CAPITAL CREEK PARTNERS REPORT – MAY 2023

The Artificially Intelligent Investor

A Way Too Early Look at AI's Macro Impact

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About Scott

Partner, Chief Strategist

Scott is a partner of the firm and the Chief Strategist. Before joining Capital Creek, Scott was the Head of Asset Allocation at UTIMCO, where he served on the firm's Management, Investment, and Risk Management Committees. Scott has 35 years of investment experience as a strategist and portfolio manager. Scott spent most of his career in New York, working at Kidder, Peabody, Morgan Stanley, and Tudor Investments. Scott studied at the University of Texas at Austin, where he received a BBA in finance in 1988. Scott is also a Chartered Financial Analyst, CFA.

About Capital Creek Partners

A Private Investment Firm, Founded by Families.

We are an investment partner organized to serve the needs of family offices, foundations, endowments, and private investment companies. Established in 2018, Capital Creek Partners was founded as a boutique multi-family office to serve a small number of prominent families. Our firm's culture is rooted in *Integrity, Humility, and Excellence*.

CAPITAL CREEK PARTNERS

Words flow through my screen

ChatGPT, thoughts unseen

Artificial dream

Austin, TX

The above Japanese Haiku was conceived of by ChatGPT on Sunday, April 21, 2023. As the author of this report, I can only take credit for asking the machine to write a haiku about artificial intelligence (AI). The haiku was generated instantaneously on the first try. At that moment, a light came on for me, and I was able to understand the incredible leverage this nascent tool could provide to my research efforts. A real, fast, and creative informational enhancer that will become better over time. An artificial sweetener with no calories. An anabolic steroid shot for my brain. The out-of-pocket cost was zero! However, deep down I knew there would be costs in the future, perhaps major ones.

Executive Summary

- AI adoption is happening faster than any other technological advancement in history.
- Commercial AI follows in the footsteps of the silicon-based semiconductor in 1961, the personal computer circa 1980, the Internet going mainstream in 1995, and the iPhone release in 2007. Each of these prior waves of technological innovation had profound impacts on the economy, financial markets, and on society.
- AI appears to be a potent disinflationary force, especially with respect to wages and productivity.
- The AI race between the US and China is critical as it could fundamentally change the future of diplomatic and military engagement between the two superpowers. I believe the US has the early advantage.
- Regulators are being left in the dust by a revolutionary technology evolving at warp speed.
- AI is accelerating the already blistering pace of innovation and change in our world. The discounting mechanism of financial markets may become ever faster, challenging humans to keep pace.
- Ultimately, AI is bullish for the US economy and financial assets. AI will likely help reduce inflation via productivity gains. Knowledge-based workers should become more productive, and AI should support corporate margins and returns on equity.
- Capital and labor could be allocated more efficiently because of AI.
- Standards of living will rise with AI adoption as humans become smarter and more effective with the help of machines.

Exhibit 1: Major Tech Waves are Bullish and Disinflationary

Source: Bloomberg, Capital Creek Partners Research

Macro Impacts from AI Tipping Point

My research took me back to 1961 at the dawn of the silicon-based microchip. While the semiconductor was a major technological breakthrough, it took approximately twenty years before chips began to penetrate consumer goods like televisions, refrigerators, and automobiles in a significant way. The productivity gains were glacial and took around a generation to move the needle. The Personal Computer (PC) gained critical mass in the early 1980s. It took around a decade before the PC began to affect key economic data in a meaningful way. The Internet penetrated corporate America around 1995 and by the end of the 1990s was pervasive. Everyone had an email address and massive numbers of new businesses were formed to take advantage of the openness and scale of this groundbreaking modern technology. The iPhone launched in June of 2007, and within three years, it and other imitators were ubiquitous all around the world. The pattern recognition is that each wave comes approximately 15 years apart, is more powerful, impacts business and society more, and gets adopted faster than the previous wave. My belief is that AIs impact and adoption will fit this time worn pattern.

I dug into the data on each of the three prior technology waves. I gave each wave five years to mature and impact the macro data. As reflected on Exhibit 2, prior major waves of technological innovation have mostly led to lower inflation, higher productivity growth, higher real GDP growth, and lower interest rates.

Inflation declined meaningfully in each of the prior tech waves along with interest rates. Major tech innovations were not solely responsible for moving the data, but my belief is that they made a significant positive contribution. The current AI innovation wave could have even more profoundly positive implications for macro data and markets.

Exhibit 2: Key Tech Wave Stats

Source: Bloomberg, Capital Creek Partners Research & FRED

Tech Wave Data		**PC Era**			**Internet**			**iPhone**	
	1980	1985	Change	1994	1999	Change	2007	2012	Change
Core CPI Inflation	12.40%	4.30%	-810 bps	2.80%	2.10%	-70 bps	2.30%	2.10%	-20 bps
Productivity	0.90%	2.30%	+140 bps	0.90%	4.20%	+330 bps	2.30%	0.30%	-200 bps
GDP	-0.26%	4.18%	+444 bps	4.03%	4.79%	+76 bps	2.18%	1.55%	-63 bps
SPX Index	107.94	211.28	95.74%	459.27	1469.25	219.91%	1478.49	1426.19	-3.54%
UST-10 Yr. Yld	11.43%	10.63%	-80 bps	7.09%	5.63%	-146 bps	4.64%	2.34%	-230 bps

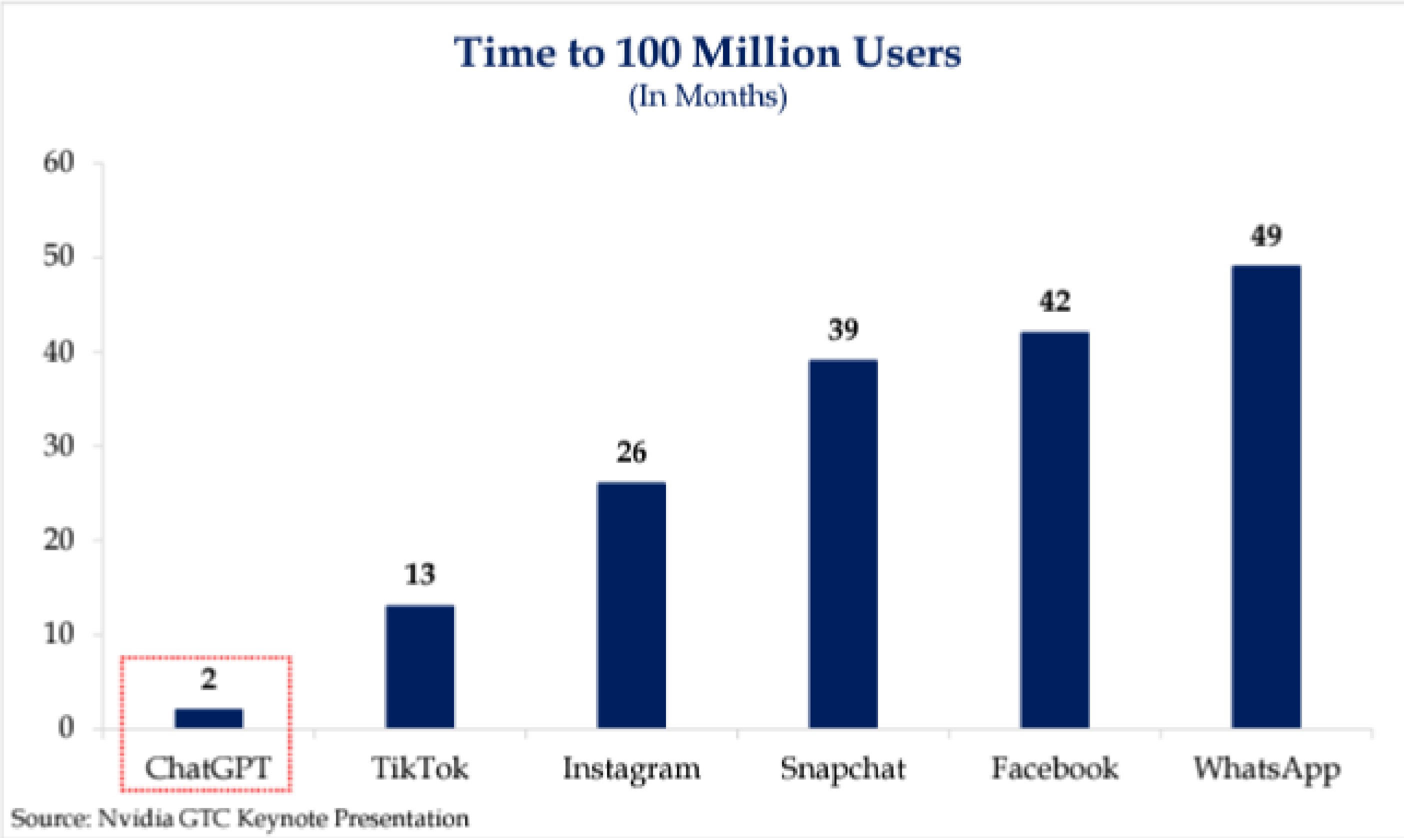
Notes: Bloomberg and Federal Reserve of St. Louis data. Used annualized average for GDP and 10 year bond yields.

The Bleed for Speed

As I analyzed the four prior major technology waves since 1960, it jumped out that each wave has moved faster than the one before. The sheer speed of the innovation and adoption around AI is breathtaking. ChatGPT was "released into the wild" on 11/22/22. Since that time, it has been upgraded three times. According to NVIDIA (NVDA), and my friends at Strategas, the adoption of ChatGPT has exploded higher in 2023 (see Exhibit 3). It took ChatGPT only two months to reach 100 million users, a small fraction of the time it took TikTok to reach that level. I am confident the world has never seen this dizzying speed of adoption before. How can you even go to a cocktail party these days if you have not run a query on an AI engine? It seems this is all people want to talk about, regardless of background or profession. AI is going to speed up the rate of change on planet Earth, perhaps beyond what mere mortal humans can tolerate. For market participants who are already accustomed to dealing with massive change and speed, this is a whole new level of acceleration. Change is going exponential.

Exhibit 3: Fastest Adoption in History

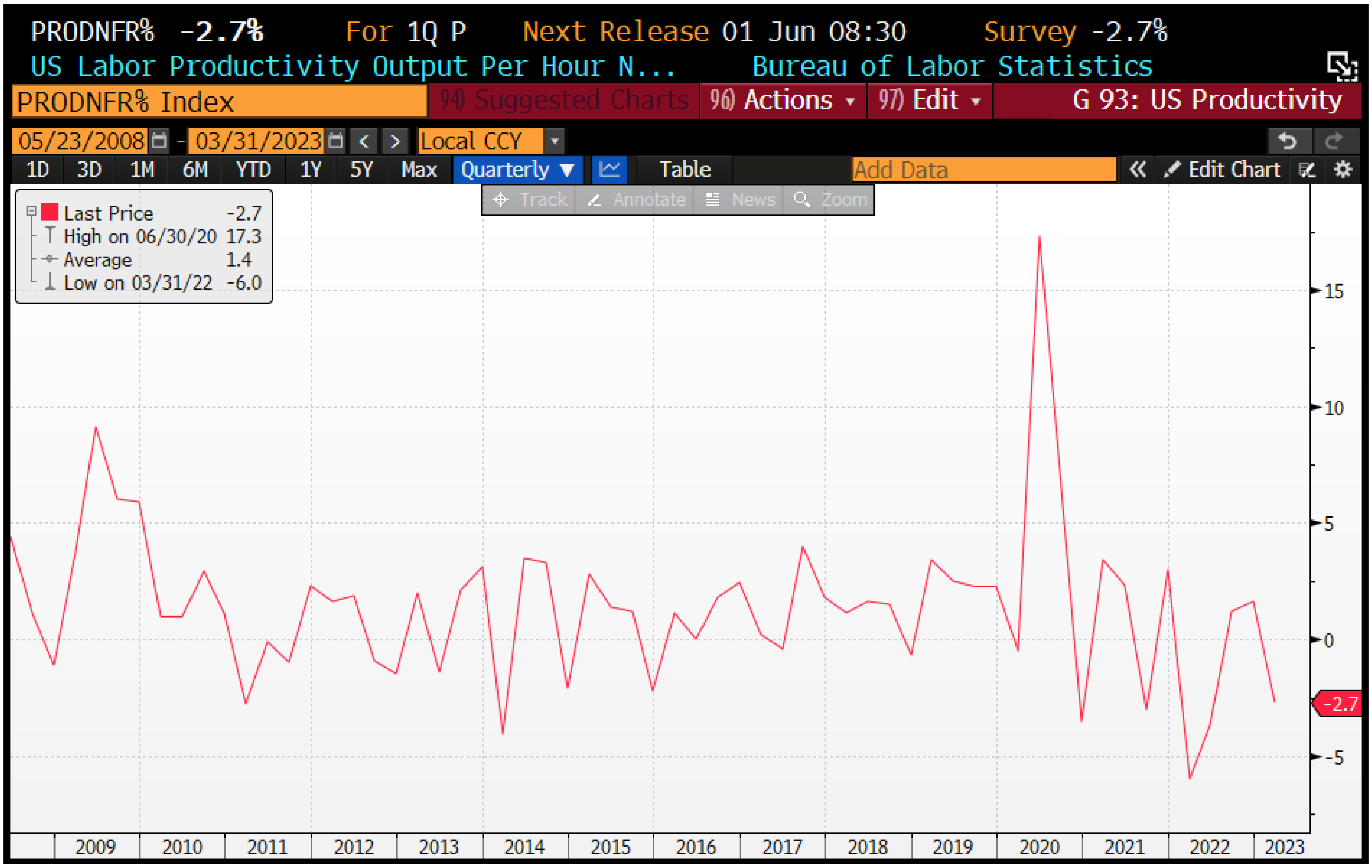
Source: NVDIA



I recently discovered that Italy has tried to block access to ChatGPT. Really? Do they expect it to go away or that Italian citizens can remain insulated from this innovation? No doubt we will see some dreadful things come from this modern technology. However, perhaps the most dangerous thing you could do for your citizenry is to prohibit them from using this powerful new tool. Most knowledge workers will have little choice but to fully embrace AI as a tool of leverage to perform jobs better and faster. With the highest inflation in over 40 years, productivity growth will be at a premium. If worker productivity moves materially higher because of AI adoption, then higher wages will be more justified, inflation will come down, and standards of living will rise. Interestingly, US productivity has been stagnant for a decade at just above 1%. I believe productivity could begin to trend higher because of AI (see Exhibit 4).

Exhibit 4: Productivity Needs a Boost – Along Comes AI

Source: Bloomberg, Capital Creek Partners Research



Let it Burn

When I was in Washington DC for the World Bank/IMF meetings in April, I learned that regulatory authorities in the US are well behind the innovation cycle speed of AI. The pace of change is so rapid that regulators cannot keep up. A divided government is also likely to impede the process of coherent regulation. On the other hand, the US Department of Defense is very keen on the private sector making breakthroughs in AI for obvious reasons. It is likely that AI innovators will be allowed to run free for a while until something goes terribly wrong. Washington politicians will then cry out for "something to be done." The powerful US technology titans are moving at light speed to beef up their capabilities and commercial AI offerings. A lack of regulation or lighter touch regulation may allow the US to solidify an early lead in developing and deploying AI across the knowledge economy. My expectation is that Europe and China will be more cautious compared to the US in how they allow AI to penetrate their economies and societies. The US has a long history of embracing technological advancements and I expect this will be the case for AI.

Remember the (Tech) Titans

The US technology titans are now locked in a titanic commercial battle to see who can gain an early lead and build an AI brand and mindshare with corporate and personal users. My read is that Microsoft (MSFT) has been the most decisive and aggressive with its AI strategy having bought 49% of ChatGPT and quickly folding it into Bing. However, the more I learn about the intellectual property embedded inside Alphabet (GOOG), the more excited I become. Having watched the talented Mark Zuckerberg for well over a decade, I want to bet on him to weave AI into META's social media and Web 3.0 offerings. Zuck is ruthless and will press every advantage that META possesses until the regulators brush him back. Besides, META appears well on its way to restructuring successfully and getting its swagger back.

NVIDIA (NVDA) is for now the key supplier of the advanced chipsets that drive large language models (LLM). We may be in a period when NVDA does not have much competition. The stock has responded forcefully and NVDA is within hailing distance of its all-time highs. How much more efficient will Amazon's (AMZN) logistical operations become a result of AI? My guess is a lot. The rapid adoption and increasing usage of AI could also reignite a boom for the AWS cloud services business. AI will undoubtedly create a lot more data and output to store in the cloud.

I am less clear about how AI fits in for Apple (AAPL), but who can bet against arguably the most successful technology company of all time? AAPL has long been a champion of security, which will be at a premium in the consumer market as AI begins to run on our personal devices.

I mistakenly started out this year with a bearish outlook on US technology. This has been wrong as the largest and most AI exposed of the tech titans have driven the INVESCO QQQ Trust ETF (QQQ) up 27 percent year to date. What I got wrong was underestimating big tech's ability to cut costs, generate prodigious cash flows, and continue to buy back hordes of stock. Now, AI has come along at just the right moment to help reignite revenue and earnings growth for big tech. ***You don't fight tech on the threshold of a major innovation wave.*** The Qs are up 32 percent from the October 2022 lows and are now well into a new bull market. The ongoing bull market is being powered by AI. Several key ingredients are there for AI related equities to turn into a bubble. We know that AI is experiencing historically rapid adoption, it is going to be transformative, it will likely help generate significant future revenues and profits, it will begin to stimulate the imagination of investors, and ultimately generate fear of missing out or FOMO. The one ingredient missing is liquidity. Financial liquidity is the mother's milk of equity bubbles. As the Fed acknowledges falling inflation and the smoldering banking crisis, they will likely go on hold and may have to inject liquidity into the banking system or begin cutting policy rates later this year. As M2 and the Fed balance sheet begin to grow again, the stage could well be set for the next tech stock mania, focused squarely on AI related equities.

Exhibit 5: QQQs Huge Outperformance Over the SPY in 2023 – Powered by AI

Source: Bloomberg, Capital Creek Partners Research

A Battle Royale for AI Dominance

The race for AI dominance may be the most important one since the space race of 1960s. If the US or China can gain a material edge, it could tip the balance both economically and militarily. If China decisively wins, it could become the new global hegemon. The stakes are very high here and the race may play out faster than most realize. Remember, speed is the key ingredient. I believe the US has several critical advantages. 1) The US has a deep innovation culture that has led all three of the earlier major tech wave innovation cycles of the last 60 plus years. 2) The US has a strong legal patent system, which protects intellectual property. This will likely attract the best innovators to our shores once more. 3) The profit motive is alive and well in the USA. In other words, if you make a large profit in AI, you can keep it and not get thrown in jail for being successful. 4) The US is home to the "tech titans" that are already leading AI innovation: MSFT, GOOG, NVDA, META, among others. 5) The US venture capital market is the most vibrant and robust in the world. Here at Capital Creek, we are already seeing an explosive increase in company formations and deal offerings for new companies in the AI ecosystem. 6) US tech companies have access to the absolute best semiconductor technology and chips sets that drive AI. 7) According to the OECD, the US is making many private sector AI investments with rational funding, while China is making fewer bets with massive or maybe even unlimited funding. 8) US regulation will be slow to adapt, thus letting the innovation culture flourish for a while.

China also has serious advantages that will keep them in the race and perhaps even allow them to become dominant. 1) "The end justifies the means." China can and will do anything in their collective power to win this race. They will view the AI race as existential. 2) Xi Jingping calls all the shots. This is an advantage because Xi will clear the way for Chinese tech innovators to access copious amounts of data, capital, the very best minds. We have already seen this movie with respect to cloning and driverless cars. Xi will be willing to accept enormous collateral damage to his own people if he thinks China can gain an edge. Think Mao in his maniacal quest for the atomic bomb in the 1950s. 3) China simply has more data and more engineers which are major advantages. Data is the "oil" of the information economy and China is the Saudi Arabia of data. 4) When China gets a top-down signal to move in a certain direction, they move, and they move fast. 5) Xi Jingping has contended for years that China's top-down authoritarian approach is superior to the profligate democratic system of the US that is besieged by polarization. AI is Xi's chance to prove to the world that his system is better. I expect the implacable Xi to move heaven and earth to achieve dominance in AI.

Great Power Constraints

The greatest constraint for China is the Chinese Communist Party's need for control. Top-down control reduces speed of development. Like all races, this one will be about speed. It will be exceedingly difficult for Party officials to control AI because it is changing so rapidly and there is still so much, we do not understand about this technology. Attempting to control AI could end up being like trying to control Covid-19. China clearly lags the US in semiconductor development. Without access to cutting edge NVIDIA chipsets, China is being forced to string together older, slower chips as a work around. The new NVIDIA chipsets for AI are said to be 20-30 times faster than older generations. The high-end semiconductor embargo against China has been surprisingly effective so far. China may ultimately catch up to the west on semiconductor technology but by then the AI race may be over. China has few natural allies. The allies they do have will be little help in collaborating on AI. North Korea, Pakistan, Russia, Syria, and Iran are not at the forefront of AI technology.

The US will likely be constrained by the inherent privacy of data. Private data sources such as Twitter can decide not to make their valuable information freely available to the likes of OpenAI or Google. Elon Musk has already said that he will charge a market rate for Twitter's data. Other data sources are likely to follow Musk. The US legal system could be both a blessing and a curse for AI development. As AI permeates our lives, businesses, and society we will see accidents and unintended consequences. Providers could get bogged down in lawsuits that could hamstring their ability to push forward. A good metaphor could be driverless cars. Several years ago, when a person in Arizona was injured by a wayward driverless car, the entire Google program was stopped in its tracks by local authorities. This is not an issue in China. People have been injured by driverless autos in China and it has been full steam ahead. China is simply more willing to tolerate collateral damage in the innovation process than the highly mature and legalistic US. The political polarization in the US could prevent an effective partnership between the public and private sectors. In China, companies have no choice but to cooperate with the Party and its directives.

In the end, I give the edge to the US. As politically polarized and fiscally broken as the US is, nobody does tech innovation like the US democratic/capitalist system. The golden goose is still alive, despite the malpractice in Washington. The much-maligned State of California and San Francisco Bay Area will be major factors in this race. While many want to count them out, I am not among them. The SF/Silicon Valley counter cultures of radical openness and eccentricity may be the ideal ecosystem in which AI innovation can germinate and thrive. This wild and open culture is the antithesis of what Xi Jingping has created in China with his "society of surveillance." Interestingly, US technology stocks have recently reasserted their trend of outperformance over China's tech national champions (see Exhibit 6).

Exhibit 6: MSCI US Tech/China Tech (FX adjusted)—US Tech Dominance Reasserted

Source: Bloomberg, Capital Creek Partners Research

Investing in AI or "How do we play it?"

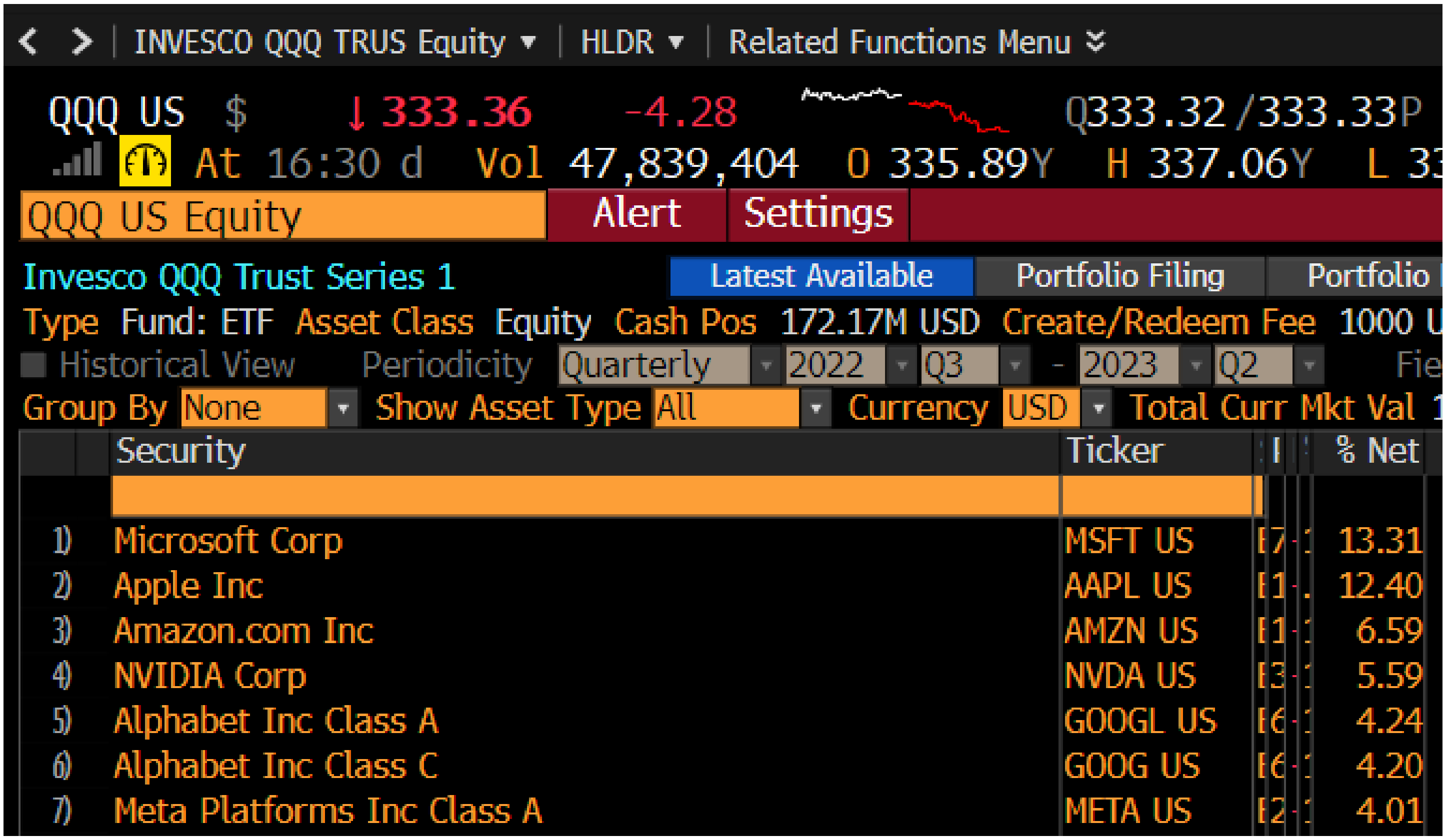
The AI theme can be indirectly accessed via the public equity markets. My investigation into this has left me unsatisfied due to the lack of pure plays available. I investigated all the publicly listed Exchange Traded Funds (ETFs) of significance. Each one had its flaws. Either the ETFs were illiquid, had extremely concentrated holdings, had too many holdings, were trading at significant premiums to NAV, or were too expensive with high management fees. I finally settled on the familiar INVESCO QQQ Investment Trust. This was among the first ETFs in the marketplace and has been around for almost 25 years. QQQ is highly concentrated in mega-capitalization technology companies that have legitimate and long-term material exposure to the AI investment theme. In addition, QQQ trades spot on its calculated net asset value, is extremely liquid, pays dividends of almost 1% annually, and has a competitive annual management fee of 20 basis points. QQQ is a simple and very well-known investment product that has stood the test of time. While not a pure play, QQQ will get investors fast and highly liquid exposure to the AI theme.

Exhibit 7: QQQ--The Best Overall Public Market Play on AI

Source: Bloomberg, Capital Creek Partners Research

Exhibit 8: QQQ Holdings and Weights

Source: Bloomberg, Capital Creek Partners Research



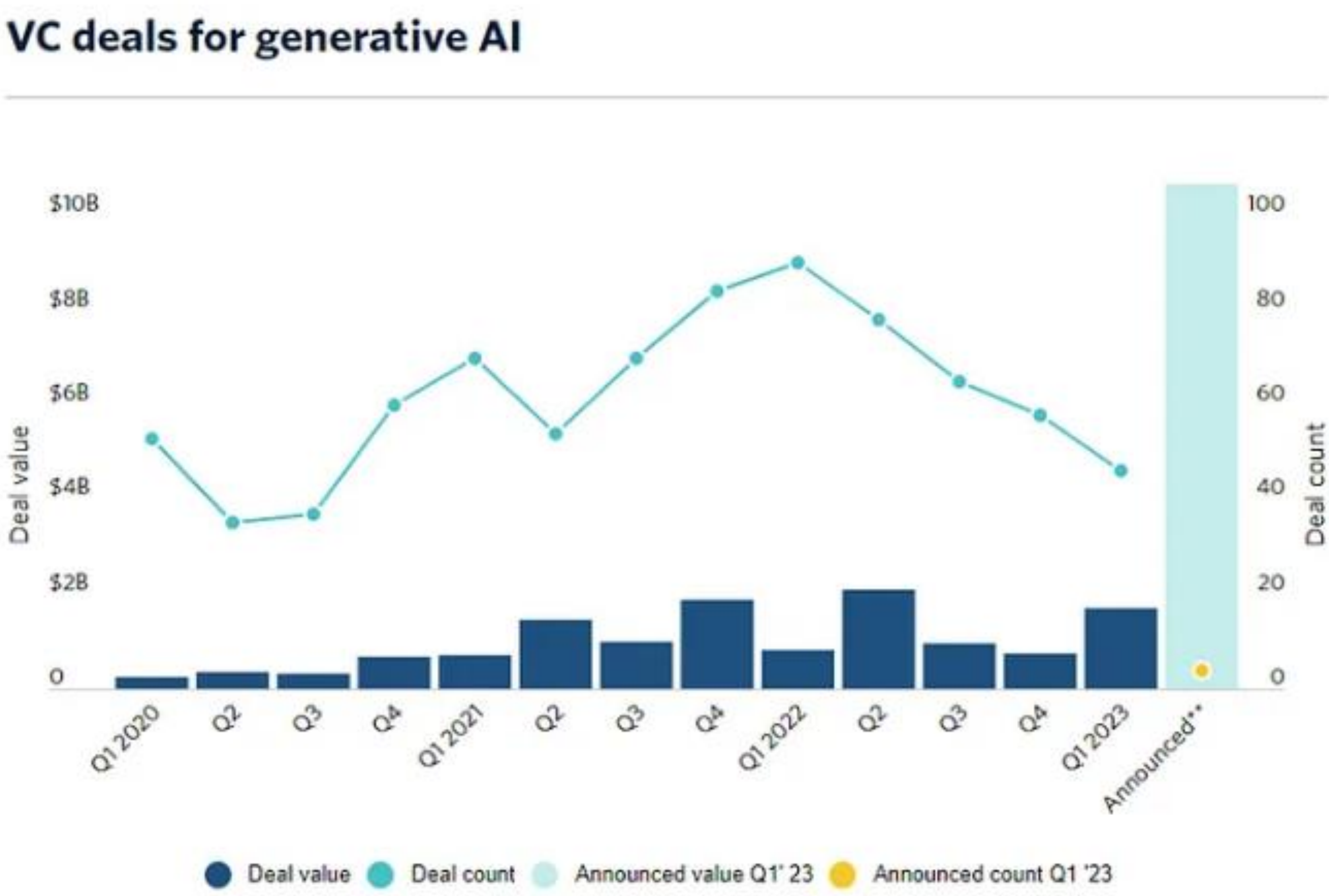
	Security	Ticker	% Net
1)	Microsoft Corp	MSFT US	13.31
2)	Apple Inc	AAPL US	12.40
3)	Amazon.com Inc	AMZN US	6.59
4)	NVIDIA Corp	NVDA US	5.59
5)	Alphabet Inc Class A	GOOGL US	4.24
6)	Alphabet Inc Class C	GOOG US	4.20
7)	Meta Platforms Inc Class A	META US	4.01

What's Your Alternative?

At Capital Creek Partners, we are starting to see significant AI related deal flow in the lower middle market tier of the venture capital and private equity universe, where we spend most of our time, resources, and due diligence capabilities. We think AI will be a significant source of innovation that is going to stimulate a potentially robust pipeline of innovative new companies. For patient investors who want to get in early on the AI theme, it is becoming clear that private markets will play a key role in allocating capital. As we saw with the Internet back in the late 1990s, and with social media in the late 2000s, the new unicorns in AI will get venture funding first. As they mature into profitable high growth companies with significant user bases, they will likely go public at enormous valuations. Others will be purchased at full price by the tech titans. The last 60 years of tech innovation cycles in the US have shown us that it pays to get involved early in major tech waves via the venture space. Of course, it has also been rewarding to then ride the wave in the public markets when the long-term winners get released as initial public offerings (IPOs) via the Wall Street capital market machines.

Exhibit 9: VC Deal Value for Generative AI Explodes in 1Q2023

Source: Pitchbook



A New Bull Market Born out of AI?

The more I discovered about the potential of AI to drive a fresh leg of growth for the Tech Titans, the more open I have become open to the idea that AI could help to drive a new bull market for large cap technology equities. From a technical perspective, the QQQ is already in a bull market, up over 32% from its bear market low of 254 on 10/13/22. If AI is powerful enough to move the needle on major economic data like inflation, productivity, GDP growth, and corporate earnings, it could also be at least partially responsible for helping to fuel a new bull market in US equities. From a behavioral perspective, highly visible gains in commercial applications for AI technology and continued rapid adoption of ChatGPT could help flip animal spirits from extreme caution post the devastating bear market of 2022 to bullish for the intermediate term. I can envision that by the third quarter of this year, company managements will be detailing their "AI strategies" and discussing how this technology could potentially flatter financial results. I had a front row seat at Morgan Stanley back in the mid-1990s when the growth of the Internet supercharged animal spirits from negative to positive. These early days of mass adoption of AI remind me of the dawn of the commercial Internet in 1995. Like today, the Fed had just finished a brutal tightening campaign, inflation was coming down, and growth was sluggish. If the analogue holds, those waiting for the "Gadot Recession" (continuously pushed into the future), to materialize may miss this bull market.

Concluding Thoughts

It is the job of serious investors to consider how major trends in technology innovation will affect the economy, business, geopolitics, and capital markets. I have no doubt after studying AI, that it will be a major force of innovation and creative destruction. I am convinced AI will contribute to lower inflation, lower interest rates, and higher equity prices, especially for large capitalization US Technology stocks. Investors and all humans will have to pay attention to this powerful technology that has reached a major tipping point. At Capital Creek Partners we are watching carefully and beginning to vet investment opportunities associated with AI. In addition, we are thinking proactively about how AI could disrupt or marginalize past or future investments. Our firm has decided to embrace the positive side of AI technology both in our business and in our approach to investing. The enduring lesson from prior technological waves is to adapt or perish.

AI adoption grows
Is it a thorn or a rose
Nobody knows