

The Impact of Artificial Intelligence on the Labor Market

Rui Yan

School of Economics and Management, Southwest Petroleum University, Chengdu 610500, China
yanrui2024@163.com

ABSTRACT

With the rapid development and wide application of artificial intelligence technology, its impact on China's labor market has become more and more significant, and has also attracted extensive attention and research in the academic community. Artificial intelligence is profoundly changing the pattern of the labor market, which has a significant impact on industrial development as well as employment opportunities. In this paper, the impact of artificial intelligence technology on the labor market is discussed in depth by analyzing the current status of research at home and abroad. The research results show that there is a duality in the impact of AI technology on the labor market, on the one hand, AI technology can improve production efficiency and create more new employment opportunities, on the other hand, the popularization of intelligent technology will also have an impact on some traditional labor positions. Therefore, in order to effectively cope with the challenges brought by AI technology, and at the same time can make better use of the opportunities brought by it to further promote the stability and sustainable development of the labor market and achieve higher quality employment, this paper puts forward relevant policy recommendations.

KEYWORDS

Artificial intelligence; Labor market; Substitution effect; Creation effect.

1. INTRODUCTION

As intelligence increasingly enters the realm of popular cognition, the scope of its impact on society is expanding, constantly changing the way humans live and work. Artificial intelligence and automation technology are also rapidly becoming a much-anticipated research hotspot in academia. The impact of artificial intelligence on the labor market has two sides, on the one hand, it can improve productivity, promote social and economic development, and have a positive impact; on the other hand, industrial intelligence can also lead to structural unemployment, further exacerbate the polarization of the rich and the poor, and cause a negative impact. Due to technological advances, the price of computing has been decreasing, artificial intelligence has been replacing regular jobs, and artificial intelligence technology is still rapidly updating and developing, and the jobs replaced by intelligence are gradually no longer limited to regular jobs. According to the World Bank's World Development Report, 51% of existing work tasks in China may be replaced by intelligence. As AI technology continues to advance and the automation process accelerates, there is a risk that the range of jobs people are able to perform will continue to shrink. This will not only lead to a growing problem of technical and structural unemployment, but may also lead to social problems such as a steady decline in wages.

At the same time, AI technology, in the process of its development and renewal, will also give rise to more new products and industries and stimulate new consumption, thus providing new employment environments for laborers, creating more new jobs and bringing new job opportunities. And it can be

conducive to improving the quality of work to a certain extent. As the application of artificial intelligence replaces some jobs, increases the cooperation between workers and machines, and promotes better cooperation between humans and machines, it will greatly improve labor efficiency and promote social and economic progress. Given the two-sided nature of the impact of AI on the labor market, it is worthwhile to pay attention to whether these impacts are opportunities or challenges for society, and what aspects of the labor market will be specifically affected. Therefore, the purpose of this paper is to reasonably assess the impact of artificial intelligence on the labor market, fully consider how to tend to the benefits and avoid the harms of the development of artificial intelligence, and put forward relevant recommendations to better exert its positive impact on promoting high-quality employment and promoting the better development of China's social economy.

2. OVERVIEW OF THE DEVELOPMENT OF ARTIFICIAL INTELLIGENCE

Artificial Intelligence (Artificial Intelligence, abbreviated AI) was first proposed at the Dartmouth Conference in 1956, and in the early stages of development, it was described as a machine with the ability to think and act equivalent to human beings, which may even surpass human beings in the future. Artificial Intelligence initially began in developed countries, applying it to manufacturing, enabling unmanned and fully automated production lines. In 2016, the intelligent robot AlphaGo engaged in a man-machine battle of the century with the world's top Go player Lee Sedol. This event not only set off a global craze for artificial intelligence, but also pushed artificial intelligence technology into the spotlight of society at large, and artificial intelligence became the focus of much attention, with its impact and potential constantly being explored and demonstrated. In recent years, the Internet of Things, big data and other technologies have developed rapidly, and artificial intelligence technology has also developed rapidly and blossomed comprehensively. In the era of artificial intelligence, people can borrow side from the complicated physical work and simple and repetitive labor, and turn to pursue more creative work. At the same time, thanks to the wide application of artificial intelligence technology, people can enjoy better quality services and convenience.

3. THE IMPACT OF ARTIFICIAL INTELLIGENCE ON THE LABOR MARKET

3.1. labor substitution effect of artificial intelligence

Frey et al. ^[1] utilized the O*NET database to predict 702 occupations in the United States that may be replaced by computers in the future through quantitative estimation methods. It also screened nine occupational skill characteristics that are not easily replaced by intelligence, according to which the occupations are labeled as automated or not automatable. The results of the study showed that about 47% of jobs in the U.S. are susceptible to automation, and this study triggered extensive academic research on the job substitution effect. David ^[2] used a similar methodology to estimate that about 55% of jobs in the Japanese labor market are susceptible to automation. Jeff et al. ^[3], using data from the PIAAC manual survey in Australia, calculated that about 9% of jobs are at risk of automation. Chiacchio ^[4] built a labor market equilibrium model using data from six European Union countries as a sample to assess the application of AI and worker employment in the European labor market, and found that for every additional robot among a thousand workers, the employment rate decreases by about 0.16% to 0.2%. Domestic scholars, Yuan Yuzhi et al. ^[5] further pointed out that the development of AI technology will lead to the intelligent replacement of jobs that require procedural cognitive skills and non-procedural physical functions. Moreover, this "substitution effect" increases the substitution of intellectual jobs along with the substitution of physical jobs ^[6]. Acemoglu et al. ^[7] analyzed the impact of the application of AI technology on the U.S. labor market between 1990 and 2007, and the results of the study showed that the increase in the application of AI did lead to a

decrease in the number of jobs. increase does lead to a decrease in jobs. Wu Shumei et al.^[8] conducted further research on the specific performance of the labor substitution effect of artificial intelligence, pointing out that this substitution effect is specifically manifested in the fact that only machines and equipment will replace repetitive and regular jobs. That is, most of the positions replaced by artificial intelligence technology are grassroots labor positions, and the impact on procedural jobs is relatively large.

3.2. Employment creation effect of artificial intelligence

Although the substitution effect of artificial intelligence technology will have a negative impact on the labor market, many scholars are still optimistic about its development prospects, because artificial intelligence will also bring job creation effect. From the perspective of stimulating consumption, the widespread application of AI technology is conducive to improving the efficiency of production activities, which in turn reduces the selling price of the products concerned and stimulates people's consumption. The consumer demand released by people in turn promotes enterprises to expand the scale of production, which promotes the development of relevant industries, realizes economic growth, expands employment demand, and promotes the employment level of the labor market^[9]. Acemoglu et al.^[10] analyzed the employment data of the U.S. labor market from 1980 to 2007, and found that there is a significant positive impact of artificial intelligence on the labor market. The total number of employed people in the U.S. grew by about 17.5%, half of which was generated by AI. In addition, from the perspective of the long-term development of AI technology, its job creation effect continues to strengthen, the application of intelligent machines and equipment on the labor market is more beneficial than harmful^[11]. Bloom et al.^[12] through the analysis of the data, made an estimate that by 2030, the world will have 734 million new jobs by artificial intelligence. brought about by AI. From the perspective of the history of technological development, artificial intelligence technology is still continuously updating and developing, and while it gradually replaces some of the jobs, it will also create new jobs in the long-term development, which will produce a compensatory effect to offset the negative impact of the substitution effect^[13]. Sun Wenkai^[14] studied China's employment data in the past decade and found that the development and application of AI technology has not led to a decline in the labor participation rate. Ting Luo^[15] pointed out that the substitution effect of AI surpasses the impact of any previous technological advances, yet the risk of jobs being automated does not imply actual job loss. In summary, the impact of the development of AI technology on the labor market is complex and multidimensional. While there are substitution effects, they also create new jobs and growth in the labor market.

3.3. The comprehensive impact of artificial intelligence on total employment

It can be seen that there are two opposite effects of AI technology on the labor market: the substitution effect and the job creation effect. The combined effect of these two effects on the labor market depends on their relative strength. Many scholars have studied this, including Atkinson et al.^[16], who analyzed the change in employment in the U.S. labor market from 1850 to 2015 and pointed out that the new employment opportunities created by technological change far exceeded the number of disappearing jobs, and accordingly concluded that the concern that AI will reduce employment opportunities is unnecessary. This is further confirmed by the findings of Li Xiuquan^[18] who, in analyzing past employment data in the United States, found that while automation in the automotive industry reduced about 620,000 jobs, it ultimately generated 7.53 million new jobs, and personal computers reduced 3.51 million jobs and ultimately generated 19.26 million new jobs. Lv Rongjie et al^[17] conducted an empirical study on the impact of AI on the number of jobs using unbalanced panel data from 31 provinces in China from 2010 to 2016. The results of the study show that the level of AI development is positively correlated with the number of overall employment, indicating that its development has a promoting effect on labor force employment. However, to a certain extent, AI also replaces the rural labor force. Aghion^[19] further pointed out that the development of AI technology

has a greater facilitating effect on the labor market than a substitution effect, and that the application of intelligent machines will ultimately have a favorable impact. Yan Xueling et al. ^[20] pointed out through empirical analysis, the current artificial intelligence technology on China's labor market there is a positive impact and has a strong persistence, 1 unit of standard deviation of the artificial intelligence technology impact, resulting in jobs to improve about 0.04 percentage points, the current impact of artificial intelligence on the labor market is more manifested in the employment creation effect, rather than the substitution effect. In addition, there are some scholars believe that the comprehensive impact of artificial intelligence technology on the labor market effect is uncertain, for different regions and different sizes of enterprises employment impact is not the same.

3.4. The impact of artificial intelligence on labor compensation

Benzell^[21] points out that increases in automation productivity will benefit contemporary capital owners, the share of intangibles in national income will rise over time, and the share of labor will eventually fall, which in turn will lead to lower wages and impoverish future generations. Dauth^[22] showed that intermediate-skilled laborers would face a significant loss of income as AI technology develops. And this loss of income does not come from job substitution, but from the reduction of wages in existing jobs. Meng Yuanyuan and Chen Jin^[23] point out that the role of AI in raising wages is gradually weakening as the level of economic development increases. When the economic development situation is at a lower level, the development of artificial intelligence technology development can significantly increase productivity and increase the income of employed people; however, as the economic level continues to rise, the increase in wages of employed people who are already at a higher level will decline. Ting Luo points out that in enterprises with a high level of AI application, due to considerations of business management and costs, they may pay high wages to internal skilled workers and outsource low-skilled positions. From this perspective, the application of AI has a strong negative impact on the wages of manufacturing laborers. Hui Wei and Jiang Wei ^[24] argued that there is industry heterogeneity in the impact of AI on the wage level of the workforce and the share of labor income, but it will widen the income gap. Wang Yongqin and Dong Wen ^[25] argued that a decline in labor demand reduces the equilibrium wage level when labor supply is constant.

3.5. Literature Review

Through the collation and analysis of relevant research literature at home and abroad, it is found that many scholars in the academic community generally agree that there is a duality in the impact of AI technology on the labor market, and that the effect of its comprehensive impact on labor force employment mainly depends on the dominant side of the two effects. When the substitution effect dominates, it will have a negative impact, and when the substitution effect is smaller than the employment creation effect, AI technology can bring positive positive impact. At the same time, with the continuous development of AI technology, it may also have a negative impact on labor wages. However, there are also many scholars who believe that the application of artificial intelligence technology does not necessarily lead to a reduction in wage levels.

In summary, existing research on the impact of artificial intelligence on the labor market has been quite rich, but there are still issues that deserve further exploration. Foreign research on AI predates China, and most of the current research literature also comes from developed countries. When Chinese scholars conducted research in the early days, most of them drew on foreign research methods and data due to the lack of domestic data. However, in recent years, China has made rapid development in the field of artificial intelligence, while China's labor market has certain special characteristics. Compared with developed countries, there are still some gaps in the current development of AI in China. Therefore, the research conclusions of developed countries may not be fully applicable to the actual situation in China. This requires us to conduct in-depth research on China's specific situation in order to better understand the impact of AI technology in China's labor

market and formulate corresponding policies and measures to cope with and guide this trend. In addition, most of the existing literature is based on theoretical analysis, with relatively few empirical analyses, and in the existing empirical analyses, the measurement of AI technology indicators is not comprehensive enough to truly reflect the reality of AI technology, which makes it difficult to measure its actual impact on the labor market. The reason is mainly due to the limited data statistics at the level of relevant industries and regions, which makes it difficult to explore the extent of the impact of AI technology on the labor market according to the actual situation in China. Finally, in studying the substitution effect of AI, most of the existing literature only considers the substitution effect of AI on low and middle-skilled labor, without considering that with the rapid development of AI technology, higher-skilled labor may also be at risk of being substituted. Although at present, high-skilled laborers cannot be replaced by machines for the time being due to their own competitive advantages, such advantages will continue to diminish with the rapid progress of AI technology. Therefore, the substitution effect of AI on jobs with high skill requirements is also an important research direction in the future.

4. POLICY RECOMMENDATIONS

The labor market is related to employment and people's livelihood, as well as the most basic support for economic development. In order to promote better socio-economic development and achieve higher quality employment, it is necessary to seize the opportunity of artificial intelligence and ride the east wind of information technology. Based on this, this paper puts forward the following policy recommendations:

Recognize the labor substitution effect of artificial intelligence correctly. With the rapid development of artificial intelligence, some simple positions replaced by artificial intelligence will become the norm, and the risk of unemployment brought about by this substitution effect is inevitable. Therefore, enterprises need to launch targeted training to enhance human-machine synergy. The government should establish an early warning mechanism, introduce employment compensation and social security system, focus on vulnerable grassroots employees, and arrange for transfer or re-employment training in advance.

Seize the opportunity to cultivate composite talents. Enterprises need to adjust salary levels in a timely manner, use salaries to motivate employees to improve their labor skill levels, motivate employees to become composite talents in the age of artificial intelligence, and attract and retain high-quality labor. The government needs to strengthen the technical education, cultivate high-tech talents, and turn the "demographic dividend" into the "talent dividend".

Reasonably grasp the scope and degree of application of artificial intelligence. Artificial intelligence has a different impact on the employment of enterprises in different regions, of different scales and of different natures. Therefore, while introducing AI technology, enterprises should fully consider their own development situation, operating characteristics, affordability, etc., and grasp the balance of AI application. The government also needs to introduce policies to properly guide and support small and medium enterprise in the application of AI technology according to local conditions.

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