Exacerbating Income Inequality:

How AI Drives Job Displacement, Skill Premium, and Monopoly

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Abstract

This paper explores how the continuous evolution of AI exacerbates income inequality through three mechanisms: job displacement, skill premium, and monopoly. The Job displacements are occurring in low-skilled jobs and progressively affecting medium-skilled positions. Yet high-skilled jobs are capturing the excess dividends brought by AI innovation. In addition, the AI industry is monopolistic, in part because of the tremendous capital investment required. Both the high capital expenditure and high return are leading to a self-strengthening relationship between AI development and capital accumulation, ultimately resulting in excessive concentration of wealth. To address the growing income inequality, the government should strengthen legislation like special taxes for AI companies and compensation for non-AI labors, the Tech Giants should aim to increase social productivity and welfare as well as limit unequal labor substitution. Furthermore, education should be enhanced so that more people can reap the benefits of these technological developments.

Keywords: *Artificial Intelligence, income inequality, Gini Index, job displacement, skill premium, monopoly*

1. Introduction

Artificial Intelligence (AI) usage is a double-edged sword. Progressing from earlier stages automation since the Industrial Revolution, AI has brought huge waves of development and leveled-up production in various fields like self-driving, tutoring, and medical diagnosis, which bring people to new levels of efficiency, convenience, and opportunities. However, according to an IMF research paper, about 40 percent of workers worldwide are in high-exposure occupations to AI, which leads to an increase in labor income inequality (Cazzaniga et al., 2024). A Forbes report announces that technology, causing 47,436 job losses in April 2023, remains the field with the highest number of job cuts in the US, among which AI development contributed the most, leading to the highest number of lost jobs (Roeloffs, 2024).

The Gini Coefficient is applied to measure inequality through frequency distribution, which is represented as a percentage from 0 to 100 percent (Bakare, 2012). A higher Gini Coefficient means a higher level of inequality. As shown in Figure 1, from 1981 to 2022 the United States, the most developed country in the world, has a higher Gini index than China and India. Differing from these main developing countries whose income inequality was decreasing, the US Gini index shows a continuous upward trend. Before the 1970s, the middle class, especially the labor unions, rose postwar but then stagnated (Piketty, 2014). From 1970 to 2022, rapid globalization and technological development benefitted the capital owners, resulting in greater wealth concentration and soaring GDP from $1,073.3 billion to $21,822 billion (O'Neill, 2024). Thus, in the US the overall income share of the richest 1% before tax is in a U-shape. As partial labor unions were displaced by automation, PC, Internet, and AI, shrinking the income share of the working class, the income share of the top 1% earners is on the right side of the U-

curve with an increasing share from 10.7% to 20.9% of US total wealth (World Inequality Database, 2024). With the wealth of the richest in the US increasing while more fall into poverty by losing jobs, income inequality is exacerbated even more.

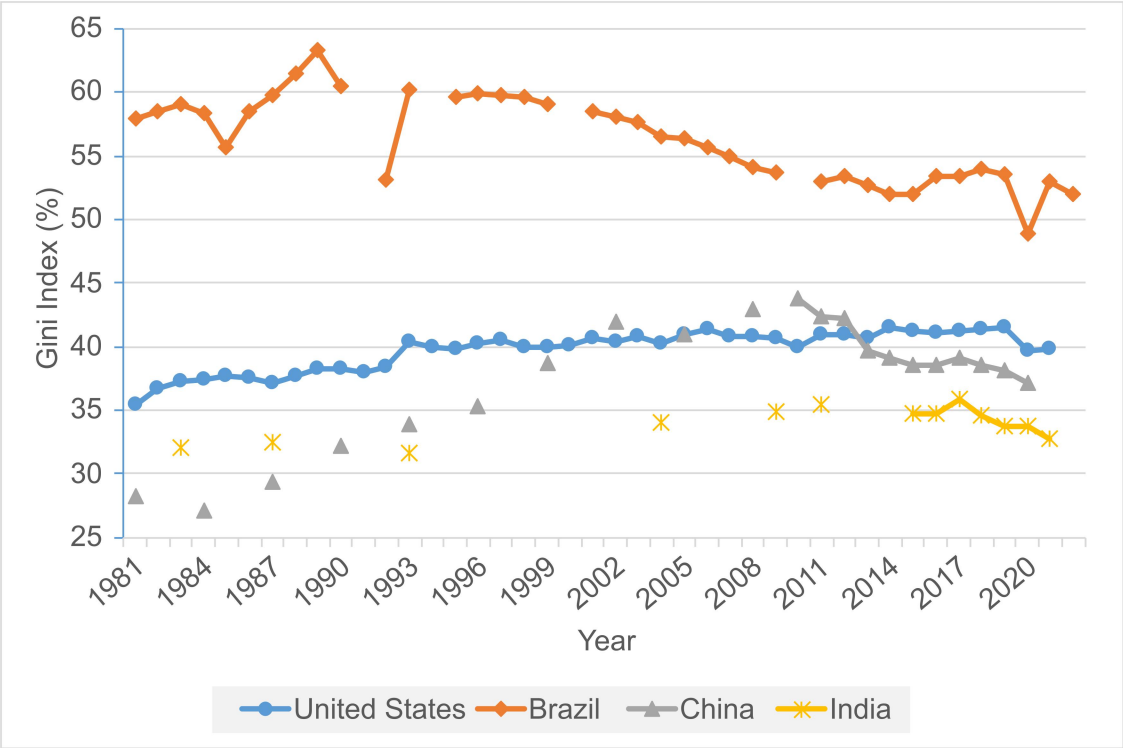

Figure 1: Gini index of United States, Brazil, China and India (1981-2022) (World Bank, 2024)

Growing income inequality is often positively correlated to with the development of technology. According to the research capacity, the US which ranks at the top of the 20 leading AI countries with a capacity of 100, far ahead of China, which holds second place, with a capacity of 54.7 (Thormundsson, 2024). The continuous evolution of AI might pose a potentially high risk of exacerbating income inequality among people. Main factors influence these trends. Three significant channels through which income disparity is increased are job displacement, skill premium, and monopolistic AI market power.

2. Examining the Problem

2.1 Job Displacement Effect

AI can lead to job displacement and structural unemployment, though this varies in impact depending on skill levels and AI's future evolution (Farahani and Ghasemi, 2024). AI is skill-biased, which means low-skilled jobs are the first to be impacted, especially in countries that prioritize large concentrations of labor and primary or repetitive jobs (Sholler and MacInnes, 2022), like call center representatives and taxi drivers. For instance, Baidu's Apollo Go provided about 899,000 rides to the public across 11 cities in China during the second quarter of 2024, representing a 26% increase compared to the previous year (Baidu, Inc., August 22, 2024). Based on an estimate of 15 to 20 rides per driver per day, this level of service indicates that between 494 and 659 taxi drivers may have lost their jobs in the second quarter of 2024. These low-skilled workers will either suffer a decrease in income or lose their jobs, which exacerbates income inequality.

Limited access to wealth and knowledge sources is another significant way AI widens income disparity. As AI technology advances, individuals with medium-level education and skills must adapt to avoid being substituted by peers with more technical expertise. Consequently, those unable or unwilling to change will be displaced by those who embrace new skills.

2.2 Skill Premium Effect

In addition to expanding the wealth gap by lower wages and job opportunities at the bottom of the income scale, AI development makes financial secure and well-educated workers richer. AI industries have high barriers to entry since they require highly educated backgrounds

and exceptional skills. Such companies demand and seek outstanding highly-skilled employees for whom they are willing to pay higher prices to stimulate their motivation for AI innovation. Big Tech companies (the Tech Giants), like OpenAI, Microsoft and Google highly value specialized skills and often provide compensation like stocks and bonuses to attract and keep the top talent. With these extra benefits on top of the high salary, workers who enter AI companies maximize the income disparity to a greater extent. Take software engineers in OpenAI as an example. Entry AI Engineers make an average of 8.13% more than their non-AI counterparts in the same company and same level (Kolesnikova, 2024). Furthermore, requiring more exceptional programming skills and work experience, the current highest level L5 earns software engineers an annual salary of $870K per year (Levels.fyi, 2024).

But there are downsides to these developments. Unfortunately, as the Frontier Models that push AI development to an unexpected extent are popularized among Big Tech companies, employment risks may increase and new displacements will occur soon.

2.3 Monopolistic Enhancement Effect

Zooming out to a broader perspective, AI companies are monopolistic on account of their great demand for capital and funds and their reliance on the top, richest investors. According to Google's former CEO Eric Schmidt's interview at Stanford University, assuming the frontier models drive forward, it is likely that the game can be only played by a few countries, each of which has "lots of money, talents, strong educational systems, and the willingness to win" (Berman, 2024).

On one hand, the cost of generative AI model training is rising to unprecedented levels. For instance, OpenAI's GPT-4 costs an estimated $78 million to train, while the training cost of

the famous foundation model Google DeepMind's Gemini Ultra is an estimated $670 million (Epoch AI, 2023; Korinek and Vipra, 2024). Specifically, in the past eight years, the cost of frontier AI model training has risen by a factor of 2-3x per year, with the largest models estimated to cost over a billion dollars in 2027 (Cottier et al., 2024). On the other hand, the investment in generative AI is surging. Funding for generative AI nearly octupled from 2022, skyrocketing to $25.2 billion (Stanford University HCAI, 2024).

In short, AI development is a Monopoly Game. The players, seven Big Tech companies, have a total market cap of $15.4 trillion. In addition, AI development benefits the capital income but underestimates the labor income. Thus, AI development makes capitalists richer, and laborers less paid.

3. Addressing the Problems

Addressing income inequality caused by the development of AI technology requires multi-faceted efforts.

First, government should strengthen legislation, in the case of AI frontiers not being covered by certain laws. Legislation should be supportive of increasing social welfare and lower tax rates for low-skilled laborers, in order to decelerate the speed of AI displacement. Leveling up tax rates for AI Tech Giants can also make up for the loss of low-income workers. For instance, the California Senate Bill 1047 on Safe and Secure Frontier AI Models, passed on August 15, 2024, aims to mitigate the risks of advanced AI by measuring floating-point operations and costs (California State Senate, 2024).

AI industry, especially the Tech Giants that are on the frontier of AI development, have to take increasing overall production efficiency and social welfare as a principle, particularly prioritizing ways that are highly complementary toward workers, instead of those high in substitutability (Ernst et al., 2019). An example would be the Frontier Model Forum (FMF), which was founded by Anthropic, Google, Microsoft, and OpenAI, as a vehicle for a cross-organizational advance of AI safety and development (FMF, 2024).

Last but not least, supporting and improving the quality of education would be effective in terms of guaranteeing the transfer of jobs for low-skilled workers after structural unemployment, and strengthening the skills of the medium-skilled who use AI to increase productivity. This will further maximize AI development's complementary.

4. Conclusion

While there is mixed evidence about whether AI is reducing or exacerbating income inequality, it is clear that AI has brought high efficiency and convenience, along with massive productivity increases, to society. However, its rapid development may potentially bear risks that raise concerns, especially regarding unemployment, skill premium, and monopolistic enhancement. Legislation can help address these issues, but politicians and their constituents need to be alert to the developments in this field, and their impacts, in order to make changes that meet the needs of the most vulnerable in society.

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