AI: Friend or Foe in the Workforce?

Economic Policy Seminar – Proposal for the Policy Paper

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1. Abstract

This policy paper explores the profound impact of artificial intelligence (AI) on the labor market, highlighting its transformative potential and associated risks. By drawing parallels from the Industrial Revolution to the present AI era, it offers a comprehensive examination of the short- and long-term effects of automation on employment. The analysis concludes that ChatGPT is expected to follow the historical path of technological revolutions, initially creating jobs but ultimately leading to significant job displacement. However, the magnitude of these effects remains unknown, underscoring the urgent need for governments and stakeholders to invest and take proactive measures to manage and understand these impacts.

2. Introduction

Artificial intelligence (AI) has emerged as a transformative force in the modern workforce, promising unprecedented efficiency and innovation while simultaneously raising concerns about job displacement and economic inequality. This dichotomy characterizes the numerous perspectives surrounding AI's impact on employment. On one hand, AI offers the potential to automate tasks traditionally performed by humans, thereby enhancing productivity and creating new job opportunities that require advanced skills. On the other hand, there is a fear that AI might render a significant portion of the workforce obsolete, particularly those in routine, manual, and low-skill jobs. Furthermore, there is an even more unsettling possibility that AI could replace high-skill jobs in sectors such as healthcare and education, if not entirely, then at least partially.

The economic implications of AI have been widely debated, with studies indicating both positive and negative outcomes. For instance, Frey and Osborne estimated that 47% of total U.S. employment is at risk of automation over the next two decades (Frey & Osborne, 2017). Similarly, the World Bank has suggested that developing countries could face an even higher risk, with up to 85% of jobs in Ethiopia being susceptible to automation. These figures underscore the potential for significant job displacement, particularly in sectors that rely heavily on routine tasks.

The recent development and widespread adoption of AI technologies like ChatGPT and its derivatives have further amplified these concerns. Over the past year, tools such as ChatGPT, which utilize advanced natural language processing capabilities, have demonstrated the potential to perform a wide range of tasks previously thought to be secure in the domain of

human workers. These include customer service interactions, legal document review, and basic medical consultations. Similarly, AIdriven content generation tools are transforming the landscape for writers and editors, raising questions about the future of creative professions.

Conversely, AI also holds the promise of creating new job categories that leverage human skills in ways that were previously unimaginable. Previous research argued that jobs requiring non-linear abstract thinking, such as critical thinking and creativity, are less likely to be automated (Josten & Lordan, 2022). This opens up opportunities for workers to transition into roles that involve managing and enhancing AI systems, highlighting the potential for AI to augment human labor rather than replace it entirely (Ernst et al., 2019).

However, the advent of ChatGPT in November 2022 highlights a crucial shift: the automation of complex, cognitive tasks that were previously considered safe from technological disruption. The past year has seen a surge in the application of AI in areas such as marketing, software development, and education. For instance, AI tools are now capable of writing code, analyzing vast amounts of data to generate marketing strategies, and even providing personalized tutoring and educational content. This rapid evolution signifies not only the broadening scope of AI's capabilities but also its increasing presence in high-skill jobs.

These developments illustrate the accelerating pace of AI integration into the workforce and underscore the urgent need to address the potential for both job creation and job displacement. As AI continues to advance, it is critical to consider how to harness its benefits while mitigating its risks, ensuring that the transition to an AIdriven economy is both inclusive and equitable.

By examining past transformations in the labor market, we aim to analyze and anticipate the probable effects of the current technological revolution driven by AI advancements, particularly the rise of ChatGPT and similar technologies.
In particular, this paper wants to emphasize the profound effect of ChatGPT on the economy. ChatGPT's effects can make every job that was once thought to be non-automatable actually subject to automation.

3. Background and Significance

History of Automation

The continuous evolution of automation technologies necessitates ongoing adaptation and policy responses to address the shifting labor market dynamics. Understanding the historical context of automation helps in framing current challenges and opportunities, guiding policymakers and stakeholders in implementing strategies that balance the benefits of technological advancements with the need to protect and prepare the workforce for future transformations (Graetz & Michaels, 2017; Josten & Lordan, 2022).

The history of automation dates back to the Industrial Revolution, which marked a significant transformation in manufacturing processes and labor dynamics. During the late 18th and early 19th centuries, the introduction of mechanized equipment, such as the steam engine, dramatically increased production capabilities and efficiency, leading to the displacement of many manual labor jobs. This period saw a shift from agrarian economies to industrial ones, fundamentally altering the nature of work and employment patterns. Machines began to perform tasks that were previously done by hand, resulting in widespread job displacement but also creating new opportunities for skilled labor and management positions (Mokyr et al., 2015). The automation wave during the Industrial Revolution set the stage for subsequent technological advancements and laid the groundwork for modern industrial practices (Josten & Lordan, 2022).

The mid-20th century witnessed the second wave of automation with the advent of computerization and the development of early robotics. This era introduced programmable machines and computers, further automating repetitive and precision tasks in manufacturing and other industries. Automation during this period was characterized by the implementation of numerical control (NC) and later computer numerical control (CNC) machines, which enhanced precision and productivity. The impact on the labor market was significant, with a notable decline in demand for certain types of manual labor while increasing the need for technical and maintenance skills to manage and operate new automated systems (Bessen, 2016; Josten & Lordan, 2022).

In the late 20th and early 21st centuries, the rise of digital technology and artificial intelligence (AI) marked the third wave of automation. This wave has been distinguished by the proliferation of sophisticated robots, machine learning algorithms, and AIdriven systems

capable of performing complex cognitive tasks. The scope of automation has expanded beyond manufacturing to sectors such as finance, healthcare, and customer service. AI and advanced robotics have automated tasks that involve data analysis, decision-making, and even creative problem-solving (Brynjolfsson & McAfee, 2014). As a result, there has been a significant impact on the labor market, with an increased polarization of job opportunities.

Chatgpt

In the rapidly evolving digital economy, ChatGPT stands as a transformative yet unsettling force, reshaping the landscape of business and industry at an unprecedented pace. Launched to both awe and apprehension, ChatGPT swiftly became the fastest-growing consumer application in history, amassing 100 million users within just two months. This meteoric rise has driven both admiration and concern. The economic impact is profound and multifaceted: streamlining operations, enhancing productivity, and driving innovation across sectors while simultaneously raising questions about the future of work and data security. By automating customer service, ChatGPT reduces operational costs, improves response times, and boosts customer satisfaction. Its advanced capabilities in data analysis and content generation empower businesses to make informed decisions, optimize processes, and stay competitive.

To place ChatGPT within the historical context of automation, it is essential to understand that, like the steam engines and programmable machines before it, ChatGPT represents a leap in how labor and tasks are conceptualized and executed. The first and second waves of automation brought mechanization into physical labor and routine manufacturing tasks. In contrast, ChatGPT's form of automation penetrates into domains traditionally considered to require human intellect, such as writing, customer service, and even coding.

Yet, this rapid integration into the fabric of commerce and everyday life poses unsettling questions. What will another year and a half bring?As we approach this AI-driven transformation, the future remains uncertain. ChatGPT's potential to drive growth and efficiency is undeniable, but so are the broader societal implications it brings. As we venture into this new era, finding a balance between leveraging AI's benefits and mitigating its risks will be crucial for ensuring a sustainable and equitable future.

4. Analysis of existing papers

Short-term Effects of Automation on the Labor Market

The introduction of automation typically leads to job creation and increased demand for certain skills. This phenomenon is often observed in the initial stages of technological adoption, where new roles emerge to support and manage the deployment of these technologies. For instance, the advent of automated systems in industries such as manufacturing and logistics has created a surge in demand for roles related to the installation, maintenance, and programming of these systems (Josten & Lordan, 2022).

Josten and Lordan's study highlights that during the early phase of automation, jobs involving high routine task intensity are most susceptible to automation. In the European Union, approximately 37% of jobs are classified as automatable, with higher risks in countries like Croatia (56.5%) and lower risks in Finland (20.7%) (Josten & Lordan, 2022). These jobs often include tasks that are repetitive and can be easily codified into algorithms, such as data entry, routine administrative tasks, and assembly line operations.

Additionally, the study points out that during this initial period, there is significant growth in occupations that complement the automation process. For example, the rise of automated machinery in manufacturing necessitates technicians and engineers who can manage and troubleshoot these complex systems. The increased use of AI in customer service has similarly led to the creation of roles focused on AI training, system monitoring, and data analysis (Josten & Lordan, 2022). This growth in demand for jobs related to automation technologies is reflected in the rise of tech-related occupations, which have grown by approximately 25% over the last decade (Acemoglu & Restrepo, 2018).

The implementation of automation technologies in manufacturing has led to significant short-term employment changes. In the United States, sectors with high automation adoption saw a 15% increase in labor productivity over a five-year period, which initially boosted employment in these sectors as companies expanded their operations to meet the growing demand (Acemoglu & Restrepo, 2018). This initial productivity surge correlates with employment growth in industries such as automotive and electronics, where automation has been heavily integrated (Acemoglu & Restrepo, 2019).

The introduction of AI and automated systems in industries like healthcare and retail has created immediate job opportunities. In healthcare, AI applications for diagnostics and patient management have necessitated roles for data analysts and AI system trainers (Ernst et al., 2019). Similarly, the deployment of automated customer service systems has led to increased demand for AI developers and support staff in the retail sector. A specific instance cited in

the paper involves the rapid adoption of AI in the financial services sector. The implementation of automated trading systems and customer service chatbots resulted in a 20% increase in tech-related jobs within the sector over a five-year period (Ernst et al., 2019, p. 7).

These short-term benefits are not uniformly distributed across all sectors or regions. The impact of automation can vary significantly depending on the specific industry and the level of technological adoption. For example, in countries with high labor costs, such as the U.S. and Germany, the adoption of automation has led to more pronounced short-term job creation in tech-intensive sectors. In contrast, in developing economies with lower labor costs, such as India and China, the introduction of automation has sometimes resulted in job displacement, particularly in sectors like textiles and agriculture where automation can replace low-skill, routine tasks more easily (Ramaswamy, 2018; Ernst et al., 2019).

For example, in Germany, the adoption of robots in manufacturing led to a short-term increase in employment in related sectors by approximately 1.5% annually from 1994 to 2008, as measured by output per hour worked (Acemoglu & Restrepo, 2019; Ramaswamy, 2018). In the U.S., the number of jobs related to technical support in the retail sector increased by approximately 5% annually following the widespread adoption of these automated systems, and that occupations such as software developers and data analysts have seen significant growth due to the increased adoption of machine learning (ML) and artificial intelligence (AI) (Frey & Osborne, 2017). This initial phase is characterized by high labor demand in tech-intensive roles, reflecting the need for skills that cannot be easily automated.

A vivid illustration of the short-term impact of automation is provided by the example of the U.S. automotive industry, where the deployment of over 150,000 robots between 2000 and 2015 initially led to an increase in productivity and a short-term boost in employment for roles that support these robots (Ramaswamy, 2018,).

Long-term Effects of Automation on the Labor Market

In the long term, the effects of automation on the labor market become more complex and multifaceted. Over time, as technologies mature and become more widespread, the initial boost in employment that often accompanies new technological adoption starts to wane, and job displacement becomes more prominent. This phase is marked by significant shifts in the

nature of jobs and a potential rise in unemployment for roles that cannot easily adapt to the new technological landscape.

Automation tends to compress wages by reducing the demand for low-skill jobs while increasing the demand for high-skill jobs that complement automated systems. This wage compression can heighten income inequality, as workers in low-skill, automatable roles face wage stagnation or decline, whereas those in high-skill, non-automatable roles see wage growth. Wage polarization has increased significantly over the past two decades, with high-skill jobs seeing a 20% wage increase, while wages for low-skill jobs have remained relatively flat (Acemoglu & Restrepo, 2018). In sectors like manufacturing and logistics, where routine tasks are prevalent, wage growth for middle-skill jobs has stagnated, with real wages growing by only 2% over the last two decades, compared to 15% for high-skill jobs (Acemoglu & Restrepo, 2019). In the EU, wages for high-skill tech jobs have increased by 10% annually, while wages for routine, low-skill jobs have remained stagnant or declined over the same period (Ramaswamy, 2018).

Furthermore, the wage gap between high-skill and low-skill jobs has widened significantly over the past two decades, with high-skill jobs seeing a 25% increase in real wages, while wages for low-skill jobs have remained largely stagnant (Frey & Osborne, 2017).

Moreover, while automation has traditionally impacted low to middle-skill jobs, advancements in AI and machine learning are increasingly threatening high-skill occupations. This includes roles in sectors like healthcare, legal services, and creative industries, where AI can now perform tasks once considered uniquely human (Acemoglu & Restrepo, 2018).

Acemoglu and Restrepo's (2018) task-based framework illustrates how long-term automation leads to a "displacement effect," where machines take over tasks previously performed by human workers. Additionally, they discuss the "reinstatement effect," where new technologies create new tasks that humans are better suited to perform, thus increasing labor demand in these areas. However, the rate of job creation through new tasks has been slower than the rate of job displacement, leading to a net decline in labor demand in sectors experiencing rapid automation (Acemoglu & Restrepo, 2018, p. 22). A clear example, in the U.S. manufacturing sector, is the introduction of automation has been linked to a 30% decline in employment over the past two decades, as machines have increasingly performed tasks such as assembly line work and quality control (Ramaswamy, 2018).

Another important illustration, in the transportation sector, is the adoption of autonomous vehicles is expected to reduce the demand for drivers significantly. The paper predicts a potential reduction of up to 70% in the employment of truck and taxi drivers over the next two decades (Frey & Osborne, 2017).

The historical patterns seen in the textile, steel, and automotive industries exemplify this inverted U-shape trajectory of employment. For example, the broadwoven textile industry in the U.S. saw over 300,000 workers employed in 1958, but this number plummeted to 16,000 by 2011 due to technological advancements and shifting demand (Bessen, 2019). Similarly, the introduction of tractors and combine harvesters initially created industrial jobs but eventually reduced the number of agricultural workers significantly (Rasmussen, 1982; Olmstead & Rhode, 2001). This pattern underscores the importance of understanding demand elasticity and the task content of production. Policymakers must consider these factors when designing interventions to mitigate the adverse impacts of automation and AI on the workforce. Ensuring a balanced approach that fosters technological innovation while also creating new employment opportunities is essential to sustain long-term economic growth and labor market stability.

As automation technologies become more advanced and widespread, their ability to substitute human labor grows, leading to potential job displacement and changes in the nature of work. This trend is concerning because it suggests that even targeted government spending may not be sufficient to counteract the job losses induced by rapid automation in these sectors. The differentiated impact on various demographic groups was also discussed: low-skill jobs and employment among women are particularly affected. For example, the study found that in sectors where women are highly involved in routine tasks, such as administration and manufacturing, the employment multiplier is significantly lower in the presence of automation (Ebeke & Eklou, 2023). This aligns with findings from other studies indicating that women and low-skill workers are more vulnerale to job losses due to automation (Brussevich et al., 2018; Hegewisch et al., 2019).

Impact of ChatGPT on Various Occupations

The study of Zarifhonarvar closely examines the impact of generative AI, particularly ChatGPT, on the labor market. The authors employ a text-mining approach on the International Standard Classification of Occupations (ISCO) database to identify how

susceptible various job tasks are to disruption by AI. The study categorizes the potential impact into three levels: full impact, partial impact, and no impact (Zarifhonarvar, 2024).

A "full impact" implies that the tasks associated with a job can be entirely automated by AI. For example, occupations such as data entry clerks, customer service representatives, and technical writers might fall into this category. These jobs involve routine and repetitive tasks that AI can perform efficiently without human intervention.

A "partial impact" suggests that AI can automate some, but not all, tasks associated with a job. This means that while certain aspects of the job can be handled by AI, human intervention is still necessary for more complex, creative, or interpersonal tasks. For instance, paralegals and legal assistants may experience partial impact, as AI can assist with legal research and document drafting, but human judgment and interaction are required for case-specific insights and client communication.

"No impact" indicates that the tasks associated with a job are not easily automated by AI, often because they require a high level of human interaction, creativity, or physical presence. Jobs such as elementary school teachers, mental health counselors, and skilled trades like electricians are examples where AI has limited applicability due to the need for personal interaction, manual dexterity, and contextual understanding.

The findings of the study indicate that 32.8% of occupations could be fully impacted by ChatGPT, 36.5% might experience a partial impact, and 30.7% are likely to remain unaffected. This comprehensive categorization helps understand the varying degrees of AI's potential disruption across different job roles and sectors (Zarifhonarvar, 2024).

The research relies heavily on text mining to analyze job descriptions and determine susceptibility to AI disruption. This approach may be criticized for its inability to capture the nuanced and contextual nature of job tasks and skills. Text mining, by its nature, focuses on keywords and phrases found in job descriptions. However, it may overlook important subtleties such as the context in which tasks are performed, the level of human interaction required, and the importance of creativity and judgment. For instance, a job description might list "data analysis" as a task, but text mining might fail to recognize that this task involves significant human judgment and decision-making that cannot be easily automated. Similarly, roles that require high levels of interpersonal interaction, such as customer service or teaching, involve nuances that go beyond the mere tasks listed in job descriptions. Therefore,

relying solely on text mining might result in an incomplete and potentially misleading understanding of which jobs are truly susceptible to AI disruption.

Consequently, the percentages and numbers derived from the study cannot be considered entirely accurate; they could be either smaller or larger than reported. Nevertheless, it is noteworthy that this research, published merely one year after the advent of ChatGPT, suggests that 32.8% of jobs are considered to be fully replaceable by AI. This finding underscores the urgency of understanding the potential magnitude of ChatGPT's impact on the labor market.

5. Automation and Chatgpt

As we have analyzed the short and long term effects on the labor market, we went through various papers that discussed different types of automation: some focused on robots, others on machines that replace assembly lines, and some, despite being published before the advent of chatgpt and its derivatives, also explore the concepts of artificial intelligence and machine learning. Notably, while ChatGPT was only introduced in November 2022, the concept of AI has been familiar for a long time. These technologies initially targeted routine, repetitive tasks. However, with the advancement of AI and ML, the scope of automation has expanded significantly. Frey and Osborne's seminal work highlights the substantial technological advancements in AI, particularly in ML, which includes data mining, machine vision, and computational statistics. These advancements have shifted AI's role from handling routine tasks to tackling more complex, non-routine tasks.

For example, tasks that once seemed insurmountable for automation, such as navigating a car through traffic or deciphering handwriting, are now becoming achievable through AI. The applications of AI extend across various sectors. In finance, AI outperforms human capabilities in stock picking and providing personalized financial advice by processing large volumes of data rapidly and making unbiased decisions. In education, AI-driven tools like Massive Open Online Courses (MOOCs) and interactive tutors utilize big data to tailor teaching and assessment strategies to individual students' needs. These applications underscore AI's potential to automate complex cognitive tasks, including those requiring creative and social intelligence. Tasks that can be well-defined and codified are most susceptible to automation. Conversely, jobs requiring high levels of creativity, social intelligence, and complex perception and manipulation are less likely to be automated in the

near future. AI's ability to perform these tasks depends on overcoming substantial engineering challenges (Frey & Osborne, 2017).

Now, seven years later, many of these significant engineering problems have been addressed, enabling AI to accomplish far more than it could back then. For instance, AI algorithms can now analyze medical images and patient data to diagnose conditions like cancer, outperforming human radiologists in some cases. Tools like ChatGPT can engage in sophisticated conversations, generate coherent text, and provide customer support, replacing or augmenting roles traditionally filled by human agents. Additionally, companies like Tesla and Waymo have developed AI systems that can navigate and drive vehicles with minimal human intervention, making significant strides in self-driving technology.

AI systems also excel in financial analysis, where they can analyze market trends, predict stock movements, and provide financial advice, performing tasks that once required teams of financial analysts. In the realm of content creation, AI can generate music, artwork, and written content, aiding or replacing human creators in various industries. Furthermore, AI optimizes logistics and supply chain operations by predicting demand, managing inventory, and reducing waste, roles typically handled by logistics managers.

Some may argue that comparing AI technologies like ChatGPT to the Industrial Revolution is not entirely fair. During the Industrial Revolution, machines were created explicitly to replace human beings on the assembly line, whereas AI is often developed with the intention of assisting rather than replacing us. However, there is a clear path of technological evolution that suggests new technologies often extend beyond their initial purposes.

For example, computers were originally designed to facilitate writing and calculations. They were not intended to serve as comprehensive sources of knowledge or to replace human roles in teaching and advisory capacities. Yet today, computers and the internet provide vast amounts of information and have transformed education, librarians, secretaries, administrative assistants, and many more.

Similarly, the development of cell phones was initially aimed at enabling mobile communication. Over time, however, cell phones have evolved into smartphones, which now serve as powerful tools for internet browsing, photography, navigation, and even health monitoring. They have reshaped how we communicate, access information, and manage our daily lives.

Consider the advancements in GPS technology. Originally designed for military navigation, GPS is now integral to civilian applications, from driving directions to location-based services in various apps. The technology has revolutionized transportation, logistics, and even personal fitness tracking.

Voice recognition technology, initially developed for basic command recognition, has now evolved into sophisticated virtual assistants like Siri and Alexa. These assistants manage smart home devices, provide real-time information, and perform tasks that previously required human intervention.

These examples illustrate that while new technologies are often developed with specific intentions, their applications and impacts can extend far beyond initial expectations. This is why we believe that ChatGPT will impact the labor market as all previous technological advancements have. As we analyzed the effects of past technological revolutions in both the short and long run, we observed a similar pattern: there is often a boost in employment in the short term, but in the long run, we see job displacement. Therefore, this analysis could drive us to think that ChatGPT will follow the same path.

However, following the same path does not imply that the magnitude of this technological innovation's impact will be identical to previous ones: we believe that while the trajectory will be similar, the magnitude of the effect will be much larger, and the rate of job displacement will be higher than before. The reason for this is that as we delve deeper into technological advancements, the pace of innovation accelerates, and AI technologies like ChatGPT are becoming more refined and can now perform a wider range of complicated activities.This rapid advancement means that AI can automate a broader range of job functions faster compared to past technologies, leading to a more pronounced and swift impact on the labor market.

Moreover, the integration of AI is happening across a wider array of industries simultaneously, further amplifying its effects. This convergence of advanced AI capabilities and widespread adoption suggests that the economic and employment landscape will undergo more significant and rapid changes than those seen during previous technological revolutions. Therefore, it is crucial for governments and policymakers to proactively address these challenges by implementing strategies to protect workers, promote continuous learning, and guide the responsible development and deployment of AI technologies.

6. Conclusion & Policy Recommendations

To effectively understand and manage the magnitude of ChatGPT's impact on the labor market, policymakers must adopt a comprehensive and proactive approach. Firstly, it is essential to establish a robust framework for continuous learning and reskilling. Governments should invest in educational programs that focus on digital literacy, AI fundamentals, and advanced technological skills. This investment should include partnerships with educational institutions and private sector stakeholders to ensure that the workforce remains adaptable and skilled in the face of rapid technological change.

Despite the rapid integration of AI into various sectors, a significant portion of the population remains unaware of AI's true capabilities and implications. According to a Pew Research Center survey, only 30% of U.S. adults can correctly identify all common uses of AI, highlighting a general lack of understanding about the technology (Kennedy et al., 2023). This gap in knowledge underscores the importance of public education and awareness initiatives to help people understand the potential and limitations of AI technologies like ChatGPT.

Supportive policies are crucial to encourage the development and adoption of AI technologies while ensuring their ethical and responsible use. Regulatory frameworks must be put in place to govern AI applications, particularly in sensitive areas such as healthcare, finance, and law enforcement. These regulations should aim to prevent misuse, protect privacy and individual rights, and foster innovation.

Strengthening social safety nets is necessary to support workers displaced by AI. This includes enhancing unemployment benefits, providing job placement services, and offering career counseling. Additionally, introducing a universal basic income (UBI) could be considered to ensure a minimum standard of living for all citizens, thereby reducing the immediate economic impact of job displacement.

Promoting job creation in sectors less susceptible to automation is imperative. Governments can incentivize industries that require high degrees of human creativity, social interaction, and complex problem-solving, such as healthcare, education, and the creative arts. Investment in these sectors can create new employment opportunities and absorb workers displaced from more automation-prone industries.

Collaboration between public and private sectors is vital for monitoring and researching the ongoing effects of AI on the labor market. Establishing dedicated research institutes to study the impact of AI technologies and develop adaptive strategies can provide valuable insights to inform policy decisions. These institutes can also facilitate international cooperation, ensuring the sharing of best practices and successful policies globally.

Fostering a culture of innovation and entrepreneurship can help mitigate AI's adverse effects on employment. Providing grants, tax incentives, and supportive infrastructure for startups and small businesses can stimulate economic growth and job creation. Encouraging entrepreneurial ventures in AI and technology can lead to the development of new industries and job opportunities previously unimaginable.

References List

Acemoglu, D., & Restrepo, P. (2018). *Artificial intelligence, automation, and work.* NBER Working Paper No. 24196. National Bureau of Economic Research. http://www.nber.org/papers/w24196

Acemoglu, D., & Restrepo, P. (2019). *Automation and new tasks: How technology displaces and reinstates labor.* Journal of Economic Perspectives, 33*(2), 330. https://doi.org/10.1257/jep.33.2.3

Bessen, J. E. (2016). *Learning by doing: The real connection between innovation, wages, and wealth.* Yale University Press. https://doi-org.ezprimo1.runi.ac.il/10.12987/9780300213645

Bessen, J. E. (2019). *AI and jobs: The role of demand.* NBER Working Paper No. 24235. National Bureau of Economic Research. //www.nber.org/papers/w24235

Brynjolfsson, E., & McAfee, A. (2014). *The second machine age: Work, progress, and prosperity in a time of brilliant technologies*. W.W. Norton & Company.

Ernst, E., Merola, R., & Samaan, D. (2019). *The economics of artificial intelligence: Implications for the future of work*. IZA Journal of Labor Policy, 9(4). https://doi.org/10.2478/izajolp20190004

Frey, C. B., & Osborne, M. A. (2017). *The future of employment: How susceptible are jobs to computerisation?* Technological Forecasting and Social Change, 114, 254280. https://doi.org/10.1016/j.techfore.2016.08.019

Goldin, C., & Katz, L. F. (2008). *The race between education and technology*. Harvard University Press. https://www.taylorfrancis.com/chapters/edit/10.4324/9780429499821-10/race-education-technology-claudia-goldin-lawrence-katz

Graetz, G., & Michaels, G. (2017). *Robots at work*. Review of Economics and Statistics, 99*(5), 753768. https://doi.org/10.1162/rest_a_00754

Javaid, M., Haleem, A., & Singh, R. P. (2023). *A study on ChatGPT for Industry 4.0: Background, potentials, challenges, and eventualities.* Journal of Economy and Technology, 1(1), 127143. https://doi.org/10.1016/j.ject.2023.08.001.

Josten, C., & Lordan, G. (2022). *Work, worklessness, and the political economy of health inequalities.* Journal of Economic Literature, 60(4), 9951068. https://doi.org/10.1371/journal.pone.0266326

Kennedy, B., Tyson, A., & Saks, E. (2023, February 15). *Public Awareness of Artificial Intelligence in Everyday Activities*. Pew Research Center Science & Society. https://www.pewresearch.org/science/2023/02/15/public-awareness-of-artificial-intelligence-in-everyday-activities/

Lin, C. (2011). *The impact of information technology on the employment of skilled workers.* Journal of Labor Economics, 29(3), 110127. https://doi.org/10.1016/j.ject.2023.08.001.

Mokyr, J., Vickers, C., & Ziebarth, N. L. (2015). *The history of technological anxiety and the future of economic growth: Is this time different?*. Journal of Economic Perspectives, 29(3), 3150.https://doi.org/10.1257/jep.29.3.31

Olmstead, A. L., & Rhode, P. W. (2001). *Reshaping the landscape: The impact and diffusion of the tractor in American agriculture*, 19101960. The Journal of Economic History, 61(3), 663698. https://doi.org/10.1017/S0022050701030042

Rasmussen, W. D. (1982). *The mechanization of agriculture*. Scientific American, 247(3), 7689. http://www.jstor.org/stable/24966681

Zarifhonarvar, A. (2024). *Economics of ChatGPT: A labor market view on the occupational impact of artificial intelligence.* Journal of Electronic Business & Digital Economics, 3(2), 100116. https://doi.org/10.1108/JEBDE1020230021