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AI and the Economy

Innovations in technology impact on the economy has been a central topic of discussion ever since the Industrial Revolution. Although creative destruction can have numerous short-term negative effects on the economy, innovation has always led to better living conditions. The recent boom in Artificial Intelligence technology has sparked many questions as to how far creative destruction can go. With conflicting views from scientists and celebrities, there is justifiable skepticism as to how AI will ultimately affect our global economy. Analyzing the economic effects of AI requires an analysis of how countries and businesses will leverage AI, how they will compete and cooperate with information, and how AI could potentially lead to income distribution and unemployment in the global economy.

Before analyzing the potential implications of AI on the economy, it is important to clarify what AI is, and what it is not. AI research began in the late 1950s, drawing interest from a wide variety of fields in academics. Despite copious amounts of funding and research, minimal progress was made for decades due to lack of computer power and storage. Due to Moore's Law, which estimates that the memory and speed of computers doubles every year, technology finally caught up decades later when the first viable AI was seen defeating the chess world champion in 1997 (Scott). Fundamentally, many of the machine learning algorithms that had been previously rendered useless became useful due to the fast advancements in computer power. In our current

age of “big data”, companies hold enormous amounts of data and computing power to process information that would have been seemingly impossible only decades ago. Going forward, researchers suggest that even if algorithms do not improve, big data and advancements in computing power can allow AI to learn through brute force (Agrawal). Considering the pace at which data is being produced, the advancement of AI is not stopping anytime soon. In order to understand our current state of AI, we must differentiate Narrow AI, General AI, and Super AI. Our current state of AI consists of Narrow AI, which is an AI that makes decisions from specific data sets. Narrow AI serves no function outside of its predetermined task. Examples of this are natural language processors such as Siri or Google Assistant. While these machines are able to mimic human responses, they do not carry human characteristics such as imagination and creativity. On the other hand, General AI machines can perform any task that a human being can such as reasoning, problem solving, planning, and learning. Researchers suggest that there is no credible timeline for when General AI will become viable, but do suggest that it will most likely come from a North American University. Finally, Super AI machines are machines that surpass human intelligence in all aspects. Super AI is what many celebrities and famous scientists have alluded to within the mainstream media that has caused fear within the uninformed. Although General AI will not become viable in the near future, it is believed that the leap from General AI to Super AI is not large (Lee).

Despite lacking human intelligence, our current state of Narrow AI has provided hundreds of applications within the economy and our personal lives. Natural Language Processing, which gives computers the ability to learn to read human language, has proved to have huge potential for businesses on the internet. Innovations in robotics have immensely

boosted productivity within assembly line based companies. Reducing the need for workers while simultaneously allowing for safer and smarter operations has allowed businesses to increase their productivity and efficiency. In our current age of “data science”, almost all companies have begun to use data to optimize their business needs. The ability to analyze massive amounts of data using machine learning algorithms has proved useful in solving complex business problems. Historically, games have been a popular way to test AI because the rules of the game can be codified. In the real world, you need a theory that pertains to the rules of the game. Just like Deep Blue defeated the chess world champion, the success of businesses lies in their ability to break complex human problems into machine learning solvable components, and ultimately into an end-to-end AI solution. Fields such as Economics will play a large role in providing rules for business AI, and putting structure and theory around complex business problems. In Particular, Econometrics will bridge the gap between the machine learning system and the data used for feedback and learning (Agrawal). In the business world, the firms with the largest amount of data will have the biggest advantages. Along with this, companies' ability and willingness to share information will help or hinder their success. While it is important to analyze the quantity of data, it is equally important to look at the quality of that data. Although many U.S. tech companies have massive amounts of data, much of this data pertains to basic information such as a person’s online behavior. On the other hand, Chinese companies are collecting data about the real world. China’s WeChat mobile app, currently holds a wide range of information on it’s over 1 billion active users. Considering the competitive nature of capitalism, the amount and span of the data these companies have will have an impact on their ability to use it in the business world. On the other hand, China’s startup culture of entrepreneurs provides a

differing perspective. Due to China's copycat culture, this forces entrepreneurs to innovate faster and build deeper moats around their businesses in order to defend their products (Lee). This is rarely seen in the United States where much of the work is outsourced to other companies. The advantage of doing the heavy lifting is owning all of the value and data insights derived. According to Kai Fu Lee, "AI deployment will add $16 trillion to global GDP by 2030. While China is predicted to take home $7 trillion, nearly double North America's 3.7 trillion" (Lee). Kai Fu Lee points out that many of these advancements will exist within the Narrow AI domain. Lee predicts that China will have the advantage within internet AI due to the sheer quantity of data. In the field of Business AI, where institutions collect and analyze data for profit, Lee predicts that the United States will have an insurmountable lead. Many of these insights will produce large profits within banking, medicine, and other data intensive industries. In the field of Perception AI (vision and speech recognition), Lee suggests that China will have an advantage due to their advantage in collecting data as it pertains to real life applications. While AI research quickly progresses in the U.S. and China, this begs the question of how other nations will adapt. As AI allows productivity and efficiency to grow exponentially, the gap between countries who are implementing AI and those who are not is also growing exponentially. Allowing a small number of countries to control AI research will ensure that long term resources are devoted. But this will ultimately leave a wide economic gap between countries who implement and those who don't. This will also leave a wide gap between firms who implement and those who do not. Automating low-skill labor will ultimately cause many businesses in developing countries to go bankrupt due to their inability to leverage low cost labor. AI also has the potential to replace

many middle class jobs, and ultimately inhibit immigrants' ability to climb the social ladder (UNUniversity).

While it is important to analyze how businesses will adapt to evolutions in AI, it is equally important to analyze the potential effects on labor markets and income distribution. In a 2017 forum with 41 economists from top universities, they were asked "whether or not they believed the rising use of robots and artificial intelligence in advanced countries is likely to create large enough benefits to compensate those workers who are negatively affected for lost wages." Over 90% of the panelists agreed with the statement (Agrawal). Despite this, many people may be skeptical considering that the last several decades has seen the majority of wealth rise to the top. Job allocation is not only a concern for income, but for happiness as well. As one of the panelists Robert Hall stated, "Those not in the labor force are unhappy and inclined towards substance abuse" (Agrawal). It is important to note that people derive satisfaction from having a job as well. It is also important to consider how although technological innovation can make human labor more efficient, large enough innovations can yield human labor obsolete (UNUniversity). Kai Fu Lee states that AI could only do about 10-20% of humans current jobs. But as AI is developed, jobs will be redesigned in order to be better achieved through AI. Lee refers to these as "ground-up replacements" rather than "one-to-one replacements". Lee estimates that within 20 years, roughly 40 to 50 percent of jobs in the United States will be replaced by AI. While it is easy to believe this will lead to mass unemployment, researchers believe this will allow humans to pursue what they are best at, socially and creatively. Automation will allow AI to take over dangerous and repetitive jobs, creating new opportunities for humans to use their abilities. At the Electrolux factory in Germany, people who once worked

building washing machines, could instead learn how to make robots more efficient at building washing machines (UNUniversity). Although AI can create room for new types of jobs, the question of unemployment still remains for potential workers who cannot be retrained. It is estimated that 80% of job losses in American manufacturing were because of automation. Despite the low unemployment rate in industrial countries, many workers were forced to take lower paying jobs. This recent shift in blue-collar jobs to low-paying jobs has brought numerous consequences. One of which has been the rise in mortality rate in wealthy countries. In the United States, mortality rates of white Americans with only a high school degree began increasing due to opioid use and suicide (Agrawal). While it is undeniable that technological improvements make us more productive, it is important to analyze if they truly make our lives better. Analyzing the potential negative effects of technology will be more important than ever moving forward with legislation and regulation.

While AI research has taken off at an exponential pace in recent years, this sparks many questions about our future global economy. While it is undeniable that AI will bring increased productivity and efficiency within businesses and our economies, this brings many questions about income distribution and mass unemployment. With AI research progressing in a small number of countries, it is more important than ever to close the gap between countries who have implemented AI, and those who have not in order to prevent potential economic consequences. Going into the future, it is also important to understand AI in order to create proper regulation and legislation for the future. While the future of AI is difficult to predict with accuracy, many factors will inevitably determine the future such as how nations and businesses will leverage AI, and how they will cooperate or compete.

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