

Exploration on the Impacts of AI on the Labor Market and Recommendations on Government Intervention

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Abstract. Artificial intelligence develops rapidly and occupies an important position in people's lives. AI technology can automate many repetitive tasks, thus improving production efficiency and reducing labor costs, promoting economic growth. The extensive adoption of AI will lead to the decline of specific traditional jobs, particularly those that are repetitive and require low skill levels, like assembly line manufacturing and data entry. At the same time, AI technology in workplaces leads to a growing need for employees who can adapt to various tasks and responsibilities in different areas. Therefore, there is a demand for individuals skilled in multiple disciplines to integrate these technologies, such as physicians with expertise in medicine and AI technology. Simultaneously, AI advancements are creating fresh job requirements. This paper looked into AI's influence on the labor market. By evaluating government policy, this paper aims to discover how the labor market should adjust to keep pace regarding work requirements, education, and working arrangements to mitigate AI's disruption to the labor market and ensure the country's economic growth.

1 Introduction

Artificial intelligence, also known as AI, was defined as "A machine-based system that is capable of influencing the environment by producing an output for a given set of objectives" [1]. Initiating by 10s, the number of AI projects has grown steadily, preliminary AI technology has been utilized more extensively by the public. In 2019, the breakthrough of Natural Language Processing (NLP) laid the foundation for the future development of AI. By November 2022, the release of Chat GPT, a language processing model, has led to a boom in generative AI (The OECD Artificial Intelligence Policy Observatory).

It was discovered that this imminent revolution of science and technology has a significant impact on the labor market. Firstly, there is a broad range of jobs will be affected, for about 40%. The market equilibrium seems to be disrupted by the innovation of AI, by a higher demand for AI-related labor ranging from +1.4% to +4.1% but a lower supply of AI-related labor ranging from -6.8% to - 1.6% than for other types of labor [6]. This phenomenon results in a preference for employees with AI skills. In the study of Alekseeva et al., job postings demanding AI skills do offer an 11% premium within the same firm and a 5% premium within the same job title [3]. Therefore, it could be concluded that the emergence of AI technology reshapes and stimulates the evolution of the labor market.

In George Akerlof 's market failure theory, the government is responsible for policy-making to correct market failures [2]. Thus, the effects of AI and

automation on employment were indeed dependent to a large extent on government institutions. In April 2021, the European Commission proposed its first regulatory framework for AI, setting different rules for different risk levels. The proposal also suggesting AI systems should be overseen by people rather than by automation. In August 2023, China's Cyberspace Administration of China introduced the Interim Measures for the Management of Generative Artificial Intelligence Services, including the ethical norms and protecting intellectual property. In October 2023, the US introduced the Executive Order on the Safe, Secure, and Trustworthy Development and Use of Artificial Intelligence, including a commitment to supporting American workers, and sought to adapt job training and education [4].

2 Influence: Benefits and Drawbacks of Advancement on AI Technology on Labor Market

2.1 In the Short Run

AI technology can automate many repetitive tasks, thereby improving production efficiency and reducing labor costs, leading to economic growth. Based on the average global adoption and absorption levels of our simulations, AI has the potential to generate around \$13 trillion in additional economic activity globally within a decade, or 16 percent more than today's cumulative

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GDP. This is equivalent to 1.2 percent of GDP growth per year [3].

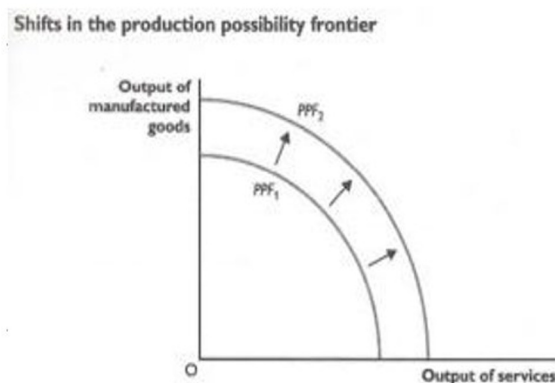


Fig. 1. Shifts in the production possibility frontier.

We could use the economic model PPF (Production possibilities frontier) to represent the economic growth. In the figure 1, the development of Artificial Intelligence (AI) will lead to higher quantity and quality of labour and represents an increase in the productivity, effectively pushing the PPF outward. However, in the meantime, AI adoption has negative multiplier effect on the market, leading to potential disruption on various sectors, could be seen from the figure 2.

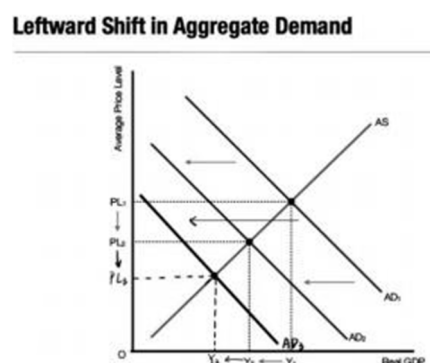


Fig. 2. Leftward shift in aggressive demand.

Firstly, wide utilization of AI technologies can lead to job displacement, particularly in sectors where automation can replace human labor. For example, the job which is mainly doing some repetitive tasks. According to Frey and Osborne, 47% of total US employment is at risk of losing jobs to automation over the next decade.

Besides, losses and economic uncertainty stemming from AI-related disruptions can destroy consumer confidence. When consumers are less confident about their financial security or the economy's future, they tend to reduce consumer spending, further contributing to decreasing aggregate demand [5].

2.2 In the Long Run

As AI technology evolves, new jobs will continue to emerge. For example, AI support Creative AI Specialists, AI fixers, AI Trainers and Explainability Experts. These jobs are created for the adoption to AI

and could boost the development of AI. In "Future of Jobs Report 2020," because of AI, 97million new roles may emerge that are more adapted to the new division of labor between humans, machines, and algorithms.

On the other hand, the development of AI technology may lead to increased wage inequality in the labor market. As a part of the workers gets unemployed due to outdated skills, another group of workers who has successfully switched their occupational categories and developed proficiency on applying digital skills gain higher salaries, leading to a raising Gini coefficient.

When AI enters the labor market, not only will AI change the structure of the market, but the market itself is also making a series of changes.

3 Adjustment of Labor Market

3.1 Changing career requirements

The widespread use of AI technology will result in the abandonment of certain traditional occupations, mainly repetitive and low-skilled, such as flow line production and transcription. This replacement of single-task workers means there is an increased demand for a versatile workforce, as AI technology is usually used in various fields. Thus, a person who is proficient in different fields to combine these technologies is in need, such as a doctor who masters knowledge in both medicine and AI technology. At the same time, the development of AI leads to new career demands. Taking an example, AI ethical supervision is required to prevent criminal activities. This is because AI should obey universally recognized societal ethics if it is in wide use for assistance to humans [7].

3.2 Growing importance of education and training

To adapt to the labor market of the AI era, education, and training cannot be ignored. Governments, businesses, and educational institutions need to allocate more resources toward education and training to meet market needs and rising productivity, as well as enhance workers' skills and competitiveness. For instance, bolstering the establishment of an AI-related curriculum could be taken into consideration. Besides, the biggest difference between people and machines is that people can think by themselves while machines can only do things according to instructions. In that case, people need to master soft skills like teamwork, innovative thinking, problem-solving, and critical thinking. With the proficient use of these skills, laborers could better deal with unknown risks faced in AI's field [8].

3.3 Flexible working arrangements

According to Keynes, he assumed that there would be three-hour shifts or a fifteen-hour week in the working time in the AI era. Now, it has been proved that AI has potentially saved employees 18 out of every 40 hours they work. Moreover, the application of AI technology will revolutionize work patterns, making remote and

flexible working arrangements possible. Employees who are liberated from such work could increase their time and energy for focusing on innovation and value creation. Therefore, several businesses have already decreased the working time for higher prospects.

4 Recommendation: Reform Educational System

According to McKinsey, approximately 800 million labors face risk of being displaced by AI in workplace worldwide. In Gary Becker's human capital theory, in order to enable the students to remain competitive and capable in future labor market, educators should lay emphasis on the cultivation of students' skills involving critical thinking, teamwork, collaboration, creativity, problem solving, etc., which are considered less possible to be heavily challenged by automation and artificial intelligence. Additionally, due to the awareness that rapid technological advancement may lead to an increased structural unemployment in the short run, and force extensive number of workers to change occupational categories, the government should accelerate workforce transformation through alleviating information asymmetry, which ensures workers to be well-informed about the evolving requirements of the companies and employers, and forming retaining programs for unemployed workers, which helps them regain competitiveness and adaptability in the labor market.

4.1 Student-centered Learning Model Accompanied with Utilization of AI Technologies

First of all, the future education model should transform from traditional "teacher-centered learning", which when all students receive information passively from teachers at same pace and time, into "student-centered learning", a system that grants student more degree of control on personal learning pace and pathway, encouraging them to get actively engaged in the educational process. As a result, it facilitates development of students' autonomy, creativity, critical thinking skill, and motivation for lifelong learning, which are crucial abilities in AI era.

In this case, instead of being a threat and competitor, AI acts more like a powerful tool and efficient assistant to the students, an indispensable component in the operation of student-centered learning system. To be more specific, we suggest schools to combine advanced digital techniques and AI algorithm with the customized learning model. This updated education system benefits students in multiple novel approaches, including designing personal learning plans and pathways based on the interest and personality traits; monitoring student's progress and providing ongoing, comprehensive feedbacks; allowing students to freely decide their studying locations, instead of requiring them coming to school according to rigid, uniform, and inflexible schedule; selecting, recommending learning resources that best match student's recent demand and

ability; assigning tasks in forms of projects, debate, discussion, presentation, rather than lecture-based learning style, etc.

Significantly, this student-centered learning system accompanied with rich AI technologies reveals plentiful advantages. For examples, it unlocks students' potential, helping them clarify personal interest and strength. Learning efficiency and productivity are improved. During the process of managing their own learning pace and objective, students tend to feel more engaged and less disoriented in academic performance. Moreover, numerous crucial skills and abilities of students, such as problem-solving, learning agility, independence, open-minded, and lifelong learning, are successfully cultivated in a more diverse, tolerant, and personally customized learning environment. As a result, all of these make contribution on preparing students to confront real-world challenges in the future labor market during AI era.

On the other hand, admittedly, a high proportion of digital learning and heavy reliance on AI technologies may lead to potential problems associated with violation on academic integrity, such as plagiarism and cheating. Besides, this model requires a popularization of electric devices in varied educational settings, meaning that almost every student needs to necessarily possess at least one lab top or iPad, which may consequently increase educational cost and financial burden on families and schools, especially to the population in impoverished area. Therefore, it reduces the possibility of large-scale implementation of the model. In order to address these problems, we also encourage the government and educational institutions to update school regulations and supervisory system, promoting utilization on AI detector to access misuse of AI technologies, and specifying punishments on academic misconduct. In addition, we recommend the government to increase subsidy to support the education on deprived regions, preventing a greater inequality caused by higher education threshold in AI era.

4.2 Retraining and Re-employment of Workers

Along with an ongoing "fourth economic revolution" and dramatic social changes brought by evolving innovations on artificial intelligence, structural unemployment caused by obsolete skills growingly becomes an urgent concern. McKinsey survey indicates that the executives of corporations increasingly consider the investment on retaining workers as crucial and necessary. In 2017, the percentage of respondents who view diminishing skill gap caused by automation and digitalization as "top 5 priority" is nearly 30 percent, and in 2023, there is 62 percent of executives admit that it is an essential business for them to develop programs and investments on retraining existing workers.

According to Joseph Stiglitz's theory of information asymmetry, an imbalance of information caused by unequal access in the market may lead to adverse consequences such as market failure. In this case, inefficiency and unemployment may get more severe, as the workers face difficulties of gaining reliable and up-to-dated access to changing new skills

requirements of the companies. Therefore, we advise the government to collaborate with companies to form comprehensive information platforms, which contain latest messages associated with AI relevant occupational trends, requirements on digital skills, and available retraining programs that open for applications. Furthermore, the government should promote transparency of utilization of AI techniques in business operation, enabling workers to timely master the demand of labor market, preventing a mismatch of retraining direction and companies' practical requirements in reality. In addition, artificial intelligence and deep learning can also get involved into the online systems of job-hunting, making contributions to a greater efficiency and shorter time of unemployment.

In the meantime, we encourage educational institutions to establish career service partnership with companies. Firstly, this collaboration offers students opportunities to utilize and practice their knowledge and digital skills in real modern workplace, gaining direct working experiences, which enables them to keep pace with technological transformations in the society. Moreover, it raises convenience for existing workers in the companies apply for available retraining programs provided by educational institutions, leading to an improvement on their skills and competence, reducing risk of unemployment due to automation and digitalization.

However, an increasing government spending and high opportunity cost of the implementation of this series of policies in the short run are also significant factors worth consideration. Besides, both the education on students through new model and retraining of unemployed or existing labors are undoubtable long-term programs. Therefore, the expected outcomes will hardly occur without a substantial amount of time investment. Aiming at these problems, we hold the opinion that raising expenditure on educational reform should necessarily accompany with higher corporate taxation on automated businesses, which replace their majority of workers by artificial intelligence and automation, enabling the government to balance the revenue and spending, preventing higher deficits.

5 Conclusion

As a conclusion, in an eventful era when growing number of professional jobs are gradually challenged by automation and digitalization, the unprecedentedly rapid advancement on artificial intelligence leads to multifaceted impacts on labor market. On one hand, technological progress makes contributions to a significant boost on productivity and reduction of cost for the companies. However, on the other hand, the structural unemployment gets inevitably higher in the short run, as a substantial number of workers are displaced by AI due to obsolete skills and outdated educational system. In order to overcome these challenges, we make two recommendations: first, widely promote student-centered learning model, which signals a transformation of educational system from

traditional knowledge-based into skill-based structure, highlighting the essentiality of students' independence, critical thinking skill, resilience, creativity, collaboration, etc, which are considered less possible to be replaced by AI technologies in future workplace; meanwhile, we suggest the government to implement policies for the purpose of moderating information asymmetry, which causes imbalance of information and disruption on market efficiency, through developing online websites, facilitating career service partnership between educational institutions and companies, promoting retraining and re-employment programs, etc. As a result, it can effectively enable workers to stay accessible to latest skill requirements, develop proficiency on the usage of AI technology, and therefore alleviate structural unemployment in the long run.

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