

Research on the Impact of Artificial Intelligence on the Labor Market

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Abstract. Language models have a significant impact on the labor market, and this paper aims to analyze the effects on different parties in detail and give policy suggestions on the adverse effects brought by AI. The author first applies a case using news about the employment market, then does an analysis and gives suggestions based on the case. The research finds that AI causes fluctuations in the labor market through the displacement effect, productivity effect, and the reinstatement effect. The pattern of employment also adjusts to favor the job seekers with AI skill sets. The paper further underlines the undesirable effects of AI including deepfakes and biases, and legal and technological measures could be adopted to alleviate the problems. This paper could help scholars better understand the impacts of AI on the labor market, and the suggestions listed could give authorities ideas on policy implementations to regulate AI.

Keywords: AI; Labor market; Economics; Case analysis.

1. Introduction

1.1. Research Background and Significance

ChatGPT was launched on November 30, 2022, by OpenAI, and reached 100 million users just within two months [1]. With the launch of the language model ChatGPT, AI caught the attention of the wider public. Many people believe that they entered the “AI era”, and discussions have arisen as to whether the launch would have a significant effect on the job market as fluctuations have already been reported in several sectors. This paper will investigate the impacts on the labor market based on cases and aims to reveal and examine the effects through analysis using economic tools and concepts, thus making it clearer for researchers. In addition, the paper will analyze the drawbacks of AI and aims to give policy suggestions on the supervision and regulation of AI.

1.2. Literature Review

There is a wealth of research already done in this field. AI is a general-purpose technology, so it is important to first get a general idea of how technology affects the labor market. A paper published in the Journal of Economic Perspectives describes the conceptual explanation of the displacement effect [2]. This is very helpful in understanding the economic reasons behind the changes in the labor market. A paper by the OECD explains AI and analyses the impacts of AI on labor, such as productivity, employment, and wages comprehensively, and explains the three effects regarding the labor market (displacement effect, productivity effect, and reinstatement effect) [3]. In this paper, the author used a lot of citations and references, so it is a good source to get a gist of study in this field. A paper by the National Bureau of Economic Research then investigates and proves that AI can increase productivity by around 13.8% [4]. This paper also finds that workers are impacted differently according to their skill levels and explains the underlying reasons [4]. This paper is very helpful when it comes to understanding the productivity effect and is credible with plenty of data and figures as evidence. Then moving next to a paper published by the Journal of Responsible Technology, this paper gives an overview of the current legal and human rights issues with AI, and for each issue, some measures are being proposed. This source gives a list of problems and uses a lot of previous research findings, however, this paper does not explain each of these concerns in detail, so further detailed investigation of this topic is required [5].

1.3. Research Content and Framework

This paper will explore the effects on the job market, by first bringing out reports on job losses and job creation in real-world cases, then analysing the reasons and indications for the change in labor markets. Afterwards, the author will evaluate the detrimental effects of the use of AI and give suggestions for authorities to cope with these problems.

2. Case Description

Artificial intelligence (AI) is described as a general-purpose technology (GPT), which means technologies with potential applications across a wide range of sectors and occupations [6]. This feature of AI makes it have significant impact on the labor market of a variety of industries. On the one hand, AI is replacing humans to conduct certain jobs which causes layoffs. Challenger Gray & Christmas, an outplacement firm, reported that 3,900 people were laid off in May because of AI, all in the tech sector [7]. AI also changes the pattern of employment as firms are now searching for AI-related abilities. For instance, Drew Houston, the CEO of Dropbox released a message on April 27, 2023, announcing that the company decided to cut its global workforce by about 16% or 500 employees [8]. In the message, the CEO stressed that in the AI era, a different mix of skill sets (especially in AI and early-stage product development) is required for the company's future growth and that the transition is necessary [8]. This indicates the changing demand for labor regarding their ability to adapt and embrace AI technology.

However, on the other hand, AI is also creating numerous new industries and careers. First, the fact that AI has applications in a myriad of industries has made the AI industry boom. So, employers in AI industries are willing to recruit. Robots. Jobs, a marketplace especially for recruitment in such industries, has reported a more than 500 percent increase in open positions in early 2022 [9]. This trend still holds now. For example, OpenAI, the company that created ChatGPT, had 59 job openings in August, with applied AI engineering having the highest demand (10 positions) [10]. In addition, companies other than AI-related industries are also hiring people with AI skills. For example, Amazon and NVIDIA have 13 percent and 6 percent of their job openings related to AI respectively on Glassdoor [11]. The most popular jobs employers are searching for among these non-directly related industries include AI data scientist, AI research scientist, AI software engineer, and AI software development engineer [11].

3. Analysis on the Problems

3.1. Economic Analysis of the Changes in Labor Market

AI's like ChatGPT have many applications, such as language translation, computer code writing, and question-answering [12]. These are the corresponding abilities needed for certain jobs, such as translator, programmer, and teacher which means that AI can take over the jobs previously conducted by labor, known as the displacement effect of technology. Unlike other previous GPTs such as the steam engines, which affected the workers related to the production process, AI can have a greater impact on white-collar jobs in the tertiary sector such as accounting, consulting, and more due to its ability to understand and use natural languages. AI, in this case, a substitute for labor of much cheaper pay, could decrease the labor demand. This would result in shrinking wages and a lower level of employment at equilibrium in the classical model. However, according to the Keynesian model, wages are downwardly rigid due to the existence of trade unions, so the wage would remain sticky at the original level for a while. In conclusion, the displacement effect of AI and the "filter of workers without AI skills" are the reasons for the decrease in labor demand, and this would lead to different outcomes in the two models.

AI could also increase labor demand as shown in the case described. First of all, AI created a whole series of new industries concerning AI-related research, development, and maintenance. In such

industries, researchers or analysts need to innovate or reflect on the results from the models. For instance, careers like AI trainers and sustainers are created [3]. From the figure below, it can be witnessed that the market size of AI increased from 95,602.77 million U.S. dollars in 2021 to 142,319.8 million U.S. dollars just within a year and is projected to reach 1,847,495.6 million U.S. dollars by 2030 [13]. This is called the reinstatement effect, the opposite of the displacement effect mentioned above, which means new tasks and jobs being generated by certain technology (AI) in which labor has a comparative advantage which would increase labor demand [2]. AI, like other technologies, could also generate productivity effect in those non-automated tasks. AI can assist people in doing jobs like content creation (Jasper), grammar checking and paraphrasing (Grammarly), and even note-taking (Mem) [14]. These features could help workers work more efficiently and become more productive since employees can save their time doing menial tasks, thus allowing them to focus more on those value-adding task. A study done by the National Bureau of Economic Research used the data collected from 5,179 customer-supported agents and found that with AI tools like ChatGPT, the productivity of workers increased by 14 percent on average [4]. The higher productivity will make labor more attractive, thus raising their demand. Furthermore, “higher productivity” could only be acquired when the specific worker has the skill set to use and apply AI tools. Hence, only those people could enjoy the growing demand from employers. In conclusion, the productivity effect and reinstatement effect would contribute to the increasing demand for labor, especially for those with AI-related skills, and in both classical and Keynesian models, equilibrium wage and employment are likely to increase.

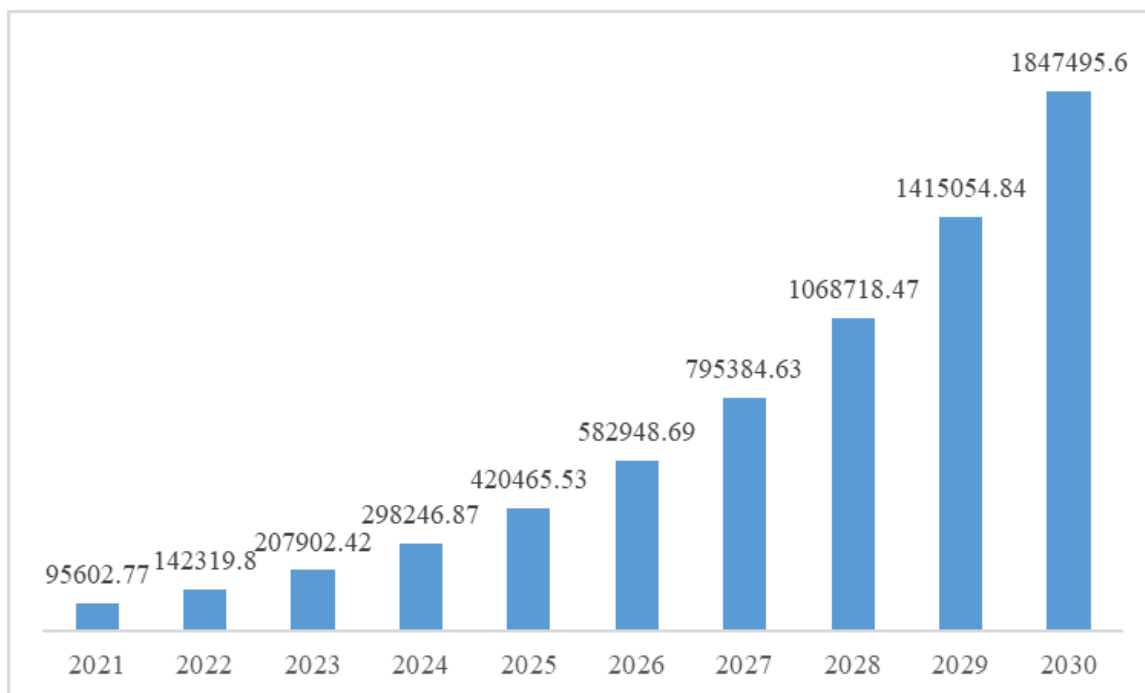


Fig 1. Artificial intelligence (AI) market size worldwide in 2021 with a forecast until 2030 [13].

3.2. Sociological Deleterious Effects of the Use of AI

AI is accessible to almost everyone. This easy availability makes it possible and likely for people to abuse it; deepfake videos are a case in point. In order to make it appear as though someone said something they never uttered, AI can manipulate expressions and sounds [15]. This, at an individual level, could lead to serious harm to one’s reputation. At a national or social level, as legal scholars Bobby Chesney and Danielle Citron stated in a 2018 California Law Review paper, deepfakes had the ability to disrupt journalism, undermine public safety and national security, destroy public trust in institutions, and skew democratic discourse [16]. The fact that there are many synthetic videos also makes it harder for people to distinguish between truths and lies. Truths may be called lies if one insists that the videos or audio used for evidence are faked. Hence, the authenticity of videos and

audio will be hard to verify, and this may lessen the weight of the evidence. Aside from that, AI could also have serious impacts on ethical issues, particularly those regarding biases and discrimination in the allocation of resources. AI is generally believed to be impartial as it derives results from datasets, however, it is not that simple. For instance, a healthcare risk-prediction algorithm that is used on more than 200 million people in the U.S. to select the kind of patients that require “high-risk care management” programs have been reported to have racial bias [17]. More specifically, black patients are likely to receive a lower risk score even if they are in the same physical condition as white patients [17]. These potential biases can extend the time that AI takes to replace workers, alleviating the concern of large fluctuations in the labor market. The bias exists in algorithms as it exists in human societies, thus measures or regulations should be adopted to restrict the abuse of AI and improve the equity of AI.

4. Suggestions

4.1. Policy Recommendations to Mitigate the Displacement Effects

The introduction of AI will lead to displacement effects which cause layoffs and thus active labor market policies should be introduced. Governments should provide some retraining schemes for those who become unemployed due to AI to help them rematch their skills. Training programs may include instructions on acquiring the new-demanded skills or AI-related skill sets to improve the productivity of such labor and help people to become reskilled. In addition, governments should encourage the growth of recruitment platforms, which can increase the mobility of labor and reduce the chance of frictional unemployment. This will therefore allow the employment caused by the AI transition to not be that long-lasting. Even more fundamentally than this, the authorities should continuously check the extent of impact on the labor market using indexes such as the unemployment rate, to see whether to encourage or restrict the development of AI. If in the long run, AI technology has become so accessible and cheap that it almost “takes over” the labor market then the resulting widespread unemployment will be transmitted through the economy and cause social unrest. It may be advisable for authorities to bring in an “Artificial Intelligence Tax”. This tax could push up the cost of applying Artificial Intelligence, and employers will hesitate to make layoff decisions. Hence, widespread technological unemployment could be prevented, and fluctuations brought to the whole economy by this shock will be reduced. However, in nowadays cases, AI is not influencing the labor market to that extent, and governments should still encourage investments in this industry.

4.2. Policy Recommendations on Alleviating AI-related Societal Issues

In order to alleviate the ethical problems caused by AI, regulations are also required. For example, with deepfakes, technology can be used to verify the authenticity of a real video using digital fingerprints. Using this kind of technology, people could verify whether a video is original or synthetic. Hence, authorities should encourage investment in “technology that detects deepfakes and other AI-related issues”. Apart from technological resolution, laws should also be enhanced to restrict the widespread of fake content, claim responsibility, and guarantee victims’ rights. Turning next to the problem of biases and discrimination, several improvements could be implemented. For example, the bias often comes from the data that are used to build the algorithm, and selecting more representative training data can possibly make it fairer [18]. In addition, authorities should encourage more investments to let researchers give “feedback” to these AI models, it is likely that this interaction could indicate the factor that leads to the biases in decision-making and make it less partial.

5. Conclusion

In conclusion, this article aimed to give scholars an overview of the impacts of AI on the labor market and its economic reasons, and to give authorities policy suggestions to minimize the adverse effects of AI in the context in which advanced AIs such as ChatGPT have been launched. The essay

investigates these by first introducing real-life cases in the labor market, and then analyzing the reasons behind these changes. Subsequently, the author evaluates the possible deleterious effects aroused by the use of AI and proposes suggestions to mitigate these problems. The final results show that AI technology will contribute to fluctuations in the labor market, through the displacement effect, productivity effect, and reinstatement effect. In addition, the pattern of employment will also change favoring workers with AI-related skill sets. Scholars looking for the effects of AI on the job market and policymakers who aim to understand the drawbacks of AI and introduce related legislation should focus on this research. This research is of significance as it explains the real-life changes in the labor market and gives readers a general idea of the underlying reasons. However, there are some limitations to this research. It has not been long since the launch of these AI technologies, and the amount of data released is relatively small so the conclusion derived may not be comprehensive. Also, this paper did not mention the long-term effects on the labor market nor compare the extent of these three effects due to the same reason. In the future, as more data on the labor market are released, and AI 's long-term effects can be observed, researchers can investigate and compare the long-term and short-term effects, and the extent of different effects on the labor market using quantitative measures.

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