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Automation: Creative Destruction and the Race for Equilibrium

Dustin Rabi

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Automation: Creative Destruction and the Race for Equilibrium

Dustin Rabi

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I. INTRODUCTION

“When the agent for the steam drill company brought the drill here,” said Mr. Miller, “John Henry wanted to drive against it. He took a lot of pride in his work and he hated to see a machine take the work of men like him . . . Well, they decided to hold a test to get an idea of how practical the steam drill was. The test went on all day and part of the next day. John Henry won. He wouldn’t rest enough, and he overdid. He took sick and died soon after that.”¹

Technological advancements have, for the most part, developed in tandem with our society. Recently, however, advancements have begun to amalgamate and accelerate our society towards the verge of an unprecedented economic paradigm shift.² As the current wave of automation begins to be rapidly adopted and normalized into our daily lives—from self-checkout at our local supermarkets to home delivery drones in our air space—it is understandable why this seemingly inevitable transition to an automation driven economy is generating excitement in some and discomfort in others.³ Although technology has without a doubt advanced exponentially in recent decades, the media has not been coy about exploiting the growing anxiety with its rather unsubtle titles such as The New York Times’ “Learning to Love Our Robot Co-Workers,” and The Washington Post’s 2017 article titled “We’re So Unprepared for the Robot Apocalypse.”⁴ Nevertheless, experts are now beginning to concede that automation is no longer the simple tool that allowed us to work faster and smarter. Thus, there may be some validity to the growing concern that automation is becoming the leading competitor to humans as the replacement of the working-class hero.⁵

¹ Guy Johnson, *First Hero of Negro Folklore*, MODESTO BEE & NEWS-HERALD, Feb. 22, 1930, at 55. The legend of John Henry is about a steel driver whose skill was measured against a steam powered rock drilling machine. William Grimes, *Taking Swings at a Myth, With John Henry the Man*, THE N.Y. TIMES (Oct. 18, 2006), <https://www.nytimes.com/2006/10/18/books/18grim.html>. Although he ultimately defeats the machine, the race led to his death due to the extreme physical stress of the challenge. *Id.* The story is often told through a folk or ballad form song that is meant to celebrate the ideals of the human will over the purported benefits of the efficiency of machines. Harry Binswanger, *John Henry, A Steel-Drivin’ Man—And A Luddite*, FORBES (Nov. 20, 2013), <https://www.forbes.com/sites/harrybinswanger/2013/11/20/john-henry-a-steel-drivin-man-and-a-luddite/#35c8390c3ae1>.

² Robert Maxim & Mark Muro, *Automation and AI will disrupt the American labor force. Here’s how can protect workers*, BROOKINGS (Feb. 25, 2019), <https://www.brookings.edu/blog/theavenue/2019/02/25/automation-and-ai-will-disrupt-the-american-labor-force-heres-how-we-can-protect-workers/>.

³ *Id.*

⁴ Lawrence Mishel & Josh Bivens, *The zombie robot argument lurches on: There is no evidence that automation leads to joblessness or inequality*, ECON. POL’Y INST. (May 24, 2017), <http://www.epi.org/publication/the-zombie-robot-argument-lurches-on-there-is-no-evidence-that-automation-leads-to-joblessness-or-inequality>.

⁵ *Id.*; see also Alexa Lardieri, *One-Quarter of U.S. Jobs Are at Risk for Automation*, U.S. NEWS (Jan. 24, 2019), <https://www.usnews.com/news/economy/articles/2019-01-24/report-one-quarter-of-us-jobs-are-at-risk-for-automation>. “Jobs deemed “high-risk” include about [thirty-six] million jobs in office administration, production, transportation and food preparation . . .” tasks

Like all significant paradigm shifts, this wave of automation naturally has and will continue to evoke divided responses and viewpoints. Economic and legal experts are divided as to what exactly is at stake and, consequently, what measures if any are necessary.⁶ In advocating for the adoption of new technology, proponents rely on the purported benefits under the theory of “creative destruction” to justify the estimated job displacements.⁷ Skeptics reject this theory, maintaining that such outlooks are relatively baseless compared to the certainty of workforce disruptions.⁸

The concerns associated with automation originate from the ever-present push and pull tensions between employers and employees. Employers struggle for less restrictive financial burdens and responsibilities, while the employees struggle for fair benefits and labor reform.⁹ From the employer’s perspective, the entitlements employees are striving for are synonymous with “net labor costs or risks that are worth avoiding if possible.”¹⁰ Consequently, it is no surprise that private firms are highly incentivized to reduce labor costs and simultaneously improve job quality.¹¹ Automation and advanced technology come in as key solutions to facilitating both of these efforts by circumventing human labor costs, including those stemming from labor law mandates.¹² The automation option has become even more compelling in recent years as the cost of machines have begun to fall while their capabilities rise.¹³

Previous legislative responses to similar technological adoptions, which created parallel apprehensions of widespread workforce disruptions such as offshoring and fissuring, have provided some helpful guidance.¹⁴ Many mitigating initiatives such as intensive job retraining programs, investments in job creation, new forms of guaranteed income support, and negative income tax have been circulating and analyzed. However, this comment will specifically focus on what is currently understood about automation’s effects on the United States workforce and what legislative efforts have been considered in response.

One thing is certain: many firms have valid reasons and possibly a legal duty to their shareholders to adopt advanced technologies as a means to expand

which “contain physical labor, information collection and routine processing activities, making more than 70[%] of tasks potentially subject to automation.” *Id.*

⁶ Matthew Yglesias, *The automation myth*, VOX (July 27, 2015), <http://www.vox.com/2015/7/27/9038829/automation-myth>.

⁷ Cynthia Estlund, *What Should We Do After Work? Automation and Employment Law*, 128 YALE L. J. 254, 321 (2018).

⁸ Erik Sherman, *Automation Won't Create New Jobs Like Technology Did in the Past*, FORBES (Dec. 17, 2016), <https://www.forbes.com/sites/eriksherman/2016/12/17/automation-has-created-more-jobs-in-the-past-but-will-it-now>.

⁹ Estlund, *supra* note 7, at 284.

¹⁰ *Id.* at 299.

¹¹ David H. Autor, *Why Are There Still So Many Jobs? The History and Future of Workplace Automation*, 29 J. ECON. PERSP. 3, 9–10 (2015).

¹² *Id.*

¹³ U.S. Gov’t Accountability Office, GAO-19-257, *Workforce Automation: Better Data Needed to Assess and Plan for Effects of Advanced Technologies on Jobs* (2019).

¹⁴ Estlund, *supra* note 7, at 283.

productivity, cut production expenses, and improve the quality of their products.¹⁵ In response to this new shift towards automation, Congress requested the U.S. Government Accountability Office (GAO) to obtain more ascertainable data as to what is currently understood about how the adoption of advanced technologies will affect the U.S. workforce.¹⁶ Nine months later, on December 12, 2019, Senate Bill S. 3034, “Trade Adjustment Assistance for Automation Act of 2019,” was introduced and referred to the Committee on Finance. This Bill may be a significant step towards addressing the growing uncertainties and concerns for widespread job displacement associated with automation.

This Comment will analyze the approach which the TAA for Automation Act of 2019 has taken to address the recent developments. In order to assess this Bill, Section II will provide a brief analysis of the history of issues surrounding automation, the current state of developments in automation, and an analysis of the viewpoints of both the proponents as well as the opponents of automation. Section III will analyze the findings presented in the recent report published by the Government Accountability Office. Section IV will look more closely at S. 3034 and other mitigating strategies. Section V will compare how S. 3034 stands in the light of the data findings and other expert strategies.

II. HISTORY, CURRENT STATE, AND THE ADVANTAGES AND DISADVANTAGES OF AUTOMATION

A. Brief History of the Technological Advancements that Led to Automation

The apprehension towards the effects of automation and new technologies on middle-class jobs is not a modern phenomenon. MIT professor of Economics David H. Autor points to two particular instances in history: the Luddite movement of the early 19th century, and the more recent concerns experienced in America during the 1950s and 60s.¹⁷ In the antecedent example, English textile artisans protested the automation of textile production by going as far as attempting to destroy the machines.¹⁸ In 1961, a TIME article titled “The Automated Jobless,” discussed and spotlighted many of the same fears being voiced in today’s media; that automation will prevent the economy from generating new jobs as a result of the industrial trend to increase output with decreased workforces. It is projected that automation adoption will cause industries to “have comparatively few jobs for the unskilled or semiskilled, just the class of workers whose jobs are being eliminated by automation.”¹⁹ The apprehension was severe enough to have led President Lyndon B. Johnson to empanel the “Blue-Ribbon Commission on Technology, Automation, and Economic Progress” to address concerns that “productivity was rising so fast

¹⁵ *Id.* at 291. “[B]oth corporate law and financial-market pressures virtually compel firms to minimize these costs if doing so increases returns to shareholders . . . increasingly firms can avoid those costs—in part through fissuring, but more completely through automation.” *Id.*

¹⁶ *Workforce Automation*, *supra* note 13.

¹⁷ Autor, *supra* note 11, at 9–10.

¹⁸ *Id.*

¹⁹ *Id.*

[that] it might outstrip demand for labor.”²⁰ Although this commission concluded that automation was not a threat to employment, it held that “technology eliminates jobs, not work.”²¹

The history of automation is closely correlated to the history of economic development. Beginning with the Industrial Revolution, dependence on technology as a means of replacing humans in the production of what began with food, textiles, and clothing has grown rapidly.²² A strong case example is the agriculture industry: in 1900, it comprised forty-one percent of the United States workforce, and in 2000, it comprised only two percent.²³ Although the adoption of advanced technologies during these years eliminated many jobs, society has also significantly benefited from the increased efficiency and the lower cost of consumer goods.²⁴ In other words, Automation, in many ways, allowed the “freeing up [of] human labor for new industries,” which in turn allowed us to “cater to the evolving appetites of a more prosperous population.”²⁵ There is little debate that these innovations and developments have led to more good than harm to our collective lives. In the four decades which followed WWII, the U.S. experienced a surge in automation and technological change. However, the changes predominantly diminished occupations, which were “physically demanding, dangerous, and menial work.”²⁶

To assess the current risks of automation, one must ask what is new about the new wave of automated technology? One noticeable difference is the pace at which today’s technology is advancing and the degree and nature of the advancements. Initially, technological advancements primarily affected manufacturing and physical work. However, researchers today are noting the significance of the more recent developments in artificial intelligence (AI) and robotics which are enabling machines to “perform cognitive tasks currently performed by humans.”²⁷ For some time, AI was limited to predefined tasks which needed to be programmed by humans.²⁸ However, following the more recent developments in big data (i.e., increased data availability, storage, and processing power) has enabled led to developments in machine learning and deep neural network architectures in which “systems are trained against observational or simulated outcomes.”²⁹ More specifically, these systems have enabled

²⁰ *Id.*

²¹ *Id.* Especially noteworthy is that the Commission found the threat to be severe enough to justify recommending a “guaranteed minimum income for each family; using the government as the employer of last resort for the hard core jobless; two years of free education; [and] a fully administered federal employment service.” *Id.*

²² *Workforce Automation*, *supra* note 13, at 5.

²³ Autor, *supra* note 11.

²⁴ Estlund, *supra* note 7, at 263–64.

²⁵ *Id.*

²⁶ Autor, *supra* note 11.

²⁷ *Id.* Artificial intelligence refers to machines and computers that attempt to mimic various aspects of human intelligence. *Id.*

²⁸ *Id.*

²⁹ *Id.*

applications in language translation and machine vision.³⁰ As a result of these developments, robotic machinery today is said to resemble “expert systems” that are not only programmed to perform predefined tasks, but also are capable of machine learning.³¹

Advancements such as machine learning and AI is what allows today’s machines to replicate a wider range of human capabilities by seamlessly combining more distinct capabilities.³² For example, Google and Oxford University, have collaboratively applied “deep learning” systems into a lip-reading program that was able to significantly outperform an expert human lip reader, by reading four times as many clips without error.³³

Essentially, automation is an amalgamation of these technological developments. Each component has existed and developed over some time, however, today’s robots for example differ significantly in that they may be “equipped with machine vision and learning capabilities that enable them to perform a more expansive array of tasks.”³⁴ An important question becomes how and when will these technologies move from development to “commercialization” or (readiness for adoption) and finally, to what extent will firms adopt the technologies for the purposes of replacing human labor.³⁵

B. The Current State of Human Labor

The concern towards automation is not directed towards technology, but the possible threat of a substantial net loss of jobs that may accompany it. Specifically, one of the strongest concerns is what is commonly called “job polarization.”³⁶ David Autor approaches this issue by distinguishing between two categories of tasks which seem to be relatively difficult to automate.³⁷ The first are characterized as “abstract” tasks which require “problem solving capabilities, intuition, creativity, and persuasion.”³⁸ These are tasks that are characteristic of “professional, technical, and managerial occupations.”³⁹ Typically, these positions require higher levels of education, superior analytical skills, communications

³⁰ *Workforce Automation*, *supra* note 13, at 6. Machine vision refers to systems “that use cameras, radar or lasers to observe their surroundings or recognize content.” Examples of machine learning include: “software that uses a training dataset to ‘learn’ how to read information from a form filled out by a person; industrial robots with machine vision incorporated to identify and pick up specific parts from a collection of randomly strewn pieces; and automated guided vehicles that transport materials around a production plant and use cameras and radar to navigate independently and re-route around obstacles.” *Id.*

³¹ *Id.* The report lists examples of expert system applications of AI as software programs that “prepare tax filings or schedule logistics” as well as “industrial robots that perform predefined or routine tasks, such as lifting, placing, and welding pieces of metal together.” *Id.*

³² Erik Sherman, *Automation Won't Create New Jobs Like Technology Did in the Past*, FORBES (Dec. 17, 2016), <https://www.forbes.com/sites/eriksherman/2016/12/17/automation-has-created-more-jobs-in-the-past-but-will-it-now>.

³³ Estlund, *supra* note 7, at 265.

³⁴ *Id.*

³⁵ *Id.*

³⁶ Autor, *supra* note 11, at 9–10.

³⁷ *Id.*

³⁸ *Id.* at 12.

³⁹ *Id.*

ability, and inductive reasoning.⁴⁰ The second category, called “manual tasks” require “situational adaptability, visual and language recognition, and in-person interactions” such as jobs involving food preparation, cleaning and janitorial work, and maintenance work.⁴¹

Naturally, jobs that depend heavily on tasks in either category fall in the polar extremes of the “occupational skill spectrum.”⁴² On one end is the “professional, managerial, and technical” and on the other are the “service and laborer” occupations.⁴³ Accordingly, if automation ultimately destroys “routine” tasked occupations and leads to the simultaneous growth of “high education, high-wage jobs at one end and low-education, low-wage jobs at the other,” then this will cause a hollowing of the opportunities for those employed in the mid-skilled individuals, thus causing a “job polarization.”⁴⁴

In order to understand the current state of directly threatened occupations it is necessary to understand how current technologies operate. Computers essentially accomplish tasks that computer programmers meticulously sequence to ultimately become the program that allows a machine to perform a particular task.⁴⁵ Thus, there is a direct correlation: the more someone can “codif[y]” a task or occupation, the higher the risk of displacement.⁴⁶ Tasks which tend to be most susceptible to codification happen to be “routine” tasks that involve core tasks which follow “precise, well-understood procedures” such as simple bookkeeping and clerical work.⁴⁷ Conversely, jobs which prove to be least susceptible and difficult to reverse engineer are jobs which require flexibility, judgment, and common sense skills that are “tacitly” understood.⁴⁸ These are capabilities which humans have developed through evolution, not simple logic.⁴⁹

C. Correlation to Previous Labor Disruptions

To properly assess the issue at hand it is necessary to discuss the major forces that have similarly threatened the United States’ labor market by way of influencing firms to choose alternative and more cost-effective options. Many experts and scholars have drawn a direct correlation from automation to “fissuring.”⁵⁰ Fissuring refers to the “migration of many jobs away from the profitable branded corporations that reign at the top of the economy.”⁵¹ These large “integrated firms” once provided a large number of jobs between the 1950s–

⁴⁰ *Id.*

⁴¹ *Id.*

⁴² *Id.*

⁴³ *Id.*

⁴⁴ *Id.*

⁴⁵ *Id.*

⁴⁶ *Id.* at 11.

⁴⁷ *Id.* at 12.

⁴⁸ *Id.* at 11.

⁴⁹ *Id.* at 9–10.

⁵⁰ Estlund, *supra* note 7, at 283.

⁵¹ *Id.*

60s, but later went on to be contracted to outside firms.⁵² Instead of providing high wages, benefits, promotions, and job security, firms are able to forego these expenses by using outside suppliers and “purport to use independent contractors, who are not covered by employment laws.”⁵³ Furthermore, the suppliers themselves protect themselves by investing little in capital and goodwill, should they be held liable or fall into insolvency.⁵⁴ This growing trend away from larger brand firms is a significant factor which has led to the current state of low wages and labor standards.⁵⁵

D. The Advantages and Disadvantages of Automation

The proponents of automation point to several different economic trends and reports to demonstrate how and why the advantages of automation outweigh the disadvantages.⁵⁶ Specifically, proponents have responded strongly to recent reports arguing that they have “mischaracterized” recent technological developments as an “alleged robot apocalypse.”⁵⁷ Proponents insist that the reports fail to show a sufficient nexus and negative effect on overall employment which is necessary to warrant the concern that the forces which drive automation are also leading to the greater issues of wage stagnation and inequality.⁵⁸ Furthermore, many scholars contend that even if automation were to have a drastic displacement effect, the principle cause would not be technology but “misgovernance” of distributional challenges that only policy makers can properly address.⁵⁹

One recurring argument centers around the theory of “creative destruction” which suggests that a firm’s decisions to embrace growth through technology will ultimately create new jobs and maintain living standards for many workers.⁶⁰ Research from a 2017 report by researchers at the McKinsey Global Institute (MGI) supports these proponent’s perspective.⁶¹ Although the research estimates that “46% of all of the time for which people are now paid in the U.S. economy . . . could be automated based on ‘currently demonstrated technology,’” the report also suggests that automation does not progress fast enough; it does not take advantage of all the gains that are potentially possible.⁶²

The reasoning behind creative destruction is that the adoption of advanced technology can increase the productivity of the workers that the adoption does not displace, which in turn raises those workers’ wages and increases demand for

⁵² *Id.* Among these outside firms some can provide anything from specialized services to components. *Id.* Others supply only labor while some take on all daily operations subject to the lead firm’s standard. *Id.*

⁵³ *Id.* at 284.

⁵⁴ *Id.* at 283.

⁵⁵ *Id.*

⁵⁶ Mishel & Bivens, *supra* note 4.

⁵⁷ *Id.*

⁵⁸ *Id.*

⁵⁹ Autor, *supra* note 11, at 8.

⁶⁰ Maxim & Muro, *supra* note 2.

⁶¹ McKinsey Glob. Inst., *A Future That Works: Automation, Employment, and Productivity*, MCKINSEY & CO. 109 (Jan. 2017).

⁶² Estlund, *supra* note 7, at 269.

other work across the economy.⁶³ Much of this gain is through labor cost savings—a factor the MGI study identifies as one of the biggest factors influencing managers’ decisions to automate.⁶⁴ Proponents advocate that automation will create new jobs by providing new opportunities for those who “create, implement, maintain, and work with the new technology itself” and through the “productivity gains and cost savings stemming from automation” which will increase consumer surplus and “generate new demand for human labor both in existing job categories and in new types of jobs that produce goods and services that do not exist in the current economy.”⁶⁵ Proponents contend that the MGI findings support the prediction that job creation and destruction will ultimately balance one another and reach an equilibrium.⁶⁶ However, this is possible only if private and public entities “step-up” to provide the investments in training, education, human services, infrastructure, and income support which will be necessary.⁶⁷

Proponents of automation also point to the recent economic statistics which indicate that the unemployment rate has fallen to “historic lows” and that employers are even encountering a labor shortage.⁶⁸ Moreover, they argue that recent deficiencies in economic growth are also an indicator that automation must not be accelerating, simply because labor productivity and capital investments have declined in the last twenty years.⁶⁹ Finally, the advocates for automation also suggest that if we embraced automation, society as a whole could shift to an agenda of less work and more leisure. In other words, they believe an automation-driven economy will create a sort of utopian “world in which everyone could meet their basic economic needs while working no more than thirty hours per week and forty weeks per year, with access to health care, basic income, [and] educational opportunities throughout one’s life.”⁷⁰

Conversely, opponents argue that this theory is particularly dangerous because it requires a blind trust that society will and can “step-up” through federal funding to invest in training and job creation.⁷¹ Opponents essentially argue that a faith-based outlook is hard to accept in comparison to the more objective

⁶³ *Id.* at 271 “[A]utomation has been destroying some jobs while creating other jobs—usually better paid and less grueling—and driving economic growth and prosperity [T]he history of automation’s impact on the labor market has been one of ‘creative destruction,’” a mantra to which many economists adhere today. *Id.* at 260.

⁶⁴ *A Future That Works*, *supra* note 60.

⁶⁵ Estlund, *supra* note 7, at 272.

⁶⁶ *Id.*

⁶⁷ *Id.* See also McKinsey Glob. Inst., *Jobs Lost, Jobs Gained: Workforce Transitions in a Time of Automation*, MCKINSEY & CO. (Dec. 2017).

⁶⁸ Estlund, *supra* note 7, at 276. See also John Schmitt, Heidi Shierholz, & Lawrence Mishel, *Don’t Blame the Robots Assessing the Job Polarization Explanation of Growing Wage Inequality*, ECONOMIC POLICY INSTITUTE (Nov. 19, 2013), <https://www.epi.org/publication/technology-inequality-dont-blame-the-robots/>.

⁶⁹ Estlund, *supra* note 7, at 276. See also Mishel & Bivens, *supra* note 4 (proponents contend that one of the strongest indicators that the threat of automation may be a mirage, lies in the evidence that suggests that automation has actually “decelerated, not accelerated, in the last 10 to 15 years”).

⁷⁰ Estlund, *supra* note 7, at 276.

⁷¹ *Id.* at 271. See also *Jobs Lost, Jobs Gained*, *supra* note 66, at 17–18.

estimates on the percentage of displacement.⁷² A concern among the opponents of automation is that the projected income growth acutely aims at benefiting the wealthy top percentage, specifically the owners of capital, and that this wealth will never actually distribute downward through new jobs.⁷³ Contrary to the presumption that is necessary for creative destruction, opponents also contend that it can exhaust consumers' demand for goods, leading to what is called the "full closet effect."⁷⁴ Opponents also refute the proponent's unemployment statistics with statistics which indicate that our nation is experiencing a long-term decline in labor force participation among young and elderly males, and more recently even among the prime working age males.⁷⁵

The crux of the problem here lies on the issue of timing and pace of adjustments. Because much of the proponents' vision relies upon the "stepping-up" of public policy and spending to foster new job opportunities, it is a legitimate concern if the rate at which firms adopt automation and consequently displace workers exceeds the rate at which these policies can establish and provide remedial efforts, then it is very likely that the reality will be a dramatic plunge into widespread unemployment.⁷⁶ Thus, if the timing cannot be regulated, the utopian—post-capitalistic—vision of leisure will simply not be possible because, as Professor Estlund states, "[l]eisure without an adequate source of household income is just the poverty and malaise of long-term unemployment."⁷⁷

E. The Incentives for Automation and Who Benefits

Advocates that are concerned about economic polarization contend that much of the advantages are geared towards a particular class: the wealthy firms and businesses that are able to invest and afford the machinery and technology that allows automation.⁷⁸ Firms with available capital can profit in the long run by

⁷² Estlund, *supra* note 7, at 271. Empirical trends indicate that "automation has become increasingly labor-displacing in recent decades, both at the industry level and in aggregate." *Id.* at 272.

⁷³ *Id.* at 264. See also *A Future That Works*, *supra* note 60.

⁷⁴ Estlund, *supra* note 7, at 273. See also Joanne Kimberlin, 'Full-Closet Effect' Puts Damper on Consumer Spending, *Retail Consultant Says*, KNIGHT RIDDER/TRIB. BUS. NEWS (Feb. 10, 2002), <https://www.highbeam.com/doc/1G1-82735497.html>.

⁷⁵ Estlund, *supra* note 7, at 275. Across the nation, 12% of men between the ages of 25 to 54, in addition to 17% of men with only a high school education or less, were not participating in the work force in 2015. *Id.* This is contextually relevant when compared to rates as low as 2-3% recorded in 1954. *Id.* See also *The Long-Term Decline in Prime-Age Male Labor Force Participation*, WHITE HOUSE COUNCIL ECON. ADVISERS 7 (June 2016), https://obamawhitehouse.archives.gov/sites/default/files/page/files/20160620_cea_primeage_male_lfp.pdf.

⁷⁶ Estlund, *supra* note 7, at 275. See also Carl Benedict Frey & Michael A. Osborne, *The Future of Employment: How Susceptible Are Jobs To Computerisation?* OXFORD MARTIN PROGRAMME ON THE IMPACTS OF FUTURE TECHNOLOGY 13 (September 17, 2013) (society has been able to overcome the effects capitalization through adoption and education of new skills, however, as "computerisation enter more cognitive domains this will become increasingly challenging").

⁷⁷ Estlund, *supra* note 7, at 275.

⁷⁸ *Id.* at 291.

abolishing worker's wages, legal costs, and responsibilities that attach.⁷⁹ Moreover, it is survival of the richest, most agile, and best designed.⁸⁰ Some of the factors firms and businesses must consider are the costs of acquiring, operating, and maintaining technology and equipment, and the additional costs required to reorganize operations; Those who can afford the transition will stand to profit substantially.⁸¹ The working class on the other hand is left to engage in what can be called the John Henry race against the machine.

For example, at one firm, two robots now smooth sharp edges and remove burrs, a task that previously required nine workers.⁸² The displacement that occurs is essentially driven by "supercharged global capital markets, in which billions of dollars move across the world in microseconds, and globalized product markets," in which firms across the world compete for customers.⁸³ Firms that forego more financially lucrative options are punished by losing investors and market shares to more "efficient producers."⁸⁴ These firms are at the mercy of the classic principles of supply and demand. If outsourcing or automation are available methods to accomplish higher returns on capital by decreasing costs while yielding higher production, why wouldn't they immerse themselves?⁸⁵ They may even have a fiduciary duty to do so. In fact, the suppliers of the robotics and technology which make automation possible, are marketing to firms at an increasing rate because of the demand for this new, more profitable business model.⁸⁶

Legal incentives are another factor driving employers and firms to adopt automation faster than ever.⁸⁷ Essentially, employers see automation as a way to release the burdens associated with costs and risks of employing humans.⁸⁸ The point was articulated more directly perhaps by investment banker, Steven Berkenfeld: "It's about health care liabilities, lawsuits[,] and insurance and disabilities benefits. And . . . people need people."⁸⁹ Furthermore "there is a whole management infrastructure that needs to go on top of every person that you employ; it's a multiplier effect."⁹⁰

⁷⁹ *Id.* at 298.

⁸⁰ *Id.* at 278–79.

⁸¹ *Id.*

⁸² Autor, *supra* note 11, at 5.

⁸³ Estlund, *supra* note 7, at 278.

⁸⁴ *Id.* at 287. *See also* Autor, *supra* note 11.

⁸⁵ Estlund, *supra* note 7, at 287.

⁸⁶ *Id.* "Those who supply the robots and the algorithms that replace human labor and destroy jobs are responding to demand from firms seeking more profitable ways to produce other goods and services. All of these related trends that fall under the rubric of fissuring—the development of far-flung supply chains, domestic outsourcing of labor-intensive functions, franchising of food service and hospitality services, and the rise of platform-based service providers—reflect the growing ability of lead firms to secure labor inputs without directly employing people. If robots or algorithms can supply those inputs even more quickly, more reliably, more cheaply, or with less risk, then lead firms will turn to them instead of human labor, so it will be." *Id.*

⁸⁷ *Id.* at 288.

⁸⁸ *Id.*

⁸⁹ *Id.*

⁹⁰ *Id.* (quoting Steven Berkenfeld, Managing Dir., Barclays Capital, Presentation at the U.S. Department of Labor Future of Work Symposium (Dec. 10, 2015)).

Many also argue that the outlook is not as gloomy and catastrophic as the opponents to automation suggest. Further research suggests that anywhere between 10–50% of jobs today are susceptible of automation.⁹¹ Moreover, in 2017, researchers from McKinsey Global Institute (MGI), also reported a significant potential for job displacement and that the extent and time frame are uncertain.⁹² Specifically, they identified eighteen distinct human capabilities in five broad categories—"sensory perception, cognitive skills, natural-language processing, social and emotional skills, and physical skills"—and assessed how current technology stacks up against human performance on these dimensions.⁹³ On a positive note, humans are still outperforming in the area of sensing others' emotional state and responding in emotionally appropriate ways . . . at least for now.⁹⁴ Conversely, technology already is outperforming humans in both cognitive and physical abilities.⁹⁵ Specifically, humans are significantly behind in data processing tasks, which is largely due to underperforming speed and accuracy.⁹⁶

MGI's research additionally divided human work-related activities into seven broad categories and assessed what percentage of time humans expend on each of those activities "is capable of being automated 'by adapting currently demonstrated technology.'"⁹⁷ The study estimated that the four categories of activities with the lowest potential for automation were "[m]anaging and developing people" (9%), "[a]pplying expertise to decision making, planning, and creative tasks" (18%), "interfacing with stakeholders" like customers, suppliers, or the public, (26%), and "[p]erforming physical activities and operating machinery in unpredictable environments."⁹⁸ The study estimated that the three categories of work activities with "significantly higher technical automation potential" were "performing physical activity and operating machinery in predictable environments, processing data, and collecting data."⁹⁹

Ultimately MGI found that on one end, jobs involving accommodation and food services are 73% automatable, work in the health care and social assistance sector was determined to be only at 36%, and other areas such as educational services and psychiatrists are only at 27% and 0% respectively.¹⁰⁰ Examples of occupations which are currently 100% automatable are sewing machine operators and graders of agricultural products.¹⁰¹ Notably, some lower wage occupations such as janitors, landscapers, and domestic workers are less susceptible to automation due to the unpredictable tasks their jobs entail.¹⁰²

⁹¹ *The Future of Employment*, *supra* note 75 (predicting that 47% of jobs are at "high risk" of automation).

⁹² *A Future That Works*, *supra* note 60.

⁹³ Estlund, *supra* note 7, at 268.

⁹⁴ *Id.* at 265.

⁹⁵ *Id.* at 268.

⁹⁶ *Id.*

⁹⁷ *Id.*

⁹⁸ *Id.*

⁹⁹ *Id.*

¹⁰⁰ *Id.*

¹⁰¹ *A Future That Works*, *supra* note 60, at 5 (see Exhibit E2).

¹⁰² Estlund, *supra* note 7, at 269.

It is not surprising that larger firms are among the first to take the plunge as early adopters of technology simply because they will have the ability “to absorb the high risks of experimenting with expensive technologies, while smaller firms tend to wait until a technology has been optimized” before adopting it as well.¹⁰³ Common risks include operational slowdowns and worker concerns.¹⁰⁴ Worker concerns involved logistical issues of adjusting, training, and introducing new and complex technologies to human employees and enabling them to properly collaborate.¹⁰⁵

However, installing advanced technologies can require building “manual redundancies” into operations to mitigate reliability concerns.¹⁰⁶ For example, a construction consulting company and a municipal township which incorporated a machine learning technology for the task of road inspections reported that the technology would erroneously categorize road quality by misidentifying tree branches as pavement cracks.¹⁰⁷ Accordingly, firm officials worked to improve the technology, which required manual redundant inspections to correct and ensure proper decision making.¹⁰⁸

III. UNITED STATES GOVERNMENT ACCOUNTABILITY OFFICE FINDINGS

A. Background and Purpose

In response to the growing apprehension discussed above and congressional request, in March of 2019, the United States Governmental Accountability Office (GAO) published a report examining the workforce issues related to the adoption of advanced technologies.¹⁰⁹ Specifically, the study sets out to assess four key issues: How does the adoption of advanced technologies affect the US workforce; what federal efforts can be applied to track these changes; what factors incentivized selected firms to adopt, and what risks did those firms encounter; and finally, in what ways has the adoption affected the workforce within the selected firms.¹¹⁰ The study reveals three key findings: (1)

¹⁰³ *Workforce Automation*, *supra* note 13, at 41.

¹⁰⁴ *Id.* at 42–43.

¹⁰⁵ *Id.*

¹⁰⁶ *Id.* at 41.

¹⁰⁷ *Id.*

¹⁰⁸ *Id.*

¹⁰⁹ *Id.* at 1. “The U.S. Government Accountability Office (GAO) is an independent, nonpartisan agency” that describes itself as “the ‘congressional watchdog[.]’” *About GAO*, U.S. GOV’T ACCOUNTABILITY OFF., <https://www.gao.gov/about/> (last visited Feb. 14, 2020). GAO assesses “how taxpayer dollars are spent and provides Congress and federal agencies with objective, reliable information to help the government save money and work more efficiently.” *Id.* “GAO provides Congress, the heads of executive agencies, and the public with timely, fact-based, non-partisan information that can be used to improve government and save taxpayers billions of dollars.” *About GAO: What GAO Does*, U.S. GOV’T ACCOUNTABILITY OFF., <https://www.gao.gov/about/what-gao-does> (last visited Feb. 14, 2020). Their “work is done at the request of congressional committees or subcommittees or is statutorily required by public laws or committee reports, per our Congressional Protocols.” *Id.*

¹¹⁰ *Workforce Automation*, *supra* note 13, at 1. GAO uses “‘Advanced technologies’ as a broad term to describe technological drivers of workforce changes, including but not limited to

between 2010 and 2016, industries with a larger proportion of occupations susceptible to automaton were also more likely to experience an increase in technological occupations, (2) industries with a higher proportion of occupations susceptible to automaton did not “experience meaningfully higher job loss rates,” however, the analysis recognizes this finding cannot be conclusive due to the limitation that it may “be too soon to observe these effects”, and finally, (3) certain demographics, “specifically workers with no college education and Hispanic workers” were found more likely to hold occupations susceptible to automaton in 2016.¹¹¹

The report is significant in a number of ways. First, it indicates that Congress is concerned about the projected impacts of widespread adoption of advanced technology. Second, amidst a growing number of divisive reports and headlines, having an even-handed and objective administrative entity to sift through the data, provide guidance, and implement a plan is essential in the wake of such drastic changes. The report is designed specifically to assist the primary agencies responsible for monitoring the economy and workforce, including the Department of Labor, Department of Commerce, and other federal agencies, from the White House Office of Science and Technology Policy (OSTP), which is responsible for interagency science and technology policy-coordination efforts,¹¹² to the National Science Foundation (NSF), which played a role in developing the Annual Business Survey (ABS).¹¹³

To analyze how the adoption of advanced technologies affects the U.S. workforce, GAO conducted a “performance audit” between October 2017 to March 2019 through an interactive method in which GAO met with officials representing 16 firms that “are using advanced technologies...”¹¹⁴ Although the report concedes that this research may not be “generalizable” it does however, provide a meaningful illustration of how different technologies are being implemented and how workers have been affected.¹¹⁵ Additionally, GAO also supplemented their research by interviewing officials from seven firms that develop advanced technologies (referred to as developers). Among them were two robotics integrator firms that assist clients in their adoption process, three industry-based organizations, and two unions representing manufacturing workers.¹¹⁶

those identified in a recent study by the National Academies of Sciences, Engineering, and Medicine (National Academies): artificial intelligence; machine learning; robotics; autonomous transport; 3D printing; advanced manufacturing; advanced materials; computing power; and internet and cloud technology.” *Id.*

¹¹¹ *Id.* at 2. The analysis from these occupations were pulled from data acquired through the use of data from the Census Bureau and Bureau of Labor Statistics. *Id.*

¹¹² *Id.* at 33.

¹¹³ *Id.* at 53.

¹¹⁴ *Id.* at 3. These firms were carefully selected through consultation and with researchers, technology developer firms and state economic development associations. *Id.*

¹¹⁵ *Id.* Among the sixteen firms, ten were manufacturing firms and six were non-manufacturing representing a range of sizes, industry sectors, types of technology, and geographical locations. *Id.*

¹¹⁶ *Id.*

For the purposes of the research, GAO concedes that although robotics have existed “for decades” now, the current wave is different in that it “may be equipped with machine vision and learning capabilities that enable them to perform a more expansive array of tasks.”¹¹⁷ A significant challenge is that the “[h]ow, when, or whether” technologies shift from the development phase to commercialization is difficult to predict.¹¹⁸ As a result, three indexes—technology progress index, AI progress index, and organizational change and technology diffusion index—should be developed to measure this progress.¹¹⁹

B. What Is Known About How Adoption Has Affected the U.S. Workforce

To understand the breadth and complexity of the research required, GAO breaks down the chain of components which constitute an “industry.” An industry comprises multiple “occupations,” each occupation comprises a group of jobs, and each job comprises work tasks.¹²⁰ GAO references other well-cited studies which have developed similar task-focused models to estimate the aggregate workforce effects. Among them is a study by Frey and Osborne titled *The Future of Employment*, which estimated that 47% of total U.S. occupations are at “high risk” of automation over some unspecified number of years.¹²¹ Another study by MGI estimated automation could account for 23% of working hours in the U.S. within this decade, and predicted that 23% of total U.S. work hours are in danger within this decade and that while some may be able to be re-employed, one third will need to change occupations.¹²² GAO states that while automation can supplant some tasks, it can also “compliment” others. This can lead to an increase in value for tasks involving creative and intuitive attributes. Thus, automation may have “a net positive effect on employment, or at least” have a positive effect on employment in certain sectors.¹²³ One major factor, however, distinguishes this wave of development: machine learning will affect tasks which earlier forms of automation never threatened.¹²⁴

The main obstacle is not the ability to track and identify vulnerable jobs but rather the overall tracking of the current or to-date workforce effects of adoption. This issue stems from the rapid and dynamic nature of technological changes and other unrelated factors which could play a substantial role. For example, technologies may complement human labor in some tasks and enable an increase in the “the demand for, or value of, human labor.”¹²⁵ Other scenarios may allow reduced prices and increased demand for products to “counteract” the human substitution altogether.¹²⁶ Another possibility is that firms may redesign

¹¹⁷ *Id.* at 7.

¹¹⁸ *Id.*

¹¹⁹ *Id.*

¹²⁰ *Id.* at 8.

¹²¹ *Id.* at 9 (referring to Frey & Osborne, *supra* note 90).

¹²² *A Future that Works*, *supra* note 60, at 68.

¹²³ *Workforce Automation*, *supra* note 13, at 9.

¹²⁴ *Id.*

¹²⁵ *Id.* at 10

¹²⁶ *Id.*

operations to allow employment increases or decreases that are greater than the direct substitution.¹²⁷

GAO's report also makes note of other economic factors such as globalization and recent unemployment rates.¹²⁸ Moreover, although the highly cited low employment rate of 4.0 percent seems promising in the years since the 2007-2009 recession, other indicators must be considered.¹²⁹ In particular, the "labor force participation rate" or the percentage of individuals that are either employed or seeking work, has declined considerably through the recession and has remained stagnant.¹³⁰ According to the Bureau of Labor Statistics, the implication here is that the post-recession decline in unemployment rate may be an overrepresentation of the state of the labor market.¹³¹

1. Lack of Data to Link Employment Trends to Adoption

Although the Job Openings and Labor Turnover Surveys provides federal data regarding employment opportunities and changes to the occupation statistics of the U.S. workforce over time, it currently does not provide any data regarding the reasons for layoffs and discharges. This makes it difficult to link changes to advanced technology.¹³² In other words, there is no census currently available which can identify whether an employment decline in one occupation is related to jobs being replaced as a result of automation or another unrelated factor.¹³³

In light of this insufficiency of data, the GAO analyzed Frey and Osborne's research, which identified occupations that presented a trend of susceptibility, to determine if any changes due to advanced technologies can be found in present employment data.¹³⁴ Although minor indications exist that advanced technologies are changing the workforce, the GAO conclusions are "limited by the unpredictability of when, if, or how automation materializes."¹³⁵

For example, one indicator was that industries such as the plastics industry, which has a relatively higher concentration of susceptibility, also were more likely to experience a growth in tech jobs between the years of 2010 and 2016. In the case of the plastic's industry, there was an 11 percent annual growth in tech jobs as a result of increases in engineers to program or maintain newly installed robots.¹³⁶ Among these sixty-nine industries which experienced significant changes in tech jobs, a "positive, though weak, correlation" was found in the concentration of occupations vulnerable to automation.¹³⁷ However, GAO

¹²⁷ *Id.*

¹²⁸ *Id.* See also National Academies of Sciences, Engineering and Medicine, *Information Technology and the U.S. Workforce: Where Are We and Where Do We Go from Here?*, THE NATIONAL ACADEMIC PRESS (2017), <http://nap.edu/24649>. Certain estimates assert that the majority of job losses in manufacturing between 2000-2010 was the result of automation and technology and not globalization. *Id.*

¹²⁹ *Workforce Automation*, *supra* note 13, at 11.

¹³⁰ *Id.* See also Mishel & Bivens, *supra* note 4.

¹³¹ *Workforce Automation*, *supra* note 13, at 11.

¹³² *Id.* at 12.

¹³³ *Id.*

¹³⁴ *Id.* at 13-14.

¹³⁵ *Id.* at 13.

¹³⁶ *Workforce Automation*, *supra* note 13, at 13.

¹³⁷ *Id.*

also found data from other surveys which showed no such correlation. Those surveys found no meaningful difference with other occupations that did not see those significant changes in tech jobs.¹³⁸ This may be why GAO stated that no relationship exists between the two factors: the relationship is too complex to analyze with the data currently available. Either it is too soon to observe the effects, or another employment trend obscures the effects.¹³⁹

According to the study, the changes may disproportionately affect certain communities.¹⁴⁰ Individuals with lower levels of education tend to hold occupations more susceptible to displacement by automation than those with higher levels of education.¹⁴¹ Additionally, the study found that certain geographical areas are more susceptible than others.¹⁴² This implies that if employment disruptions take place, certain regions will have groups of workers with similar skills in the same labor market that will need to adapt to changes and, as a result, “strain the availability of local job opportunities and support resources.”¹⁴³ Another finding suggests that automation will more strongly affect those who are already facing economic hardships; the workers earning less will be more susceptible to job displacement.¹⁴⁴

2. Methods Used to Measure Workforce Effects

The GAO report notes different approaches researchers have taken to measure workforce effects and find correlation trends. These methods included the use of specific technology such as robot sales, automation patents, and changes to tasks from use of technology. The researchers used this data to anticipate future changes.¹⁴⁵ Data from the International Federation of Robotics indicates that annual sales of industrial robots in the United States increased significantly between the years of 2010 and 2016. Researchers attribute this trend, in part, to “lower robot prices, improved robot functionality, and greater awareness of the benefits of robots.”¹⁴⁶ A separate study estimated that each additional robot used in a geographical area reduced employment by about six workers.¹⁴⁷ Moreover, the study projects that one robot per thousand workers reduces wages by about 0.5 percent. However, since the United States economy

¹³⁸ *Id.* at 16.

¹³⁹ *Id.*

¹⁴⁰ *Id.*

¹⁴¹ *Id.* “60.7 percent of workers with a high school degree or less hold these types of jobs, as compared to 46.7 percent of workers with some college, 26.9 percent of workers with a bachelor’s degree, and 11.3 percent of workers with a graduate degree. In addition, 54.1 percent of Hispanic workers hold jobs in occupations susceptible to automation, as compared to 46.4 percent of Black workers, 40.0 percent of White workers, and 35.9 percent of Asian workers.” *Id.* at 17.

¹⁴² *Workforce Automation*, *supra* note 13.

¹⁴³ *Id.* at 17.

¹⁴⁴ *Id.* at 19. Specifically, these individuals on average were found to earn 17.2% less than similar workers in other occupations. *Id.*

¹⁴⁵ *Id.*

¹⁴⁶ *Id.* at 20. The automotive sector was noted to be the largest customer for robot sales in the United States between the years of 2004–2016. The greatest growth during this period, however, was in the consumer electronics sector. *Id.*

¹⁴⁷ *Id.* The most substantial affect was related to manufacturing and industries exposed to routine manual work-related occupations.

currently uses few robots, this limited effect could grow substantially as the usage of robots increases.¹⁴⁸

Another method that was highlighted by GAO was the use of patent data to monitor the spread of adoption. Automation patents were found to have grown substantially between 1976 and 2014.¹⁴⁹ By tracing the industries where such patents were ultimately used, researchers estimated that automation causes manufacturing jobs to fall while causing employment in the service sector to rise.¹⁵⁰ Additionally, this method also found that AI patents in particular have experienced a rapid rise in the last decade.¹⁵¹ Finally, the micro level data which analyzed firm's operations found that automation replaces some routine tasks which threatens the number of production floor jobs.¹⁵²

C. Federal Efforts to Track Adoption and Workforce Effects

GAO's report recommends the Secretary of Labor to direct the Bureau of Labor Statistics (BLS) and the Employment and Training Administration (ETA) to "develop ways to use existing or new data collection efforts to identify and systematically track the workforce effects of advanced technologies."¹⁵³ Among these suggestions, one recommended BLS to expand existing worker or firm surveys to assess how advanced technologies have resulted in displacements, work hour reductions, or changes to tasks.¹⁵⁴ In addition, the GOA suggests that similar expansions are necessary to identify occupational, skill and task related changes that occur as a result of advanced technologies.¹⁵⁵

D. Federal Efforts to Track Automation

1. Department of Commerce and Current Efforts

The Department of Commerce has initiated the administration of several collaborative surveys which provide firms with specific questions that focus on the adoption of advanced technologies and the resulting effects it has had on their workforce.¹⁵⁶ This initiative is part of a strategic effort to "represent new efforts to provide a timely, in-depth, and accurate picture of the economy amidst the economic shifts and technological advances of the 21st century."¹⁵⁷ While this is a positive step forward, the results of this survey will take time and will be available late 2019 or later. Additionally, the new Annual Business Survey (ABS) is also collaborating with the Department of Commerce and the National Science Foundation to collect information on firms' specific use of advanced technologies.¹⁵⁸ These surveys for example, will be asking whether firms "are

¹⁴⁸ *Id.*

¹⁴⁹ *Workforce Automation, supra* note 13, at 21.

¹⁵⁰ *Id.*

¹⁵¹ *Id.*

¹⁵² *Id.*

¹⁵³ *Id.* at 54.

¹⁵⁴ *Id.*

¹⁵⁵ *Workforce Automation, supra* note 13.

¹⁵⁶ *Id.* at 23.

¹⁵⁷ *Id.*

¹⁵⁸ *Id.*

testing a given technology or using it for either less than 5 percent, 5 to 25 percent, or more than 25 percent of their production or service” with the intent of establishing information on a nationwide scale on the extent of industry concentrations of advanced technology.¹⁵⁹ These questions will characterize the prevalence of the changes in workforce within the economy caused by factors such as declines in production workers, increases in supervisory workers, and ultimately, whether any difference exists between industry sectors..¹⁶⁰

Other surveys which are being expanded and applied include the Annual Survey of Manufactures (ASM) and Annual Capital Expenditures Surveys (ACES).¹⁶¹ These surveys will collect capital expenditures data for industrial robotics from 50,000 manufacturing plants, in addition to the number of robotic equipment purchased and in use at the plants.¹⁶² However, Office of Management and Budget has not yet granted final approval, so these surveys will not be applied until May 2019.¹⁶³ According to census officials, these surveys will be useful for understanding the impact robots may have on productivity in addition to the impact they may have on the manufacturing labor force. However, these results may not be available until the end of 2020.¹⁶⁴

2. Department of Labor and Current Efforts

GAO identifies the Department of Labor (DOL) as the one responsible for the collection of data which enables the tracking of changes that take place in the U.S. Economy and workforce. Moreover, DOL develops strategies to track “emerging economic trends.”¹⁶⁵ However, the recurring issue which GAO has identified is that there has been insufficient data to enable one to “link shifts in the workforce to technological changes.”¹⁶⁶

The Bureau of Labor Statistics also has the essential role of measuring labor market activity.¹⁶⁷ The DOL’s strategy is to have BLS play the supportive role for both public and private decision making to meet the needs of the general public as well as the public workforce system. This task requires periodic monitoring to identify “structural shifts in the economy” and the development of data to reflect those changes.¹⁶⁸ BLS, on a biennial basis, analyzes changes to project how employment by occupation may shift over the course of a decade.¹⁶⁹ BLS monitors factors such as technological innovations; shifts in business or production practices; changes in the size of business, restructuring of work processes; as well as offshoring or domestic outsourcing. BLS then incorporates

¹⁵⁹ *Id.* at 23–24. Additional questions the Census is planning to incorporate pertain to firm’s use of AI, cloud computing, robotics, and specialized software and equipment; the motivation for adoption; the impact it may have on the number and skill level of workers; and finally the factors that could have an adverse impact on the decision to adopt. *Id.*

¹⁶⁰ *Id.*

¹⁶¹ *Workforce Automation*, *supra* note 13, at 25.

¹⁶² *Id.*

¹⁶³ *Id.*

¹⁶⁴ *Id.*

¹⁶⁵ *Id.* at 26.

¹⁶⁶ *Id.*

¹⁶⁷ *Id.*

¹⁶⁸ *Id.*

¹⁶⁹ *Id.*

this data into a “table of occupations that are projected to have direct employment changes due to some identified reason.”¹⁷⁰

The DOL’s Employment and Training Administration (ETA) will also play a critical role in the foreseeable future. ETA assists the entry and reentry of workers into the industries and occupations which are in demand. To provide this service, ETA must have accurate labor market data regarding opportunities so it can align training services to industry demands and provide a networking bridge between skilled workers and businesses.

Ultimately, GAO reports that as a result of insufficient data that would allow the DOL to connect employment shifts and technological changes, policymakers and the DOL are ill-equipped to establish programs that encourage economic growth and provide aid to affected workers.¹⁷¹ The issue is that the DOL programs rely heavily on the missing data. Without the data the DOL is unable to guide job seekers or provide training services because the agency does not know which way industries or the economy is shifting.¹⁷² Suppose there is merit to the projected changes. In that case, the dire consequences of being unprepared for automation necessitates specific data analysis to properly assess, mitigate, and potentially regulate the speed of the transition to an automation-immersed economy.

According to the GAO report, Congress expressed the same concern regarding the lack of data. However, in January 2019, BLS reported to Congress that it would be moving forward with a contractor to research additional information pertaining to automation and provide a report that could answer more questions.¹⁷³

E. Motivations to Adopt Automation

1. Cost-Savings

Through its interviews with selected firms, the GAO identified several recurring factors that motivated its ultimate decision in favor of automation. Among these different firms, the most common motivating factor was cost savings through optimal global market competition, production, costs per unit, labor costs, or onsite operation size.¹⁷⁴ For example, one firm, a medium-sized door manufacturer, stated that automation enabled its business to “increase efficiency, reduce labor costs, and re-focus its product line on custom doors to survive the entry of manufacturers in China that could sell mass-produced doors for lower prices.”¹⁷⁵ Another official from a large manufacturing corporation told the GAO that automation has allowed it to meet forty percent of its goal to reduce

¹⁷⁰ *Id.* at 27.

¹⁷¹ *Id.* at 31.

¹⁷² *Id.*

¹⁷³ *Workforce Automation*, *supra* note 13, at 31. Moreover, in 2020, BLS has also planned to identify “pilot projects to test the feasibility of new data collection” based on the 2019 report. *Id.*

¹⁷⁴ *Id.* at 34.

¹⁷⁵ *Id.* at 36. See also Will Knight, *China Is Building a Robot Army of Model Workers*, MIT TECH. REV. (Apr. 26, 2016), <https://www.technologyreview.com/s/601215/china-is-building-a-robot-army-of-model-workers>.

its workforce by 1,500 full-time positions per year for five years.¹⁷⁶ A more interesting example came from a large automotive manufacturer who implemented a laser welding system to “save production line space—which is a valuable commodity in manufacturing”—to increase production capacity by using that space to install even more robots for other production tasks.¹⁷⁷

2. Job Quality and Safety

Another recurring factor, was the desire to improve job quality. Automation allows firms to assign machines tasks that are “dangerous, difficult, dull, or dirty in large part to improve worker safety.”¹⁷⁸ For example, machines can pick up 90-300 pound doors—a task that previously led to work-related injuries—thus allowing the firm to save a great deal of money by decreasing the number of worker compensation claims.¹⁷⁹ Another firm automated a task that was so dull that the position was consistently known to have a high turnover rate among those hired.¹⁸⁰ Other firms reported that automation allowed more consistent output from employees because the autonomous mobile robots reduced the time spent traveling between tasks and transporting items.¹⁸¹

F. Various Risks Associated with Automation

Beyond the substantial costs of purchasing advanced technologies, firms admitted that several risks could affect their investment return that must be assessed in a cost-benefit analysis before adopting automation. Among these risks, firms noted that included the reliability of the technology as well as the process of working with tech-developers.¹⁸²

1. Reliability of Technology

The principal concern is one that affects an early adopter in any capacity: because the technology is new there will always be a risk that it may not be “sufficiently reliable for [the] firms’ operations.”¹⁸³ One large manufacturer who purchased technology to inspect wire connections reported that the technology was still “immature,” reported false readings, and had to be removed from the production line to be improved.¹⁸⁴ Another firm reported similar issues with an automated vehicle that lacked turn signals and would shut down when there was a spill in its path.¹⁸⁵

These issues sometimes led to additional costs because they necessitated that an employee watch over the technology. For example, when a construction consulting company adopted technology to inspect roads, the machine would “miscategorize road quality;” while the developer worked to fix this issue, the

¹⁷⁶ *Workforce Automation*, *supra* note 13, at 36.

¹⁷⁷ *Id.*

¹⁷⁸ *Id.* at 37.

¹⁷⁹ *Id.*

¹⁸⁰ *Id.*

¹⁸¹ *Id.* at 38.

¹⁸² *Id.* at 40.

¹⁸³ *Id.*

¹⁸⁴ *Id.*

¹⁸⁵ *Id.*

company had to conduct manual inspections “to ensure they were making road repair decisions based on accurate information.”¹⁸⁶

2. Working with Developers and Other Concerns

Another recurring risk that firms reported to the GAO pertained to dealing with developers with limited experience. When new developers go out of business or large firms purchase them, their technology could become obsolete, difficult to service, or update.¹⁸⁷ Moreover, firm officials reported that because both the hardware and software associated with advanced technology are not yet “standardized,” the technology may not be supported among other developers if major issues arise.¹⁸⁸

Firms voiced other concerns about the transitional difficulties that arise between the “lengthy and iterative” process of adoption and optimization.¹⁸⁹ For example, one manufacturer reported that its process required the firm to construct a “customized environment for the robot to function in, make parts by hand, purchase a 3-D printer to develop tools for the robot, and build additional parts to take care of increased byproducts like sawdust.”¹⁹⁰

G. Varied Effects on the Workforces

After adopting and implementing advanced technologies, different firms were able to respond differently to workforce demands. Many firms admitted that they needed fewer employees in areas.¹⁹¹ While some firms were able to adjust by redeploying employees to other responsibilities, others reduced their workforce through attrition and direct layoffs.¹⁹² One important factor that may have prevented greater layoffs was that many of these technologies, as noted, caused significant delays initially.¹⁹³ Short term effects may not tell the whole story, “such as reductions or slower growth rates in workforce size over time.”¹⁹⁴

1. Redeployment

Firms, when possible, often redeploy employees. For example, at one firm, two robots now smooth sharp edges and remove burrs, a task that previously required nine workers.¹⁹⁵ Now, because of robots, three workers load and inspect parts, and the remaining six are redeployed.¹⁹⁶ Although the workforce did not decrease, the actual number of “production” positions decreased while “monitoring” jobs increased.¹⁹⁷ This shift requires skills that will ultimately affect whether an employee can transition to another position.¹⁹⁸ Furthermore, this is an example of how workforce changes may take place without appearing in

¹⁸⁶ *Id.* at 41.

¹⁸⁷ *Id.* at 42.

¹⁸⁸ *Id.* at 43.

¹⁸⁹ *Id.*

¹⁹⁰ *Id.* at 44.

¹⁹¹ *Id.*

¹⁹² *Id.*

¹⁹³ *Id.*

¹⁹⁴ *Id.*

¹⁹⁵ *Id.*

¹⁹⁶ *Id.* at 45.

¹⁹⁷ *Id.* at 46.

¹⁹⁸ *Id.*

employment data and surveys, revealing the complex nature of assessing the effects of automation.

2. Attrition and Layoffs

At some firms, attrition took place instead of layoffs because of the workforce's high turnover rate. One firm reported eliminating seventeen positions after adopting robots; however, rather than lay off workers, employees were moved to already vacant positions.¹⁹⁹ Officials from other firms reported that significant layoffs were executed as a direct result of automating.²⁰⁰ One U.S. automotive parts firm adopted machine learning to compete with online retailers and, as a result, reduced the number of employees in one office from 500 to 200 while another firm that sells telecommunication circuits reported that adoption enabled them to replace 150 employees with 110 because of fewer customer services calls.²⁰¹

H. Positive Effects

Among firms interviewed, some reported that the implementation of advanced technologies had the beneficial effect of increasing their "competitiveness" and productivity, which enabled them to grow their workforces.²⁰² One example included a small automotive parts manufacturer that was able to win a bidding contract after adoption.²⁰³ Although the manufacturer adopted six robots, winning the contract created nine new jobs.²⁰⁴ In this case, although the robots completed the production, the higher volume created tasks that only people could complete.²⁰⁵ Other firms reported that, while they were not able to increase the size of their workforce, they became more competitive to stay in business, saving jobs and retaining their employees.²⁰⁶ In one case, a medium-sized manufacturer told the GAO that "their firm 'could not survive' global competition without the use of advanced technologies."²⁰⁷

Another consequence of adoption was that workers at some firms changed roles and tasks, sometimes "focusing more on interactive, cognitive, higher-skilled, and monitoring tasks, and in other cases lower-skilled tasks."²⁰⁸ The GAO's report states that workers who can adapt to task changes will likely experience positive effects in these situations, such as less taxing and monotonous tasks that are safer and more ergonomic.²⁰⁹ Conversely, workers who are not flexible will experience negative outcomes because only some firms will provide internal training or resources to help these workers.²¹⁰

¹⁹⁹ *Id.* at 45–46.

²⁰⁰ *Id.* at 46.

²⁰¹ *Id.*

²⁰² *Id.* at 47.

²⁰³ *Id.*

²⁰⁴ *Id.* at 48.

²⁰⁵ *Id.* at 47.

²⁰⁶ *Id.*

²⁰⁷ *Id.*

²⁰⁸ *Id.* at 48.

²⁰⁹ *Id.*

²¹⁰ *Id.*

IV. PENDING ACTIONS AND POTENTIAL REMEDIES

A. Trade Adjustment Assistance (TAA) for Automation Act

Well, my shoes, they come from Singapore
 My flashlight's from Taiwan
 My tablecloth's from Malaysia
 My belt buckle's from the Amazon
 You know, this shirt I wear comes from the Philippines
 And the car I drive is a Chevrolet
 It was put together down in Argentina
 By a guy making thirty cents a day²¹¹

On December 12, 2019, Senate Bill 3034, the Trade Adjustment Assistance for Automation Act (TAA for Automation), was introduced in the Senate as Congress's most recent attempt to mitigate automation's projected effects.²¹² Specifically, it expanded TAA benefits—such as training and job search support—to cover employees displaced or underemployed because of technological advancements.²¹³ The bill, presented by Senators Peters, Stabenow, Gillibrand, and Cortez Masto, was read twice, and referred to the Committee on Finance.²¹⁴ The bill's stated purpose is “to make trade adjustment assistance available to workers whose jobs are eliminated through automation.”²¹⁵

This legislation intends to attach as an extension of the previously established Trade Adjustment Assistance (TAA) benefits. Originally, TAA benefits were established to provide assistance such as job-training and reemployment resources to individuals who had lost their job as a result of trade with foreign nations.²¹⁶ The bill concedes that “there has been a shift in production of articles or supply of services by such workers' firms from utilizing the workers methods or systems primarily utilizing automation.”²¹⁷ It further specifies the shift as one that has “contributed importantly to such workers' separation or threat of separation” *or* caused the “sales or production, or both, of such firm [to] . . . decrease[] absolutely” or “that the use of automation in the production of articles or services like or directly competitive with articles produced or services supplied by such firm . . . to increase[].”²¹⁸

²¹¹ Bob Dylan, *Infidels* (Sony Music Entertainment 1983).

²¹² Trade Adjustment Assistance for Automation Act of 2019, S. 3034, 116th Cong. (as introduced in Senate, Dec. 12, 2019).

²¹³ *Id.*

²¹⁴ *Id.*

²¹⁵ *Id.*

²¹⁶ *Peters, Donnelly, Gillibrand Introduce Bill to Help Workers Who Lose Their Jobs to Automation*, PETERS.SENATE.GOV (May 25, 2018), <https://www.peters.senate.gov/newsroom/press-releases/peters-donnelly-gillibrand-introduce-bill-to-help-workers-who-lose-their-jobs-to-automation>.

²¹⁷ TAA for Automation Act of 2019, S. 3034.

²¹⁸ *Id.*

The Bill also seeks to incorporate a definition of automation into section 222(c) of the Trade Act of 1974 as the use of “technology to produce a good or service previously produced by human work.”²¹⁹ Similar to GAO’s use of “advanced technologies,” this definition may be appropriately broad for the Act to encompass a larger variety of circumstances.²²⁰

The legislation addresses the ultimate concern highlighted in the GAO’s report: that the Department of Labor is hindered by the insufficiency of data required to properly address the potential issues projected to arise. Section 3, “Workforce Advisory Board or Subcommittee on Automation” requests the Secretary of Labor to “establish an advisory board, or form a subcommittee of an advisory board . . . to provide recommendations to the Secretary on addressing the impact of automation on the workforce, including matters relating to jobs and occupations at risk of elimination as a result of automation.”²²¹

TAA for Automation, if passed, also requires the Commission to provide an annual report. This report must identify occupations that are at risk of elimination due to automation and experiencing “above average decline for which there is evidence that technological advancement has contributed to that decline.”²²² Additionally, the report must evaluate and provide strategies for workforce developments “based on measurements of impact on the workforce due to automation and on other relevant evidence.”²²³ Finally, the Act requires the report to disseminate strategies to “relevant stakeholders and mak[ing] such strategies available to the public” to foster collaboration with state workforce agencies.²²⁴

The bill, if passed, will create a workforce advisory board to inform the Department of Labor, Congress, and the general public on the current status of jobs in jeopardy as a result of automation.²²⁵ In a press release, Senator Peters explained that “as companies continue to integrate new technologies into their daily operations, the legislature must ensure that these advancements help support and expand our workforce” and that the “legislation would help strengthen our

²¹⁹ *Id.*

²²⁰ *Workforce Automation*, *supra* note 13.

²²¹ TAA for Automation Act of 2019, S. 3034, 116th Cong. § 3. Specifically, it requires the Secretary to have the advisory board or subcommittee consist of “nationally representative members, including the balanced participation of— (1) state boards . . .; (2) labor organizations; (3) industry representatives; (4) nonprofit entities, or community-based organizations, with experience researching the impact of automation on the workforce; (5) academic experts in the field of workforce development, labor economics, and program evaluation; (6) engineering and technology experts, such as experts from the National Institute of Standards and Technology; and (7) any other stakeholders the Secretary considers appropriate.” *Id.*

²²² *Id.*

²²³ *Id.*

²²⁴ *Id.*

²²⁵ Katie Malone, *Senate Bill Would Aid Workers Hurt By Automation*, MERITALK. (Dec. 17, 2019), <https://www.meritalk.com/articles/senate-bill-would-aid-workers-hurt-by-automation/>. Senator Cortez Masto concedes that, “[a]utomation has the power to transform our economy, and it’s already having an impact on industries like manufacturing, food service and transportation.” *Id.* However, he also warns that “[i]nnovation like this is exciting, but we need to make sure that our nation’s workers aren’t left behind as technology advances.” *Id.*

economy by supporting workers displaced through no fault of their own.”²²⁶ Senator Peters’ statement alludes to the concerns harbored by opponents of automation—the apprehension that the legislature cannot harmoniously sync the remedial efforts to the rate of adoption required to yield the equilibrium point.

B. Other Potential Solutions in Labor Law

1. Cynthia Estlund’s “Unburdening Strategy”

Cynthia Estlund, legal scholar and labor law expert, presents a strategy that may seem counterintuitive to many labor advocates.²²⁷ Estlund suggests a reconsideration of the very labor laws that have achieved and continue to achieve higher standards for employees because these same efforts have incentivized firms to seek alternate modes of labor input through fissuring and, now, automation.²²⁸ Estlund proposes what she calls the “unburdening” strategy to essentially offset the incentives driving firms to automation by finding “judicious ways to unburden or deregulate the employment relationship so as to slow down, or avoid speeding up, automation-related job losses.”²²⁹

This strategy is in response to efforts seeking to combat fissuring by expanding employment-relationship entitlements to include subcontractors, and returning the jobs that have been displaced due to outsourcing.²³⁰ While Estlund understands the importance of these efforts, she suggests it would be more expedient and effective to ease such labor law efforts by essentially disincentivizing firms to adopt automation because time is a critical factor in the response to automation-related displacement. This would buy more time for policy and funding for establishing the necessary remedial efforts needed to retrain and reestablish new jobs.”²³¹

This strategy concedes that employment-related costs are a principle incentive that drives firms to adopt automation in the first place.²³² The strategy then questions which entitlements workers should have and whether the employer must be responsible for. In other words, it separates the entitlements or “burdens” that are “inextricable from employer mandates” from those that “can and should be detached.”²³³

Laws and regulations protecting health and safety issues such as workplace hazards, working time and fair scheduling, discrimination, and retaliation reflect our society’s “evolving definition of ‘decent work’” and would fall into the category of “inextricable.”²³⁴ These laws have compelling societal interests and rights at issue and therefore cannot be salvaged or deregulated.

²²⁶ *Id.* The lawmakers cited the January 2019 Brookings Institution report estimating twenty-five percent of all U.S. jobs will be exposed to automation in the future and more than seventy percent of current tasks are at risk of being substituted by automation. *Id.*

²²⁷ Estlund, *supra* note 7, at 302.

²²⁸ *Id.* at 303.

²²⁹ *Id.* at 301.

²³⁰ *Id.*

²³¹ *Id.*

²³² *Id.* at 302

²³³ *Id.* at 303–04

²³⁴ *Id.* at 303.

Although compliance with such laws will carry necessary net costs and burdens upon the employer, firms will undoubtedly move towards adopting the latter option. This will be particularly true if these costs ultimately become more expensive than the option to automate.²³⁵ However, given the nature of these laws and regulations, the societal interests outweigh the threat of job losses.

Entitlements, which "can and should be detached," include mandates that do not redress harms that an employer caused or failed to prevent.²³⁶ This is not to say these mandates do not also support social interests, but the employer does not have to cover the mandates.²³⁷ From the employer's perspective, these entitlements are perceived as "taxes on the employment of human labor, and introduce a distortion in firms' demand for labor and toward the substitution of capital."²³⁸ Examples include entitlements such as healthcare and paid leave.²³⁹ For example, at one firm, two robots now smooth sharp edges and remove burrs, a task that previously required nine workers.²⁴⁰ In other words, the employer "did not cause the circumstances giving rise" to the need for the entitlement.²⁴¹ In such circumstances, the unburdening strategy would shift the burden of these entitlement mandates away from the employment nexus. The rationale for the unburdening strategy recognizes firms are "increasingly able to boost profits by shedding workers and automating work, [so] their chronic complaints about the costs of employment mandates will have to be taken more seriously."²⁴² The legislature does not intend to withhold entitlements that people deserve, but it does intend to slow the pace of automation adoption to make the "major social, political, and individual adjustments that will be required to meet the challenge of automation[s]."²⁴³

In addition to the efforts, such as those set forth through the amendment of TAA to include automation-related remedies, legislatures may need to find a way to dissuade firms from seeking an alternative and provide a compromise that may in the long run make the automation investment more costly in comparison.²⁴⁴ According to Estlund, the legislature has the challenge of striking a delicate balance between raising labor standards and encouraging a tax cut.²⁴⁵ Specifically, the question becomes, "which entitlements workers should have . . . [and] how the entitlements should be financed."²⁴⁶ Estlund argues that "[i]n some cases it makes sense to put the costs of workers' entitlements on those who employ workers, or more broadly on those who use their labor."²⁴⁷ Essentially, she suggests creating

²³⁵ *Id.* at 305–06.

²³⁶ *Id.* at 306.

²³⁷ *Id.*

²³⁸ *Id.* at 305.

²³⁹ *Id.* at 307.

²⁴⁰ *Id.* at 309.

²⁴¹ *Id.* at 315.

²⁴² *Id.*

²⁴³ *Id.*

²⁴⁴ *Id.*

²⁴⁵ *Id.* at 303.

²⁴⁶ *Id.*

²⁴⁷ *Id.*

an inventory to determine which of those entitlements should correspond to employer burdens and which should not.²⁴⁸

The obvious problem here is that legislatures should not be pressured into surrendering hard-fought labor rights and the little leveraging power employees have maintained in exchange for the opportunity to have “decent work.”²⁴⁹ Labor advocates have difficulty accepting the current circumstances because technology advancements have essentially eliminated employees' ability to negotiate with employers.

2. Automation and Collective Bargaining

One particular strategy which has played an effective role in slowing the impact of automation in the workplace have been traditional collective bargaining rights.²⁵⁰ For at least half a century, courts and commentators have engaged much debate regarding whether automation decisions are a subject of such a right.²⁵¹ However, much of the case law and academic commentary seems to suggest that nothing in the National Labor Relations Act, nor practical limitations on administration by the National Labor Relations Board can defeat the sound arguments in favor of having automation be considered a subject of mandatory bargaining.²⁵²

Under Section 8(a)(5) of the National Labor Relations Act, employers are required to bargain collectively with employee representatives.²⁵³ Furthermore, section 8(d) requires “mandated bargaining be in ‘good faith’ and defines the subject matter of requisite bargaining as ‘wages, hours, and other terms and conditions employment.’”²⁵⁴ Traditionally, the National Labor Relations Board, the organization responsible for the prosecution of labor law violations, has divided the subjects of bargaining into two classes. One class includes subjects which are mandatory, in other words, the parties must bargain at the request of the other.²⁵⁵ The second, pertains to subjects which are “permissive”; the parties may lawfully bargain but are not compelled by law to do so.²⁵⁶

Labor Unions have been in debate with management firms since the 1970s over the standard which determines which automation issues should fall into the category of mandatory bargaining.²⁵⁷ Unions on one end urge that “because the working force is so vitally affected by technological change, any decisional calculus must take account of labor’s interests and desires.”²⁵⁸ In other words, labor proponents advocate that “although final [decision-making] powers are

²⁴⁸ *Id.*

²⁴⁹ *Id.* at 301.

²⁵⁰ Robert T. Quackenboss & Ronald Meisburg, *Viewpoint: Union Strategies to Confront Automation in the Workplace*, SOC’Y FOR HUMAN RES. MGMT. (July 30, 2020), <https://www.shrm.org/resourcesandtools/legal-andcompliance/employment-law/pages/unions-automation-in-the-workplace.aspx>.

²⁵¹ *Automation and Collective Bargaining*, 84 HARV. L. REV. 1822 (1971).

²⁵² *Id.* at 1824.

²⁵³ *Id.* at 1826.

²⁵⁴ *Id.* at 1826–27.

²⁵⁵ *Id.*

²⁵⁶ *Id.*

²⁵⁷ *Automation and Collective Bargaining*, *supra* note 246.

²⁵⁸ *Id.* at 1824.

ultimately vested in corporate shareholders, labor should be given broad opportunities to influence those decisions which affect their legitimate interests.”²⁵⁹

Conversely, the management perspective argues that union restrictions on decisions to automation could “contribute to misallocation of economic resources” and the goals of profit maximization and economic efficiency.²⁶⁰ Furthermore, they argue that efficient corporate decision-making is integral to a sound economy. Finally, management also argues that because they owe a fiduciary duty to its stockholders, their decisions should not be interfered with by the “will of a union which is neither representative of nor accountable to corporate ownership.”²⁶¹ Ultimately, the argument by the management side is that there is a certain class of “managerial” decisions, like automation, which involve operational planning and methods of production,” which “are uniquely management prerogatives.”²⁶² Regardless, it is important to note that under the terms of section 8(d) the party only has a duty to merely bargain in good faith, thus, no employer would be forced to concede to the demands.²⁶³

Ultimately, the question of whether unions may have influence over automation decision making has been largely dependent upon whether “decisions to mechanize are mandatory subjects of bargaining within the meaning of the phrase ‘other terms and conditions of employment.’” A string of legal precedence, *Fibreboard Paper Products Corp. v. NLRB*²⁶⁴, *Renton News Record*²⁶⁵, and *Leach Corporation v. NLRB*²⁶⁶, have ruled in favor of the interpretation that technological changes that affect an employer’s unionized workforce is a condition of employment subject to mandatory bargaining under the language of the NLRA.²⁶⁷

In *Fibreboard*, the Supreme Court upheld the NLRB’s finding that an employer’s unilateral implementation of a decision to subcontract work out of the bargaining unit constituted a violation of section 8(a)(5).²⁶⁸ Here, the employer had subcontracted its maintenance work to an independent firm for the exclusive purpose of reducing its costs.²⁶⁹ Additionally, the employees of the independent contractor were assigned to perform the work under identical conditions only with lower pay and fewer fringe benefits.²⁷⁰ Here, the employer ignored Union requests to bargain arguing that the decision was exclusively a managerial prerogative.²⁷¹ The Board initially sustained in favor of the employer, however,

²⁵⁹ *Id.*

²⁶⁰ *Id.* at 1825.

²⁶¹ *Id.*

²⁶² *Id.* at 1826.

²⁶³ *Id.* at 1833.

²⁶⁴ *Fibreboard Paper Prods. Corp.*, 138 N.L.R.B. 550 (1962).

²⁶⁵ *Renton News Record*, 136 N.L.R.B. 1294, 1302 (1962).

²⁶⁶ *Leach Corp. & Int’l Ass’n of Machinists and Aerospace Workers*, 312 N.L.R.B. 990 (1993).

²⁶⁷ *Automation and Collective Bargaining*, *supra* note 246.

²⁶⁸ *Id.* at 1834.

²⁶⁹ *Id.*

²⁷⁰ *Id.*

²⁷¹ *Id.*

was later reversed on a rehearing relying on the opinion of another case, *Town & Country Manufacturing Co.*²⁷² In this intervening opinion, it was held that a decision to contract out was matter within the language of “terms and conditions of employment.”²⁷³ The Supreme Court ultimately found that cases in which an employer’s action can in some way qualify employment tenure to be a clear “condition of employment.”²⁷⁴ Furthermore, the Court believed that by ruling to include decisions to subcontract as being within the scope of collective bargaining, the Court would be acting in accord with the “primary policy of the federal labor relations laws: the promotion of industrial peace through negotiated settlement of disputes.”²⁷⁵

Although *Fibreboard* was concerned with the issue of subcontracting, the Board and commentators have expanded this reasoning to create a legal nexus to issues pertaining automation.²⁷⁶ However, the issue is that Court’s broad interpretation of the language could potentially apply to nearly any managerial decision which has an impact on the bargaining unit’s employment security.²⁷⁷ Thus, commentators have noted from the NLRB decisions which followed, that a more appropriate standard that can be used to analyze when a decision to automate will fall “within the conditions of employment” to be whether the decision will “directly and foreseeably result in adverse impact on the bargaining unit or its members.”²⁷⁸ Under this standard, if the adverse effect are neither immediate or foreseeable, then bargaining should not be mandatory.²⁷⁹ Advocates of this standard argue that it allows the employer to be on notice as to whether he or she is legally required to bargain.²⁸⁰ This standard is in accord to the NLRB’s decision in *Richland, Inc.*,²⁸¹ where an employer unilaterally decided to install remote control devices that led to the layoffs of five engineers.²⁸² Here, because the employer had actual knowledge that engineers would be laid off and failed to bargain despite the unions requests the Board ultimately ordered mandatory bargaining.²⁸³

The Supreme Court also provided insight on what standard should be used in the 1981 holding of *First Nat’l Maintenance Corp. V. NLRB*.²⁸⁴ Here, the Court stated that bargaining which pertains to “management decisions that have a substantial impact on the continued availability of employment should be required only if the benefit, for labor-management relations and the collective-bargaining

²⁷² *Id.* See also *Town & Country Manufacturing Co.*, 136 N.L.R.B. 1022 (1962).

²⁷³ *Id.*

²⁷⁴ *Id.*

²⁷⁵ *Id.* at 1834–35.

²⁷⁶ *Id.* at 1835.

²⁷⁷ *Id.*

²⁷⁸ *Id.* at 1839.

²⁷⁹ *Id.*

²⁸⁰ *Id.*

²⁸¹ *Richland, Inc.*, 180 N.L.R.B. No. 2, 73 L.R.R.M. 1017 (1969).

²⁸² *Automation and Collective Bargaining*, *supra* note 246, at 1839.

²⁸³ *Id.* See also *Weston & Brooker Co.*, 154 N.L.R.B. 747 (1965) (where the board held that the foreseeable lay-off of one employee was sufficient to trigger the duty to bargain).

²⁸⁴ *Quackenboss & Meisburg*, *supra* note 245.

process, outweighs the burden placed on the conduct of the business.”²⁸⁵ Commentators have noted that this case will likely be the standard which will be applied to determine whether automation related decisions will be subject to mandatory bargaining.

More complex circumstances such as *Renton* and *Leach* also “highlight the Board’s extreme caution when dealing with technology that might lower headcount.”²⁸⁶ In *Renton*, a newspaper publisher began negotiations which led to the purchase of a Goss Press, which allowed them to compete more effectively, however the court ultimately found that they had violated the NLRA by their refusal to bargain with the Union concerning their intended change of operations and its effects upon the composing room employees and their failure to give prior notice or consultation.²⁸⁷ The Board conceded in its opinion that:

[Technological] improvements serve the interests of the economy as a whole and contribute to the wealth of the Nation. Nevertheless, the impact of automation on a specific category of employees is a matter of grave concern to them. It may involve not only their present but their future employment... accordingly, the effect of automation on employment is a joint responsibility of employers and the representatives of the employees involved. To the extent that this responsibility imposes a statutory obligation on either party to bargain in good faith about wages, hours, and conditions of employment, it is a matter over which this Board has jurisdiction. Certainly, in some cases, the adverse effect of changes in operation brought about due to improved, and even radically changed, methods and equipment could be at least partially dissipated by timely advance planning by the employer and the bargaining representative of its employees. Obviously, this is not possible, where, as here, the employers did not advise the Union in advance of the change, and, in fact, never did notify the Union, but rather, when the time came, informed the employees. For this reason we have stated that in remedying violations like those in the instant case, we would ordinarily order the Respondent to restore the status quo ante by reinstating its employees with backpay and to bargain with the Union over any future changes in operations.²⁸⁸

²⁸⁵ *Id.*

²⁸⁶ Patrick T. Wilson, *Competing with a Robot: How Automation Affects Labor Unions*, WAKE FOREST J. BUS. & INTELL. PROP. L. (Aug. 22, 2017), <http://ipjournal.law.wfu.edu/2017/08/competing-with-a-robot-how-automation-affects-labor-unions/>. “In *Leach Corp.*, even though the employer’s proposed solution made no fundamental change to the employer’s processes, the switch to automation itself was likely a mandatory subject of bargaining. Moreover, absent any indication of a waiver, this case suggests that any unilateral changes to the conditions of employment that pertain mandatory subjects will result in a violation by the employer.” *Id.*

²⁸⁷ *Renton News Record*, 136 N.L.R.B. 1294, 1295–96 (1962).

²⁸⁸ *Id.* at 1297.

Here, the Board found that even in the case of economic exigencies, the employer was required to bargain.²⁸⁹ Although, the court ultimately hesitated to enforce the “usual” order to reinstate the employees because of the harsh detrimental and punitive effects such an order would have on Renton.²⁹⁰ Under section 10(c) of the NLRA, the NLRB has the power to “frame remedies which compensate for illegal avoidance of the duty of the 8(a)(5) duty, but only those which are remedial or corrective, and not punitive.”²⁹¹ The Board, however, did order the employers to bargain with Union regarding this matter.²⁹²

Finally, some unique circumstances also provide employers creative ways to implement the change without incurring a violation of the law. For example, if management’s unilateral decision to automate leads to changes which are not inconsistent with “a preexisting pattern of actions, an employer can ordinarily continue to act at will within that pattern’s boundaries.”²⁹³ Additionally, in *Lufkin Foundry & Machine Co.*,²⁹⁴ because the technological implementations had previously been acquiesced to by the union, continued alterations and adoptions were held to be “comprehended [by the union] in earlier understanding and was but an outgrowth of the status quo.”²⁹⁵ Thus, this case illustrates the precautions that labor representatives must be aware of in their negotiations and not accidentally waive their position in the case of gradual implementations by the employers.

These cases highlight the ways in which collective bargaining agreements can be negotiated and tailored, to help curb the rate at which firms will implement advanced technologies. The most common bargaining demands that are being negotiated pertain to “robust retraining of union members to improve their suitability for new jobs that emerge from the introduction of technology” and “requests for advance notice of technology implementation, especially when the technology could lead to worker displacement.”²⁹⁶ Such contractual agreements are designed to give unions more leveraging power and hold employers accountable to helping employees maintain some security in the workforce.²⁹⁷ In one example from 2018, the Culinary Workers Union Local 226 in Las Vegas successfully won a bargaining negotiation which obligated the local hotel employers to give the union a six month advance notice of new technology implementations that could potentially lead to job displacement.²⁹⁸ This agreement additionally won the union no-cost retraining for any new jobs that may generate from the implementation of technology.²⁹⁹

²⁸⁹ *Id.*

²⁹⁰ *Id.*

²⁹¹ *Id.* at 1842.

²⁹² *Renton News Record* at 1298.

²⁹³ *Automation and Collective Bargaining*, *supra* note 246, at 1847.

²⁹⁴ *Lufkin Foundry & Machine Co.*, 181 N.L.R.B. No. 35, 73 L.R.R.M. 1575 (1970).

²⁹⁵ *Id.* at 1847.

²⁹⁶ *Quackenboss & Meisburg*, *supra* note 245.

²⁹⁷ *Id.*

²⁹⁸ *Id.*

²⁹⁹ *Id.*

Conversely, management side labor firms can use collective bargaining agreements to “negotiate robust and far-sighted management rights clauses” which “reserve the employer’s right to make operational changes and include a ‘no-strike’ clause that prohibits striking over changes during the agreement’s term.”³⁰⁰ Essentially, such clauses if written transparently would be interpreted the NLRB and other regulators as a waiver by the union of their right to bargain and allow the employer to implement automated solutions without the obligation to bargain at the will of the union.³⁰¹ Ultimately, both labor-side and management-side representative have been and will continue to look for more input from employment counsels to navigate through the complex and critical legal challenges that will arise in the process of technological implementation.³⁰²

C. Other Strategies

An alternative solution is the concept of “shifting all or part of the cost of some worker entitlements from employers’ payrolls to a broader and more progressive tax base would mitigate both the incentive to automate and the growth of income inequality.”³⁰³ Many other alternative forms of taxation, which essentially lead to the same result, are also available. For example, legislatures may consider “a wealth tax, a tax on financial transactions, or a European-style consumption tax.”³⁰⁴ Ultimately, however, the goal here would be finding a way to fund entitlements such as health insurance, paid leave, and to supplemental income for poor workers.³⁰⁵ The concept of a federal universal basic income is suggested as a mitigating factor to alleviate the interruptions or shortcomings of working hours that would be affected. However, where the funding for such complex and costly proposals can be acquired is not a simple question.³⁰⁶

V. CONCLUSION

Senate Bill S. 3034, TAA for Automation Act of 2019, indicates that Congress is anticipating the larger adoption of automation. The Bill’s attempt to take action through TAA’s previous efforts to curb job displacement suggests that policymakers are using TAA as the bedrock foundation to address automation.

The correlation is logical because both issues are dealing with widespread and rapid job displacement. The proposed TAA expansion, which includes automation shines a light on the heavy reality that nearly half the U.S. workforce may be in jeopardy as a result of the numerous developments taking place both domestically and internationally. In other words, their hardships are being further compounded as they are not only threatened by individuals in other countries taking their work, but the remaining jobs are now going to the machines. So,

³⁰⁰ Ken Green, *How Unions Can Protect the Workers Who Are Most Vulnerable to Automation*, UNIONTRACK (Sept. 17, 2019), <https://www.uniontrack.com/blog/unions-and-automation>.

³⁰¹ *Id.*

³⁰² *Id.*

³⁰³ Estlund, *supra* note 7, at 316.

³⁰⁴ *Id.* at 318.

³⁰⁵ *Id.* at 317.

³⁰⁶ *Id.* at 323.

where can they fit in? At this juncture, it may be helpful to return to the heart of this issue, which happens to be the bottom line of the corporations and firms that are outsourcing and now automating to cut expenses and liabilities.

In the larger scheme, however, S. 3034 is preparing the federal and policy resources which economists and even proponents of automation have been relying upon in their arguments. It could be argued that this policy is implicitly encouraging the adoption of advanced technology by creating a safety net for those who will be dispensable to firms after advanced technologies are optimized.

This is where Professor Estlund's unburdening strategy may make the most sense. As the findings in the Report by GAO demonstrated, there are numerous risks and costs still affecting the private firm's ultimate decision to automate. Thus, by "unburdening" the salvageable labor costs, policymakers may be able to triage the situation by incentivizing firms to not make the final decision to automate. Conversely, for these same reasons, substantial efforts to negotiate by way of collective bargaining agreements may further agitate firms to move more rapidly towards adoption.

S. 3034's timing is also noteworthy because it followed approximately nine months after Congress received GAO's report. The report alerted Congress that numerous surveys must be established to gather the necessary data to enable the Department of Labor and Commerce to fully assess the breadth to which advanced technological adoption is directly responsible for the disruption of the U.S. workforce. TAA for Automation attempts to remedy this critical issue through its establishment of committees and annual reports.

S. 3034, as it currently stands, provides some insight into the lawmakers' perspectives. The decision to build upon the foundations of TAA reflects the analogous nature of the issue to previous fissuring strategies such as the outsourcing of jobs to overseas labor markets. However, economic and legal experts suggest automation may not be treated and remedied the same way as outsourcing. Though the incentives which influence firms to adopt it are for the most part the same, the critical difference may be that the rate of job loss will likely outpace the rate at which TAA efforts have previously been able to assist. Essentially, the impacts of fissuring may not be a justifiable comparison to the potential impacts of automation. Thus, this effort alone may be insufficient because it does not provide any legislative strategy that could potentially slow down the rate of automation and achieve the sense of economic equilibrium that would allow sufficient time for the creation of new jobs to replace those that are lost.

TAA has previously attempted to mitigate displacements due to fissuring strategies such as outsourcing by transitioning qualified candidates into new employment opportunities that can return them to a similar position to where they were, prior to the displacement. Previously, if one plant shut down it was possible to find an analogous facility elsewhere, but when the skill itself is universally automatized, there remains an even narrower opportunity for transition. Thus, a great deal of effort will be required to fundamentally reeducate the displaced workforce.

Ultimately, the projected breadth and scope of the two issues warrant criticism. As the GAO report suggests, the complete scope of layoffs have not yet manifested because the new technologies are still in the process of true optimization, thus requiring manual redundancies. While outsourcing has had a widespread effect upon many American's lives, it can be argued that it did not affect as many individuals who are projected to be affected by the transition to an automation-based economy. While time is of the essence because of the pace at which implementation by firms can take place, only time will tell whether S. 3034 and other creative strategies can establish the infrastructure needed to transition the millions of Americans who will be displaced by automation.