

Policy Responses to Technological Unemployment

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Introduction

The Industrial Revolution marked the first major wave of automation. New technologies of production required fewer workers to create the same amount of output. Yet, the unprecedented explosion in productivity failed to lead to permanent, mass technological unemployment. New industries and new jobs arose. Modern skeptics of the job-displacing potential of new technologies in the 21st century often compare believers to those who feared the Industrial Revolution would cause mass unemployment. They accuse believers of falling victim to the “Luddite fallacy,” named so after the textile workers who, at least in the popular imagination, sought to destroy the machines that replaced them in a doomed attempt to save their jobs.¹

Regardless of whether or not this time is truly different from the last, there is now extensive literature and public debate as to how the United States ought to react to automation and manage its effects, if it should at all. This paper surveys the various ideas governments, unions, and individuals have proposed to address the labor displacement that increasing automation may cause, and the extent to which those ideas have been implemented in the past and present. There are two parts, corresponding to two broad categories of proposals. Part A surveys proposals to prevent labor displacement by preventing, or at least slowing down, the diffusion of automation technology. Part B surveys proposals that do not get in the way of automation. Instead, these proposals accept any labor displacement that may occur because of automation, and deal with the effects of that labor displacement instead.

¹ See, e.g., *Rethinking the Luddites*, The Economist (Nov. 6, 2009), https://www.economist.com/blogs/freeexchange/2009/11/rethinking_the_luddites.

A. Preventing Labor Displacement by Preventing Automation

Central to the Industrial Revolution were the new technologies of production in the textiles industry, like spinning mules, water frames, and power looms, which cumulatively required fewer workers to create the same amount of output. Partly as a response to the job displacement that the new technologies caused, many textiles workers, who would become known as Luddites, organized to destroy the machinery as an act of political protest.² Destruction of machinery was routine throughout the United Kingdom and France, reaching its peak from 1811 to 1816, in what are now known as the Luddite Revolts.³ Obviously, the revolts did not halt the industrialization of the textiles industry.

Destroying machines was never a viable response to automation; it is even less so now when many of the technologies that threaten jobs are at least partly software-based and therefore difficult to attack and easy to replace.⁴ However, entities can and have sought to use legal methods to slow, or stop altogether, the proliferation of labor-saving technology. Outright bans are the bluntest method. Earlier this year, the Indian government stated that it would ban self-driving cars

² See Jeff Horn, *Machine-Breaking in England and France During the Age of Revolution*, 55 *Labour: Journal of Canadian Labour Studies* 143, 147 (2005). The Luddites' acts are often now construed solely as doomed attempts to halt technology, when in reality, the Luddites were less protesting the fact of the technology than their working conditions and exploitation. See Brian Bailey, *The Luddite Rebellion* 11 (1998). Machine-breaking had long been a means of winning bargaining power against capitalists. See *id.* Nonetheless, this misconception of Luddites has stuck around.

³ See Robert F. Wearmouth, *Some Working-Class Movements of the Nineteenth Century* 1–12 (1948).

⁴ Consider that data collection and processing, which take up roughly one third of workers' time across the U.S. economy, are two of the functions most susceptible to automation. See Michael Chui, James Manyika, & Mehdi Miremadi, *Where machines could replace humans—and where they can't (yet)*, McKinsey Q. (July 2016), available at <https://www.mckinsey.com/business-functions/digital-mckinsey/our-insights/where-machines-could-replace-humans-and-where-they-cant-yet>.

from operating in India in order to protect people's jobs. Minister for Road Transport Nitin Gadkari, India's top transportation official, stated, "We won't allow driverless cars in India. I am very clear on this. [. . .] In a country where you have unemployment, you can't have a technology that ends up taking people's jobs."⁵ India's stance stands in contrast to that of U.S. regulators, who have generally expressed support for the development of driverless technology,⁶ though nearly 3% of the American workforce make their living driving taxis, buses, vans, and trucks.⁷ Virginia and Idaho state legislatures worked with robotic-delivery companies to pass bills allowing and regulating the operation of delivery robots on their streets.⁸ However, some Americans are warier, and have sought to put in place measures restricting technologies on the basis of their labor-displacing potential. San Francisco City Supervisor Norman Yee has proposed banning sidewalk delivery robots, primarily for safety reasons, but also out of concern that the robots will take away delivery jobs.⁹ Workers presently employed in driving jobs have, unsurprisingly, been more vocal in their opposition to self-driving technology than regulators. The Upstate Transportation

⁵ Timothy B. Lee, *India's transport minister vows to ban self-driving cars to save jobs*, ArsTechnica (July 25, 2017), <https://arstechnica.com/tech-policy/2017/07/indias-transport-minister-vows-to-ban-self-driving-cars-to-save-jobs/>.

⁶ See Mike Spector & Mike Ramsey, *U.S. Proposes Spending \$4 Billion to Encourage Driverless Cars*, Wall St. J. (Jan. 14, 2016), <https://www.wsj.com/articles/obama-administration-proposes-spending-4-billion-on-driverless-car-guidelines-1452798787>.

⁷ See Steven Greenhouse, *Driverless Future?*, The Am. Prospect (Mar. 21, 2017), <http://prospect.org/article/driverless-future> (quoting labor economist Lawrence Katz).

⁸ April Glaser, *A robot-delivery startup helped write state laws that are locking out competition*, Recode (Apr. 22, 2017), <https://www.recode.net/2017/4/22/15273698/robot-delivery-startup-starship-state-laws-lock-out-competitors>.

⁹ April Glaser, *San Francisco is considering legislation that would ban sidewalk delivery robots*, Recode (May 16, 2017), <https://www.recode.net/2017/5/16/15648324/san-francisco-legislation-ban-autonomous-delivery-robots-sidewalks>.

Association, a lobbying organization for professional drivers in upstate New York, has urged the state of New York to ban self-driving cars from the state's roads for 50 years.¹⁰

Some have argued that automation ought to be resisted for workers' sake even if workers are not entirely supplanted by automation, but merely have fewer responsibilities on the job. Nicholas Carr argued that increasing automation would make humans worse at their jobs, as humans cede increasing amounts of what makes their jobs important and challenging to automated machinery.¹¹ He draws an example from aviation: as cockpits became increasingly automated, the overall safety record in aviation increased, but the infrequency with which pilots now cognitively engage with the task of flying has made them worse at their jobs.¹² The same thing can occur with other jobs that used to be more cognitively demanding. Carr's argument suggests that even technology that seems complementary to human labor can end up having a substituting effect. As human workers rely more upon machines at work, their skills degrade, making substituting technology in lieu of labor yet more attractive to management.

Market-based mechanisms for restricting automation are more commonly proposed than bans. Such mechanisms work by increasing the opportunity cost of using automation relative to labor.¹³ So-called "robot taxes," proposals to either directly tax automated machinery or, more

¹⁰ Matt McFarland, *The backlash against self-driving cars officially begins*, CNN (Jan. 10, 2017), <http://money.cnn.com/2017/01/10/technology/new-york-self-driving-cars-ridesharing/index.html>.

¹¹ Nicholas Carr, *All Can Be Lost: The Risk of Putting Our Knowledge in the Hands of Machines*, The Atlantic, Nov. 2013, available at <https://www.theatlantic.com/magazine/archive/2013/11/the-great-forgetting/309516/>

¹² *Id.*

¹³ Often times the primary purpose of the mechanism is not deterring the use of robots but raising revenue to help workers displaced by them. See *European Parliament calls for robot law, rejects robot tax*, Reuters (Feb. 16, 2017), <http://www.reuters.com/article/us-europe-robots-lawmaking/european-parliament-calls-for-robot-law-rejects-robot-tax-idUSKBN15V2KM>

commonly, the capital gains accrued by corporations from the use of automated machinery that has a labor-displacing effect, have gotten the most attention. In May 2016, Member of European Parliament Mady Delvaux proposed taxing corporations for reliance on automated equipment as a means of protecting workers.¹⁴ The proposal was ultimately rejected by the European Parliament.¹⁵ South Korea is cutting back on its pre-existing tax incentives for automation. The country currently incentivizes automation by allowing companies that invest in automated equipment to deduce from their corporate taxes 3–7% of the value of the investment.¹⁶ As part of its comprehensive tax reforms, which will be put in place towards the end of this year, the South Korean government plans to cut the amount companies can deduce under the incentive.¹⁷ However, the “robot tax” is most famously associated not with a particular legislative proposal but with a particular person. Bill Gates has argued that since modern automation could be a “net loss” for society, governments should be willing to use taxes to “slow down the speed” of its adoption and buy time to transition to a new economy.¹⁸ Gates has also pointed out that human laborers are taxed for their productivity, and so a “robot tax” would be less about penalizing robots than equalizing the playing field

(describing European Parliament’s rejection of proposal “to impose a so-called robot tax on owners to fund support for or retraining of workers put out of a job by robots”).

¹⁴ Draft Report with Recommendations to the Commission on Civil Law Rules on Robotics, Committee on Legal Affairs for the E.U. Parl. (May 31, 2016), *available at* <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//NONSGML%2BCOMPARL%2BPE-582.443%2B01%2BDOC%2BPDF%2BV0//EN>.

¹⁵ Reuters, *supra* n. 12.

¹⁶ Yoon Sung-won, *Korea takes first step to introduce ‘robot tax’*, Korea Times (Aug. 7, 2017), http://www.koreatimes.co.kr/www/news/tech/2017/08/133_234312.html.

¹⁷ *See id.*; *see also* Cara McGoogan, *South Korea introduces world’s first ‘robot tax’*, *The Telegraph* (Aug. 9, 2017), <http://www.telegraph.co.uk/technology/2017/08/09/south-korea-introduces-worlds-first-robot-tax/>.

¹⁸ Kevin J. Delaney, *The robot that takes your job should pay taxes, says Bill Gates*, Quartz (Feb. 17, 2017), <https://qz.com/911968/bill-gates-the-robot-that-takes-your-job-should-pay-taxes/>.

between robots and workers.¹⁹ Gates's endorsement of the idea led San Francisco Supervisor Jane Kim to create the nascent Jobs for the Future Fund in August 2017.²⁰ Citing the notorious statistic that 47% of jobs could be automated in the next 20 years,²¹ Kim's Jobs for the Future Fund proposes that "as workers are displaced, [] companies continue to pay a portion of the lost tax into a fund that can then be used for education, retraining and targeted investments in new industries. This modest tax will help smooth the transition for our workers, providing them with better opportunities."²² Unlike Gates, who champions the robot tax mainly as a way to deter automation from occurring in the first place, Kim sees automation as somewhat inevitable, and would tax gains from automation mainly for the purpose of raising revenue for workers who will be displaced one way or another. Consequently, Kim's proposal is more of a proposal to deal with automation rather than prevent it.

Keeping labor costs down is another way to increase the opportunity cost of automation. Policymakers frequently cite automation as a reason to push back against movements for greater worker protections, including the Fight for \$15.²³ President Trump's initial nominee for Secretary of Labor, Andy Puzder, stated that if he had been successfully appointed Secretary of Labor, he

¹⁹ *Id.*

²⁰ See Matt Simon, *Tax the Rich and the Robots? California's Thinking About It*, Wired (Aug. 24, 2017), <https://www.wired.com/story/tax-the-rich-and-the-robots-californias-thinking-about-it/>; see also Jamie Condliffe, *San Francisco Will Consider a Tax on Robots*, The Download, MIT Technology Review (Aug. 24, 2017), <https://www.technologyreview.com/the-download/608732/san-francisco-will-consider-a-tax-on-robots/>.

²¹ See Carl Benedikt Frey & Michael A. Osborne, *The Future of Employment: How Susceptible are Jobs to Computerisation* 40 (Oxford Martin School Working Paper, Sept. 17, 2013), available at <http://www.oxfordmartin.ox.ac.uk/downloads/academic/future-of-employment.pdf>.

²² *About Us*, Jobs for the Future Fund, <https://www.jobsofthefuturefund.com/about/>.

²³ A strange example of this argument being put forth is the satirical Facebook page "Robots for a \$15 Minimum Wage," which shares tongue-in-cheek posts arguing in favor of a \$15 minimum wage from the perspective of the robots that the page's authors think would inevitably replace workers paid \$15 an hour. The page has 4,750 followers.

would have prioritized making entry level jobs accessible by keeping wages low.²⁴ Otherwise, workers in such positions would lose their jobs to automation—a possibility that Puzder celebrated as CEO of CKE, a fast food holdings company.²⁵

The argument for limiting worker entitlements so as to save their jobs is not limited to conservatives, either. The Brookings Institute has urged that the “second-order effects of automation and skills demand must be taken into account by lawmakers considering a minimum wage hike.”²⁶ New York University law professor Cynthia Estlund has proposed that policymakers shift the economic burden of certain worker entitlements away from the employer to other actors, like the state, when the nature of the entitlement means the entitlement’s provision is practically extricable from the employer.²⁷ Estlund gives health insurance as an example. Employers are not intrinsically necessary to protect the underlying entitlement of health care, and employers are not deterred from undesirable behavior by virtue of providing healthcare.²⁸ Employer mandates, then, are a “tax” employers bear to employ people that employers do not need to bear.

²⁴ See Trent Gillies, *Former CKE chief Andy Puzder on automation: If robots take your job, ‘the minimum wage is zero’*, CNBC (Apr. 23, 2017), <https://www.cnbc.com/2017/04/23/andy-puzder-on-automation-if-robots-take-your-job-the-minimum-wage-is-zero.html>.

²⁵ See Kate Taylor, *Fast-food CEO says he’s investing in machines because the government is making it difficult to afford employees*, Business Insider (Mar. 16, 2016), <http://www.businessinsider.com/carls-jr-wants-open-automated-location-2016-3> (quoting Puzder as saying about automated machines, “They’re always polite, they always upsell, they never take a vacation, they never show up late, there’s never a slip-and-fall, or an age, sex, or race discrimination case.”).

²⁶ Jack Karsten & Darrell M. West, *Rising minimum wages make automation more cost-effective*, Brookings Inst. (Sept. 30, 2015), <https://www.brookings.edu/blog/techtank/2015/09/30/rising-minimum-wages-make-automation-more-cost-effective/>.

²⁷ Cynthia Estlund, *What Should We Do After Work?*, N.Y.U. L. & Econ. Research Paper No. 17-26 (2017), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3007972.

²⁸ *Id.* at 37.

The argument against providing workers higher wages and greater protections so as to deter the adoption of automated technology, of course, also supports intentionally reducing worker power in order to stave off the robots for even longer. There is no clear evidence that the status quo level of worker protections is one that will meaningfully deter automation in any field, considering that the marginal cost of operating a piece of automated equipment for an hour can be zero or near-zero.²⁹

The above examples are recent, and they are all public law proposals. In the latter half of the 20th century, collective bargaining played a prominent role as a legal tool for restricting the spread of automation technology. As increasing numbers of industrial jobs became automated, unions argued that decisions to automate ought to be a subject of collective bargaining.³⁰ Management disagreed.³¹ Since labor-saving machines were simply another word for physical capital, labor's occasional substitute, automation was simply capital investment, a classically "managerial" decision.³² Unless the union had some stake in the company, the union ought to have no say in the decision to automate.³³

Unions sued companies for refusing to negotiate on automation decisions.³⁴ Section 8(a)(5) of the NLRA requires employers to bargain with unions,³⁵ and Section 8(d) defines the

²⁹ Cf. M. Ishaq Nadiri & Ingmar R. Prucha, *Estimation of the Depreciation Rate of Physical Capital in the U.S. Total Manufacturing Sector* (NBER Working Paper No. 4591 Dec. 1993), available at <http://www.nber.org/papers/w4591.pdf> (estimating that the depreciation rate of physical capital in the United States is 0.059).

³⁰ See generally, Note, *Automation and Collective Bargaining*, 84 Harv. L. Rev. 1822 (1971).

³¹ See *id.* at 1825 (citing N. Chamberlain, *The Union Challenge to Management Control* 14–18 (1948)).

³² See *id.*

³³ See *id.*

³⁴ See *id.* at 1827.

³⁵ 29 U.S.C. § 158(a)(5).

subject matter of mandatory bargaining as “wages, hours, and other terms and conditions of employment.”³⁶ The NLRB had to decide whether automation-related decisions were “other terms and conditions of employment” and thus subjects of mandatory bargaining. In several opinions, the NLRB held yes. *Richland, Inc.*³⁷ involved an employer who unilaterally installed automated equipment that replaced three union members. The NLRB held that the employer violated “Section 8(a)(5) and (1) of the Act by refusing to bargain with the Union over the decision to install automated equipment and the effects of that decision.”³⁸ The NLRB explained: “Technological advances can be both progressive and destructive in their consequences. While automation leads to increased efficiency and productivity, it may also lead to unemployment. By its unilateral action, the Employer deprived the Union of its right to negotiate on behalf of the men who were to be replaced by machines.”³⁹ Accordingly, the court enjoined the employer from making similar capital investments without first consulting the union, and ordered the employer to bargain with the union over “the effects of its decision to automate in this case.”⁴⁰ In *Eaton, Yale & Towne, Inc., Unit Drop Forge Div.*,⁴¹ the NLRB also held that an employer had violated § 8(a)(5) by installing automated equipment without consulting the union when no one was fired, but as a consequence of the equipment’s installation, the duties and compensation of one of the workers changed.⁴²

³⁶ 29 U.S.C. § 158(d).

³⁷ 180 N.L.R.B. 91 (1969).

³⁸ *Id.* at 91.

³⁹ *Id.* at 92.

⁴⁰ *Id.*

⁴¹ 171 N.L.R.B. 600 (1968).

⁴² *See id.* at 600.

That said, when unions did negotiate with employers over automation, they did not resist the adoption of the technologies themselves.⁴³ Most unions understood that automated equipment, like almost all technology, had its benefits and drawbacks.⁴⁴ Thus instead of seeking to prevent automation itself, many workers sought to integrate technology with their pre-existing jobs while preserving those jobs, and if that failed, to keep workers who were displaced by technology afloat by getting management to retrain them for another job within the firm or provide financial support. A 1965 Communications Workers of America report on automation's implications for labor summarized the six most important provisions in labor agreements for protecting workers as follows: 1) guarantees against job or income loss, 2) compensation for employees who lose their jobs, 3) guarantees of income for workers required to take lower paying jobs, 4) provisions for retraining, 5) provisions for transfer to other plants, and 6) agreements to provide workers with advance notice of plant closings and other major changes.⁴⁵ One example of a labor agreement that had provisions on automation is the 1963 contract between the Kaiser Steel Corporation and the United Steel Workers of America. The union accepted the introduction of automated equipment but provided that no worker could be laid off as a result of automation.⁴⁶ If automation made a worker unneeded, the worker would be reassigned to another position or put on paid reserve.⁴⁷ The

⁴³ See generally, Calvin Sims, *Unions Offer Labor Help on Automation*, N.Y. Times (Oct. 21, 1987), <http://www.nytimes.com/1987/10/21/business/business-technology-unions-offer-labor-help-on-automation.html?mcubz=3> (“[Unions’] first concern is still to protect jobs and to preserve wages, but the emphasis in most organized unions is on helping workers adapt to new technology rather than blocking its introduction.”).

⁴⁴ See, e.g., *Automation: a report to the UAW-CIO Economic and Collective Bargaining Conference held in Detroit, Michigan, the 12th and 13th of November 1954*, at 2, UAW-CIO (1954).

⁴⁵ See *Automation: Impact and Implications—Focus on Developments in the Communications Industry*, at 165, Communications Workers of America & AFL-CIO (1965).

⁴⁶ See *id.* at 166.

⁴⁷ See *id.*

Dow Chemical Company had a similar arrangement with its workers. Workers displaced by automation would be placed in a labor pool for retraining and assignment to other jobs within the firm, and the retraining would be financed by savings the firm earned from automation.⁴⁸ These approaches do increase the opportunity cost of automating, but ultimately they seek to adapt workplaces to technological change, not fight against it. They stand in contrast to the combative approach unions had and have with management on the issue of outsourcing.⁴⁹

B. Dealing with Automation's Effects

In addition to policies that would prevent or slow the diffusion of automation, there are policies that prepare workers for its eventual effects. In a market economy, cheap production technology can only be avoided for so long. The most modest and politically palatable way to prepare workers for automation is to retrain them into less automatable positions. Retraining refers both to training a firm's existing employees to work in a more needed position within the firm, and, more generally, to training workers displaced by trade, automation, or the normal ebbs and flows of the economy.⁵⁰ Ideally, workers would acquire more sophisticated skills that enable them to work better, more in-demand jobs. However, the effectiveness of retraining is contingent on the idea that not all jobs will be automatable soon, and so workers displaced by automation can shift to other types of work.⁵¹ In order to be a viable new job for the worker, the job that the worker is

⁴⁸ *See id.*

⁴⁹ *See* Robert H. Ziegler, Timothy J. Minchin, & Gilbert J. Gall, *American Workers, American Unions* 263 (4th ed. 2014) (describing UAW protesting against outsourcing by refusing to handle outsourced components unless their union workers were guaranteed job protection).

⁵⁰ *See* Steven Deutsch, *Successful worker training programs help ease impact of technology*, 110 *Monthly Labor Rev.* 14 (Nov. 1987).

⁵¹ *See* Greg Satell, *How to Win with Automation*, *Harvard Bus. Rev.* (Mar. 30, 2017), <https://hbr.org/2017/03/how-to-win-with-automation-hint-its-not-chasing-efficiency>.

retraining for must be both in high demand and not vulnerable to automation soon—otherwise, the worker will later have to expend considerable investment to retrain, yet again, for a new job.

Tech jobs are often recommended to workers displaced from automation.⁵² Employment in the field is projected to grow 12% from 2014 to 2024, and the median salary for computer and information technology occupations is \$82,860, more than twice the median salary for all occupations.⁵³ Entry barriers into the profession are low; half of developers lack a computer science degree.⁵⁴ There are many brief vocational programs on the market with the specific goal of getting students, many of whom are seeking a mid-life career change, employed.⁵⁵ One coding startup based in eastern Kentucky employs only former coal miners.⁵⁶ The comparative ease with which people can pick up coding skills has even led some journalists to characterize coding as a “blue-collar job.”⁵⁷

Retraining proposals also focus on jobs emphasizing social skills and creativity, as some futurists think such jobs are the most difficult to automate.⁵⁸ Some educators urge that 21st century

⁵² Similarly, adopting skills with technology is recommended for workers threatened by automation. For a discussion on how information technology workers can remain employable by finding complementarities between computers and human labor, see generally Thomas Davenport & Julia Kirby, *Only Humans Need Apply: Winners & Losers in the Age of Smart Machines* (2016).

⁵³ See *Computer and Information Technology Occupations*, Bureau of Labor Statistics (Dec. 17, 2015), <https://www.bls.gov/ooh/computer-and-information-technology/home.htm>.

⁵⁴ See *2015 Developer Survey*, StackOverflow, <https://insights.stackoverflow.com/survey/2015>.

⁵⁵ For a list of such “boot camps,” see *Best Coding Bootcamps: The 2017 Comprehensive Guide*, Switchup (June 12, 2017), <https://www.switchup.org/research/best-coding-bootcamps>.

⁵⁶ See Erica Peterson, *From Coal to Code: A New Path for Laid-Off Miners in Kentucky*, NPR (May 6, 2016), <http://www.npr.org/sections/alltechconsidered/2016/05/06/477033781/from-coal-to-code-a-new-path-for-laid-off-miners-in-kentucky>.

⁵⁷ See Clive Thompson, *The Next Big Blue-Collar Job is Coding*, Wired (Feb. 8, 2017), <https://www.wired.com/2017/02/programming-is-the-new-blue-collar-job/>.

⁵⁸ See Harry J. Holzer, *Will robots make job training (and workers) obsolete? Workforce development in an automating labor market*, Brookings Inst. (June 19, 2017), <https://www.brookings.edu/research/will-robots-make-job-training-and-workers-obsolete->

education should focus on teaching students more general skills, like interpersonal skills, critical thinking, and creativity,⁵⁹ as the technology needed to mimic such attributes resembles artificial general intelligence, the creation of which is much more difficult technologically than the creation of robots that can perform specific, repetitive functions.⁶⁰

Many 20th century labor agreements had retraining provisions for workers, not just as a means of preventing automation but as a way for workers to progress within a company and accumulate seniority. In 1974, 50% of workers covered by a labor agreement with an employer that employed over 1,000 employees had guaranteed on-the-job training as a provision.⁶¹ However, with so few workers in a union, a present-day mass retraining program would have to be publicly delivered in order to reach most of the workers whose jobs are at risk from automation. One model for how a public retraining program would work is the Trade Adjustment Assistance program. The federal program allows people who can demonstrate that they lost their jobs as a consequence of American trade policy to receive free schooling and cash for up to two and a half years, or an apprenticeship paid for by the government.⁶² The program funded 227,882 people in 2010.⁶³ One can imagine a similar program for people who lost their jobs as a consequence of automation.

workforce-development-in-an-automating-labor-market/; McKinsey & Co., *Harnessing Automation for a Future that Works* 5–7 (Jan. 2017).

⁵⁹ See generally Bernie Trilling & Charles Fadel, *21st Century Skills* (2009).

⁶⁰ See Kate Baggaley, *There are two kinds of AI and the difference is important*, Popular Science (Feb. 23, 2017), <https://www.popsci.com/narrow-and-general-ai>.

⁶¹ National Center for Productivity and Quality of Working Life, *Productivity and Job Security: Retraining to Adapt to Technological Change* 12 (1977).

⁶² See *Episode 750: Retraining Day*, NPR (Jan. 27, 2017), <http://www.npr.org/templates/transcript/transcript.php?storyId=512060753>.

⁶³ *What is Trade Adjustment Assistance?*, U.S. Department of Labor (last updated June 22, 2012), <https://www.doleta.gov/TRADEACT/factsheet.cfm>.

In lieu of retraining workers for less automatable jobs, some urge policymakers to abandon employment as a goal and instead focus on ensuring people have an acceptable standard of welfare—the reason most people work in the first place. Labor economist Richard Freeman argues that in order to ensure the benefits of automation do not just accrue to the already wealthy, “workers need to own part of the capital stock that substitutes for them.”⁶⁴ In line with this idea, economist Noah Smith suggests that displaced workers should receive an endowment of capital in companies that rely heavily upon automation, a sort of citizen’s stock portfolio.⁶⁵ The central problem of automation, after all, is the productivity from capital outstripping labor. One merit of Freeman and Smith’s emphasis on redistributing capital compared to redistributing income is that it would theoretically keep income inequality somewhat in check, as it would tether the incomes of average citizens to the capital gains of the wealthiest few who have significant ownership of the companies profiting off of automation. Another merit is that the government need not acquire and distribute income regularly; instead, companies could be required to offer stock as part of a severance package for laid-off workers.

But the most popular proposal to combat automation is, by far, universal basic income. The idea of universal basic income (UBI) has featured prominently in political theory for a long time,⁶⁶ but has been seriously considered by policymakers more recently. At its core, UBI is straightforward—people receive a regular, unconditional sum of money from the government to spend on whatever they like. But the extensive literature on UBI, and its favorability among both

⁶⁴ See Richard B. Freeman, *Who owns the robots owns the world*, IZA World of Labor (May 2015), <https://wol.iza.org/uploads/articles/5/pdfs/who-owns-the-robots-rules-the-world.pdf?v=1>.

⁶⁵ See Noah Smith, *The End of Labor: How to Protect Workers from the Rise of Robots*, The Atlantic (Jan. 14, 2013), <https://www.theatlantic.com/business/archive/2013/01/the-end-of-labor-how-to-protect-workers-from-the-rise-of-robots/267135/>.

⁶⁶ See, e.g., Thomas Paine, *Agrarian Justice* (1797).

certain segments of the political left and right,⁶⁷ means that unsurprisingly, UBI proposals come in many forms. Therefore, some UBI proposals are worse than nothing to the supporters of other UBI proposals.

People disagree on how much money a basic income should provide. A basic income that does not meet a person's basic needs is a partial basic income. If a person depended on it alone, they would still be below the poverty line.⁶⁸ A partial basic income would thus mitigate the effects of underemployment, but it would not, alone, address widespread technological unemployment, where automated machinery is so advanced that workers simply cannot even do work for significant supplementary income. But in an economy short of mass technological unemployment, there may be strategic reasons to have partial basic income in lieu of full basic income, if one thinks that allowing people too comfortable a life would incentivize them not to work.⁶⁹ Even if one had no problem with that effect, one may still worry about the poor incentives from an exceedingly generous UBI proposal if it creates a political backlash to UBI as a whole.

Perhaps the biggest political barrier for UBI right now is cost. Though estimates vary, almost all agree that the cost of a UBI program sufficient to bring everyone out of poverty today would be a significant expenditure. One study estimates that in 2002, the increase in government

⁶⁷ Economist Milton Friedman proposed a negative income tax that would accomplish the same goal of providing a minimum guaranteed income in his book *Capitalism and Freedom*. See Milton Friedman, *Capitalism and Freedom* 192–94 (1962). French presidential candidate Benoit Hamon, from the center-left Socialist Party, supported basic income as part of his 2017 campaign. See Lucy Williamson, *France's Benoit Hamon rouses Socialists with basic income plan*, BBC (Jan. 24, 2017), <http://www.bbc.com/news/world-europe-38723219>.

⁶⁸ See Phillippe van Parijs, *A Basic Income for All*, Boston Review (Oct. 1, 2000), <http://bostonreview.net/forum/ubi-van-parijs>.

⁶⁹ See David Calnitsky & Jonathan P. Latner, *Basic Income in a Small Town: Understanding the Elusive Effects on Work*, 64 *Social Problems* 373 (2017) (finding an 11% reduction in the labor force participation rate in a town where all individuals received a full annual basic income in the 1970's).

expenditures required to fund a UBI sufficient to lift everybody above the poverty line would have been \$1.69 trillion.⁷⁰ A negative income tax⁷¹ that would have the equivalent redistributive effect as UBI would cost \$826 billion, according to the same study.⁷² Another study, however, estimates that a household-based negative income tax set at the U.S. poverty level would cost only \$219 billion a year.⁷³ The severity of the cost burden on the United States largely depends on whether UBI replaces the pre-existing welfare services or supplements them. Conservative and libertarian proponents pitch UBI as a more efficient, market-friendly alternative to the welfare state and argue that UBI should replace expenditures like Social Security, Medicare, Medicaid, unemployment benefits, disability benefits, and sometimes even public education.⁷⁴ In 1969, Richard Nixon proposed the Family Assistance Plan, a means-tested basic income scheme for poor families with children that would replace the New Deal era Aid to Families with Dependent Children program.⁷⁵

⁷⁰ See Philip Harvey, *The Relative Cost of Universal Basic Income and a Negative Income Tax*, 1 Basic Income Stud., at *2 (2006), available at <https://www-degruyter-com.ezp-prod1.hul.harvard.edu/downloadpdf/j/bis.2006.1.2/bis.2006.1.2.1032/bis.2006.1.2.1032.pdf>.

⁷¹ For an explanation of the differences between a negative income tax and UBI, see Davide Tondani, *Universal Basic Income and Negative Income Tax: Two different ways of thinking redistribution*, 38 J. Socio-Economics 246 (2009).

⁷² See Harvey, *supra* n. 67.

⁷³ See Dylan Matthews, *The 2 most popular critiques of basic income are both wrong*, Vox (July 20, 2017), <https://www.vox.com/policy-and-politics/2017/7/20/15821560/basic-income-critiques-cost-work-negative-income-tax>, citing Jessica Wiederspan et. al., *Expanding the Discourse on Antipoverty Policy: Reconsidering the Negative Income Tax*, 19 J. Poverty 218 (2015), available at <http://www.tandfonline.com/doi/abs/10.1080/10875549.2014.991889>.

⁷⁴ See Charles Murray, *A Guaranteed Income for Every American*, Wall St. J. (June 3, 2016), <https://www.wsj.com/articles/a-guaranteed-income-for-every-american-1464969586>; Noah Gordon, *The Conservative Case for a Guaranteed Basic Income*, The Atlantic (Aug. 6, 2014), <https://www.theatlantic.com/politics/archive/2014/08/why-arent-reformicons-pushing-a-guaranteed-basic-income/375600/>.

⁷⁵ See Scott J. Spitzer, *Nixon's New Deal: Welfare Reform for the Silent Majority*, 42 Presidential Stud. Q. 455 (2012).

The Family Assistance Plan would have provided a family of four with \$1600, which is worth about \$10,500 today.⁷⁶

Part of why automation and UBI are often coupled together is because automation may help justify the costs of UBI to an electorate skeptical of any government spending on welfare. At least in theory, automation will increase productivity, allowing society to create more goods and services at a lower cost.⁷⁷ If the productivity growth from automation is significant, the additional surplus in value generated from that productivity could pay for UBI. Thus, excepting any resultant deadweight loss, UBI represents a transfer from the firms and people who benefit from automation to those who lost their income from automation, not an additional social cost. Reaping additional productivity from automation may actually depend on wealth transfer programs like UBI. “If machines substitute for workers entirely, then no one has a job or an income from any type of labor. The vast majority of consumers have no purchasing power.”⁷⁸ And so the economy cannot keep growing.

Prior attempts and experiments with UBI have been mostly concerned with its feasibility as an alternative to the welfare state. The threat of automation plays a bigger role in the present interest in UBI. Former SEIU President Andy Stern, who earlier this year defended UBI in a guest

⁷⁶ See Mike Alberti & Kevin C. Brown, *Guaranteed Income’s Moment in the Sun*, Remapping Debate (Apr. 24, 2013), http://www.remappingdebate.org/sites/default/files/Guaranteed%20income%E2%80%99s%20moment%20in%20the%20sun_0.pdf.

⁷⁷ See John G. Fernald & Charles I. Jones, *The Future of U.S. Economic Growth* 8 (Fed. Res. Bank S.F., Working Paper No. 2014-02 Jan. 2014) (“[A]rtificial intelligence and machine learning could allow computers and robots to increasingly replace labor in the production function for goods. . . . In standard growth models, it is quite easy to show that this can lead to a rising capital share — which we intriguingly already see in many countries since around 1980 — and to rising growth rates.” (citation omitted)).

⁷⁸ Martin Ford, *Rise of the Robots* 263 (2015).

post responding to Brishen Rogers,⁷⁹ came to support universal basic income partly out of concern with automation’s impact on workers.⁸⁰ Y Combinator, the largest and most successful startup accelerator in Silicon Valley, is running a randomized controlled trial testing the effect of unconditionally giving \$1000 per month for five years to U.S. citizens to “advanc[e] the debate about social spending and the future of work.”⁸¹ The “yes” campaign for the 2016 Swiss referendum on basic income, the first ballot measure of its kind, centered its message on how basic income would liberate individuals from the need to work only for money, enabling them to spend more time pursuing their passions.⁸² But in “Grundeinkommen,” the documentary made by the two filmmakers who would eventually lead the referendum campaign, the looming threat of automation is a reason why a basic income is not just utopic but necessary.⁸³

⁷⁹ Andy Stern, *A Reply to Brishen Rogers’ “Why UBI Proponents Should Support Labor Law Reform”*, OnLabor (July 7, 2017), <https://onlabor.org/in-response-to-why-ubi-proponents-should-support-labor-law-reform/>.

⁸⁰ See Andy Stern, *Raising the Floor* 65 (2016) (“For the most part, I think automation is good and inevitable. . . . But, unless significantly more work or new types of jobs are created, increased automation will result in the loss of more cherished middle-income jobs causing considerable pain to too many middle- and lower-income American families.”).

⁸¹ See *Basic Income Research Proposal*, Y Combinator Research Blog (Sept. 20, 2017), <https://basicincome.ycr.org/blog/2017/8/24/basic-income-research-proposal>. Sam Altman, the CEO of Y Combinator, has predicted that automation will lead to “a change in the economy on the order of the Industrial Revolution or the Agricultural Revolution,” and described the potential resultant job loss as a “problem that we’re helping to create,” referring to Silicon Valley. See Melia Robinson, *A top Silicon Valley investor predicts robots will change our economy ‘on the order of the Industrial Revolution’*, Bus. Insider (Apr. 25, 2017), <http://www.businessinsider.com/sam-altman-robots-taking-jobs-2017-4>.

⁸² See Mark Gimein, *The Swiss Vote on Guaranteed Income is About Rich People’s Problems*, New Yorker (June 2, 2016), <https://www.newyorker.com/business/currency/the-swiss-vote-on-guaranteed-income-is-about-rich-peoples-problems> (“The most interesting implication of the basic income,” the Swiss actress Bettina Dieterle says in the film-essay, “is that when I die I will no longer be able to say, ‘I could not do what I wanted.’”).

⁸³ See *id.*

Conclusion

It remains unresolved whether automation will actually cause the mass displacement of workers. Experts disagree whether automation will create or destroy more jobs on net, and the extent of that creation or destruction.⁸⁴ In any case, the uncertainty of the future has encouraged, not deterred, people from thinking of ways to manage automation and its implications.

Proposals to manage automation vary in many ways. They fall along the spectrum of ambition, from relaxing worker protections to universal basic income, and along the spectrum of resistance, from outright bans on automated machinery to giving laid off workers some ownership in that machinery. One difference separating the policy proposals put forth in response to automation is whether the proposal seeks to deter automation in the first place or to deal directly with its consequences. But if the risks of automation are real, both types of responses will likely be necessary—ways to delay the future, and ways to deal with it.

⁸⁴ See Jack Ewing, *Robocalypse Now? Central Bankers Argue Whether Automation Will Kill Jobs*, N.Y. Times (June 28, 2017), <https://www.nytimes.com/2017/06/28/business/economy/ecb-automation-robotics-economy-jobs.html?mcubz=3>.