AI in the Global Economy

Independent Research Study



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Independent Research Project

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1) Introduction

There have been a few major industrial revolutions in the past, all which drastically impacted the way that the world functioned, from simple interactions between two firms to the state of the global economy. Artificial Intelligence (AI), in the broadest terms, can be defined as the intelligence and learning capabilities displayed by machines, particularly modern computer systems. Similar to previous industrial revolutions—the steam engine in the 18th century, electricity in the 19th century, and the internet in the late 20th century—AI is projected to transform industries and redefine the state of the global economy. Each of these technological leaps known as industrial revolutions drastically improved productivity, spurred economic growth, and were associated with job displacement, amongst other characteristics, and AI is expected to follow this trajectory.

2) Objectives of the Paper

The research paper aims to explore the role of Artificial Intelligence in the global economy. Though this is a very broad topic, this paper will dive into multiple specific parts of the global economy individually, and conclude with a holistic analysis of AI on the global economy based on the analysis of certain key sectors. Key areas of focus include AI's influence on the global economy as a whole, and specific sectors like business, finance, developmental economics, government regulation on AI, and the overall future of the economy with AI.

This paper will examine both the positive and negative impacts of AI, exploring how AI is driving economic growth, improving efficiency, and fostering innovation, while also considering the challenges related to job displacement, regulatory needs, and ethical considerations. Through detailed case studies and sector-specific analyses, the research will highlight the strategies being used to integrate AI into various economic sectors and assess the future implications of AI on the global economy. The paper will conclude with a holistic evaluation of AI's overall effect on the global economy, providing insights into the long-term economic transformations driven by AI technology.

3) AI in the Global Economy

3.1) Maco and Micro Effects

Artificial Intelligence is profoundly shaping the global economy, having great influence on both a microeconomic and macroeconomic level. At the macroeconomic level, AI's potential to significantly boost productivity is becoming evident through increased automation and efficiency in various sectors. AI-related technologies, such as machine learning and robotics, have already begun to contribute to productivity growth in significant ways. "AI and robotics have the potential to increase productivity growth but may have mixed effects on labor, particularly in the short run" (Furman, Seamans, 2019). At the microeconomic level, the impact of AI is particularly noticeable within individual firms and industries. Companies that successfully integrate AI into their operations can achieve significant productivity and efficiency gains, reduce operational costs, and create more innovative products and services.

AI could also play a crucial role in reversing the trend of plateauing economic growth in advanced and highly developed countries by driving up innovation and productivity. However, the benefits of AI will not be evenly distributed, with some sectors and regions potentially lagging behind. Targeted policies are needed to ensure that the economic gains from AI are distributed broadly, preventing the worsening of existing inequalities. It is extremely important to implement policies that can "boost productivity growth while also mitigating any labor market downsides," such as expanded antitrust enforcement and strategies like universal basic income to address potential unemployment (Furman, Seamans, 2019).

3.2) The Duality of AI in the Global Economy

AI-driven automation however, is leading to a dual effect: on one hand, it creates new job opportunities, particularly in development sectors, due to the demand for new skills required to implement, and maintain AI technologies. On the other hand, it creates job displacement in sectors due to AI's ease of automation in tasks and jobs that are more menial and repetitive. This displacement is particularly common and concerning in industries where tasks can be easily automated, such as manufacturing and certain service sectors (Ernst, Merola, Samaan, 2019).

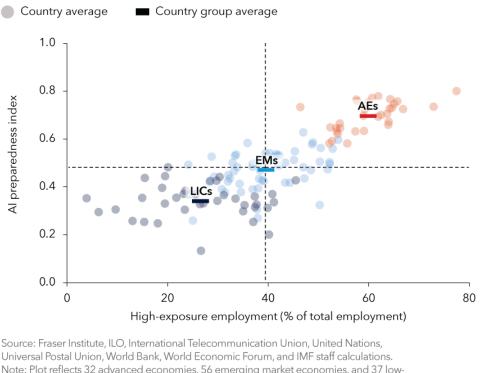
Firms with the resources to invest in AI technologies are likely to implement AI more efficiently, creating a competitive advantage that could widen the gap between large, resource-rich companies and smaller firms struggling to keep up. This dynamic could lead to increased market inequality in certain industries, where a few firms dominate due to their advanced AI capabilities, and other firms without these resources would be left in the dust (Ernst, Merola, Samaan, 2019).

Figure 1)

Advanced-economy advantage

Wealthier countries often are better equipped for Al adoption.

Al Preparedness Index and employment share in high-exposure occupations



Note: Plot reflects 32 advanced economies, 56 emerging market economies, and 37 lowincome countries. Dotted reference lines are derived from AI Preparedness Index median values and high-exposure employment.

IMF

Figure 1 depicts this idea, but on a broader scale with countries instead of firms. Wealthier countries are generally better equipped for AI adoption, as indicated by their higher positions on the AI Preparedness Index. Advanced economies (AEs) are clustered in the upper-right section of the chart, showcasing a high share of their employment in high-exposure employment. This leads one to believe that these more advanced

economies with more resources and their firms are more likely to benefit from AI's advancements and much faster. In contrast, low-income countries (LICs) and emerging markets (EMs) are positioned lower on the preparedness index, indicating they may struggle to keep up with the more advanced economies, contributing to more global inequality.

The impacts of job displacement due to AI also extend to changes in wage structures and labor dynamics in the global economy. A specific example of this is how AI tends to favor high-skilled workers who can adapt to new technologies and learn new skills, leading to a sort of polarization in the labor market. This basically means that high-skilled workers may see wage increases due to the increased demand for their abilities, while low-skilled workers may face a steady decline in wages or job loss (Ernst, Merola, Samaan, 2019). The creation of new tasks and roles, such as data analysis, AI system management, and machine learning model training, to name a few, shifts the demand for different and new skill sets, fanning the flames of wage disparity.

While some jobs are at risk of being displaced by AI automation, new opportunities and entire sectors are being created by the same hand. The introduction of AI can lead to "labor market upheaval" in certain industries, while simultaneously driving up demand for new skills and job roles in others (Furman, Seamans, 2019). This sentence basically outlines the duality of AI in the global economy. This change emphasizes the need for a reevaluation of current labor policies and education systems to better prepare the next generation and current global workforce for the skills and experiences required to manage with the rise of AI in the global economy. Without appropriate policy and regulation implementations, such as retraining programs and altered education initiatives, the economic gains from AI could lead to greater inequality rather than broad economic benefits (Ernst, Merola, Samaan, 2019).

3.3) Generative AI

While AI is a broad spectrum of machine learning applications such as the technology powering our phones and self driving cars, generative AI, with the most commonly known form nowadays being ChaptGPT, is a different application of AI that has changed the way people can do just about any task. Generative AI is proving to be a powerful force that drastically increases productivity, and could significantly boost economic growth across all sectors of the global economy.

According to the 2023 McKinsey & Company report, generative AI has the potential to contribute between \$2.6 trillion and \$4.4 trillion annually to the global economy. This immense global impact is expected across multiple sectors, including customer operations, marketing and sales, software engineering, and product research and development (McKinsey & Company, 2023). AI's ability to automate and optimize tasks that were previously thought to be the only performed at a professional evel by trained human intelligence such as coding, copywriting, note-taking and endless more tasks marks a new era of productivity for the global economy.

One of the main points discussed in the report is how generative AI can transform industries by streamlining operations, reducing costs, and increasing efficiency. One of the case studies discussed is in customer operations, where generative AI can automate complex service interactions that would previously require a person on the other side of the screen, leading to faster resolution times and improved customer satisfaction (McKinsey & Company, 2023). Similarly, in marketing and sales, AI-driven tools can create personalized content, such as the algorithms used by Spotify, Tiktok and Youtube, enhancing engagement and driving higher conversion rates.

Generative AI also has the potential to drive productivity in more technical fields, such as software engineering and product R&D. Through generative AI's advanced ability in code generation, debugging, and other routine tasks, generative AI allows software engineers to focus on more strategic and value-added activities (McKinsey & Company, 2023). This shift not only boosts productivity across all these industries and jobs but also accelerates the pace of innovation, as the development process is now much faster and costs less money.

However, there are also challenges associated with the widespread adoption of generative AI, including the need for upskilling the workforce, managing the ethical implications of AI-generated content, and ensuring that the economic benefits are distributed equitably. Like with the effects of AI in general in the global economy, well thought out and efficient policy needs to be implemented to ensure that generative AI can be used to its fullest potential.

4) AI in a Business Setting

4.1) Effects on Productivity

AI-driven technologies significantly boost productivity by automating tasks that were traditionally thought to be labor-intensive. This automation often leads to gains in efficiency and productivity, for example, in the manufacturing sector. AI technologies have enabled the automation of production lines, such as those that assemble cars, resulting in faster production times, eliminate human error, and a more consistent quality of final product. Similarly, in the service and public relations sector, AI applications such as chatbots and AI customer service systems, have drastically increased business operations productivity, enabling businesses to handle larger volumes of customer interactions with greater consistency and efficiency (Cao, 2020).

This increase in productivity and efficiency applies not just to automating repetitive tasks but also enhancing complex processes like logistics management, product development, and supply chain optimization (Ernst, Merola, Samaan, 2019). Al-driven tools like AI supply-chain management databases can process large amounts of data in real-time.

The Cao Finance paper discusses a case study about the use of AI in predictive analytics, which is used in finance to assess credit risks but can also be applied in other sectors like supply chain management to forecast consumer behavior, improve inventory management, and personalize marketing strategies. These AI-driven processes not only enhance productivity but also contribute to the creation of new skills and positions which depend on reading this data and acting on AI-generated insights.

4.2) Effects on Employment

In terms of employment, the analysis in the Cao Finance Paper reveals that AI has the potential to both create and displace jobs in almost all subsectors of business. While AI can automate simple tasks and assist with more complex ones, it can also create new opportunities in areas that require new and more developed skills, such as AI system management, data analysis, and cybersecurity (Cao, 2020). "Job polarization," as discussed in a previous section of the paper, is one of the effects of AI on employment in the global economy. Specifically in the business sector, this phenomenon should be

addressed through significant reskilling and upskilling of the workforce (Ernst, Merola, Samaan, 2019). This means that businesses need to invest in education and training programs for their current employees to be able to get the most out of them and the AI technologies in the global economy. Thi will also allow their new employees to be trained in much more depth with AI specific positions and skills.

One of the case studies discussed in the paper "Economics of Artificial Intelligence: Implications for the Future of Work", by Ekkehardt Ernst, Rossana Merola and Daniel Samaan is in regards to employment, specifically the impact of AI on the banking industry. With the introduction of AI powered ATMs, there were initial concerns about job losses. In the short term, these ATMs replaced the position of traditional bank tellers, indeed leading to job displacement by these positions getting automated. In the long term however, through the deployment of these AI powered ATMs, bank employment actually increased as the cost savings from automation allowed banks to open more branches, creating new roles focused on customer service and sales, instead of traditional bank tellers. This example illustrates how AI-driven automation can lead to job creation in certain sectors, even as it displaces jobs in others.

4.3) Balancing Productivity Gains with Employment Concerns

Both papers discussed in this section discuss the importance of balancing the productivity gains brought about by AI with the potential risks of job displacement. They both suggest that businesses need to proactively address these challenges by creating strategies that not only leverage AI for operational improvements such as productivity and efficiency gains, but also need to make sure that their workforce is well prepared for the changes. This includes investing in education and training programs that equip new, current and future employees with the skills needed to operate and understand these AI driven tools and technologies. Without such policies, the benefits of AI-driven productivity gains are being and will continue to be offset by the social costs of increased unemployment and income inequality.

5) AI in Finance

Longbing Cao's paper, "AI in Finance: A Review" is a detailed summary of the transformative effects of AI on various aspects of the financial sector, past, present, and future. In this section I will discuss that analysis in multiple different parts.

5.1) Classic Research on AI in Finance

The Cao Finance Review outlines some past and foundational studies that have contributed to the development of modern AI applications in the financial sector. This research primarily focused on early computational models that aimed to simulate and enhance financial decision-making processes (Cao, 2020). For example, classic AI methods such as mathematical and statistical modeling, and quantitative analysis were heavily employed and relied on to understand early financial systems and the way the markets moved. These methods were applied to and led to the development of tasks like financial market analysis and forecasting, agent-based modeling of economic systems, and intelligent investment optimization (Cao, 2020).

These early studies and methods of understanding the financial markets built a crucial base for understanding complex financial systems and laid the groundwork for more sophisticated AI applications in the financial sector, such as "modeling financial system characteristics; macro, meso and micro indicators and variables; interactions, information and influence propagation and effect" (Cao, 2020).

5.2) Modern Research on AI in Finance

The Cao Finance Review also discusses advancements in AI that have transformed the financial sector in recent years. This modern research talks about recent advancements such as machine learning, which is used to create the advanced and adaptive financial systems that we use today.

Modern AI research has expanded into areas such as Fintech-based finance, global and cross-market analysis, and smart blockchain technologies applied in financial settings. For instance, in global and cross-market analysis, AI is implemented to "model relations, interactions, and influence between financial markets, regions, countries, and financial indicators" (Cao, 2020). The implementation of these more modern AI developments in finance not only reflects the growing complexity of financial markets,

but also the growing power and adaptability of AI technologies to be applied in such settings and define the course for the future of financial technology.

5.3) Specific Financial Applications of AI

Aside from the analysis the Cao Finance Review discusses many different specific applications of AI in the financial markets through use case analysis. "AI enables automated and smart investment...by designing and implementing intelligent trading and investment decision-support platforms, online services, and mobile applications to support quantitative investment, investment portfolio formation and selection, evaluation of investment strategies and portfolio, and high-frequency algorithmic trading" (Cao, 2020). This quote sums up nicely the impact that AI implementation has on the finance sector, and some specific ways by how it is done.

Implementation of AI such as machine learning and deep learning is used to predict market movements and trends by analyzing historical market data and external factors like news events. A specific example provided in the paper includes the use of deep neural networks to predict stock prices, where the AI system learns from past data to identify patterns that indicate future market behavior (Cao, 2020). This kind of analysis, which is only possible through the application of modern AI, allows not only financial institutions but also individuals to make more accurate financial decisions based on market trends, which has revolutionized both short-term and long-term financial planning.

This is further explored in a case study about algorithmic trading, discussing how AI-driven platforms optimize investment management by analyzing large amounts of data to predict market movements and make informed investment decisions. This advancement has completely changed the traditional investment processes, allowing for faster and more accurate decisions that create more return on investment.

6) AI in Development Economics

The paper "AI Solutions for Developmental Economics: Opportunities and Challenges in Financial Inclusion and Poverty Alleviation" by Temitayo Oluwaseun Jejeniwa1, Noluthando Zamanjomane Mhlongo and Titilola Olaide Jejeniwa analyzes how AI can be implemented to tackle issues in developmental economics that are present

all over the globe, such as financial inclusion and poverty alleviation. This section will discuss those.

6.1) Financial Inclusion

In general, Financial inclusion is the availability and access of financial services, such as banks and loans, to all parts of society, particularly to underprivileged or developing communities. The paper AI Solutions for Developmental Economics concludes that AI has immense potential to overcome barriers to financial inclusion, which is crucial for lasting development in less developed countries. AI can play a significant role in this area by using data analytics and prediction models to tailor financial services to individual needs (Jejeniwa, Mhlongo, Jejeniwa, 2024).

A case study discussed in this paper is about how AI-powered credit scoring models can assess the creditworthiness of individuals with limited to no financial histories by analyzing other sources of data such as mobile phone usage and social media activity (Jejeniwa, Mhlongo, Jejeniwa, 2024). This approach, backed by AI implementation, allows financial institutions to extend credit to people with no realistic way of getting it before.

6.2) Poverty Alleviation

In addition to enhancing financial inclusion, AI also has the potential to contribute to poverty alleviation by enabling more targeted and efficient interventions. The paper discusses how AI technologies can be used to identify and prioritize the needs of the most vulnerable populations, ensuring that resources are allocated where and when they are most needed.

A case study discussed in the paper about poverty alleviation talks about how AI can analyze large amounts of data to identify patterns of poverty and inequality, allowing governments and NGOs to design and implement programs that directly address the root causes of poverty.

Another one talks about how AI-driven tools can optimize the delivery of social services, such as healthcare and education, by predicting demand and improving resource allocation (Jejeniwa, Mhlongo, Jejeniwa, 2024). One case study emphasized in the paper describes how AI was used in a pilot project to optimize food distribution in a rural area,

leading to a significant reduction in food insecurity and malnutrition (Jejeniwa, Mhlongo, Jejeniwa, 2024).

6.3) Ethical Challenges

While AI has immense potential and offers amazing opportunities in developmental economics, the paper also addresses the ethical challenges associated with growing use. One major concern is the potential for algorithmic bias, where AI systems could inadvertently exacerbate existing inequalities if they are trained on biased data. This could lead to unfair lending practices or discriminatory financial services that disadvantage certain groups, such as women or minorities (Jejeniwa, Mhlongo, Jejeniwa, 2024).

The paper discusses the importance and need for continuous monitoring and evaluation of AI systems to ensure fairness, transparency, and accountability. On top of all of that, the developing adaptable and sustainable policy in regards to AI and fostering cross-sector partnerships to mitigate these risks as much as possible and maximize the benefits of AI in developmental economics is strongly recommended (Jejeniwa, Mhlongo, Jejeniwa, 2024).

7) Understanding AI Liability

As AI becomes more integrated into various sectors of the global economy, the question of AI liability becomes harder and harder to answer. AI technology and systems, especially the ones that function autonomously or semi-autonomously, such as self-driving cars, present a unique set of challenges compared to traditional rules regarding liability, which were never made to deal with something as complex as AI technology.

One of the key issues with AI liability is the difficulty in assigning fault and causality when there are errors. What this basically means is the unpredictability of AI technology and systems make it challenging to assign whether the fault lies with the producers, who develop AI, or the users, who implement and use it. This lack of clarity has led to a need for adapted liability rules, policies and regulations that can better deal with AI related liability issues.

8) Government Policies and AI

There is no doubt that for AI to be implemented to its maximum efficiency and safely, there is a need for an adaptable and well thought policy to be implemented. The paper by Buiten, De Streel, and Peitz, titled "The Law and Economics of AI Liability," alongside President Biden's recent Executive Order on AI, depicts how the European Union and the United States are taking different approaches to AI regulation. The EU adopts a more controlled approach while the executive order shows the U.S.'s efforts to balance AI innovation with government regulation.

8.1) European Union Policy

The EU's approach, discussed in "The law and economics of AI liability" by Miriam Buiten, Alexandre De Streel, and Martin Peitz, leans towards strict regulation of AI, particularly through the AI Liability Directive and the Product Liability Directive.

The purpose of these proposed regulations are to ensure that AI systems are safe, secure, and trustworthy by holding both developers and users accountable for the AI's outcomes (Buiten, De Streel, Peitz, 2023). The EU's model focuses more on strict liability rules, which are designed to protect consumers and ensure that any harm caused by AI is verified and adequately compensated.

This approach could be seen as a form of nationalization, in the sense that it imposes heavy regulations and strict governmental oversight on AI, potentially limiting the rapid and unchecked expansion of AI technologies in the marketplace (Buiten, De Streel, Peitz, 2023).

8.2) United States Policy

In comparison to the UE's regulations, President Biden's Executive Order reflects a more balanced approach to AI regulation that seeks to maximize the benefits of AI while also implementing safeguards to manage its many risks. The Executive Order established new standards for AI safety and security, while focusing on protecting Americans' privacy, advancing equity standards, and promoting innovation (The White House, 2023).

A key part of the order is its requirement for developers of powerful AI systems to share safety test results with the federal government, so the government can ensure these systems and technologies are secure before being made active for the public or in whatever scenario they will be deployed. This shows that the US government wants to be more active and involved in AI development, but still compared to the EU's policies, the U.S. approach seems less controlling, allowing for greater flexibility for both developers and users and potential for innovation (The White House, 2023).

8.3) Comparative Analysis

The comparison between the EU and U.S. policies show two very different approaches in managing AI's implementation into the global economy. The EU's strict policies and regulations might slow down AI adoption and widespread implementation but guarantee more safety and consumer protection (Buiten, De Streel, Peitz, 2023). On the other hand, the U.S. approach, as reflected in Biden's Executive Order, attempts to create a balance between allowing opportunities for innovation and ensuring that AI development is safe and regulated. While the U.S. encourages AI innovation through initiatives like the National AI Research Resource and efforts to support small developers, it also acknowledges the need for extremely high safety standards with AI, particularly in areas like cybersecurity and privacy protection (The White House, 2023).

As AI continues to grow and influence the global economy, the way that regulations and policies in major economies like EU countries and the U.S. align or differ will affect how AI is developed and implemented in the global economy. In theory, companies operating in both the EU and the U.S. or other large international economies may face challenges in complying with different sets of regulations and policies in regards to AI, which could impact where large companies choose to invest and develop AI technologies.

8.4) AI Liability Directive

The proposed AI Liability Directive by the European Union seeks to address the evident challenges with AI Liability, which were discussed in a previous section of the paper. This directive introduces specific rules for claims involving AI systems and technologies.

Some specifics include shifting the burden of proof in certain cases, such as when claimants can establish that the AI system or technology was defective, and establishing a rebuttable presumption of causality when AI systems and technologies cause harm (Buiten, De Streel, Peitz, 2023). For instance, if harm is caused by an AI system, the directive allows the people who were affected by it to assume that the defect in the AI system was the cause of the harm, unless the producer or operator can prove otherwise.

Additionally, the directive requires producers and operators of AI technologies to maintain detailed documentation of their AI systems, which could be used as evidence in liability claims (Buiten, De Streel, Peitz, 2023). This directive emphasizes the importance of creating balanced and extensive liability rules for AI that encourage innovation while protecting consumers from the potential risks associated with AI (Buiten, De Streel, Peitz, 2023).

9) Future Implications

Even though AI already has an immense impact on the global economy as it is, as AI continues to evolve and become more advanced, its impact on the global economy is expected to increase even more.

The effect of AI going forward will be multifaceted and will impact more than just one aspect of the global economy. For example, AI will drastically change the landscape of employment, as discussed a few times throughout the paper, it will both create job displacement and new skills and jobs that don't really exist yet, such as AI ethics specialists and human-AI collaboration specialists. In addition to that, The gig economy, or freelance economy may expand as AI enables more flexible, remote, and project-based work. Young people might find it more beneficial and much easier to work as freelancers or independent contractors with the assistance of modern and more advanced AI technology as time passes.

Due to this change in employment, there will also be a change in education. There could be more of an emphasis on STEM or technology based education from an earlier age, equipping the next generation with a strong foundation to get into AI related positions and earn AI related skills in further education. In the more recent future, for the people that are in the workforce already and will need to adapt to the rising levels of AI

usage in their workplaces, there will have to be not only corporate sponsored but external courses about learning these AI tools and skills.

AI technologies will inevitably be developed and consolidated by a few large tech companies and other corporations with power, causing the worsening of inequality in those sectors and the global economy in general. This will lead to the gap between rich and poor countries to widen, depending on these corporations. On a broader scale, AI will affect trade dynamics between countries as countries that invest heavily or quickly in AI will have a competitive advantage in many industries.

Figure 2)
Automation adoption is likely to be faster in developed economies, where higher wages will make it economically feasible sooner.

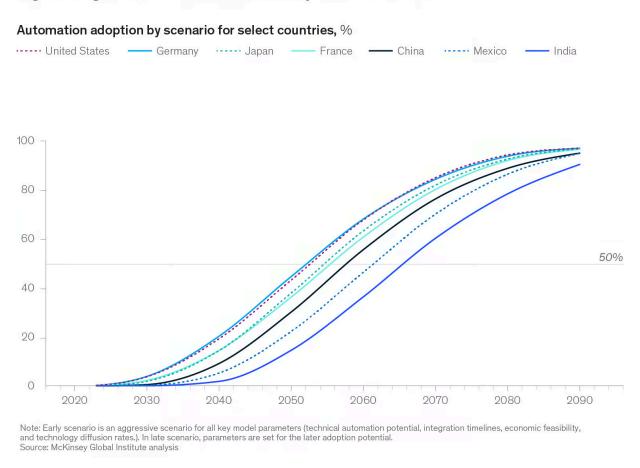


Figure 2 depicts how countries with more resources and more developed economies are predicted to have an easier time integrating AI into their economies at a

McKinsey & Company

faster rate, long term due to higher wages. As these more advanced economies implement AI more efficiently, they will dominate the global market, contributing to increased global market inequality in the future.

In the world of starting business or creating innovations, AI will lower the barriers of entry for startups by providing tools that can automate complex tasks that would traditionally be time consuming, such as market research and backend development work. This will allow startups and new businesses to succeed quicker, and will also surely encourage people of all ages and backgrounds to try their hand at it because of how much easier it will be to create your own online store or your own social media content like YouTube videos or music.

Finally, due to the ethical and social implications and issues surrounding AI, there will definitely be more research done into these issues, leading to a more wide range of in-depth policy and legislation on that matter. As AI becomes even bigger in the global economy and everything begins to rely on and grow around new AI developments, it is possible for something like an international council on AI to be formed that deals with creating global guidelines and dealing with more global AI based issues.

10) Conclusion

In conclusion, AI, or Artificial Intelligence, greatly impacts the global economy today. As discussed throughout the course of this paper, AI creates both immense amounts of opportunities and challenges, enhancing productivity and economic growth, while creating job displacement and contributing to the worsening of current economic inequalities, especially between resource rich and less resource abundant countries and firms

The many future implications of AI suggest that we are just beginning to understand the future potential and risks of AI. The future changes in employment, education, and ethical and policy changes, just to name a few, are things we can only speculate about right now and try to prepare for. More development into AI related policy and legislation is key to harness the full power of AI in a fair and equitable way.

Future research and studies should focus more on developing concrete strategies to mitigate the risks and potential downsides, specifically with the labor market and global

inequality, as the positives are pretty obvious and will continue to rack up as AI becomes more advanced over time. They should also look more into the long-term effects of AI, as that will become more prominent as years pass and may be things we need to prepare for. Lastly, studies should definitely look more into the liability issue surrounding AI and how to deal with them, as it already is and will grow to be a very unique and widespread issue with the rise of AI in the global economy.

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