Artificial Intelligence (AI) has emerged as a major topic of conversation this year and we have received several questions from our clients about its impact.   In response, we thought it would be helpful to share our thoughts on AI and address some of the questions we've been receiving. We have organized our thoughts into the four bullet points below:

    I.   **Artificial Intelligence (AI) isn't new, so what's changed?**
    II.   **What are the potential impacts on the economy; the labor markets; and investments?**
    III.   **Will the AI cycle be different from past technology cycles?**
    IV.   **What are the potential risks?**

I.   **Artificial Intelligence (AI) isn't new, so what's changed?**

AI has been around for a very long time (since the 1960s), and mostly focused on getting machines to mimic human intelligence to perform specific tasks. Good examples would be the voice assistants we have all interacted with like Alexa and Siri, as are customer service chatbots that pop up to help you navigate websites.

What's changed is the emergence of Generative Artificial Intelligence (GAI). According to Goldman Sachs, the new GAI technologies like Chat GPT, DALL-E, and LaMDA are distinguished by three main characteristics: 1) their generalized rather than specialized use cases, 2) their ability to generate novel, human-like output rather than merely describe or interpret existing information, and 3) their approachable interfaces that both understand and respond with natural language, images, audio, and video. When you ask Chat GPT to describe what it can do, here is part of the response it gives.

> "Generative Artificial Intelligence (AI) refers to a class of AI models and algorithms that have the ability to generate new content or data. Unlike traditional AI systems that rely on explicit rules or predefined responses, generative AI models can autonomously produce original and creative outputs...

> Generative AI has a wide range of applications, including:

> 1. Content Generation: Generative models can create realistic images, videos, music, and text, which can be used in various creative fields such as art, design, and entertainment.
> 2. Data Augmentation: Generative models can be used to augment datasets for training other AI models. For example, they can generate additional synthetic data to improve the performance of computer vision or natural language processing algorithms.
> 3. Simulation and Scenario Generation: Generative AI can be used to simulate realistic scenarios for training purposes, such as virtual environments for autonomous vehicles or simulations for training medical professionals.
> 4. Creativity Support: Generative AI can assist artists, writers, and designers by providing inspiration, generating ideas, or creating initial drafts that can be further refined by human creators.

5. Personalization: Generative models can be used to personalize user experiences by generating customized recommendations, advertisements, or content tailored to individual preferences."

Did anything in the above description seem off to you? Maybe not. The grammar is perfect, the tone works, and the narrative flows. A pretty good demonstration of its capabilities. If you want to try it out, go to: https://openai.com/blog/chatgpt

II.   What are the potential impacts on the economy; the labor markets; and investments?

The economy:

The potential impact of AI on economic growth and productivity is huge. The economic team at Goldman Sachs estimates that AI adoption could drive almost $7 trillion in global economic growth over a 10-year period. It's also estimated that productivity could grow 1.5% faster annually over that same period. In fact, a recent study by Erik Brynjolfsson and his co-authors revealed that productivity rose by 14% among customer service workers at a major software firm after they were given access to GAI. A huge pickup in productivity.

AI has been improving exponentially for many years but is only now that we have reached the point along the curve where it can surpass humans on a wide variety of cognitive tasks. The charts below illustrate how quickly AI technologies have been improving.
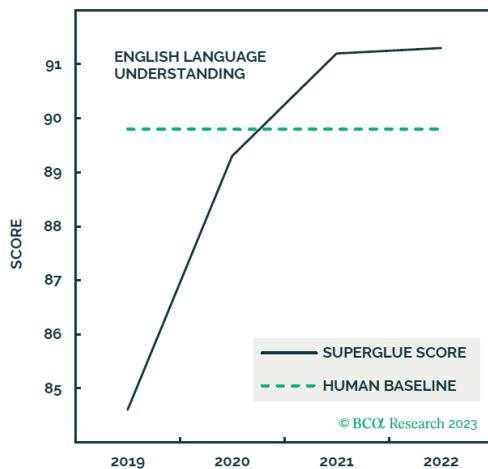
SUPERGLUE IS A COMPREHENSIVE ENGLISH LANGUAGE UNDERSTANDING BENCHMARK THAT TRACKS THE PROGRESS OF AI MODELS ON EIGHT DIFFERENT LINGUISTIC TASKS. SOURCE: SUPERGLUE LEADERBOARD (2022), AI INDEX REPORT (2023).
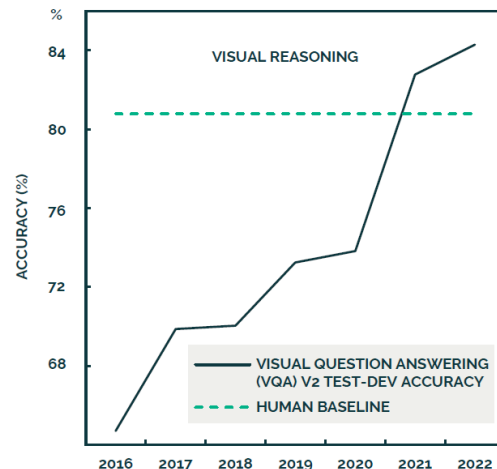
THE VISUAL QUESTION ANSWERING CHALLENGE TESTS AI SYSTEMS WITH OPEN-ENDED TEXTUAL QUESTIONS ABOUT IMAGES. SUCCESSFULLY ANSWERING THE QUESTIONS REQUIRES THAT AI SYSTEMS POSSESS VISION, LANGUAGE, AND COMMONSENSE REASONING CAPABILITIES. SOURCE: PAPERS WITH CODE, 2022; ARXIV (2022), AI INDEX REPORT (2023).

The research team at the Bank Credit Analyst (BCA) believe that AI's progression is following an exponential growth curve, more likely a hyper-exponential curve and that advances will occur much faster than expected. BCA believes the transition to super-intelligent AI has the potential to impact economic growth as much as the Agricultural Revolution and the Industrial Revolution. Both revolutions experienced a 30-to-100-fold increase in GDP growth relative to the preceding periods. The potential is significant.

The Labor Market:

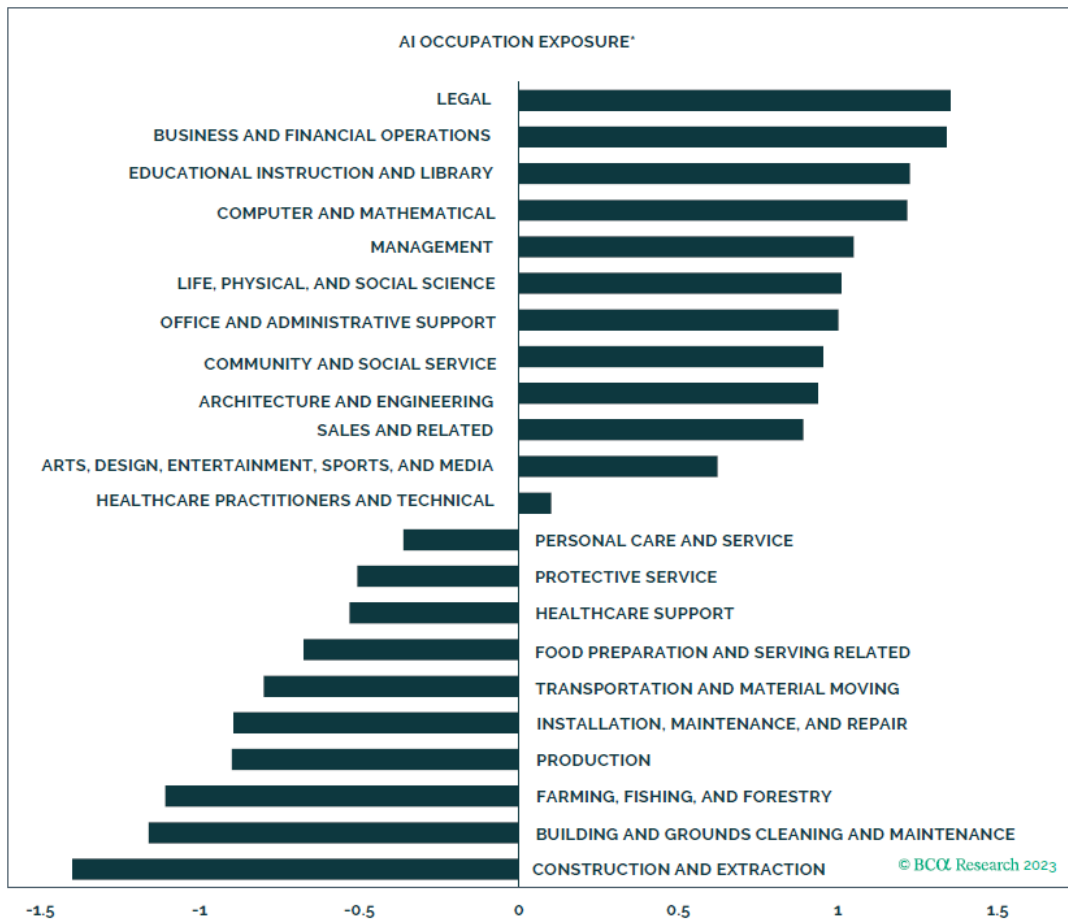The chart below is a good reminder that even as the economy grows, the workforce is continuously evolving and changing. Unlike a century ago, very few people work in agriculture today, with the majority of jobs now in the service sector. It is estimated that 60% of US workers in 2018 were employed in occupations that did not even exist in 1940.

Unlike A Century Ago, Few People Work In Agriculture Today

SHARE OF EMPLOYMENT BY OCCUPATION

- SERVICES
- MANUFACTURING
- CONSTRUCTION
- MINING
- AGRICULTURE

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SOURCE: STANLEY LEBERGOTT, "MANPOWER IN ECONOMIC GROWTH," (1964); HAROLD BARGER, "DISTRIBUTION'S GROWING SHARE OF THE LABOR FORCE," DISTRIBUTION'S PLACE IN THE AMERICAN ECONOMY SINCE 1869, PP. 3-19. NBER, (1955); AND BUREAU OF ECONOMIC ANALYSIS (SINCE 1948).

We expect that AI has the potential to significantly disrupt the labor market. As the Luddites (people opposed to technological change) discovered, just because technological innovation tends to result in higher living standards for most workers, that does not apply to all workers. Although economic growth should lift the overall economy and standard of living for workers, some professions and jobs will be more vulnerable to disruption than others. These workers will need to be retrained to prosper in the age of AI. Below is a list of some of the occupations that may be most and least impacted by the coming AI revolution.
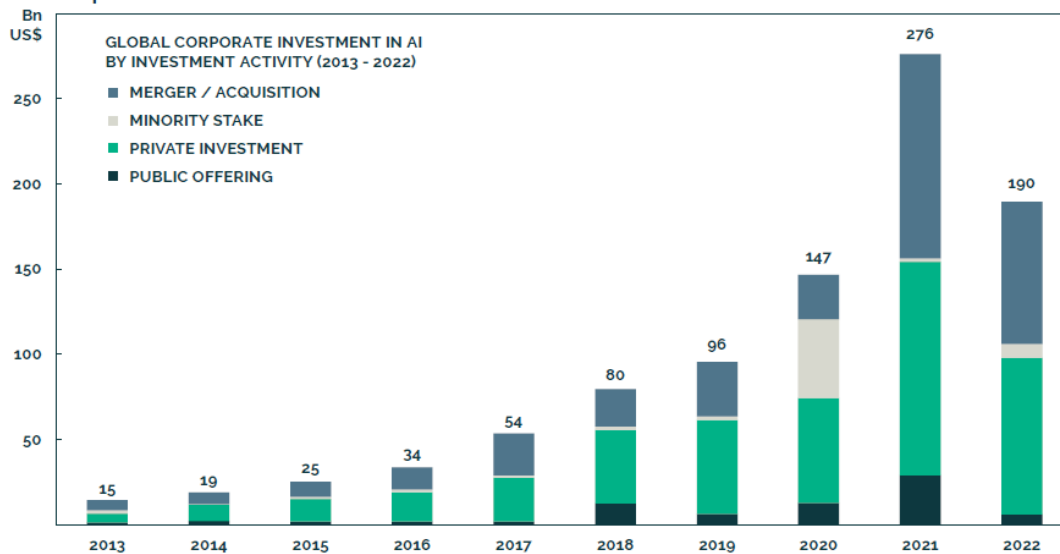
AI Has The Potential To Replace Many Tasks Performed By Humans

AI OCCUPATION EXPOSURE*

Occupation	
LEGAL	(positive, ~1.35)
BUSINESS AND FINANCIAL OPERATIONS	(positive, ~1.3)
EDUCATIONAL INSTRUCTION AND LIBRARY	(positive, ~1.2)
COMPUTER AND MATHEMATICAL	(positive, ~1.2)
MANAGEMENT	(positive, ~1.05)
LIFE, PHYSICAL, AND SOCIAL SCIENCE	(positive, ~1.0)
OFFICE AND ADMINISTRATIVE SUPPORT	(positive, ~1.0)
COMMUNITY AND SOCIAL SERVICE	(positive, ~0.95)
ARCHITECTURE AND ENGINEERING	(positive, ~0.9)
SALES AND RELATED	(positive, ~0.9)
ARTS, DESIGN, ENTERTAINMENT, SPORTS, AND MEDIA	(positive, ~0.6)
HEALTHCARE PRACTITIONERS AND TECHNICAL	(positive, ~0.1)
PERSONAL CARE AND SERVICE	(negative, ~-0.35)
PROTECTIVE SERVICE	(negative, ~-0.5)
HEALTHCARE SUPPORT	(negative, ~-0.55)
FOOD PREPARATION AND SERVING RELATED	(negative, ~-0.7)
TRANSPORTATION AND MATERIAL MOVING	(negative, ~-0.8)
INSTALLATION, MAINTENANCE, AND REPAIR	(negative, ~-0.9)
PRODUCTION	(negative, ~-0.9)
FARMING, FISHING, AND FORESTRY	(negative, ~-1.1)
BUILDING AND GROUNDS CLEANING AND MAINTENANCE	(negative, ~-1.2)
CONSTRUCTION AND EXTRACTION	(negative, ~-1.35)

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Axis: -1.5, -1, -0.5, 0, 0.5, 1, 1.5

* MEDIAN SCORE OF OCCUPATIONS (SIX-DIGIT STANDARD OCCUPATIONAL CLASSIFICATION LEVEL) IN EACH OCCUPATION MAJOR GROUP (TWO-DIGIT STANDARD OCCUPATIONAL CLASSIFICATION LEVEL). CALCULATION USING DATA FROM FELTEN ET AL. (ACCESSED ON MAY 1, 2023).
SOURCE: EDWARD FELTEN, MANAV RAJ, AND ROBERT SEAMANS, "OCCUPATIONAL, INDUSTRY, AND GEOGRAPHIC EXPOSURE TO ARTIFICIAL INTELLIGENCE: A NOVEL DATASET AND ITS POTENTIAL USES," *STRATEGIC MANAGEMENT JOURNAL*, (42:12) (2021).

III.   Investments:

The amount of money being invested in AI has taken off over the last decade, see the chart below. According to Stanford's AI Intelligence Report, global corporate AI investment is up 10-fold since 2013 and should grow significantly in the years ahead.

Corporate Investment In AI Has Taken Off Over The Last Decade

GLOBAL CORPORATE INVESTMENT IN AI BY INVESTMENT ACTIVITY (2013 - 2022)
- MERGER / ACQUISITION
- MINORITY STAKE
- PRIVATE INVESTMENT
- PUBLIC OFFERING

Bn US$

Values by year: 2013: 15, 2014: 19, 2015: 25, 2016: 34, 2017: 54, 2018: 80, 2019: 96, 2020: 147, 2021: 276, 2022: 190

According to BCA, the beneficial impact on technology stocks from the AI revolution, though sizable could be a lot smaller than the impact on economic growth. This is because rapid technological change could render many existing technologies obsolete, leaving many of today's tech companies in the dust. The divergence between winners and losers may be wide. Below are some examples of potential winners (not necessarily current recommendations!).

Insight Partners projects that global revenue for AI-dedicated processors will grow at an annualized rate of 35% from 2019 to 2024, reaching $83 billion by 2027. This should benefit chip designers and manufacturers such as Nvidia, AMD, and Intel.

Technology platform companies such as Google, Meta, and Baidu that have access to large amounts of data and the technical expertise to leverage that data will benefit. So will cloud-service providers such as Amazon, Microsoft, and IBM, which have the ability to make this data available to other companies, while also integrating it into their own product offerings.

Goldman Sachs estimates that enterprise software companies will be big beneficiaries, as generative AI (GAI) should lead to new companies and offer incumbents new growth opportunities. They estimate GAI could increase enterprise software by over $150 billion in the next decade, this would benefit firms like Salesforce, Intuit, Adobe, and others.

According to BCA, some of the biggest winners may actually be commodities and real estate. Mainly because AI has the potential to create an economic boom that would increase the need for commodities, digital workers, robots, etc.

Cybersecurity is already a huge business and will only continue to grow in the future. Firms that can incorporate AI safety into their offerings will be very well positioned in the years ahead.

Several exchange-traded funds (ETFs) have popped up in the past couple of years, however, most of these funds are too broad and include all AI applications, from self-driving cars to service robots, etc. Many of which we may not benefit from the true potential of AI.

IV. What are the potential risks?

The risks are substantial. With AI's ability to improve at an exponential rate, there is a chance that both the investment community and the broader public may be blindsided by how quickly AI transforms

society and the economy.   AI has the potential to revolutionize society and the economy for the better, although it has the potential for negative outcomes. There are potential risks to our infrastructure, financial system, and even our government and defense industries if it is not regulated properly.   As of now, there are no regulating bodies in the U.S. or globally that are overseeing the use of AI technologies. We view this as a substantial risk and will be monitoring closely how this evolves in the future. We will provide updates on important changes as they occur.

We hope you found the above informative, please give us a call if you have any questions or would like to discuss.