Population, Resources & Environmental Economics (2024)
Clausius Scientific Press, Canada

DOI: 10.23977/pree.2024.050302
ISSN 2616-2253 Vol. 5 Num. 3

Best of Times, Worst of Times: Balancing Innovation and Labor Protection

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Keywords: Industrial Revolution, Artificial Intelligence, Labor Market, Labor Protection

Abstract: Throughout the four industrial revolutions, technological innovation has transformed the dynamics between workers and machines, significantly impacting the labor market through displacement and productivity effects. This study examines these impacts, with a particular focus on the burgeoning role of artificial intelligence (AI). By dissecting the intricate ways in which AI is altering the labor landscape, the research endeavors to shed light on the interplay between technological progress and employment. The study's objective is to provide actionable insights for policymakers, helping them in crafting policies that balance the imperatives of technological advancement and labor protection. By doing so, it aspires to contribute significantly to the nation's productivity and enhance the living standards of workers. The findings of this research are poised to inform a nuanced discourse on how to harness the potential of AI while safeguarding the interests of the workforce, ensuring that the benefits of innovation are equitably distributed across society.

1. Introduction

Innovation, as conceptualized by Joseph Schumpeter (1911), is a pivotal driver of economic growth. Technological innovation has been central to each industrial revolution, leading to profound changes in social productivity. However, studying the process of the 1st-3rd industrial revolutions, it can be found that the displacement effect and productivity effect on the labor market brought by technological innovation cannot be underestimated, and the time lag between the two will lead to a huge impact on the labor market inevitably. In this regard, artificial intelligence has the characteristics of the innovative technologies of successive industrial revolutions, and also has a new connotation due to its great progress. This paper analyzes the novel aspects of AI and its potential short- and long-term impacts on the labor market. It advocates government policies that actively promote technological progress, accelerate educational reform, and enhance social security to balance innovation and labor protection.

2. Impact of Artificial Intelligence on the Labor Market

The current global industrial revolution, centered on digitalization, automation, the Internet of Things, and AI, is profoundly altering the social economy, production methods, and labor relations. Since 2010, we have seen AI develop rapidly and become increasingly integrated into various

sectors[1]. AI, supported by new information technologies, is emerging as a new force in social and economic development. While AI fosters innovation, its impact on employment has raised considerable concerns. AI retains the characteristics of previous industrial revolutions but also exhibits new features that differentiate its labor market impact.

2.1 Displacement and Productivity Effects of AI on the Labor Market

AI's impact on the labor market manifests as both displacement and productivity effects. Initially, AI triggers a displacement effect through capital substitution for labor, where machines replace tasks previously performed by human workers, leading to a reduction in labor demand and a decline in total employment in the short term[2]. AI primarily replaces programmed tasks and some non-programmed tasks it excels at, such as lifting, driving, and image diagnosis[3]. Historically, the fields where humans are first replaced by AI share three characteristics: simplicity of rules, economic application, and technical feasibility[4].

As AI permeates various industries, its impact is further evident in the productivity effect, which enhances productivity and labor demand through the flexible allocation of tasks. Since AI increases output at reduced costs while also raising labor demand for non-automated tasks and the production of other labor-intensive goods, the productivity effect can ultimately increase total employment in the long run[5].

2.2 New Features of AI's Impact on the Labor Market

The evolution of technology during the fourth industrial revolution has seen a shift from traditional robotic automation, which solves deterministic problems, to modern AI that addresses uncertainty through interactive learning. This transformation has moved AI from machine-like to human-like attributes, introducing new characteristics in its impact on the labor market.

2.2.1 The application of AI will reshape industries with stronger substitution for numerous occupations and a more potent productivity effect.

ChatGPT-based expansion applications are poised to bring new industry transformations. ChatGPT has already demonstrated significant influence in fields such as education, scientific research, and media, showcasing its strong substitution capabilities for traditional occupations. However, in terms of labor and employment, technological advancements and refinements will drive the structural evolution of the labor market, with the updating of knowledge and skills becoming increasingly crucial in employment competition, thereby exhibiting a powerful productivity effect[6].

2.2.2 AI's displacement effects are not uniform across the labor market.

AI impacts differently skilled workers to varying degrees, with medium-skilled workers being more affected and high- and low-skilled workers being relatively less impacted. Efficient AI is a stronger substitute for simple, rule-based, economically profitable, and technically realizable occupations, leading to a strong displacement effect that squeezes the viability of medium-skilled workers.

Many low-skilled jobs are not immediately replaceable for two reasons: first, certain jobs require human flexibility that AI struggles to replicate; second, the cost of AI implementation may exceed the cost of low-skilled labor, reducing companies' incentives for research, development, and substitution. However, when medium-skilled laborers are displaced to lower-skilled positions by AI, such as the trend of college graduates delivering couriers, it also compresses the living space of original low-skilled workers.

It is noteworthy that with the advent of AI such as ChatGPT, the replacement of high-skilled workers by AI is becoming evident in many sectors. For instance, skilled financial analysts face the risk of being replaced by intelligent algorithms and machine learning systems. AI's application in finance, including high-frequency trading, financial analysis, and risk management, may reduce the demand for certain professionals. Thus, generative AI may reverse the historical substitution order from low to high skill, contrasting with the uniqueness of previous automated technologies.

2.2.3 The income disparity between capital and labor will widen.

Thomas Piketty, in his work "Capital in the Twenty-First Century," posits that r>g (the rate of return on capital exceeds the rate of economic growth) is typical in capitalist economies[7]. Accelerated capital accumulation relative to output growth leads to capital's share outpacing labor's share. AI may exacerbate this trend, further widening the income gap between capital and labor. On one hand, AI investment bolsters the capital share, and AI-driven technological change that displaces workers may result in labor capturing a diminishing share of national income. On the other hand, the marginal cost of AI application trends toward zero, offering substantial marginal benefits and creating significant profit margins once successfully implemented. High profit margins naturally attract substantial capital into the market, further reinforcing the incentive to increase the capital share[8].

2.3 Summary: AI's Short- and Long-Term Impacts on the Labor Market

AI's influence on the labor market is contingent on the relative costs and benefits of utilizing AI technology versus traditional human labor. As analyzed, AI enhances social productivity and efficiency at various times, but its labor market impact varies, with a temporal mismatch between the different effects.

In the short term, AI's displacement effect on the labor market outweighs its productivity effect, and the technological progress it brings also triggers some frictional unemployment. McKinsey & Company, a leading global consultancy, forecasts significant job transformations by 2030, with many roles becoming obsolete and up to 800 million jobs worldwide potentially being automated. Currently, this displacement effect is primarily evident in the substitution of laborers for jobs of medium skill demand and the subsequent compression of low-skilled laborers; meanwhile, the jobs created by the productivity effect have a delayed impact and will impose new skill requirements on workers.

Second, the income gap will further widen. As the application of new-generation AI technology necessitates substantial investment and financial backing, leading firms will capture greater market share and profits, while small and medium-sized enterprises and individuals may struggle to compete, leading to employment polarization and income disparity.

In the long term, AI's productivity effect will materialize, with numerous new jobs emerging. Some of these roles will be concentrated within the AI industry, such as robotics engineers and technicians. Other job creation will focus on areas where humans excel but machines do not, such as those with complex social interactions and the perception of irregular objects.

Furthermore, the labor force structure will upgrade. Technological breakthroughs will drive the labor market's structural evolution, with the updating of knowledge and skills becoming increasingly advantageous in employment competition. To adapt to the industry, labor field, and working environment changes brought by AI advancements, workers must continuously enhance their comprehensive skills, including communication, numeracy, self-learning, collaboration, problem-solving, and information processing.

Ultimately, human-machine collaboration will become the norm, and working hours will decrease. The human-machine collaboration facilitated by new-generation AI technology will improve work efficiency and reduce job difficulty. The World Economic Forum predicts that by 2025[9], human and

machine working hours will be equal, with algorithms and machines focusing on information and data processing, management tasks, and traditional manual labor, while human work will concentrate on management, advisory, decision-making, reasoning, communication, and interaction. In the future, working alongside robots and intelligent systems will become the primary employment model, with AI playing a significant role in hazardous areas unsuitable for human work. Moreover, AI-driven digital platforms will provide new job opportunities for the unemployed and help companies access a personalized, flexible workforce.

3. Government's Position

Historically, no one can halt the march of technological progress. The government must confront this reality, focusing its efforts on balancing innovation and worker protection. Collaborating with industry stakeholders, research institutes, and labor unions, the government should promote technological advancement while fostering a dynamic labor market adaptable to AI's progress and ensuring social security and equitable opportunities for all[10].

3.1 To Actively Promote Technological Progress

It is necessary for the government to actively promote the development of the new-generation AI industry and the corresponding industrial upgrading, in order to maintain market competitiveness to ensure the demand for the labor market[11]. In particular, the government need conduct further research and judgment on the emergence of the creative effects of AI, promote synergistic cooperation between humans and AI, and promote greater progress in areas with more creative effects. It is worth noting that the government should also promote the development of digital platforms to create more flexible employment opportunities.

3.2 To Reform Education Methods

Government should implement policies to encourage educational reform adapting to AI technology. In basic education, it is advised to focus on creative education and critical thinking adapted to AI, such as how to ask good questions. In vocational education, institutions are suggested to provide retraining for medium-skilled workers who will be most affected by the displacement effect, and to provide support for affected workers as well as promote employment opportunities in new industries. At the same time, we should also consider that AI will also affect some high-skilled people, and their training and guidance should be synchronized.

3.3 To Strengthen Social Protection

In mitigating the negative impact of AI on employment and income inequality, governments can take a variety of measures, including interventions in the areas of taxation, transfer payments and social protection floors[12]. Governments can promote equity in income distribution through tax policies. For example, higher tax rates may be imposed on high-income individuals or enterprises to ensure that they contribute more to society. Governments can provide additional income support through transfer payment programs to help people who have been affected by technological advances and have lost their jobs. These programs can include unemployment benefits, social assistance, and subsidies for low-income families. The government can set a minimum wage and ensure that labor groups do not earn less than that. A minimum wage policy can provide a measure of protection to ensure that workers enjoy a basic level of economic security and standard of living. In addition, the government can strengthen regulation and enforcement to ensure that employers comply with

minimum wage regulations.

4. Conclusion

In conclusion, governments must strike a balance between encouraging innovation and protecting the labor force amidst the impact of artificial intelligence (AI). Short-term effects may include job displacement and income inequality, but long-term effects bring new employment opportunities and labor force upgrades. Governments should actively promote technological progress, reform education systems to adapt to AI, and strengthen social protection measures. These actions will foster a dynamic labor market that embraces innovation while safeguarding worker welfare. By adopting these measures, societies can harness the full potential of AI for productivity development and improved living standards.

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