Thoughts on Artificial Intelligence

In this edition of our Thinking Man we will provide some high-level thoughts on one of the most popular themes of 2023: Artificial Intelligence (AI). We would like to emphasize that we approach the topic with a great deal of humility, since we are by no means experts in understanding the technical details which give "life" to AI, much less the timing and magnitude of its impacts on our society. Nonetheless, as professional money managers, part of our job is to stay on top of the innovations that will power the future. To this end, we strive to identify the beneficiaries of technological disruption, and the price we are willing to own them at. We have structured our thinking on the topic around two questions:

1. Does Generative AI represent an inflection point, or is it merely a name change for what is fundamentally a continuation of prior computational advances? From an investing standpoint the answer to this question will determine if AI businesses deserve higher valuation multiples.

2. Is it more attractive to own the companies that produce and enable AI, or is better to own the companies that will benefit the most from merely using AI, or some combination of both? In other words, is it better to own the grass, to own the cow, or to just buy the milk?

A brief history of AI

The rise of AI has been more than 60+ years in the making. In 1960, MIT's natural language processor named ELIZA simulated human/computer conversation. Throughout the 70's and 80's advances in neural networks enabled computers to begin to recognize complex patterns. In 1997 IBM's DeepBlue supercomputer defeated Chess World Champion, Gary Kasparov. At the turn of the century, computational capacity exploded as powerful microprocessors enabled the rise of personal, mobile, and cloud computing. With increased computational capacity, more sophisticated applications of machine learning continued to evolve. In 2011 IBM's Watson defeated Jeopardy champion Ken Jennings. In 2016, Google's AlphaGo defeated Go world champion Lee Sedol (Go is a board game with more positional permutations than there are atoms in the universe). Today, various forms of AI permeate our lives: from predictive text and autocomplete, to virtual assistants like Siri and Alexa, to AI's which tailor advertising to a consumer's preferences, and more recently, AI's which can create images and write music from scratch.

The Thinking Man's Approach

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- The evolution of AI has been more than 60+ years in the making
- The recent wave of excitement is the result of the development of Generative AI's which facilitate human/computer interaction
- The arrival of natural language AI's represents an inflection point in global productivity, particularly because of the technology's ease of adoption
- AI will displace many workers, though 60% of jobs today didn't exist in 1940
- Investing in AI is derisked today because AI's leaders are highly profitable tech incumbents
- The first-mover advantage does not always apply, especially in tech
- True disruption is often highly unpredictable. Investing behind transformation often requires more faith than is comfortable

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What changed and are we at an inflection point?

The most recent wave of excitement around AI is the result of the release of OpenAI's ChatGPT, which is itself the result of the intersection of three technological developments. The first is the development of graphics processing units or GPU's (one of Nvidia's primary product lines). Initially developed for gaming, GPU's are specialized processors that have much higher memory bandwidths and faster processing speeds, enabling computers to do complex tasks more efficiently. The second, is the advent of Big Data: the proliferation in the volume of raw digital information that can be used to train AI's. This would include the whole universe of search engine, social media, streaming, and e-commerce activity. Lastly, and most importantly, is the recent development of transformers (the T in Chat GPT): a machine-learning model designed to process sequences of elements – in this case words in a sentence. Using a method called data parallelization, the transformer learns relationships between words in a more efficient way, facilitating communication between computers and humans.

These three pillars together have formed a new class of what has now been labeled: Generative AI (GenAI for short). Where prior iterations of AI have been very good at solving specific tasks, Generative AI has the capacity to create and distill any variety of content in highly intelligent ways that appear to be almost indistinguishable from human intellect (i.e. text, video, images, or even computer code). Most importantly, Generative AI's like ChatGPT are able to interact with humans without the need for learning programming skills: one simply talks to it and it talks back. We think this is a particularly important development because, as Yuval Noah Harari has argued, language is the basic ingredient of large-scale human collaboration. We see the development of seamless communication channels between machines and humans as the key to a potential revolution in human productivity; and it is why we believe that GenAI does indeed represent an inflection point in the global economy.

If we look at the history of other transformational technologies, we find that the adoption of a technology is as important as the creation of the technology itself. What changed the nature of transportation wasn't only the invention of the automobile but that Henry Ford developed a way to mass-produce them at a low cost, such that average people could own and use them. Equally, what truly accelerated the advent of the digital age was not only the invention of computers, but that Bill Gates and Steve Jobs packaged them into a personal formats like PC's and mobile phones.

ChatGPT and other similar natural language AI's perhaps represent a similar paradigm shift, since anyone who wants to, is now able to tap into a vast reservoir of digital knowledge with relative ease. Additionally, since these systems are designed to continue learning, as more people use them they will only get better with time. We don't think it is a coincidence that ChatGPT is the application that reached 100 million users in the shortest time on record, roughly two months. This is well ahead of now ubiquitous applications like Tiktok (which took 9 months), or Instagram (which took 2 years and 6 months).

We envision a future where whole categories of tasks are automated, freeing up employee labor time for new or more complex tasks. In some cases, GenAI will serve to augment worker productivity; in other cases it will replace certain workers entirely. At any rate, increases in corporate productivity will allow companies to drive margin expansion and profitability. Goldman Sachs Global Investment Research estimates that ~$7tn (or roughly 5% of Global GDP) will be added to the global economy in the next 10 years alone, representing about a 3% annual gain in overall labor productivity. For those who are concerned about the collapse of society in the event of a large-scale displacement of workers, we would only cite a recent study by David Autor of the National Bureau of Economic Research, which shows that 60% of workers today are employed in occupations that did not exist in 1940. This implies that 85% of employment growth over the last 80 years is the result of new positions created by technological progress. Though nefarious uses of AI (or the possibility that AI would develop an independent will that puts its own interests ahead of human interests) are concerning, we believe that is sort of apocalyptic thinking it is still somewhat premature.

Investing in AI

Regular readers of this publication know that our investment philosophy is guided first and foremost by the principle of *preserving* capital: it is better to avoid losses and compound modest returns over long periods of time, than it is to expose oneself to large losses chasing outsized, short-term returns. As a result, we make an extra effort to separate reality from perception, and secular trend from passing fad. As students of market history, we are highly sensitive to the vast sums of capital that have been destroyed when reality fails to meet expectation. Some memorable examples from the dot-com crash include:

- Pets.com: online pet company that IPO'd at $11 in November 1999, peaked at $39.85, and fell to $0.31 in November 2000
- Webvan: online grocery store that IPO'd at $30 in June 1999, peaked at $100 in November 1999, and fell to $0.20 in July 2001
- Excite@Home: internet service provider that IPO'd at $28 in March 1999, peaked at $95 in December 1999, and fell to $0.11 in March 2001
- Sun Microsystems: market cap peaked at $227bn in December 1999, fell to $11bn in March 2001
- Netscape: market cap peaked at $121bn in March 2000, fell to $1bn in March 2001
- Yahoo!: market cap peaked at $125bn in December 1999, fell to $36bn in March 2011

As Scott McNealy, Sun Microsystems CEO during the early 2000's told Bloomberg in an interview in 2002 after the share price collapsed 96% from the peak: *"… selling at 10x revenues, I have to pay you 100% of revenues for 10 years in dividends, assuming zero costs, zero expenses, no taxes…Do you realize how ridiculous those basic assumptions are? Having said that, would any of you like to buy my stock at $64? What were you thinking?"*

It should come as no surprise then that we are hesitant to choose who will be the winners in an industry that is still developing. Having said that, the most striking difference between today and prior episodes of overextended expectations is that many of today's AI leaders, whether it be developers (Microsoft, Google), enablers (Nvidia), or AI users/integrators (Amazon, Salesforce, Adobe) are already highly profitable companies that throw off large sums of free cash flow. These companies have diversified business lines that are all well established and poised to continue growing regardless of what ends up happening with AI. From this perspective, we see AI applications as extra upside, and not nearly as speculative as investing in unproven e-commerce businesses at the height of the dot-com bubble.

Regarding Nvidia specifically (whose meteoric year-to-date rise has prompted many client conversations), we take a constructive view in the long-term but worry about the possibility of a shorter-term dislocation. This is not necessarily because of Nvidia's competitive positioning, but rather because the macro backdrop still remains highly uncertain. Should a financial or economic accident happen (i.e. geopolitics, recession, or another banking crisis) the charm of futuristic thinking will surely fall to the wayside.

Equally important to remember is that the so called "first mover advantage" is by no means a universal phenomenon that applies at all times and in all industries. For every Google, Facebook, and Spotify there is often a Yahoo!, MySpace, and Napster (first movers that ultimately failed in becoming market leaders). Though companies like Nvidia are off to very strong starts, and by all means are offering turn-key solutions with meaningful network effects, we should also remember that perhaps many of the companies that will come to dominate AI haven't even been created yet, or are still relatively unknown. When new industries are created, the initial players are often the most profitable because they have a limited number of competitors. If however, there are relatively limited barriers to entry, and if the profit margins are wide enough, then invariably new competitors enter the space, eating away at the profitability of the entire industry. What Nvidia did to Intel, perhaps some other company will one day do to Nvidia.

As a parting thought (and so our readers don't confuse us for being excessively pessimistic or conservative) we think it is important to acknowledge that as the rate of technological progress accelerates, the importance of the accuracy of one's forecasts for next-generation businesses decreases. This is not to say that it is worth investing in transformational technology at any price, but only that fine-tuning valuation assumptions in highly exponential growth investments rarely affects investment outcomes. This is also not an excuse to take reckless bets on high growth companies simply because we are unsure about how big a business or industry will be. It is only to say that it is almost always a precondition of true transformational change that no one can even imagine it.

Whether it be 3D printing, autonomous vehicles, nuclear fusion, or quantum computing, the technologies of tomorrow all represent the possibility of radical changes to the very structure of our society. Let us for a second imagine how different the present is vs. the year 1920, and then let us imagine that if the pace of change is accelerating, how even more unimaginably different the year 2120 will be to the present. Though we would agree that hope is not a strategy, investing in the technologies of the future does inevitably, require some amount of blind faith in civilizational progress. Consequently, adequate diversification and modest position sizing end up being the most important factors in riding the wave of progress without losing your shirt.

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