THE EFFECT OF AUTOMATION ON LABOR

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On my honor as a student, I have neither given nor received unauthorized aid on this assignment

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Date 14 May 2022

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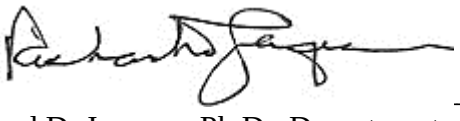

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Introduction

As the pace of technological progress accelerates, jobs traditionally filled by human workers are becoming increasingly automated in part or in full. Automation in the workplace can come in many forms, and historically has been associated with mechanization in production settings, such as an automated car manufacturing factory. Yet automation is a widely general term. Digitalization is one facet of automation, and includes concepts such as the Internet, social media, and mobile applications, which have been used to revolutionize communication (van der Zande et al., 2018). Improvements in the field of robotics have allowed the creation of machines that can perform increasingly complex physical tasks. Lastly, artificial intelligence and its subfield, machine learning, are making strides in automating human intelligence (van der Zande et al., 2018). As each of these related fields of technology continue to grow rapidly and are increasingly implemented in workplaces, it becomes crucial to consider both the positive and negative effects on individuals, businesses, the labor market, and society.

Literature Review

Attitudes Toward Automation

Though technology is often the driving force behind powerful positive changes in society, a sense of apprehension frequently accompanies advancements. Specifically, many hold concerns that computerization will do its job "too well," replacing not only certain tasks but human employment. Historically, people have always experienced a level of anxiety regarding technological progress. During the first Industrial Revolution, during which great leaps in mechanization occurred, factories were introduced, and the manufacturing of textiles began to

shift to factory production. However, many skilled weavers of that time, having practiced their entire lives to master their craft, experienced resentment when these new machines began replacing their livelihoods. Calling themselves "Luddites," these workers resorted to destroying machinery, often in textile factories, in protest (Andrews, 2015). While the term Luddite is still used to describe one adamantly opposed to technological progress, one need not be an extremist to experience similar unease when presented with the accelerating pace of modern-day technology, particularly in the field of artificial intelligence.

Similar to the Luddites, workers nowadays are experiencing job insecurity, which is the "sense of powerlessness to maintain desired continuity in a threatened job situation," and as a result, studies have shown that employees experience concern regarding the implementation of automation in their workplaces (Bhargava et al., 2020). Since automation often works most effectively for performing mundane tasks, however, these concerns are not felt equally across fields. Employees who work in more creative or knowledge-based careers, like researchers, are more likely to view their professions as irreplaceable by technology. On the other hand, those who work in industries such as retail, insurance, and machinery experience greater job insecurity (Bhargava et al., 2020). Companies should keep these attitudes in mind as they take steps to implement automation alongside their human employees. For a smoother transition, workers must view automation as a growth opportunity rather than a replacement, so this should be emphasized during automation initiatives to maintain job satisfaction among employees (Bhargava et al., 2020).

Impact on Worker Wellbeing

Done incorrectly, the implementation of automation in workplaces can raise serious ethical concerns, since machines can impact the experiences of the employees who must collaborate with them. Automation surely has the potential to be extremely advantageous to workers, but as with any powerful tool, it can cause harm in the wrong hands.

One high-profile example can be found in the addition of warehouse robots to Amazon's fulfillment centers. The robots were highly effective at improving overall packing efficiency. Unfortunately, the human workers were expected to keep up. Workers began experiencing various toxic workplace expectations, such as timed toilet breaks and unrealistically high distribution goals to keep pace with the machines (Selby, 2017). Despite low wages, the workers were often so overworked that they would fall asleep on the job. Instead of lightening the load on workers as could have been done, Amazon used increased automation as a method of forcing their human workers into stricter and more exhausting conditions. As a result, the warehouse workers felt they were serving the robots, contributing to the negative perspective of automation as a business tool (Selby, 2017).

However, this unfortunate situation need not be the case. Other forms of automation have easily increased the health and safety standards in certain professions by eliminating dangerous working conditions. For example, welding robots, which are now standard in car manufacturing lines, prevent human workers from having to experience hazardous welding environments that cause various short-term and long-term health issues such as nose and throat irritation, pulmonary infection, heart disease, and cancer (Pham et al., 2018). Even in non-hazardous environments, automation can be leveraged to improve working conditions. One study found that that implementation of an automated dispensing system had a positive effect on the stress

experienced by the staff of a pharmacy by improving work-life balance as well as decreasing the perception of workload allocations as illogical (James et al., 2012). Clearly, automation holds the ability to both help and harm the wellbeing of workers, so it will be crucial going forward for policymakers to hold companies accountable as they implement automated systems.

Effects on the Labor Market

There exist many contrasting views on whether automation will positively or negatively affect the labor market in both the short-term and the long-term. Economists often disagree as to the cause of high unemployment rates and poor labor markets, and some scholars blame computerization for these issues, especially as the capabilities of technology begin to expand beyond routine manufacturing tasks (Frey & Osborne, 2013). Certain studies support a pessimistic view of the addition of automation to workplaces in terms of incumbent workers, who were found to lose about 11% of their yearly earnings over the five years following the addition of automation, mostly due to spells of non-employment which were attributed to automation (Bessen et al., 2020). Government benefits usually only partially cover these losses. Furthermore, evidence indicates that the addition of automation often leads to a slow departure of incumbent workers from companies, either due to lay-offs or by choice. They are liable to enter a different industry or even self-employ or retire earlier. Despite this, it was found that automation negatively affects fewer workers and creates less significant adverse effects than mass layoffs caused by economic turmoil (Bessen et al., 2020). Regardless, the data indicates that some job loss or transitioning is likely to occur as companies experience changes due to automation.

However, there also exist studies that provide a more optimistic view of the situation by considering long-term perspectives. One study considered several industries that underwent massive periods of automation in the past and found fascinating trends when considering employment in these industries over time (Figure 1). Automation catalyzed huge growth in employment alongside technological growth; only over extended periods of ongoing automation did job losses begin to occur, countering the view that automation might spur immediate mass unemployment (Bessen, 2019). Instead, the employment within an industry can be better explained by the creation of demand, which automation can impact by lowering prices. For example, in the case of the textile industry, the textile factories lowered cloth prices and thus increased the demand for textiles, which were incredibly useful and unavailable to people in the early 1800s. Thus, the textile industry experienced growth and began employing more working to run the machinery. Yet, over time, this demand was satisfied as households accumulated their necessary textiles. Only at this point, when demand dropped, did employment drop back down due to the highly efficient, labor-saving automation (Bessen et al., 2020). Here, it becomes evident that while automation may replace workers, it can simultaneously generate demand within the industry, effectively balancing the job-eliminating effects. Furthermore, automation can often increase national income due to the increased production of goods, so even if automation destroys some jobs, the aggregate impact of the automation may still be positive and create a rise in employment in other industries (Bessen et al., 2020). Figure 2 shows other evidence that strongly rejects the theory that automation will lead to mass unemployment. Individual companies were studied, and it was found that firms that invested in automation experienced much higher growth in general, which in turn allows them to thrive financially and employ more workers (Bessen et al., 2020).

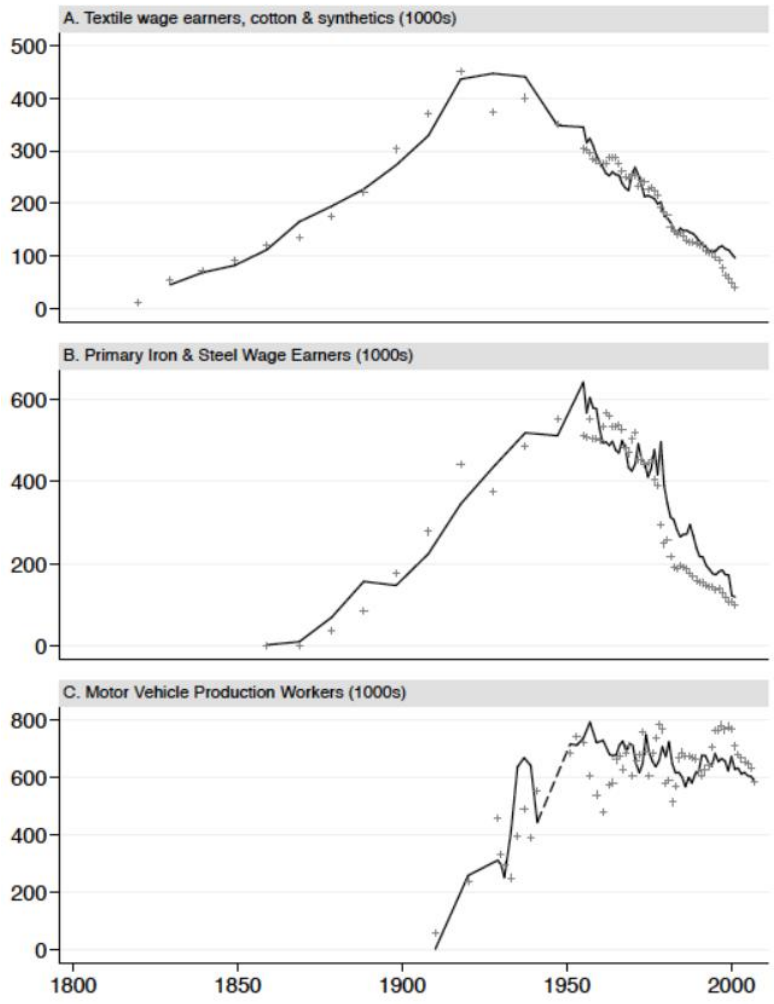

Figure 1: Trends in employment in automated industries over time (Bessen, 2019)

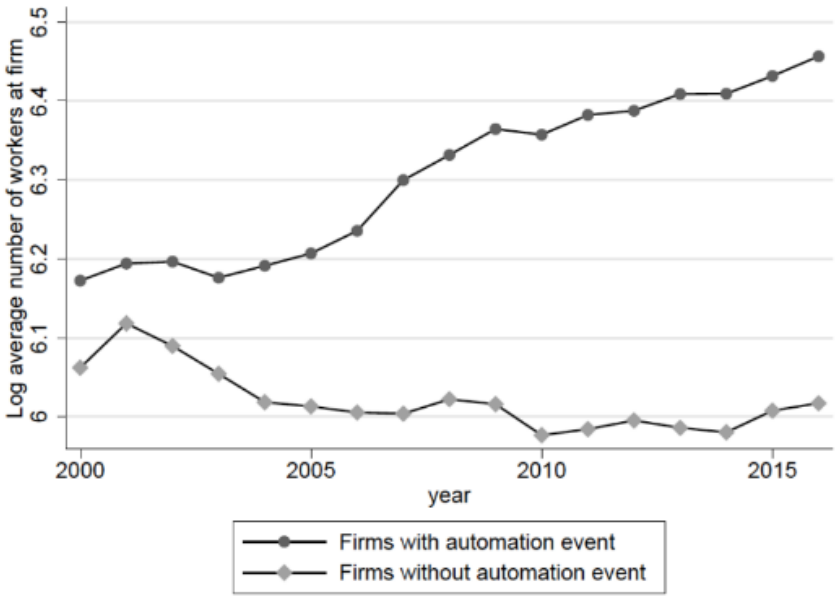

Figure 2: Comparison of employment between automation investing firms and non-automation investing firms (Bessen et al., 2020)

Which Jobs are at Risk?

Yet, it is important to note that these effects will not be equal across industries. As opportunities grow in some areas, it in inevitable for other jobs to be eliminated. A simple distinction is often made between high-level cognitive tasks and routine manual tasks, but recent leaps in artificial intelligence even threaten domains traditionally seen as untouchable by automation. For example, due to the development of machine learning algorithms, computers can undoubtedly outperform human on some non-routine cognitive tasks such as finding patterns in large data (Frey & Osborne, 2013). Computers show less bias and much higher levels of efficiency than their human counterparts and are being deployed to recognize patterns that can help detect fraud and assist with healthcare diagnostics. Computers have even begun performing work in the legal domains to assist with pre-trial research through language analysis, a job

previously reserved for high-skill paralegals (Frey & Osborne, 2013). Furthermore, automation has also begun making progress in non-routine manual tasks that were previously too complex for robots. Improved sensors have made this possible, allowing for the creation of robots that can perform an array of physical tasks such as self-driving, surgery, and wind turbine maintenance (Frey & Osborne, 2013). Yet, robots still fall behind humans when it comes to perception and manipulation, creative intelligence, and social intelligence. A study by Frey & Osbourne attempted to predict the susceptibility of various occupations based on the amount of non-automatable skill required to work in each job (Figure 3). It was found that industries such as production, construction, farming, sales, and service were at considerable risk of automation. Fields such as management, engineering, education, arts, and healthcare were at lower risk of automation since the jobs in these fields require skills not yet mastered by machines. Job insecurity caused by automation is highly correlated with the disuse of skills in specific areas.

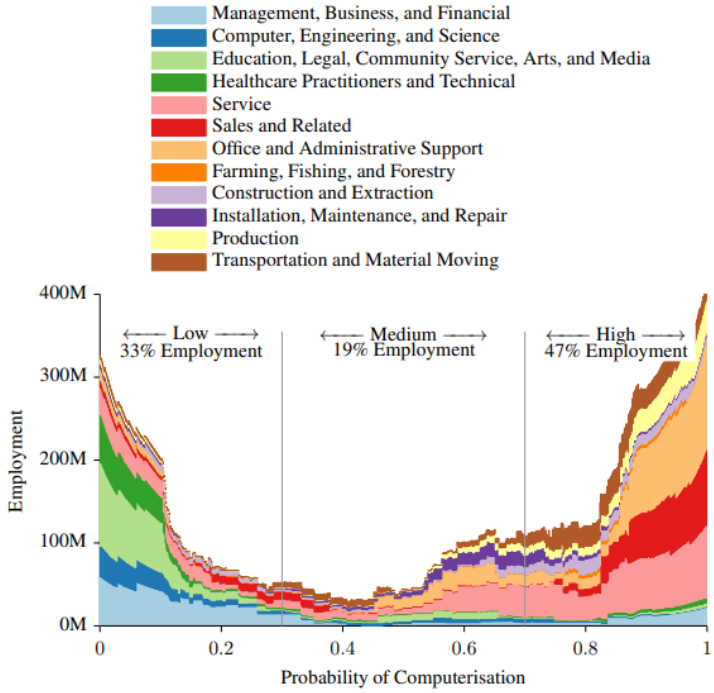

Figure 3: Industry-specific risk analysis of being replaced by automation (Frey & Osborne, 2013)

Recommendations

Importance of Upskilling

Since it has been observed that automation in the workplace will cause job market shifts from some sectors to others, it becomes important to understand how to leverage these changes to create the best possible outcomes. The World Economic Forum estimates that while artificial intelligence may eliminate eighty-five million jobs by 2025, it will also create ninety-seven million new jobs in the same time frame (Ascott, 2021). Job listings for roles like engineers and data scientists have skyrocketed in recent years, and industries such as healthcare and automated transportation stand to see massive growth due to automation (Ascott, 2021).

There will occur a massive shift in the skills required of human workers as automation and AI transform the workplace. A study by McKinsey & Company shows that there will occur a decline in the need for physical and manual skills as well as basic cognitive skills. Yet, demand for higher cognitive skills, social and emotional skills, and especially technological skills, will see a steep increase (Figure 4). As advanced technologies replace basic physical and cognitive tasks, the job market will require those with the skills to both develop and operate them (Bughin et al., 2021). Unfortunately, problems may arise if workers are not well-equipped to fill these new roles, and companies as well as workers will need to adapt by focusing on upskilling if they want to harness the full potential of advancements in automation.

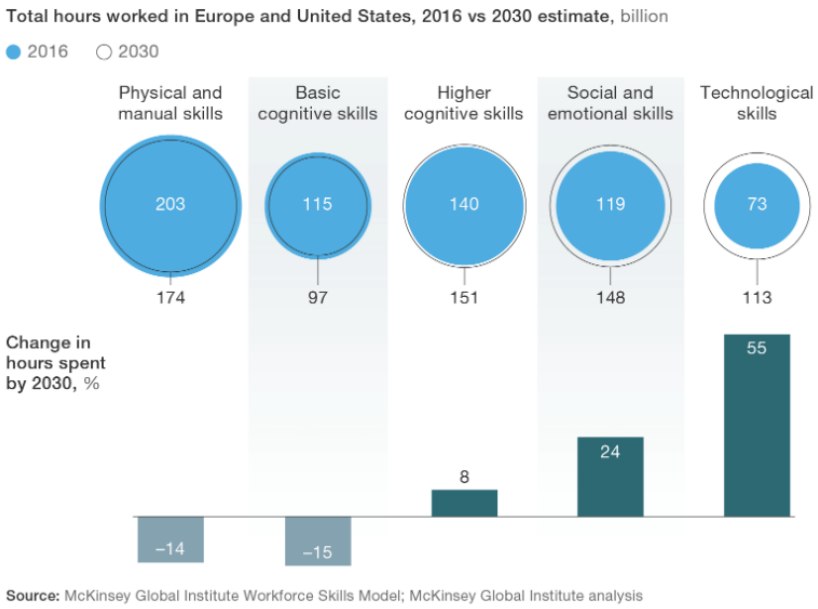

Figure 4: Predicted need for various skill types in 2030 (Bughin et al., 2021)

Policy Recommendations

Policymakers will also play a crucial role in supporting a smooth transition to higher levels of automation in the workplace, which is important not only for the welfare of individuals

but also for a country to enjoy the wider societal benefits of utilizing highly productive technologies. Governments can provide support for workers displaced by automation by shifting focus toward public upskilling and training programs as opposed to simply providing a passive unemployment compensation, with the intent of setting the unemployed up for future success (Bughin et al., 2021). Furthermore, policymakers could support programs such as relocation assistance and reconsider pre-existing policies that may impede workers from transitioning into different positions (Bessen et al., 2020). In general, since there exists compelling evidence that automation will continue to create new jobs that require new skill sets as opposed to catalyzing widespread unemployment, policymakers will find it in their best interest to support workers through this transition instead of preparing for recession.

Furthermore, policymakers can influence the ways in which automation affects individual workers by holding companies accountable for deploying new technologies in ways that enhance productivity without compromising employee welfare. The driving principle should always support the idea of prioritizing people over technology. As new emerging forms of work are created, unforeseen welfare issues can easily arise, so legislators should monitor these issues closely and evolve to protect workers. For example, standards could be written to help remote workers fully disconnect outside working hours by clarifying requirements for rest periods (Deshpande, A. et al., 2021). Legislation can also require elevated levels of transparency to be maintained regarding complex technological systems that may obscure poor ethical practices. For example, an AI system that manages the hiring process and may unfairly prioritize certain candidates. Transparency should also be the standard regarding personal data, especially when related to the regulation of usage of AI to monitor workers (Deshpande, A. et al., 2021).

Conclusion

As developments in fields such as artificial intelligence is accelerating rapidly and taking on more roles historically reserved for human workers, there remains one question: Will automation reach a point where robots fully control most markets, and there is no need for humans to work? While it is impossible to rule out the possibility of a post-employment society where humans enjoy endless leisure time, the data shows this is not a scenario for many years to come. For the near future, it is predicted that demand will continue to adapt alongside technological progress and regular employment will remain the standard (Bessen et al., 2020). In the meantime, it is much more important to focus on the challenges directly ahead. Automation may spur growth, but it will also create shifts in employment requiring specific skill sets that do not exist in the present workforce at the necessary scale. However, with a continued emphasis on upskilling initiatives as well as a careful approach to policies that support worker wellbeing over strict profits, society can fully reap the benefits of this technological progress.

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