Implications of Technological Advancements on Income Inequality in China

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Abstract: This paper investigates the implications of technological advancements on income inequality in China, particularly in the realms of automation and artificial intelligence (AI), and reveals how these technologies have reshaped China's labor market, contributing to a widening income gap. Specifically, the research demonstrates that while automation has propelled economic growth and enhanced productivity, it has also disproportionately benefited skilled workers, worsening existing inequalities as a result. The paper assesses existing policies that aim to solve these effects including "Made in China 2025" and proposes new targeted interventions such as expanding reskilling programs that provide opportunities to all workers. There are also strengthened social safety nets and unemployment benefits to prepare for the potential job loss that technological advancements may cause. The findings in this paper emphasize the need for a policy approach that promotes growth equally for everyone facing rapid technological change. Hopefully, these policies will lead to a more balanced distribution of the benefits of technological progress.

Keywords: artificial intelligence, income inequality, wage gap, automation.

1. Introduction

China has a serious problem of income inequality, with the income gap between skilled and unskilled workers, as well as that between urban and rural areas, widening over the past few decades. In 2020, the Gini coefficient was 0.371 in China, as shown by the data from World Bank. In the last few years, significant technological advancements happened in China, particularly in the realms of artificial intelligence (AI) and automation. AI revolutionized industries by enhancing automation and increasing efficiency. This impacts on the economy in a multitude of ways and has the potential to both propel economic growth and exacerbate income inequality in China. For example, through the job substitution and creation effect, AI may widen the income gap [1]. The job substitution effect works due to AI creating new jobs that require a high level of skills to do, while replacing simple jobs that consists of repetitive actions. In the end, to have a certain level of skills, workers would require a good education which the rich find more accessible than the poor. This causes the rich to grasp new technology faster and gain more opportunities compared to the poor, leading to the income inequality gap to eventually worsen.

The effects that technological advancements have on income disparities in China are significant for many different individuals, from policymakers to economists to the society as a whole. In the future, as China continues to embrace innovation, understanding how changes in technology

influence income distribution and inequality would be a vital step for devising effective policies that promote inclusive growth and mitigate the negative effects of technological disruption on the workforce. Furthermore, addressing the potential displacement of workers and skill gaps in the labor market will be essential for ensuring a smooth transition to a more technologically advanced economy that benefits all segments of society. The current trend is that technological advancements have had a dual impact on income inequality in China. An example is that although AI and automation have led to increased efficiency in various industries, they also widened the wage gap between skilled and unskilled workers, as those with specialized skills benefit disproportionately from the available technology. This causes many low-skilled workers in routine and manual jobs to be replaced by automation, leading to job losses and wage stagnation for this segment of the workforce.

This paper plans to analyse this problem primarily by using past data trends influenced by a new technology developing in China. Overall, this research aims to contribute to the existing literature on the related field and provide insights for policymakers.

2.   Economic Development of China

China is now among the world's economic superpowers thanks to its economic transformation over the last few decades. Ever since the implementation of market reforms in 1978, the Gross Domestic Product (GDP) of China has increased at an average annual rate of approximately 9%, according to the World Bank. This rapid economic expansion has been driven by several key factors, including industrialization, globalization, and technological advancement. According to Statista, as of 2024, China remains the second-biggest economy in the world, with a GDP of over $18.5 trillion, representing about 19% of global output. A large part of China's economic success comes from industrialization, with manufacturing becoming the main source of income for the economy. At the same time, China's industrial growth has been coupled with significant investments in technology. China has become one of the global leaders in industries such as AI, advanced robotics, and automation. In fact, the National Bureau of Statistics of China claims that China's spending on research and development (R&D) reached around 390.5 billion dollars in 2021, making it the world's second-largest spender, only surpassed by the United States [2].

Technological advancement has reshaped China's labor market, particularly through the automation of various industries. The rise of AI and robotics led to significant changes within the industry sector. An example is Foxconn, which implemented large-scale automation in its factories, reducing its human workforce by more than 50% in some locations. While these advancements have increased productivity, they have also played a role in the loss of job, especially for low-skilled workers. In fact, technologies used by industries also seems to have increased capital intensity and skill levels, which has slowed and plateaued the growth of the low-skill labor supply in all of China [3]. The impact of automation can be further seen through the distribution of workforce across various sectors. According to data from Statista, the workforce of both the industry and agriculture sectors decreased in the past decade, with the industry factor decreasing to 29.1% from 30.3% and the agriculture sector plummeting to 22.8% from 31.3% from 2013 to 2023. By contrast, high-tech and service industries, such as information technology and financial services, have seen job growth with the service sector's share of workforce increasing by nearly 10% from 2013 to 2023, rising from 38.4% to 48.1% [4]. These trends have worsened existing inequalities in the labor market, as workers in traditional industries like manufacturing face displacement while those with skills in high-tech fields thrive. This is a classic example of how innovation that is skill based alters the structure of the market and widens the wage difference between skilled and unskilled workers [5].

3. Technological Advancement and Income Inequality

Technological advancements have played a critical role in shaping income distribution in China, particularly in sectors like manufacturing, services, and agriculture. The adoption of automation technologies has increased productivity but has also led to significant disruptions in the labor market. According to Statista, the production volume of industrial robots in China amounted to over 443,100 units in 2022, an increase of more than 20% compared to 2021 and more than 80% compared to 2020 [6]. This increase in automation has reduced the demand for low-skilled labor, leading to unemployment for workers in manufacturing. In fact, a 2021 study by the International Monetary Fund (IMF) found that automation in China had replaced around 40% of routine manufacturing jobs over the past decade, contributing to rising income inequality in the sector. Furthermore, not only does automation impose a substitution effect on low-skilled jobs that causes the income of these workers to decrease, but automation also has a creative effect on highly skilled employment, increasing the income of highly skilled laborers and widening the income inequality gap [7].

The service sector, traditionally seen as more resilient to automation, is also experiencing disruption. AI-driven technologies are replacing human labor in areas like customer service, retail, and logistics. This includes roles such as cashiers, customer service representatives, and delivery drivers. Similarly, new jobs in technology-related fields that often require specialized skills are being created, leaving many workers behind. Furthermore, this not only results in a wage gap between workers of varying skill levels but also creates inter-generational gaps between older and younger workers that could lead to further issues [8]. In agriculture, new technologies have also influenced the labor market, causing a decrease in its labor force. The main reason for this is the introduction of smart farming technologies, such as automated harvesting machines, which partially reduced the need for manual labor in agriculture. Additionally, this shift has contributed to population outflow from rural areas, a phenomenon when young workers from rural areas migrate to urban cities in search of more opportunities. This further worsens regional income disparities. An overall trend that exists in all these sectors is skill-biased. Simply put, technology typically raises the relative demand and wage for skilled workers as well as the relative profitability of skilled-intensive industries, which eventually leads to less equal income distribution across workers [9].

Technological advancement has a complicated effect on economic inequality in China, having both positive and negative impacts. On the one hand, automation and innovation have created new industries and job opportunities, increased productivity, and driven economic growth. According to Statista, China has one of the greatest projected rates of worker productivity growth in the world, with an average annual growth rate of more than 8% between 1995 and 2020. This productivity growth has been largely driven by technological advancements in sectors like manufacturing, logistics, and information technology. On the other hand, the negative effects of automation on employment and income inequality cannot be ignored. Job displacement is a significant issue, particularly for low-skilled workers in traditional industries. According to the World Bank, around 550,000 manufacturing jobs in China have been lost to automation from 2000 to 2019. While some of these workers have been able to transition to new jobs, many others have struggled to find employment in the high-tech economy. This leads to growing income inequality, as displaced workers are often forced to take lower-paying jobs or remain unemployed.

Another issue that requires attention is the skill gaps brought about by automation in China, since education and training systems have not kept pace with the rapid technological changes. A 2020 report by the Organization for Economic Cooperation and Development (OECD) found that in contrast to the 83% average for OECD member countries, only 37% of Chinese workers (aged 25 to 64) held at least an upper secondary qualification [10]. Since secondary attainment is often seen as a minimum qualification for successful labor participation, it shows how lacking China is in terms of

educating and upskilling workers. This lack of access to upskilling programs has contributed to the mismatch between the supply and demand for labor in the high-tech economy, worsening income inequality.

All of this has led to the polarization of the labor market, causing the disappearance of many middle-income jobs, particularly in manufacturing and routine services. Middle-income jobs, which are often routine and susceptible to automation, are disappearing, leading to a hollowing out of the middle class. Eventually, the middle class shrinks while the rich-poor divide grows.

4. Evaluations and Suggestions

The Chinese government has implemented several policies before to address the challenges posed by automation and technological advancements. One of the most prominent initiatives is the "Made in China 2025" plan, which aims to modernize China's manufacturing sector by promoting high-tech industries such as robotics, AI, and electric vehicles. The plan includes investments in R&D, education, and skill training for workers that allow them to acquire the skills needed for the high-tech economy.

In addition to industrial policies, the Chinese government has also introduced social welfare policies to support workers displaced by automation. According to the Chinese Ministry of Human Resources and Social Security, unemployment insurance coverage in China had an increase of 4.49 million participants in March 2024 compared to the previous year. The government has also expanded vocational training programs, and aim to have over 75 million workers join such programs by 2025. However, despite these efforts, many displaced workers still struggle to access the training and support they need to transition to new jobs.

One problem of the government's focus on high-tech industries may exacerbate regional income inequality by creating a two-tiered labor market. While high-skilled workers in urban areas benefit from technological advancements, low-skilled workers in rural areas are often left behind. A 2021 report by the IMF warned that China's focus on high-tech industries could lead to greater regional disparities, as rural areas with less access to high-tech industries and fewer opportunities for reskilling fall further behind.

Although there are policies like personal income tax reforms or labor market policies on minimum wages, these policies will likely only work as short-term solutions that would not solve the problem from the root. Based on the analysis of the impact of technological advancements on income inequality in China, several policy recommendations can be made. First, the government should expand access to reskilling and upskilling programs to guarantee that all workers have the chance to obtain the skills required for the high-tech economy, regardless of their location, background, or educational attainment. This could involve increased investment in rural education and training programs, as well as targeted support for disadvantaged groups, such as older workers or those with lower levels of education [11].

Second, social welfare policies should be strengthened to provide more comprehensive support for workers displaced by automation. This could include increasing unemployment benefits, expanding job placement services, and providing financial assistance for retraining. In addition, policymakers should consider implementing wage support mechanisms to help bridge the income gap for workers who transition to lower-paying jobs after being displaced by automation.

Finally, policymakers must take a balanced approach to promoting high-tech industries. While innovation and technological advancement are essential for economic growth, it is important to ensure that the benefits of these developments are shared widely across the population. This could involve promoting the development of high-tech industries in rural areas, as well as investing in infrastructure and services that support inclusive growth.

5. Conclusion

This study discusses the dual-edged nature of technological advancements in China, where automation and AI have simultaneously driven economic growth and deepened income inequality. By examining data from different sectors, how technological shifts have disproportionately advantaged skilled workers while displacing those in low-skilled positions is highlighted, leading to a polarized labor market. The analysis concludes that while China's "Made in China 2025" initiative and other policy efforts are steps in the right direction, there remains a critical need for more comprehensive strategies. Specifically, policies should focus on expanding access to reskilling programs, particularly in rural areas, and enhancing social welfare systems to support displaced workers. These measures are essential to ensuring that the economic benefits of technological progress are more widely shared across different segments of the population, thereby promoting more inclusive and sustainable growth.

Admittedly, this paper has several limitations that must be acknowledged. The analysis is primarily based on historical data and trends, which may not accurately reflect the dynamic nature of technological advancements and their long-term impact on income inequality. Additionally, the study focuses largely on the economic aspects of income inequality, potentially overlooking other factors that also play a significant role. Future research could benefit from a more comprehensive approach that considers these factors, as well as a more in-depth analysis of regional disparities within China. Moreover, as technology continues to evolve, ongoing studies will be necessary to monitor the effectiveness of policy interventions and to adapt strategies to new challenges. Future research should also explore the role of emerging technologies, such as AI in new sectors, and their potential impact on income distribution. Hopefully, future research will be able to offer more in-depth insights and aid in the creation of more potent solutions to address income inequality by overcoming these constraints.

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