

INVESTMENT INSIGHTS

Prepared by: BNY Mellon Advisors

A Midsummer Night's AI Hallucination

JULY 2023

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Executive Summary

Five Trends to Consider

1. Artificial Intelligence (AI) and Machine Learning (ML) Impacting Markets

Major brokerage firms have forecast the potential for AI/ML techniques to boost profits for major corporations. In the U.S. stock market, the seven stocks of companies considered leaders in AI have contributed close to 100% of the gains for broad stock market indexes year to date through June 30.

2. Balancing Risk Versus Reward

AI could have transformative impact in three sectors: healthcare, professional services/IT and media/digital. However, there's a long list of concerns about AI including job loss and weaponization. Investors currently remain more focused on the upside potential.

3. Potential Impacts of an Extended Federal Reserve Tightening Cycle

We may find it more difficult to achieve the disinflationary effect we have witnessed in the first half of 2023 in the second half of the year. While the market has been waiting for the inevitable long and variable lags of tighter monetary policy to fully appear, the market has been riding a wave of better disinflationary news, better rate differentials with the rest of the world and a weaker dollar.

4. Realizing Real Rates

Investors should not fret about "top-ticking" longer-term interest rates. Locking in higher, longer-duration interest rates and having some patience to wait for gains typically has been part of the standard playbook for this part of the economic and interest rate cycle.

5. Finding the Forest Through the Trees

Parts of the international and emerging markets currently may offer much better value than the U.S. and may be offering entry points we have not seen in decades.

A Midsummer Night's AI Hallucination

I spent a summer as a teenage exchange student with a British family in the village of Aston Clinton in Buckinghamshire, United Kingdom (UK). One sublime evening, we took a long hike at dusk in the woods near Chequers, the 16th-century manor home that serves as the summer residence of the prime minister. As the sun diminished, I somehow got separated from the rest of the group. When I looked up to find my way, the twilight woods suddenly did not appear real. I had wandered into a landscape painting, familiar but ethereal. I almost reached out to touch the canvas. Like many things that happened a distant time ago, the memory still feels fresh, immediate and tangible.

“Are you sure that we are awake?”

–Shakespeare’s “A Midsummer Night's Dream” (Act 4, Scene 3)

Market Overview Index Returns (%) as of June 30, 2023

Index	2Q 2023	1 Yr.	3 Yr. ^	5 Yr. ^	2022	2021	2020	2019
S&P 500	8.7	19.6	14.6	12.3	(18.1)	28.7	18.4	31.5
MSCI USA Small Cap	5.3	15.4	13.8	6.8	(17.2)	19.6	18.9	27.4
MSCI EAFE (net of taxes)	3.0	18.8	8.9	4.4	(14.5)	11.3	7.8	22.0
MSCI Emerging Markets (net of taxes)	0.9	1.7	2.3	0.9	(20.1)	(2.5)	18.3	18.4
Bloomberg US Aggregate Bond	(0.8)	(0.9)	(4.0)	0.8	(13.0)	(1.5)	7.5	8.7
Bloomberg Global Aggregate ex-US	(2.2)	(1.8)	(5.9)	(2.7)	(18.7)	(7.0)	10.1	5.1
S&P GSCI Crude Oil	(6.6)	(33.2)	21.6	(1.0)	6.7	55.0	(20.5)	34.5
S&P GSCI Gold	(2.5)	6.2	1.1	7.8	(0.7)	(4.3)	20.9	18.0
Bloomberg Commodity	(2.6)	(9.6)	17.8	4.7	16.1	27.1	(3.1)	7.7
Bloomberg US Treasury Bill 6-9 Month	0.7	2.3	0.7	1.4	0.2	0.0	1.2	2.6
Inflation §	0.5	4.1	6.2	4.2	6.4	7.1	1.3	2.3

^3-year and 5-year returns are annualized

Sources: MSCI; Bloomberg; Standard and Poor's (©2023, S&P Dow Jones Indices LLC. All rights reserved); Bureau of Labor Statistics.

§ Inflation data through May 2023. Visual created by BNY Mellon Advisors, Inc. For additional information regarding the indices shown, please refer to the Important Disclosures at the end of this document. Indices are unmanaged and are not available for direct investment. **Past performance is not a guarantee of future results.**

For those of you still asleep or enchanted, artificial intelligence (AI) is having a moment both in the public imagination and in the stock market. AI refers to the simulation of human intelligence in machines that are programmed to think like humans and mimic human behavior. Perhaps AI should be better named “machine intelligence.” The word “artificial” implies that it's fake. What we term “AI” may just be a different kind of computational intelligence that can process oodles of information way faster than any human.

Machine learning (ML) is a type of AI system designed to automatically learn from experience without explicit programming. Other terms such as deep learning, neural networks and random forests refer to techniques used within AI data processes for different applications. Like Shakespeare, who contributed at least 420 words to the English language (e.g., addiction, bedroom, birthplace, cheap, dwindle, employer, fairyland, farmhouse, hint, lackluster, zany and many more), the adoption of AI/ML is changing our vocabulary. We generate new text, while simultaneously generating new words to describe what we are doing.

Software like OpenAI's ChatGPT, based on so-called large language models, can mimic virtually any kind of human-written text. It learns by mimicking a large training set of data. In this case, the training set is a "large language" database of text. ChatGPT is a "generative" AI tool designed to create new text-based compositions. In contrast, a "discriminative" model would classify data within the training set. It doesn't generate new data. For example, a model trained to examine X-rays for disease doesn't create new X-rays. It categorizes an existing X-ray and classifies it into discriminate categories.

Since the fall of 2022, generative models like ChatGPT have garnered enthusiasm for its uses. The generative models can create text, music, graphics or art. Yet, even with the newfound awareness, it's estimated that only 14% of Americans have tried it, according to the Wall Street Journal.

As one of the remaining 86% of the luddites, I gave it a go. I opened a ChatGPT account in about two minutes. Like a harried college sophomore, I asked the chatbot to write a paragraph explaining the major themes of Shakespeare's "A Midsummer Night's Dream." I edited the response, but the following is what it wrote back to me.

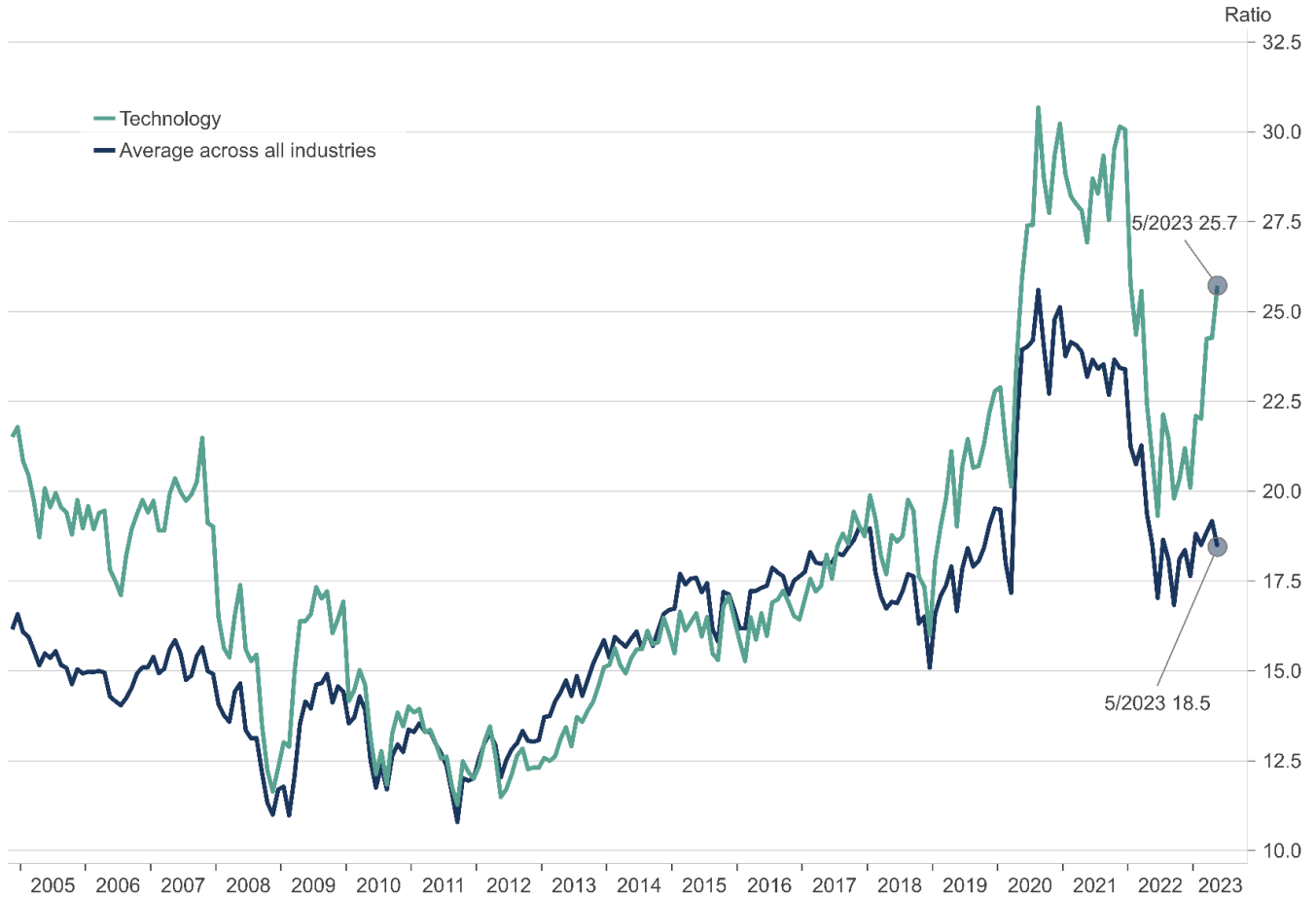
"'A Midsummer Night's Dream', one of William Shakespeare's most beloved comedies, explores several major themes that intertwine throughout the play. A prominent theme is the contrast between reality and illusion. Shakespeare blurs the lines between the natural and supernatural realms, questioning the nature of perception and challenging the audience's understanding of what is real. The play also delves into the theme of dreams and the power of the imagination, suggesting that dreams can reveal hidden truths and ignite the creative spirit. These themes combine to create a whimsical and enchanting tale that examines the complexities of human nature."

**“Lovers and madmen have such seething brains,
Such shaping fantasies, that apprehend
More than cool reason ever comprehends.”**

–Shakespeare’s “A Midsummer Night's Dream” (Act 5, Scene 1)

Major brokerage firms have gushed about the potential for AI/ML techniques to boost profits for major corporations. In the U.S. stock market, the seven stocks of companies considered leaders in AI have contributed close to 100% of the gains for broad stock market indexes year to date through June 30. Yes, that means the other hundreds or thousands of stocks in an index contributed nothing or next to nothing. Many of the other stocks detracted from performance year to date through June 30. Call option volume on a handful of tech names this year has been breaking records, according to the Wall Street Journal. FactSet reported that 110 of the S&P 500® Index companies, and a large proportion of communications and information technology sector stocks, cited "AI" on their recent earnings calls, up from two in the second quarter of 2011. This enthusiasm for AI has helped push the price/earnings multiple on the tech sector up to a very wide historical spread to the remaining sectors in the U.S. market.

U.S. Tech Stocks Price/Earnings (P/E) Ratio Soars Above Other Industries



Sources: BNY Mellon Advisors, Macrobond. Data as of May 2023.

This relative narrow leadership in the U.S. stock market has its share of puzzled detractors. Some interpret the market narrowness bullishly. What could happen when the other 493 stocks in the SP&P 500 Index catch up? Others interpret it negatively. That is, what happens when the high-flyers, like Icarus, come crashing back down? While it's easy to draw parallels to the behavior of internet stocks during the time period that immediately preceded the peak in the NASDAQ tech boom in 2000, we're a long way away from the type of extreme valuations we witnessed in that era. Most of the companies leading the AI market charge have rapidly growing revenues and actual earnings. Moreover, interest rates were higher in the dot-com era, making a justification of extreme fundamental valuations, that prevailed at that time, even more incredible. Still, many worry the public is embracing a new love affair with transformative tech just as a myriad of cyclical warning signals flash concern about the near-term macro-outlook.

Emotional Entanglement

I also asked ChatGPT, "Is the stock market's leadership narrow this year?" The following is the chatbot's reply:

"As an AI language model, I don't have real-time data or insights beyond my last knowledge update in September 2021. Therefore, I cannot provide an accurate assessment of the current state of the stock market's leadership. The market dynamics can change frequently, and the breadth or narrowness of leadership can vary over time. It would be best to consult up-to-date financial sources, market analysts, or investment professionals for the most recent information and analysis regarding the stock market's leadership."

Ah, now that sounds like a trained human response!

Many AI/ML tools are designed to be predictive. They analyze the data, the "training set," and calculate a probability that another action will occur from prior behaviors. Therefore, it has not taken long for asset managers to attempt to apply the technology to picking stocks and bonds. Given enough data, it is possible that a predictive AI/ML tool could outperform portfolio managers. However, the ability to predict stock price movements has often been in doubt. For example, a popular book on stock market patterns has been Burton Malkiel's *A Random Walk Down Wall Street*. In that book, Malkiel argues that it is difficult to outperform the market average (an index) because markets are extremely efficient in pricing securities. Under the efficient markets theory, any price move in one period is independent of price movements in the next period. Predictive AI/ML tools could challenge efficient markets if they find pricing anomalies and continuously learn from new data.

One of my market mentors would frequently remind me that "the stock doesn't know you're in love with it." Like the characters in a play, we can get emotionally and inappropriately entangled in our successes and our reveries. Financial gain, even if irrational, feels wonderful. We don't want to be reminded that "trees don't grow to the sky." We're often blinded by our enthusiasm.

**"...and yet, to say the truth, reason and
love keep little company together now-a-days..."**

–Shakespeare's "A Midsummer Night's Dream" (Act 3, Scene 1)

It's typically been this way. In the 1920s, the enthusiasm for the rapid electrification of the country was a major contributor to the roaring stock market. Many start-up firms were established to create the nation's electricity grid. Yet only a fraction of those electricity companies ultimately survived the stock market crash and subsequent economic downturn. A similar pattern emerged from the internet mania that occurred during the tech market of 1998-2000. Famously, many of the pioneer companies did not survive or were gobbled up by players who joined the internet game later. Will the companies currently considered leaders in AI remain at the forefront? Only time will tell.

"AI hallucination" is a term that describes an output from an AI/ML process that sounds perfectly logical and reasoned yet bears little resemblance to reality. The output may be unfaithful to the data provided for the training set. An AI/ML process could create a response that is nonsensical or unjustified. It doesn't hold up under scrutiny. The "hallucination" could come from improper training or misspecified data.

**"...I have had a most rare vision.
I had a dream, past the wit of man to say what dream it was...
...The eye
of man hath not heard, the ear of man hath not
seen, man's hand is not able to taste, his tongue
to conceive, nor his heart to report, what my dream was..."**

–Shakespeare's "A Midsummer Night's Dream" (Act 4, Scene 1)

AI Risk Versus Reward

A survey of 119 chief executive officers (CEOs) conducted at a recent Yale conference found that 42% of the CEOs believed AI could "destroy humanity in five to ten years." They also indicated that AI could have a transformative impact in three sectors: healthcare (48%), professional services/IT (35%) and media/digital (11%). Currently, CEOs appear to be convinced of the potential transformative abilities of the technology.¹

There is a long list of concerns about AI. The first may be job losses. If a computer algorithm can perform a job as well as a human, workers will need to upskill to remain in the workforce. Workers have frequently had to adapt to a changing economy. Consider that in the U.S., approximately 95% of the country was engaged in subsistence level farming at our founding. Now, less than 2% of the workforce feeds the world.

Besides jobs, there are additional concerns. Foremost is the connection of AI to weaponry. Man's savagery to man is already well documented. Autonomous weapons could become even more terrifying and lethal. If the output from AI becomes indistinguishable from human intelligence, how can we identify "deepfakes"? How do we minimize bias in AI decisions if bias was part of the training set? If AI is predictive, can it be used to survey the population in an authoritarian manner?

"One sees more devils than vast hell can hold."

—Shakespeare's "A Midsummer Night's Dream" (Act 5, Scene 1)

Because of these and other widespread risks and concerns, AI companies likely face more regulation, which could lower return on capital. Several bills designed to regulate corporate AI/ML efforts are working their way through Congress. Regulation may be slow to adapt to these newfound technologies. AI companies also may have a long way to go to prove their product viability, as users may remain skeptical of the output and wary of any benefits.

Investors currently remain more focused on the upside potential. As a general-purpose technology tool, it's possible that AI/ML could stimulate adjacent technologies and spur general productivity gains. It is also possible that the productivity gains from AI/ML are more prosaic and are simply part of the general technology productivity we may have been benefiting from for the past several decades. There is scant evidence of any universal productivity gains from AI/ML so far. Even a chatbot can't yet answer the many questions about the longer-term impact of these powerful new computer technologies.

Dreams of Rate Cuts

Meanwhile in monetary policy, the market has quietly repriced higher interest rates for longer. Markets have also begun to price in the possibility of an additional interest rate hike or two from the Federal Reserve. Like the characters in "A Midsummer Night's Dream," equity market investors appear to have been in a reverie. Many have convinced themselves the Federal Reserve will hike interest rates once or twice more but then rapidly cut them again in the back half of the year into early 2024. We see that as unlikely. The Federal Reserve has frequently communicated that "higher for longer" is the more likely course while "core" inflation remains stubbornly sticky at a relatively high level. We're somewhat concerned that we have already received many of the benefits from easier comparisons versus last year in the indexed inflation statistics. In the second half of the year, it could be more difficult to achieve the disinflationary effect we have witnessed in the first half of 2023.

¹CNN "Exclusive: 42% of CEOs say AI could destroy humanity in five to ten years" by Matt Egan June 14, 2023

“To fan the moonbeams from his sleeping eyes.”

–Shakespeare’s “A Midsummer Night's Dream” (Act 3, Scene 1)

Yet, so far this year, while the market has been waiting for the inevitable long and variable lags of tighter monetary policy to fully appear, the market has been riding a wave of better disinflationary news, better rate differentials with the rest of the world and a weaker dollar. All of that has been good news. We pointed out several quarters ago that the labor market might perform unusually well, which has indeed been the case, even five quarters after the Federal Reserve began its tightening process. Companies may be hoarding labor after a period of pandemic labor scarcity.

It's possible that both monetary and fiscal policy have long and variable lags. Excessive stimulus in the COVID-19 era may still be helping to shape rather optimistic consumer attitudes. As long as the labor market remains resilient, the U.S. consumer could hold up better than analysts expect. As 68% of gross domestic product (GDP) derives from consumer spending, overall economic output may perform better as well. While the economy performs better than expected, expensive stocks can get more expensive.

It's more likely, though, the macro picture darkens somewhat in the second half of 2023. We wrote last quarter about likely tightening credit from the banking channel ([Investment Insights: Rigged for Silent Running](#)). Unfortunately, yield curves, manufacturing surveys, earnings and housing prices also signal that we may not have yet fully realized the pressures from an extended Federal Reserve tightening cycle – a cycle that may not yet have run its full course.

U.S. TIPS 10-Year Yield (%)

Real Yield (%) with Trend Line and Standard Deviation Band



Sources: BNY Mellon Advisors, Macrobond, U.S. Department of the Treasury. Data as of June 30, 2023.

Treasury Inflation-Protected Securities (TIPS) Get Real Rates

In our view, several areas of the market demand extra attention from investors now. Today, we believe shorter maturity interest rates look more attractive than they have in many years. Over 2022, the entire bond market repriced. For example, we show the 10-year TIPS rate in the graph. TIPS are quoted in "real," after-inflation interest rates. They are higher than any time in more than decade. However, if the long and variable lags of tightening Federal Reserve policy do begin to have more of an impact over the next several quarters, longer-duration bonds should also begin to gain favorability. We believe there is little reason for investors to fret too much about "top-ticking" longer-term interest rates. If the general shape of longer rates begins to turn lower due to cyclical pressure, eventually there will be pressure on the Federal Reserve to lower shorter duration interest rates again. Locking in higher, longer-duration interest rates and having some patience to wait for gains typically has been part of the standard playbook for this part of the economic and interest rate cycle.

We still believe that parts of the international and emerging markets currently offer much better value than the U.S. While cyclical deterioration has begun to appear in many places around the world, many international markets already sport large fundamental discounts to U.S. assets. We believe some of the growth risks appear to be priced in. Emerging markets, debt and equity both, appear to offer compelling value, in our view. The additional political risk from owning emerging markets presents a challenging factor for investors to consider. Still, based on most future projections of demographics and likely capital formation, emerging markets may be offering entry points we have not seen in decades.

When we were wrapping up our commentary, the news broke that a short-lived coup attempt took place in Russia. As most Russian assets have been evicted from many Western portfolios, this event will have less of an investment impact but still constitutes pure political risk. It elevates the range of potential outcomes that could occur and thus is a source of additional uncertainty to markets. Fortunately, markets have likely priced in a potential shock from this region.

We should also mention that the financial community lost a giant on June 22, 2023. Harry Markowitz, 95, who modernized financial theory by connecting and optimizing expected returns with expected risk. In addition to a Nobel Prize in Economics in 1990 for his work on portfolio theory, he also won a Jon von Neumann Theory Prize. He may have been prouder of the latter. It had become fashionable in certain circles to malign his portfolio theory, written in 1952. While newer techniques have evolved, he still deserves the credit for the original idea. Moreover, he performed those calculations when computing power was at a dear premium.

Back to Reality

**"That you have but slumber'd here
While these visions did appear."**

—Shakespeare's "A Midsummer Night's Dream" (Act 5, Scene 1)

As my conversation with ChatGPT pointed out, the main theme of "A Midsummer Night's Dream" may be the fickle nature of human attention. In the play, according to Chat GPT, "...love can be both a powerful force capable of causing chaos and a source of transformation and reconciliation." Shakespeare is talking about romantic love, but investors can feel tremendous affection for their favorite securities. As we've seen in the past, these types of investor manias may grab hold of investor attention for a long and variable amount of time.

Electricity was transformative. The internet was transformative. Tulip bulbs? Not so much. Whether the benefits accrued to the early investors in the AI movement will continue remains dubious. Today, AI/ML enthusiasm is having a great effect on the entire market. We can't really say at this juncture how long this enthusiasm will last or how impactful it will be on the market or the economy. It could be real. It could be illusory, an "AI hallucination." When you take your next walk in a forest, both the walk and the forest may be random.

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It is important to remember that there are risks inherent in any investment and that there is no assurance that any money manager, fund, asset class, index, style or strategy will provide positive performance over time.

Diversification and strategic asset allocation do not guarantee a profit or protect against a loss in declining markets. **All investments are subject to risk, including the loss of principal.**

Foreign investments are subject to risks not ordinarily associated with domestic investments, such as currency, economic and political risks, and may follow different accounting standards than domestic investments.

Investments in emerging or developing markets involve exposure to economic structures that are generally less diverse and mature, and to political systems that can be expected to have less stability than those of more developed countries. These securities may be less liquid and more volatile than investments in US and longer established non-US markets.

Investments in fixed income securities are subject to several general risks, including interest rate risk, credit risk, the risk of issuer default, liquidity risk and market risk. These risks can affect a security's price and yield to varying degrees, depending upon the nature of the instrument, and may occur from fluctuations in interest rates, a change to an issuer's individual situation or industry, or events in the financial markets. In general, a bond's yield is inversely related to its price. Bonds can lose their value as interest rates rise and an investor can lose principal. If sold prior to maturity, fixed income securities are subject to gains/losses based on the level of interest rates, market conditions and the credit quality of the issuer.

Liquidity risk increases when particular investments are difficult to purchase or sell. A lack of liquidity also may cause the value of investments to decline. Illiquid investments may be harder to value, especially in changing markets. Typically, liquid investments may become illiquid, particularly during periods of market turmoil. When illiquid assets must be sold in such market conditions (to meet redemption requests or other cash needs for example), it may be necessary to sell such assets at a loss.

Investments in technology-related companies may be negatively impacted by, among other things, intense competition, earnings disappointments, rapid obsolescence of products and services due to technological innovations or changing consumer preferences, issues with obtaining financing or regulatory approvals, product compatibility and high required corporate capital expenditure for research and development or infrastructure and development of new products.

Investments in artificial intelligence companies, especially smaller companies, tend to be more volatile than companies that do not rely heavily on technology. Artificial intelligence companies face intense competition and potentially rapid product obsolescence, and many depend significantly on retaining and growing the consumer base of their respective products and services. Artificial intelligence companies are heavily dependent on intellectual property rights and may be adversely affected by loss or impairment of those rights. There can be no assurance such companies will be able to successfully protect their intellectual property to prevent the misappropriation of their technology, or that competitors will not develop technology that is substantially similar or superior to such companies' technology. Company products and services may be impacted by legal and regulatory changes, particularly related to information privacy and data protection. Artificial intelligence companies typically engage in significant amounts of spending on research and development, and there is no guarantee that the products or services produced by these companies will be successful.

Investments in small/mid-capitalization companies involve greater risk and price volatility than an investment in securities of larger capitalization, more established companies. Such securities may have more limited marketability and the firms may have limited

product lines, markets and financial resources than larger, more established companies.

Investments in gold bullion come with additional risks. The price of gold has fluctuated widely over the past several years. Several factors affect the price of gold, including global supply and demand; global or regional political, economic or financial events and situations, investors' expectations with respect to the rate of inflation; currency exchange rates and interest rates. There is no assurance that gold will maintain its long-term value in terms of purchasing power in the future.

Investments in natural resources-related companies may be negatively impacted by variations, often rapid, in the commodities markets, the supply of and demand for specific products and services, the supply of and demand for oil and gas, changes in energy prices, exploration and production spending, government regulation, economic conditions, events relating to international political developments, environmental and safety regulations, energy conservation, the success of exploration projects and environmental incidents. As a result, the securities of natural resources companies may experience more price volatility than securities of companies in other industries.

Past performance is not a guarantee of future results. Current performance may be lower or higher than the performance data quoted. The investment return and principal value of an investment will fluctuate, so that an investor's assets, when sold, may be worth more or less than their original cost.

Inflation is the rate at which the general level of prices for goods and services is rising and, consequently, the purchasing power of currency is falling.

The information on indices is presented for illustrative purposes only and is not intended to imply the potential performance of any fund or investment. Index performance assumes the reinvestment of all distributions but does not assume any transaction costs, taxes, management fees or other expenses, which would reduce the performance shown. Indices unmanaged and are not available for direct investment.

Bloomberg Global Aggregate ex-US Bond Index: The Bloomberg Global Aggregate ex-US Bond Index is designed to be a broad-based measure of the global investment-grade, fixed rate, fixed income corporate markets outside the United States.

Bloomberg US Aggregate Bond Index: The Bloomberg US Aggregate Bond Index represents securities that are SEC registered, taxable and dollar denominated. The index covers the US investment-grade fixed rate bond market, with index components for government and corporate securities, mortgage pass-through securities and asset-backed securities. These major sectors are subdivided into more specific indices that are calculated and reported on a regular basis. Securities must have at least one year to final maturity regardless of call features and must have at least \$250 million par amount outstanding.

Bloomberg US Treasury Bill 6-9 Month Index: The Bloomberg US Treasury Bill 6-9 Month Index represents United States-issued government debt with a bond maturity between six months and nine months.

Bloomberg Commodity Index: The Bloomberg Commodity Index is designed to be a highly liquid and diversified benchmark for the commodity futures market. The index is composed of exchange-traded futures and represents 20 physical commodities, which are weighted to account for economic significance and market liquidity (subject to weighting restrictions). On July 1, 2014, the Dow Jones UBS Commodity Index rebranded as the Bloomberg Commodity Index.

Consumer Price Index (CPI): The Consumer Price Index (CPI), as measured by the U.S. Bureau of Labor Statistics, represents changes in prices of all goods and services purchased for consumption by urban households.

MSCI EAFE (Europe, Australasia and the Far East) Index (net of taxes): The MSCI EAFE (Europe, Australasia and the Far East) Index (net of taxes) is a free-float-adjusted market-capitalization index that is designed to measure developed market equity performance, excluding the United States and Canada. As of June 30, 2022, the MSCI EAFE Index consisted of the following 21 developed market country indices: Australia, Austria, Belgium, Denmark, Finland, France, Germany, Hong Kong, Ireland, Israel, Italy, Japan, the Netherlands, New Zealand, Norway, Portugal, Singapore, Spain, Sweden, Switzerland and the United Kingdom. The index is net because dividends are reinvested after deducting a withholding tax from dividend distributions. Since taxes are withheld from the MSCI EAFE Index (net of taxes), the performance of the MSCI EAFE Index (net of taxes) will generally be lower than that of the MSCI EAFE Index (gross of taxes).

MSCI Emerging Markets Index (net of taxes): The MSCI Emerging Markets Index (net of taxes) is a free-float adjusted, market-capitalization index that is designed to measure equity market performance of emerging markets. As of June 30, 2022, the MSCI Emerging Markets Index consisted of the following 24 emerging market country indices: Brazil, Chile, China, Colombia, Czech Republic, Egypt, Greece, Hungary, India, Indonesia, Korea, Kuwait, Malaysia, Mexico, Peru, Philippines, Poland, Qatar, Saudi Arabia, South Africa, Taiwan, Thailand, Turkey and United Arab Emirates. The index is net because dividends are reinvested after deducting a withholding tax from dividend distributions. Since taxes are withheld from the MSCI Emerging Markets Index (net of taxes), the performance of the MSCI Emerging Markets Index (net of taxes) will generally be lower than that of the MSCI Emerging Markets Index (gross of taxes).

MSCI USA Small Cap Index: The MSCI USA Small Cap Index is an unmanaged index designed to measure the performance of the small-cap segment of the US equity market. The index represents approximately 14% of the free float-adjusted market capitalization in the US.

S&P GSCI Gold Index: The S&P GSCI Gold Index, a subindex of the S&P GSCI Index, provides investors with a reliable and publicly available benchmark for investment performance in the gold commodity markets. The index is designed to be tradable, readily accessible to market participants and cost efficient to implement. The S&P GSCI Index is widely recognized as the leading measure of general commodity price movements and inflation in the world economy.

S&P GSCI Crude Oil Index: The S&P GSCI Crude Oil Index, a sub-index of the S&P GSCI, provides investors with a reliable and publicly available benchmark for investment performance in the crude oil commodity markets. The index is designed to be tradable, readily accessible to market participants and cost efficient to implement. The S&P GSCI is widely recognized as the leading measure of general commodity price movements and inflation in the world economy. Spot price in the S&P GSCI means the price of the S&P GSCI futures holdings.

S&P 500 Index: The S&P 500 Index, an unmanaged index, includes 500 of the largest stocks (in terms of stock market value) in the United States; prior to March 1957, it consisted of 90 of the largest stocks. Although the S&P 500 focuses on the large-cap segment of the market, with approximately 80% coverage of US equities, it is also used as a proxy for the total US equity market.

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