

# The Heterogeneous Effects of Artificial Intelligence on Labor Market Outcomes by Skill Level

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**Abstract**—Artificial intelligence (AI) is one of the most powerful technological advancements that determines the contemporary labor markets. Its quick spreading to industries has brought about significant issues concerning the change in employment opportunities, wages, and job structures. This paper examines the non-homogeneous impacts of AI on the labor market, including the variations among low-, medium-, and high-skilled workers. This paper utilizes a qualitative method of analysis based on recent empirical research, institutional reports, and theoretical frameworks. It discusses the impact of AI on labor markets in terms of automation of tasks, productivity, and restructuring of occupations. The results suggest that AI does not affect all workers in the same way. Routine jobs will be more prone to job displacement and wage pressure as a result of the automation of routine jobs among low-skilled workers. The medium-skilled workers experience job polarization and reduced demand in conventional jobs. High-skilled employees, in their turn, tend to be positively affected by AI in terms of productivity and new jobs, but their jobs are also evolving. The research paper concludes that AI is transforming instead of eradicating work, but its disproportionate impact threatens to increase inequality. Policies to address this need need to be effective, such as reforms in education and reskilling, so that the technological advancements can only work to the advantage of a larger group of the workforce.

**Keywords**—artificial intelligence, labor market, automation, skill levels, inequality

## I. INTRODUCTION

Artificial Intelligence (AI) is being introduced into the economy and is impacting the way work is structured and executed. The progress of machine learning, data analytics, and generative AI has increased the rate of technological change and enabled machines to do things that were once regarded as unique to humans (Eloundou, Manning, Mishkin, & Rock, 2023). In contrast to the previous periods of automation, when AI was mostly used to simplify and automate manual and routine labor, AI has already started to influence thinking and analysis activities (European Commission, 2022). This has increased the technological destabilization of more professions. According to the current literature, there are both opportunities and threats related to the adoption of AI. On the one hand, AI can lead to an increase in productivity and the establishment of new industries. Conversely, it also brings the issue of job displacement and wage differentiation, especially to workers whose work is easily automated (Acemoglu & Restrepo, 2020). Although there is a substantial body of literature, most of this work takes an aggregate approach to the labor market, providing little information on the impact of labor markets on various categories of workers.

This paper summarizes relevant literature, focusing on the effects of AI on employment, wages, and career change. This

research also discusses the disproportionate character of technological change. By analyzing the impact of AI on workers in different ways, the study can help provide a more detailed view of the transformation of the labor market due to AI and form the basis of more specific policy responses.

## II. BACKGROUND

### A. Conceptual and Empirical Framework of AI in Labor Markets

To comprehend the effects of artificial intelligence on labor markets, it is important to integrate conceptual knowledge with empirical research as opposed to discussing them as two distinct topics. In its essence, AI influences the labor markets with the alterations in labor tasks, skills requirements, and productivity that overall define the employment outcomes of various groups of workers.

A task-based approach is one of the most powerful approaches to comprehending this process. Restrepo and Acemoglu state that jobs consist of various tasks, and technological change is when machines replace certain tasks instead of whole jobs (Restrepo & Acemoglu, 2022). This view can be used to discuss why AI does not necessarily remove jobs, but instead, it reorganizes jobs within the organization. As an illustration, AI can automate regular elements of a job, leaving the rest, which is more intricate and needs more competency or judgment. The closest to this is the idea of skill-biased technological change. Autor believes that new technologies will benefit only employees with better education and flexibility, which will promote the demand for high-skilled labor and decrease the chances of those who do simple jobs (Autor, 2019). Nevertheless, this traditional perception is complicated by the emergence of AI. In contrast to the former technologies, which were primarily applied to manual or repetitive labor, AI is now coming to occupations that require analytical and cognitive work, which is increasingly impacting a broader scope of professions.

This change in scope is supported by empirical studies. Felten, Raj, and Seamans show that the extent to which a job is susceptible to AI is determined by the exposure of the job to activities that include prediction, classification, and data processing (Felten, Raj, & Seamans, 2021). This indicates that automation susceptibility depends not on position but on the type of activities behind the position. In the same vein, Webb demonstrates that AI-related innovations tend to be oriented to the high-skilled cognitive activities, which means that even the professions that were viewed as safe are not beyond change (Webb, 2020). The second concept's significance lies in the dual nature of AI as an alternative and a complement to human labor.

Although automation takes place, some tasks are improved. Noy and Zhang give evidence that AI can dramatically improve productivity in knowledge-based work, as it decreases the time required to complete tasks and increases their quality (Noy & Zhang, 2023). In this regard, AI does not necessarily displace workers but can also expand their abilities, especially when human capabilities and machine intelligence are used wisely. Meanwhile, the literature points out that these impacts are disproportionate. Acemoglu and Restrepo discovered that the use of automation technologies has the potential to decrease jobs and wages in areas with high routine job exposure (Acemoglu & Restrepo, 2020). Conversely, institutional theories like the OECD argue that the application of AI is introducing new patterns of labor market segregation, especially regarding skill needs and the quality of jobs (OECD, 2023). Gmyrek, Berg, and Bescond also focus on the fact that AI is most likely to change jobs by changing the composition of tasks but not abolishing them, moving the center of attention to adaptation and reskilling (Gmyrek, Berg, & Bescond, 2023). Collectively, these theoretical and empirical findings lead to a key conclusion, namely, the effects of AI on labor markets depend on the interplay between task organization and skills distributions. The workers are not influenced merely by their occupation, but also by the nature of the work that they do and their capacity to embrace technological change.

#### *B. Research and Implications Synthesis in Labor Market Outcomes.*

These views can be viewed holistically to create a more holistic perception of the impact of AI on the labor market. Instead of considering AI as a disruptive or a purely helpful tool, the literature indicates that AI can be viewed as working by three interdependent processes: displacement, transformation, and augmentation. The displacement effect is experienced when AI is used to replace tasks that were being done by human workers. This is the most pronounced in jobs that have routine components, as automation will lower the employment requirement. As Acemoglu and Restrepo assert, the further usage of automation technologies is linked to a reduction in employment and wages in the impacted industries (Acemoglu & Restrepo, 2020). Nevertheless, it is not always total displacement, but rather it is gradual as companies restructure the production procedures.

The transformation effect is the alteration in the composition of work. With AI replacing some of the tasks, the other tasks in a job tend to become more complicated or demand new skills. Autor emphasizes that this process leads to the polarization of the labor market, with the middle-skilled positions reducing, and the high and low-skilled jobs growing (Autor, 2019). This reorganization is an indication of the changing balance between routine and non-routine. The augmentation effect will reflect how AI will boost human productivity. As Noy and Zhang demonstrate, AI tools can enhance performance in such activities as writing and data analysis, which means that workers can create better outputs in a shorter period of time (Noy & Zhang, 2023). This impact is especially significant in professional jobs with a high level of skills, as AI strengthens, but does not eliminate human knowledge.

These three operations do not exist in isolation, but rather

they interact to give differentiated results in the labor market. Indicatively, one technology can replace some employees and, at the same time, enrich others. This broad effect is hence reliant on the allocation of duties and skills in the labor force. This combined perspective is supported by institutional reports. It is estimated by the World Economic Forum that technology implementation will result in both job creation and job displacement, which will cause the churn in the labor market to be enormous (World Economic Forum, 2023). On the same note, the European Commission asserts that AI can lead to productivity growth but at the same time worsen inequality in case the gains are not distributed equally (European Commission, 2022). These results indicate that the impacts of AI are not fixed but rely on the adoption and regulation of technology. Notably, this synthesis underscores the reason why the impacts of AI are dissimilar among different skills. Routine workers have more chances of being displaced, and non-routine or creative workers have more chances of augmentation. Simultaneously, reorganization of work generates opportunities for certain workers and narrows possibilities for others.

### III. DIFFERENTIAL IMPACTS OF AI ON LABOR MARKETS ACROSS SKILL LEVELS

#### *A. Low-Skilled Workers*

The effect of artificial intelligence on the low-skilled workforce is most pronounced in jobs with routine and repetitive work. These are jobs that are very vulnerable to automation since their operations can be codified into a predictable process. This can be easily demonstrated in the manufacturing sector. Acemoglu and Restrepo demonstrate that the implementation of industrial robots in American industry led to a significant drop in employment in the areas where automation was more prevalent, especially among workers who completed everyday production jobs (Acemoglu & Restrepo, 2020). Activities like the assembly line work, packing, and simple handling of machines have been augmented by automated alternatives.

The same trend can be noted in the retail and service sectors. The need to hire cashiers and stock clerks has been minimized by the mass adoption of self-checkout kiosks, automated kiosks, and inventory management systems. As an example, giant retailers gradually started implementing AI-powered checkout counters, which enable one worker to monitor several automated points. Although this will not completely wipe out the jobs, it will lower the number of employees needed in each store, and this will decrease the employment level gradually and not at once.

The wage implications of low-skilled workers are also important. Since the demand for routine labor is less, the workers are usually compelled to be in the competitive labor markets, and this puts pressure on wages downwards. Most of the displaced employees move to service jobs like cleaning, delivery, or other unskilled work. This shift is not only a change in jobs but also a deterioration in job quality in terms of job security and career advancement. Economic inequality is becoming more pronounced as a result of those changes. The low-skilled employees do not have access to training and education programs that could enable them to move to higher-skilled jobs. This exposes them to increased

long-term unemployment or underemployment. This is a cycle whereby technological change under-privileges the least-endowed people to make changes.

### *B. Medium-Skilled Workers*

The impact of AI on medium-skilled workers has been one of the most significant in terms of the structural changes that have occurred in particular jobs with the routine cognitive processes. A good example is in the clerical and administrative positions. Bookkeeping, payroll processing, and data entry are some of the jobs that are being increasingly automated by AI-driven software. In the case of accounting, machine learning algorithms are currently being applied to financial records in accounting platforms, eliminating mid-level accounting personnel.

According to Autor, this can be referred to as polarization of the labor market when the middle-skilled jobs are on the decrease and the high- and low-skilled jobs are on the rise (Autor, 2019). This hollows out the labor market, in which the traditional routes to secure middle-class jobs become less available. Employees in these positions have to make hard choices; either they must shift to less skilled positions or seek to develop new technical skills.

However, the experience of medium-skilled workers is not completely displaced. AI is a complement and not a substitute in certain industries. As an example of healthcare administration, AI systems help employees handle patient data, appointments, and insurance claims. Instead of destroying jobs, these technologies transform the content of work, making the employees concentrate on more complex or interpersonal work.

Flexibility is thus the major problem for medium-skilled workers. Individuals who can reskill and especially acquire digital and analytical skills can move into new hybrid jobs, which involve technical skills and human-oriented skills. The ones that do not manage to adjust, though, are going down the career ladder, and their salaries are not growing. The wider implication is a redesign of career routes. Stable middle-skill jobs are becoming less stable, making workers less certain and causing long-term changes in the labor market composition.

### *C. High-Skilled Workers*

The problem with artificial intelligence is that it is typically advantaged by high-skilled workers, and their experience is not a mere benefit, but an opportunity and a transformation. AI positively impacts productivity in most professional areas, with the implementation of routine aspects of complicated tasks. In the case of finance, AI is applied to predictive modeling to analyze large datasets, enabling an analyst to concentrate on the strategic decision-making process, instead of performing manual data processing.

Noy and Zhang show that employees who work with AI tools can accomplish their tasks faster and deliver superior outputs, which is the complementary nature of AI and skilled employees (Noy & Zhang, 2023). It has resulted in higher levels of specialization in fields like data science, machine learning, and software engineering. This has led to an overall increase in wages of well-skilled employees because of their value in the technology-based sectors.

Simultaneously, AI is starting to have an impact on activities that are traditionally linked to high-skilled

occupations. In law, such as in legal review and research, AI is also becoming popular in document analysis and legal research. AI-assisted diagnostic systems can help physicians interpret medical images in the healthcare industry. Eloundou et al. argue that there is a high rate of high-skilled jobs that are vulnerable to AI-based task transformation, meaning that no particular population is fully resistant to the technological change (Eloundou, Manning, Mishkin, & Rock, 2023). This forms a two-sided dynamic. On the one hand, AI provides more opportunities to high-skilled employees, raising productivity and offering new positions. Conversely, it increases the skill requirements and, therefore, constant learning is necessary. Employees not only should have high-level skills but also should be able to adapt to fast-changing technologies.

The long-term effect is the increasing division even among the high-skilled segment itself. Individuals with leading technical capabilities are the beneficiaries, while others are possibly unable to keep up with technological change. Such internal differentiation increases inequality in the workforce as well.

## IV. POLICY IMPLICATIONS

Using the interaction of task exposure and skill distribution, it is evident that AI delivers differentiated results among the groups of workers. This also indicates the need to take urgent policy actions.

The response to the challenge presented by AI must be a collaborative effort by the industry and the government. The employers are required to invest in the development of their workforce so that the employees can access training and chances to develop their skills. This is not just technical skills, but also critical thinking and social skills that are not as vulnerable to automation. Governments are very important in establishing an enabling environment. To restructure education systems, the focus should be on lifelong learning, and social policies should support workers in the transition stage. Negative impact of displacement can be addressed through targeted interventions, including reskilling programs and income support. It is also important that it is regulated. Bias and inequality risks can be minimized by ensuring that AI is implemented in an ethical and transparent way. The partnerships with the government can also contribute to the effectiveness of such efforts, as they can be used to align technology innovation and social objectives.

## V. CONCLUSION

This paper analyzes the impacts of artificial intelligence on labor market performance on various levels of skills. The results indicate that AI is not an undifferentiated force but rather one that creates disproportionate and sometimes opposing impacts. Displacement mostly affects low-skilled workers, but medium-skilled workers undergo changes in the structure of work, which threaten the conventional career paths. Though usually benefiting AI, high-skilled workers will have to constantly adapt to changing requirements. One of the most important things I have learned during this analysis is that AI does not completely eradicate work, but it only changes its essence. Distribution of tasks, the emergence of new roles, and changes in skills needs are experienced. This process brings opportunities and

challenges depending on the capacity of a person to adapt.

The limitations are not absent in the study. It does not use original empirical evidence but builds on the already existing literature, which could restrict the conclusions it is able to draw. And, on top of that, the speed of technological change is so high that one cannot be sure of any long-term results. Future studies ought to consider the dynamics in different regions and industries. It will be imperative to comprehend the contribution of institutions, education systems, and policy frameworks to the creation of more inclusive labor market outcomes. Finally, the effects of AI will be determined by the societal reaction to it. The benefits of AI can be used, and the risks can be reduced with wise policies and investment in the area of human capital. Otherwise, the technology can widen the existing disparities and introduce some new forms of economic segregation.

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