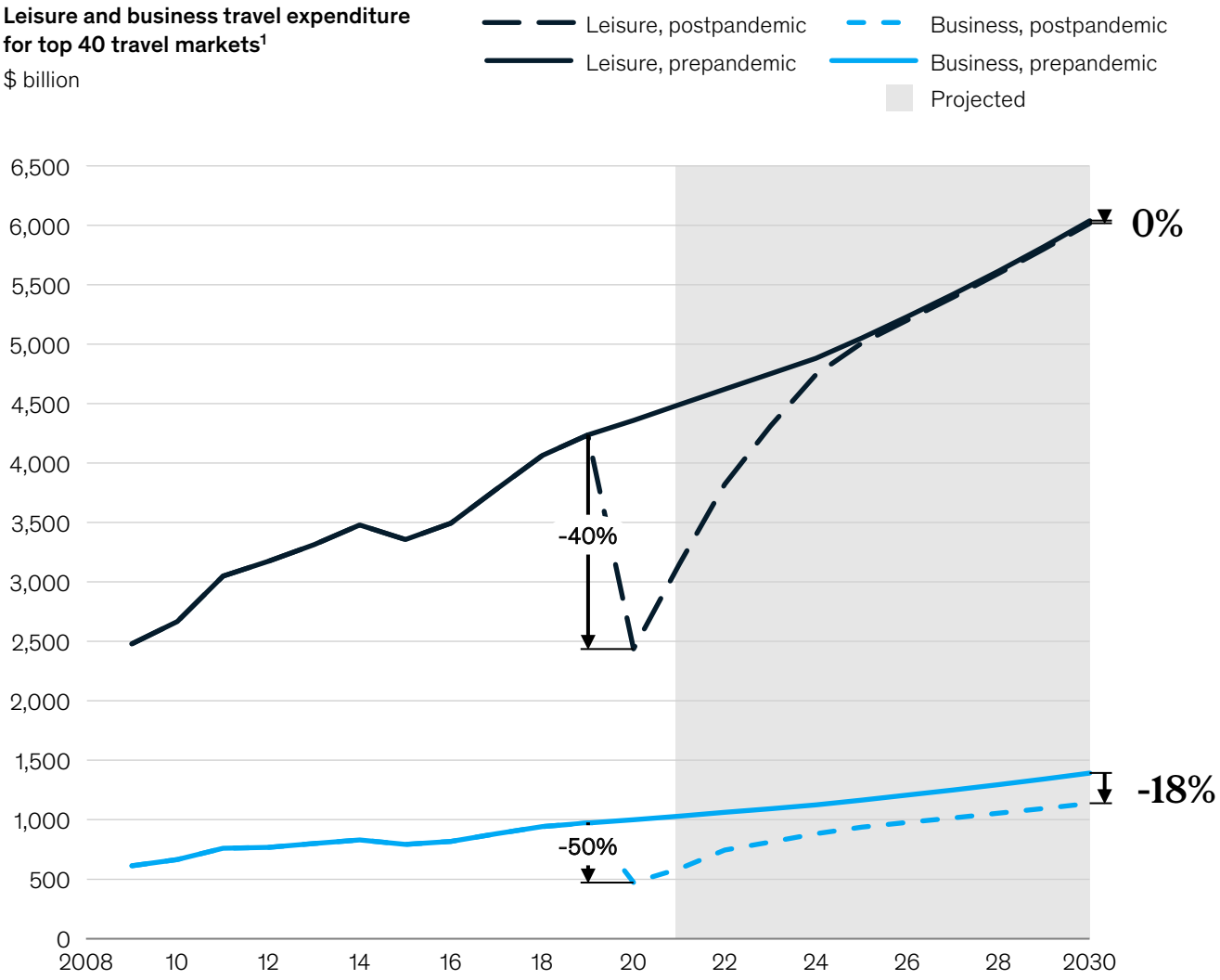
The larger context is also informative. History shows that, after a recession, business travel takes longer than leisure travel to bounce back. After the 2008–09 financial crisis, for example, international business travel took five years to recover, compared with two years for international leisure travel.[89] Regional and domestic business travel will likely rebound first; some companies and sectors will want to resume in-person sales and customer meetings as soon as they safely can. Peer pressure may also play a part: once one company gets back to face-to-face meetings, its competitors may not want to hold back. All told, however, a survey of business travel managers found that they expect business travel spending in 2021 will only be half that of 2019.[90] Although global growth will translate into more business travel in the years ahead, it may never reach prepandemic projections. Estimates of how much business travel may fall vary, and we model a decline of roughly 20 percent compared to 2030 expectations before the pandemic (Exhibit 15).[91]

A reduction in business travel could have far-reaching second-order effects on labor demand in a range of industries, including commercial aerospace and airlines, airports, hotels and accommodation, food service and restaurants, and ridesharing and taxis, primarily in the leisure and travel work arena. Business travelers account for 12 percent of total passengers but 75 percent of airline profits, and their spending while on the road accounts for robust revenues at hotels, restaurants, and other hospitality venues.[92] In New York, the 478-room Hilton Times Square closed for good, as did the 399-room Omni Berkshire Place in midtown Manhattan; both hotels were popular with business travelers.[93] Many other hotels around the world are shuttered due to the pandemic, and how many reopen remains to be seen.

[85] Vik Krishnan, Ryan Mann, Nathan Seitzman, and Nina Wittkamp, "Hospitality and COVID-19: How long until 'no vacancy' for US hotels?," June 2020, McKinsey.com.
[86] OAG Schedule Analyzer; STR hotel market data.
[87] Monica Buchanan Pitrelli, "More than 600 million people traveled in China during 'Golden Week,'" CNBC, October 9,2020, cnbc.com.
[88] Seth Borko, Wouter Geerts, and Haixia Wang, *The travel industry turned upside down: Insights, analysis, and actions for travel executives*, Skift Research, September 2020, skift.com.
[89] Kevin Sneader and Shubham Singhal, "The next normal arrives: Trends that will define 2021—and beyond," January 4, 2021, McKinsey.com.
[90] Seth Borko, Wouter Geerts, and Haixia Wang, *The travel industry turned upside down: Insights, analysis, and actions for travel executives*, Skift Research, September 2020, skift.com.
[91] Scott McCartney, "The Covid pandemic could cut business travel by 36 percent—permanently," *Wall Street Journal*, December 1, 2020, wsj.com.
[92] "Business travel by the numbers," Trondent Development Corporation, trondent.com.
[93] Patrick McGeehan, "Pandemic puts N.Y.C. hotels on the brink: 'A complete washout,'" *New York Times*, September 21, 2020, nytimes.com.

Exhibit 15

While leisure travel is expected to recover, business travel may likely see a long-term dip.



1. Prepandemic data refers to projections calculated before outbreak of COVID-19. Postpandemic data based on A1 scenario from McKinsey Tourism Recovery Model.

Source: McKinsey Tourism Recovery Model, November 2020; McKinsey Global Institute analysis

Other digital tools adopted by companies during the pandemic will also transform work

Beyond internal collaboration tools, companies made use of other digital technologies to keep operations going in the pandemic, and their use may persist and reshape work in the years ahead. Some 35 percent of executives surveyed in July 2020 reported an acceleration of digitization across their supply chains.[94] The pandemic highlighted a lack of insight into where inputs in deeper tiers of the supply chain were coming from; today, digital platforms and solutions can offer more transparency.[95] Companies also increased the use of advanced analytics to improve the accuracy of supply forecasts and introduced IoT and sensors to better track movement of goods. Thirty-nine percent of business leaders surveyed in the manufacturing sector said that in response to the crisis, they had leveraged digital solutions such as nerve-center or control towers to increase end-to-end supply chain transparency.[96] Greater deployment of such digital tools will affect the type of talent

[94] André Dua, Wan-Lee Cheng, Susan Lund, Aaron De Smet, Olivia Robinson, Saurabh Sanghvi, "What 800 executives envision for the postpandemic workforce," McKinsey Global Institute, September 23, 2020, McKinsey.com.

[95] See *Risk, resilience, and rebalancing in global value chains,* McKinsey Global Institute, August 2020, McKinsey.com.

[96] Mayank Agrawal, Karel Eloot, Matteo Mancini, and Alpesh Patel, "Industry 4.0: Reimagining manufacturing operations after COVID-19," July 2020, McKinsey.com.

and skills required in supply chain management, increasing demand for data scientists and software engineers in the computer-based office work arena and reducing it for traditional procurement roles in the same arena.

More broadly, manufacturing companies had to find workarounds when travel was not possible. Virtual reality headsets have been used so that an expert in one location can coach less skilled technicians elsewhere. These technologies also enable companies to get production lines up and running faster. Enel, the Italian energy company, used augmented reality glasses to conduct quality control inspections remotely, overcoming travel restrictions and ensuring the safety of the workforce.[97] Supply chain disruptions interfered with sales of VR headsets in the first half of 2020, but sales were nonetheless expected to grow 23.6 percent that year due to demand from companies and consumers.[98] These examples are prompting many companies to reconsider how and when to deploy highly paid and highly skilled experts rather than less skilled technicians.

Companies may accelerate adoption of automation and AI technologies as they reimagine the postpandemic future

During the severe recession the pandemic sparked, many companies paused nonessential investment to focus on putting in place the digital tools and digital platforms critical for enabling remote work and reaching customers.

Going forward, companies may accelerate adoption of automation and AI for a variety of reasons: to better cope with pandemic-induced surges in demand (for instance, in food processing and consumer goods), to reduce density in crowded spaces (as in meat processing plants that were the site of virus outbreaks), to provide customers with contactless customer experiences (for example, self-checkout in grocery stores, ordering on apps or by QR codes in restaurants), and simply to boost speed, efficiency, and productivity as they reimagine business after the pandemic. Other companies are likely to maintain new automation and AI technologies adopted during the pandemic to cope with lockdowns and quarantines: for instance, chatbot agents deployed to replace call center agents who could not work from home or to cope with surges in volume at call centers from increased e-commerce.

Although hard data on increased rates of adoption of automation and AI will take months or years to show up in official statistics, some evidence already suggests that an acceleration is under way. First, we see evidence from past recessions that companies use downturns to rethink their businesses and streamline operations. These belt-tightening exercises may include deploying technology to replace labor, as well as simply redesigning business processes. As a result, the share of jobs made up primarily of routine tasks that are automatable declines and does not recover even when an overall recovery takes hold (see Box 1, “Past recessions have spurred automation of routine jobs”).

[97] “A new normal means an augmented reality for Enel,” Procurement Leaders, December 3, 2020, procurementleaders.com.

[98] “AR and VR headset will see shipments decline in the near term due to COVID-19, but long-term outlook is positive, according to IDC,” IDC, March 18, 2020, idc.com.

Box 1.

Past recessions have spurred automation of routine jobs

History shows that recessions have prompted companies to redesign work in ways that permanently reduce jobs requiring mainly routine tasks. This suggests that technology is at play, as automation is best suited to performing activities that are routine, repetitive, and transactional.[1]

Jaimovich and Siu have found that since the 1980s, 88 percent of job losses in the United States in routine occupations, which are those involving repetitive tasks requiring limited skills, could be traced back to recession periods.[2] Studies from Canada and Spain also show that recessions are crucial periods for intensifying skill-biased labor demand.[3] Our analysis on the level of employment in routine and nonroutine occupations during and after the Great Recession finds a similar trend across four countries (Exhibit 16).

Other research in the United States has found not only that the regions most affected by recession saw more growth in demand for higher skills after the financial crisis, but also a correlation between rising demand for higher skills and rising capital investment in automation technologies for performing routine work. Studies have also found that pandemic events accelerate robot adoption.[4] In effect, companies invest more in automation and other new technologies during and after recessions and hire workers with higher skills, shedding those whose work can be done more efficiently by machines. The evidence that recessions spur rising investment in automation is shown in the trend in industrial robot installations after the 2008–09 recession: installations worldwide dropped in 2009 but recovered quickly after the recession and picked up pace thereafter, suggesting an enduring increase in technology adoption in the aftermath of recession (Exhibit 17).[5]

Although the downturn sparked by COVID-19 has unique characteristics, for the reasons noted above it is plausible that companies will not behave so differently from the past in its wake, particularly in adopting automation for uses newly relevant and desirable because of the pandemic.

1 See *A future that works: Automation, employment, and productivity*, McKinsey Global Institute, January 2017, McKinsey.com.

2 Nir Jaimovich and Henry E. Siu, *Job polarization and jobless recoveries*, NBER working paper number 18334, August 2012, revised November 2018, nber.org.

3 Joel Blit, "Automation and reallocation: Will COVID-19 usher in the future of work?," *Canadian Public Policy,* August 2020, Volume 46, Issue S2, uwaterloo.ca; Brindusa Anghel, Sara De La Rica, and Aitor Lacuesta, "The impact of the Great Recession on employment polarization in Spain," *Journal of the Spanish Economic Association*, August 2014, Volume 5, Issue 12, pp. 143–71.

4 Tahsin Saadi Sedik and Jiae Yoo, *Pandemics and automation: Will the lost jobs come back?*, IMF working paper number 2021/011, January 2021, imf.org.

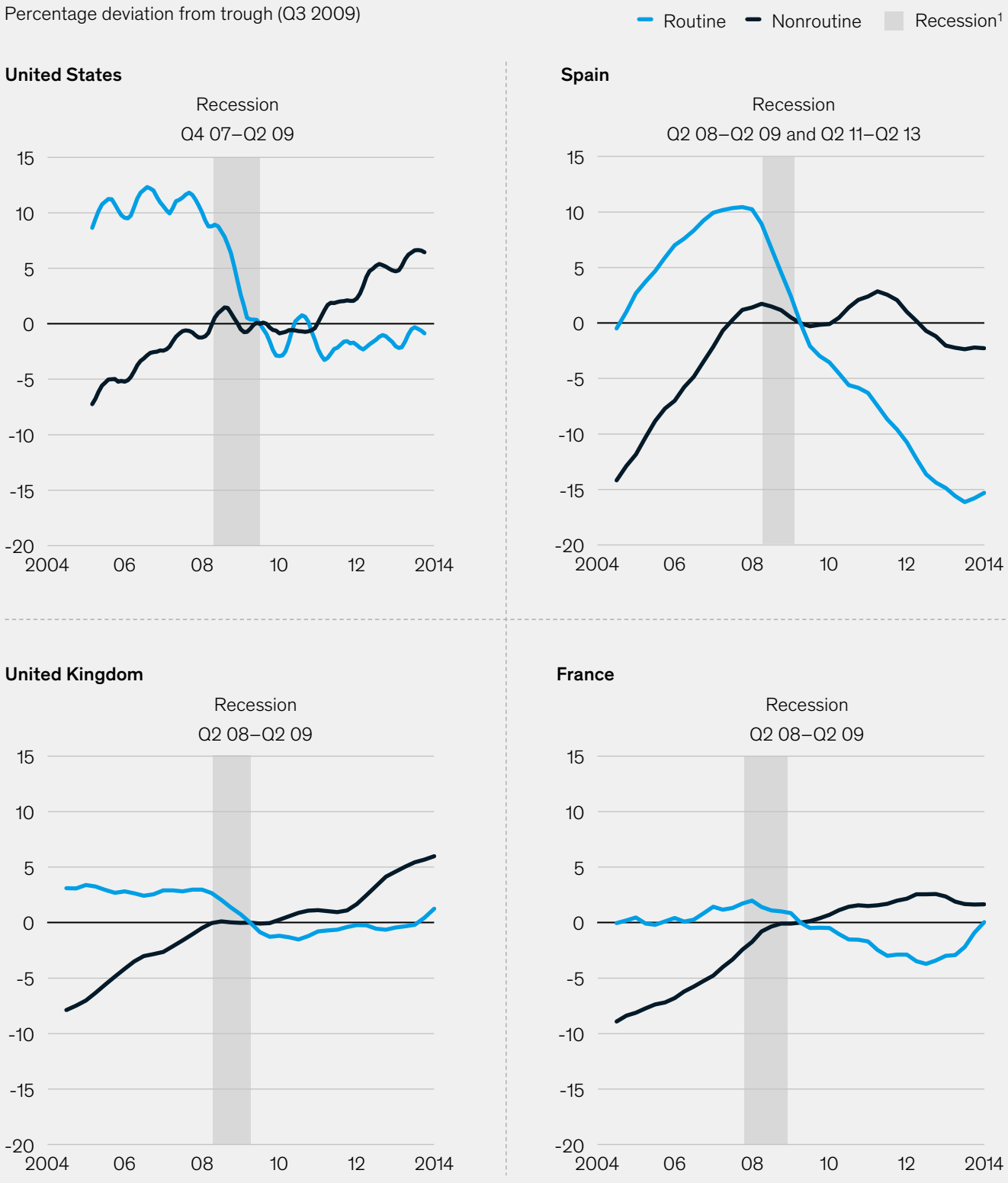
5 Alexandr Kopytov, Nikolai Roussanov, and Mathieu Taschereau-Dumouchel, *Short-run pain, long-run gain? Recessions and technological transformations*, NBER working paper number 24373, March 2018, nber.org.

Exhibit 16

In past recessions, routine jobs were displaced and never fully recovered.

Routine and nonroutine employment, 2004–14

Percentage deviation from trough (Q3 2009)



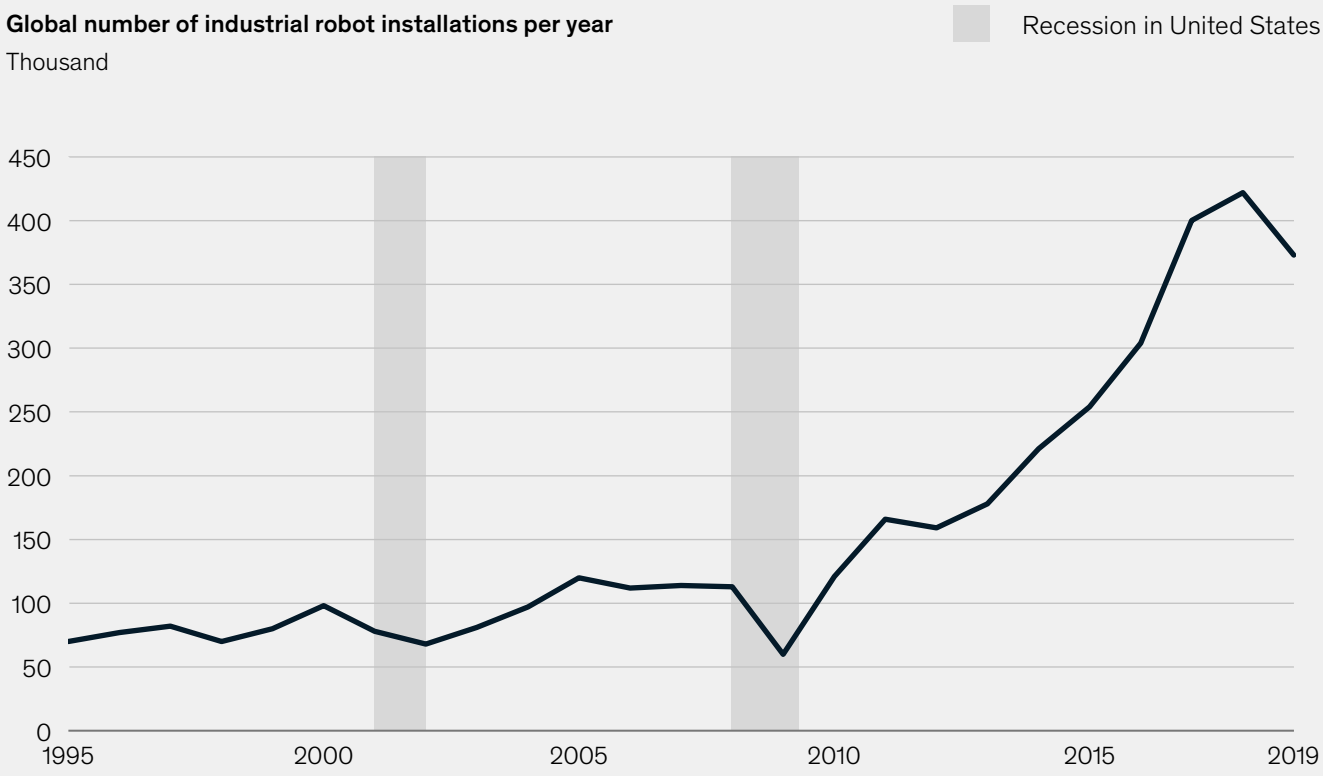
1. Analysis focuses on 2008–09 recession; France, Spain, and United Kingdom also experienced double-dip recession in 2012.

Note: Trough determined as point when GDP is lowest during a recession. Routine employment defined as work with a limited and well-defined set of cognitive and manual activities that can be accomplished following explicit rules; nonroutine work is defined as problem-solving and complex communication activities.

Source: Eurostat; US Bureau of Labor Statistics; McKinsey Global Institute analysis

Exhibit 17

Installations of industrial robots have shown strong recovery and growth following past recessions.



Source: International Federation of Robotics; McKinsey Global Institute analysis

The evidence that recessions spur rising investment in automation is shown in the recovery trend in industrial robot installations after the 2008–09 recession.

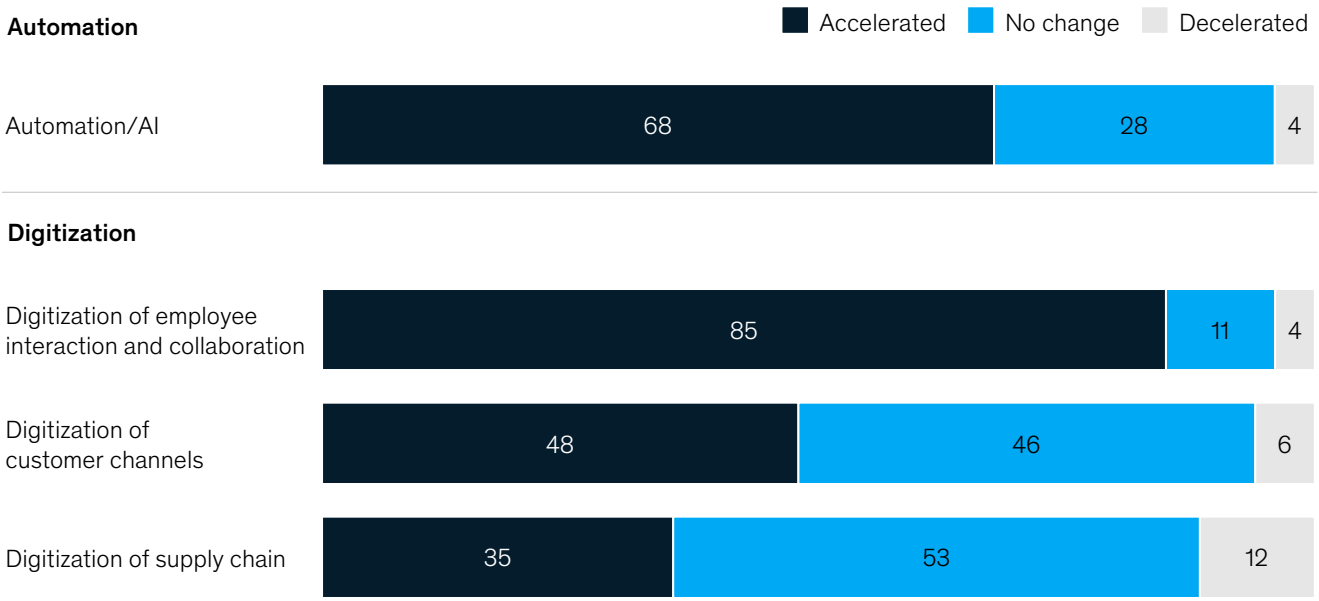
The pandemic recession differs from those of the past, with higher impact on service sectors and on small and midsize businesses than the 2008–09 financial crisis, for example. But we also see many new triggers from COVID-19 that may accelerate automation, as discussed above. We commissioned a survey in July 2020 of 800 business executives from nine countries: Australia, Canada, China, France, Germany, India, Spain, the United Kingdom, and the United States. The results show that 68 percent of executives indicated they have plans to increase adoption of automation and AI, and similarly large shares of respondents indicated they expect more deployment of digital working tools, e-commerce platforms, and digital supply chain platforms (Exhibit 18).

Exhibit 18

Executives say that COVID-19 is accelerating adoption of automation and digital technologies.

Since the start of the COVID-19 outbreak, how has your company's or business area's adoption of the following technology trends changed?

% of respondents (n=800)[1]



1. Excludes six respondents who selected the option, "Not applicable; we have not yet adopted this trend."

Source: McKinsey Global Business Executive Survey, July 2020; McKinsey Global Institute analysis

While overall sales of robots may have declined in the initial months of the downturn, the intention to accelerate adoption of automation is reflected in the rising share prices of robotics and robotic process automation, or RPA, companies (Exhibit 19). More broadly, we see that in Japan, which weathered the pandemic better than countries in the European Union or North America, sales of industrial robots grew by 2 percent in August 2020 compared to the previous year, while machinery sales fell more than 12 percent.[99] In the United States, imports of robots grew by 1 percent while overall imports shrank by 9 percent from the beginning through the third quarter of 2020 compared to the same period in 2019.[100] A McKinsey global survey found that respondents from companies already seeing a high bottom-line impact from their use of AI before COVID-19 increased investment in AI as a response to the pandemic.[101]

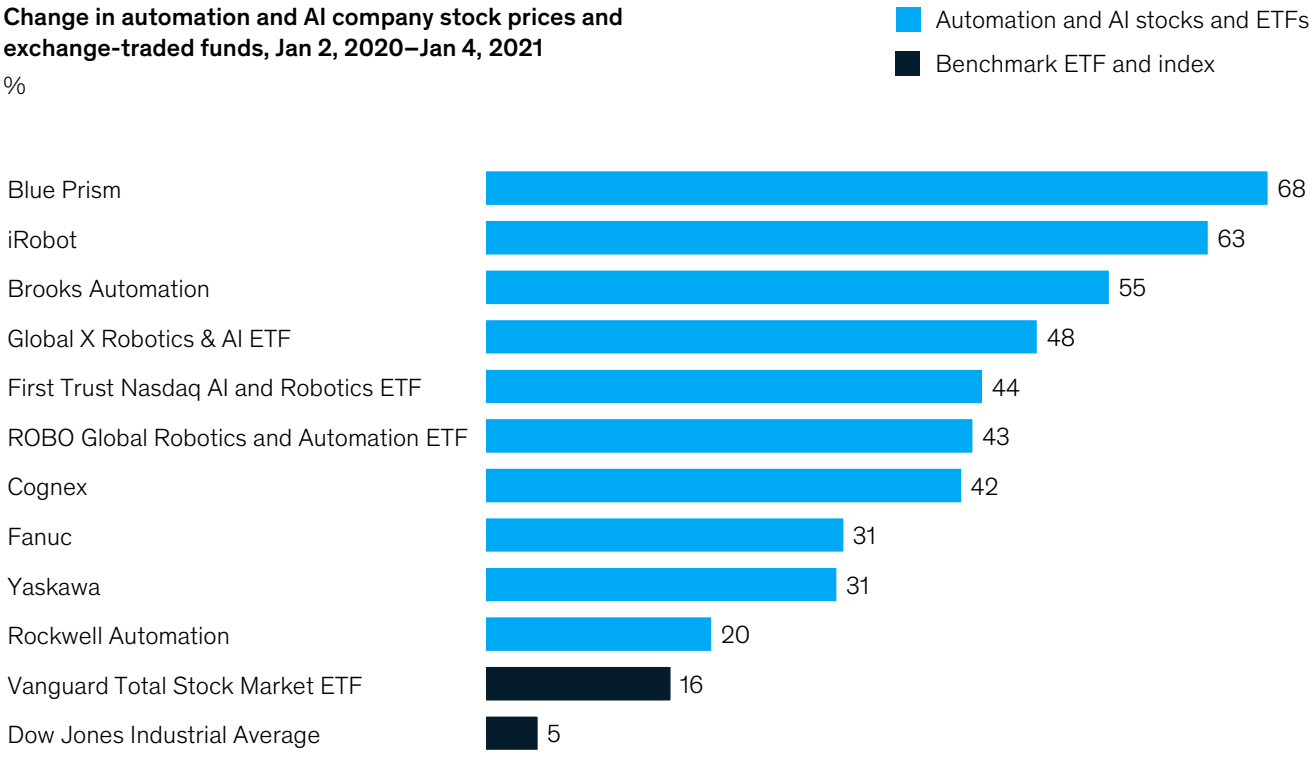
[99] Valentina Romei, "Pandemic boosts automation and robotics," *Financial Times*, October 20, 2020, ft.com.
[100] US International Trade Commission.
[101] Tara Balakrishnan, Michael Chui, Bryce Hall, Nicolaus Henke, "McKinsey Global Survey: The state of AI in 2020," November 2020, McKinsey.com.

Exhibit 19

Major automation and AI company shares and exchange-traded funds outperformed the market in 2020.

Change in automation and AI company stock prices and exchange-traded funds, Jan 2, 2020–Jan 4, 2021

%



Source: Eurostat; Yahoo Finance; McKinsey Global Institute analysis

Any acceleration in adoption of automation and AI technologies is unlikely to occur uniformly across industries, occupations, or technologies (Exhibit 20). Rather, evidence from companies so far suggests they are turning to the specific types of automation and AI that can help them better cope with the constraints and challenges imposed by COVID-19. For example, companies needed greater flexibility to meet erratic demand due to the pandemic. Retailers like Amazon, Walmart, and Target have enlisted industrial robots to pick, sort, and track merchandise in their warehouses to manage the surge in e-commerce demand. Takeda enlisted robotic process automation to dramatically speed up paperwork related to patients involved in trials of a potential COVID-19 vaccine by handing off repetitive, routine tasks to machines.[102]

Companies also are turning to automation to help maintain distance between workers and reduce the number of humans in a workspace. Meat processors in the United States, for example, automated parts of their production lines after large COVID-19 outbreaks. Fast food chains and restaurants are encouraging customers to order by app and kiosk, and the use of "ghost kitchens," which restaurant chains share to make meals ordered digitally for delivery, rapidly increased during the pandemic.[103] Staffed by fewer workers, these kitchens reduce the need for order takers and other restaurant staff not directly involved in cooking—which is also gradually being automated. Hospitals and hotels around the world have deployed service robots to sanitize rooms, while the use of AI-powered chatbots has surged in industries ranging from financial services to retail and healthcare.[104]

[102] Will Knight, "The pandemic is propelling a new wave of automation," *Wired*, June 12, 2020, wired.com.
[103] Taylor Telford, "Chipotle leans into burritos to go with first digital-only restaurant," *Washington Post*, November 11, 2020, washingtonpost.com.
[104] R. Dallon Adams, "Chatbot use surges amid pandemic as digital transformation accelerates," Tech Republic, July 17, 2020, techrepublic.com.

Exhibit 20

Automation adoption may accelerate for selected technologies.

Illustrative

Potential change in automation adoption due to Covid-19: ◯ Deceleration ● No change ● Acceleration

Automation technology	Description	Potential change in adoption due to COVID-19[1]	Example use cases accelerated by COVID-19
Artificial Intelligence/ Machine Learning 	Algorithms able to mimic human intelligence by learning, adapting, and improving		• Complementing customer service agents with conversational assistants and chatbots • Combining AI with remote sensors to enable remote management of operations
Service robots 	Robots that perform tasks and can work around humans in venues other than industrial and warehouse sites		• Deploying autonomous robots to deliver meals in hotels and supplies in hospitals • Introducing COVID-19 swab cobot[2] that takes nasal swabs, reducing risk to healthcare worker • Using mobile robots for cleaning and disinfection services in stores, hospitals, and offices
Robotic Process Automation (RPA) 	Software that replicates the activities of a human interacting with other software systems		• Eliminating paperwork documentation and processing for loan applications through use of RPA • IRPA handling processing of refund requests for travel companies
Industrial robots 	Programmable devices used in industry to perform manual tasks, including stand-alone, collaborative,[2] and mobile robots		• Robotic processing of COVID-19 tests • Deploying cobots on assembly lines to reduce factory floor density and promote social distancing • Using autonomous mobile robots in distribution centers to speed order fulfillment
Virtual/augmented reality 	Technology that creates virtual environments or overlays virtual objects on the real-world		• Using augmented reality to repair machines or perform maintenance remotely • Leveraging augmented reality in medical operations to reduce human proximity
Unmanned aerial vehicles (UAV) 	Drones and other vehicles capable of operating without a human aboard		• Using drones to make deliveries in healthcare • Deploying drones for surveillance during pandemic lockdowns and curfews
Autonomous vehicles 	Wheeled vehicles capable of operating without a human driver		• Achieving contactless delivery with autonomous grocery delivery vehicles • Speeding operations in industrial sites with unmanned vehicles

1. Each automation technology has different levels of current usage. For instance, there currently are many times more industrial robots than service robots.
2. A "cobot" is a collaborative robot, or one that can work alongside humans and in some cases learn from them.

Source: *A future that works: Automation, employment, and productivity*, McKinsey Global Institute, January 2017; company releases; *Industrial robotics: Insight into the sector's future growth dynamics*, McKinsey Global Institute, July 2019; International Federation of Robots; McKinsey Global Institute analysis

Adoption of some automation technologies may see less acceleration in response to the pandemic. In China, for instance, drones were used to spray areas with disinfectants and transport medical supplies during outbreaks, but there is little evidence that use of unmanned aerial vehicles came into widespread use during the pandemic.[105]

Businesses and consumers may realize benefits and greater convenience and efficiency from trends that COVID-19 has spurred. At the same time, these trends have enormous implications for the workforce, and particularly workers in low-wage jobs requiring more routine skills. In the next chapter, we explore how remote work, soaring e-commerce and digital interactions, and accelerated automation and AI will affect labor demand and the mix of occupations over the next decade.

[105] Junwei Yang, and Timothy Reuter, "3 ways China is using drones to fight coronavirus," World Economic Forum, March 2020, weforum.org.

Spotlight

Will the pandemic spur growth in the independent workforce?

MGI's previous research has documented the breadth and diversity of the independent economy, which encompasses 25 to 31 percent of the working-age population in advanced economies.[1] More than half of participants in the independent economy use independent work to supplement their income from another job. These workers provide a wide range of work and services, spanning knowledge work, lower-skill work, selling goods, and leasing assets. They span income, education, and age ranges, including self-employed doctors and accountants as well as part-time tutors and dog walkers, Uber drivers, and Airbnb hosts.

Gig platforms increased their workforce base by 18 percent annually between 2016 and 2019 in the UK, while independent contractors and temporary agency workers were roughly flat between 2018 and 2019.[2]

Some of this growth reflects increasing use of labor- and goods-centric platforms such as Alibaba, Etsy, and Fiverr. But knowledge-centric platforms have also propelled it, with their offerings of on-demand access to highly skilled professionals, such as Catalant Technologies for business professionals, UpCounsel for lawyers, and InnoCentive for crowdsourcing solutions for engineering and technical problems.[3]

COVID-19 has had an uneven impact on the independent workforce

COVID-19 put millions of individuals temporarily or permanently out of work, displacing those in both traditional jobs and independent work. Unemployment rates surged in April 2020, particularly in countries that provided no incentives to keep workers on the books, as economies went into lockdown. Many platform-enabled gig workers and independent workers saw declines in work during 2020 as well, although the impact has been uneven in some forms of gig work. In the United States, grocery and meal delivery on gig platforms soared during the pandemic, while ridesharing and accommodation rentals fell sharply. Meanwhile, the total number of temporary workers employed by companies dropped by 29 percent in April 2020—but the segment had regained more than 80 percent of lost jobs by December, 1.3 times the 60 percent recovery rate for US nonfarm workers overall (Exhibit 21).[4]

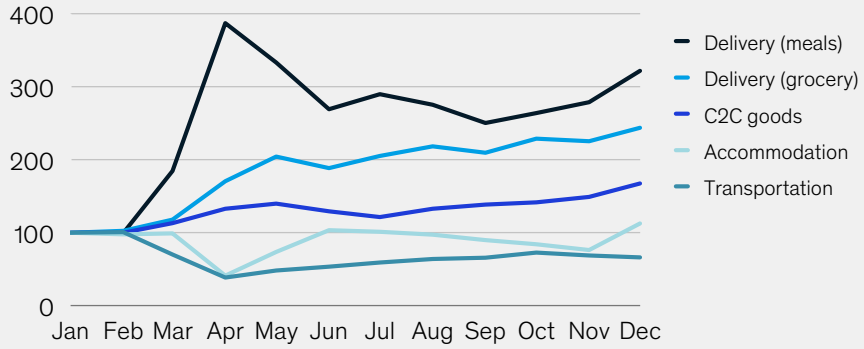
Exhibit 21

During COVID-19, some segments of the independent economy saw significant increases, even as others declined.

Change in demand for gig platforms and temp workers in the United States

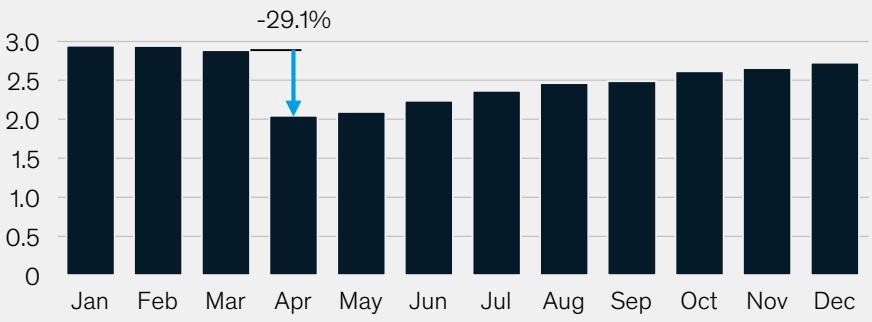
Spending on gig platforms in the United States in 2020[1]

Index: 100 = January 2020



Number of temporary workers in the United States in 2020[2]

Million



1. Index based on debit and credit card spending on each platform in the United States—accommodation: AirBnb (excludes returns); C2C goods: eBay; meal delivery: Uber Eats, DoorDash, Caviar, Grubhub, Postmates; grocery delivery: Instacart, Fresh Direct, Shipt, Peapod; transportation: Uber, Lyft.
2. Temporary workers are defined as workers employed by temporary help services establishments, which are primarily engaged in supplying workers to client businesses for limited periods of time to supplement the client workforce.

Source: Affinity Solutions; US Bureau of Labor Statistics; McKinsey Global Institute analysis

1 See *Independent work: Choice, necessity, and the gig economy*, McKinsey Global Institute, 2016.
2 Ursula Huws et al, "The platformisation of work in Europe," University of Hertforshire, 2019; Adam Pode, "The Global Gig Economy." Staffing Industry Analysts, August 2019 and June 2020.
3 Joseph Fuller et al., "Rethinking the on-demand workforce," *Harvard Business Review*, November 2020.
4 US Bureau of Labor Statistics, 2020.

Workers adversely affected by the pandemic turned to platform-enabled gig work to earn income

Independent work can also serve as a safety net, providing workers who lose jobs with alternative sources of income.[5] Research prior to the pandemic found that individuals who worked on gig labor platforms used independent work to offset losses in other income and therefore had *less* variable monthly income.[6] During the pandemic in 2020, 62 percent of Uber drivers said that driving was the biggest or at least a significant source of income[7] (Exhibit 22).

This trend is not limited to the United States. In India, the gig economy grew rapidly in 2020 across all platforms. In China, waiters and cooks, office administrative staff, and many other workers who lost jobs during COVID-19 found new work in the gig economy; four of the top digital platforms in the country together created more than five million new jobs in the first half of 2020 (Exhibit 23). The most common previous occupation for Meituan food delivery drivers in China was factory work, followed by small business owners.

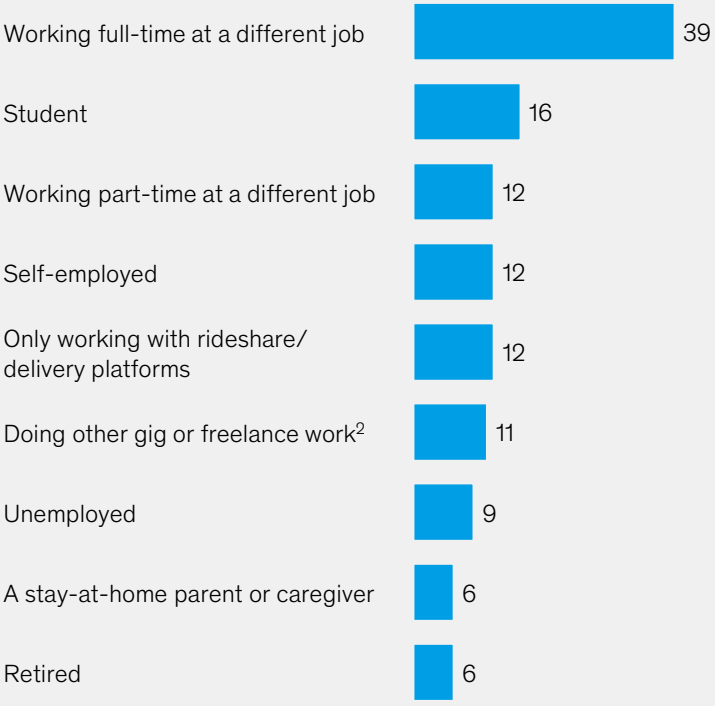
However, many jobs on gig platforms do not provide significant career progression or benefits such as paid sick leave, health insurance, and pensions. Even before the pandemic, the increase in workers on certain platforms had led to a decline in earnings in some occupations, such as transportation.[8]

Exhibit 22

In the United States, platform work is the most significant source of income for two-thirds of Uber drivers.

Significance of income derived from rideshare gig work to Uber drivers
% of Uber drivers surveyed (n=1,002)[1]

Additional occupations of Uber drivers
% of Uber drivers surveyed[1]



1. All drivers surveyed work for Uber, but responses may reflect their experience working for Uber and other gig platforms.
2. Not app-based rideshare or food delivery.

Source: Benenson Strategy Group and GS Strategy Group, July 2020; McKinsey Global Institute analysis

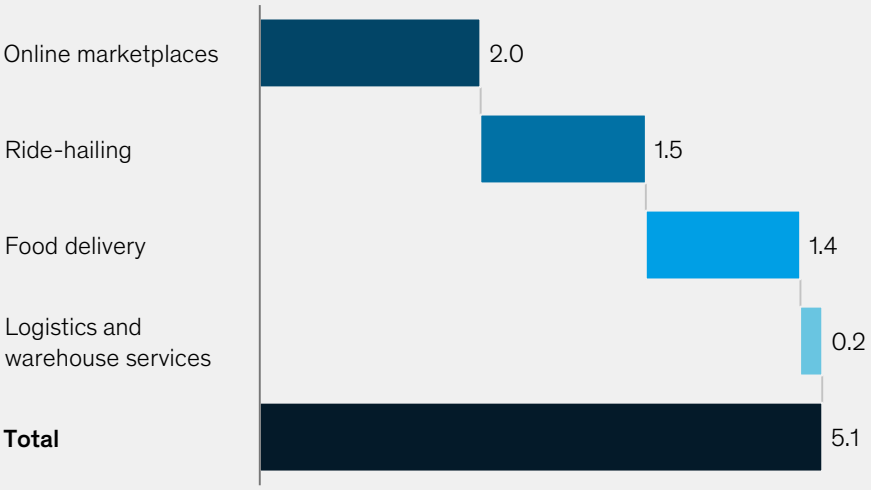
5 Dylan Walsh, *How the gig economy can reduce unemployment and debt,* MIT Sloan School of Management, September 2020.
6 Diana Farrell and Fiona Greig, *Paychecks, paydays, and the online platform economy: Big data on income volatility,* JP Morgan Chase Institute, February 2016, jpmorganchase.com.
7 App-Based Driver Survey (n=1002 Uber Drivers) by Benenson Strategy Group and GS Strategy Group. Conducted from July 10 to July 17, 2020, United States.
8 Diana Farrell, Fiona Greig, and Amar Hamoudi, *The online platform economy in 2018: Drivers, workers, sellers, and lessors*, JPMorgan Chase Institute, September 2018, jpmorganchase.com.

Exhibit 23

In China, some workers displaced during COVID-19 found work among the 5.1 million new jobs created on digital platforms.

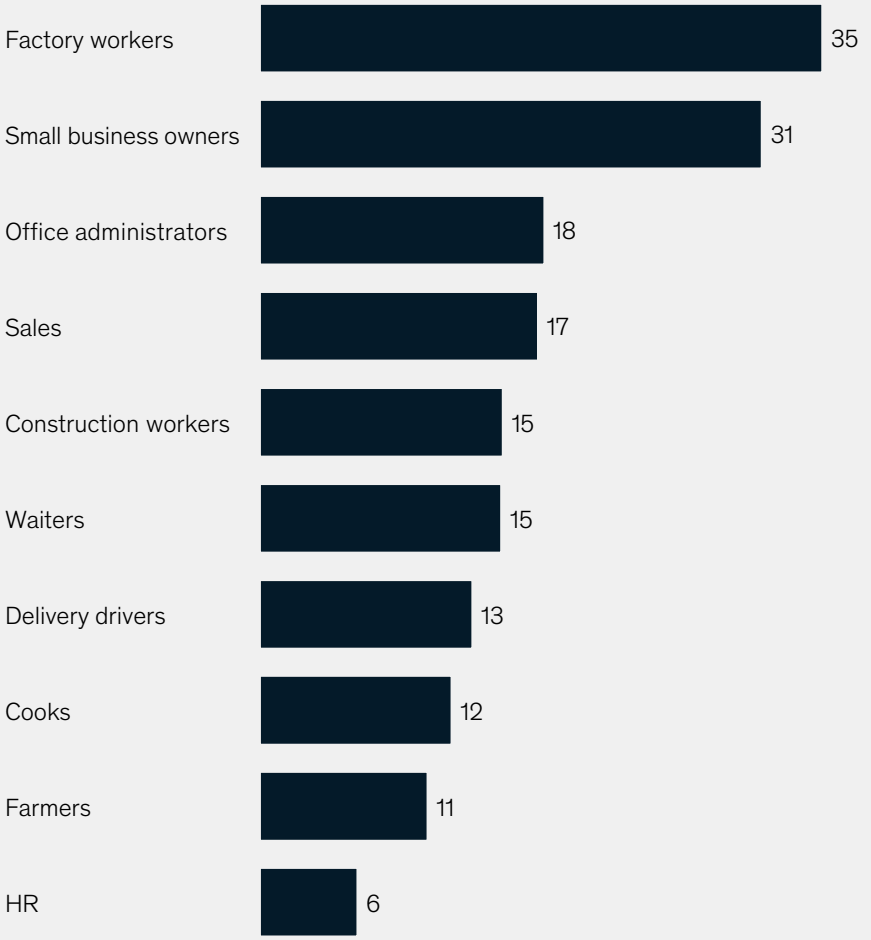
Reported jobs created on digital platforms in first half of 2020

Million



Top 10 occupational backgrounds of Meituan riders who joined in the first half of 2020[1]

% of Meituan drivers surveyed (n=10,810)



1. All figures are for H1 2020, except for online marketplaces, which is for Q1 2020, based on reported data from four major Chinese digital platform companies.

Note: Figures sum to more than 100% because respondents could pick more than one answer.

Source: Alibaba; DiDi; Meituan; SF Express; McKinsey Global Institute analysis

Governments have started offering more benefits and protections to independent workers (see Exhibit 40). COVID-19 accelerated this effort by highlighting the precarity of independent work. In the United Kingdom, the government included independent contractors in the Self-Employment Income Support Scheme, which provides grants to compensate for wages lost due to COVID-19.[9] In the United States, the federal government allowed independent workers and self-employed individuals access to unemployment benefits provided through the Pandemic Unemployment Assistance program.[10] These programs are in place during the pandemic, but policy makers could consider how to innovate similar benefits for independent workers in the long term.

Businesses have also been rewiring their organizational policies and processes to better leverage a flexible workforce and use independent workers' skills to help adapt to a postpandemic world.[11] In our survey of 800 business executives around the world, 70 percent report an intent to hire more on-site independent workers and freelancers after COVID-19.[12] A reimagination of the relationship between independent workers, businesses, and society at large could unlock the potential of these workers and provide them with the flexibility and support that they need.

9 HM Revenue & Customs, Government of the United Kingdom, gov.uk.

10 "Unemployment insurance relief during COVID-19 outbreak," US Department of Labor, dol.gov.

11 Joseph Fuller et al., "Rethinking the on-demand workforce," *Harvard Business Review,* November 2020.

12 Susan Lund, Wan-Lae Cheng, André Dua, Aaron De Smet, Olivia Robinson, and Saurabh Sanghvi, "What 800 executives envision for the postpandemic workforce," McKinsey Global Institute, September 23, 2020, McKinsey.com.

4. Shifts in labor demand post-COVID-19 impact the most vulnerable workers

Together, the trends that COVID-19 has shifted may have profound effects on the workforce even after the pandemic recedes. While some workers will return to the office, shoppers will return to stores, and diners will return to restaurants, many of the behavioral changes in consumers and businesses are likely to persist. All of this portends larger workforce disruptions than we expected before the pandemic.

In this chapter, we explore how trends accelerated by COVID-19 may shape the workforce and mix of occupations in the years ahead. We model two scenarios: a pre-COVID-19 and a post-COVID-19 scenario. Our pre-COVID-19 scenario is based on MGI's previous research on the future of work and incorporates jobs lost from adoption of automation and AI technologies as well as jobs gained from long-term macro trends, such as aging populations and the greening of the economy. Our post-COVID-19 scenario builds on this scenario and incorporates three additional trends accelerated by COVID-19—remote work, a shift to e-commerce and other virtual transactions, and faster adoption of AI and automation in select cases (see Box 2, "Methodology for estimating labor demand in 2030"). We caution that estimates from our model are not forecasts but rather scenarios of how workforce shifts may play out in the coming years. We make the assumption that job growth by 2030 will be sufficient to match growth in the workforce of each of our focus countries; in other words, we do not project an unemployment rate higher than the natural rate seen during full employment. Our results therefore focus on shifts in the mix of occupations available and skills required of the workforce, as opposed to overall change in employment levels.

Our findings indicate much larger shifts in employment and occupations after the pandemic than our estimates from before. Over 100 million workers in the eight focus countries—1 in 16—may need to switch to a different occupation to remain employed, a 12 percent increase overall compared to before COVID-19, and an increase of up to 25 percent in advanced economies. Nearly all job growth may occur in high-wage jobs, while for the first time, the share of employment in low-wage jobs may decline. This will increase the challenge of retraining workers. Before the pandemic in the United States, for example, we found that most low-wage workers who lose jobs could find a new job in another low-wage occupation. A data entry worker could take a job in retail or home healthcare, for instance.

Given the trends accelerated by COVID-19, we now estimate that more than half of low-wage workers in declining occupations may need to shift to occupations in higher wage brackets that require different skills. Moreover, women, people with less education, and the young may face a larger need to switch occupations and so require targeted interventions to help them make such transitions.

Box 2.

Methodology for estimating labor demand in 2030

To understand the impact of COVID-19 on the labor market over the next decade, we focus on two scenarios of labor demand: pre-COVID-19 and post-COVID-19. We model labor demand to 2030 for eight countries that represent a diverse range of labor markets and income levels: China, France, Germany, India, Japan, Spain, the United Kingdom, and the United States.

Our pre-COVID-19 scenario is based on MGI's previous research on the future of work. This includes jobs lost as a result of the adoption of automation and AI technologies that reduce demand for human labor as well as jobs gained from seven long-term trends that increase demand for some types of labor.[1] Those seven trends are rising incomes that increase demand for all types of work; aging populations that consume more healthcare; the investment in technology that companies employ; ongoing infrastructure investment; the shift away from fossil fuels and greening of the economy; increasing higher education and the need for more workforce training; and marketization of work in the home as more women enter the labor force.

For this report, we updated MGI's previous labor demand model to build the pre-COVID-19 scenario, which means that figures in this report may differ somewhat from our earlier reports.

For instance, we have incorporated the latest projections of real GDP growth from Oxford Economics and labor force growth projections from the United Nations and the International Labour Organization. We assume that each of the eight focus countries will return to full employment by 2030. By that time, the economy will likely have absorbed the effects of the pandemic and economies should be in equilibrium. This approach allows us to focus on the change in the mix of occupations, rather than on the overall employment level.

In the post-COVID-19 scenario, we build on the pre-COVID-19 trends and include the following three additional broad trends accelerated by the pandemic that may influence labor demand and jobs in the economy through 2030:

- **Increased remote work and virtual meetings.** Even after the pandemic, many companies plan to continue using hybrid forms of remote work for some employees.[2] We assume no direct effects of remote work on labor productivity or labor demand, but model its second-order impact on jobs in other industries, such as office administrators and maintenance; food service and retail in urban centers; and demand for transportation. In addition, videoconferencing for business meetings is projected to replace some business travel in the future. We used data from the Oxford Economics Tourism model and from the McKinsey travel practice to project the difference in business travel spending pre- versus postpandemic. Like the increase in remote work, a reduction in business travel will have second-order implications for jobs in other industries, such as air travel, ridesharing, hotels and accommodation, and food service.
- **Shift to e-commerce and other virtual transactions.** COVID-19 prompted a huge increase in e-commerce and other digital transactions, reducing jobs in some brick-and-mortar establishments but creating new jobs in other venues. We use Euromonitor data for online and offline retail sales value and project to 2030 to estimate the impact on labor demand in different occupations. The academic literature on the impact of e-commerce on jobs is mixed. We take a middle-of-the-road assumption that jobs lost in retail stores are offset by job gains in warehouses and delivery; final job losses and gains in these occupations may be different after taking into account automation, which affects these jobs differently.[3]
- **Faster adoption of automation and AI.** Our survey of 800 business executives globally suggests that many companies are accelerating plans for automation in their business. To determine the potential magnitude of this shift, and to determine which occupations are most likely to be affected, we conducted more than 80 expert interviews within McKinsey over a range of industries and functions. We identified 139 occupations that could see accelerated automation due to COVID-19 and triangulated the results with the latest literature on automation.

We caution that our estimates of labor demand for various occupations are not forecasts; rather, they are meant to illustrate how trends could play out over the next decade. Our analysis has some important limitations. It provides a partial equilibrium view that does not account for changes in wage rates, interest rates, and other prices that may have second-order effects. It also does not model different outcomes for unemployment or labor force participation rates. Moreover, the changes to labor demand experienced over the next decade will depend in part on the choices and investments made by businesses, policy makers, and workers. A more detailed discussion of our methodology can be found in the technical appendix.

[1] For details see *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages*, McKinsey Global Institute, November 2017, and *A future that works: Automation, employment, and productivity*, McKinsey Global Institute, January 2017.

[2] Susan Lund, Anu Madgavkar, James Manyika, and Sven Smit, "What's next for remote work: An analysis of 2,000 tasks, 800 jobs, and nine countries," McKinsey Global Institute, November 23, 2020, mckinsey.com.

[3] See, for instance, Michael Mandel, *How e-commerce creates jobs and reduced income inequality*, Progressive Policy Institute, September 2017; William C. Wheaton and Edward Tung, *Bricks or clicks? The efficiency of alternative retail channels*, MIT Center for Real Estate Research, paper number 9, November 2020.

After COVID-19, shifts in the mix of occupations within countries may be larger than before

MGI has published extensively on the potential impact of automation on the future of work. The displacement of workers by automation technologies—at least in the short-term, and in specific occupations—is well-documented by other academic research as well.[106]

As discussed in the previous two chapters, COVID-19 has triggered new consumer and business behaviors that may have additional effects on labor demand in the years ahead and may result in greater displacement of workers in some occupations while also increasing job growth in others.

In our post-COVID-19 scenario, we find that displacement of workers could rise by between 10 and 35 percent compared to our prepandemic estimates. Across our eight countries, this amounts to an additional 66 million workers whose jobs may disappear (see Country Appendix for detailed results by country). The displacement is likely to concentrate in work arenas and occupations with high levels of physical proximity and human interaction. For instance, expanding e-commerce and a shift to more "contactless" customer interaction may displace cashiers and in-store sales representatives. Food service occupations may decline more in the aftermath of the pandemic as a result of accelerated automation combined with an anticipated decline in demand for restaurants among business travelers and remote workers. Some restaurant chains have already deployed automation to reduce physical proximity between their workers. For example, during the pandemic, White Castle began testing Flippy, a robotic kitchen assistant expert at grilling and frying.[107]

Great displacement may occur among office support jobs in the post-COVID-19 scenario as companies reimagine the workforce and seek efficiencies through automation. In a September 2020 McKinsey survey of chief operating officers, more than 30 percent expected to pare office space as hybrid remote work becomes permanent for some workers.[108] That will reduce demand for office facilities and maintenance jobs, such as custodians, receptionists, and security guards, although cleaning staff may increase to address greater attention to sanitation and hygiene inspired by the virus.

The same trends spurred by COVID-19 together with other long-term macro trends may accelerate job growth in other occupations. For instance, while e-commerce displaces retail jobs in stores, it creates positions in warehouses and delivery. As incomes rise as a result of growing GDP, consumer and business spending increases for all goods and services, creating jobs across the board; this trend is particularly pronounced in China and India, which are projected to see real GDP growth of 4 percent and 7 percent, respectively, in the long run. Aging populations require more health professionals such as nurses, as well as health support positions like home health aides. Increased adoption of automation and AI would result in greater demand for engineers, computer scientists, and programmers to create and maintain technologies within industries.

Exhibit 24 shows the net change in labor demand through 2030 in the post-COVID-19 scenario for the eight focus countries, expressed as the change in share of total employment in each country. Exhibit 25 shows the incremental change in the number of jobs in different occupational categories in the post-COVID-19 scenario compared to the pre-COVID-19 scenario.

[106] See, for instance, Daron Acemoglu and Pascual Restrepo, *Robots and jobs: Evidence from US Labor Markets*, National Bureau of Economic Research working paper number 23285, March 2017; David Autor, and Anna Salomons, *Is automation labor-displacing?:Productivity growth, employment, and the labor share*, National Bureau of Labor Research working paper number 24871, August 2019; Nir Jaimovich and Henry E. Siu, *Job polarization and jobless recoveries*, National Bureau of Economic Research working paper number 18334; Daron Acemoglu, David Autor, Jonathon Hazell, and Pascual Restrepo, "AI and jobs: Evidence from online vacancies," National Bureau of Economic Research working paper number 28257, January 2021; Carl Frey, *The technology trap: Capital, labor, and power in the age of automation*, 2019; Jamie Merisotis, *Human work in the age of smart machines*, 2020.

[107] Lana Bandoim, "White Castle Plans to use Flippy The Robot in More Locations," Forbes, October 28, 2020, forbes.com.

[108] McKinsey CXO Survey on Reimagining SG&A, Q3 2020.

Exhibit 24

The mix of occupations may shift in all countries by 2030 in the post-COVID-19 scenario.

Estimated change in share of total employment, post-COVID-19 scenario, percentage points, 2018–30[1]

Increased share — Decreased share

Occupational category	Advanced						Emerging	
	France	Germany	Japan	Spain	United Kingdom	United States	China	India
Health aides, technicians, and care workers	1.6	1.9	1.4	1.5	1.4	2.2	2.7	1.0
Health professionals	0.8	0.7	0.9	1.0	0.7	1.2	1.3	0.5
Creatives and arts management	0.5	0.4	0.4	0.5	0.4	0.2	0.4	0.5
STEM professionals	1.0	1.2	1.0	0.9	1.0	1.0	1.2	0.8
Managers	0.7	0.6	0.4	0.7	0.9	0.6	0.5	0.6
Transportation services	0.3	0.6	0.1	0.3	0.1	0.3	0.9	0.4
Business and legal professionals	0.3	0.3	1.1	0.5	0.3	0.2	1.1	0.8
Community services	-0.3	-0.1	0.1	-0.1	-0.3	-0.2	0.8	0.2
Builders	-0.3	0.0	-0.2	-0.3	-0.3	-0.1	0.1	1.0
Educator and workforce training	0.0	0.4	-0.1	0.0	0.2	-0.1	0.4	0.7
Property maintenance	0.4	-0.2	-0.2	0.0	-0.2	0.1	0.5	-0.4
Food service	-0.6	-0.3	-1.1	-1.6	-0.7	-0.7	0.5	0.7
Customer service and sales	-0.9	-1.9	0.2	-0.5	-0.8	-1.1	1.3	0.3
Mechanical installation and repair	-0.2	-0.2	0.0	-0.2	-0.1	-0.2	-0.1	0.5
Office support	-2.1	-2.3	-2.2	-1.4	-2.2	-2.6	0.3	0.3
Production and warehousing work	-1.0	-1.0	-1.7	-0.9	-0.3	-0.7	-3.8	1.0
Agriculture	-0.2	-0.3	-0.3	-0.4	0.0	-0.1	-8.0	-8.9

1. Pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. Post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: McKinsey Global Institute analysis

Exhibit 25

The post-COVID-19 scenario anticipates stronger job growth in transportation and declines in food service and customer service compared to pre-COVID-19.

Difference in estimated net employment between pre-COVID-19 and post-COVID-19 scenarios, 2018–30, per 100K jobs

Increased demand in post-COVID-19 scenario

Decreased demand in post-COVID-19 scenario

	Advanced						Emerging	
Occupational category	**France**	**Germany**	**Japan**	**Spain**	**United Kingdom**	**United States**	**China**	**India**
Health aides, technicians, and care workers	0.0	-0.3	1.0	0.3	1.0	8.1	8.1	2.3
Health professionals	0.5	0.7	1.6	0.6	0.3	6.5	8.2	2.8
Creatives and arts management	0.1	0.3	0.5	0.0	0.3	1.3	-1.4	0.0
STEM professionals	0.8	1.4	1.1	0.4	1.0	6.9	7.2	5.0
Managers	-0.3	0.3	-0.4	-0.4	0.3	3.2	2.4	-3.8
Transportation services	1.5	2.9	1.7	0.6	1.1	7.6	25.8	3.2
Business and legal professionals	-0.5	-0.3	0.3	-0.3	0.1	0.3	-2.1	-4.6
Community services	0.8	1.3	1.4	0.4	0.4	7.9	10.0	1.1
Builders	0.6	0.7	1.8	0.5	0.7	6.5	20.6	10.5
Educator and workforce training	0.2	0.3	0.5	0.1	0.3	1.7	3.0	0.3
Property maintenance	-0.1	-2.0	-1.2	-0.2	-0.4	-0.9	-1.9	2.8
Food service	-0.8	-1.8	-3.5	-1.6	-1.9	-10.7	-48.5	-12.0
Customer service and sales	-2.8	-5.6	-3.2	-1.0	-2.9	-32.4	-58.6	-1.8
Mechanical installation and repair	0.5	0.9	0.9	0.4	0.3	2.8	11.5	1.1
Office support	-0.9	-0.1	-1.8	-0.3	-1.2	-9.3	-15.5	-6.9
Production and warehousing work	0.5	1.6	0.3	0.2	0.5	-0.5	30.6	-18.1
Agriculture	0.0	-0.5	-0.9	0.2	0.1	0.8	0.6	18.0

Note: Net employment refers to estimated labor demand after applying effects of all modeled trends. The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The postpendemic scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: McKinsey Global Institute analysis

Comparing our two scenarios, transportation services could see the biggest net increase in jobs, driven by increasing e-commerce and the delivery economy associated with it. These include jobs such as light truck and delivery services drivers and heavy and tractor-trailer truck drivers, among others. In advanced economies under our pre-COVID-19 scenario, jobs in transportation services were expected to decline by 1 to 12 percent, whereas in the post-COVID-19 scenario they are estimated to increase by 2 to 14 percent. This equates to 4.4 million more jobs created in transportation than before the pandemic across the eight countries (Exhibit 26).

That growth will fuel job growth in transportation, warehousing and logistics in China and elsewhere. In Germany, the growth is particularly large, since transportation accounted for just 2.9 percent of the workforce in 2018, compared to 3.3 percent in the United States and 4.1 percent in Spain; from that lower baseline, the country may add transportation jobs to accommodate growing demand for delivery driven by e-commerce. Many delivery jobs are gig work, and compared to other types of independent work, jobs coming via gig platforms have increased rapidly during the pandemic.

Health aides, technicians, wellness occupations, and health professionals will see the greatest growth in labor demand by 2030 across countries, driven primarily by long-term trends such as aging populations and rising incomes. The share of the population aged 65 or over is expected to grow from 22 to 26 percent in Germany, 16 to 20 percent in the United States, and 12 to 17 percent in China.[109] China will have the greatest growth in healthcare jobs across all countries, with the share of the workforce employed as health professionals potentially increasing as much as 1.3 percentage points by 2030, as GDP grows rapidly and raises incomes and the population ages. Among advanced economies, the United States may have the highest growth in health aides, technicians, and care worker occupations, with the share of the workforce employed in these occupations growing by 2.2 percentage points by 2030. This is because the US population is aging more rapidly (although from a lower starting point) and GDP is expected to grow faster than in other advanced economies.

STEM jobs may grow rapidly, in part driven by increasing use of digital tools and automation spurred by the pandemic. These jobs may increase an additional 2.4 million jobs across the eight countries compared to the pre-COVID-19 scenario. In Spain and India, the employment share of these workers will increase 0.9 and 0.8 of a percentage point, respectively. While these figures may seem small, across our eight countries, this change represents an additional 17 million STEM jobs, including some five million in India alone. While India's lower average wage costs may mean lower levels of automation, a surge in digital interactions by consumers, businesses, and government institutions is under way, supported by the country's universal digital ID; robust digital payments infrastructure; and emerging new digital ecosystems in areas spanning e-commerce, healthcare, education, and even logistics, agriculture, and government-to-person services.[110]

India's overall pattern of employment shifts may have less impact from COVID-19 compared to the seven other focus countries because of its stage of demographic and economic development. The country's growing labor force and population mean that almost all jobs will grow significantly, and its on-going structural shift from agriculture to manufacturing and services far outweighs the pandemic's effects. The labor force in India will swell by 70 million over the coming decade, driven by demographic trends, and more than 20 million workers might transition out of agriculture by 2030 and move to nonfarm jobs.[111] Our recent research on India's economy suggests potential for these workers to move into construction and manufacturing, in addition to the mainstays of retail trade and transportation.[112] Ongoing infrastructure spending and India's rising urbanization rate are two powerful factors driving this.

[109] *World Population Ageing 2019*, United Nations Department of Economic and Social Affairs, un.org.
[110] See *Digital India: Technology to transform a connected nation*, McKinsey Global Institute, March 2019; and *Risk, resilience, and rebalancing in global value chains*, McKinsey Global Institute, August 6, 2020.
[111] Ibid.
[112] See *India's turning point: An economic agenda to spur growth and jobs*, McKinsey Global Institute, August 26, 2020.

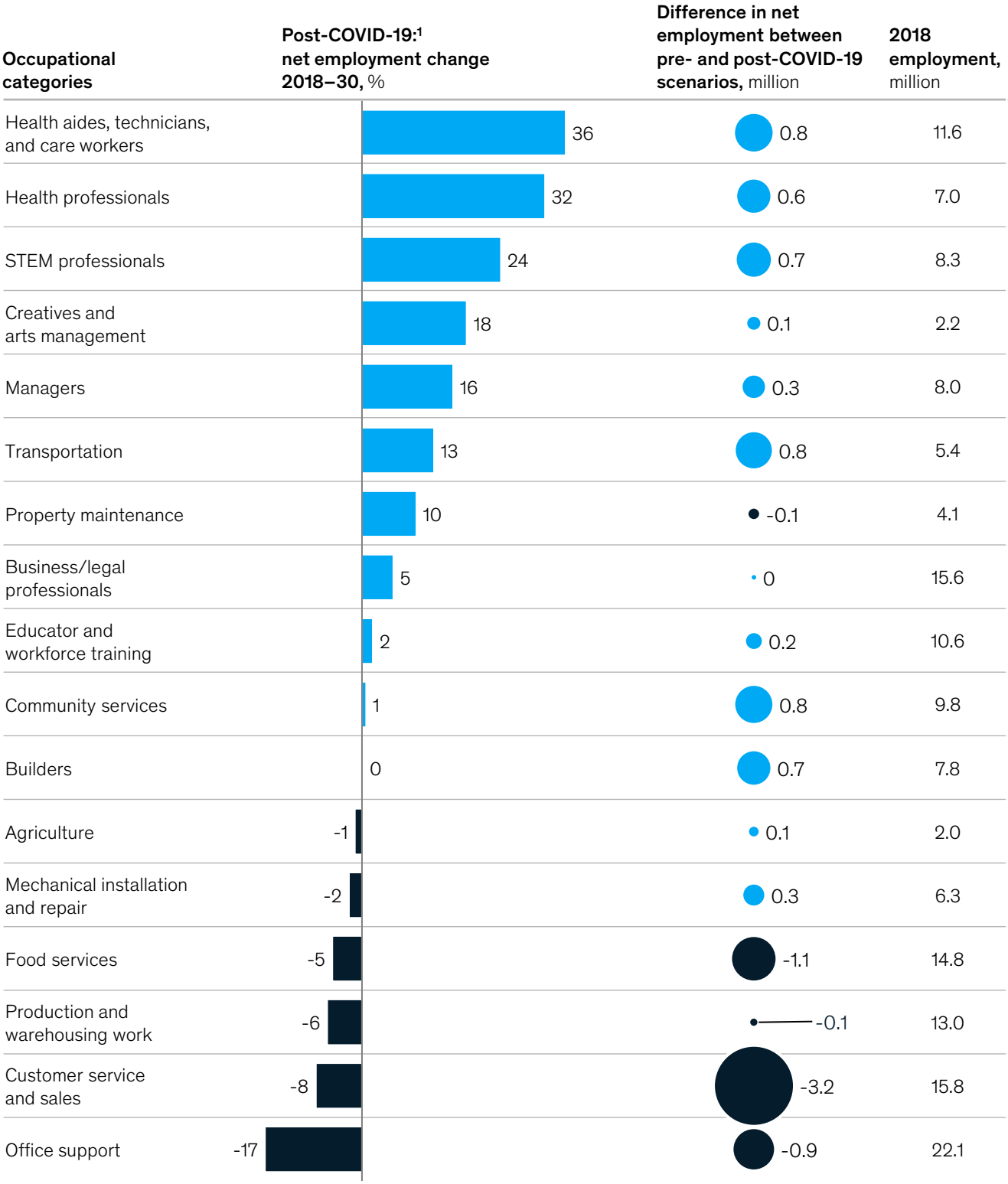
Exhibit 26

Trends accelerated by the pandemic may cause larger declines in customer service and food service jobs but growth in transportation and health jobs.

Pre- and post-COVID-19 change in net employment, 2018–30, United States

%

Increase in net employment Decrease in net employment



1. Net employment refers to estimated labor demand after applying effects of all modeled trends. The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: McKinsey Global Institute analysis

Demand for workers in production occupations in India could grow due to significant domestic demand for manufactured products as incomes rise and global value chains shift, increasing India's potential for greater participation in global trade.

It is also important to note that entirely new occupations will emerge over the next decade, as they have in the past, creating demand for labor in jobs we cannot envision today. Academic research suggests that about 8 to 9 percent of jobs by 2030 will be positions that barely exist today (see Box 3, "New occupations and jobs of the future").[113]

[113] Jeffrey Lin, "Technological adaptation, cities, and new work," *Review of Economics and Statistics,* May 2011, Volume 93, Number 2.

Box 3.

New occupations and jobs of the future

Throughout history, technology has created entirely new types of jobs as it transformed the economy. From the first industrial revolution onward, employment has shifted as new technologies became widespread.[1] Today, a look at some of the fastest-growing occupations in the United Kingdom and in the United States over the past three years reveals that the trends we have outlined in this report are already under way (Exhibit 27). Jobs that make use of new technologies include not only software developers but healthcare technologists, wind turbine service technicians, and solar photovoltaic installers. A society with increasing affluence has more demand for personal services, creating work for housekeepers, animal caretakers, and athletic trainers.[2] Creative jobs, such as advertising and public relations directors, musicians, and fashion designers, are another growth area. There are more marriage and family therapists, career advisers, and mental health counselors—roles involving the kind of interpersonal interaction and empathy that machines and robots cannot provide.

COVID-19 has accelerated trends such as the increase in remote work that may spark rapid growth in different types of occupations. For instance, companies may hire a work-from-home integration manager who ensures that new technologies and equipment are in place to make remote work a success. Organizations with a renewed focus on health and hygiene may hire office disinfectors or chief medical officers. New occupations such as smart home designers, who integrate the Internet of Things into home design, and algorithm bias checkers, who ensure that algorithms do not lead to discriminatory decisions, are emerging. Across the globe, growing demand for automation, AI, and digitization will spur demand for a wide range of workers such as robot repair technicians and 3-D printing engineers.

[1] James Bessen, *Automation and jobs: When technology boosts employment*, Boston University School of Law, Law and Economics Research Paper number 17-09, 2019; David Autor, "Why are there still so many jobs? The history and future of workplace automation," *Journal of Economic Perspectives,* summer 2015, Volume 29, Number 3.

[2] See David H. Autor, *Work of the past, work of the future,* American Economic Association Annual Meeting, Atlanta, GA, January 4, 2019.

Polarization in labor markets may worsen, as high-wage jobs gain share and low-wage jobs decline

Before COVID-19, some advanced economies experienced polarization in the labor market, with growth in low- and high-wage jobs and decline in middle-wage jobs.[114] In the United States, the data clearly show this pattern (Exhibit 28). Between 2000 and 2010, the share of employment in high-wage occupations and low-wage occupations grew, while the share of employment in middle-wage jobs declined. This mainly reflected the twin effects of automation and globalization on manufacturing jobs, although middle-wage jobs grew more slowly overall. Between 2010 and 2018, a similar pattern held, although low-wage job growth was markedly less than growth in high-wage jobs. This reflects the continued impact of automation on manufacturing and also the rise of automation in routine white-collar jobs, such as data entry clerks and bookkeeping assistants.

[114] See David Autor and David Dorn, "The growth of low-skill service jobs and the polarization of the US labor market," *American Economic Review*, August 2013, Volume 103, Number 5.

Exhibit 27

Rapidly growing occupations include jobs involving new technologies, wealth work, creatives, and socioemotional supporters

Illustrative examples of fast-growing occupations

Category[1]	Occupations	Job growth in United States or United Kingdom, 2017–19 %
Frontier tech	Chartered architectural technologists	110
	Software developers, analysts, and testers	66
	Healthcare technologists	57
	Wind turbine service technicians	36
	Solar photovoltaic installers	23
	Web and digital interface designers	18
Wealth workers	Skincare specialists	26
	Concierges	17
	Animal trainers	15
	Athletic trainers	14
	Animal caretakers	12
Creatives	Designers	37
	Advertising and public relations directors	33
	Actors, entertainers, and presenters	29
	Musicians	20
	Artists	18
	Fashion designers	16
Socioemotional supporters	Marriage and family therapists	38
	Career advisers and vocational guidance specialists	32
	Speech and language therapists	30
	Substance abuse, behavioral disorder, and mental health counselors	17
	Welfare and housing associate professionals	14

1. Types based on future occupation categories "frontier tech," "wealth workers," and "last mile" defined by Autor and Salomon (2019).

Source: UK Office for National Statistics; US Bureau of Labor Statistics; McKinsey Global Institute analysis

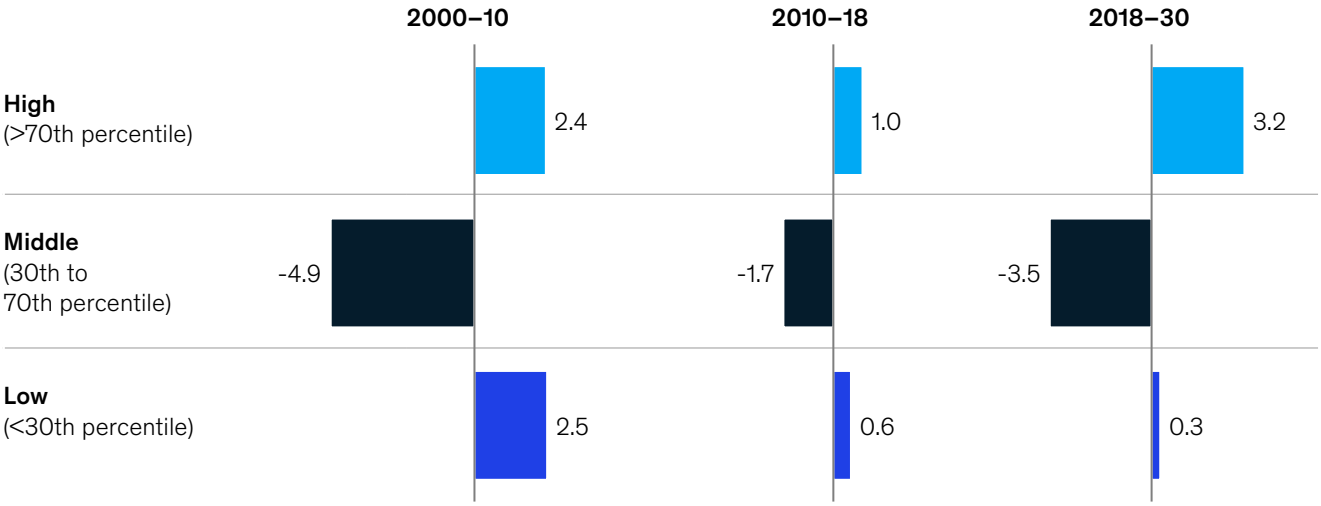
Complicating the pandemic's impact on workers in the low and middle quintiles in the wake of COVID-19, we estimate that job growth over the next decade may be even more concentrated in high-wage jobs, while the share of middle-wage jobs continues to decline and the share of low-wage jobs grows very little. Declines in net job growth may be most pronounced in low-wage jobs in customer service in retail, hospitality, and food service, which may be partially offset by growth in other low-wage occupations, such as home health aides and personal care workers.

Exhibit 28

After the pandemic, net labor demand for middle- and low-wage workers may decline compared to change in the historic trend.

Change in employment share by wage bracket in United States 2000–30[1]

Percentage points[2]



1. Wages calculated by multiplying hourly mean wage by number of working hours in a year. Low wage: occupations in 30th percentile of median annual wages or below; middle wage: 31st percentile to 70th percentile; high wage: greater than 70th percentile.
2. Wage brackets defined at beginning of each period. Periods 2000–10 and 2010–18 include payroll employment numbers only, while projected 2018–30 period includes all workers.

Source: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Our new estimates suggest there may be no growth or even a decline in the proportion of workers in the low-wage bracket in the post-COVID-19 scenario. In France, we estimate no growth in the share of low-wage workers such as packaging and filling operators, and a two percentage point decline in the share of middle-wage workers such as insurance claims processing clerks. We estimate a two percentage point increase in the share of high-wage workers such as pharmacists.

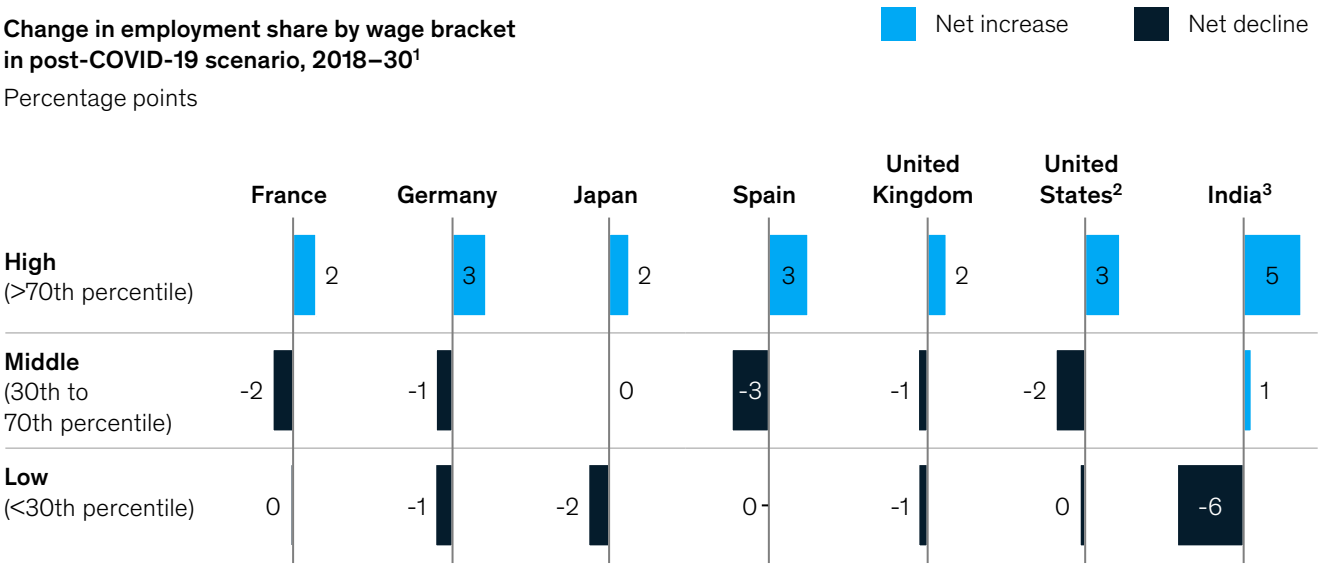
A similar pattern could be seen in our seven other countries, except in India, where we estimate some growth in middle-wage jobs as the economy transitions away from agriculture and farm laborers move up into different, higher-wage occupations (Exhibit 29).

Exhibit 29

In the post-COVID-19 scenario, almost all labor demand growth could be in high-wage occupations.

Change in employment share by wage bracket in post-COVID-19 scenario, 2018–30[1]

Percentage points



1. Annual wages calculated by multiplying hourly mean wage by number of working hours in a year. For occupations with no published hourly wage, annual wage calculated from reported survey data.
2. Uses data from 6-digit Standard Occupational Classification codes; results may differ from similar analysis that uses 2-digit SOC codes due to slightly different proportions of population captured in each wage tercile.
3. For India, low wage: occupations earning less than the 40th percentile of median annual wages; middle wage: 40th percentile to 80th percentile; high wage: higher than 80th percentile.

Note: China excluded due to limited data availability on income by occupation.

Source: McKinsey Global Institute analysis

Low wage, younger, and less educated workers, as well as women, may be disproportionately impacted

We find that increase in job displacement over the next decade, compared to prepandemic estimates, is likely to be disproportionately high among low-wage workers, women, and those without a college degree. This is consistent with other research.[115] In our post-COVID-19 scenario, we estimate that while 29 to 30 percent of the labor force is in low-wage jobs (defined as the bottom tercile in annual wages), they may comprise 43 to 64 percent of workers displaced across countries due to the trends influenced by COVID-19 (Exhibit 30). This reflects the heavy impact of the virus on workers in retail, food service, and hospitality. In the United States, we estimate that 4.3 million jobs may disappear over the next decade in customer service and food service roles compared to before the pandemic—and the 760,000 more jobs in transportation and last-mile delivery will only partially offset those losses.

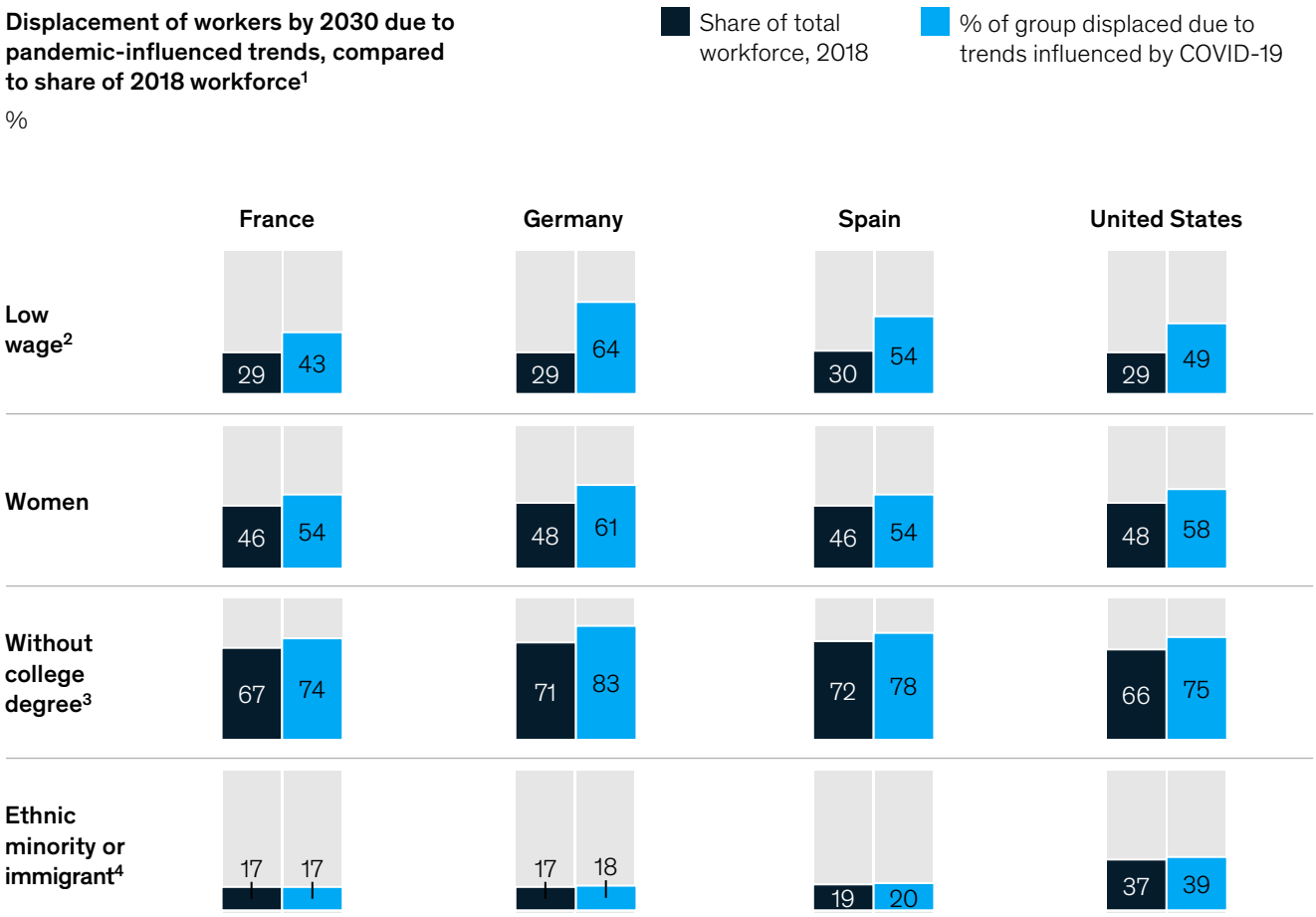
The pandemic and long-term trends accelerated by COVID-19 also affected women disproportionately. Although women globally make up 39 percent of the workforce, they suffered 54 percent of job losses during the pandemic.[116] They also shoulder more childcare and housework than men—and that increased during COVID-19, with US women spending 10 to 15 hours more on these activities each week.[117] In the post-COVID-19 scenario, our research suggests that while women in the United States, France, Germany, and Spain make up roughly 47 percent of the workforce, they may account for 55 to 60 percent of workers displaced. This

[115] See also David Autor and Elisabeth B. Reynolds, *The nature of work after the COVID crisis: Too few low-wage jobs*, Brookings Institution, Hamilton Project, essay number 2020-14, July 2020.
[116] See Jamille Bigio, Kweilin Ellingrud et al, "COVID-19 could undo decades of women's progress," Foreign Affairs, January 5, 2021.
[117] Oxfam and Promundo, "Caring under COVID-19," 2020.

reflects the predominance of women in customer service and office support roles, such as food servers, receptionists, and cashiers (Exhibit 30).

Exhibit 30

Low-wage workers, those without college educations, and women may be disproportionately displaced because of COVID-19 trends by 2030.



1. The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.
2. Wages calculated by multiplying the hourly mean wage by the number of working hours in a year. Low wage is classified as occupations in the bottom 30th percentile of median annual wages.
3. For Europe, defined as workers without ISCED 5–8, bachelors, masters, or doctoral degree.
4. Data for the United States refer to people classified as Hispanic, Black, Asian, and other races. Data for Europe collected differently and refer to immigrants to the country specified.

Source: Eurostat; US Bureau of Labor Statistics; McKinsey Global Institute analysis

Some of these impacts have become manifest since the start of the pandemic. In 2020, one in three mothers in the United States considered leaving the workforce or downshifting her career because of COVID-19, due to unemployment or furlough, or voluntarily to take care of children or homeschooling during lockdowns.[118]

Low-wage workers have disproportionately lost their jobs during the pandemic, and the unemployment rate for these workers remains very high.

In the United States, the pandemic's impact on workers in different wage brackets during 2020 was dramatically different (Exhibit 31). Employment among high-wage workers declined by 4 percent between January and April 2020, the peak of unemployment in the United

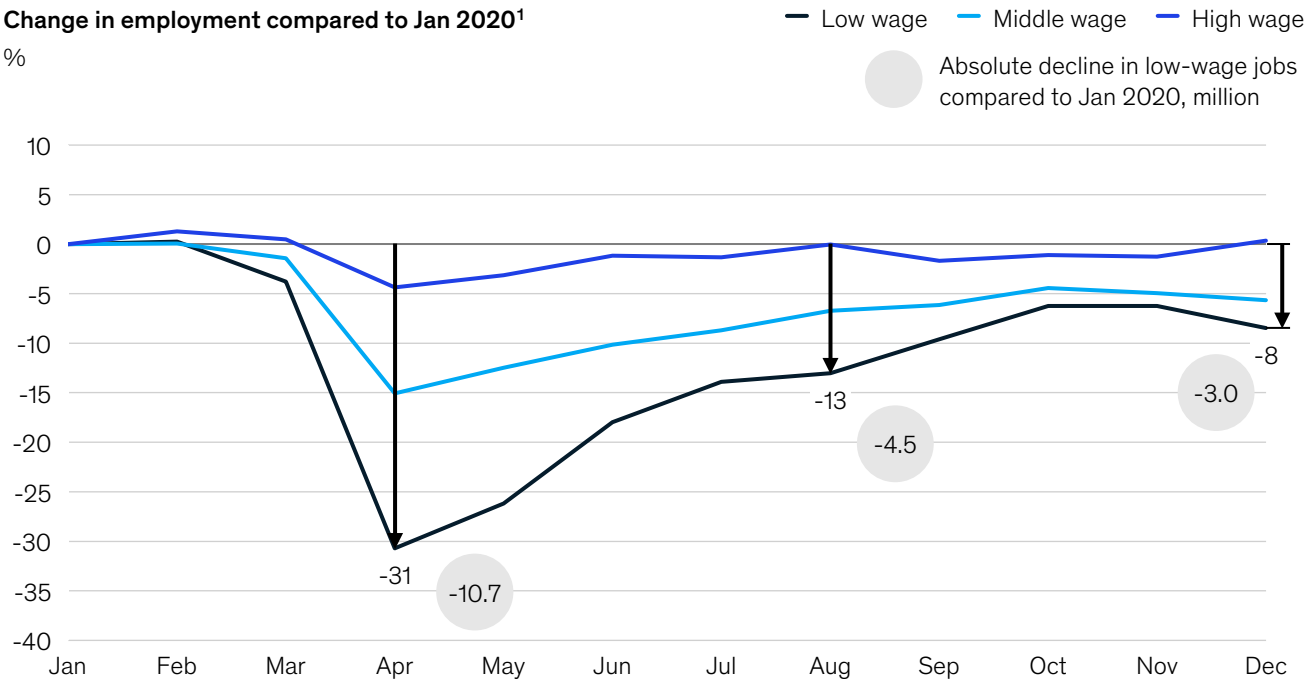
[118] Sarah Coury, Jess Huang, Ankur Kumar, Sara Prince, Alexis Krivovich, and Lareina Yee, "Women in the Workplace 2020," September 30, 2020, McKinsey.com.

States; by August 2020, their jobs had largely recovered. In contrast, employment among low-wage workers had fallen 31 percent by April 2020—and was still 8 percent below prepandemic levels in December 2020. The impact on ethnic minorities is similarly severe. Data from the US Bureau of Labor Statistics shows that the unemployment rate for Blacks peaked at 16.6 percent in May 2020 and remained at 9.8 percent in January 2021, far higher than the 6.2 percent unemployment rate for whites[119]

Exhibit 31

During COVID-19, low-wage workers in the United States had greater job losses and recovered more slowly than middle- and high-wage workers.

Decline in employment by median annual wages during 2020 in the United States



1. Wages calculated by multiplying hourly mean wage by number of working hours in a year. Low wage: occupations in 30th percentile of median annual wages or below; middle wage: 31st percentile to 70th percentile; high wage: greater than 70th percentile.

Source: US Bureau of Labor Statistics; McKinsey Global Institute analysis

By accelerating e-commerce and virtual interactions, remote work, and automation in some areas, COVID-19 has also markedly accelerated displacement in the labor market. While middle-wage workers were already being displaced when the pandemic hit, the low-wage jobs that once provided a landing pad for them now are also at risk of displacement as companies embrace robotics and AI and the workers who once created demand for restaurants and service providers in urban centers continue to work from home. Thus, the job transitions required to obtain work in the postpandemic labor market are likely to be bigger and more challenging than we anticipated before the pandemic, as we describe in the next chapter.

[119] Population, Employment, & Labor Markets, Economic Research, Federal Reserve Bank of St. Louis.

5. Workers face more challenging skill transitions

The trends COVID-19 has accelerated are shifting demand for labor across occupations, which may force more workers to find new occupations. Those workers face even larger transitions in the skills needed to find the jobs that will be available. Even more than before the pandemic, the need to make challenging skill transitions could fall more heavily on low-wage workers, women, younger workers, and members of ethnic minority groups, as we noted previously.

In the eight focus countries, we estimate that 107 million workers may need to switch occupations by 2030, compared with 95 million in our pre-COVID-19 scenario. If societies successfully equip workers to make these transitions, workers could gain access to career pathways that offer better pay and more opportunities for upward mobility.

Creating and ensuring access to such career pathways starts with identifying which workers are most likely to need to change occupations over the next decade and the new skills they need to learn. In this chapter, we show the scale of the coming occupational transitions and how they may affect workers with different skills. We also look at how the demographic impact of these job transitions could play out through the lens of ethnicity, age, and gender, and consider the role education and skills play in equipping workers to better navigate changing job prospects. College degrees and higher cognitive skills are not a guarantee against the impact of the pandemic on the labor market, but they confer advantages to make the process of changing occupations easier in the future.

In the post-COVID-19 scenario, more workers may need to transition to new occupations than before the pandemic

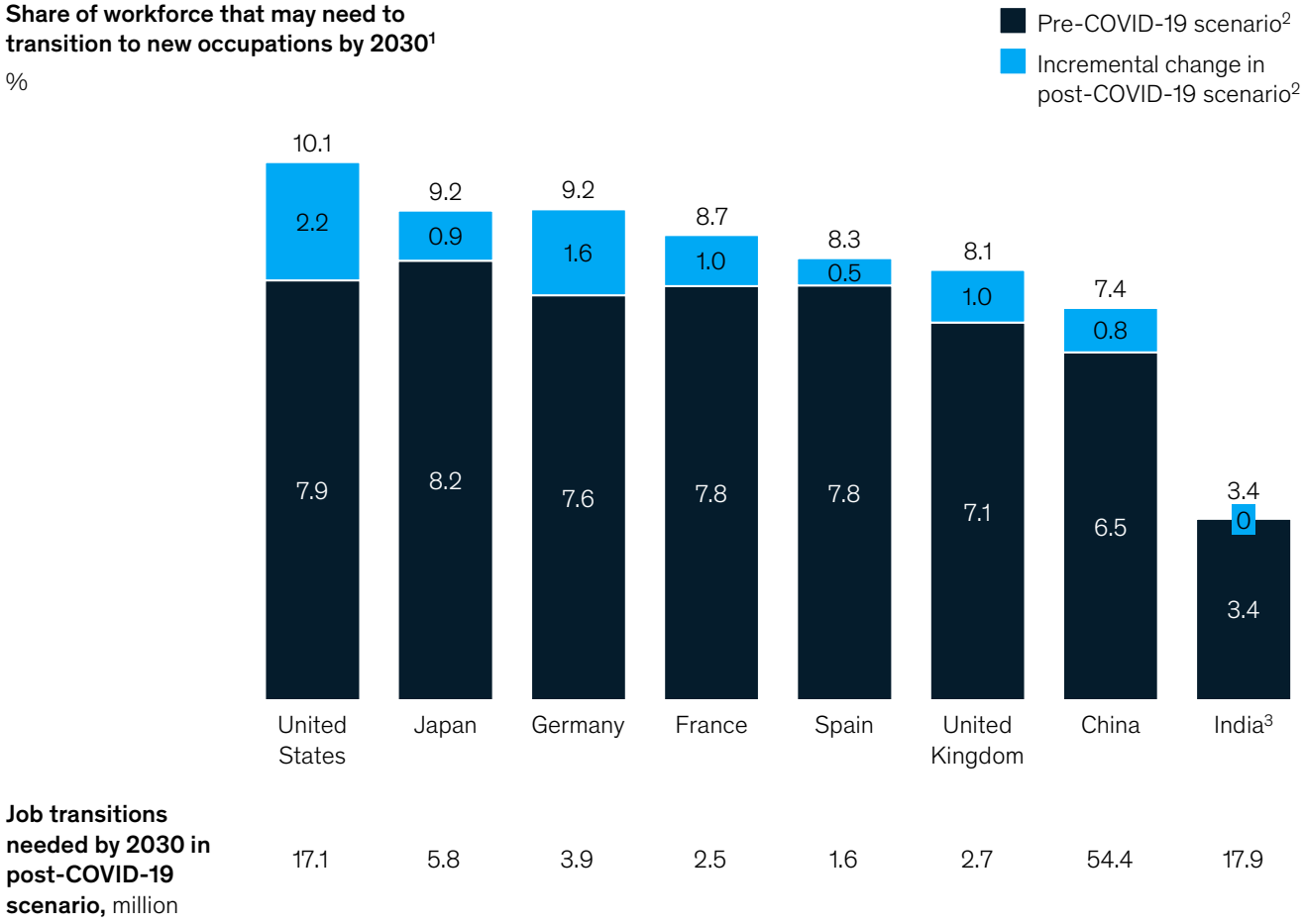
The impact of COVID-19 on labor markets may increase the number of workers who need to transition to new occupations. A transition is needed when a worker is displaced from a job by automation, rising e-commerce, or another trend and no other jobs in the same occupation are available because demand for that occupation has declined.

Some displaced workers may find an alternative job within the same occupational category. For example, a bookkeeping and accounting clerk could take a job as a database administrator without needing new skills because both jobs fall in the same occupational category: office support. But a displaced waiter or food server may no longer find a job in food service, which is a declining occupational category. A food service worker may instead need to transition to another type of work altogether, such as a light truck and delivery driver.

Using this definition of occupation transition, we find that 107 million workers in our eight countries may need to find new occupations by 2030 in the post-COVID-19 scenario, or 12 million more than before the pandemic. In the United States, the share of the workforce that may need to find new jobs could rise from 7.9 percent in our pre-COVID-19 scenario to 10.1 percent in our post-COVID-19 scenario, or 3.8 million additional workers. In Germany and Japan, 9.2 percent of the workforce could need new jobs, compared to 7.6 percent and 8.2 percent, respectively, under our pre-COVID-19 scenario (Exhibit 32).

Exhibit 32

More people may need to transition to new occupations in the post-COVID-19 scenario.



1. An occupation transition is defined as a job that has been displaced and does not come back with growth in labor demand overall.
2. The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.
3. Job transitions remain flat pre- and post-COVID-19 scenarios because of fewer service jobs (due to accelerated automation) for low-skill construction workers to transition into. Excludes farm transitions; if farm jobs are included, transitions fall before the pandemic compared to after because there are fewer transitions to secondary and tertiary sectors.

Source: McKinsey Global Institute analysis

This increase is driven by greater worker displacement in the post-COVID-19 scenario and larger declines in some occupations compared to the pre-COVID-19 scenario. For instance, in France, customer service and sales occupations were estimated to grow 5 percent in our pre-COVID-19 scenario, but now are estimated to shrink by 11 percent, resulting in 200,000 people needing to transition out of this occupational category. Only in India is the number of workers who may need to make job transitions needed by 2030 likely to remain stable after COVID-19, compared to before the pandemic. This is in large part because the main trend determining how many workers may need to change occupations is the continuing migration of workers from the agriculture sector to the manufacturing and service sectors. In India, accelerated automation and e-commerce in the post-COVID-19 scenario, although more muted than in other countries, may decrease the jobs available and level of wages into which agricultural workers can transition.

Going forward, the majority of workers needing to switch occupations may have to look for employment in entirely different occupational categories than they previously worked in, rather than looking for a new job within a category.[120] Of the 17.1 million workers in the United States needing to change jobs, 14.9 million may need to find work in different occupational categories (Exhibit 33). For instance, 5.7 million office workers may need to find jobs in occupations other than office work, while 2.2 million working in customer service and sales may need to migrate to a different occupation. Just 2.2 million of the 17.1 million US workers facing occupational shifts in our post-COVID-19 scenario can find new work in the same occupational category. These include business and professional employees in the computer-based office work arena and transportation workers in the transportation of goods arena, as well as those working in healthcare. For similar analyses for other countries, see the Country Perspectives in this report.

[120] We assigned more than 800 Standard Occupational Classification 2010 occupations to one of 17 occupational categories based on similarity of work activities. Standard sector view of the economy does not segment work activities; office support, for instance, occurs in all sectors.

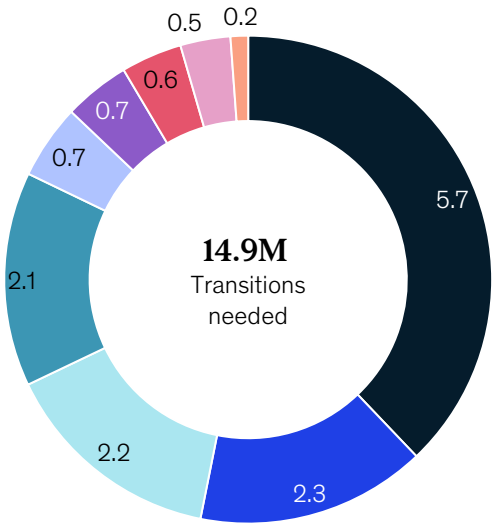
Exhibit 33

The large majority of people who may need to transition to new occupations may also need to reskill to new occupation categories.

Breakdown of occupation changes estimated in the United States by 2030, post-COVID-19 scenario[1]

Number of workers who would need to find new work within a different occupational category

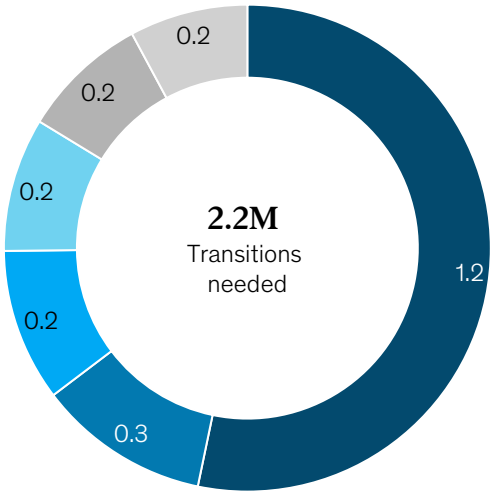
Million



- Office support
- Production work
- Customer service and sales
- Food services
- Community services
- Mechanical installation and repair
- Builders
- Educator and workforce training
- Agriculture

Number of workers who could find new work within the same occupational category

Million



- Business/legal professionals
- Transportation services
- Property maintenance
- Health aides, technicians, and wellness
- Managers
- Other[2]

Example occupations	Number of occupation transitions estimated by 2030, thousand
Office clerks	1,050
Retail salespersons	930
Cashiers	630
Secretaries and administrative assistants	560
Welders, cutters, solderers, and brazers	240
Counter attendants	230
Insurance sales agents	190
Food servers	180
Package packers	140
Paralegals and legal assistants	140

1. The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.
2. Property maintenance, health professionals, creatives and arts management, and STEM professionals.

Source: McKinsey Global Institute analysis

More women, younger and less educated workers, and ethnic minorities and immigrants may need to change occupations

In chapter 4, we noted that women and younger and less educated workers have a higher risk of displacement in the next decade from trends propelled by COVID-19. This pattern translates to more of these workers needing to shift occupations. In Europe and the United States, we see that workers without a college degree, members of ethnic minority groups, and women are more likely to need to change occupations after the pandemic compared to before. In the United States, people without a college degree are 1.3 times more likely to need to make transitions compared to those with a college degree, and Black and Hispanic workers are 1.1 times more likely to have to transition between occupations than white workers. In France, Germany, and Spain, the increase in job transitions required due to COVID-19 trends is 3.9 times higher for women as it is for men. Similarly, increase in occupation transitions hit younger workers more than older workers, and individuals not born in the European Union more than native-born workers.

In Europe, the pandemic had a particularly hard impact on service jobs that typically employ more immigrants. Organisation for Economic Co-operation and Development research has found that immigrants account for one-quarter of employment in hospitality in Europe, or twice the share they represent in the overall labor market. In Germany, the share of immigrants in hospitality employment is even larger, at least 40 percent.[121] Given the number of restaurants and hotels that closed during the pandemic, this suggests that non-native workers disproportionately lost their jobs.

The effects of COVID-19 may mean that more women, younger workers, workers with lower educational attainment, and members of minority groups may need to change occupations (Exhibit 34). The number of workers who may need to change occupations in France, Germany, Spain, and the United States may increase by 24 percent on average across the workforce over the next decade due to COVID-19 influenced trends. Breaking this down by demographic groups, we find that the impact is disproportionate. For example, 41 percent more women in France, Germany, Spain, and the United States may need to shift occupations compared to only 10 percent more men in those countries. Roughly 30 percent more workers without a university degree may need to change occupations in the post-COVID-19 scenario, compared to an 8 percent increase among workers with higher education. In this postpandemic scenario, 25 percent more older workers and almost 25 percent more immigrants may need to change occupations.

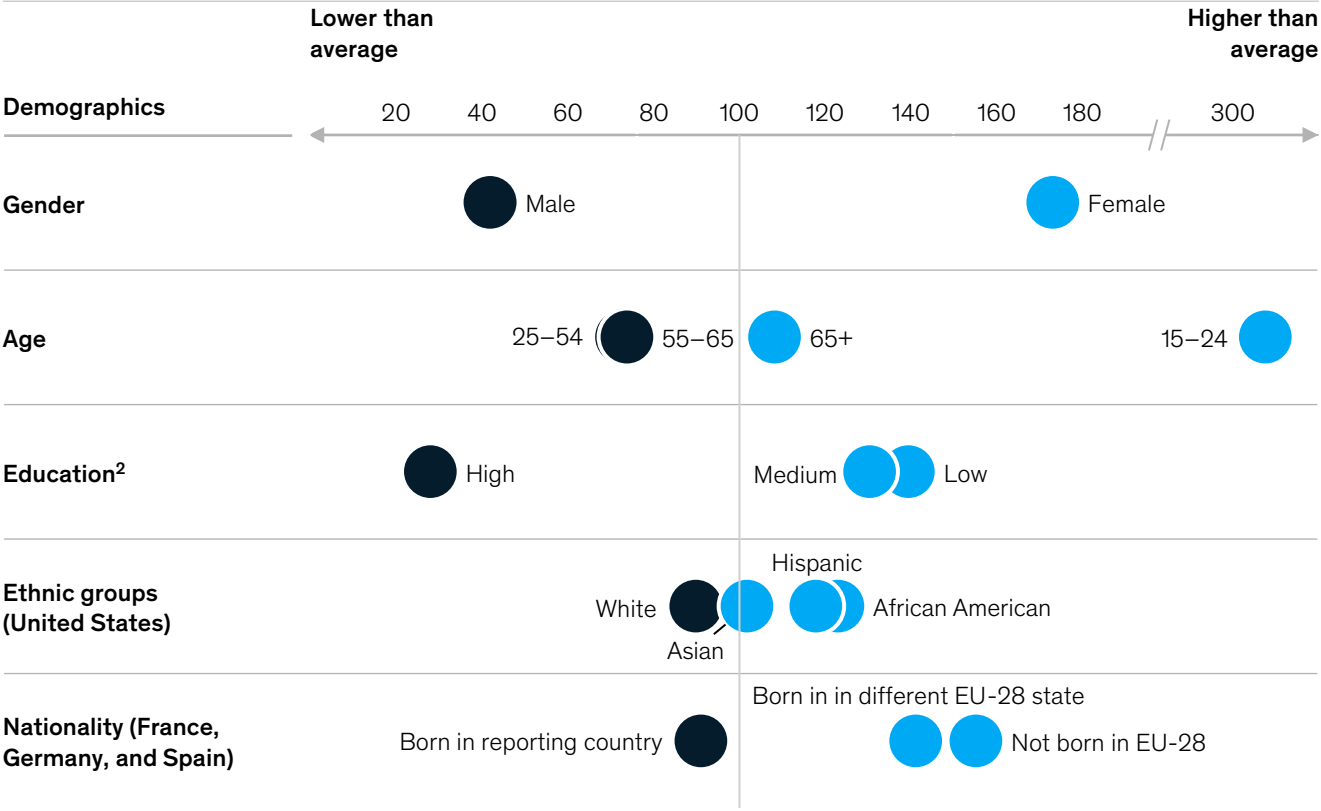
[121] "What is the impact of COVID-19 on immigrants and their children?," OECD, October 2020, oecd.org.

Exhibit 34

Women, young, less-educated workers, ethnic minorities, and immigrants may need to make more occupation transitions after COVID-19.

Estimated percentage increase in number of occupation transitions between pre- and post-COVID-19

Indexed to overall percentage increase=100, weighted average of United States, France, Germany, and Spain[1]



1. Individuals need to transition occupation if they are in an occupation that sees net declining labor demand relative to 2030 baseline. The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.
2. For US: Low (less than high school), Medium (high school, some college or associate degree), High (Bachelors degree and above); for France, Germany, and Spain: Low (ISCED 0-2, primary and lower secondary), Medium (ISCED 3-4, upper secondary and postsecondary non-tertiary), High (ISCED 5-8, bachelors, masters, and doctoral degree).

Source: National statistics agencies; McKinsey Global Institute analysis

Low-wage workers are more likely to need to switch occupations than middle- and high-income workers

In chapter 4, we showed that the trends accelerated by COVID-19 may lead to lower growth in demand for low-wage jobs, reversing the prior historical trend of job declines mainly in middle-wage jobs.[122] Consistent with this, we find that low-wage workers are more likely to need to switch occupations and learn new skills after COVID-19 than before. At the same time, as demand for higher skilled jobs rises, our analysis suggests that fewer workers in the United States in the highest wage quintile may need to change occupations over the next decade than in our pre-COVID-19 scenario. This is because of the higher growth in healthcare and STEM jobs compared to before the pandemic.

In contrast, more workers in lower wage quintiles may need to switch occupations—and the transitions they make will be much larger than before the pandemic as more low-wage and middle-wage jobs decline. In the United States, we find that an additional 4.9 million workers in the two lowest wage quintiles will likely need to find new occupations compared to before the pandemic—and jobs available in those wage quintiles will remain flat (Exhibit 35). As a result, more workers will need to migrate to occupations in higher wage quintiles that require additional and different skills.

More workers in lower wage quintiles may need to switch occupations—and the transitions they need to make will be much larger than before the pandemic.

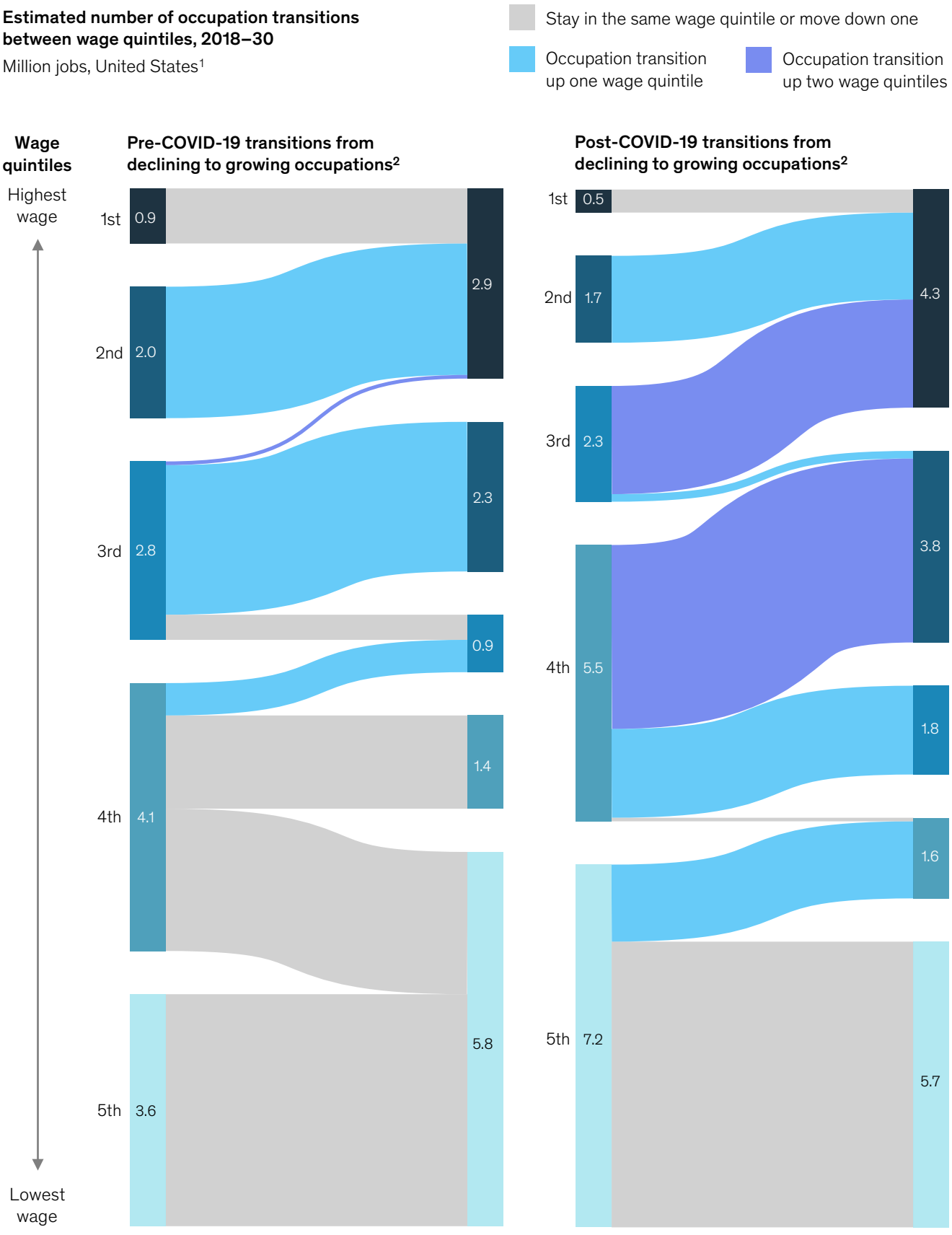
[122] David Autor, David Mindell, and Elisabeth Reynolds, *The work of the future: Building better jobs in an age of intelligent machines*, MIT Task Force on the Work of the Future, November 17, 2020, workofthefuture.mit.edu.

Exhibit 35

COVID-19 may result in workers in the lowest wage quintiles needing to transition to new occupations more than earlier estimated.

Estimated number of occupation transitions between wage quintiles, 2018–30

Million jobs, United States[1]



1. A transition is defined as a displaced job that does not come back due to lack of growth in labor demand in the same or similar occupation.
2. Additional jobs prioritized for lower income quintile workers.

Source: McKinsey Global Institute analysis

In the pre-COVID-19 scenario, we find that in the United States, just 6 percent of workers, or 500,000 workers in the lowest two wage quintiles who may need to switch occupations would have to look for work in a higher wage quintile. In the post-COVID-19 scenario, 55 percent workers in these quintiles may need to move to higher wage quintiles—or 7 million workers, which is 14 times more than prepandemic. Of those, 3.7 million may need to move into jobs two income quintiles higher to remain employed. For example, a bookkeeper in the fourth wage quintile might find work as a market research specialist in the second wage quintile. Similarly, 2.2 million workers in the middle wage quintile may have to find jobs in the top wage quintile. For instance, a financial clerk may need to consider becoming a financial analyst.

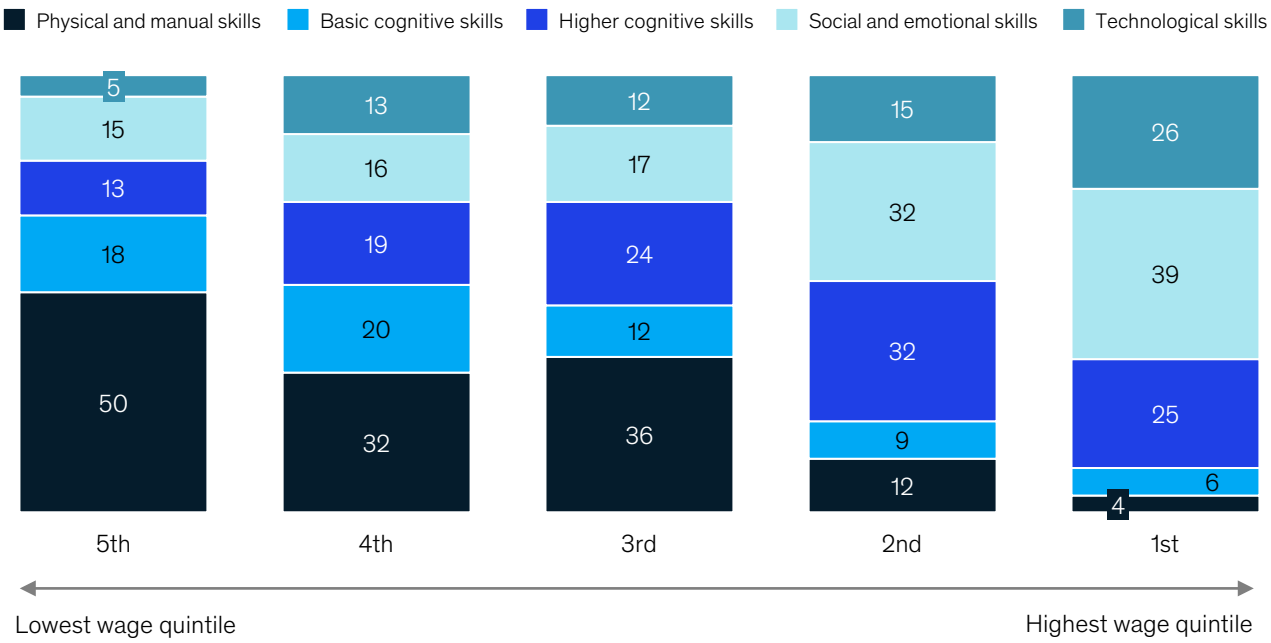
While the magnitude of the shifts differs, similar increases in the need to switch to occupations in a higher wage quintile are seen across the eight focus countries, which could entail significant new training efforts. Workers in the lowest wage quintile in advanced economies on average spend half of their time at work doing physical and manual tasks and 13 to 17 percent of their time in activities involving higher cognitive skills. In the middle wage quintile, 24 to 35 percent of work involves physical and manual labor and 16 to 28 percent uses higher cognitive skills. In the highest wage quintile, workers devote up to one-third of their time to activities requiring higher cognitive skills and only 3 to 5 percent of their time to physical and manual work (Exhibit 36).

Exhibit 36

Workers will need to learn more social and emotional skills, as well as technological skills, in order to move into occupations in higher wage brackets.

Time spent using skills in each skill category by wage quintile in the United States[1]

%



1. Using O*NET data, more than 2,000 work activities for more than 800 occupations were classified according to the primary skill used.

Source: Employment and Training Administration, US Department of Labor;O*NET OnLine; US Bureau of Labor Statistics; McKinsey Global Institute analysis

We analyzed the change in demand for skills across a workforce by reviewing more than 800 occupations and more than 2,000 work activities, then classifying each work activity according to the primary skill used among a set of 25 skills.[123] For instance, "analyzing data or information" would be classified as primarily using what O*NET calls the "advanced quantitative and statistical" skill. Using our estimates of labor demand by occupation, we calculate the proportion of time spent on each skill and compare how it will change in the post-COVID-19 scenario compared to skills used today and to the pre-COVID-19 scenario.

In work arenas, workers with higher proximity scores are likely to experience the greatest need to change occupations over the next decade. For example, in the United States, 10 percent of workers in the on-site customer interaction arena may need to retrain or gain additional skills or education in order to transition to more secure occupations by 2030, compared to 4 percent estimated before the pandemic. Workers in these arenas tend to be younger, less educated, and women, and many of them disproportionately lost jobs during the pandemic.

Demand for technological and social and emotional skills will grow, while demand for basic cognitive skills will decline

The change in labor demand over the next decade will require a major retraining effort as workers transition from jobs that entail mainly routine tasks requiring basic cognitive skills (such as literacy and numeracy) into work requiring more technological and social and emotional skills. But the scale of the retraining challenge goes beyond those workers needing to switch occupations: Even among workers who keep their jobs, the tasks they perform will shift. For instance, delivery drivers now use GPS to calculate the fastest routes and employ apps to provide real-time tracking of packages.

Overall, in our post-COVID-19 scenario, we find that the greatest increase in demand is for technological skills, such as advanced IT skills, computer programming, engineering, and scientific research and development (Exhibit 37). In China, the demand for time spent on these skills may increase by 51 percent by 2030, reflecting the country's rapid move into advanced industries and digitization. Time spent on such technological skills is projected to increase by 13 to 27 percent in the advanced economies in our sample. The figures are lower in advanced economies because the magnitude of change in labor demand is much smaller than in developing countries, which are seeing large structural shifts out of agriculture and into manufacturing and services.

In the post-COVID-19 scenario, demand for social and emotional skills could increase by 25 percent in the United States over the next decade, compared with 18 percent in the pre-COVID-scenario. In China, demand for social and emotional skills could rise to 18 percent, compared to 17 percent before the pandemic. Tasks that utilize these skills—which include interpersonal skills and empathy, negotiation, leadership, and initiative taking—are less automatable, like caring for patients or children, managing people, leading an organization, coaching an employee, and negotiating a deal. The increase occurs because demand for social and emotional skills in the post-COVID-19 scenario is driven primarily by the increased demand in healthcare jobs compared to the pre-COVID-19 scenario. Across our eight countries, we expect increased demand for adaptability and continuous learning, reflecting a need for all workers to continuously learn new skills as technology evolves and continuously transforms jobs. This will challenge educators and employers, as there is little consensus on how to teach social and emotional skills. In school settings, such skills are mainly learned through extracurricular activities that students choose, and in work settings, they are just beginning to be taught.

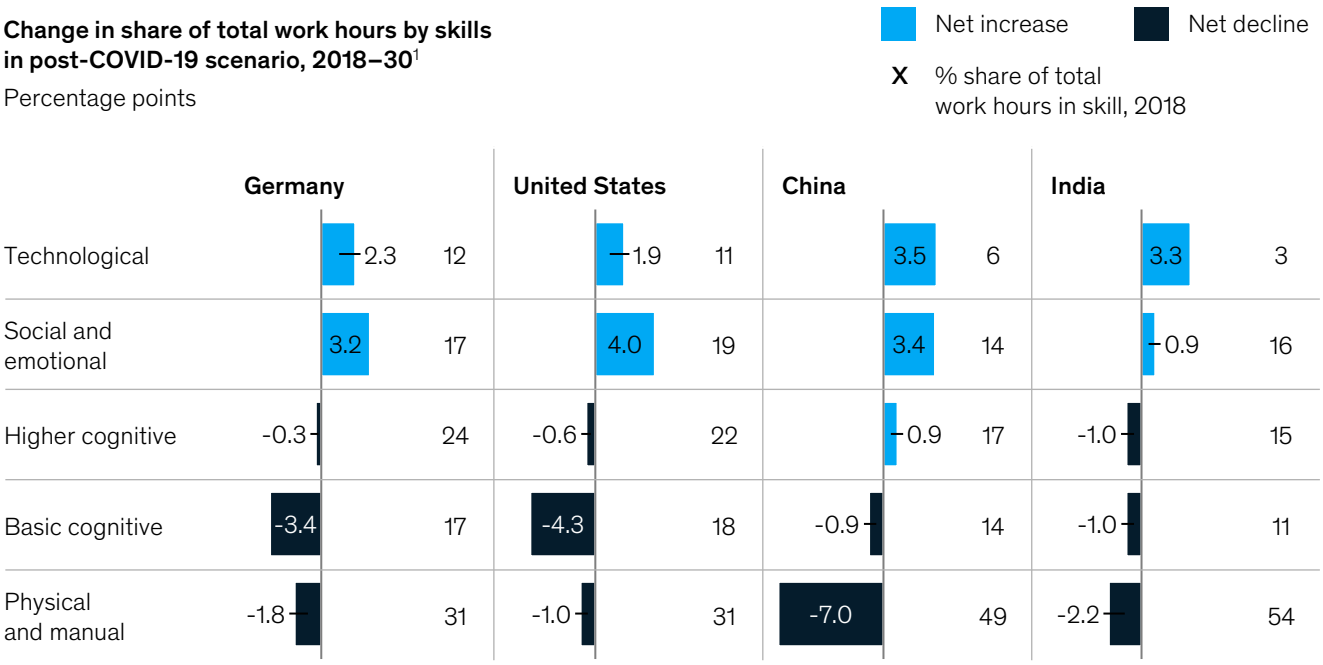
[123] We use the methodology in this report that was first developed in MGI's research in *Skill shift: Automation and the future of the workforce,* June 2018. For more detail, see the technical appendix.

Exhibit 37

The skills needed in the workforce may shift toward more technological and social and emotional skills.

Change in share of total work hours by skills in post-COVID-19 scenario, 2018–30[1]

Percentage points



1. Based on estimated 2030 labor demand; we modeled labor demand by occupation in 2030 after effect of long-term trends such as aging populations and rising incomes as well as COVID-19 trends like accelerated automation and increased e-commerce. Using O*NET data, we then broke each occupation into work activities and time spent on each work activity, then classified work activities into 25 categories of skills and calculated change in hours spent on each category due to changes in labor demand.

Source: McKinsey Global Institute analysis

Demand for higher cognitive skills presents a mixed picture. This category includes advanced literacy and writing skills and quantitative and statistical skills as well as creativity, critical thinking, and decision making; complex information processing and interpretation; and project management (Exhibit 38). Overall, the category shows virtually no growth in most countries. However, this stagnation obscures diverging trends. Automation and AI can increasingly perform tasks related to writing, reading, and quantitative and statistical work, so demand for workers with these skills is declining. Robotic process automation AI can also perform some complex information processing and project management, so these skills show negligible growth. But we foresee strong growth for creativity and critical thinking.

In contrast, demand for basic cognitive skills (literacy, numeracy, and data entry) is projected to decline substantially in seven of our eight economies. Activities that require these skills are highly automatable, for instance as chatbots replace call center representatives, self-checkout replaces cashiers, and natural language processing algorithms take over data entry.[124] Only India will see increased demand for workers with these skills, reflecting the shift of workers out of agriculture and into low-skill service and manufacturing jobs.

[124] Karen Hao, "The pandemic is emptying call centers. AI chatbots are swooping in," *MIT Technology Review,* May 14, 2020, technologyreview.com; Elliot Maras, "How self-service equipment helps define the 'new normal' against COVID-19," Retail Customer Experience, May 13, 2020, retailcustomerexperience.com; Qingyu Chen et al., *Artificial intelligence (AI) in action: Addressing the COVID-19 pandemic with natural language processing (NPL),* National Institutes of Health, January 3, 2021, arxiv.org.

Exhibit 38

Demand for technological and social and emotional skills may grow across all countries.

Percentage change in demand for skill in post-COVID-19 scenario, 2018–30[1]

Increase ■■■■■■■■■ Decrease

		Advanced						Emerging	
	Skill/skill category	France	Germany	Japan	Spain	United Kingdom	United States	China	India
Technological skills	Basic computer skills	52	25	31	50	49	37	75	171
	Scientific research and development	21	12	13	15	21	26	25	71
	Technology design, engineering, and maintenance	18	6	14	9	13	15	22	61
	Advanced IT skills and programming	10	1	2	-2	2	14	49	78
	Data analysis and computational skills	-26	-21	-21	-37	-19	-29	-1	26
Social and emotional skills	Interpersonal skills and empathy	32	25	25	28	28	42	60	70
	Leadership and managing others	23	15	17	20	18	28	24	15
	Advanced communication and negotiation skills	22	13	15	19	17	24	1	10
	Entrepreneurship and initiative-taking	22	19	26	10	18	25	32	37
	Adaptability and continuous learning	11	-2	8	18	9	16	21	32
	Teaching and training others	14	6	4	5	11	13	22	40
Higher cognitive skills	Creativity	24	15	24	23	18	31	26	56
	Critical thinking and decision making	15	6	6	9	10	15	-3	4
	Complex information processing and interpretation	-4	-7	-5	-6	-4	1	2	19
	Project management	0	-5	-4	-5	-5	1	3	0
	Quantitative and statistical skills	-25	-36	-25	-20	-21	-28	-19	0
	Advanced literacy and writing	-19	-24	-4	-17	-17	-26	3	13
Physical and manual skills	Gross motor skills and strength	8	-4	-10	-3	2	2	-9	17
	Fine motor skills	-1	-8	-11	-7	2	5	-14	8
	General equipment repair and mechanical skills	1	-7	-8	-3	3	1	-18	9
	Craft and technician skills	-12	-17	-20	-15	-8	-4	-29	12
	General equipment operation and navigation	-12	-19	-25	-14	-4	-7	-23	5
	Inspecting and monitoring	-19	-23	-21	-19	-14	-7	-25	-1
Basic cognitive skills	Basic literacy, numeracy, and communication	-11	-16	-9	-11	-12	-11	-4	9
	Basic data input and processing	-26	-29	-29	-25	-26	-29	-17	0
Change in size of labor force due to demographics		4	-5	-5	-1	3	3	-5	14

1. Based on estimated 2030 labor demand; we modeled labor demand by occupation in 2030 after effect of long-term trends such as aging populations and rising incomes as well as COVID-19 trends like accelerated automation and increased e-commerce. Using O*NET data, we then broke each occupation into work activities and time spent on each work activity, then classified work activities into 25 categories of skills and calculated change in hours spent on each category due to changes in labor demand.

Source: McKinsey Global Institute analysis

Transitions from low- to high-wage occupations have historically been rare—but could offer better career paths and upward mobility.

In the past, few workers have transitioned from declining occupations to growing ones. Based on data from LinkedIn, we found that among European workers in currently declining occupations, 57 percent had worked in declining occupations previously.[125] A LinkedIn study analyzing the occupation transitions of European LinkedIn members found that the 95,000 administrative assistants who changed roles commonly moved to occupations that are estimated to decline over the next decade, such as accounting assistants and retail sales assistants. The skill adjacencies required for such shifts are often above 60 percent, making these logical moves, but the affected workers might not improve their longer-term prospects. Conversely, the analysis found that 78 percent of workers in currently growing occupations previously held a job in a growing occupation.

Pathways do exist, however, for workers in declining occupations to move into growing ones, many of which offer higher wages, and these pathways can be strengthened so that workers achieve the job changes required over the next decade. Walmart, for example, has set up the Walmart Academy program to train hourly wage sales associates to move into management positions. As a result of this program, three-quarters of its US store managers, who can earn six-figure salaries, were promoted from within the company. Walmart is now working with other US retailers to create opportunities for career development outside the retail sector as well. Now more than ever, the need to identify these pathways and guide workers into them is apparent.[126]

To define potential career pathways out of declining occupations, we calculated an adjacency score between occupations based on the similarity of the work activities involved. In our analysis of 2,000 work activities in 800 occupations, we created more than 300 activity categories and computed the percentage of time devoted to similar work activity categories across occupations. We then applied a filter for salary to ensure that a worker would transition only to the same or a higher salary in the next occupation.

This analysis identified some of the pathways a worker can take to achieve a better job at higher pay. A cashier, for example, has a high potential for displacement by automation. In our post-COVID-19 scenario, demand for cashiers in the United States is likely to decline by 13 percent by 2030, or 500,000 jobs. However, a cashier who lost her job could transition to a sales management pathway and, after three career moves, could end up as a sales manager, an occupation that is set to grow by 22 percent over the next decade and offers six times the median annual income of a cashier. Additionally, the cashier could move onto pathways leading to better jobs in healthcare, technology, or e-commerce, as shown in Exhibit 39.

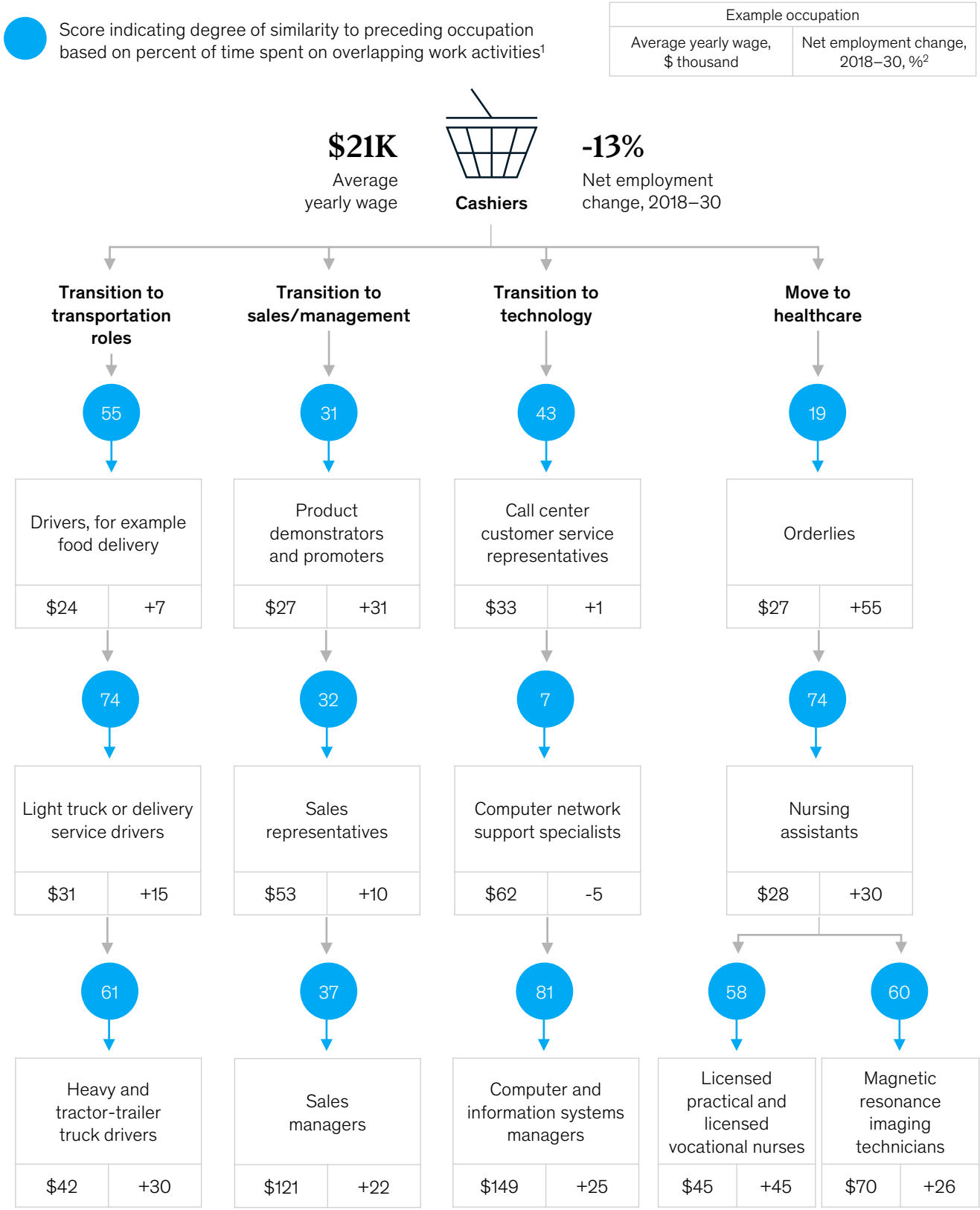
If achieved, such skill transitions offer potential upward mobility and increased productivity growth. To be sure, the changes are daunting, but the rewards are big not only for individual workers and their families but also for society at large. Policy makers and companies will need to move quickly to create pathways and programs to help workers successfully navigate changes in occupation.

[125] See *The future of work in Europe: Automation, workforce transitions, and the future geography of work*, McKinsey Global Institute, June 2020.

[126] "Working at Walmart," Walmart, corporate.walmart.com; "Walmart opens its first Supply Chain Training Academy at Sanger Distribution Center," Walmart, September 27, 2019, corporate.walmart.com.

Exhibit 39

A cashier could follow several different pathways to growing and more highly paid occupations.



1. MGI analysis of work activities in each occupation and time spent in each work activity, then grouping work activities into 322 categories and calculating percent of time spent in overlapping categories for each pair of occupations.
2. The pre-COVID-19 scenario includes the effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels, and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Helping vulnerable workers transition to new occupations is emerging as one of the key challenges of the postpandemic economy. Our analysis suggests that the number of people needing to transition to different categories of work will grow after the pandemic compared with our previous estimates, and the transitions themselves will be harder, requiring more advanced skills. As we discuss in the final chapter, this will require imaginative solutions.

6. Building a brighter future of work

Business executives and policymakers have a variety of options to help workers make the challenging skill transitions that COVID-19 has imposed on the most vulnerable members of the workforce. Already, innovative changes they introduced in 2020 suggest a path towards the future.

The COVID-19 crisis demonstrated that workers and companies have greater capacity to adapt more quickly than previously thought.[127] Companies that could shifted large segments of their workforces to remote work in a matter of weeks. Most employees adapted easily to online videoconferencing, document-sharing apps, online collaboration systems, and new ways of interacting. Companies without digital channels to reach customers quickly built them, and many consumers embraced digital interactions for the first time. Essential workers in manufacturing and utilities learned to use virtual reality headsets to guide maintenance and repairs from a distance.

The challenge of retraining and redeploying workers into new occupations long-term is greater than adapting to the crisis as it unfolded. As companies look beyond the pandemic, they have an opportunity to reimagine work, their workforce, and their workplace by focusing on specific tasks and activities, not entire jobs.[128] Rather than simply returning to the office and processes previously in place, leading firms are using the pandemic to reconfigure their workforce in ways that boost productivity and engagement, and set a path for future growth. Policy makers could play an important role in expanding the digital infrastructure, supporting workers between jobs, ensuring that lifelong learning becomes a reality, and easing barriers to workforce mobility.

An ecosystem approach that brings together businesses, policymakers, educators, and other stakeholders might prove more effective than isolated efforts at addressing workforce challenges, based on past experience. Company initiatives to reskill workers are more robust when supported by educational institutions. The work of educators and social enterprises to train workers in more sought-after skills is most effective when coordinated with efforts by government agencies aligned to company needs. Given the accelerated disruption to work that this report suggests over the coming years, a closely coordinated, comprehensive response could help more workers make the challenging job transitions ahead.

Businesses have an opportunity to reimagine where and how work is done

Businesses looking beyond the pandemic have an opportunity to reimagine how and where work is done, harnessing lessons learned during the pandemic.[129] The virus forced organizations to quickly adapt to unforeseen circumstances. Companies and their employees demonstrated in real-time that rapid changes in work practices and how people do jobs can be accomplished quickly. The same level of agility can be applied in designing how work will be reorganized and workers retrained and redeployed to meet the needs of the future. Increasingly, technology will be core to the process of work reorganization. In

[127] Aamer Baig, Bryce Hall, Paul Jenkins, Eric Lamarre, and Brian McCarthy, "The COVID-19 recovery will be digital: A plan for the first 90 days," McKinsey and Company, May 2020, McKinsey.com.
[128] See Brodie Boland, Aaron De Smet, Rob Palter, and Aditya Sanghvi, "Reimagining the office and work life after COVID-19," McKinsey and Company, June 2020, McKinsey.com.
[129] Kevin Sneader and Shubham Singhal, "The next normal arrives: Trends that will define 2021—and beyond," January 2021, McKinsey.com.

2017, McKinsey's Global Leadership survey found that 48 percent of business leaders saw technology primarily as a means to reduce costs, often accompanied by labor displacement. The same survey in Fall 2020 finds that the vast majority of companies now see technology as a way to build a competitive advantage, expand new products and services, and enable new customer channels and ways of working.[130] Against this backdrop, we offer four thought-starters for business leaders as they transition to working in a postpandemic economy.

Assessing who can work remotely by focusing on activities rather than whole jobs
Given that most jobs with remote work potential moved offsite during the pandemic, the first challenge for many companies is to determine what forms of hybrid remote work may endure once vaccines have reduced the virus's threat.[131] Many organizations are already putting together hybrid remote working strategies with the goal of increasing employee satisfaction and reducing real estate costs.

Creating a successful remote work program requires intentionality. IBM and Yahoo are among the companies that tried and discarded remote work in the prepandemic era.[132] Those prior attempts at widespread telecommuting largely stumbled because companies failed to identify which activities benefit from in-person connections, such as training and onboarding new employees, engaging in critical decision-making, feedback meetings, and building a strong company culture. They also failed to innovate new ways of working and adopt technologies to make remote working a success (although in fairness, many such tools are new).

During COVID-19, some companies began providing "work from home" packages to employees learning to work remotely, offering laptops, video-cameras, MiFi devices, and other supporting technology. To ensure long-term success, companies could first figure out which roles can be fully or partially remote and which need to be done in person. A next step is to define key metrics around productivity, employee satisfaction and connectedness, and innovation, then rigorously measure outcomes across these metrics. Businesses can successfully make the shift to a distributed work operating model by scaling practices that work and changing those that do not—making sure to involve employees from the beginning to ensure they feel their voices matter in shaping decisions,

Companies could play a larger role in retraining workers
Companies know best the training they need to develop the skills they want. The changes wrought by COVID-19 open the door for them to play a larger role in retraining workers for new jobs and creating career pathways with upward mobility for their employees in order to ensure a supply of workers with the right skills. Some 87 percent of executives report existing skills gaps or expect to face gaps within the next five years.[133] While companies might be tempted to trim training budgets amid the ongoing crisis, experience shows that investing in retraining can pay off in the long run.[134]

Over the last several years, many large companies created major reskilling and workforce transformation programs as technology changed the way work was done. Now those programs have taken on new urgency.[135] Faced with a shortage of tech talent, companies like IBM, Bosch, and Barclays started apprenticeship programs to recruit and train workers from nontraditional backgrounds for these roles.[136] Merck, Nike, and more than 30 other companies came together with more than $100 million to back a new organization, OneTen, that aims to train Black Americans and place them in one million new jobs over the next decade.[137] In India,

[130] "Survey: How COVID-19 has pushed companies over the technology tipping point—and transformed business forever," October 2020, McKinsey.com.
[131] Andrea Alexander, Aaron DeSmet, Mihir Mysore, "Reimagining the postpandemic workforce," *McKinsey Quarterly*, July 2020, McKinsey.com.
[132] David Streitfeld, "The long, unhappy history of working from home," *New York Times*, June 29, 2020, nytimes.com.
[133] Sapana Agrawal, Aaron de Smet, Sébastien Lacroix, and Angelika Reich, "To emerge stronger from the COVID-19 crisis, companies should start reskilling their workforces now," May 2020, McKinsey.com.
[134] Anand Chopra-McGowan and Srinivas B. Reddy, "What would it take to reskill entire industries?," Harvard Business Review, July 2020.
[135] Raphael Bick, Eric Hazan, Hamza Khan, Sébastien Lacroix, Hugo Sarrazin, and Tom Welchman, "The future of work: Reskilling and remote working to recover in the 'next normal,'" July 2020, McKinsey.com.
[136] Agam Shah, "Seeking tech talent, companies kickstart apprenticeship programs," Wall Street Journal, January 30, 2020, wsj.com.
[137] Khadeeja Safdar, "CEOs pledge one million jobs for Black Americans," Wall Street Journal, December 10, 2020, wsj.com.

NASSCOM started FutureSkills, an initiative that aims to help two million workers acquire skills needed to capitalize on emerging technologies.[138]

Companies could partner with universities, government agencies, and nonprofits to retrain workers. For instance, the Alibaba Group and Hangzhou Normal University co-founded the Alibaba Business School, which offers bachelor's programs.[139] In November 2020, the European Commission initiated the Pact for Skills, which provides incentives for businesses and other stakeholders to help in overcoming the mismatch between skills and available jobs.[140] One of the Pact's goals is to build the skills of 5 percent of workers in the automotive industry each year, investing €7 billion to reskill 700,000 employees annually.

Focusing on skills rather than academic degrees when listing jobs and recruiting can ease occupational transitions

Focusing recruitment on skills rather than academic degrees can expand the pool of available job candidates and increase diversity for companies while helping ease the broad workforce transitions likely to play out after COVID-19. The number of major employers hiring based on skills needed rather than on educational achievement has grown, offering viable models for others. Google, Hilton Hotels, Ernst & Young, and IBM are among the companies that have made that change, and they report a marked increase in new hires without college degrees.[141] The US Business Roundtable is developing an initiative that encourages organizations to focus on skill-based hiring as a way to drive diversity in the workplace.[142]

Such hiring requires the ability to quickly identify and verify skills of potential employees. Easily accessible tools to consistently recognize skill sets across workers have only recently come online. Workday has developed an AI system that gathers data on skills and matches workers to roles or suggests new training opportunities.[143] Eightfold.ai, FMI (The Food Industry Association), and McKinsey & Company partnered to create Talent Exchange, a platform that uses AI to match workers in arenas hit hard by the pandemic, such as travel and leisure and on-site customer interaction, to roles in companies that are expanding.[144] Deployment of more such technology solutions could enable organizations to lower barriers to transitions by hiring based on skills rather than degrees or qualifications.

Diversity and inclusion measures can help counter COVID-19's regressive impact

As this report has demonstrated, women, younger workers, less educated workers, and underrepresented ethnic groups are likely to grapple with a disproportionate number of occupation transitions over the next decade. With school closures and higher risks of becoming sick, pressures on at-home caregivers—more often women and people of color—are higher than ever. Research consistently shows that efforts to promote diversity and inclusivity improve employee well-being and performance, as well as economic outcomes for businesses.

Some companies have offered greater work flexibility to support these employees. Starbucks temporarily expanded its Care@Work program, which subsidizes paid care for children and elderly adults.[145] Upwork partnered with Awaken, a diversity and inclusion consultancy, to hold a forum addressing the uptick of racism and discrimination during the pandemic.[146]

[138] "FutureSkills: A NASSCOM initiative," futureskills.nasscom.in.
[139] Jenny W. Hsu, "Alibaba Business School welcomes first international class," Alizila, September 2018, alizila.com.
[140] European Commission, "The Pact for Skills: Mobilising all partners to invest in skills," November 2020.
[141] Rajguru Tandon, "Google, Apple, IBM need skills more than degree for hiring," BW Businessworld, August 2018, businessworld.in.
[142] "Placing a greater emphasis on skills in hiring and advancement, improving equity and diversity in employment," Business Roundtable, business-roundtable.org.
[143] *Workday Blog,* "The Foundation of the Workday Skills Cloud," blog entry by Jim Stratton, October 15, 2020, blog.workday.com.
[144] *McKinsey Blog*, "A new AI-powered network is helping workers displaced by the coronavirus crisis," April 8, 2020.
[145] Ruth Umoh, "How diversity heads are steering their companies through the COVID-19 crisis," *Forbes,* April 16, 2020, forbes.com.
[146] Laura Morgan Roberts et al., "How U.S. companies can support employees of color through the pandemic," *Harvard Business Review,* May 2020, hbr.org; Sundiatu Dixon-Fyle, Kevin Dolan, Vivian Hunt, and Sara Prince, "Diversity wins: How inclusion matters," May 2019, McKinsey.com.

Policy makers have a range of options, including expanding the digital infrastructure and supporting workers in transition

Policy makers have an important role to play in easing the workforce transitions necessary to avoid high unemployment and workers dropping out of the labor force. There are many ways to do this, and we offer a few options to consider and examples from around the world here.

Expanding the digital infrastructure

Even in advanced economies, up to 19 percent of households lack access to internet services.[147] This excludes their members from educational and work opportunities, not to mention participating in the online economy that boomed during the pandemic. McKinsey research in the United States found that learning losses from the pandemic could wipe out the equivalent of one year of salary on average—and more for underrepresented ethnic groups.[148] In some school districts, as many as a third of the students were unable to log into online classes during the pandemic, putting them further behind academically.[149] The number of drop-outs from college and high school is set to rise due to the pandemic as some students lacked the online access needed to participate in remote classes.[150] Besides students, workers with insufficient internet connectivity to work from home also were at a disadvantage.

MGI research finds that enabling more people to plug into global flows of information, communication, and services could add another $1.2 to $2 trillion to global GDP.[151] Affordable high-speed internet access could be expanded, particularly in rural areas. The state of Connecticut, for example, provides funding to help small towns get wired through the Community Connectivity Program.[152] Enabling all individuals to participate in and benefit from the growing digital economy will require more public investment.

Supporting workers during occupational transitions

Many countries extended financial support to workers who lost jobs in the early days of the pandemic. Data on personal income and spending in subsequent months confirmed that these actions supported families and helped stave off more severe and sustained economic damage in the United States.[153] In an era in which mid-career workers are likely to need to retrain to change occupations, new or expanded forms of income support may be warranted.

Among possible options, policy makers could consider new ways to modernize and strengthen the social safety net to support people transitioning between jobs or facing significant wage cuts due to automation. Support could take many forms, including more flexible income support programs, relocation assistance, training grants, increased minimum wages, and reformed tax systems. In the United States, individuals qualify for unemployment benefits only when laid off, not when they leave a job voluntarily. This discourages workers from capitalizing on better opportunities, taking time to gain new skills, or shifting to more in-demand occupations. Tax incentives to encourage employers to offer and allow employees to take advantage of job retraining could head off potential displacements before they occur.

Beyond supporting workers financially and helping them reskill, public leaders can help workers better navigate the transition process. The Harvard Business Review found that in many cases, workers struggle to find a new job not because they lack skills but because they lack access to relevant and actionable information needed to navigate the job transition process.[154] Many workers don't know what jobs their skills equip them for. By providing greater transparency to workers about their occupation transition options, and by adopting a skills-centric rather than an experience-centric or credential-centric approach when connecting

[147] *Measuring digital development,* International Telecommunication Union, November 2020.
[148] See Emma Dorn, Bryan Hancock, Jimmy Sarakatsannis, and Ellen Viruleg, "COVID-19 and student learning in the United States: The hurt could last a lifetime," June 2020, McKinsey.com.
[149] Dana Goldstein, Adam Popescu and Nikole Hannah-Jones, "As school moves online, many students stay logged out," *New York Times,* April 8, 2020, nytimes.com..
[150] Will Feuer, "At least 24 million students could drop out of school due to the coronavirus pandemic, UN says," CNBC, September 15, 2020, cnbc.com.
[151] See McKinsey Global Institute, *Connected world: An evolution in connectivity beyond the 5G revolution,* February 2020.
[152] State of Connecticut, ct.connectivity.com.
[153] Diana Farrell et. al, "The unemployment benefit boost: Trends in spending and saving when the $600 supplement ended," JP Morgan Chase & Co Institute, October 2020; Scott Baker et al, "Income, liquidity and the consumption response to the 2020 economic stimulus payments," NBER working paper, September 2020.
[154] Michelle R. Weise, "Research: How workers shift from one industry to another," *Harvard Business Review,* July 2020.

workers to new employment opportunities, government agencies can improve the match between workers and jobs.

Expanding workforce benefits and protections to cover independent workers
Many jurisdictions are considering how they might revamp labor market policies and benefits for the growing independent workforce. For the first time during the pandemic, many independent and gig workers across countries were temporarily offered similar support extended to hourly wage employees (Exhibit 40).[155] Crafting sustainable benefits policies to cover a larger share of the workforce and better suited to a modern labor market could merit further consideration.

Exhibit 40

Some governments and gig platforms offered independent workers more benefits during COVID-19.

Aid type	Country or company	Actions or policies introduced since the outbreak of COVID-19	
Government aid 	United Kingdom	Self-Employment Income Support Scheme	Provides grant to some self-employed workers adversely affected by COVID-19 covering 70-80 percent of monthly profits up to a maximum of £2,500 per month[1]
	United States	Pandemic Unemployment Assistance	Provides up to 39 weeks of benefits to independent workers and some other workers ineligible for regular unemployment compensation
		Federal Pandemic Unemployment Compensation	Provides an additional $600 in federal benefits each week to eligible unemployed workers, including self-employed workers on PUA
	France	COVID-19 Solidarity Fund (Fonds de Solidarité)	Provides grants of up to €1,500 per month to self-employed workers and small businesses that have lost up to 50 percent of their income due to COVID-19
	Canada	Canada Recovery Benefit	Provides benefits of CA$1,000 per two-week period, for a maximum of 13 periods, to some employed and self-employed workers directly affected by COVID-19
	Netherlands	Temporary bridging measure for self-employed professionals[2]	Provides income support to self-employed professionals for limited time periods
Employer-provided benefits 	Ola[3]	Temporary income protection	Provides drivers with up to a maximum of 30,000 Indian rupees due to loss of earnings if a driver or their spouse tests positive for COVID-19
	Uber	COVID-19 financial assistance	Provides drivers affected by COVID-19 with financial assistance for up to two weeks, with cap depending on geography

1. UK government launched three SEISS grants in 2020, each with different criteria and maximum payments.
2. Temporary bridging measure for self-employed professionals.
3. Major Indian rideshare provider.

Note: This is not an exhaustive list, and many of these actions or policies are temporary and may have ended.

Source: Business.gov.nl; Canada.ca; Ministère de l'Économie des Finances et de la Relance; Ola; Uber; UK Chartered Institute of Taxation; US Department of Labor; McKinsey Global Institute analysis

[155] *What have platforms done to protect workers during the coronavirus (COVID-19) crisis?*, OECD, September 2020, oecd.org.

A variety of policy changes could help. Some countries and companies are defining an intermediate class of worker who has some protections of traditional employees. In response to proposed legislation in California to reclassify drivers as employees rather than contractors, Uber has proposed that gig platform companies establish benefits funds for independent workers, giving them cash to spend on the benefits they want.[156] In 2019, the European Parliament approved new rules to protect gig economy workers in the European Union, ensuring more predictable work hours and payment for canceled work.[157]

Discussion is under way about how to modernize the social safety net for traditional workers who change jobs more often than in the past, as well as for independent workers who do not have a single employer. In the United States, where companies rather than governments provide many worker benefits, policymakers have for several years discussed creating a more portable system of benefits tied to workers themselves, not to a single employer.[158] One option is allow independent workers to form pools to create their own marketplaces and delivery systems for benefits. This model already has a long and successful history in industries ranging from Hollywood to construction: workers shift from project to project, and their unions or guilds deliver a range of benefits such as health insurance.[159] Alia is an online platform for portable benefits, which enables its clients to pool benefits from multiple employers in a single pot that they can draw on to cover sick pay, life insurance, and paid time off.[160] Another proposal involves a so-called "hours bank." Policymakers might consider working to resolve the many hurdles such proposals face, starting with who would pay for such benefits and how they would be earned and tracked for workers with multiple clients and employers or working independently.

Supporting lifelong learning and expand mid-career training options

Lifelong learning is critical to enabling the large-scale workforce transitions looming. Individuals might consider embracing the idea of periodically reinventing themselves — that is, creating a mind-set of lifelong employability. Jamie Merisotis, president of the Lumina Foundation, calls these workers "worker-learners."[161] As technologies shift the tasks required in an occupation, education will also need to shift focus and teach the social and emotional skills that machines cannot master.

Transparent, nationally recognized credentials that verify workforce skills—particularly those learned on the job—could help ease transitions. Ideally, individuals would continually earn new, verifiable skill credentials throughout their career, through job experience and training programs. The Europass Digital Credentials system is a start, enabling students from across the European Union to have a file that employers across countries can understand.[162]

Education need not only occur early in life. Higher education has long been a stepping stone between high school and work, but the typical student of the future may be a 35- or 45-year-old looking to reboot her education. Mid-career workers also need short-term continuing education programs, and some schools are already seizing this opportunity. The Ross School of Business at the University of Michigan, for example, offers MBA students career counseling and online coaching resources at any time after graduation.[163]

At the other end of the spectrum, "early college high schools" combine a high school degree with an associate degree, which is all that's needed for many jobs. Now, in more than 30 US states, early college high schools allow students to earn an associate's degree or college credits towards a bachelor's degree while still in high school.[164] The P-Tech model, pioneered

[156] Dara Khosrowshahi, "I am the C.E.O. of Uber. Gig Workers Deserve Better," *New York Times,* August 10, 2020.
[157] "EU law fixes minimum rights for 'gig economy' workers," BBC, April 16, 2019.
[158] "Warner, DelBene release proposal for emergency portable benefits fund," US Senator Mark Warner, May 2020, warner.senate.gov.
[159] David Rolf, Shelby Clark, and Corrie Watterson Bryant, "Portable benefits in the 21st century," Aspen Institute, June 2016.
[160] Fabian Wallace Stephens, "COVID-19 and the case for portable benefits," The Royal Society of Arts, March 2020, thersa.org.
[161] Jamie Merisotis, *Human work in the age of smart machine*s, Rosetta Books, October 2020.
[162] Europass Digital Credentials, European Union, europa.eu
[163] Alumni Career Services, Ross School of Business, University of Michigan, michiganross.umich.edu.
[164] Mengli Song and Kristina L. Zeiser, *Early college, continued success: Longer-term impact of early college high schools,* American Institutes for Research, September 2019.

by IBM, is a public-private partnership that offers a six-year diploma plus an associate's degree in a STEM field.[165]

Lowering barriers to physical mobility

In some countries, workers cannot easily move locations, which restricts their ability to adjust to rapid changes in labor demand. Workers who can work remotely may move out of major cities to suburbs, smaller cities, or even other countries. Several mid-size and smaller cities in the United States are offering financial incentives for workers to move. Tulsa, Topeka, and Savannah, for instance, are offering relocation grants to attract remote employees.[166]

For emerging economies such as India and China, migration to urban areas will remain significant, as job growth in those countries will likely be concentrated in cities over the next decade.[167] Even so, many workers face barriers to moving into cities. Affordable housing schemes could be expedited, such as one launched in India for domestic migrant labor under the government's Pradhan Mantri Awas Yojana program.[168]

Lowering barriers to occupational mobility

Licensing ensures professionals have the requisite skills and training and protects consumers, but it can also limit competition and limit occupational mobility. Indeed, across the United States, there is evidence that the greater the licensing requirements across a workforce, the lower the mobility of workers between occupations and may have hidden costs for consumers.[169] The Harvard Business Review found that opticians received a 5 percent premium from consumers for each additional exam required by the state.[170] National and local policymakers have opportunities to reconsider licensing in ways that preserve safety and protect consumers yet also enable labor market fluidity.

During the pandemic, several US states and the federal government eased "scope of practice" restrictions on nurse practitioners and doctors.[171] Nurse practitioners were allowed to provide some medical services that previously only doctors could perform to patients insured by Medicare in nursing homes, and many states allowed doctors to provide care across state lines via telemedicine without needing a state license. Policymakers can capitalize on this experience to spark a broader review of licensing, retaining requirements that genuinely protect consumers and retiring others that lack sound justification.

The job disruptions and transitions that COVID-19 has kick-started will affect more workers—and more disadvantaged workers—more quickly, according to our research. Companies and governments proved during the pandemic that they can move swiftly to help workers. To help workers make job changes in the future, more innovations may be needed. The reward would be a more resilient, more talented, and better-paid workforce—and a more robust and equitable society.

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[165] P-Tech, ptech.org

[166] Sarah Holder, "Paying remote workers to relocate gets a pandemic-era boost," Bloomberg CityLab, June 23, 2020.

[167] *India's turning point: An economic agenda to spur growth and jobs*, McKinsey Global Institute, August 2020.

[168] Pradhan Mantri Awas Yojana (Urban)-PMAY (U), Government of India, pmaymis.gov.in.

[169] Mikkel Hermansen, *Occupational licensing and job mobility in the United States,* OECD working paper number 1585, December 2019.

[170] Edward Timmons, "More and more jobs today require a license. That's good for some workers, but not always for consumers," *Harvard Business Review,* April 2018.

[171] Philip A. Wallach and Shoshana Weissmann, *Taking stock of COVID-19 deregulation,* Brookings Institution, June 2020.

Country perspectives

China

France

Germany

India

Japan

Spain

United Kingdom

United States

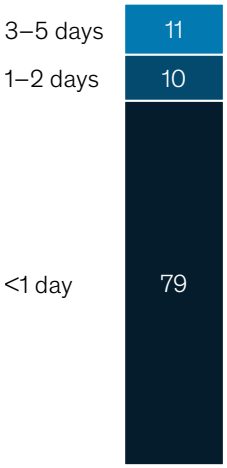
China

China's workers experienced only short-term disruption from COVID-19 because the country gained control over the virus relatively quickly. China led the world in e-commerce use before the pandemic, and COVID-19 increased that trend, creating jobs for displaced workers in delivery and sorting and packing. Acceleration of automation, however, is likely to spur displacement in agriculture, manufacturing, and production, while China's ongoing shift to a service economy will continue to displace workers in those sectors. Aging and rising incomes will expand demand for workers in healthcare and high-quality service jobs.

Key trends accelerated by COVID-19

Remote work potential by number of days per week, 2018 workforce

%



11%

Can work 3 days or more per week remotely

Automation displacement, 2030 workforce, %

Incremental in post-COVID-19

Pre-COVID-19

143.4M

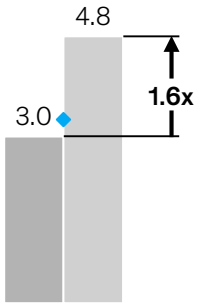
Workers displaced by automation in pre-COVID-19 scenario

157.8M

Workers displaced by automation in post-COVID-19 scenario

Year-over-year growth of e-commerce sales as percentage of total retail sales

Percentage points



Projected 2019–20 based on 2015–19 trend

2015–19

2019–20

Net employment

Occupational categories	Post-COVID-19:[1] net employment change 2018–30, %	Difference in net employment between pre- and post-COVID-19 scenarios, million	2018 employment, million
Health aides, technicians, and care workers	134	0.8	14.3
Health professionals	118	0.8	7.7
Creatives and arts management	36	-0.1	7.2
STEM professionals	34	0.7	23.4
Managers	30	0.2	10.6
Community services	29	1.0	17.5
Transportation	25	2.6	23.7
Property maintenance	22	-0.2	14.6
Business and legal professionals	18	-0.2	34.3
Educator and workforce training	7	0.3	26.0
Customer service and sales	6	**-5.9**	84.9
Food service	4	**-4.8**	43.0
Office support	-2	-1.5	67.7
Builders	-4	**2.1**	51.7
Mechanical installation and repair	-8	1.1	30.6
Production and warehousing work	-28	**3.1**	117.2
Agriculture	-34	0.1	201.5

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

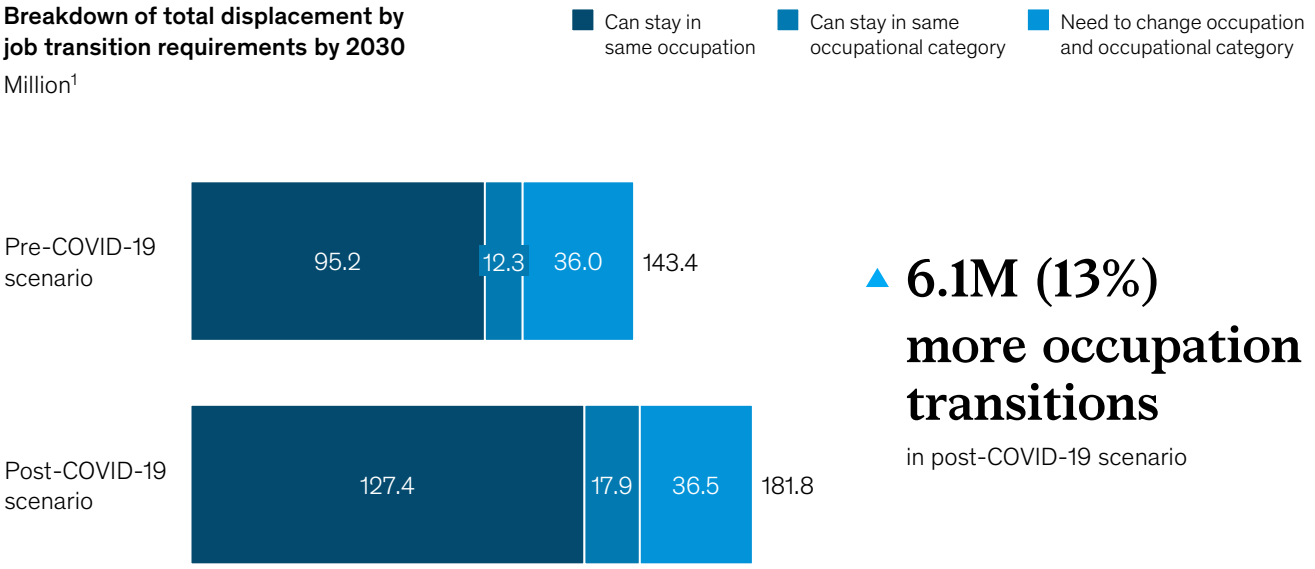
Source: McKinsey Global Institute analysis

China (continued)

Job transitions

Breakdown of total displacement by job transition requirements by 2030

Million[1]



▲ **6.1M (13%) more occupation transitions**

in post-COVID-19 scenario

Example occupations from occupational categories requiring the most job transitions[2]

Example occupations	Transitions needed Thousand	Occupational category
Demonstrators and product promoters	3,710	Customer service and sales
Retail salespersons	3,630	Customer service and sales
Office clerks	2,540	Office support
Pressers, textile, garment, and related materials	1,960	Production and warehousing
Inspectors and testers	1,490	Production and warehousing
Bookkeeping, accounting, and auditing clerks	760	Office support
Insurance underwriters	750	Business/legal professionals
Food machine operators and tenders	720	Food service
Dining room, cafeteria, and bar attendants	690	Food service
Insurance sales agents	500	Business/legal professionals

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.
2. Excludes long-run historical trends such as shift from agriculture to manufacturing and services.

Note: Wage analysis was not performed for China due to data challenges.

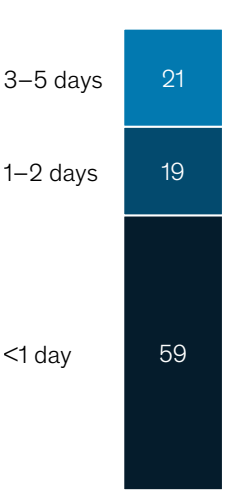
Source: McKinsey Global Institute analysis

France

Labor disruption linked to the impact of COVID-19 is likely to be moderate in France. E-commerce has accelerated but not as vigorously as in the United States and the United Kingdom, and France's remote work potential is also more modest. Compared to before the pandemic, France may see a 28 percent rise in job displacement (1.6 million workers), and 12 percent more French workers may need to switch occupations (300,000). As in other countries, most job growth over the next decade will be in high-wage jobs, while middle-wage jobs are projected to decline and low-wage jobs to grow very little.

Key trends accelerated by COVID-19

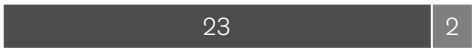
Remote work potential by number of days per week, 2018 workforce



21%

Can work 3 days or more per week remotely

Automation displacement, 2030 workforce, %



Incremental in post-COVID-19

Pre-COVID-19

5.8M

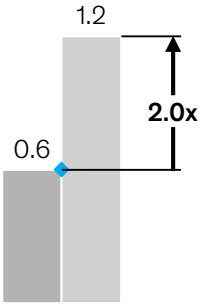
Workers displaced by automation in pre-COVID-19 scenario

6.4M

Workers displaced by automation in post-COVID-19 scenario

Year-over-year growth of e-commerce sales as percentage of total retail sales

Percentage points



Projected 2019–20 based on 2015–19 trend

2015–19

2019–20

Net employment

Occupational categories	Post-COVID-19:[1] net employment change 2018–30, %	Difference in net employment between pre- and post-COVID-19 scenarios, thousand	2018 employment, million
Health professionals	32	51	0.8
Creatives and arts management	25	7	0.7
Health aides, technicians, and care workers	23	1	2.3
STEM professionals	19	**81**	1.8
Transportation	14	**148**	0.9
Managers	14	-31	2.1
Property maintenance	12	-7	1.4
Business and legal professionals	7	-50	2.1
Educator and workforce training	4	18	1.5
Community services	-1	76	1.6
Builders	-1	60	1.5
Agriculture	-3	3	0.7
Mechanical installation and repair	-6	48	0.7
Production and warehousing work	-7	47	2.7
Customer service and sales	-11	**-279**	1.8
Food service	-12	-81	1.1
Office support	-14	**-92**	3.3

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

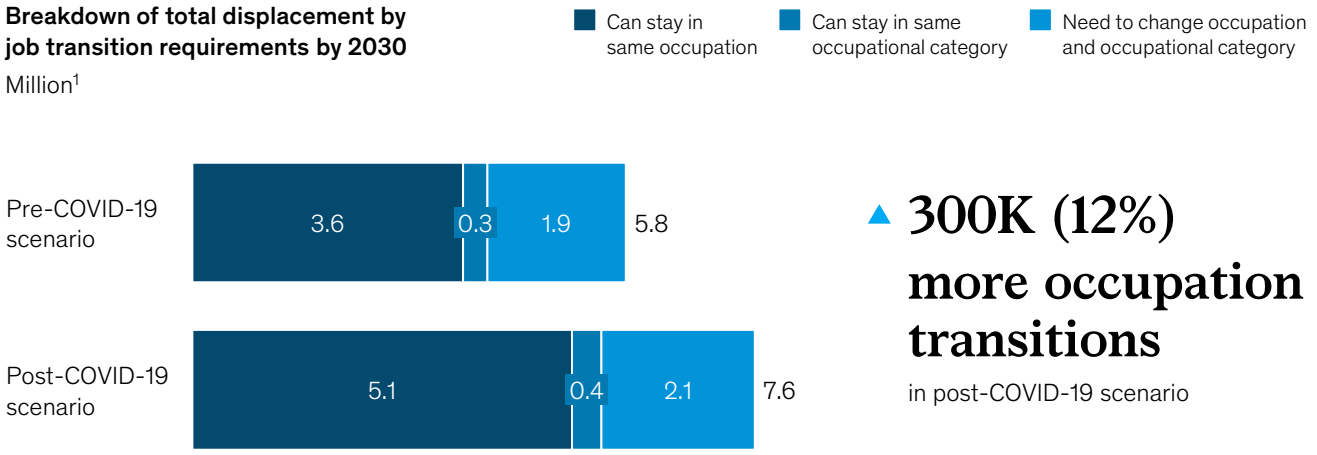
Source: McKinsey Global Institute analysis

France (continued)

Job transitions

Breakdown of total displacement by job transition requirements by 2030

Million[1]



▲ **300K (12%) more occupation transitions**

in post-COVID-19 scenario

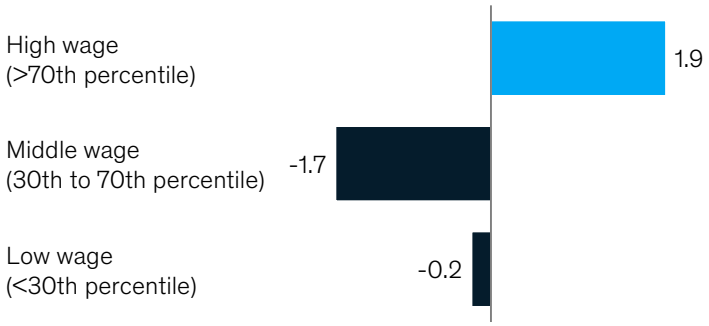
Example occupations from occupational categories requiring the most job transitions

Example occupations	Transitions needed, Thousand	Occupational category
Retail salespersons	140	Customer service and sales
Office clerks	140	Office support
Bookkeeping, accounting, and auditing clerks	130	Office support
Packing and filling machine operators	100	Production and warehousing
Cashiers	70	Customer service and sales
Insurance sales agents	40	Business/legal professionals
Drilling and boring machine operators	20	Production and warehousing
Accountants and auditors	20	Business/legal professionals
Cafeteria attendants and helpers	20	Food service
Bartenders	10	Food service

Demographics

Change in employment share by wage bracket in post-COVID-19 scenario by 2030

Percentage point change



850,000 more high-wage jobs

50,000 fewer middle-wage jobs

Only 150,000 more low-wage jobs

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: McKinsey Global Institute analysis

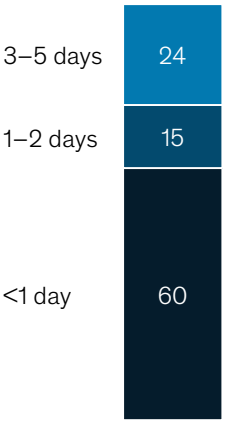
Germany

Germany is likely to experience moderate long-term labor disruption from the effects of COVID-19. A high proportion of its workforce is employed in production, and those jobs are vulnerable to automation accelerated by the pandemic. Overall, Germany may see the number of jobs displaced increase by 24 percent (2 million), and the number of German workers needing to transition occupations could increase by 21 percent by 2030 (700,000). As in other countries, most job growth is projected to occur in high-wage healthcare and STEM professions, while low- and middle-wage jobs decline as a share of the workforce. Germany's overall workforce, like Japan's, is expected to shrink by 5 percent by 2030 due to its aging population, meaning that its long-term problem is likely to be too few workers rather than too few jobs.

Key trends accelerated by COVID-19

Remote work potential by number of days per week, 2018 workforce

%



24%

Can work 3 days or more per week remotely

Automation displacement, 2030 workforce, %

Incremental in post-COVID-19

Pre-COVID-19

9.5M

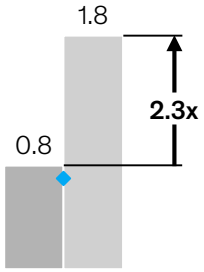
Workers displaced by automation in pre-COVID-19 scenario

10.4M

Workers displaced by automation in post-COVID-19 scenario

Year-over-year growth of e-commerce sales as percentage of total retail sales

Percentage points



Projected 2019–20 based on 2015–19 trend

2015–19

2019–20

Net employment

Occupational categories	Post-COVID-19:[1] net employment change 2018–30, %	Difference in net employment between pre- and post-COVID-19 scenarios, thousand	2018 employment, million
Health professionals	21	75	1.2
Health aides, technicians, and care workers	18	-35	3.5
Transportation	15	**289**	1.3
Creatives and arts management	13	28	1.1
STEM professionals	11	**142**	3.2
Managers	8	30	1.9
Educator and workforce training	4	31	1.8
Business and legal professionals	0	-26	3.0
Builders	-4	74	2.0
Community services	-6	134	3.0
Property maintenance	-8	**-199**	2.1
Mechanical installation and repair	-10	91	1.7
Food service	-13	-179	1.7
Production and warehousing work	-14	158	4.8
Office support	-17	-7	8.0
Customer service and sales	-25	**-559**	4.0
Agriculture	-25	-48	0.6

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

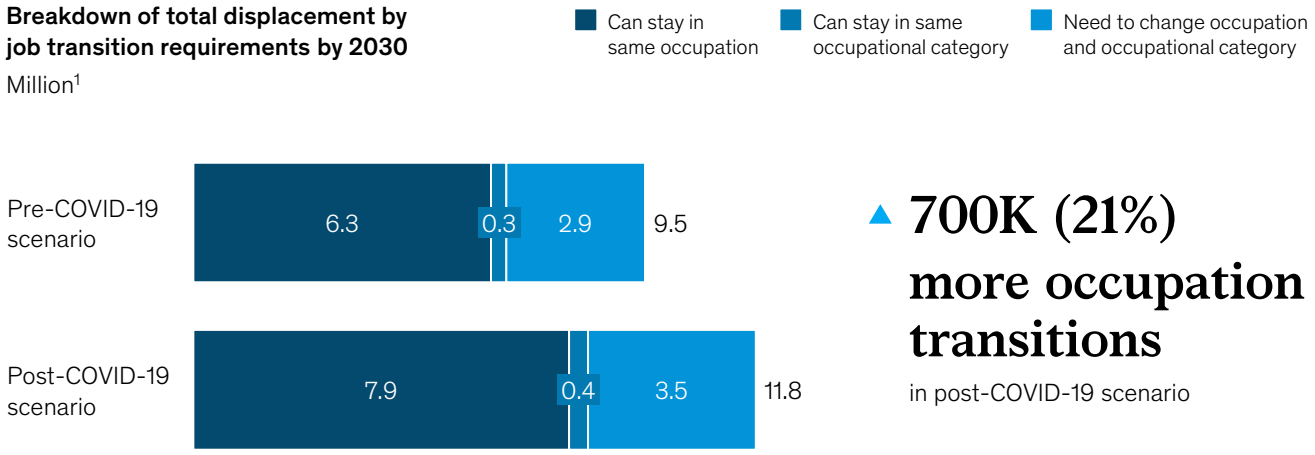
Source: McKinsey Global Institute analysis

Germany (continued)

Job transitions

Breakdown of total displacement by job transition requirements by 2030

Million[1]



▲ **700K (21%) more occupation transitions**

in post-COVID-19 scenario

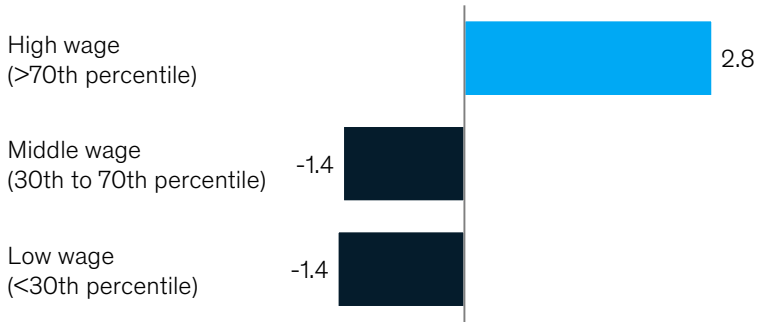
Example occupations from occupational categories requiring the most job transitions

Example occupations	Transitions needed Thousand	Occupational category
Retail salespersons	530	Customer service and sales
Bookkeeping, accounting, and auditing clerks	190	Office support
Secretaries and administrative assistants	190	Office support
Machine feeders and offbearers	100	Production and warehousing
Cashiers	60	Customer service and sales
Drilling and boring machine operators	60	Production and warehousing
Cafeteria attendants and helpers	40	Food service
Accountants and auditors	30	Business/legal professionals
Insurance sales agents	20	Business/legal professionals
Food servers	20	Food service

Demographics

Change in employment share by wage bracket in post-COVID-19 scenario by 2030

Percentage point change



500K more high-wage jobs

1.5M fewer middle-wage jobs

1.3M fewer low-wage jobs

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: McKinsey Global Institute analysis

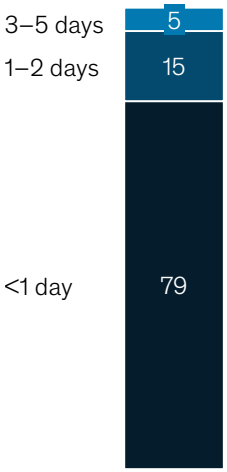
India

India experienced short-term work disruptions during the pandemic, but it faces the most long-term labor market disruption of any of our countries. Long-term trends such as population growth, rising incomes, and increasing urbanization will far outweigh the impact of trends influenced by COVID-19. India's labor force is projected to increase by 14 percent over the next decade, and nearly all categories of jobs are forecast to grow (with the exception of agriculture). We estimate that India will see growth in both middle- and high-wage jobs, unlike other countries, although the share of low-wage jobs is expected to decline.

Key trends accelerated by COVID-19

Remote work potential by number of days per week, 2018 workforce

%



5%

Can work 3 days or more per week remotely

Automation displacement, 2030 workforce, %

Incremental in post-COVID-19

Pre-COVID-19

48.3M

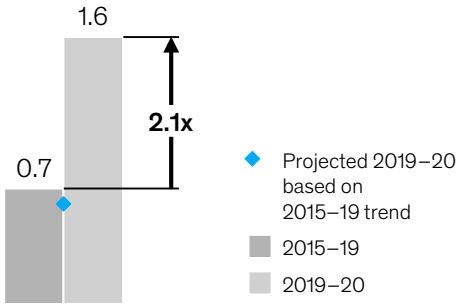
Workers displaced by automation in pre-COVID-19 scenario

51.5M

Workers displaced by automation in post-COVID-19 scenario

Year-over-year growth of e-commerce sales as percentage of total retail sales

Percentage points



Net employment

Occupational categories	Post-COVID-19:[1] net employment change 2018–30, %	Difference in net employment between pre- and post-COVID-19 scenarios, million	2018 employment, million
Health professionals	112	0.3	2.9
Creatives and arts management	103	0.0	2.8
Health aides, technicians, and care workers	102	0.2	5.8
STEM professionals	94	0.5	5.3
Business and legal professionals	54	-0.5	10.8
Managers	49	-0.4	8.4
Food service	45	**-1.2**	11.9
Educator and workforce training	42	0.0	13.8
Community services	34	0.1	5.6
Mechanical installation and repair	31	0.1	15.7
Transportation	29	0.3	16.6
Builders	26	**1.1**	46.6
Office support	26	-0.7	15.8
Production and warehousing work	24	**-1.8**	54.2
Customer service and sales	18	-0.2	34.4
Property maintenance	4	0.3	23.8
Agriculture	-11	**1.8**	189.6

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

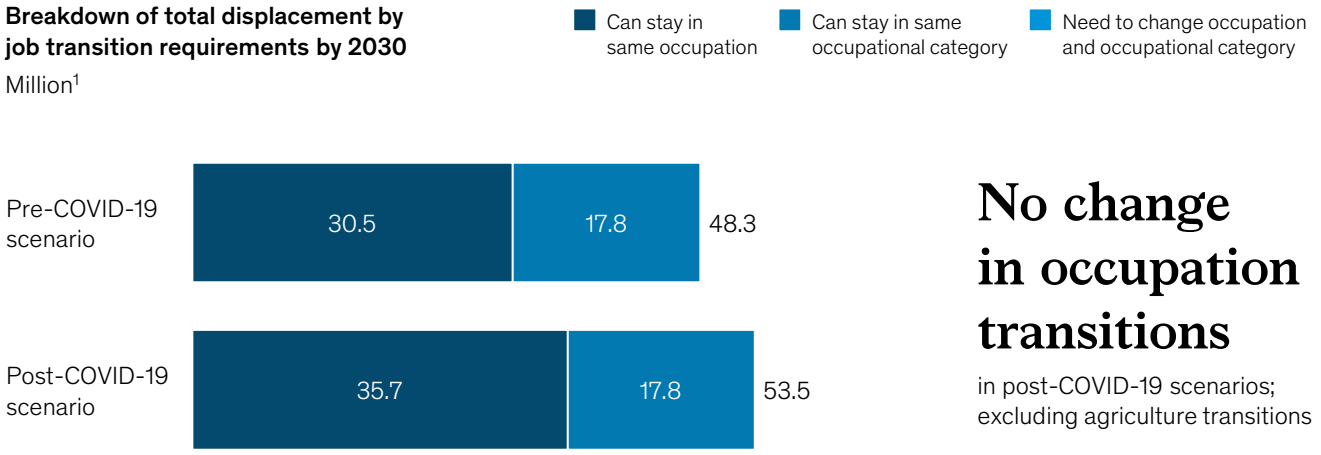
Source: McKinsey Global Institute analysis

India (continued)

Job transitions

Breakdown of total displacement by job transition requirements by 2030

Million[1]



No change in occupation transitions

in post-COVID-19 scenarios; excluding agriculture transitions

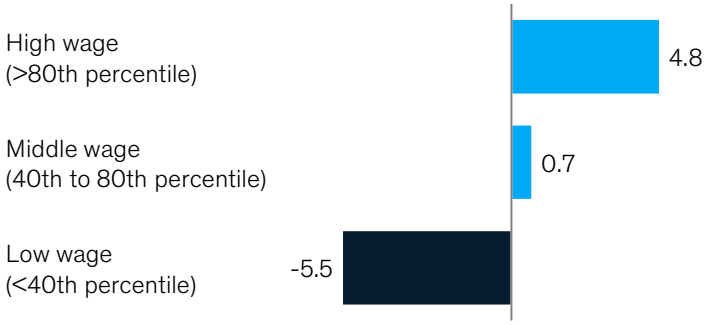
Example occupations from occupational categories requiring the most job transitions[2]

Example occupations	Transitions needed Thousand	Occupational category
Demonstrators and product promoters	1,290	Customer service and sales
Door-to-door, street, and related sales workers	1,190	Customer service and sales
Retail salespersons	670	Customer service and sales
Production helpers	490	Production and warehousing
Tellers	440	Office support
Office clerks	360	Office support
Pressers, textile, garment, and related materials	350	Production and warehousing
Data entry keyers	300	Office support
Insurance underwriters	210	Business/legal professionals
Paralegals and legal assistants	170	Business/legal professionals

Demographics

Change in employment share by wage bracket in post-COVID-19 scenario by 2030

Percentage point change



35.6M more high-wage jobs

30.6M more middle-wage jobs

Only 300K more low-wage jobs

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.
2. Excludes long-run historical trends such as shift from agriculture to manufacturing and services.

Source: McKinsey Global Institute analysis

Japan

The trends influenced by COVID-19 are likely to have a milder long-term impact on Japan's workforce compared to other countries because Japan, like China, was better prepared to prevent widespread infection than other countries. Our pandemic-accelerated trends could displace 3.2 million more jobs by 2030 compared to before the pandemic, and 600,000 more Japanese workers may need to switch occupations. But Japan's aging population is projected to reduce its labor force by 5 percent by 2030, meaning that Japan, like Germany, may have more jobs than workers.

Key trends accelerated by COVID-19

Remote work potential by number of days per week, 2018 workforce

%

22%

Can work 3 days or more per week remotely

Automation displacement, 2030 workforce, %

Incremental in post-COVID-19

Pre-COVID-19

15.8M

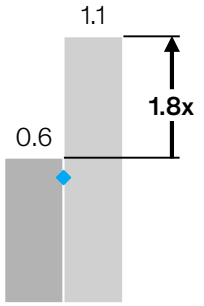
Workers displaced by automation in pre-COVID-19 scenario

17.7M

Workers displaced by automation in post-COVID-19 scenario

Year-over-year growth of e-commerce sales as percentage of total retail sales

Percentage points



Projected 2019–20 based on 2015–19 trend

2015–19

2019–20

Net employment

Occupational categories	Post-COVID-19:[1] net employment change 2018–30, %	Difference in net employment between pre- and post-COVID-19 scenarios, thousand	2018 employment, million
Health professionals	21	163	2.1
STEM professionals	20	113	2.5
Creatives and arts management	18	46	1.0
Health aides, technicians, and care workers	17	101	3.8
Managers	12	-44	1.6
Business and legal professionals	8	26	5.5
Transportation	-2	**171**	1.7
Community services	-2	137	2.6
Customer service and sales	-3	**-322**	6.9
Mechanical installation and repair	-4	89	2.1
Educator and workforce training	-7	49	3.3
Builders	-9	**178**	2.9
Agriculture	-12	-89	2.4
Property maintenance	-13	-123	1.4
Office support	-15	-180	14.4
Production and warehousing work	-18	34	8.2
Food service	-21	**-349**	4.3

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

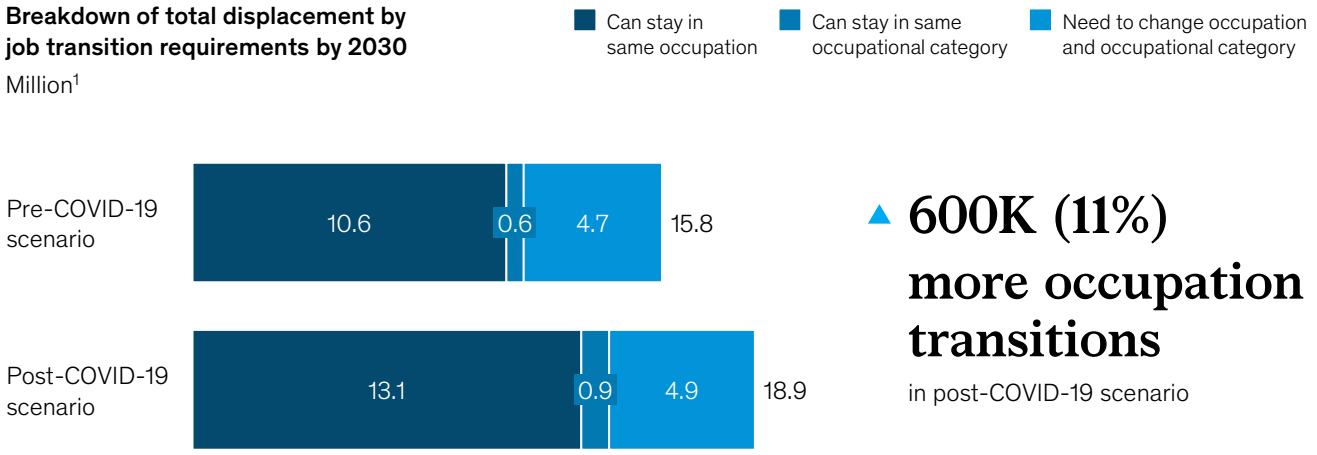
Source: McKinsey Global Institute analysis

Japan (continued)

Job transitions

Breakdown of total displacement by job transition requirements by 2030

Million[1]



▲ **600K (11%) more occupation transitions**

in post-COVID-19 scenario

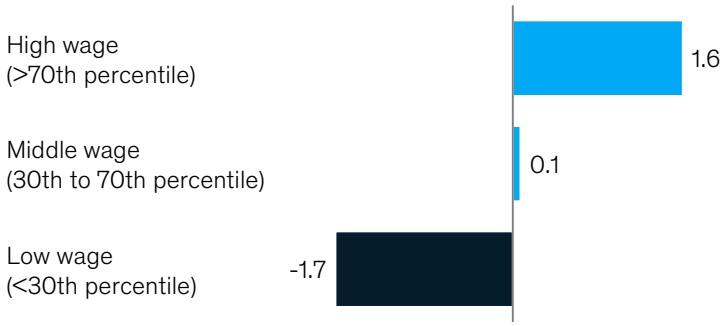
Example occupations from occupational categories requiring the most job transitions

Example occupations	Transitions needed Thousand	Occupational category
Office clerks	300	Office support
Bookkeeping, accounting, and auditing clerks	170	Office support
Production inspectors and testers	150	Production and warehousing
Counter attendants	140	Food service
Cashiers	140	Customer service and sales
Packaging and filling machine operators	130	Production and warehousing
Retail salespersons	60	Customer service and sales
Food processing workers	50	Food service
Insurance underwriters	40	Business/legal professionals
Insurance sales agents	30	Business/legal professionals

Demographics

Change in employment share by wage bracket in post-COVID-19 scenario by 2030

Percentage point change



<50,000 more high-wage jobs

1.3M fewer middle-wage jobs

2.1M fewer low-wage jobs

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: McKinsey Global Institute analysis

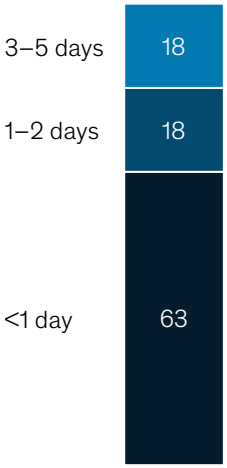
Spain

Spain has a large share of workers in food service, retail, and customer service and sales due to the importance of tourism in its economy. The long-term impact of COVID-19, however, is projected to be more muted than in other advanced economies. Spain's e-commerce growth rate quintupled in 2020 during the pandemic, but from a small base. Just 18 percent of Spanish workers could work remotely the majority of the time, less than in other countries. Nonetheless, we estimate that the number of workers needing to switch occupations could increase by 7 percent compared to the prepandemic scenario, or 100,000 workers. These are mainly low- and middle-wage workers needing to transition to high-wage jobs.

Key trends accelerated by COVID-19

Remote work potential by number of days per week, 2018 workforce

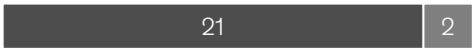
%



18%

Can work 3 days or more per week remotely

Automation displacement, 2030 workforce, %



Incremental in post-COVID-19

Pre-COVID-19

4.1M

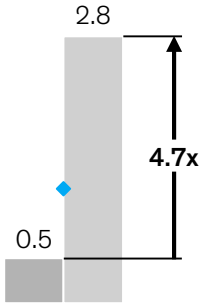
Workers displaced by automation in pre-COVID-19 scenario

4.6M

Workers displaced by automation in post-COVID-19 scenario

Year-over-year growth of e-commerce sales as percentage of total retail sales

Percentage points



Projected 2019–20 based on 2015–19 trend

2015–19

2019–20

Occupational categories	Post-COVID-19:[1] net employment change 2018–30, %	Difference in net employment between pre- and post-COVID-19 scenarios, thousand	2018 employment, million
Health aides, technicians, and care workers	29	29	0.9
Health professionals	23	**57**	0.8
Creatives and arts management	19	3	0.4
STEM professionals	16	45	1.0
Managers	9	**-44**	1.3
Business and legal professionals	7	-33	1.1
Transportation	6	**57**	0.8
Property maintenance	-1	-16	1.1
Educator and workforce training	-1	14	1.2
Community services	-3	38	0.7
Mechanical installation and repair	-6	37	0.8
Builders	-6	52	1.1
Customer service and sales	-7	**-96**	1.7
Production and warehousing work	-10	20	2.0
Agriculture	-11	24	0.8
Office support	-13	-27	2.3
Food service	-20	**-159**	1.6

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

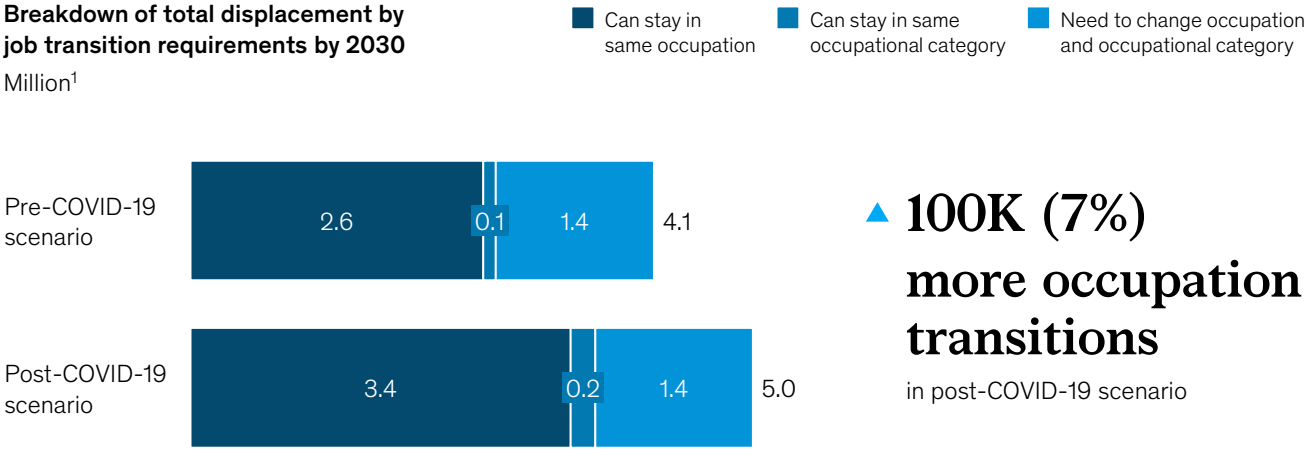
Source: McKinsey Global Institute analysis

Spain (continued)

Job transitions

Breakdown of total displacement by job transition requirements by 2030

Million[1]



▲ **100K (7%) more occupation transitions**

in post-COVID-19 scenario

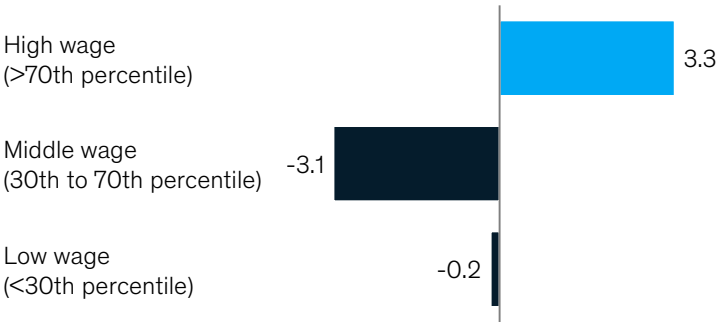
Example occupations from occupational categories requiring the most job transitions

Example occupations	Transitions needed Thousand	Occupational category
Bartenders	120	Food service
Retail salespersons	70	Customer service and sales
Office clerks	60	Office support
Packaging and filling machine operators	40	Production and warehousing
Bookkeeping, accounting, and auditing clerks	40	Office support
Cashiers	30	Customer service and sales
Package packers	30	Production and warehousing
Food servers	30	Food service
Accountants and auditors	10	Business/legal professionals
Insurance sales agents	10	Business/legal professionals

Demographics

Change in employment share by wage bracket in post-COVID-19 scenario by 2030

Percentage point change



500,000 more high-wage jobs

700,000 fewer middle-wage jobs

100,000 fewer low-wage jobs

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: McKinsey Global Institute analysis

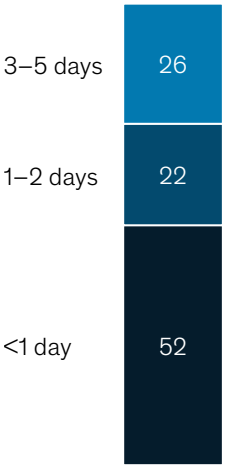
United Kingdom

The United Kingdom may experience moderate work disruption from COVID-19, with 14 percent more workers (300,000) needing to move into different occupations. This reflects the United Kingdom's large service economy, with high numbers of workers in retail, food service, and office work—all jobs that are vulnerable to displacement from the increase in e-commerce and automation. The United Kingdom has a high potential for remote work, reflecting the large number of office-based workers.

Key trends accelerated by COVID-19

Remote work potential by number of days per week, 2018 workforce

%



26%

Can work 3 days or more per week remotely

Automation displacement, 2030 workforce, %

Incremental in post-COVID-19

Pre-COVID-19

5.9M

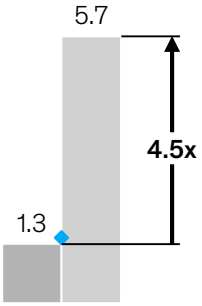
Workers displaced by automation in pre-COVID-19 scenario

6.7M

Workers displaced by automation in post-COVID-19 scenario

Year-over-year growth of e-commerce sales as percentage of total retail sales

Percentage points



Projected 2019–20 based on 2015–19 trend

2015–19

2019–20

Net employment

Occupational categories	Post-COVID-19:[1] net employment change 2018–30, %	Difference in net employment between pre- and post-COVID-19 scenarios, thousand	2018 employment, million
Health aides, technicians, and care workers	27	**102**	2.0
Health professionals	20	31	1.4
Creatives and arts management	17	28	1.0
STEM professionals	16	97	2.5
Managers	10	25	4.1
Business and legal professionals	6	11	2.8
Educator and workforce training	5	26	2.5
Transportation	5	**113**	1.1
Agriculture	2	9	0.5
Production and warehousing work	-2	51	2.3
Mechanical installation and repair	-2	33	0.7
Builders	-4	74	1.5
Community services	-4	44	1.4
Property maintenance	-4	-41	0.8
Customer service and sales	-7	**-291**	2.6
Food service	-14	**-195**	1.5
Office support	-16	-117	3.7

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

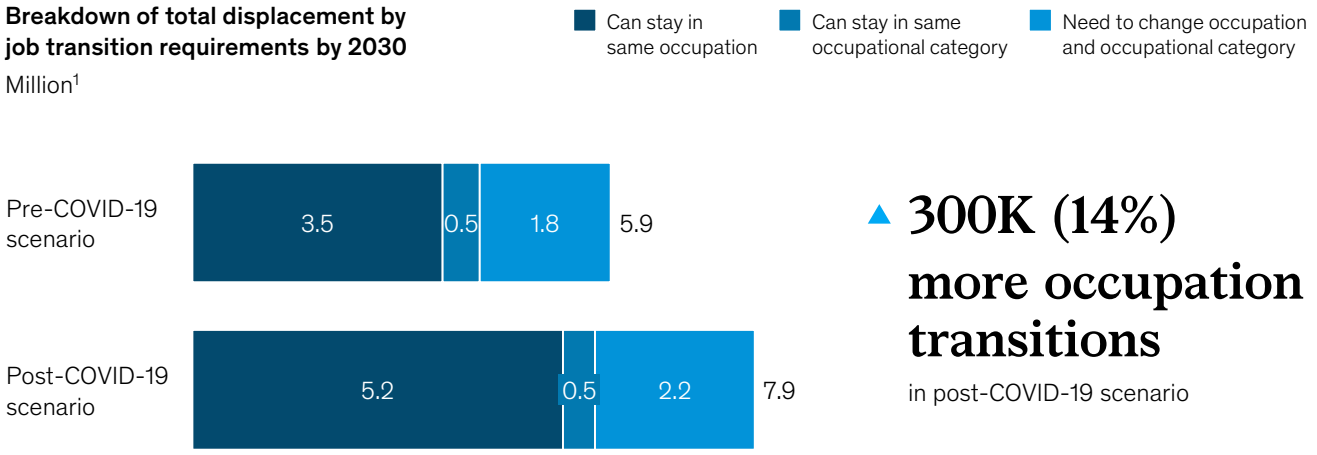
Source: McKinsey Global Institute analysis

United Kingdom (continued)

Job transitions

Breakdown of total displacement by job transition requirements by 2030

Million[1]



▲ **300K (14%) more occupation transitions**

in post-COVID-19 scenario

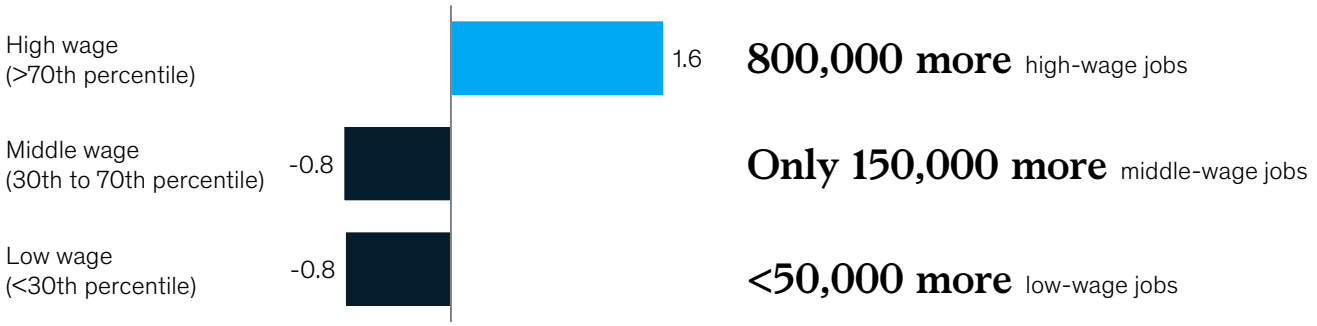
Example occupations from occupational categories requiring the most job transitions

Example occupations	Transitions needed Thousand	Occupational category
Bookkeeping, accounting, and auditing clerks	150	Office support
Retail salespersons	150	Customer service and sales
Tellers	130	Office support
Bartenders	50	Food service
Food servers	50	Food service
Metal-refining furnace operators	40	Production and warehousing
Cashiers	40	Customer service and sales
Accountants and auditors	40	Business/legal professionals
Paralegals and legal assistants	20	Business/legal professionals
Production inspectors and testers	20	Production and warehousing

Demographics

Change in employment share by wage bracket in post-COVID-19 scenario by 2030

Percentage point change



800,000 more high-wage jobs

Only 150,000 more middle-wage jobs

<50,000 more low-wage jobs

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: McKinsey Global Institute analysis

United States

The United States is one of the countries with the most potential labor market disruption after COVID-19, reflecting its large service sector employment and acceleration in e-commerce and automation. Some 3.8 million more Americans may need to change occupations after the pandemic than before it, a 28 percent increase. Nearly all net job growth over the next decade is projected to be in high-wage occupations, particularly in healthcare and STEM. The rise of the delivery economy in the postpandemic scenario may create an additional 800,000 jobs in transportation, but they will not offset the loss of 4.3 million jobs in customer service and sales and food service.

Key trends accelerated by COVID-19

Remote work potential by number of days per week, 2018 workforce

%

22%

Can work 3 days or more per week remotely

Automation displacement, 2030 workforce, %

Incremental in post-COVID-19

Pre-COVID-19

36.9M

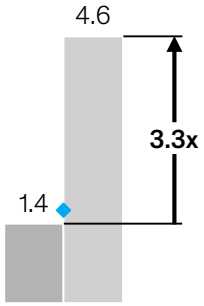
Workers displaced by automation in pre-COVID-19 scenario

45.3M

Workers displaced by automation in post-COVID-19 scenario

Year-over-year growth of e-commerce sales as percentage of total retail sales

Percentage points



Projected 2019–20 based on 2015–19 trend

2015–19

2019–20

Net employment

Occupational categories	Post-COVID-19:[1] net employment change 2018–30, %	Difference in net employment between pre- and post-COVID-19 scenarios, million	2018 employment, million
Health aides, technicians, and care workers	36	**0.8**	11.6
Health professionals	32	0.6	7.0
STEM professionals	24	0.7	8.3
Creatives and arts management	18	0.1	2.2
Managers	16	0.3	8.0
Transportation	13	**0.8**	5.4
Property maintenance	10	-0.1	4.1
Business and legal professionals	5	0	15.6
Educator and workforce training	2	0.2	10.6
Community services	1	**0.8**	9.8
Builders	0	0.7	7.8
Agriculture	-1	0.1	2.0
Mechanical installation and repair	-2	0.3	6.3
Food service	-5	**-1.1**	14.8
Production and warehousing work	-6	-0.1	13.0
Customer service and sales	-8	**-3.2**	15.8
Office support	-17	-0.9	22.1

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

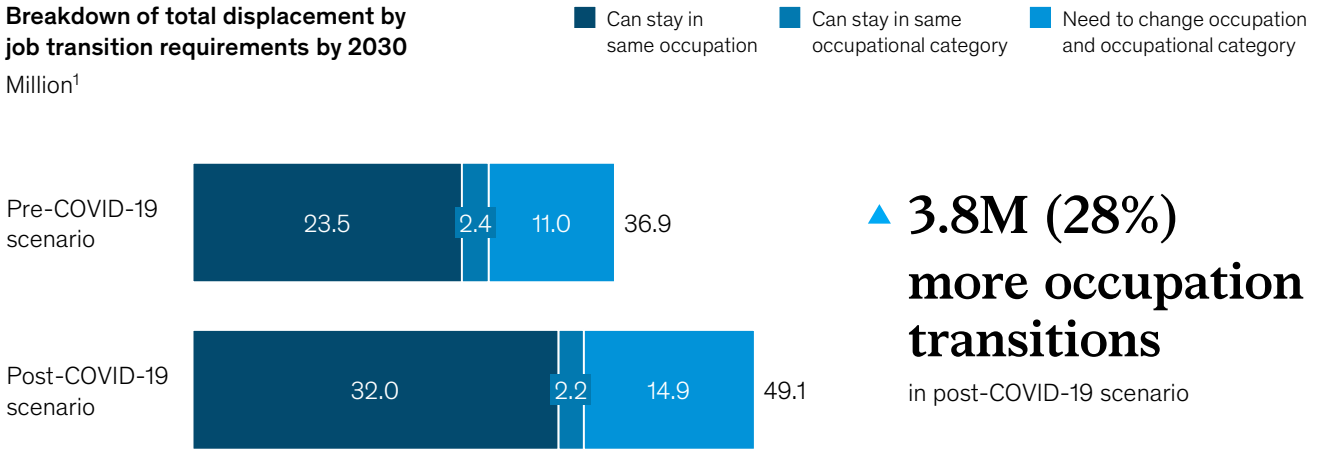
Source: McKinsey Global Institute analysis

United States (continued)

Job transitions

Breakdown of total displacement by job transition requirements by 2030

Million[1]



▲ **3.8M (28%) more occupation transitions**

in post-COVID-19 scenario

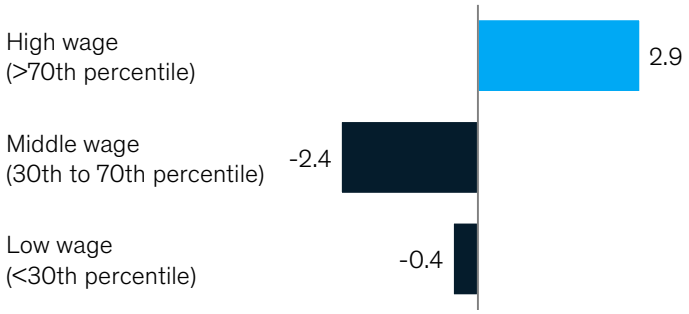
Example occupations from occupational categories requiring the most job transitions

Example occupations	Transitions needed Thousand	Occupational category
Office clerks	1,050	Office support
Retail salespersons	930	Customer service and sales
Cashiers	630	Customer service and sales
Secretaries and administrative assistants	560	Office support
Welders, cutters, solderers, and brazers	240	Production and warehousing
Counter attendants	230	Food service
Insurance sales agents	190	Business/legal professionals
Food servers	180	Food service
Paralegals and legal assistants	140	Business/legal professionals
Package packers	140	Production and warehousing

Demographics

Change in employment share by wage bracket in post-COVID-19 scenario by 2030

Percentage point change



6.6M more high-wage jobs

1.9M fewer middle-wage jobs

Only 900K more low-wage jobs

1. The pre-COVID-19 scenario includes effects of eight trends: automation, rising incomes, aging populations, increased technology use, climate change, infrastructure investment, rising education levels. and marketization of unpaid work. The post-COVID-19 scenario includes all prepandemic trends as well as accelerated automation, accelerated e-commerce, increased remote work, and reduced business travel.

Source: McKinsey Global Institute analysis

Technical appendix

This appendix provides methodological details on the following analyses:

1. Work arenas
2. Remote work potential
3. Net labor demand
4. Impact of labor demand changes by demographic group
5. Job transitions and skill shifts
6. Potential limitations

1. Work arenas

We group more than 800 occupations in the eight focus countries into ten work arenas based on their level of physical proximity. To determine the level of physical proximity, we create a physical proximity score for each occupation and aggregated them at the level of each work arena, based on five metrics. For each metric, we use data from O*NET scores along with some calibrations across occupations. The metrics are the following:

— **Physical closeness to others** describes how close a worker is required to get to other people. We use the O*NET score for "physical proximity" as an input for this metric.

— **Frequency of interactions** describes how frequently a worker physically interacts with the same or different people. We use the O*NET score for "face-to-face interactions" as an input for this metric.

— **Exposure to strangers** describes how frequently a worker must interact with strangers. We use the O*NET score for "dealing with external customers" as an input for this metric.

— **Indoor work** describes whether an occupation is typically performed indoors. We use the O*NET metric for "indoors, environmentally controlled" as an input for this metric.

— **Site-dependent work** describes whether an occupation requires being on-site, either in order to use special equipment or machinery or to take care of a building or area. We use an average of O*NET scores for "spends time using your hands to handle, control, or feel objects, tools, or controls" and "assisting and caring for others" for this metric.

A physical proximity score is first defined for each occupation using 2010 Standard Occupation Classification (SOC) codes from the US Bureau of Labor Statistics, and then defined for the whole work arena. For each occupation, we take a simple average of these five metrics, where each individual metric receives a score between 1 and 100 as defined by O*NET.

Based on the physical proximity score, we group occupations with similar scores into ten work arenas: medical care, personal care, customer interaction, leisure and travel, home support, indoor production and warehousing, classroom and training, computer-based office work, transportation of goods, and outdoor production and maintenance. The physical proximity score for a whole arena is calculated by taking a simple average of the scores of the occupations included in the work arena. We keep the score constant for the same occupation across countries, while the proportion of different occupations in each arena differs across countries based on their labor force structure.

We measure each work arena against a set of future of work outcomes, including the following:

— **Potential for remote work:** We calculate the percent of time that could be spent working remotely by work arena, based on our estimation of remote work potential by activity and occupation as described in section 2, below.

— **Change in adoption of digital technologies:** We measure the level of digitization by work arena based on the McKinsey Global Institute Digitization Index from 2015, applying a multiplier for each arena to estimate how much digital adoption had accelerated since then, and particularly since the outbreak of the pandemic, from McKinsey surveys. The Digitization Index is based on investment in digital assets, use of digital channels, and investment in digital training and skills.

— **Change in automation adoption:** For each work arena, we estimate the percentage point change in share of workers who could be displaced by automation from 2018 to 2030 between the pre- and post-COVID-19 automation scenarios using the McKinsey Global Institute Automation Model. Details on our methodology for automation displacement and descriptions of our scenarios appear in section 3, below.

— **Labor demand growth:** We estimate the percentage point change in labor demand growth from 2018 to 2030 between the pre- and post-COVID-19 scenarios for each work arena. Further details on how we estimate labor demand growth can be found in section 3, below.

— **Occupation transitions:** We estimate the percentage point change in share of the workers needing to switch occupations from 2018 and 2030 between the pre- and post-COVID-19 scenarios in each work arena.

2. Remote work potential

We estimate remote work potential by work activity, which in turn aggregates up to remote work potential by occupation and by country. The metric we calculate is percentage of time that could be spent working remotely. We determine the remote work potential of more than 2,000 work activities and aggregate it up to more than 800 occupations based on time spent per occupation on each work activity.

First we estimate the time spent on each activity by occupation. The 2018 O*NET database of the Employment and Training Administration of the US Department of Labor provides frequency scores for each activity ranging from 1 (rarely, once a year, or less) to 7 (frequently, daily, or more). The score is used to calculate corresponding time factors. We plot these scores against the time factor, which is assigned for given integer frequency. We then scale by number of working hours per year to calculate time spent on each activity by job title.

We then analyze the time spent on more than 2,000 work activities in more than 800 occupations and assess the theoretical feasibility of carrying out each of the work activities remotely. This is done by considering the action (for example, analysis) and work context (for example, equipment use or customer service) of a work activity. For instance, answering customer queries as a telemarketer could be done remotely, whereas answering customer queries as a cashier requires physical presence in a store. This assessment classifies each work activity into one of three groups: can be done remotely, cannot be done remotely, or depends on occupational context. For activities whose remote work potential depended on occupational context, we classify them differently for different occupations based on the context in each case. After our previous findings on remote work potential we have scaled back our assessment of remote work possible among clerks in the German manufacturing sector, who may need to be physically present to carry out clerical activities such as inspecting goods and documenting processes.

We then develop two scenarios: the theoretical maximum remote working potential and the effective remote working potential. The theoretical maximum remote working potential for a given occupation is calculated as the proportion of time spent in work activities

that can theoretically be done remotely, although they may lose some effectiveness. To estimate the effective potential for remote work, we examine the set of activities that could theoretically be done remotely and exclude activities where there is a clear benefit to doing the activity in person, including coaching, counseling, and providing advice and feedback; building customer and colleague relationships; bringing new employees into a company; negotiating and making critical decisions; teaching and training; and work that benefits from collaboration, such as innovation, problem solving, and creativity. We base our calibration of the potential loss of effectiveness on surveys and expert interviews with organization experts. Our effective remote work potential for a given occupation is then calculated as the proportion of time spent on work activities that can be performed remotely without any loss of effectiveness and productivity.

3. Net labor demand

We construct two scenarios of net labor demand: pre-COVID-19 and post-COVID-19. The pre-COVID-19 scenario estimates the labor demand effects of MGI's midpoint automation scenario and seven long-term trends, drawn from 20 broader trends after conducting high-level sizing to estimate their potential to create labor demand by 2030: rising incomes, which represent increased consumer spending as well as overall spending on healthcare and education that results from increased prosperity; aging populations, which in many countries will raise healthcare demand; investment in technology that companies employ in the wake of increasing rate of technological progression; ongoing spending on infrastructure and commercial and residential buildings; the shift away from fossil fuels and move toward green energy production; investment to improve education standards; and marketization of unpaid care work as more women enter the labor force. Modeling for the pre-COVID-19 scenario leverages the approach from previous MGI reports; more details of previous methodology can be found in the technical appendix of *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages* (2017), which was based on data from 2016. We update those models with the latest available economic and labor force data and make some methodological improvements to come up with an updated view on the pre-COVID-19 scenario for net labor demand in 2030, which may differ from the estimates previously published. We make the assumption that each of the eight focus countries will return to full employment by 2030. This approach allows us to focus on the change in the mix of occupations, rather than on the overall employment level.

The post-COVID-19 scenario projects the labor demand effects of pre-COVID-19 trends and three COVID-19 trends: increased remote work and virtual meetings, shift to e-commerce and other virtual transactions, and faster adoption of automation and AI. For both pre- and post-COVID-19 scenarios, the steps in estimating final labor demand at the occupation level are (a) create a 2018 employment baseline with standard occupation taxonomy; (b) construct a baseline of employment in 2030; (c) size the jobs lost and jobs gained effects of each trend (in the case of the post-COVID-19 scenario, including COVID-19 trends); and (d) subtract or add job losses and gains from the 2030 employment baseline and scale employment proportionally to return to full employment.

a. Create a 2018 employment baseline

We use employment data from national statistical agencies, such as the UK Office for National Statistics, US Bureau of Labor Statistics, and India Ministry of Statistics and Programme Integration, at the most granular occupation level available to create a baseline of 2018 employment. These data are mapped to US SOC 2010 occupation codes for modeling and homogeneity purposes, using publicly available occupation taxonomy crosswalks, for example ISCO-08 to SOC 2010, and based on occupation definitions.

b. Construct a baseline of employment in 2030

Employment in 2030 at the national level is calculated using the following formula:

*Employment 2030 = population * participation rate * (1 - unemployment rate)*

Forecasts from the United Nations (population), International Labour Organization (labor force participation), and Oxford Economics (unemployment) are used. First, population and labor force participation rates by five-year bands are used to calculate the size of the labor force; working-age population is assumed to be 15 years old and up. Then size of labor force is aggregated to the country level, and country unemployment forecasts are applied to compute employment. For advanced economies, namely France, Germany, Japan, Spain, the United Kingdom, and the United States, this national employment baseline is broken down into the sector-occupation level using 2018 sector-occupation mix. For developing economies, namely China and India, in order to incorporate the effect of long-running historical trends such as urbanization and the shift from agriculture to secondary and tertiary industries, we first project the change in sector mix by 2030 based on productivity assumptions from MGI–Oxford Economics macroeconomic projections; some productivity assumptions are adjusted based on local expert input. The 2018 occupation mix is then applied to each sector to generate 2030 baseline employment by sector-occupation. Occupational data are extrapolated to 2018 from the latest available year, where 2018 data were not yet released at the time of analysis.

c. Size the jobs lost and jobs gained effects of each trend

MGI's Automation Adoption Model

This report continues and adapts the methodology and findings of the McKinsey Global Institute report *A future that works: Automation, employment and productivity* (2017). A full methodology of that work is detailed in its technical appendix.

In line with our previous approach, in this report, the technical potential for automation of the global economy and projected adoption rates are determined by an analysis of the underlying work activities for each occupation in 53 countries. It uses databases published by institutions including the World Bank and the US Department of Labor (2018 O*NET database) to break down about 800 occupations into more than 2,000 activities, and it determines the performance capabilities needed for each activity based on the way humans currently perform them. The report further breaks down each activity into 18 capabilities and assesses their technical automation potential. This framework is informed by academic research, internal expertise, and industry experts.

Our report focuses on 2018–30, and thus takes the automation adoption percentage through 2030. We use our findings to size the number of jobs that could be automated by 2030. We assume that each hour of work that could be automated will result in proportional job loss. For example, if 10 percent of current work hours in an occupation could be displaced, then 10 percent of jobs in the baseline would be displaced by 2030, because fewer work hours are needed to complete all required activities.

In our earlier research, we estimated three scenarios of automation adoption or displacement rate: an early adoption scenario with an accelerated timeline; a late scenario in automation adoption due to a mix of factors like slower technology and solution development, among others; and a midpoint scenario, which is the average of the early and late adoption scenarios (see the technical appendix of *Jobs lost, jobs gained: What the future of work will mean for jobs, skills, and wages* for a more detailed explanation of the early, midpoint, and late scenarios). All pre-COVID-19 analyses in this report are based on the displacement rate in the midpoint scenario.

Our post-COVID-19 scenario is one of accelerated automation. In it, the displacement rate for an occupation starts with the midpoint displacement rate. We then draw on the results of a survey of 800 executives on intentions to accelerate automation adoption and roughly 80 interviews with McKinsey experts in relevant sectors and practices to identify 139 occupations that could experience increased automation displacement due to COVID-19, and triangulate the results with the latest literature on automation. For the identified occupations, we increase the automation displacement rate from the midpoint adoption rate to a level between the midpoint and early adoption scenarios. The magnitude of the acceleration is estimated based on inputs from the executive surveys and interviews mentioned above.

MGI's Jobs Gained Model and trends accelerated by COVID-19

To model job growth through 2030 for seven long-term, pre-COVID-19 trends, we adapt the methodology and findings of the MGI report *Jobs lost, jobs gained: Workforce transitions in a time of automation.* The adapted approach we use in this report is detailed below.

Rising incomes

Our rising incomes trend represents increasing consumer spending as well as overall spending on healthcare and education that results from increased prosperity, that is, rising GDP per capita. We take GDP per capita projections as an exogenous input to our modeling for all drivers related to changed spending. For consumer spending, we use univariate regression analysis to identify spending trends by category based on 2018 GDP per capita and 2018 consumption per capita data for the 53 countries in this model. With GDP per capita changes from 2018 to 2030 as the independent variable, we model change in spend by category for accommodation and food service, automobiles, clothing, financial services, food, household goods, leisure goods, leisure services, and utilities. (To avoid double counting, we exclude some categories of consumer spending, such as public transportation, which could overlap with our infrastructure investment trend.) An adjustment is made across categories to cap overall consumption in order to ensure that our regression analyses do not imply a major shift in consumption per capita. To do this, we scale overall consumption to a low and high scenario based on consumption per capita projections from the McKinsey Global Growth model. We then multiply the 2018 and 2030 spending by 2018 and 2030 job multipliers, respectively. The productivity-adjusted 2030 job multiplier accounts for an increase in productivity, which drives some consumption categories to negative job growth in countries where productivity growth outstrips demand growth, such as the agriculture sector in India. Additionally, we use indirect job multipliers to capture the demand created in other sectors that supply these sectors. Goods and services modeled under rising incomes are determined to be tradable or nontradable, and the labor demand for those that are tradable is distributed according to 2018 levels of global trade. Given the discrepancies between countries in funding models for education and healthcare, these trends are sized separately from the rest of consumer spending to take into account other important drivers of demand other than income.

Healthcare: Aging populations and rising incomes

In addition to rising incomes increasing demand for jobs in healthcare, aging populations in many countries will likewise raise healthcare demand. We model the effects of rising incomes and aging together to avoid double counting the increase in healthcare jobs. The change in the number of healthcare jobs is modeled through bivariate linear regression with 2018 GDP per capita, and the old-age dependency ratio as independent variables and healthcare professionals per capita in 2018 as the dependent variable for all countries in our model. We use this model to estimate the increase in healthcare professionals as GDP per capita increases and as the population ages from 2018 to 2030 levels. We account for all parts of the healthcare delivery sector, including hospital care, home care, nursing homes, and support roles. We then use indirect job multipliers to capture jobs created in other sectors that are suppliers to the healthcare sector.

Education: Higher education and need for more workforce training

We model the full education sector, including subsectors funded by consumers as well as public- and private-sector funding. We see a trend toward increased numbers of jobs in education as GDP per capita rises. We model this relationship through univariate regressions on student-teacher ratios (STR) and gross enrollment rates (GER) at the primary, secondary, and tertiary levels using 2018 data for all 53 countries in this model. We also capture the effect of aging populations; if there is low population growth and the population is aging, this decreases education jobs, and vice versa. The general formula we use is the following:

[(2030 student age population / 2030 STR) * 2030 GER] - [(2018 student age population / 2018 STR) * 2018 GER]

We use this to model education jobs in 2030, then subtract the number of jobs in 2018 to size the incremental labor demand in education. We then use indirect job multipliers to capture jobs created in other sectors that are suppliers to the education sector.

Investment in new technology

We identify trends between rising GDP per capita and spend on information technology. For enterprise IT spending, we find that a country's GDP is correlated with the amount spent on hardware, software, and IT services. For consumer technology spending, we consider only the hardware and software components of spend, finding that the richer a population (meaning the higher the GDP per capita), the higher its spending on technology. We use univariate linear regression analyses to find a relationship between 2018 GDP per capita as the independent variable and each category of IT spending per capita in 2018 (including consumer and enterprise spending) as the dependent variable across all 53 countries. These categories of IT spending are then multiplied by productivity-adjusted job multipliers for 2018 and 2030 to calculate net new jobs. All data are based on historical baselines from the IDC Worldwide Black Book published in November 2020. Finally, we use indirect multipliers to capture jobs created in sectors supplying to the IT sector.

Because the consumer technology element of rising incomes is captured within this driver, we omit it from the rising incomes driver. Likewise, since the infrastructure driver captures telecommunications and electric utilities, we do not consider increase in technology infrastructure spend as part of our technology definition, in order to avoid double counting. Finally, this driver assumes that technology spend grows according to current trends and thus does not consider the scenarios of extraordinary technology spend that are possible in more rapid automation scenarios.

Infrastructure investment

We use the scenarios for projected gross value added in construction and infrastructure from Oxford Economics and IHS Markit Comparative Industry November 2020 to estimate job creation by 2030. These 2018 and 2030 infrastructure spending numbers are multiplied by 2018 and 2030 job multipliers, respectively, for the construction sector to estimate jobs in each year. The 2030 job multipliers, as with other catalysts, are calculated using productivity growth as discussed below. The difference is the incremental addition of new infrastructure jobs between 2018 and 2030.

Shift away from fossil fuels and greening of the economy

This labor demand driver captures the potential job creation due to the shift in mix of electricity generation. The potential increase in jobs in electric power generation due to increase in demand for power is captured in the utilities category of consumer spending driven by rising incomes. We avoid double counting by isolating the mix shift effect in this driver. Using McKinsey modeled scenarios for gigawatt capacity in 2030, we multiply projected GW capacity by a jobs-per-GW multiplier across manufacturing, decommissioning, fuels, construction and installation, operations, and maintenance by energy type, such as solar, coal, and gas. Given the rapid and hard-to-predict changes in productivity in the renewables value chain, we model a minimum scenario in which rapid productivity growth continues and a maximum scenario in which productivity gains plateau. We then shift GW capacity toward renewables targets that could help slow global temperature increases to two degrees Celsius above preindustrial levels. This shift results in greater numbers of jobs created to change the energy generation mix by country.

We model potential spend on energy efficiency using estimates from the International Energy Agency's 2014 World Energy Investment Outlook report. We use the IEA model New Policies Scenario. In the New Policies Scenario, "energy demand and supply projections reflect energy policies and measures that have been adopted as of early 2014, as well as other commitments that have been announced, but not implemented, taking a cautious view of the extent to which these may be realized." We then use job multipliers to estimate the number of incremental jobs associated with the increase in spending that the IEA projects between 2018 and 2030 and use indirect multipliers to capture jobs created in other supplying sectors.

Marketization of currently unpaid home work
We use local time-use surveys to understand the amount of time spent in various countries on unpaid domestic work, including cooking, cleaning, childcare, and eldercare. We estimate the number of hours that can be professionalized by reducing the number of hours spent on a given domestic activity closer to the lowest value among peer countries, taking into account what reduction can be realistically achieved by 2030. We then make assumptions about productivity gains in each activity through professionalization to estimate the potential for new labor demand creation.

Increased remote work and virtual meetings
This trend consists of two effects: the fall in demand for certain goods and services due to increased remote working and the fall in spending in the travel and hospitality industry from reduced business travel. For remote work, we first identify occupations that may be affected by a fall in demand for commuting services and office management—for instance, subway drivers and office custodians. We then estimate the number of jobs displaced due to increased remote work by applying remote work potential estimates from the effective potential scenario described above; an increase in remote work causes a commensurate fall in demand for these services and thus labor demand for identified occupations. For job displacement due to reduced business travel, we create two scenarios for spending using data and forecasts from the Oxford Economics Tourism Model: pre-COVID-19 and post-COVID-19. In the pre-COVID-19 scenario, spending in 2030 is estimated by applying historical trends from 2019. In the post COVID-19 scenario, spending in 2030 is estimated by applying historical growth rates from 2022; business travel that did not return by 2022 is assumed to be replaced by virtual ways of working. The difference in spending between the pre- and the post-COVID-19 scenarios is converted to job displacement using job multipliers.

Shift to e-commerce
We use data from Euromonitor International Retailing 2020 Edition on online and offline retail sales value. Euromonitor projects this data to 2024, and we project online retail sales value to 2030 using scaled historical growth rates for online retail sales. In many countries, e-commerce is in its infancy and sees large historical growth rates. We classify countries into four groups based on their current e-commerce maturity and scale down a country's projected online retail growth rate based on the historical pattern of growth observed in its peer group.

We first regress the dependent variable of gross value added in the transportation and warehousing and the retail and wholesale sectors, with the independent variables of GDP and online and offline retail sales, using 2018 values for 67 countries. Using the regression and projected 2030 online retail sales value, additional GVA from e-commerce is estimated while holding GDP and offline retail sales value constant to isolate e-commerce growth effects. We then use direct and indirect job multipliers to calculate additional jobs from increased GVA due to e-commerce growth. This analysis does not take into account the negative effects of e-commerce—for instance, a negative effect on offline retail sales from higher e-commerce sales. The literature on the net effects of e-commerce is unclear, and we take the middle-of-the-road assumption that the number of jobs created from the e-commerce trend will equal the number of jobs displaced. For instance, e-commerce may lead to displacement of food servers but an increase in food delivery drivers.

However, after assuming an equal number of jobs are created as are displaced due to the e-commerce trend, we apply two more impacts, which means the final results are not necessarily equal (see the country perspectives following chapter 6). The first is that for every job created or displaced, some additional indirect jobs are added or displaced. For example, an increase of one delivery driver might create indirect demand for a truck manufacturer. The second impact is automation; we assume that some of the jobs that are created due to the e-commerce trend will be displaced by automation, and the automation displacement rate differs by occupation.

Job multipliers

For drivers of labor demand in which we model an increase in spending, we use job multipliers from input-output tables to calculate the number of jobs created with each additional dollar of spending. In many drivers based on linear regression analysis (for example, rising consumer spending), the general sizing approach for the number of jobs created incremental to 2018 levels is captured in the following formula:

Net new jobs = (2030 spend per capita × 2030 population × 2030 I–O multiplier)—(2018 spend per capita × 2018 projected population × 2018 I–O multiplier)

To take into account projected increases in productivity between 2018 and 2030, we adjust 2018 job multipliers for projected productivity gains (from factors other than automation) to create a 2030 job multiplier. For all labor drivers, we calculate indirect jobs using indirect job multipliers from McKinsey input-output tables based on source data from the World Input-Output Database, making adjustments informed by expert input as necessary. To avoid double counting, we remove particular indirect multipliers if they may overlap with our drivers. For example, we exclude all indirect effects in healthcare, education, and construction, since we have sized these drivers independently. This may undercount job creation in these areas.

d. Scale employment proportionally to return to full employment

To calculate final net labor demand in 2030, we sum the sized job gains and losses from the relevant trends and 2030 baseline employment. In the pre-COVID-19 scenario, this is displacement in MGI's midpoint automation scenario and job gains from seven long-term trends. In the postpandemic scenario, it is all the effects from the pre-COVID-19 scenario and the job gains and losses from the three COVID-19 trends. This gives us a new distribution of jobs across our more than 800 occupations. After summing job losses and gains, national employment may not correspond to the initial calculated employment—we add or subtract jobs across occupations using the distribution after applying our trends to return to the calculated full employment baseline; this preserves a mix of occupations after applying our trends while assuming we return to full employment by 2030.

4. Impact of labor demand changes by demographic group

We estimate the impact of labor demand changes by different demographic groups, and measure the impact of labor demand changes, on the change in distribution of workers across wage brackets.

The different demographic groups we investigate are women, low-wage workers, young workers, those without a college degree, members of ethnic minority groups, and immigrants. For the United States, we use data from the Bureau of Labor Statistics, and for Europe we use data from Eurostat for the number of hours worked by a full-time employee in a year. For occupations with no published hourly wage, the annual wage is calculated from reported survey data. We calculate three wage brackets: the low-wage bracket includes the 30 percent of the workforce that earns the lowest wages; the high-wage bracket includes the 30 percent earning the highest wages, and the middle-wage bracket includes the 40 percent of the workforce earning wages in between those earned in high- and low-wage brackets. In India, 41 percent of the workforce as of 2018 was employed in agricultural occupations, which are typically low wage. So we use different wage bracket classifications for India's workforce: The high-wage bracket covers the top earning 20 percent of the workforce, the low-wage bracket the lowest earning 40 percent, and the middle-wage bracket includes the 40 percent earning wages between the low- and high-wage brackets.

Brackets are not always at these exact thresholds across countries because we do not split occupation categories between wage brackets. Wages were kept constant in our analysis; for instance, if an occupation was in a wage bracket in 2018, it remained the same wage bracket in 2030 analyses.

5. Job transitions and skill shifts

Job transitions

For advanced economies, namely France, Germany, Japan, Spain, the United Kingdom, and the United States, job transitions are defined as jobs in net declining occupations compared to the 2030 baseline. For developing economies, namely India and China, due to data accuracy challenges, we put each occupation in one of 60 categories—for example, production workers—and one of five skill levels. A worker would need to make an occupational transition if their job is in a category and skill combination that is, on net, seeing labor demand declines compared to the 2030 baseline. For details on how we estimate baseline and net labor demand by occupation, see section 3, above.

Skill shifts

We seek to quantify skill shifts using a set of 25 workforce skills in five categories: physical and manual, basic cognitive, higher cognitive, social and emotional, and technological skills. These skills are based on previous MGI work, primarily the 17 skills used in the report *Artificial intelligence: The next digital frontier?* (2017) as well as other frameworks used externally.

We map these skills to individual work tasks by assigning each of the more than 2,000 workplace activities from the US Bureau of Labor Statistics O*NET OnLine database to a specific skill required to perform the activity. While workers use multiple skills to perform a given activity, for the purposes of our quantification, we identify the main skill used. For example, in banking and insurance, we map "prepare business correspondence" and "prepare legal or investigatory documentation" to the skill "advanced literacy and writing," which is grouped in the category of higher cognitive skills. In retail, we classify "stock products or parts" in "gross motor skills and strength" in the category of physical and manual skills, while "greeting customers, patrons, or visitors" is mapped to "basic communication skills" in the basic cognitive category.

To quantify skills, we then estimate the number of hours that workers spend performing the activities mapped to that skill. To allocate a specific number of hours to each activity, we use data from the 2018 O*NET database (see section 2, above, for further details). As the number of hours in each activity (by country and by sector) changes with automation and future job growth, so does the number of hours spent exercising different skills.

Since our approach ties each individual activity to a single skill, only pure IT activities such as operating a computer are tagged under "basic digital skills." This understates the importance of this group of skills, as workers' aptitude at working with digital technologies has increasingly become a core part of many positions that are not typically thought of as IT jobs. For example, designers today need to be able to work with computer-based design software, and fluency with digital tools is a prerequisite. We consequently apply a refinement to correct for the digital component of work not being fully reflected in the activities associated with most jobs. We reallocate a portion of hours from activities requiring nontechnological skills to basic digital skills to account for their digital requirements. For example, professional driving now often requires the use of GPS and thus some basic digital skills. To determine how much of these hours to reallocate in each occupation, we use the digital score devised by Mark Muro and colleagues at the Brookings Institution. We first examine the relationship between the digital score and digital component of work in the top 50 ICT occupations; the digital component is more explicitly captured in these occupations. Then we extrapolate the relationship between the digital score and digital component of work to other occupations to estimate the digital component of work in those jobs. We also assume a continued digitization trend in line with the shift observed in the 2002–16 period.

To model the skill shift from 2018 to 2030, we then layer in our net labor demand modeling; a change in demand for a given occupation leads to the same change in demand for the skills used in that occupation. See section 3, above, for details on net labor demand modeling.

6. Potential limitations

In addition to smaller caveats we have noted, we acknowledge some larger limitations to our research. This report models only one post-COVID-19 scenario out of the numerous possible outcomes; it is not an attempt to forecast conditions in 2030. Our models rely on macroeconomic forecasts, for example, of GDP growth and unemployment, as of the fourth quarter of 2020. Many factors could cause our macroeconomic assumptions to diverge from reality, including geopolitical tensions, a new recession or unforeseen national events, and changes to government policy. Many governments have also announced large COVID-19 budgets, and how these are spent could affect the shape of the labor market; for instance, some countries are aiming to spend more on environmental investment, which could shift jobs to the green economy.[172]

We also make the following simplifying assumptions, which may cause our analysis to over- or understate the disruption we could see in the next decade:

— **Modeling a limited set of trends:** We model only the effects of our short-listed long-term and COVID-19 trends. Other factors that we have left out could affect labor markets.

— **Using nondynamic and unlinked models:** Our models do not take into account dynamic adjustments that will occur after the impact of each trend; wages may fall, for example, reducing the incentive for firms to adopt automation and reduce displacement rates. Our trends are also modeled separately and do not account for the interconnectivity between trends; for instance, automation may boost productivity, which may cause incomes to rise further and boost job creation among higher-wage occupations.

— **Assuming a return to full employment:** We assume that employment levels will not be affected by the pandemic in the long run. In particular, we assume that the unemployment rate will return to the long-term trend rate and that participation rates and population growth will continue in line with prepandemic expectations. This may not be the case; for instance, long-term structural unemployment could result if workers lose skills and cannot return to the labor market (so-called labor market scarring) or if workers cannot retrain quickly enough to match changing demand for skills.[173]

— **Variation in government response to the pandemic:** Many governments are spending large sums on responding to the COVID-19 pandemic and plan to continue doing so. Where they choose to invest these funds may affect some of the assumptions we have taken in our modeling.

This report continues and adapts the methodology used in previous reports. A fuller description of the potential limitations of our approach to modeling automation and long-term trends can be found in the technical appendix of *The future of work in America: People and places, today and tomorrow.*

[172] See, for example, *Recovery plan for Europe*, European Commission, November 2020, ec.europa.eu.
[173] See, for example, Dave Ramsden, *The potential long-term economic effects of COVID,* Speech at Institute for Policy and Engagement, November 2020, bankofengland.co.uk.

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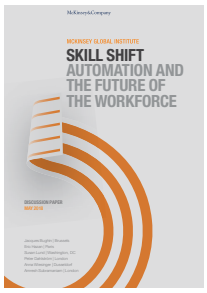

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