

## Article

## Shared Prosperity in the Era of AI

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## Abstract

The rapid development of artificial intelligence (AI) in the recent period brings hope for increasing productivity and economic growth, while it also raises concerns about mass unemployment and rising inequality. This paper examines the impact of technological progress, including AI, on the labor market by reviewing current studies. Although there is concern about the 'robocalypse,' it is unlikely that technologies like AI will significantly replace human labor. However, the role of technology in increasing inequality can be large, as several empirical studies report that automation results in higher inequality. This raises the essential question of how to minimize the risk of AI while maximizing its benefits for human labor. This paper argues that we need extensive institutional reforms and policy measures, along with political changes, to promote inclusive growth and shared growth in the era of AI. A more active role of the government, including increasing public investment and protecting workers, is essential. Additionally, we should guide the direction of technological change to ensure it complements human labor rather than replaces it. Workers should strengthen their bargaining power, and we should strive for more progressive political changes.

**Keywords:** Artificial Intelligence, Inequality, Unemployment, Inclusive Growth

**JEL Classification:** O33, E24, J64, J08

## I. Introduction

We live in an era of rapid societal change, and technology stands out as one of the most significant factors. The advancements in automation technology, specifically AI (artificial intelligence), are expected to affect our lives profoundly. On one hand, these developments can increase productivity, while on the other hand, they can replace human labor with machines. It is evident that our future will involve an increasing co-existence with machines. However, this change also poses risks, rendering workers more vulnerable with concerns

of mass unemployment and the possibility of rising inequality. This indicates that it is crucial to study how to promote shared prosperity in the era of AI.

Against this backdrop, I will first examine the impact of technological progress such as AI on the labor market, encompassing issues of unemployment and inequality. While some studies suggest the high risk of human labor being replaced by machines, the actual possibility of mass unemployment caused by automation is not very high. However, rapid automation has indeed contributed to an increase in income inequality and a decline in the labor share recently. Then the question is how we can harness technological progress to benefit all members of society without exacerbating inequality. I will emphasize that institutional reform and proper policies, together with political changes, are crucial. More specifically, policies for educating and training workers, providing a social safety net, and guiding the development of AI more beneficial to human labor are necessary.

The outline of the paper is as follows. Section II examines the effects of automation on employment and income inequality by reviewing current studies. Section II discusses the implications of AI for these issues and presents the necessary changes to promote shared prosperity in the era of AI. Section III concludes.

## II. Automation, Unemployment and Inequality

### 1. The Risk of Automation and Mass Unemployment

In human history, there has been always a serious concern about the so-called ‘robocalypse,’ referring to the huge unemployment caused by automation replacing human labor. The Luddites protested against machines in the early period of industrialization, and similar worries resurfaced in the 1960s. However, these concerns did not materialize, and they faded away.<sup>1)</sup> The recent advancements in robot technology and AI have reignited this concern. The rapid progress in information and communication technology, coupled with machine learning, has the potential for large-scale automation in several industries (Brynjolfsson and McAfee, 2012). Frey and Osborne (2013) report that about half of the jobs in the US faced a high possibility of automation in 10–20 years as of 2010. They estimated it by matching job information from O-Net data with the opinions of experts in machine learning and mobile robots regarding the technical feasibility of automation. Other studies using a similar methodology report a high risk of automation in other countries (Citibank, 2016; World Bank, 2016). However, subsequent studies estimate the possibility to be much lower because each job consists of several tasks, and while some tasks can be automated others cannot. The task-based approach by Arntz et al. (2016) reports only 9% of jobs in the OECD face a high probability of automation, while Nedelkoska and Quintini (2018) estimate around 14%, applying more extensive information on tasks in Canada to other coun-

tries.

We should also keep in mind that various factors can affect unemployment. It is not just the technical possibility of automation; profit motives of firms and institutional factors play a role. For instance, firms may not introduce automation technology if it isn't profitable, often because they can hire cheap workers. According to the UNCTAD (2017), although the level of repetitive tasks is similar in the food processing and automotive industries the level of automation is much higher in the auto industry due to higher wages. Political resistance and government regulation could also hinder the automation process which can result in unemployment. Looking back on history, we observe that more new jobs were created than jobs lost because technology promoted productivity and income, leading to higher demand for labor (Autor, 2015). Technological progress has not only displaced jobs but also created new tasks in which labor has a comparative advantage, called the reinstatement effect. According to Acemoglu and Restrepo (2019), it was large enough to offset the displacement effect, and the task content did not change much in the US until 1987, resulting in stable labor demand and the labor share out of GDP. Autor et al. (2022) examine the change in job categories and find that 60% of job titles in 2018 did not exist in 1940. They argue that historically technological innovation augments human labor and spurs employment growth as well as automation. They use patent data to show that augmentation innovation produces the emergence of new job titles across occupations and a long time. This suggests that the idea of the robocalypse is inaccurate, and the impact of automation on employment is indeed complex.

## 2. The Impact of Technological Progress on Inequality

However, there is a valid reason to be concerned about the impact of technological progress and automation on inequality. Many economists point to technology as one of the most important factors contributing to rising inequality since the 1980s in advanced countries, particularly the US. The traditional model that examines the race between technology and education focuses on the supply and demand and labor. It posits that workers with higher education and skills can earn higher wages as technological progress occurs (Goldin and Katz, 2008). In fact, the college wage premium has increased since the 1980s, with the development of technology such as computers, when the supply of highly educated workers was insufficient. However, this theory fails to account for the earnings decline of non-college-educated male workers, as it does not consider the labor replacement effect of technology.

More recent research by labor economists focuses on the polarization of the labor market using a task-based approach (Autor and Dorn, 2013; Goos et al., 2009). This approach embraces the reality that automation or computerization directly replaces human labor in some tasks but complements highly educated labor. Additionally, low-skill tasks in personal

service, such as cleaning, requiring dexterity and tacit knowledge are also hard to automate. The argument put forth is that IT development replaced workers with middle level of skill who were primarily engaged in routine tasks, while both high-skilled work and low-skilled work are difficult to be automated. This phenomenon resulted in a U-shaped relationship between skill levels and the increase in the number of workers, leading to the hollowing out of the middle class, as empirical studies have found. However, the implications for wage inequality are more nuanced (Autor, 2022). For highly educated workers performing non-routine tasks, this argument predicts higher earnings, while wages in middle-skill occupations engaged in routine tasks should decline. But wages in lower-skill service occupations might also decline because workers with middle-skill levels could enter previously lower-paid service occupations, exerting downward pressure on wages. Therefore, while the U-shaped pattern of occupational growth is evident, the pattern of wage growth is less certain (Böhm, 2020).

Overall, recent empirical studies demonstrate that automation exacerbates income inequality. Acemoglu and Restrepo (2022) examine the impact of automation using extensive data from the US industry and labor market. They find that workers exposed to more routine jobs in industries where the labor share declined due to automation experienced significantly lower wage growth from 1980 to 2016. These workers were mostly uneducated workers without a college education. The task displacement from automation accounts for over 50% of changes in the wage structure<sup>2)</sup>. Another study also reports that the introduction of industrial robots has negative effects on wages and employment, using commuting zone data in the US (Acemoglu and Restrepo, 2020a). According to it, one more robot per thousand workers reduces the employment-to-population ratio by 0.2 percentage points and wages by 0.42%. Furthermore, Kogan et al. (2021) investigate the impact of innovation by analyzing 160 years of patent data and occupation tasks. They find that technological innovation has been associated with adverse labor market outcomes at the occupational level, including wages and employment. Additionally, panel data on individual workers reveal that less-educated, older, and more highly-paid workers experience greater declines in earnings after controlling for industry and occupation effects. Other empirical studies on functional income distribution also report that the rapid technological progress, resulting in lower investment goods prices, explains the decline in the labor share in advanced countries (Karabarabounis and Neiman, 2014).

However, we should not overlook the fact that changes in inequality are closely associated with political and institutional change. Advanced countries experiencing similar technological change have seen significant variations in the levels and patterns of inequality, largely depending on government policies and politics. For example, the income gap and top income concentration increased much more in the US than in European countries after the 1980s, probably due to differences in government redistribution and workers' bargain-

ing power. A recent study emphasizes the importance of worker power in explaining the decline of the labor share in the US (Stansbury and Summers, 2020). They present empirical evidence that the decline of worker power, as measured by falling unionization rates, and the large-firm and industry wage premium, can account for the decrease in the wage share out of value added. Acemoglu and Johnson (2023) highlight the significance of countervailing power, and policy changes in determining the inequality effect of technological progress. After reviewing the long history of technology and prosperity, they argue that inclusive economic growth and shared prosperity alongside technological progress and automation were achieved only when there was a proper vision of technology, workers' countervailing power and government policies aimed at promoting shared prosperity. This suggests that the impact of technology on inequality depends on our collective effort, and it will continue to shape the future.

### III. How to Achieve Shared Prosperity with AI Development

#### 1. AI, Unemployment and Inequality

Some argue that AI is fundamentally different from previous automation technologies in terms of its scope and power, potentially rendering human labor obsolete (Susskind, 2020). AI has the ability to handle tacit knowledge and solve classification problems without following explicit rules (Autor, 2022). This means that AI could replace non-routine labor much more than before, such as white-collar workers in office settings. A survey by the Pew Research Center finds that in 2023, 52% of Americans feel more concerned than excited about AI, while only 10% are more excited.<sup>3)</sup> This sentiment is largely related to the negative impact of AI on unemployment and inequality.

There is a need for further research to examine the impact of AI on the labor market. One study reports that establishments whose occupational structure in 2010, the pre-AI period, made them suitable for AI increased job postings for workers with AI skills between 2010 and 2018 (Acemoglu et al., 2022). They also find that as these establishments adopted AI more extensively, they changed the mix of job skill requirements in non-AI positions, reducing hiring in non-AI positions moderately. However, the overall effect of AI at the aggregate occupation or industry level remains unclear. A more recent study by Goldman Sachs suggests that AI can replace about half of jobs in the US but only 7% of jobs are at significant risk, with more than half of their tasks being automatable (Hatzius et al., 2023). They argue that for most jobs, AI will serve as a complement, leading to higher productivity growth. In contrast, Hui et al. (2023) report that the negative impact of generative AI on white-collar jobs could be large. They find that copywriters and graphic designers on major online freelancing platforms experienced a significant drop in the number

of jobs they got and steeper declines in earnings within a few months of the launch of ChatGPT.

Still, there is significant uncertainty surrounding AI's impact. Although AI has the potential to replace human labor in many non-routine and higher-level decision-making tasks in the future there are currently limitations in this process, as Autor (2022) argues. It may take several decades for artificial general intelligence to emerge, reaching what is called the singularity. Humans will still have a comparative advantage in creativity, judgment, contextual thinking, emotional intelligence, and other areas. In the meantime, most skilled workers will likely continue to be complemented by AI, as more professionals are currently utilizing generative AI. AI's replacement of low-skilled service occupations will also be slow because automating these will require progress in low-cost robots capable of dexterous and adaptive interactions with people and the environment. Furthermore, new AI technologies can create new skill demands and job opportunities, such as 'prompt engineers' who guide ChatGPT to provide more correct answers.

However, the effect of AI on inequality can be a cause for concern. It is interesting that many recent studies report that recent developments in generative AI are more beneficial to lower-skilled workers in customer support service, writing tasks, law exams, software development, and even consulting work (Brynjolfsson et al., 2023; Noy and Zhang, 2023; Choi and Schwarcz, 2023; Peng et al., 2023; Dell'Acqua et al., 2023). This suggests that AI technology may play the role of an equalizer for income among workers in similar tasks. Nevertheless, there is still a possibility that inequality may rise between workers who know how to utilize AI and those who do not, as well as between workers threatened by AI and capitalists who own machines. If AI results in unemployment for some white-collar workers (Hui et al., 2023), albeit not too many, and they find jobs with lower wages and worse working conditions, the overall distributional effect of AI could be rather negative. Although the AI's impact on the quantity of jobs may be benign, its impact on the quality of jobs may not be. AI will change the set of jobs available and the skills they demand, presenting a challenge to unprepared workers. Consequently, what happened in the last 40 years—rising income inequality and the falling labor share—may occur on an even larger scale in the AI era.

## 2. AI and Prosperity for All

The coming era of AI raises a fundamental question: how can we maximize the benefits of AI while minimizing its risk, particularly the inequality effect? First, it is crucial to recognize that technological innovation, including AI, when left only to the market will not lead to shared prosperity. History has shown that a profit-driven capitalist logic, coupled with neoliberal economic policies that reduce government regulation and weaken worker power resulted in increased income and wealth inequality.

This is why many are now advocating for the need for complementary institutions and policy measures to achieve prosperity for all. For instance, more public investment in education and workforce training can enhance access to good jobs for workers and improve the quality of existing jobs. However, merely expanding education may not be sufficient, as we have witnessed a rise in inequality in the US despite more education in the recent period. What we need are institutional reforms and policies that protect and empower workers, and increase wages in line with rising productivity (Autor, 2022). Specifically, this entails enforcing labor standards more rigorously, enhancing the bargaining power of vulnerable workers by assisting them in organizing labor unions and engaging in collective bargaining, raising the minimum wage, and expanding the scope and scale of the unemployment insurance system. Moreover, a shift from shareholder capitalism, which prioritizes short-term profits at the expense of workers, to stakeholder capitalism will be desirable. The AI report by the White House also underscores the importance of simultaneously promoting innovation and protecting workers (White House, 2022). It presents a range of measures, including investments in training and job services, public investment to support AI initiatives that can complement workers, and effective regulation of platforms.

We should also actively influence innovation and the direction of technological progress to complement and augment human labor. Emerging industries, such as renewable energy, supported by government R&D and subsidies, have the potential to create new jobs that can offset the losses from automation. The process of automation by AI should be managed with care, too. Acemoglu and Restrepo (2019) emphasize the issue of excessive automation with so-so technology that does not yield substantial productivity gain. This happens when technological progress primarily leads to automation when labor markets are imperfect, resulting in a limited reinstatement effect. Several factors contribute to this, including the vision and business models of tech companies and government tax policies. Current AI technology often encourages firms to simply replace workers with capital without increasing productivity largely and considering the adverse effects of automation (Acemoglu, 2021). To address this, we should develop AI in a way that fosters the creation of new labor-intensive tasks and promotes productivity, rather than merely cutting labor costs in production, thereby increasing labor demand. For example, in education, AI can be harnessed to create new tasks and boost teacher productivity. This includes adapting teaching material to meet the diverse needs and attitudes of students in real time, enabling more individualized teaching (Acemoglu and Restrepo, 2020b). Similarly, AI applications in healthcare can personalize patient care and empower nurses and other practitioners to deliver more effective care. This kind of AI adoption could increase labor demand and productivity. The role of the government in providing public investment and R&D support is essential for facilitating this transformation.

Of course, all these changes depend fundamentally on political changes. Workers who

may face threats of AI should make concerted efforts to organize themselves and form alliances with civil groups to drive these political changes. Citizens should actively participate in the democratic process, electing politicians who support these transformations and influence policy-making. Scholars should engage in research and communicate their findings with citizens and policymakers, contributing to a vigorous debate about an alternative future. This can help establish a vision for technological progress that fosters shared prosperity. Finally, international cooperation is essential. We should collaborate globally to learn from successful experiences in managing automation in specific industries and through various policies and share these lessons worldwide. As argued by Acemoglu and Johnson (2023), a proper vision or ideology, workers' struggle for power, and institutional and policy changes are crucial components of achieving shared prosperity in the AI era.

#### IV. Conclusions

This paper discusses the impact of automation and AI technology on employment and inequality by examining various studies. Unlike the common concern about the robocalypse, it is unlikely that robots and AI will extensively replace human labor in the near future. Technological progress has consistently created new tasks and jobs in the past, and AI is expected to follow the same trend in the future though there are valid concerns to consider. However, its potential effect on inequality is a cause for serious concern, as demonstrated by the experience of the past few decades. Economists report that automation has played an important role in the rise of income inequality and the decline in the labor share, particularly during periods when the government reduced its role in the economy, and worker power diminished. Without institutional and political changes, the rapid development of AI technology may result in excessive automation, merely replacing human labor without generating substantial productivity gains, and exacerbating inequality.

Therefore, we argue that a more active role of the government is essential for achieving shared prosperity in the age of AI. This includes promoting public investment in education and training, as well as protecting and empowering workers. Specifically, it is crucial to steer the course of technological progress of AI in a direction that creates more tasks for human labor, with a significant reinstatement effect. How AI can contribute to shared prosperity and inclusive growth hinges on human efforts and the determination to bring about change of the current system. As Marx pointed out long ago, the issue is not machinery in itself but how capitalists use it. This observation holds for the current development of AI. Whether we can coexist harmoniously with machines and achieve shared prosperity for all in the AI era will depend on our collective efforts to reshape politics and create better institutions and policies.



## Notes

- 1) President Kennedy said reaching full employment at a time when machines are replacing men is the major domestic challenge of the Sixties. See Barestrup (1962).
- 2) This relationship was not observed before 1980, suggesting that the downward pressure on the wages of workers performing routine tasks is associated with technological advancements such as automation and computerization.
- 3) The share of concerned people increased from 38% and that of excited people fell from 15% in 2022 (Tyson and Kiuchi, 2023).
- 4) These tasks are also not very attractive to automation because personal attention and affection from another person is important.

## References

- Acemoglu, D. 2021. Harms of AI, NBER Working Paper, No. 29247.
- Acemoglu, D. and Johnson, S. 2023. *Power and Progress: Our Thousand-Year Struggle Over Technology and Progress*. PublicAffairs.
- Acemoglu, D. and Restrepo, P. 2019. Automation and New Tasks: How Technology Displaces and Reinstates Labor. *Journal of Economic Perspectives*, 33(2).
- Acemoglu, D. and Restrepo, P. 2020a. Robots and Jobs: Evidence from US Labor Markets. *Journal of Political Economy*, 128(6).
- Acemoglu, D. and Restrepo, P. 2020b. The Wrong Kind of AI? Artificial Intelligence and the Future of Labor Demand. *Cambridge Journal of Regions, Economy and Society*, 13(1).
- Acemoglu, D. and Restrepo, P. 2022. Tasks, Automation, and the Rise in U.S. Wage Inequality. *Econometrica*, 90(5).
- Acemoglu, D., Autor, D., Hazell, J., and Restrepo, P. 2022. AI and Jobs: Evidence from Online Vacancies. *Journal of Labor Economics*, 40(S1).
- Arntz, M., Gregory, T., and Zierahn, U. 2016. The risk of automation for jobs in OECD Countries: A comparative analysis. OECD Social, Employment and Migration Working Paper No. 189.
- Autor, D.H. 2013. The ‘Task Approach’ to Labor Markets: An Overview.” *Journal for Labour Market Research* 46(3).
- . 2015. Why Are There Still So Many Jobs? The History and Future of Workplace Automation. *Journal of Economic Perspectives*, 29(3): 3–30.
- . 2022. The labor Market Impacts of Technological Change: From Unbridled Enthusiasms to Qualified Optimism to Vast Uncertainty. NBER Working Paper, No. 30074.
- Autor, D., Chin, C., Salomons, A., and Seegmiller, B. 2022. New Frontiers: The Origin and Content of New Work, 1940–2018. NBER Working Paper, No. 30389.
- Böhm, M.J. 2020. The Price of Polarization: Estimating Task Prices under Routine-Biased Technical Change. *Quantitative Economics*, 11(2).
- Braestrup, P. 1962. President Ranks Automation Fist As Job Challenge. New York Times, 1962. 2. 15.
- Brynjolfsson, E., and McAfee, A. 2014. *The Second Machine Age: Work, progress, and Prosperity in a Time of Brilliant Technologies*. WW Norton & Company.
- Brynjolfsson, E., Li, D., and Raymond, L. R. 2023. Generative AI at Work. NBER Working Paper, No. 31161.
- Choi, J. H. and Schwarcz, D. 2023. AI Assistance in Legal Analysis: An Empirical Study. Minnesota Legal Studies Research Paper No. 23-22.

- Citibank. 2016. Technology at Work v2.0 The Future is not What It Used to Be. Citi GPS. Der Global Perspectives and Solution.
- Dell' Acqua, F. et al., 2023. Navigating the Jagged Technological Frontier: Field Experimental Evidence of the Effects of AI on Knowledge Worker Productivity and Quality. Working Paper 24-013. Harvard Business School.
- Frey C. B. and Osborne, M. A. 2013. The future of employment: How susceptible are jobs to computerization? Oxford Martin School, Oxford University.
- Goldin, C. and Katz, L. F. 2008. *The Race Between Education and Technology*. Harvard University Press.
- Goos, M., Manning, A., and Salomons, A. 2009. Job Polarization in Europe. *American Economic Review: Papers & Proceedings*, 99(2).
- Hatzius, J. et al., 2023. The Potentially Large Effects of Artificial Intelligence on Economic Growth. Goldman Sachs Economics Analyst.
- Hui, X., Reshef, O., and Zhou, L. 2023. The Short-Term Effects of Generative Artificial Intelligence on Employment: Evidence from an Online Labor Market. Mimeo.
- Karabarbounis, L., and Neiman, B. 2014. The Global Decline of the Labor Share. *Quarterly Journal of Economics*, 129(1).
- Kogan L., Papanikolaou D., Schmidt L. D., and Seegmiller B. 2021. Technology-skill complementarity and labor displacement: Evidence from linking two centuries of patents with occupations. NBER Working Paper, No. 29552.
- Nedelkoska, L. and Quintini, G. 2018. Automation, Skills Use and Training. OECD Social, Employment and Migration Working Paper, No.202.
- Noy, S. and Zhang, W. 2023. Experimental Evidence on the Productivity Effects of Generative Artificial Intelligence. Mimeo.
- Peng, S., Kalliamvakou, E., Cihon, P., and Demirer, M. 2023. The Impact of AI on Developer Productivity: Evidence from GitHub Copilot. Mimeo.
- Stansbury, A. and Summers, L. H. 2020. The Declining Worker Power Hypothesis: An Explanation for the Recent Evolution of the American Economy. Brookings Papers on Economic Activity, Spring 2020.
- Susskind, D. 2020. *A World Without Work: Technology, Automation, and How We Should Respond*. Metropolitan Books, New York, N. Y.
- Tyson, A. and Kikuchi, E. 2023. Growing public concern about the role of artificial intelligence in daily life. Pew Research Center.
- UNCTAD. 2017. Trade and Development Report 2017. Ch 3. Robots, Industrialization and Inclusive Growth. UNCTAD.
- White House. 2023. The Impact of Artificial Intelligence on the Future of Workforces in the European Union and the United States of America.
- World Bank. 2016. World Development Report 2016: Digital dividend. Washington DC, World Bank.