

Augmenting and Replacing Labor:
How technological change has affected workers (and would-be workers),
and potential responses to negative implications of that change.

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Adam Lewis Bayer

Candidate for Bachelor of Science
and Renée Crown University Honors
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Thesis Advisor: _____
Prof. Steven Sawyer

Thesis Reader: _____
Prof. Alexander Corsello

Honors Director: _____
Dr. Danielle Smith, Director

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ABSTRACT

Work has been changing at an exponentially increasing pace since the Neolithic Revolution around 10,000BCE, and what we do for work has surely changed since. Yet, we still work. Humans are unique for our aptitude to build ever-improving tools that make accomplishing tasks quicker and easier. Our drive to innovate led us to create simple tools, then complex tools, and then machines. Simple machines begot more complex machines. We use a general term to describe our tools, machines, and systems; that term is *technology*. Today, what we consider to be technology includes artificially intelligent machines that can accomplish work we previously thought them incapable of doing. Mass produced goods, automated manufacturing, and computer programs have eliminated jobs in some industries and reduced jobs in others, while growing and creating new jobs in yet other industries. New technologies' impacts in each category is difficult to measure. For the most part, these technological changes have improved general wellbeing but their damaging aspects to work are notable and should certainly be addressed; many workers and would-be-workers have seen reduced prosperity, stability, job quality, and opportunities.

This paper contains an analytic synthesis from other works to carry its argument. The argument advanced is that technology has significantly changed work both for the better and for the worse, but in order to preserve the positive aspects of this change, we must address the negative aspects. The majority of these negative aspects stem from economic inequity; so, we should limit the extent to which workers can be exploited. To do so, our government can offer support for health care, job training, education, childcare, and possibly even a universal basic income grant. It is clear that more ought to be done in order to address looming technological unemployment and reduced prosperity, stability, job quality, and opportunities for today's workers and would-be workers.

EXECUTIVE SUMMARY

This project focuses on the current state of work, how we got here, and what can be done to address how changes in the world of work have adversely affected workers. I focus on how job-related tasks and benefits have changed for American workers, and how these changes have been enabled by technology. Shifts in expectations, treatment, and compensation for workers have significantly affected their lives. Clearly, jobs look different today than they did in previous decades. This is the case for a variety of reasons including governmental policies, but the main culprit is developments in technology. While workers have been affected by anti-union and pro-corporation policies enacted in previous decades, many of those policies be tied to technological shifts. Now, some state governments have used their regulatory power to help workers instead of hurting them. One example of such a policy that aims at platforms like Uber, is California's Assembly Bill 5 which addresses how freelance employees must be compensated. This bill was written as a direct result of what some saw as Uber's exploitation of workers.

While the focus of this thesis to analyze the changing nature of work, I focus mostly on technological advancements that are independent of any given occupation because changes in work respond to changes in technology. Devices such as the horse-drawn seed drill changed agricultural work a couple hundred years ago (Johnson, 1842), then machines made factory work more efficient. Over the past century, computers and phones revolutionized office work. Now, laptops and smartphones with reliable internet capabilities have become common in American homes and workplaces. An increasing number of employers are expecting their workers to own these devices and to use those personal devices for work (Lucas, 2019). Still, while new technologies have the potential to change how we work, it is not the case that we must blindly

follow all technological progress. Humans are the ones who build and regulate that progress; it is not the other way around. So, we do not have to take passive roles in the implementation of life-changing devices. Nothing is necessarily good for society *just* in virtue of it being new technology; we need better reasons, and capable leadership that understands the disruptive nature of innovation.

With artificially intelligent machines and automating technologies like self-driving cars, we can expect to see some job sectors shrink or disappear in our lifetime. Even though some medium and high-wage jobs will be created in industries that benefit from automation, prospects for the American worker look bleak if we stay on our current trajectory. Without social programs and relevant policies to protect working people who are unable to get jobs in those high-wage industries, those workers will continue struggling due to a growing number of low-wage jobs, decreased job stability, and stagnation in real wages. This path towards decreased strength, power, and opportunities for workers has defined the past few decades of American technological growth and work-related policy. I seek to give a picture of how work is changing for the better *and* for the worse, and to identify possible responses to the negative changes without hindering positive changes such as increased flexibility and productivity for workers and a growing national Gross Domestic Product (GDP).

This project is significant because it serves to educate readers on something that defines all of our lives – work. Understanding the world of work and *how we got here* is important for shaping how we think about technology and work-related policies. This paper results in a productive and informative message that can influence decision makers, advocates, and voters. That message follows: more ought to be done in order to respond to looming technological

unemployment and reduced prosperity, stability, job quality, and opportunities for today's workers and would-be workers.

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I.

INTRODUCTION

Work defines our lives, whether we like it or not. It makes up the things we do to educate ourselves, accomplish our goals, and progress as individuals and groups. While some despise work, they would be remiss not to acknowledge that work can give people a purpose. Even if you feel absolutely no joy from working, you will probably still try to work and keep your job because – unless you were born into incredible wealth or have already saved enough to retire – you need to work to afford life’s necessities. I say all this to make a simple point: figuring out the extent to which the nature of work is changing is a reasonable and worthwhile pursuit; work is central to the structures of our lives.

This is particularly worthwhile at this time since work is changing rapidly. These changes make it unclear whether work is being altered for the better, for the worse, or – somehow – both. Work is changing due to access to high internet speeds and the rise of artificially intelligent machines combined with changes to both labor law and expectations for employers and employees. There are concerns about robots taking our jobs, and also about intelligent task-management technology making our jobs *miserable*, just as they have done to Amazon warehouse workers; for instance, one worker spoke about how he was forced to be so “productive” that he ended up having to carry around “pee bottle” in order to avoid consequences – affecting his employee “score” – that would result from taking too long of a walk to the bathroom (Pollard, 2018).

In bowling, you do not have to predict whether the ball is going left, right, or center in order to take precautions to avoid a gutterball; you can just put the bumpers up – even though, of

course, that makes the game less risky and fun. Similarly, we don't have to be fully sure of how labor-replacing technologies will disrupt society because we can work to prevent possible harm without damaging the global economy. We can "put the bumpers up." Could the market just be working out some kinks with intelligent machines entering the workforce? Sure. Yet, regardless of whether labor-replacing technologies are *net* good or bad to workers or society, we need to respond to their potential threats. Again, we need to *put the bumpers up*, even if that gets rid of the risk that some say motivates us to succeed. The risk is not worth it when it entails poverty and pain.

My thesis begins from this premise: more ought to be done in order to respond to looming technological unemployment *potentially arising from intelligent machines taking our jobs*, the rising inequality that could result from that mass unemployment, and the stagnating wages, growth of low-wage jobs, decreased stability, and overall worse opportunities for today's workers.

In this paper, I answer the broad question: "how is work changing in the modern era?" In responding to this question, I also address some possible actions that can be taken in order to mitigate the negative aspects of those changes. This paper serves to give you a better understanding of *how* job-related tasks and benefits have changed due to social and technological shifts, and a grasp of which policies can be put in place to protect values of fairness and equality for working people.

I begin by outlining the technological revolutions that have shaped work over time, then I summarize the roles that technology plays in the world of work today. I discuss the differences between replacing and augmenting work as well as the differences between how "smart" and

“dumb” technologies enable task automation. And, I address how some technology-related systems such as ridesharing and food delivery apps have contributed to a shift from stable to precarious work. Of course, the growth of freelance work cannot be attributed to any single technology, but the gig economy – which can be characterized by the growth of low-wage, small task freelance work – can surely attribute its growth to fast internet speeds and devices that allow consumers to access gig-powered platforms like Uber. So, while the gig economy is not a technology, it is surely technology-enabled. Thus, it is apt to credit unfettered technological progress with increased precariousness and lower benefits for workers.

In addition to explaining new forms of work, I address changes to the lives of traditional workers, including the increased numbers of households with two working parents, the increased number of weekly hours that people are working, and the decreased power of unions and workers in general. Nearing the end of this paper, I outline the positive and negative changes to labor that have arisen in the past few decades. I conclude with responses that could potentially address the negative impacts of technology on workers and would-be workers. To address reduced stability, benefits, and opportunities as well as the fear of mass unemployment for workers, government programs can be introduced that eliminate the need for people’s quality of life to be so heavily tied to their occupations. Such programs can include government-sponsored healthcare and childcare, financial and worker regulations on corporations, and possibly a universal basic income grant.

II.

BACKGROUND

To understand the greater context of how work is changing today, we must first look at how it has changed *in the past*. Today, technology affects our lives in too many ways to count, but *technological* is not a new thing. Simply put, technology is any item, device, contraption, machine, doodad, widget, or system that humans create for practical purposes. So that includes the ancient axes and spears used by our ancestors, the pencil, the vase, the printing press, and of course the iPhone. Technology, if we consider it in these broad terms, has been changing the nature of work since the stone age.

For all we know, ancient hominids were concerned with the invention of longer spears and more powerful slingshots because it meant that one hunter could kill twice as many animals in half the amount of time as others, leaving none left for the other hunters. Thankfully, that concern, if it was a concern at all, didn't prevail. Humanity has clearly flourished with our ever more complicated technological developments. Given the perceived history of success in the realm of implementing new technologies into daily life, it can be difficult to make the argument that more technology could be *anything* but good. Still, as we are entering of what engineers and economists like Klaus Schwab call "the Fourth Industrial Revolution" (Schwab, 2017) – which is also referred to as the Second Digital Revolution – it is worth looking back at how society has changed during other drastic periods of economic and work-related change. Thus, I briefly summarize how society and work have changed and restructured themselves over the past several thousand years. Industrialization happened at different times in different countries and

different towns, but for the sake of ease, I use an Anglophilic lens to summarize much of industrialization.

A. First Agricultural Revolution (10,000BCE)

Let us begin with the First Agricultural Revolution. It is generally agreed upon that *part* of what makes humans unique is our organized societies which are centered around *how we work*. One of the first shifts in how humans worked, and therefore how our societies functioned, was the transition from nomadic hunter-gatherer lifestyles to settlement-oriented lifestyles. The term Neolithic Revolution was ascribed to this period by Australian archaeologist V. Gordon Childe in 1935. This transition – which took place around 10,000BCE – has also come to be known as the First Agricultural Revolution. The settlement-oriented lifestyles which succeeded nomadic lifestyles entailed the “shift to cultivating plants, breeding animals for food, and forming permanent settlements” (History.com, 2018, para. 3). Childe referred to this period as *the Neolithic Revolution* it was around this time that organized agriculture started, which separated Neolithic people from their Paleolithic ancestors. That said, not all people made this shift immediately. While nomadic lifestyles have fizzled out over the past twelve millennia, some nomadic communities still exist today.

Examples of new technologies developed during or before this period include the pestle, sickle, wooden plough, hoe, digging stick, granary, and many others (Fussell & Crawford, 2020). Also, systems such as animal and crop domestication, fermentation, irrigation, food preservation, and terracing increased the productivity and output of farm work.

B. Second Agricultural Revolution (17th – 18th centuries)

The term Second Agricultural Revolution refers to the period of rapid growth of food production in England during the 17th and 18th centuries that resulted from the introduction of new crop rotation techniques and selective livestock breeding as well as other advancements that took place over the previous century or so. Agriculturist Jethro Tull famously invented horse-drawn hoes and seed drills increasing farming productivity. As is sometimes the case today when machines are brought in to increase productivity, Tull's workers accepted the new machines with the "utmost reluctance." His laborers likely destroyed and disposed of *at least* one of Tull's inventions (Johnson, 1842). The significance of the many agricultural changes that took place during this revolution was their impact on population. British population growth accelerated, and as other countries developed the same agricultural strategies, the world population grew at an unprecedented rate (Grigg, 1992). The First Industrial Revolution benefited from this population boom.

The Second Agricultural Revolution involved an increase in work and land productivity which meant that less people were needed to accomplish the same amount of work. The wheel-less plough, crop rotations, selective livestock breeding, economical transportation, systems for better land maintenance, and more complicated tools like Tull's horse drawn hoe and seed drill were all technological developments that changed agriculture and defined this revolution. Because of these developments, a smaller share of the population participated in the agrarian workforce. Thus, people joined the urban workforce which fueled industrialization, which brings us to the First Industrial Revolution.

C. First Industrial Revolution (18th – 19th centuries)

There were very apparent changes to the functionality of big industry and labor that occurred in the 18th and 19th centuries that resulted in sweeping changes to how we work. The First Industrial Revolution was characterized by the transition from artisanal and manual production to machine-enabled production. In other words, it can be viewed as the beginning of the mechanization of labor *on a large scale*. That said, the First Industrial Revolution cannot be properly portrayed without delving into the technological and scientific innovation that enabled it. That innovation included new technical capabilities such as mechanized spinning as well as improved methods for chemical manufacturing, iron production, textile production, and steam power among other advancements (Olmstead & Rhode, 2000).

The First Industrial Revolution also marked the beginning of continuous improvements to western economies and ways of life. Yet, that does not mean life became comfortable for all people. While harsh working conditions and abusive child labour existed before industrialization, the factory system and urbanization made them more prevalent. It takes time for laws to catch up to a quickly changing world, as is evident in today's world; so, child labor was not restricted properly for decades to come.

Also, it took time for unions to form and overcome legal roadblocks to participate in effective collective bargaining. While many English workers tried to unionize and change existing structures, some banded together to form the radical Luddites. The term "Luddite" is used today in a derogatory way to refer to someone who opposes new technologies. However, the Luddites were a specific group of workers who protested and destroyed machinery since they feared losing their jobs to automation, and thus, they felt their crafts were becoming obsolete.

The Luddite movement spread from Nottingham and led to “region-wide rebellions” between 1811-1816. Ultimately, government and industry leaders quelled the Luddites by using force (Deseriis, 2015)

As with all other socio-economic revolutions, the First Industrial Revolution defines a period of sweeping change. It is not the case that there was no mechanization before the 18th century, nor is it the case that trade and big business stopped playing a large role in private life and the global economy after the 19th century. While historians and economists put specific time frames such as *from the 1760s to the 1830s/40s* as does Eric Hobsbawn or *from the 1780s to the 1830s* as does T. S. Ashton, these are rough labels without an exact truth value. Still, this sort of categorization can help us make sense of the world. When we see huge innovations such as mechanized spinning as well as the widespread use of steam power followed by tremendous economic, population, and technological growth at the same time as urban workforces changed and grew, it is useful to consider this a new era – during which lessons from a bygone era might not apply. Since those new markets reached maturity and economic growth slowed down with a recession in the 1830s and 40s, it was sensible to consider the First Industrial Revolution to have ended around that time.

The definitive technological shift during this time was the transition from hand-made goods to machine-made goods. Some rudimentary machines automated weaving and made yarn and cloth production increase significantly, but most industrial developments were due to the steam engine. “Flour, paper, and cotton mills, iron works, distilleries, waterworks, and canals” were all automated with steam power (History.com, 2009). Canals and train tracks as well as the boats and locomotives that used them were increasingly powered by steam. Productivity and population boomed as a result of the technological advances of the First Industrial Revolution.

Still, working conditions were unsafe by reasonable standards and pollution from the growth of fossil fuel industries is something that the global population still struggles with.

D. Second Industrial Revolution (19th – 20th centuries)

The world before the First Industrial Revolution looked incredibly different from the world afterward, especially in developed areas. Yet, after the 1830s, there was a lull in progress. It was not until the 1870s when new innovations started heavily influencing the economy again. That said, a lot happened between the 1830s and 1870s. Namely, the American Civil War, the invention and implementation of the electrically power telegraph, and the expansion of railroads in the U.S. From the 1870s until the start of the Great War in the 1910s, telegraph and railroad systems expanded significantly which allowed increased movement of people and ideas. The telephone was patented in 1876 by Alexander Graham Bell and the telephone line systems that it needed in order to operate were heavily expanded, with nearly 6 million connected phones by 1910 (Elon University, 2009). Other technological systems such as “gas and water supply and sewage systems” were widely adopted as well (Hulst, 2017). Reasonably so, this revolution is also sometimes referred to as the Technological Revolution because of the expansion of these technologies in addition to the introduction of systems for telephones and electrical power. The Second Industrial Revolution can be characterized by standardization, electrification, and its enablement of technologies allowing information to spread easily.

With each of these revolutions, industrialization became more normalized and society got closer to what it is today. The first twenty years of this revolution saw a previously unmatched level of growth. The price of goods went down and living standards went up. This was all due to increases in productivity.

The mass urbanization and technological progress that began a century-or-so earlier continued through this time period, but public and academic debate about whether this was *good* for society as a whole faded away. Debate among thinkers like Charles Babbage and Karl Marx about mass machine-caused unemployment became less popular as even working-class people saw improvements to their ways of life (Rosenbloom, 1964). In the United States, unemployment did not skyrocket with the inventions of new machines even as a large influx of laborers immigrated to the United States. Still, labor unions formed and realized their power to strike and use collective bargaining techniques to fight for better working conditions. The power of organizing was important during and after the Great Depression when workers in the U.S. fought for the Fair Labor Standards Act and eventually got it passed in 1938 (Grossman, 1978).

E. First Digital Revolution (20th – 21st centuries)

The Second Industrial Revolution is said to have ended around the time of the World War I in the 1910s, and then the First Digital Revolution – which has also been called the Third Industrial Revolution – is said to have started in the 1970s (Khan, 1987). Does that mean new innovations did not significantly change the world in the meantime? No, of course they did! The period from the 1910s to the 1970s encompassed myriad technological developments including the invention of much of the underlying technology used for digital computation. This period also encompassed the development and expansion of “the automobile, radio, television, commercial air travel, atomic energy, penicillin and vaccines” (Sawyer, 2020). It should be clear that the timeframes for technological revolutions are somewhat arbitrary. Still, this timeframe was chosen because one of the biggest changes to the world of technology was the switch from mechanical and analog to digital technology. This shift entailed improvements to everyday life in

addition to new challenges in our personal and professional lives. That shift defined the beginning of the First Digital Revolution – usually referred to as just *the Digital Revolution*.

Much of the underlying technology upon which modern digital inventions were built was invented in the previous century, including telephone lines, the telegraph, and Babbage's analytical engine, but the more *fundamental* technologies to the Digital Revolution were invented in the 20th century – specifically, between the 1940s and 1970s. During this time period, transistors – which are semiconductors conveying the 1s and 0s used in digital technology – were created, and so were metal-oxide-semiconductor integrated circuit chips – which are computer chips (CHM, 2020a). Also, packet-switching networks like the ARPANET – a precursor to the modern internet – were developed from joint efforts by government agencies, academic institutions, and businesses during this time. With the proper infrastructure in place, Intel released the Intel 4004 in 1971 which was the first single-chip microprocessor – officially laying the groundwork for personal computers (CHM, 2020b). Exciting stuff.

While computers had been devised in the 1940s and by the 1960s were used for banks and government operations, the 1970s are considered the start of the Digital Revolution; these years saw the introduction of early home desktop computers and coin operated video games such as Pong and Space Invaders (June, 2013). Also, early compression techniques were invented for making the storage of audio and visual files easier. In the 1980s, computers entered everyday life in schools, homes, labs, and businesses. Computers were not just a scientific or consumer experiment, they were incredibly useful to the extent that by the late 1980s many businesses were dependent on computers.

Computing technology was also used in cell phones. Early cell phones were not small enough to be handheld, so they were put inside of cars. The term “cell” phone was used because the coverage maps for radio towers looked somewhat like biological cells. In 1973, Motorola made the first call from a working mobile handheld phone, but it wasn’t until 1983 that Motorola sold the world’s first commercially available mobile handheld phone, the DynaTAC, for \$3,995 (Protin, 2017), which would be upwards of \$10,000 today. By the end of the 1980s, Motorola created the first pocket-sized phone, and early internet-capable phones and early smart phones were introduced in the 1990s. Also, by the 1990s, animation and photography had become digitized and 2G networks were developed. The World Wide Web, which had previously only been available to governments and academic institutions, became publicly accessible in 1991 (Long, 2017). By the turn of the millenium, nearly all countries had an option for internet-connection (ITU, 1999). Online banking was introduced during this time as well.

The 2000s saw the Digital Revolution become a global phenomenon. 1 billion people were connected to the internet in 2005, 2 billion were connected in 2012, and now, the majority of the global population uses the internet (Clement, 2020a). While early smartphones were concieved and sold in the 1990s, – in fact, IBM’s Simon from 1993 can be called the world’s first smartphone – the smart-phone business did not truly take off until the first iPhone was released in 2007. Now, the majority of web traffic comes from mobile devices (Clement, 2020b). It is easier than ever to spread new ideas and information, but the spread of misinformation has also become prevalent in the modern era. Debate on information privacy and automation’s effects on labor has not been resolved. The aspects of these issues that relate to labor will be addressed later in this paper.

The Digital Revolution has entailed the creation of systems like 4G LTE internet in addition to incredibly powerful microprocessors in affordable computers such that working from home is a possibility for businesspeople, technologists, and even doctors, teachers, and military personnel. As the internet and computers have improved, we have become more globally connected and that has made outsourcing work to other countries easier, since if a worker is remote, they *might as well* be a world away. Because of the automation and outsourcing of manual jobs, the U.S. manufacturing workforce has lost about 7.5 million jobs since the 1980s (Hernandez, 2018). On the consumer side, this tech has made life more convenient: taxis are easier to get, packages are easier to order, entertainment is easier to access. Also, parcel and food delivery services offer consumers the ability to track delivery workers by GPS in real-time. However, some workers feel over-tracked by their bosses, and they feel that their privacy and autonomy is at stake. Still, thers welcome additional performance metrics.

In Silicon Valley, software companies like Addepar, “a wealth management platform that specializes in data aggregation, analytics and performance reporting” (Addepar, 2020), track employee metrics in order to assess their productivity. They use these metrics to give them tips for how to be more effective. According to their SVP of Services, whom I spoke to, they use software companies like Gong with AI-enabled systems that “listen” to work-related calls. This sytem gives actionable performance reports. Employees and employers use these reports to assess their abilities regarding whether their response times were too quick or too slow and whether they used effective language or not, in addition to other information. In general, employees don’t have the option to opt-in or opt-out to being tracked, but they recognize the benefit of this technology at Addepar. This might be because Addepar’s employees are high-income workers. Still, issues surrounding privacy, autonomy, and worker protections certainly

still exist in lower-income jobs where workers hold less power. These issues partially define the labor-related ethical concerns of this era.

To sum up, the First Digital Revolution entailed the creation of everything that has any computer component. This even entailed updating things that had been invented previously. Now, cars, trains, washing machines, music, and tractors all have digital components.

F. Second Digital Revolution (21st century and beyond)

It is reasonable to wonder what makes something a revolution. The term revolution is a function of language used to categorize time periods so it seems that whatever terms are generally agreed upon should be the ones we use as instruments of denotation. The reason that we must use a new term for categorizing this and future decades is the profound difference between the past and the world of *today and beyond*. Progress in the developed world will not be about the mass expansion of internet access because the vast majority of people in the developed world already have access. Also, transistors are approaching the size of *atoms*. They cannot get much smaller since, at a certain size, electrons can do something called “quantum tunneling” which would make a transistor useless (a transistor that is less than 1 nm wouldn’t work). The Second Digital Revolution might be called the quantum revolution if quantum computing begins to define technological and industry-related changes to the world, or for all we know, it might become *the AI Revolution* as computers do all of our work for us, or maybe the *cyborg* revolution as humans merge with technology. Predicting which of these things will define the future would be a waste of time, since we cannot possibly know for sure.

Regardless of the specifics of the *future* of technology, we know that the First Digital Revolution was oriented around faster computing and expanding internet access, so whatever

comes next will build off of that. Even though the internet has been around in some form since the latter half of 20th century, one might consider the Second Digital Revolution to actually include the introduction of 4G LTE networks in the 2010s since these networks significantly changed how people *used* the internet. The speed of LTE internet allowed companies like Uber to offer a real-time cab hailing service that sparked a significant expansion of the gig economy. The internet of things, machine learning, bio-technology, 3D printing, and AI also have defined very recent history. The long-term effects of implementing such technologies on large scales will be studied fearfully in the future; the world will become even more tech-enabled, and we will gather more data on behavior in the workplace. For now, we can still take a shot at analyzing how new technologies shape the world of work.

III.

MODERN ERA AND AUTOMATION

After taking a metaphorical “step back” and looking at the history of human interactions with technology, you are probably not thinking of *work* or *society* as any sort of stable thing. You would be right. Asking the broad question “how is work changing today” seems vague and unspecific. Still, I will leave it unclear. The idea of *modern* is itself unclear. I want to speak to this vague notion of *changes in work in the modern era* without choosing any arbitrary time periods.

A. Role of AI

The nature of work has always shifted in a relation to technological advancement. Relatively simple machines like the loom made it so less workers were needed for textile creation. When using human labor alone is more expensive and less efficient than using machines *along with* humans, business owners seem to always choose the latter. Workers that cannot compete with machines get replaced – as was the case with telephone operators and most bank tellers. Also, artisans that have been unable to compete with cheaper factory-produced goods have lost their customers to larger corporations. In the past, machines were added to factories alongside workers and did not always replace them since machines could often only do physical, repetitive tasks. Fears about technological unemployment, that is, unemployment caused by machines doing human jobs, have been dissuaded with claims that there are too many things that machines *cannot* do. Advocates of unchecked technical progress often remark that even if machines take some jobs, they will create *more* in the future. Nowadays, intelligent machines can do much more than replace simple, physical, repetitive tasks.

Artificial intelligence, or AI, refers to the abilities of machines to make complex calculations based on inputted data and experience such that their outputs or decisions seem *intelligent* (SAS, 2020). That means being able to solve problems in a dynamic way, similar to or much better than how a human could. Self driving cars, facial recognition software, and any technologies that can “react” to new situations use AI.

AI is used to do things that many humans thought could never be done by a robot. There are algorithms that can play music and create art, and while AI music isn’t always very “good,” we can surely conceive of a future in which AI music is hard to differentiate from human music. There are key differences between the two, but it sure seems that AI will continue to surprise us by accomplishing things that we never believed it capable of doing. The set of tasks and roles that we believe *only humans* can fulfil seems to be shrinking. This is a scary thing to many people because they wonder: if robots can learn complex creative tasks simply by *watching and learning*, then what will humans be needed for? Considering employment, the answer could be “not much.” The situation in which intelligent machines take human jobs and leave humans without work is called technological unemployment, and the fear of technological unemployment) is sometimes referred to as automation anxiety. Automation anxiety was a large part of former presidential candidate Andrew Yang’s message. A solution he proposed, Freedom Dividends included unconditional cash payments to all Americans to supplement their low wages or unemployment that could be caused by a robot takeover (Yang, 2019).

Some differentiate between AI and automation by saying “AI” means smart technology like self driving cars, and “automation” means dumb technology like the loom. However, automating is about making things automatic, and if something is sufficiently “automatic” then it can work “... by itself with little or no direct human control” (Lexico, 2020). This suggests it

makes more sense to consider *anything* that automates human tasks to be an automating technology regardless of how one denotes the smartness or dumbness of the given technology. So, I consider AI to be under the umbrella of automation.

Still, it is worth noting that AI-enabled smart technologies are the main reason for the modern-day fear of technological unemployment. For the first time ever, machines have the ability to replace knowledge workers. While this is unsurprising – because even knowledge workers have relatively routine and repetitive tasks – it is still scary. It is also frightening that, in general, “the percentage of people who are paid primarily to engage in truly creative or non-routine occupations is actually fairly small” (Ford, 2013, p. 37). Thus, many jobs could be subject to automation. Even regarding creative jobs, “if, someday, machines can match or even exceed the ability of a human being to think and to conceive new ideas – while at the same time enjoying all the advantages of a computer in areas like computational speed and data access – then it becomes somewhat difficult to imagine just what jobs might be left for even the most capable human workers” (Ford, 2013, p. 39). With constant improvements to artificial intelligence and automating technologies, the fear of technology-enabled joblessness is valid.

B. Two Types of Automation

There is one thing, which I mentioned above, that all automation entails – enabling something to work by itself with little or no direct human control. This means that when something that a human used to do becomes affordably automated, a human no longer needs to do that thing. It is worth noting that when a *task* is automated, jobs are not *necessarily* lost. Jobs involve many interrelated tasks. Thus, automation often results in *labor augmentation*. As

mentioned above, the fear of technological unemployment is more about how *labor replacement* can result from smart, dynamic technologies that automate *every* task associated with a job.

1. Labor Augmentation

Technology changes how we work. Before and during the 1970s, much of an accountant's job was repetitive debit and credit entry into a physical book. Spreadsheet software aided in reducing errors and changed their schedules such that work that used to take hours could now be done in minutes (Beattie, 2020). Accountants now focus more on forecasting and helping clients make decisions. Many accountants shifted to working on projects related to advisory solutions. With 3D printing, an automotive technology, it has become less tedious for architects to make very exact models. Talk to any person who has been working for several years and they will be able to tell you how technology has changed their job to some extent over the years. Repetitive and routine tasks are often automated so that employees can focus their energy on different tasks.

Sometimes, it is not your job that a company automates, but your manager's job. This was the case for Amazon warehouse workers. To increase efficiency in their warehouses, Amazon uses automated task management. Workers have a "scan gun" that has a screen showing workers what their next task is – this includes a timer for how long the worker should spend in order to complete a given task. Worker productivity is measured by "tasks per hour." One Amazon worker claimed that if his tasks per hour were low, a message would pop up on his device that said, "your rates are down this hour, please speed up." Ironically, workers were not allowed to run, and could get a "point" for doing so – "earn six [points] and your fired" (Shapiro, 2018, para. 17). That same employee claimed to have received a point for taking a day off, and

he claimed a coworker of his was given a point for leaving early to see their kid in the hospital. Also, he said you could get a point for failing to meet your minimum tasks per hour. This high-stress environment creates an incentive not to waste any time doing something as seemingly harmless as going to the bathroom. So, workers carried around pee bottles to achieve their unreasonably high work targets (Pollard, 2018). Ultimately, Amazon increased their productivity and made the jobs of managers easier by augmenting task management, but other stakeholders were in this equation, namely, the warehouse workers.

Why don't Amazon workers quit? Well, no matter how awful the job, people need an income to afford life's basic necessities. Most people choose employment over unemployment as long as employment entails a slightly better standard of living. For that reason, it is easy for workers to be exploited without proper protections; they'll take what they can get. In other words, Amazon warehouse workers reasonably want to keep their jobs even though their occupation is difficult and stressful.

2. Labor Replacement

Companies like Amazon have already automated much of their warehouse processes, and they plan to do more. According to an Industry Week article, Amazon has “started replacing human packers with so-called CartonWrap robots in some warehouses” (Whittle, 2019, para. 2). In this case, Amazon is not augmenting human jobs, they are replacing them. The same thing might be happening to truckers and cab drivers as self-driving cars become the norm. The difference between augmentation and replacement can be illustrated using the following example: while GPS systems in cars *automate* the task of map-reading, which augments the task of driving by making navigation easier, to *completely* automate *all* the tasks associated with

driving would entail *replacing* drivers. Still, even when jobs are completely replaced, jobs are created in the industries that benefit from that replacement. However, since truckers won't simply be promoted to AI programmers, ensuing joblessness from mass job replacement must be addressed.

C. Gig Economy and Precarious Work

One of the biggest changes in the nature of work in modern history has been the big shift from full-time work to gig work. Gig work is what it sounds like; it is freelance or contracted work. All independent contractors, which can include authors, graphic designers, real estate agents, and taxi drivers among other occupations, are gig workers. In some cases, becoming a gig worker can be the result of career-aspirations; your favorite actors are gig workers and so are the real-estate agents you see on billboards. However, when the gig economy makes headlines it seems to be regarding rideshare companies like Uber and Lyft or food delivery companies like Postmates and Grubhub. That is because the rapid growth and the changes we are seeing to the gig-based workforce have been due to these kinds of companies. Companies who have utilized our internet-enabled hyper-connected world to connect gig workers to clients and then cause increased demand for their services.

The gig economy is a wonderful thing for artists selling crafts on Etsy and for drivers who need the flexible hours that Uber provides. Still, gig workers do not have the stability that full-time jobs provide. There is no health, vision, or dental insurance provided when you work for Uber. However, in some states, that might be changing. California passed AB 5 which took effect on January 1st, 2020 (Bergman, 2020). It would require companies like Uber and Postmates to treat their gig workers as employees in a legal sense. "Under the new law,"

According to Forbes, “California workers could generally only be considered independent contractors if the work they do is outside the usual course of a company’s business” in addition to a few other restrictions (Wood, 2019). So, since Uber’s business is all about offering transportation, their drivers would likely be treated as employees. Yet, these gig-based platforms plan on continuing their fight against this legislation. It’s not only tech companies doing the fighting, though. The California Trucking Association, the American Society of Journalists and Authors, and the National Press Photographers Association have also filed suit in opposition of this restrictive legislation (Dailey & Mulvaney, 2020).

The future of legislation surrounding gig work is uncertain, but there seem to be clear cultural changes relating to how people view freelance work. According to Syracuse University Professor Steven Sawyer, there are changing expectations among today's workers in the gig economy; “There is an absolute belief by both workers and employers that loyalty to an organization makes no sense; and gig workers understand that relationships between companies and workers are dead” (Sawyer, 2019, para. 9). To an extent, work is now viewed as a “transaction” between employers and employees instead of a meaningful commitment. In short, the changing nature of employer-employee relations has changed how we view work such that gig work has become incredibly normalized in industries that previously involved fewer gig-based jobs. Still, for jobs that have not been replaced or transformed into freelance work with fewer benefits, work is still changing, which brings us to the next section.

IV.

CHANGES TO TRADITIONAL EMPLOYMENT

It should be intuitive that with changes in work come changes to wages. Technological progress often brings about good things; take the First Industrial Revolution for instance. According to Clark Nardinelli, a United States FDA economist, “as T. S. Ashton pointed out in 1948, the industrial revolution meant the difference between the grinding poverty that had characterized most of human history and the affluence of the modern industrialized nations.” It entailed general improvements to living standards and the growth of real wages. In fact, “the Lindert-Williamson index number for real wages rose from 50 in 1819 to 100 in 1851. That is, real wages doubled in just thirty-two years” (Nardinelli, 2020, para. 4). In the modern era, we have not seen that kind of growth.

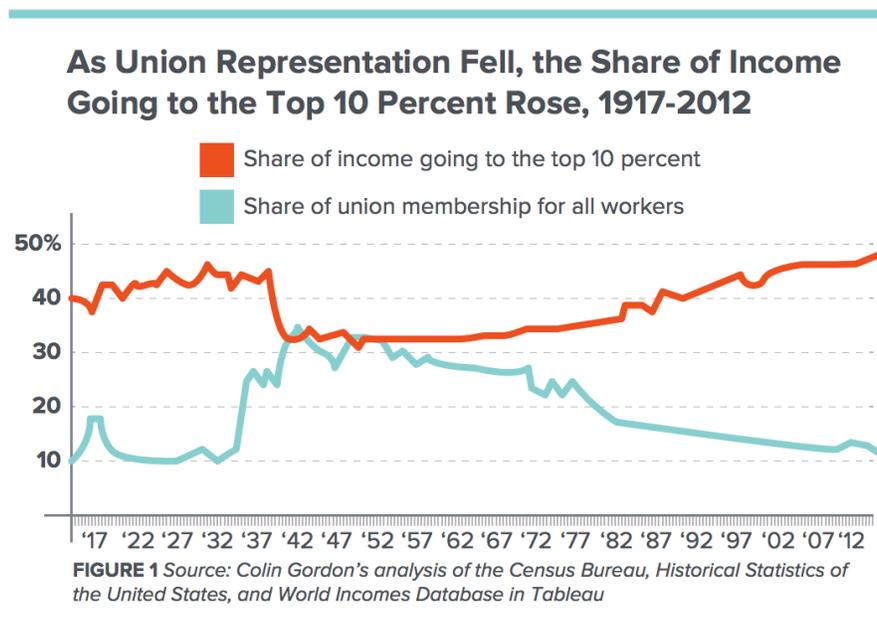
According to scholars at the Roosevelt Institute, “...despite a seemingly robust and healthy economy, as indicated by measures like rising GDP growth and low unemployment, workers across America are struggling. Real wages are stagnant, workplaces are increasingly fissured, and workers have less bargaining power, all while the wealthy few hoard the economic gains of a high-profit economy” (Mabud & Forden, 2018, p. 4). There are many possible explanations for wage stagnation in the United States, which has been occurring in the United States since the middle of the 20th century. While there is likely not one *single* cause of wage stagnation, researchers at the Kellogg School of Management at Northwestern University identify several possible explanations including “globalization, high-tech automation, and labor-market concentration.” The researchers were able to show that labor-market concentration – that is, “too few employers competing for the same workers on a local level” – reduced competition

which contributed to stagnating wages. Monopsony power, which is the power that employers gain from labor-market concentration, is strengthened by globalization and automation because these phenomena reduce competition between corporations for workers; globalization causes some local competition to shrink/disappear when they cannot compete with cheaper foreign goods, and automation reduces the demand for those workers (Benmelech et al., 2019).

This research strongly suggests that monopsony power is the reason behind why wages have been stagnating since the 1970s, but globalization has aided since the 1990s and automation seems to have contributed to this phenomenon in recent years.

A. Decline of Unions

It is no secret that unions have lost power in the modern era. This is bad for workers. Union power is connected to wage growth for workers especially when those workers are subjected to monopsony power (Benmelech et al., 2019). Also, it seems apparent when considering this research as well as the information conveyed in the *graph below* (Mabud & Forden, 2018, p. 6) that union power is strongly correlated with workers reaping the economic output of their labor.

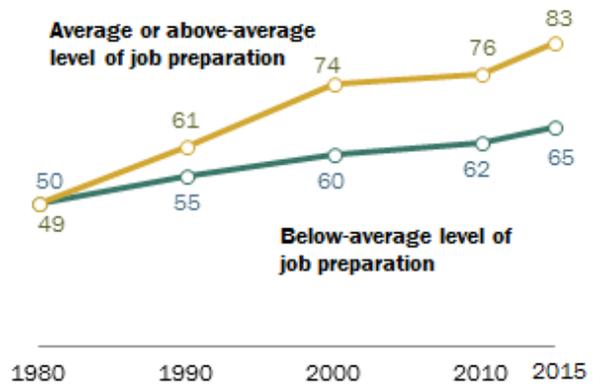


B. Higher Qualifications

Even though wages are stagnating, the expectations for workers are increasing. According to the Pew Research Center's *graph on the right*, the number of higher-than-average skilled occupations is increasing faster than the number of lower-than-average skilled occupations. As opposed to the 1980s when these two categories were more or less equal, "the clear majority of workers in today's workforce are in jobs calling for significant preparation. At a minimum, these jobs require an associate degree or a similar level of vocational training, plus some prior job experience and one to two years of either formal or informal on-the-job training" (Pew Research Center, 2016, p. 23).

Employment is rising faster in occupations requiring higher levels of preparation

Number employed, in millions



Note: Based on employed civilians ages 16 and older. The job preparation level is based on a scale of one (little or no education/experience/training) to five (extensive education/experience/training).

Source: Pew Research Center analysis of O*NET and monthly Current Population Survey data (IPUMS).

"The State of American Jobs"

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C. Increased Working Hours

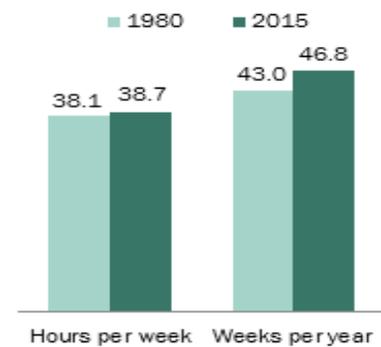
Freelancers/gig workers are not the only ones seeing changes to their hours and schedules. In many cases, those in full time roles are seeing more flexibility with "remote" work from home. The opportunity to work from home is often regarded as a privilege to employees but the cost to employees is rarely discussed. According to an article from the Indian Journal of Industrial Relations, "recent research reveals significant employee cost such as increased work stress and loss of wellbeing." In the internet-age, it can feel like you are *always* working; it can

feel like you are expected to respond to emails at all hours of the day and expected to stay up to date with fast-paced trends. According to that same journal, “other costs include social and professional isolation, consequent negative performance appraisal and its adversary impact on career growth” (Bathini & Kandathil, 2015, p. 570).

Regarding total hours worked, including hours worked from home, Americans are working more according to the Pew Research Center’s *graph on the right*. The number of hours that Americans work per week, as well as the number of weeks in the year that Americans work has increased noticeably since the 1950s. However, Pew Research Center clarifies that some of this shift is due to women and older folks working more than in previous decades (Pew Research Center, 2016, p. 37).

People are working more weeks and hours

Average usual hours worked per week and the number of weeks worked, in previous calendar year



Note: Based on civilians ages 16 and older who worked last year. Paid vacation and sick leave are counted as weeks worked. Source: Pew Research Center analysis of Current Population Survey Annual Social and Economic Supplements (IPUMS). “The State of American Jobs”

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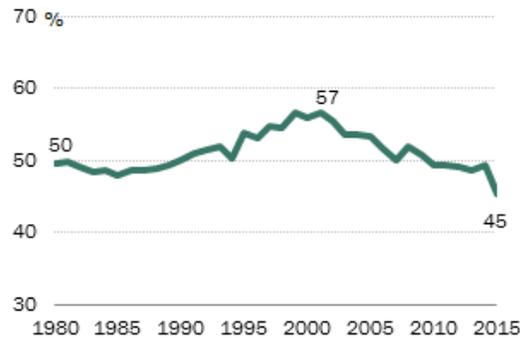
D. Decreased Benefits

Freelancers/gig workers don’t get the privilege of employer-sponsored health plans, which is one of the sacrifices they make for the sake of avoiding unemployment or rigid schedules. However, it seems that traditional workers are losing ground on this issue as well according to the Pew Research Center’s *graph below on the right*. “Seven-in-ten young workers in 1980 had health insurance either through their own employer or through the employer of a family member, but only half of today’s young workers do” (Pew Research Center, 2016, p. 34). Employers do not feel the same inclination towards their employees that they once did. Similar

to health insurance, the number of civilians with employer-provided retirement plans has shrunk according to the same source's *graph below on the left*. "The share of workers with access to an employer-sponsored retirement plan, whether a traditional pension or a 401(k)-type plan, peaked most recently at 57% in 2001, up from 50% in 1980.¹⁸ However, the share fell to 45% by 2015" (Pew Research Center, 2016, p. 35).

Share of workers who participate in a retirement plan or have access to one has fallen since 2000

% of civilians ages 16 and older with a job in the preceding year, who had access to an employer-provided retirement plan

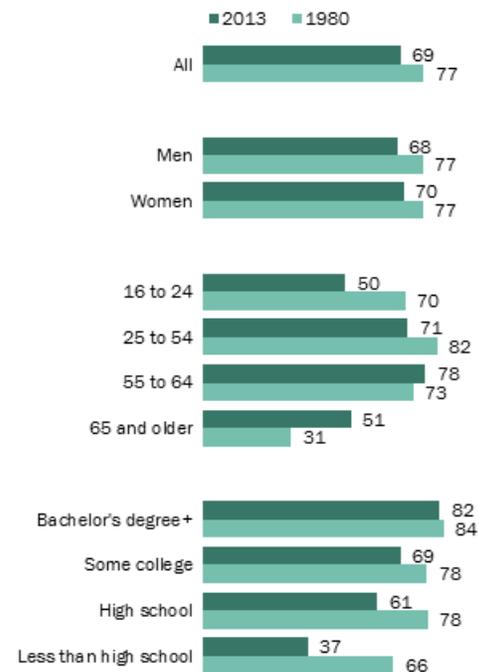


Note: Respondents were asked to report access during the previous calendar year. Data labels shown are for 1980, 2001 and 2015.
Source: Pew Research Center analysis of Current Population Survey Annual Social and Economic Supplements (IPUMS).
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Participation in employer-sponsored health insurance plans fell most among young adults and the lesser educated

% of employed civilians ages 16 and older who participated in an employer-sponsored health insurance plan



Note: Figures represent health insurance coverage either through own employer or through the employer of a family member. Respondents were asked to report participation during the previous calendar year. "Some college" includes those with a two-year associate degree.
Source: Pew Research Center analysis of Current Population Survey Annual Social and Economic Supplements (IPUMS).
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V.

SOCIOTECHNICAL ISSUES

There is no technology that has an inherent moral value. Technology is neither good nor bad prior to implementation. Still, it has the potential to disrupt industries for the worse when implemented without proper safeguards – consider Amazon’s automated task manager, or expansive job replacement.

A. Technological Determinism

The above is especially true when decision-makers and industry leaders succumb to “technological determinism” which is the view that “technology is the prime factor in shaping our lifestyles, values, institutions, and other elements of our society” (Jones, 2015, p. 80). In other words, it is the idea that tech is inherently good – that we should implement new useful technologies and whatever happens to our lives, the economy, the world, etc. is just something to which we must adapt. This philosophy is pervasive. Consider how email has changed your life; you might be expected to do more off-the-clock, unpaid work than before. Consider how having a smartphone has made it so you can be easily contacted at all times. At first, sending a weekend email/text was taboo but we are expected to adapt to technological changes just in virtue of them being tech-enabled. Still, these are social shifts that can be addressed by individuals. You can tell your employer/coworkers that you will not respond to any emails or texts after 7:00pm however, there is institutional “technological determinism” that is harder to change.

B. Technochauvanism

A similar but distinct term used by Meredith Broussard in her book *Artificial Unintelligence: How Computers Misunderstand the World* is “technochauvanism” – the idea that technology is always the solution because it is objective (Broussard, 2018). To differentiate the two concepts: (1) technological determinist believes that we should be *passive* as technology shifts and we should not seek to obstruct its progression; they believe we should then adapt to this change. (2) a technochauvanist *actively* supports tech-enabled solutions to existing problems without considering negative effects, primarily because they believe *technology is always the answer*.

One symptom of technochauvanism was the implementation of racist predictive policing in Chicago. The issue with predictive policing is that *not all data holds objective truth*. Predictive policing consists of using existing criminal data to predict future criminal behavior. Issues surrounding that practice are clear since, today, minority groups are disproportionately monitored and targeted. So, any system that predicts where crime will be located based on existing data is going to take into consideration the frequent arrests made in areas with larger minority populations. Therefore, these systems end up predicting that minority groups are more likely to commit crimes. Unfortunately, because a machine is making this calculation, observers assume the bias is eliminated without realizing that the data itself is biased. *Garbage in garbage out*, as they say. Technochauvinism and predictive policing involve doubting that data can have biases. In Chicago, and all over the country, police are using algorithms to assess and predict whether or not you are a threat based on who you know, where you’re from, and what you have done previously. In Chicago, even if you have committed no crimes, you might still get a visit

from the police letting you know that you are being monitored (Broussard, 2018). Predictive policing surely entails unfair policing, and technochauvanism entails biased systems.

C. Regulation

When groups cannot regulate themselves, it is important for larger entities such as unions or the government to work to implement policies that ensure a fair world. A technologically deterministic or “hands off” approach to innovation seems insufficient. Those who oppose government regulation may say that a “free market” simply *works* better. In former Secretary of Labor Robert Reich’s new book, *The System*, he explains that the choice between regulation and the “free market” isn’t really a choice at all, because the free market cannot exist without regulation; “A market cannot exist without a government to organize and enforce it. The important question is whom the market has been organized to serve. Forget the standard economic goals of higher growth and greater efficiency. The issue is who benefits from more growth and efficiency” (Reich, 2020, p. 7). When I use the word “regulation” in this paper, I use it to refer to the kind of regulation that *restricts* corporations in favor of working people. The current system is designed such that more growth and efficiency benefits those at the top of the economic ladder, while proper regulation can entail spreading that wealth more fairly.

Compared to the middle of the 20th century, there has been less regulation on corporations in the modern era, and less power for unions and working people. During this time, inequality has increased, and wages have stagnated. Broadly, classical liberalism – a philosophy that is fundamental to American culture – represents the idea that *people* should be free. However, neoliberal economics have taken hold in American politics and support the notion that *corporations* should be free. A consequence of this is anti-regulatory sentiment, and when the

common ideology opposes restricting corporate power, working people get hurt. Regulation is already a difficult task because it is either predictive or reactionary. When regulation is predictive, it can get stuff wrong since the future is uncertain and generally difficult to predict. When it is reactionary, that means it is already too late to address the problem because the problem is probably rampant by then. In some cases, that problem might have become a part of our daily lives. For example, we have already grown accustomed to lower prices and ease of access to goods from Amazon. If Amazon were to be broken up into smaller companies, which is what NYU-Stern professor Scott Galloway advocates, the cost of goods and shipping could increase. If Converse stopped using child and sweatshop labor, their prices would go up and consumers would be unhappy. The government already has a slow reaction time, and anti-regulatory lobbyists from wealthy corporations profiting off of unregulated markets slow this process down even more. Also, the speed at which technology is changing is accelerating, making regulation of new markets difficult to implement without harming the economy as a whole. That said, simply saying “government should intervene” is easy, while creating comprehensive policy that properly makes growth more equitable without hurting the economy is very difficult.

In *The Ironies of Automation Law: Tying Policy Knots with Fair Automation Practices Principles*, Meg Leta Jones argues for the formation of policy knots – “three-way intersections between design, practice, and policy” – for the sake of good regulation. Clearly, technologies that automate can bring a lot of good to society in how they can make us safer, healthier, and smarter. Though, “with these opportunities come questions about the ability of current laws and policies to protect important social values new technologies may threaten.” “The task for law is to bring legal treatment of automation in line with responsible automation design and

implementation in practice—to tie a policy knot” (Jones, 2015, p. 102). However, today, governments do not prevent corporations from solely focusing on the *capabilities* of an automating technology and its economic prospects which can conflict with what is good for the people. Predictive policing software, automated task management technology, and invasive company privacy policies – aspects of which are legal in America but restricted in the EU – would not be implemented if we focused on tying a policy knot with human concerns in mind. Even though these mentioned policies are not all automation related, the Fair Automation Practices Principles can be useful for assessing them. “Using existing principles from automation design, humanrobot automation, and information policy, the FAPPs state that automation design and use should involve: (1) informed risk assessment, (2) transparent processes, (3) error detection and correction, (4) consideration of sensitive situations, (5) diversity and discrimination testing, (6) man and machine reallocation comparisons, and (7) an inventory of the predictable and unpredictable” (Jones, 2015, p. 83).

VI.

OUTLOOKS

There are multiple ways to view the changes to work that have been discussed in this paper. There are clear pros and cons, but it can be confusing whether the good outweighs the bad or vice versa. Assessing whether moral weight is difficult, but fortunately we do not have to do that. Instead, we can accept positive changes to work and try to improve aspects of work that have gotten more unpleasant. Here, I summarize two perspectives on how work has changed.

A. Positive changes

It is undeniable that technological revolutions have, in many ways, changed society for the better. New technologies have enabled easier trade, manufacturing, and information dissemination. Technology-enabled products like washing machines, cars, cameras, security systems have improved the quality of our lives. We take basic things like centralized heating and refrigeration for granted because we have gotten so used to them. Unsurprisingly, we also take farming technologies, database systems, cash registers, calculators, and computers for granted, too. Improvements in agriculture led to less people being needed to work on farms; at first, this was simple technology like the plow, then the cotton gin, and now complex biological engineering. Because of that progress, people moved to other industries and developed better medicine, efficient city planning, indoor plumbing, and all of the things that make modern life in the developed world very comfortable. It seems that, because of developments in technology, the average American has a better life than even the wealthiest kings of the 1800s. There are certainly more options for leisurely activity in the modern era, but is it also true that *work* has changed for the better? The answer is surely “yes” for many occupations.

The social status of women can be tied to how technology changed household work. For the past few centuries, attitudes towards women in the U.S. and U.K. involved the expectation that they would be child rearers and take care of their husband's home. Much of their time was used to care for the house and, of course, their children. Dishwashers, washing machines, and vacuums sped up tasks that took up large portions of women's days. With extra time, they had opportunities to organize for better treatment and spend more of their time working outside of the home. There is, obviously, still deeply ingrained sexism towards women in the workplace where they are seen as weak and expected to be subservient to men, and mothers are sometimes discriminated against because employers think that a mother can't commit to her job since her priorities lay with her children; so we have much further to go as a society. Regardless, technology surely improved work for women because it enabled them to have the time and resources to battle their oppression.

A more contemporary example of technology-enabled social justice in the working world involves access to information powered by the internet. No matter your background, you can learn about the world online. You can learn how to write a resume and cover letter, and you can also learn specific skills from free online tutorials. To learn about a complex issue, one just needs to Google it. And, while it is difficult, you *could* learn to code online and find gig work on the web using library computers even if you had limited means. Of course, it would be unreasonable to expect Americans to escape poverty with just "free information." Still, you cannot deny that the connectivity offered by the internet has made work easier to find. For those who are already employed, communication at your job is faster and easier. Collaborative work between people who are 1000s of miles away from each other is now possible. Even in traditional occupations,

flexible working hours have become more common because folks no longer have to be in the same place at the same time to communicate properly.

Ignoring the internet, technology has still changed work for the better in many ways. We have automated boring, repetitive jobs like telephone operation and many manufacturing jobs, and we have augmented others like trucking and taxi-driving. This seems to have been for the *better*. Jobs involving driving have gotten safer over the years with improvements like power steering, anti braking systems, and vehicle sensors. In other fields, like accounting and business, workers are able to do complex calculations using spreadsheets and business intelligence tools to find trends in complex data. 50 years ago, it might have taken days or even weeks for a team of mathematicians to accomplish the same data visualization that twenty-year-olds can now do with Microsoft's Power BI. Yet, even though accomplishing *more* work has gotten quicker, easier, and more precise. These gains in productivity haven't resulted in higher pay or a better quality of life. A worker might be doing work that previously needed 10 equally competent men and women, but they are not being compensated any more than in previous decades when adjusting for inflation. "CEO compensation has grown 940% since 1978" while workers wages have grown negligably (Mishel & Wolfe, 2019). It seems that with quicker and more efficient work comes *more* tasks that keep the worker *just* as busy, and since they are compensated the same, it seems that any positive changes to work are cancelled out. This brings us to the negative changes to work which, unfortunately, do *not* get cancelled out.

B. Negative Changes

Real wages today are nearly the same as they were in the 1970s however top earners have grown their wealth far faster than the rate of inflation. Much of this can be attributed to what was

mentioned in the “wages” section about automation, globalization, the decline of unions, and – most significantly – monopsony power, which is *strengthened* by the preceding items. Also, while jobs are being augmented and changed, it seems that mass unemployment or underemployment caused by continued automation is a reasonable fear. Jobs have been and will be replaced by technology that can outperform humans. However, society can cross that bridge when we come to it since, for all we know, that might not be a serious issue until the 23rd century. However, income inequality that has resulted from exploiting the productivity of workers is an issue *currently*.

As inequality is growing, employers are not showing mercy toward their employees. More is expected of today’s workers, and in recent years, risk has been transferred from corporations to workers. Jobs today are often less stable than those of the past. Increased freelance work means less company sponsored healthcare and less job security. Also, employer-funded pensions have largely been replaced by employee-funded 401(k)s which means workers need a higher level of financial literacy than they did previously. In general, there are more responsibilities and risks that the employee has to deal with nowadays than they did previously.

As was mentioned earlier, job replacing technologies and resulting unemployment have affected workers as well. When new technology replaces old jobs like what happened during the Second Agricultural Revolution, workers have moved to new industries. “In the U.S., the mechanization of agriculture vaporized millions of jobs and led workers to eventually move from farms to factories. Later, manufacturing automation and globalization caused the transition to a service economy. Workers repeatedly adapted by acquiring new skills and migrating to jobs in new industries” (Ford, 2013, p. 37). In the past, these changes happened relatively slowly, and other industries were in situations where they could grow with more employees. Today, that

seems to not be the case. Every company can use AI to accomplish tasks more efficiently and increase their productivity with fewer workers. Workers have kept moving to higher ground as the tide of automation has gotten higher, and there is a concern that there might not be much land left to stand on. Even though people have been concerned about technology replacing workers since before the invention of the loom, the concern is now more reasonable than ever. Some make the argument that while technology destroys old jobs, it creates new ones. But, surely, truck drivers and manufacturing workers aren't becoming web developers or Youtube and instagram influencers overnight.

Even if jobs are not replaced, the quality of worker's lives will be diminished with less privacy and lower wages. With a more tech-enabled workplace, employees now have their behavior monitored at all times. Everything they say, type, or do can be recorded and key metrics like productivity are calculated to assess their value. Consider this excerpt from George Orwell's *1984*; "... There was of course no way of knowing whether you were being watched at any given moment ... It was even conceivable that they watched everybody all the time ... You had to live – did live, from habit that became instinct – in the assumption that every sound you made was overheard, and, except in darkness, every movement scrutinized" (Orwell, 1949, p. 3). This might as well have been written about today's workplace. "Drug and alcohol testing, computer-aided credit checking, AIDS testing, genetic screening, overall healthiness screening, on-and-off-duty conduct regulation (e.g. co-worker dating/marriage, company monitoring of worker behaviors such as political activities, gambling, lifestyle preferences . . .)" are already common practice (Brown, 1996, p. 1237).

As prospects for their quality of life already look grim, workers cannot find solace in good wages. As was discussed in the "wages" section, wages have stagnated for decades and the

share of wealth going to top earners is disproportionately high. So, whether or not jobs get replaced by machines, the quality of work for many Americans seems to be worsening

VII.

POTENTIAL RESPONSES

There is little use in stoking fear without considering potential responses to that fear. This section serves to suggest *how* to address concerns regarding the future of work, specifically how low-wage jobs with minimal benefits have been growing and how technological-unemployment could be on the horizon. Reasonable responses include – but are not limited to – implementing the following: financial regulations, universal education and job training, universal healthcare, family friendly work arrangements including free child-care and preschool, and universal basic income (UBI). It is clear that the economy is changing work such that employment and benefits will not be guaranteed to the same extent that they have been in previous decades. If that trend continues, between one and all of these responses should be implemented to protect workers.

A. Financial Regulation

Often, when the market cannot properly take care of things on its own, regulations are proposed. While regulation, in general, can be viewed negatively as an over-expansive government measure or unnecessary restriction, it surely seems like it is the duty of the government to ensure fair financial and labor practices, and in dire situations such as these, financial and employer restrictions can hardly be called “unnecessary.”

There are myriad specific actions that can be taken to hold financial institutions accountable, which will be raised in subsequent paragraphs. Generally, the *laissez-faire* approach has not worked. While the decrease in blue-collar jobs and wage stagnation in the U.S. can be partially explained by aforementioned monopsony power and automation as well as competition

with auto manufacturers in Japan (Lazonick, 2013), another huge component was bankers' influence in the SEC. "In 1982 [Reagan] made it legal for companies to repurchase their shares on the open market pretty much whenever they wanted." (Lopez, 2017, para. 21). Up to that point, the SEC considered such practices *stock price manipulation*. But, with Rule 10b-18, the practice of stock price manipulation was essentially legalized, drastically increasing corporate profits and reducing benefits for normal employees. Economist William Lazonick urges us to "consider the 449 companies in the S&P 500 index that were publicly listed from 2003 through 2012." He says, "during that period those companies used 54% of their earnings—a total of \$2.4 trillion—to buy back their own stock, almost all through purchases on the open market. Dividends absorbed an additional 37% of their earnings" (Lazonick, 2014, para. 2). This money was not put into workers' paychecks. Simply put, "stock-based instruments make up the majority of [executive's] pay, and in the short-term buybacks drive up stock prices" (Lazonick, 2014, para. 4) The goal of maximizing shareholder value and profits for the wealthy have created an economy such that, according to that same source, "while the top 0.1% of income recipients—which include most of the highest-ranking corporate executives—reap almost all the income gains, good jobs keep disappearing, and new employment opportunities tend to be insecure and underpaid. Corporate profitability is not translating into widespread economic prosperity" (Lazonick, 2014, para. 1). This is relevant to the future of work because resulting inequality entails comparatively worse wages for working people. Higher productivity for less jobs and stagnant pay is a symptom of an unfair system.

Rule 10b-18 should be eliminated, but what else? Financial regulation is complicated, making an exhaustive list of everything wrong with SEC rules and tax policies that unduly benefit executives while hurting everyday workers could fill an entire thesis paper. Still, I can

address several rules that have unreasonably deregulated financial institutions. For example, another case of *laissez-faire* SEC deregulation involves the 1991 allowance of “top executives to keep the gains from immediately selling stock acquired from options” (Lazonick, 2014, p. 40). Also, tax cuts for the wealthy have decreased the capabilities of the government to invest in the populous and instead have further enabled the the rich to maximize their profits; “the richest 0.1% of U.S. households collected a record 12.3% of all U.S. income in 2007, surpassing their 11.5% share in 1928, on the eve of the Great Depression” (Lazonick, 2014, para. 9).

When you consider the predatory monetary policies that benefit a small percent of Americans while hurting most, one might be reminded of the practice of sharecropping after the end of slavery. In theory, sharecropping involves renting out land (and maybe tools and other materials) in return for a portion of the rentee’s yield. In practice, renters ensured that rentees would always be indebted to them so that they owned the rentee even though slavery was illegal. Nowadays, it is still the case that when workers have debt they must work and comply with their corporate rulers. Usury hurts workers in this way, so another response to the economic changes of the modern era that hurt workers could involve reducing, forgiving, and/or lowering rates on medical, credit card, and tuition-related debts. When states like Texas charge almost 700% for payday loans (Leonhardt, 2018), proposals like a cap on interest rates seem like they can make a big difference in people’s lives. Also, some policymakers propose that post-offices should be able to offer small-dollar loans since they are easily accessible to most Americans, and they would be held to more stringent lendings standards than banks; banks constantly get in trouble for lending discrimination (Aubin, 2017).

Regardless of what policies an individual might support, it seems wrong that the voices of the rich should be more powerful than the average working-class or middle-class person. That

is a recipe for corruption and manipulation. One action that could change how working people are represented on the national stage would be *to get money out of politics* which can involve eliminating corporate contributions and reducing individual contributions. While it is worthwhile to talk further about things like reinstating the Glass-Steagall act (banning collusion between commercial and investment banks), auditing the Federal Reserve, or instituting a financial transaction tax, this could fill up hundreds of pages. If money weren't so heavily involved in politics, ethical policies might be embraced as a result. Similarly, if corporations were forced to share their wealth with their workers through Democratic Employee Ownership Funds or if they were forced to give a certain amount of stocks to employees, things could continue as is since corporate growth and productivity would therefore be tied to the wealth of employees. For more suggestions on how to fight corporate greed, go to the campaign page for the independent senator from Vermont who has been fighting for working people his entire life (i.e., Bernie Sanders).

B. Job Training and Education

Obviously, putting the needs of the stock market over those of working people has had negative results for blue-collar workers – go figure. Since, throughout the 80s, “the stock market came to react favorably to permanent downsizings of the blue-collar labor force,” those jobs were automated and shipped overseas. “As secure middle-class jobs for high-school educated blue-collar workers permanently disappeared, there was no commitment on the part of those who managed U.S. industrial corporations, or the Republican administrations that ruled in the 1980s, to invest in the new capabilities and opportunities required to upgrade the quality, and expand the quantity, of well-paid employment opportunities in the United States on a scale sufficient to reestablish conditions of prosperity for displaced members of the labor force” (Lazonick, 2013, p. 863). So, investment in American workers is long overdue, and since job replacing

technologies are becoming more prevalent, job training and retraining programs can be a realistic and useful response to the economic and technological threats facing workers. As was stated previously, even though (at this point in time) technological progress creates more jobs than it destroys, the truckers and cabdrivers of today will not become app developers once their jobs disappear.

It would be a bad idea to simply restrict companies from becoming more efficient using technology. To illustrate a generally accepted reasoning for not restricting progress in favor of jobs, I will use the famous story about Milton Friedman's, the professor and economist, trip to China. At one point, Friedman noticed a construction project for which workers were using shovels and no heavy machinery. Friedman asked the project manager on that construction site why that was the case. The project manager explained that this was part of a jobs program and, therefore, they did not want to use modern machinery because then less people would be employed. Friedman responded, "then instead of shovels, why don't you give them spoons and create even more jobs?" (Perry, 2006, p. 2). So, instead of choosing jobs over efficiency, why not choose both? Giving universal access to job training and higher education would entail a better skilled population, which would be good for the American economy, as well as more opportunities for workers to find jobs in other industries. Choosing to implement universal higher education should be no-brainer. We understood the need for tuition-free public high schools in the 19th century, and times have changed sufficiently such that in the 21st century, one needs some sort of post-secondary education to be successful. The financial burden of higher education is incredibly high, and the opportunity cost of not working for two years is huge. Education required in the 21st century is unattainable for too many people; it must be publicly funded and tuition free.

C. Universal Healthcare

There is no one-size-fits-all healthcare system for the world. However, the American healthcare system is notoriously flawed, and folks without employer-sponsored health coverage are expected to pay unreasonable costs. “The median per capita spending on health care in wealthy countries is \$4,700 per year, according to research by the Organisation for Economic Co-operation and Development ... In contrast, the U.S. spent more than twice as much, at \$9,900 for every man, woman and child” (Komlos, 2017, para. 6). For precarious coverage and higher prices, Americans do not seem to get better healthcare than other wealthy countries. Age expectancy in the U.S. is several years below that of Canada, Denmark, and Germany, and all of these countries have cheaper healthcare systems that involve universal coverage. There are myriad single-payer and multi-payer universal healthcare programs, and all of them entail ensuring that every American has access to healthcare at an affordable cost. Simply having the government pay for basic medical necessities is not the solution, but it gives government officials an incentive to set drug prices and negotiate with medical companies in favor of the people. The cost of basic life-saving medicine like insulin and epinephrine are too high, and people have died due to their inability to afford them (Prasad, 2019). It surely is reasonable to heavily regulate items with elastic demand like insulin and epinephrine.

The American healthcare system matches a patient’s quality of care with their ability to pay. In a country where inequality is rampant and workers are losing money, benefits, and protections, it is the government's role to ensure that even if the people are unemployed or impoverished, they have affordable access to quality care. It is an added benefit that universal

healthcare would end being *cheaper*, but it should be enacted regardless of cost for the sake of protecting those without sufficient means.

D. Family Friendly Work Arrangements

The share of two parent households “with a father who works full time and a mother who doesn’t work outside the home has declined considerably; 26% of two-parent households today fit this description, compared with 46% in 1970” (Pew Research Center, 2015a, p. 2). There are many households with couples involving two dads, two moms, trans, or non-binary parents, and this study also excludes stay-at-home dads. Still, given this data, it is apparent that more families today have two working parents than families in previous decades. Also, as of 2014, “the share of children living with one parent [stood] at 26%, up from 22% in 2000 and just 9% in 1960” (Pew Research Center, 2015b, p. 16). Needless to say, there are a plethora of parents who need childcare or at least flexible working arrangements so that they can care for their children themselves. Paid family leave and flexible working arrangements can lessen the burden on working parents, but without childcare and pre-k, that burden can be too much to give quality care to children. For working parents, there is a pressing need for universal childcare and pre-k. 80 percent of parents with young kids have difficulties finding quality childcare at an affordable cost (Halpin et al. 2018). There are current programs that exist to address this need, like the Child Care and Development Block Grant (CCDBG) and Head Start, but they are underfunded; only 15% of eligible children receive CCDBG subsidies (Chien, 2019, p. 2), and Head Start only reached one third of eligible children (Schochet, 2019, para. 12).

To respond to this change in employment, tax-payer dollars could be used to fund childcare and pre-k similar to how they are used for public schools. Between the ages of 0 and 5,

parents lacking adequate resources have nowhere for their child to go since toddlers are too young to attend public schools and also too young to take care of themselves. Universal childcare and pre-k could fill a serious need for working families who need affordable childcare. For parents of children who already attend school, their work schedule does not always line up with their kid's school schedule, so flexibility for working parents can also serve to reduce the financial burden of, say, paying for their kid to take a taxi if they miss the school bus, and ordering food when the parents are getting home after dinnertime.

E. Universal Basic Income (UBI)

The premise of UBI entails a regular unconditional cash payment to individuals or family units with *no strings attached*. That is, no restrictions on how it can be used. To be a true UBI, there would be no work requirement, no means testing, and no constraints such that rigid bureaucratic structures can be avoided. UBI proposals are usually designed for the citizens of a nation, but these cash payments could apply to all non-citizen residents as well. The intent of UBI programs is to give people “security” so that they do not have to be subjected to poor living conditions when they cannot find a good job. The economic idea has become more popular lately due to Andrew Yang’s presidential campaign and the COVID-19 stimulus package which included cash payments of \$1200 to many families. The proposal sounds outlandish because it entails *giving away free money*, but it has found support across the aisle. In addition to democratic presidential hopeful Andrew Yang, both Richard Nixon and Martin Luther King Jr. have supported basic income programs.

Liberals like the program because it is an unrestricted social safety net policy that addresses disadvantaged groups, and some conservatives like the program because it requires

little administration and does not disincentivize work – since the benefit does not decrease if you make more money. Also, this program puts more money into the economy without increasing inflation due to something called *marginal propensity to consume*. Groups with lower incomes have a higher marginal propensity to consume because they are going to *spend* additional income instead of just putting it into their savings; those in higher income brackets would pay a larger share than they receive due to progressive income taxes so it does not matter that they are more likely to *save* instead of spend. In fact, due to higher marginal propensities to consume, economists from the Roosevelt Institute concluded that “implementing a guaranteed income of \$1,000 a month for all Americans would accelerate U.S. economic growth by an additional 12.56% over eight years” (Morris, 2017, para. 1).

The intention of a full UBI would be to ensure that recipients can afford life's necessities. A partial UBI only intends to supplement their income and make them more comfortable. Full UBI grants are not usually intended to be added on top of existing social welfare programs, and instead, are a way of replacing what some see as an overly bureaucratic social welfare system. It is debatable where the threshold for a truly *full* UBI would be because, while \$1000/month would put you above the poverty line in the United States, being slightly above the poverty line does not entail comfortably affording all of life's necessities. For that reason, some consider simply maintaining a minimum basic income (MBI) such that, if you make below a certain income – call it \$20,000/year – your income could be supplemented such that you end up reaching that minimum income no matter how much your employer pays you. The issue with this program is that there is a strong disincentive to work *at all* for the millions of Americans who make under \$20,000 a year. UBI does not risk reducing work incentives in this manner because, even though recipients could cash in without working, they have nothing to *lose* by working.

Basic income would give workers bargaining power because they would have the security to strike or quit without risking starvation and homelessness. Also, since crime and poverty are linked, a UBI could reduce the cost of the prison system by reducing the number of impoverished people who are put in positions where they have to commit thievery in order to survive. However, that is speculative. It is inherently speculative to consider how a UBI could benefit any society since it has never been implemented on a national scale, and local studies come up with contradicting conclusions. Still, a UBI could give low-wage workers and would-be workers the resources they need to live comfortably in a world where their opportunities for success are diminished.

VIII.

CONCLUSION

Work has changed drastically over time, and this change has both excited and challenged people throughout history. Automating work and connecting previously distant groups so that people can trade goods and labor have led to unrivaled prosperity. However, even though the resulting situation have been clearly positive for global wealth and quality of life, there is no guarantee that unfettered automation and globalization will do the same in the future. Regulation and sustainable responses to address the negative impacts of technological progress are needed. Such responses have been lacking and inadequate as is evident from the fact that workers' wages have stagnated while their productivity and working hours have both increased. This can mainly be attributed to increased monopsony power for employers which has been fueled by outsourcing, automation, and decreased bargaining power for workers. Workers lost much of their bargaining power because labor is no longer a scarce resource due to technological progress and globalization.

When workers have unionized, their prospects have been better, but union power has declined in recent decades. Still, the nation as a whole continues to get wealthier so instead of completely overhauling our economic system and risking the U.S.'s stable growth, it seems more reasonable to figure out how to ensure workers can share in that prosperity. Possible responses to the reduced prosperity, stability, job quality, and opportunities facing workers and would-be

workers entail redistributing resources from those who have enjoyed the bulk of our national prosperity. It is surely fair to use funds from the wealthiest Americans to benefit citizens of the country that enabled their success. Also, even though redistributing resources through the funding of universal childcare, health care, and education doesn't seem to *directly* address the precariousness or quality of any given job, it *does* give people the ability to work towards bettering their situations. When the resources that workers need to survive are not tied to their jobs, then being unemployed, underemployed, or underpaid does not have to result in being impoverished. We can embrace progress and create wealth in a capitalist system while also sharing prosperity.

Work will continue changing and we will have to adapt our social and professional behavior such that we can continue to be effective workers, but we can change policy as well. While I did not take into account the impacts of COVID-19 for this thesis, the world's state of affairs – as I finish this paper – makes clear that this pandemic will likely play a huge role in how we deal with added technical burdens and privacy-related surveillance issues that result from working from home. Also, there might be more expectations for workers regarding technology that they should already own and purchase themselves. In the 1990s, companies like Accenture (Andersen Consulting at the time) paid for employees' computers, internet-connection, and early mobile phones during work hours according to former Andersen consultant Daniel Bayer. Now, Accenture does not cover large portions of the cost for home WiFi, and other companies now expect workers to use their own devices for business-work. It is difficult to predict how this might be affected by new shifts in the working world that result as a consequence of COVID-19 pushing employees to work from home; some workers will transition back to physical working spaces while others might realize that they are better off working from home. Regardless, work

from home policies will clearly not eliminate the fact that working people are not seeing the prosperity that should have come with their increased productivity.

More ought to be done in order to address looming technological unemployment and reduced prosperity, stability, job quality, and opportunities for today's workers and would-be workers. Possible responses can include better financial regulation, fair worker protections, universal health care, free education and job training, more family friendly work arrangements, and potentially a UBI. A just society is one that works for the people, and a society that works for the people would implement response like those previously mentioned.

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