

A Hearing of the U.S. House Budget Committee
“Machines, Artificial Intelligence, & and the Workforce:
Recovering & Readying Our Economy for the Future”
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Chairman Yarmuth, Ranking Member Womack, and members of the Committee. Thank you for the opportunity to testify at this hearing. I am Vice President of Governance Studies at the Brookings Institution and co-author with John R. Allen of [*Turning Point: Policymaking in the Era of Artificial Intelligence*](#) (Brookings Institution Press, 2020) and the author of [*The Future of Work: Robots, AI, and Automation*](#) (Brookings Institution Press, 2018). I am the co-editor with Nicol Turner-Lee of the Brookings technology policy blog [TechTank](#) and co-producer with her of the TechTank [Podcast](#).

In my testimony, I argue that artificial intelligence is one of the transformative technologies of our time and likely to have major ramifications for the workforce and the economy. AI is being deployed in a number of different sectors and its usage will accelerate in coming years with advances in computer storage and processing capabilities. It will necessitate rethinking our policies in the areas of budgeting, taxes, infrastructure, agency modernization, health, education, workforce development, economic development, and market competition. The remainder of this memo outlines a series of suggestions for moving forward.¹

What is Artificial Intelligence?

Artificial intelligence is automated software that analyzes data, text, and/or images and makes decisions based on those insights. It is characterized by several qualities that separate AI from traditional computer software: intentionality, intelligence, autonomy, and adaptability. It is these features that enable AI algorithms to find patterns or associations through “neural networks” that group data based on common similarities and act on them. In addition, AI-based systems learn from insights gathered via “deep learning” techniques that use statistics to spot underlying trends or patterns in data and apply that knowledge to changing circumstances. And it is not just numbers that can be mined as AI can employ “natural language processing” (NLP) that has the

¹ For more details on the analysis and recommendations, see Darrell M. West and John R. Allen, [*Turning Point: Policymaking in the Era of Artificial Intelligence*](#), Brookings Institution Press, 2020 and Darrell M. West, [*The Future of Work: Robots, AI, and Automation*](#), Brookings Institution Press, 2018.

capacity to ingest massive amounts of text or video to find patterns and meanings. NLP may be one of the most powerful derivative capabilities to emerge from the AI constellation.²

AI Impact on the Workforce

As AI and other emerging technologies become widely deployed, there are several possible ramifications for the workforce: job loss, job dislocation, job redefinition, job mismatch, and/or job churn. For example, there can be job losses in entry-level and mid-level positions as firms automate routine tasks and apply computational processes to augment or replace human activities. There also can be geographic dislocations as positions migrate to urban population centers clustered on the coasts and in a few metropolitan areas scattered around the heartland. Some positions will get redefined as AI performs tasks that currently are conducted by humans. There certainly will be new jobs created by technology, such as in data analytics and machine learning, but most people do not have the skills necessary to fill those positions so there will be job mismatches. And there could be job churn as people move from company to company. In an economy where benefits are tied to fulltime employment, any increase in job churn would create instabilities and insecurities in people's ability to maintain their income and their health and retirement benefits.

COVID-19, the Workforce, and the Economy

Most of the issues noted above have grown more worrisome with the advent of the COVID-19 pandemic and the resulting recession. Unemployment has grown and millions are suffering economically. Huge segments of the population are "financially unanchored" without sufficient monetary protection. The health and economic devastation coupled with tech disruption creates considerable urgency in making future policy changes that address the workforce in general but the negative consequences for individual workers in particular.

The pandemic has revealed stark inequities in access to online education, telemedicine, and opportunities for remote work. As an illustration, African-Americans are far less likely than Caucasians to access online educational resources and are far more likely to suffer from the coronavirus.³ They also are more likely to have jobs in sectors where the work cannot be performed from home and a number are not able to afford the technologies required to work from their personal residence.

Tech Ramifications for the Federal Budget

It is hard to estimate the precise impact of technology innovation on the federal budget because there are so many direct and indirect ramifications for government revenues and expenses. Shifts

² John R. Allen and Darrell M. West, "The Brookings Glossary of AI and Emerging Technologies," Brookings TechTank, July 13, 2020. <https://www.brookings.edu/blog/techtank/2020/07/13/the-brookings-glossary-of-ai-and-emerging-technologies/>

³ Rashawn Ray, "How to Reduce the Racial Gap in COVID-19 Deaths," Brookings FixGov, April 10, 2020. <https://www.brookings.edu/blog/fixgov/2020/04/10/how-to-reduce-the-racial-gap-in-covid-19-deaths/>

in one area undoubtedly will affect expenditures and revenues in other parts of the budget. A detailed answer to that question would require sophisticated budget modeling.

But one thing that appears clear is we are going to need greater investment by the private and public sectors in several key areas. As I outline below, these areas will include infrastructure, agency modernization, healthcare, education, economic development, and market competition. With the increased importance of lifelong learning in a rapidly changing digital economy, for example, we will need to figure out ways to invest in and deliver effective workforce training, job upskilling, and continuing education.

At the same time, there are likely to be revenue ramifications as the economy shifts toward digital sectors. Many large technology platforms pay a relatively small percentage of their overall revenues in taxes and if that sector grows as a part of the overall economy while firms paying a larger tax share shrink, that could negatively impact government revenues. To deal with that possibility, it may be necessary to close business tax loopholes and/or reenact an alternative minimum tax for large companies.

As an illustration of misaligned tax incentives, research by economists Daron Acemoglu, Andrea Manera, and Pascual Restrepo finds “the U.S. tax code systematically favors investment in robots and software over investments in people”. The reason, according to them, is capital investment in equipment is taxed at 5 percent, while the effective labor tax is around 28.5 percent. The result is a tax code that encourages automation far beyond any efficiency gains represented by the software.⁴

There also could be ramifications for the Social Security Trust Fund if there are job losses that reduce the inflow of payroll taxes. The Congressional Budget Office estimates the program could run out of funds in 2031 due to COVID-related job reductions. Any AI-related job disruption could harm the 40 percent of retired Americans for whom Social Security is their only income source.⁵

Improving Infrastructure

Right now, there are around 18 million Americans who lack sufficient access to the internet.⁶ This creates problems in terms of economic development, education, healthcare, and employment. You need an online connection to apply for many jobs and a number of people do not have the connectivity required for online education, telemedicine, and remote work. The

⁴ Daron Acemoglu, Andrea Manera, and Pascual Restrepo, “Does the US Tax Code Favor Automation?”, Brookings Institution, March 18, 2020. <https://www.brookings.edu/bpea-articles/does-the-u-s-tax-code-favor-automation/>

⁵ Megan Henney, “Social Security Benefit Cuts Could Be Coming,” *Fox Business*, September 4, 2020, <https://www.foxbusiness.com/economy/social-security-benefit-cuts-could-be-coming-heres-who-it-will-affect-first?ocid=uxbndlbing>

⁶ Federal Communications Commission, 2020 Broadband Deployment Report, April 20, 2020, <https://assets.documentcloud.org/documents/6878120/FCC-20-50A1.pdf>

Federal Communications Commission has estimated that it would take \$40 billion to close the bulk of that connectivity gap.⁷

In addition, many people lack laptops, notebooks, smart phones, or electronic devices that allow them to stream videos and take advantage of online service delivery. They are not able to utilize new opportunities in virtual education, telemedicine, and remote work and are stuck in low-paying jobs with little opportunity for advancement.

It is vital to close gaps based on race, income, and geography so that all can benefit from the digital economy. As noted by Nicol Turner Lee, those who lack online access fall behind, are not able to utilize digital resources, and suffer greatly during pandemics and economic downturns.⁸ For individuals falling on the “wrong side” of the digital divide based either on income or race, it is very difficult to advance economically.

Agency Modernization

Government agencies need to modernize their operations and infrastructure in order to become more efficient and effective. Many state and federal organizations have antiquated information technology that is not user-friendly and does not deliver a high quality of service. Tools that have enabled innovation in the private sector, such as cloud computing, artificial intelligence, machine learning, and data analytics, are not widely deployed in most agencies, which harms agency performance and weakens public confidence in government.

This year, there were vivid examples of these problems in the COVID response. Many states had unemployment systems that were not up to the task of delivering assistance to those who filed jobless claims. Across the country, people reported long wait times, IT systems that crashed, and processes that were hard to understand. We need to modernize government agencies so systems can handle citizen needs, are easy to use, and process information efficiently.

Portable Health Benefits and Faster Vesting of Retirement Benefits

The emerging economy presents challenges with respect to ensuring health and retirement benefits. With a number of employers moving toward greater use of temporary staffing with limited benefits, it is vital that we figure out ways to provide essential benefits. Since most benefits are tied to fulltime employment, any increases in temporary jobs or long-term unemployment will necessitate attention to benefit delivery models.

A key to any reform is the idea of *benefit portability*. In the digital economy, people are moving across employers, and these movements could accelerate in the future. As noted by analysts

⁷ Federal Communications Commission, “Improving the Nation’s Digital Infrastructure,” January 19, 2017. <https://www.fcc.gov/document/improving-nations-digital-infrastructure>

⁸ Nicol Turner Lee, “What the Coronavirus Reveals about the Digital Divide Between Schools and Communities,” Brookings TechTank, March 17, 2020. <https://www.brookings.edu/blog/techtank/2020/03/17/what-the-coronavirus-reveals-about-the-digital-divide-between-schools-and-communities/>

Daniel Araya and Sunil Johal, “Introducing portable benefits for independent workers so that pension and health care benefits can be taken from gig to gig while requiring contributions from technology platforms that employ these workers” is an important feature of the emerging landscape.⁹ In today’s world, workers need benefit flexibility to survive in a working environment that can be turbulent and chaotic.

In addition, organizations need to shorten their vesting periods for people to become eligible for company retirement contributions. Right now, many organizations do not vest employees until they have worked at the firm for one or two years. If there is increased joblessness or job churn resulting from tech disruption, lengthy vesting periods will short-change workers, rob them of the benefits of compound interest, and lead to shortfalls in retirement income.

Lifelong Learning and Continuing Education

In a world of rapid technological, organizational, and economic transition, it is imperative that people engage in lifelong learning. The traditional model, in which people focus their learning on the years before age twenty-five, then get a job and devote little attention to education thereafter, is obsolete and dangerously out of tune with the emerging digital era. In the contemporary world, people can expect to switch jobs, see whole sectors disrupted, and need to develop additional skills as a result of major economic shifts. The type of work they do at age thirty likely will be different from what they do at ages forty, fifty, or sixty.

For this reason, it is important that people develop new capabilities throughout their lives. People need to stay abreast of the latest developments and understand that employers will look for different skills as the economy changes. Skills that might be perfectly suited for a certain time may become obsolete due to AI or machine learning and thereby force individuals to update their abilities.

Community colleges are vital in the contemporary situation because they train many adults who need additional coursework. With their lower cost and practical orientation, they are a venue of choice for people of limited financial means and working-class adults wanting to develop new skills. Since they are important in a workforce undergoing transition, it is crucial they be adequately funded so that they can fulfill their mission.

Vocational education and apprenticeship programs also help provide valuable skills and smooth people’s transition into the workforce. Students in these programs can join the workforce with the particular skills that are needed and so can contribute to the economy right away.

One possibility to encourage continuing education is the establishment of a *lifelong learning account*. In an era of fast technological innovation and rapid job displacement, there needs to be a way for people to gain new skills throughout their working lifetime. When people are employed, their companies could contribute a set amount to an individual’s fund. This account could be augmented by contributions from the person him or herself. The funds would be

⁹ Daniel Araya and Sunil Johal, “Work and Social Policy in the Age of Artificial Intelligence,” Brookings TechTank, February 28, 2017. <https://www.brookings.edu/blog/techtank/2017/02/28/work-and-social-policy-in-the-age-of-artificial-intelligence/>

analogous to individual retirement accounts or state government-run 529 college savings plans, but the owner of the account could draw on the account to finance online learning, certificate programs, or job retraining expenses. The account would be portable, so that if the person moved across state lines or switched jobs, the account would migrate with that individual.

Closing Geographic Disparities

As America deploys AI and moves to a digital economy, its two coasts have fared much better economically than the heartland. Much of the technology innovation and resulting economic activity is focused on the East and West coasts and a few metropolitan areas in between.

According to research by Brookings senior fellow Mark Moro and analyst Sifan Liu, about 15 percent of American counties generate about 64 percent of GDP economic activity.¹⁰

That leaves little activity in large parts of the country. Having major geographic inequities is not healthy from an economic or political standpoint. The limited economic activity in rural areas, for example, spawns public discontent and a sense that the system is rigged against those places.

Several communities have sparked economic growth through regional innovation districts. As noted in a 2019 Brookings paper by Robert Atkinson, Mark Muro, and Jacob Whiton, just five cities “Boston, San Francisco, San Jose, Seattle, and San Diego -- accounted for more than 90% of the nation’s innovation-sector growth during the years 2005 to 2017.”¹¹

To improve economic opportunity, these researchers propose public-private partnerships that boost innovation centers in heartland cities. The districts would include regulatory relief, tax benefits, workforce development funding, and infrastructure support designed to spur growth. Some places already have launched innovation districts and been successful at creating new jobs. This approach represents a way to use technology and other sectors to boost growth and better prepare young people for the emerging economy.

Boosting Market Competition

The dominance of large internet platforms complicates the economic situation for small and medium-sized businesses. In a 2020 House Judiciary Antitrust Subcommittee hearing, there were allegations of unfair competition and predatory business practices that hurt these firms. Several legislators suggested greater attention to the “consumer welfare” standard that has guided antitrust enforcement and clarification of the rules regarding possible harms to individuals and businesses.

During a recent Brookings TechTank podcast, Subcommittee Chair David Cicilline called for a Glass-Steagall Act for the internet that would separate the functions of selling goods and services

¹⁰ Mark Muro and Sifan Liu, “Another Clinton-Trump Divide: High-Output America vs. Low-Output America,” Brookings The Avenue, November 29, 2016. <https://www.brookings.edu/blog/the-avenue/2016/11/29/another-clinton-trump-divide-high-output-america-vs-low-output-america/>

¹¹ Robert Atkinson, Mark Muro, and Jacob Whiton, “The Case for Growth Centers: How to Spread Tech Innovation Across America,” Brookings Institution, December 9, 2019. <https://www.brookings.edu/research/growth-centers-how-to-spread-tech-innovation-across-america/>

from setting the overall rules of the marketplace. He suggests it is time to have clearer, fairer, and more transparent rules of the digital marketplace and that we need more inclusive policies to rebuild the overall economy.¹²

The Need for Action

To summarize, America is headed for significant economic disruption due to AI and machine learning, and shifts in business models. It is crucial to think proactively as these changes unfold. The longer we wait, the more stressful and painful the transition will be. Now is the time to start having the national discussions required to make meaningful changes. I applaud this committee for providing a platform for this important conversation. Thank you for your time.

¹² Brookings TechTank Podcast, “Why Rep. David Cicilline Thinks We Need a Glass-Steagall Act for the Internet,” September 2, 2020. <https://www.brookings.edu/blog/techtank/2020/09/02/techtank-podcast-episode-3-why-rep-david-cicilline-thinks-we-need-a-glass-steagall-act-for-the-internet/>