CHIEF INVESTMENT OFFICE

Investment Insights

Generative Artificial Intelligence: Economic Fad or Standard

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All data, projections and opinions are as of the date of this report and subject to change.

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At a high level, Generative Artificial Intelligence (GAI) represents the next big technology platform shift (after the internet, mobile and the cloud), with the potential to be as transformative to the global economy as the steam engine and electricity. The main positive effects from GAI are likely to be related to productivity for both knowledge workers and consumers (saving time for both), as the technology augments and enhances tasks like content creation, software development, marketing and sales, and customer service. In terms of leaders, technology companies (the "hyperscalers" with large data sets, software expertise and cloud infrastructure cost advantages) along with strategic "picks and shovels" suppliers in the Artificial Intelligence (AI) value chain—semiconductors and web services—are likely to be near-term beneficiaries of the shift to GAI, with longer-term beneficiaries too early to call.

GAI is a type of artificial intelligence system capable of generating text, images, or other media in response to prompts. GAI models learn the patterns and structure of their input training data, and then generate new data that has similar characteristics.

With the total global AI market expected to grow at a 18.6% compounded annual growth rate to reach $900 billion by 2026 (estimate),[1] one of the key debates about the rise of GAI centers on its economic effect, namely how jobs, particularly for knowledge workers, will be affected. Of course, this is not the first time the risk of jobs being lost to technological advancements has been raised. Historically, much of this loss has focused on what can be referred to today as manual labor jobs—the invention of the steam engine, advancements in agriculture machinery, and the advent of the assembly line—all drove concerns that there would be less need for manual labor and thus job losses. More recently, similar concerns have been raised about computers, software and automation.

On May 2, 2023, International Business Machines Corp. (IBM) CEO Arvind Krishna told Bloomberg that as many as 30% of current roles could become replaced by AI over the next five years and that this would occur by not replacing roles that were lost to natural attrition, with low-skilled jobs in the back office appearing to be most at risk.

The concerns over the risk of job loss in the near term (two to five years) are likely to be overblown, while the longer-term implications (five to ten years) are much harder to predict. A March 2023 report from OpenAI, University of Pennsylvania and Open Research provides us with a first impression of which areas of the economy will be affected most by the adoption of GAI. The study discovered that professions that are heavily reliant on scientific and critical thinking skills are less prone to automation. Conversely, jobs that require proficiency in programming and writing are more susceptible to being automated; however, the degree to which each industry adopts these changes remains to be seen. We expect that those with differentiated skill sets and whose workflows are more varied will be less likely to be replaced. Creative fields may see a shift in what is valued, like how interest in abstract art rose following the advent of photography as a medium.

While task automation for many jobs will likely increase with the rise of GAI, one would expect this process to be gradual over many years, and one would not expect companies to carry out employee layoffs at a large scale.

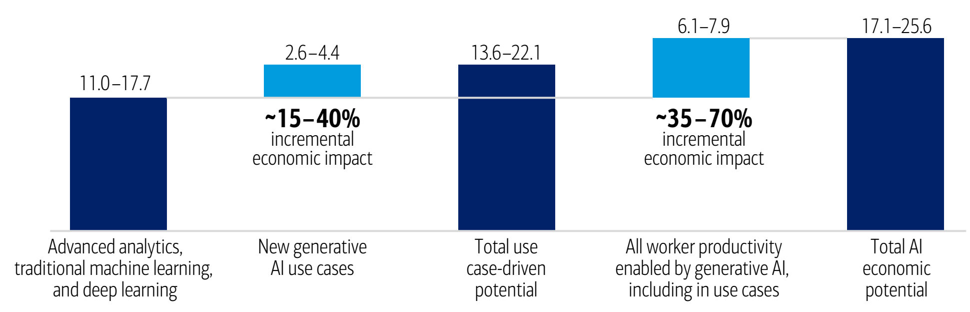
Undoubtedly, technological advancements have changed the nature of all jobs at some point in time. Yet these advancements have also paved the way for entirely new industries, businesses, skillsets and careers. The effect of GAI shouldn't be any different. Many white-collar jobs are likely to be augmented, some will become less prevalent, and others may become wholly obsolete over time. But new jobs are likely to be created to

[1] International Data Corporation (IDC) including software, hardware, and services, IDC Worldwide Semiannual Artificial Intelligence Tracker, July 2022.

develop, train and maintain AI models. Legal and policy experts will be needed to draw the boundaries on how AI can be deployed. Technology may be necessary to separate AI-generated content or deepfakes from real content. It is likely many more roles will be created that we cannot even envision at this point.

The deployment of GAI and other technologies could also help accelerate productivity growth, partially compensating for declining employment growth and enabling overall economic growth.

Exhibit 1: GAI's Potential Impact On The Economy.



Note: in Trillions of dollars. Source: The Economic Potential of Generative AI. McKinsey & Co. June 14, 2023.

Based on a June 14, 2023, Mckinsey & Co study, *The economic potential of generative AI*—the automation of individual work activities enabled by these technologies could provide the global economy with an annual productivity boost of .2% to 3.3% from 2023 to 2040 depending on the rate of automation adoption—with generative AI contributing from .1 to .6 percentage points of that growth—but only if individuals affected by the technology were to shift to other work activities that at least match their 2022 productivity levels (Exhibit 1). In some cases, workers will stay in the same occupations, but their mix of activities will shift; in others, workers will need to shift occupations.

Enthusiasm over AI has spread to Corporate America, with a fifth of the S&P 500 companies discussing it in their Q1 earnings calls. According to Empirical Research May 2023 report, for many companies, improving customer service is the initial focus, with the expected cost savings for the most part expected to fall below 10%. The evidence from three decades of robotics use is that most of the cost savings fell to the bottom line, benefiting the largest companies.

Empirical Research also identified the advances in the power of AI and in the deep learning era of the last decade where training times fell by 75%. The performance of the most popular systems has, on average, improved by more than 40% since they were launched. An experiment in the customer service department of a large enterprise software company showed that AI improved productivity by +14%, by learning from the behaviors of experienced representatives and helping new ones mimic them.

Overall, GAI has the potential to be one of the most profound new technology innovations in decades, which puts us on the cusp of one of the most significant new computing cycles, rivaling anything from the mainframe to the internet to the iPhone.

That said, we need to be wary of the risks and listen to concerns coming from people like Geoffrey Hinton, considered by many to be the "godfather" of AI, who has stated in a New York Times May 4, 2023 article that it's not inconceivable that AI could try to replace society with machines and that everybody must be committed to a responsible approach to AI.

While GAI has promised substantial near- and long-term benefits in productivity, there are growing concerns (ethical and otherwise) about the pace of AI model advancements that may occur without human phasing or judgment, as well as risks associated with data security/privacy (cyberattacks), intellectual property rights (whether it is even legal to train datasets on copyrighted material or the implementation of AI within educational institutions), and, trustworthiness or bias of content outputted by these models. Governments are clearly playing catch-up here given the lightning-fast pace of market development. When considering the consumer's perspective, the Pew Research Center found that around 62% of Americans believe the use of AI in the workplace will have a significant impact on workers over the next 20 years, with 28% thinking it will have a personal impact on them. Clearly, the effects of GAI are being felt across all aspects of the population.[2]

Microsoft CEO Satya Nadella stated, "the world's most advanced AI models are coming together with the world's most universal user interface—natural language—to create a new era of computing,"[3] suggesting we are potentially at the forefront of a major new computing cycle and one in which the pace of innovation is like no other.

What we can say at this moment is that we are still very much in the pregame phase of GAI and that the pace of technological innovation will only accelerate. A virtual GAI arms race has kicked off, with many business processes, jobs, and computer–human interactions likely to be forever changed.

[2] Lee Rainie, Monica Anderson, Colleen McClain, Emily A. Vogels and Risa Gelles-Watnick, "AI in Hiring and Evaluating Workers: What Americans Think," Pew Research Center, April 20, 2023.

[3] Noel Randewich and Akash Sriram, "Tech CEOs wax poetic on AI, big adds to sales will take time," Reuters, April 26, 2023.

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