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GOLDEN FORESIGHT: WHEN SPECULATION MEETS HISTORY

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Picture it, if you will: December of 2029. In a dimly lit private dining room, the sound of cutlery clinking blends with spirited conversation. Gathered at this stately round table is a diverse group of investors. Some wear the hard-fought wrinkles of significant gains, while others wear the furrowed brows of regrettable losses. What stratagems, one wonders, divided the winners from the less fortunate?

To call the 2020s volatile might be akin to calling the sun slightly warm. Consider 2020, with the globe in the clutches of COVID-19. Then there was the inflationary flare of 2022, a fire stoked by Russia's move on Ukraine. Central banks, as reactive as ever, escalated rates in a dramatic fashion, prompting many to toast to the Federal Reserve's apparent mid-2023 success. Alas, as the hypothetical scene suggests, the party might have been premature.

The prevailing wisdom of 2023 still held that oil demand had seen its heyday in late 2019. How baffling, then, that by the end of the decade, demand kept reaching new unexpected

RENEWABLE ENERGY, HAILED AS THE SAVIOR OF BOTH WALLET AND ENVIRONMENT, TOOK A RATHER IRONIC TURN. WITH HEAVY GOVERNMENT BACKING, ALL THAT THESE “CLEAN” ENERGIES SEEMED TO GENERATE WAS ESCALATING ELECTRICITY COSTS AND PERSISTENT POWER SHORTAGES, PLAGUING THE VERY WESTERN ECONOMIES THAT CHAMPIONED THEM.

highs, largely propelled by emerging markets like India. A trust in the boundless potential of the US oil shales was dashed, as production waned midway through our tumultuous decade. The American solution, releasing a sizable portion of its strategic reserves, was a mere temporary salve, and oil’s price ascended to dizzying heights. In a few short years, oil had gone from universally accepted as “uninvestable” to the “must-own” asset class.

A brief upturn in food prices post the Russian-Ukraine conflict turned out to be just the opening act. The main event? A succession of agricultural calamities, the most severe being a midwest US drought, eerily reminiscent of the 1930s Dust Bowl.

Renewable energy, hailed as the savior of both wallet and environment, took a rather ironic turn. With heavy government backing, these “clean” energies seemed to generate only escalated electricity costs and persistent power shortages, plaguing the very Western economies that championed them.

The mighty dollar began the decade without peer. Yet, halfway through the 2020s, the musical chairs of global monetary order began, with nations gravitating towards their own currencies and the golden touch of precious metals to square off their imbalances.

With the dollar’s retreat, the inflationary inferno pushed commodity demand significantly higher. Bonds were not spared, resulting in the central banks’ predictable rescue operation as governments had trouble rolling over their short-term obligations.

Equity markets too grappled with inflation’s weight and the diminishing lure of bonds. A stark illustration: The Dow Jones Industrial Average’s relationship with gold. From a once formidable 20:1 ratio at the decade’s onset, a historical crossroads loomed: ten years later, they looked set to cross – a rare event that had occurred only three times in 140 years (1896, 1932-4 and 1980).

Retrospect at our 2029 table illuminated the follies and triumphs of a decade. Those that had bought the “must own” assets of the early 2020s (i.e., fixed income and growth stocks) were rewarded with the worst inflation-adjusted returns. Conversely, the assets most universally hated at the start of the 2020s (i.e., hard assets) produced the best returns by far. Leading that hard asset class would be the quintessential “hard” asset: gold.

Those far-sighted souls who, a decade earlier, had the wisdom to acquire gold found themselves comfortably ensconced in the cozy realm of foresight. While much of the market grappled, rather inelegantly, with the unforeseen maladies of the decade — resulting in discernible, tangible losses in what were once deemed “safe” portfolios — these astute speculators sat on the very asset that the generalist hordes suddenly found irresistible. Come the twilight of the 2020s, they stood not just as benefactors of their own prudence but as the envy of many, having firmly secured the reins of their financial future.

Peering into fog of the future, one is invariably met with a degree of uncertainty, a kind of myopia if you will. Yet, it might amuse our diligent readership that the unforeseen turns and tempests in today’s financial landscape were none other than the subjects dissected at our Fall 2022 Investor Day.

Marko Papic candidly expounded on our trajectory: veering away from the quiet sanctity of a unipolar world to the cacophonous theaters of multipolarity. The aspiring occupant of the Oval Office, Vivek Ramaswamy, elucidated on the curious ways ESG pressures have

begun to distort corporate investment, particularly when one treads the rugged terrains of natural resources. Leigh Goehring sounded the clarion call on a looming metamorphosis – our gas fields, both global and our own continental, teetering on the brink of a structural deficit. As for agriculture? Shaun Hackett painted a frosty panorama, hinting at the dawning of a global cooling epoch, replete with its tantrums of volatile weather and crop yields that greatly disappointed. Adam Rozencwajg warned of the faux allure of renewables, focusing on the paradoxical energy crisis it might birth, thanks to the nettlesome issue of their efficiency. Edward Chancellor, always the astute historian, regaled us with tales of investment cycles, drawing our gaze to the grand pendulum swings in energy and metals – a narrative of liquidation, but promising prosperity in its aftermath.

Now, it's true that at Goehring & Rozencwajg, our crystal ball isn't infallible. Yet, it's in our DNA to speculate, prognosticate, and occasionally, pontificate. An interesting tapestry woven by our speakers was a shared spirit of contrarianism, a thirst to not just see the future but to envision it with a tint different from the many.

The golden thread for our attendees? A bullish outlook for several commodities. But ah! One precious element was not discussed: gold. The gilded metal, we assert, stands on the precipice of a roaring bull run, perhaps echoing its luminous days of the '70s and the 2000s. Despite its sluggish dance since the commodity rally began in May 2020, with gold's mere 15% advance looking rather pale against the Rogers International Commodity Index's 160% and the Goldman Sachs Spot Commodity Index's 125% leap, we sense an imminent turn of the tides. Investors, it seems, might be getting one last golden ticket.

Those with long memories might remember how gold became the “must-own” asset of the 1970s. We believe the same thing is happening today. Gold demand will come from speculators seeking a short-term profit and generalist investors seeking protection from financial turmoil and mounting inflationary pressures. Gold and silver were radically undervalued in 1971. Over the next decade, they were the best-performing asset class. Between 1970 and the peak in January 1980, gold and silver surged 2,000% and 2,800%, respectively. After peaking in 1980, gold spent the next 20 years drifting lower. By 1999, it had become as cheap as ever on many metrics. Between 1999 and today, gold advanced more than eight-fold, significantly outperforming stocks and bonds. Despite its strong appreciation, we believe gold remains exceptionally cheap based on our framework. In the following essay, we will describe our valuation techniques and show that gold still has a considerable upside, irrespective of what occurs in global financial markets.

The question remains: Come 2029, on which side of the table do you envision yourself?

The Upcoming Gold Bull Market: How High Will Gold Prices Go?

Gold is no different than any other asset class: it becomes popular, rises in price, is overvalued, and ultimately represents a poor investment. Other times, it undergoes periods of investor disinterest, suffers sustained price declines, becomes undervalued, and ultimately represents an excellent investment.

GOLD HAS BEEN IN A BULL MARKET FOR NEARLY A GENERATION, LEAVING MANY QUESTIONING IF IT STILL REPRESENTS AN ATTRACTIVE INVESTMENT AS IN THE LATE 1960S OR 1990S.

We are not gold bugs. Over the long term, gold protects monetary debasement; however, unlike equities, gold will provide little real return. If an investor can identify periods when gold becomes extremely undervalued, it can offer exceptional excess returns, often uncorrelated with other financial assets.

The key is figuring out when gold is undervalued and overvalued.

In this essay, we will describe the various valuation frameworks we have used over many years to estimate gold price targets and determine when to add or reduce our gold exposure.

In May 2000, I was profiled in Forbes ([link](#)) and discussed gold's radical undervaluation. I predicted gold would reach \$2,500 per ounce before the bull market ended. When the article was published, gold was \$275 per ounce, and continuous central bank selling had left investors wildly bearish towards the so-called "barbarous relic." Our valuation framework pointed instead to substantial potential returns. Although gold never hit our \$2,500 target, it reached \$1,900 in 2011 and was the best-performing asset class of the 2000s.

Gold has been in a bull market for nearly a generation, leaving many questioning if it still represents an attractive investment as in the late 1960s or 1990s.

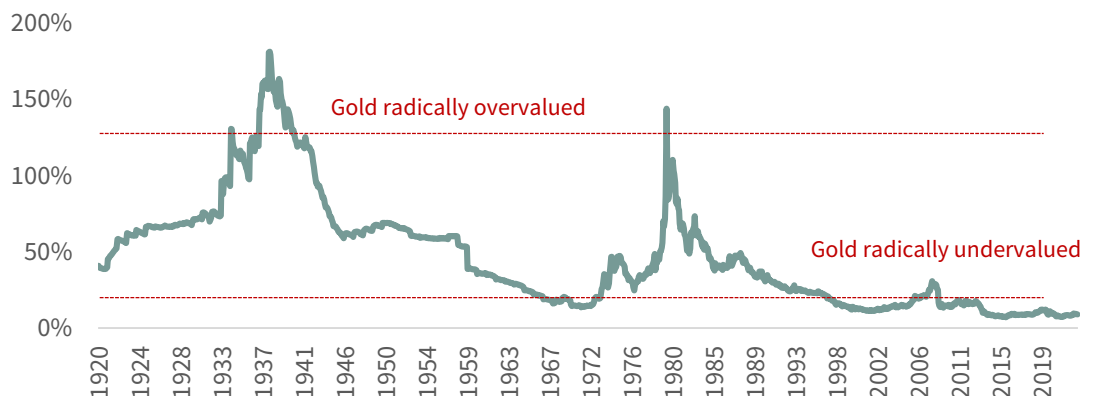
After bottoming at \$251 per ounce in August 1999, gold surged to \$1,900 in August 2011, pulled back to \$1,050 by December 2015, and resumed its advance, making an all-time high triple-tops of \$2,050 in August 2020, March 2022 and May 2023. However, gold is now as undervalued as in 1999 on several metrics.

Potential gold investors must ask three questions. First, is gold undervalued today? Second, if gold is undervalued, to what degree? And finally, how high could it go were it to swing from undervalued to overvalued – something that has happened twice in 100 years?

To help answer the first question, we compare the value of gold to both the money supply and the value of financial assets. We also find it helpful to consider the historical relationship between gold and other commodities.

Below are three charts that highlight these relationships over the last 100 years. The first chart shows the relationship between the size of the US Treasury's gold holdings and the Federal Reserve's balance sheet. Although somewhat controversial, we believe the size of the Fed's balance is related to the dollar value of the Treasury's gold holdings over the long term. According to this chart, there have been two distinct periods over the past 100 years

FIGURE 1 US Treasury Gold Holdings / Federal Reserve Monetary Base



Source: Bloomberg, US Treasury, US Federal Reserve.

during which gold was highly overvalued and three periods during which gold was significantly undervalued. In the late 1930s, President Roosevelt devalued the dollar by 65%, raising the gold price to \$35 per ounce. At the same time, clouds of war were gathering across Europe. The combination of a higher gold price in the US and growing hostilities in Europe led to a massive volume of gold inflows in America. At the peak, the dollar value of the Treasury's gold holdings exceeded the size of the Fed's balance sheet by an incredible 1.7 times. The gold flows into the US were so great that the Treasury could have exchanged every dollar bill in circulation for gold and retained half of its gold stock.

The gold's second period of overvaluation occurred in January 1980. Gold spiked in a parabolic blow-off to \$850 per ounce in January 1980, following two decades of accelerating inflation. At the peak, the Treasury's gold holdings (vastly diminished from the late-1930s levels) were once again valued at 1.7 times the size of the Federal Reserve balance sheet.

Gold turned out to be a terrible investment after both periods of radical overvaluation. Between 1937 and 1971, gold was flat while the stock market advanced tenfold. Between 1980 and 2000, gold fell 70% while the stock market ran thirteen-fold.

On the other hand, gold was radically undervalued three times. The first period occurred in the late 1960s. With gold fixed at \$35 under the Bretton Wood's Gold Exchange Standard and inflationary pressures mounting in the US, gold flowed out of the Treasury. By 1971, the Fed's monetary base exceeded the Treasury's gold holdings by seven times. The three-decade reversal was impressive: between 1938 and 1971, the Treasury's gold holdings went from covering the Fed's monetary base by 1.7 times to less than 15%.

The second period of undervaluation occurred during the late 1990s. Following twenty years of falling gold prices and a rapid expansion of the Fed's balance sheet, the size of the Fed's monetary base exceeded the Treasury's gold holdings by nine times. In other words, the dollar's unofficial (and unconvertible) gold coverage reached an all-time low of 11%.

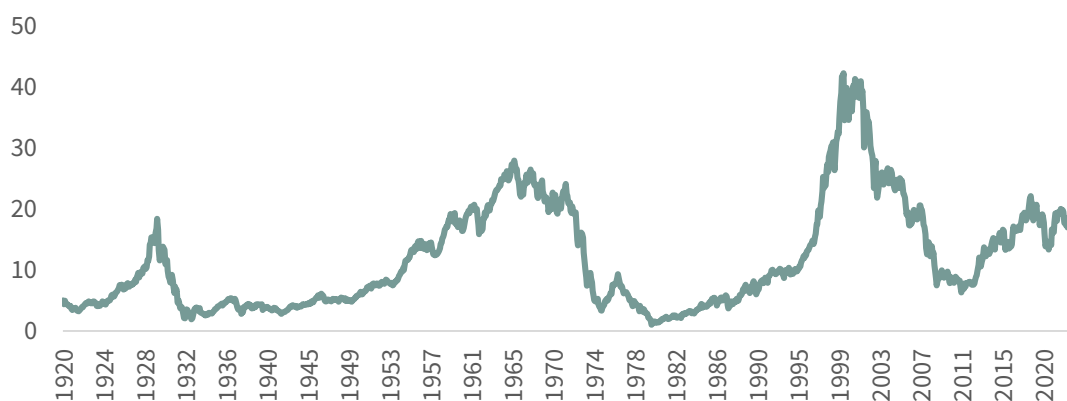
As we saw, the periods of overvaluation (the 1930s and 1980) were great opportunities to sell gold. Conversely, the periods of undervaluation (1969 and 1999) were excellent buying opportunities. Gold was the best-performing asset class in the decade following each period of maximum undervaluation.

Gold, relative to the size of the Fed's balance sheet, is more undervalued today than in the late 1960s or 1990s. The reason: even though gold advanced over seven-fold over the last twenty-three years, the Federal Reserve's balance sheet has grown even faster. Following the global financial crisis of 2008, global central banks have undertaken radical monetary policies.

Since 2008, the Federal Reserve has undertaken four massive rounds of quantitative easing, resulting in a monetary base nine times larger than in 1999. The Fed printed money faster than gold appreciated over the last twenty-three years. The Fed's monetary base currently stands at over nine times the Treasury's gold holdings, compared with six times in 1969 and nine times in 1999 – the other two excellent buying opportunities. According to our analysis, gold is 30% more undervalued than in 1969 and on par with 1999.

Valuing gold against financial assets tells a similar story. Chart 2 shows the relationship between gold and the Dow Jones Industrial Average. Over the last 100 years, there have been three periods during which gold was radically undervalued relative to financial assets.

FIGURE 2 Dow Jones Industrial Average / Gold Price



Source: Bloomberg.

The first period occurred in the late 1920s. In response to a decade of rapid monetary growth in the US (related to Britain's failed attempt to peg the pound to gold at the pre-World War I rate), the US stock market surged, driven mainly by speculation funded by borrowed money. From the 1921 lows, the Dow appreciated six-fold, hitting 380 in August 1929.

With gold fixed at \$20.65 per ounce, the Dow, by the fall of 1929, was equivalent to approximately eighteen ounces. In retrospect, the stock market was radically overvalued. Over the next four years, the Dow fell 90%, bottoming at 42. At the lows, the Dow was equivalent to only two ounces of gold – an extreme reading that would not be repeated for fifty years.

In January 1934, Roosevelt raised the gold price to \$35 per ounce. The Dow and gold nearly reached parity in 1932; however, they missed each other by \$7 per ounce and eighteen months. Between 1929 and 1934, the Dow fell 80% while gold rose 70%. From 1929 to 1935 gold radically outperformed global equity markets.

The next time financial assets were radically overvalued relative to gold occurred in the late 1960s. The Dow first broke 1,000 in 1966 and then again in 1969 and 1971. With gold still fixed at \$35 per ounce, the Dow was equivalent to twenty-eight ounces – a new record. The 1960s experienced long periods of excess money and credit creation, resulting in a speculative bull market again funded by debt. In retrospect, financial assets were overvalued. Between the late 1960s and 1980, the Dow fell by 25% while gold advanced twenty-four-fold. Finally, by 1980, the Dow and gold both hit 850.

Gold entered a grinding bear market following its record overvaluation in 1980. On the other hand, financial assets spent the next two decades rallying. Following the 1929 episode, gold took fifty years to work off its overvaluation. Following the 1980 peak, gold only took twenty years to become cheap relative to financial assets. Between 1980 and 1999, gold fell by 68% from \$850 to \$253 per ounce, while the Dow advanced thirteen-fold from 850 to 11,000. A prudent investor ought to have been out of the gold market entirely.

In 1999 the Dow surpassed 11,000 while gold had fallen to \$253 per ounce. The Dow was equivalent to forty-three ounces of gold at those levels – an all-time record. Given these extreme levels, an investor ought to have expected a booming bull market in gold to develop. Indeed, that is what I expected when I made my investments and gave my interview to *Forbes* in 2000.

We were handsomely rewarded. Between 1999 and 2011, gold surged seven-fold, becoming

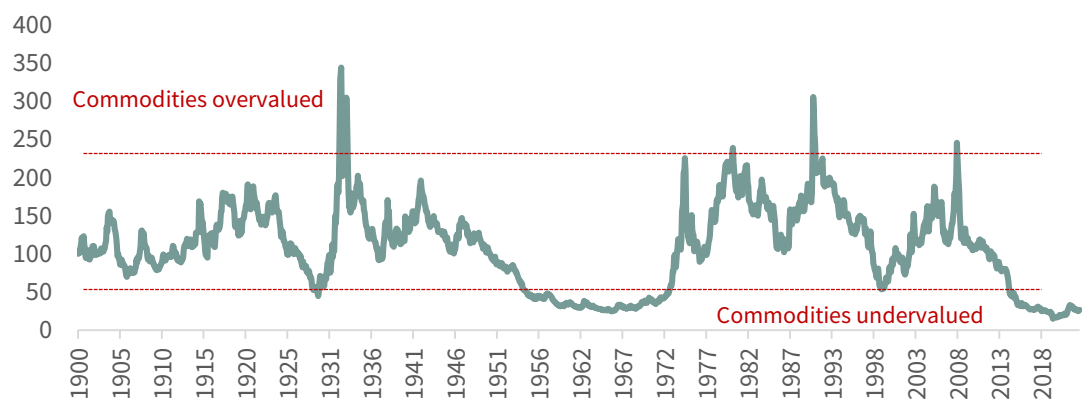
WE WERE HANDSOMELY REWARDED. BETWEEN 1999 AND 2011, GOLD SURGED SEVEN-FOLD, BECOMING THE BEST-PERFORMING ASSET CLASS OF THE DECADE. GLOBAL EQUITIES SUFFERED TWO MASSIVE BEAR MARKETS, ENDING THE PERIOD WHERE IT STARTED.

the best-performing asset class of the decade. Global equities suffered two massive bear markets, ending the period where it started.

Over the last decade, the stock market has again entered another huge bull market, leaving the Dow equivalent to 20 ounces of gold. The question is whether this represents under- or overvaluation. Financial bulls (i.e., gold bears) might highlight how the Dow has been equivalent to thirty ounces of gold in the late 1960s and forty ounces in the late 1990s. In this context, 20:1 does not appear radically undervalued. Perhaps the equity bull market will continue. Unfortunately, for equity markets, we firmly believe otherwise.

Chart 3 gives us great confidence that today's 20:1 ratio will end up being the cycle peak and that over the next several years, the Dow will be equivalent to fewer than five ounces of gold, the level reached at gold's peak in 2011. The Dow and gold may again cross, similar to what happened in 1980 and almost happened in 1932-4.

FIGURE 3 Commodity Prices / Dow Jones Industrial Average



Source: G&R Models, Bloomberg.

Each peak in the Dow-gold ratio (1929, 1969, and 1999) coincided with periods of commodity undervaluation. As each commodity bull market started, the Dow-gold ratio contracted massively. In 1929, commodities bottomed relative to financial assets exactly as the Dow reached a high of twenty ounces of gold equivalent. Four short years later, commodities were overvalued relative to financial assets, and the Dow was equivalent to only two ounces of gold after having rallied 70%.

In 1968 (the year President Johnson removed the US dollar's required 25% gold backing), commodities were the cheapest in history relative to financial assets. At that moment, the Dow peaked at twenty-eight ounces of gold. Over the next twelve years, commodities entered a massive bull market and, by 1980, had become radically overvalued. Gold led the bull market and soared twenty-four-fold from \$35 to \$800 per ounce. Like in 1929, the Dow-gold ratio peaked in 1968 at precisely the same time commodities bottomed. By January 1980, the Dow was equivalent to one ounce of gold – the lowest reading since the Dow Jones Industrial Average was established in 1896.

In 1999, commodities were almost as radically undervalued as in the late 1960s. The Dow-gold ratio reached an all-time high of forty-two just as commodities bottomed. As commodity prices rose, the Dow-gold ratio contracted, reaching eight in 2011.

Were commodities overvalued today, we would agree that the boom in financial assets (and bear market in gold) still had years left to run. Under these circumstances, the Dow-gold

ratio would continue to move significantly higher. Instead, commodities are as undervalued as they have ever been relative to financial assets. According to our historical framework, a commodity bull market has likely started. As such, we believe the Dow, equivalent to twenty ounces of gold, probably represents a cycle-high and will fall throughout the decade, similar to 1929, 1969, and 1999.

How high could prices go if we enter a new gold bull market?

In past gold bull markets, the value of the Treasury's gold holdings has surpassed the monetary base by over 1.5 times – including in 1980 after the US dollar was no longer backed by gold.

Given the Fed's balance sheet explosion since 2009, a projected target price for gold seems outlandish. The Fed's monetary base today stands at \$5.6 tr. For the Treasury's gold holdings to cover the monetary base by 1.5 times, gold would have to reach \$32,000 per ounce. Critics might argue the monetary base is distorted by excess reserves left on balance at the Fed. At present, excess reserves foot to \$3.2 tr, and the Fed has talked of someday draining them out of the system. If that were to happen, the Fed's monetary base would fall to \$2.4 trillion. Even under this conservative scenario, gold would have to reach \$14,000 for the Treasury's gold position to cover the monetary base by 1.5 times. Although these numbers sound outlandish, they represent relationships that have emerged twice in the past 100 years. The first time (the late 1930s) was during massive deflation, while the second (1970) was during inflation. In both scenarios, gold had become the "must own" asset class that all investors clamored for, and the valuation of gold was pushed to the extreme.

Could the dollar value of the Treasury's gold holdings reach 1.5 times the monetary base-- as it has twice in the last 100 years? We believe it's highly probable. As financial turmoil surges this decade, investors will aggressively buy gold as an asset class that provides both wealth protection and the opportunity for huge speculative profit. In such a scenario, gold's valuation could very well be pushed to extremes just like it was in the late 1930s and 1980.

What about looking at the Dow-Gold relationship?

In the 1930s, the Fed aggressively shrunk its balance sheet by half, producing a deflation implosion that turned into the Great Depression. At the worst point in the crisis, the Dow traded at half its \$80 book value. By 1934, gold (now at \$35 per ounce) nearly reached parity with the Dow. Currently, the Dow's book value is 8,000. Were the Fed to undertake equally draconian hawkish measures as in the 1930s (something we believe to be unlikely), the Dow could conceivably trade for half its book value, or 4,000. Were gold to trade at parity to the Dow, like it nearly did in 1934, it would more than double. In other words, in the most extreme deflationary scenario, the Dow would fall almost 90% while gold would double – similar to between 1929 and 1934. Investors, with a substantial gold allocation, would do very well.

In the late 1970s, the Fed ultimately raised interest rates to record levels in a final successful attempt to break the inflationary forces of the past twenty years. Record real rates put severe downward pressure on global equities. By 1980, the Dow traded at its book value of 850. Gold reached parity with the Dow in January 1980.

If we repeat the 1970s and the Fed raised interest rates significantly because of persistent acceleration in inflation, we should see a huge bear market in the Dow with a downside target of its 8000 book value. If history were to repeat the 1970s experience, the Dow to

IN OUR VIEW, GOLD WILL EMERGE AS THE ASSET CLASS WITH THE MOST POTENTIAL THIS DECADE, NO MATTER THE FINANCIAL OR GEOPOLITICAL BACKDROP. UNDER THE MOST EXTREME SCENARIOS (A REPEAT OF THE DEFLATIONARY IMPLOSION THAT PRODUCED THE GREAT DEPRESSION OR A PERIOD OF INFLATION THAT VERGES ON HYPERINFLATION), GOLD WILL BE THE WINNING ASSET CLASS.

enter a huge bear market and potentially trade down 75% to its book value, and gold prices would rise four –fold Again, investors with significant gold allocations would be the winners.

Finally, let us consider a third scenario that has never occurred in 230 years of US financial history. What might happen if the US directly monetized its debt?

Given the massive amount of sovereign debt held by governments worldwide and the inherent refinancing risks that it creates, countries (including the US) may attempt to directly monetize their debt in response to a potential failure of a government debt auction. Were this to happen, inflationary pressures would surge, and hyperinflation may ensue. Our hunch is that equities markets may rise, but gold would enter a massive bull market as investors sought assets to protect against currency debasement and the resulting inflation. In such a scenario, gold could easily surpass \$35,000 per ounce – 1.5 times today’s \$5.6 tr monetary base. Once again, the winners would be gold investors.

In our view, gold will emerge as the asset class with the most potential this decade, no matter the financial or geopolitical backdrop. Under the most extreme scenarios (a repeat of the deflationary implosion that produced the Great Depression or a period of inflation that verges on hyperinflation), gold will be the winning asset class.

Natural Resource Market Commentary: 2nd Q 2023

Commodities and related natural resource markets were broadly weak in the second quarter. Investors remained concerned about a global recession driven by rising interest rates and persistent central bank hawkishness. Adding to the overall gloom was a perceived disappointment in Chinese economic activity. Caused by problems in the real estate sector, disappointing exports, and weaker-than-expected aggregate economic data, investors were decidedly “risk-off” when it came to China, and commodity markets were not spared.

With its heavy energy focus, the Goldman Sachs Commodity Index fell almost 6%, while the Rogers International Commodity Index, emphasizing metals and agricultural commodities, fell by 2.5%.

Natural resource-related equities were weak as well. The S&P North American Natural Resource Stock Index (heavily energy weighted) fell 1% during the quarter, while the S&P Global Natural Resources Index (more metal and agricultural exposure) fell almost 6%. By comparison, global equity markets were strong during the second quarter: the S&P 500 rose 8% while the MSCI All Country World index advanced almost 6%.

Metals were among the weakest performers in the second quarter, reflecting concerns about China. Copper prices pulled back 9%, despite easily mobilized copper inventories approaching all-time lows during the quarter. Nickel fared even worse, falling by 14%. Aluminum, meanwhile, fell by 11%, while zinc plummeted by 21%. Cold-rolled steel fell almost 25% in the ferrous metal sector, while iron ore fell 10%. Mining equities were also weak. The COPX ETF (which tracks copper equities) fell by almost 3%, while the S&P Global Base Metals Index fell by 4%.

Weak LNG and Chinese worries drove coal prices lower. Australian and South African

thermal coal pulled back 30% and 22%, respectively. In the US, coal with access to seaborne markets (notably Central Appalachian and Illinois Basin) fell 28% and 32%, respectively, after surging last year.

The oil market was also weak during the second quarter. West Texas Intermediate (WTI) fell almost 7% during the quarter, while Brent fell 5%. Energy-related equities were mixed. The XLE ETF (mega-cap international energy weighted) fell 2%. However, the S&P Oil & Gas E&P index and the OIH oil service stock ETF were strong, rising by 1% and 4%, respectively.

Global energy demand continues to surprise to the upside, and even the IEA has raised its estimates. For example, at the end of 2022, the IEA estimated global oil demand would average 101.6 mm barrels per day -- a significant 1.7 mm increase over 2022. In their June “Oil Market Report,” the IEA raised their 2023 demand estimate by an additional 700,000 b/d, with the bulk of their underestimation again coming from China. Since the end of 2022, the IEA has raised its Chinese oil demand estimates by 400,000 b/d.

Responding to global recession worries, the IEA reduced global oil demand by 200,000 b/d in its July 2023 OMR. However, we believe the IEA is still radically underestimating global oil demand and that further upward revisions must be made. For example, the IEA has 1.3 mm b/d of missing barrels in its first quarter 2023 balances. Our readers know that missing barrels represent the excess of supply less demand that are missing—literally-- they can't be found in global inventories. Historically the IEA has made missing barrels disappear by revising global demand upwards, and we believe this time will be no different. We believe the weakness in oil prices in the second quarter can't be explained by faltering demand.

We believe the primary weakness in global oil prices in the second quarter is unexpected supply issues. In the final week of March, the US government began selling an additional 26 mm barrels of Strategic Petroleum Reserve oil under previously legislated Congressional mandates. All 26 mm barrels had been sold by the last week of June. Over the next four years, the DOE, under Congressional mandate, was scheduled to sell an additional 155 mm barrels of oil out of the SPR—42.5 mm barrels in 2024 and 2025 and 35 mm barrels in 2026 and 2027, and these sales would represent almost 50% of the remaining SPR reserve.

In July, however, the DOE announced the cancellation of these sales as part of the attempt to begin “refilling” the SPR. Over the last 18 months, 330 mm barrels have been released by US, European, and Japanese SPR and have been 100% responsible for the slight build we've seen in commercial inventories. Given July's DOE announcement, SPR sales will be zero over the next four years, which we believe has already begun impacting oil prices. We think it's no coincidence that oil prices rebounded almost 18% since the last week in June—just as US SPR releases wound down.

SPR sale cancellations, combined with rapidly slowing production growth from the Permian basin and unexpected production cuts from Saudi Arabia, mean that commercial inventories will experience rapid drawdowns in the second half of 2023.

Natural gas staged a massive rebound in the second quarter, advancing 26%. European gas, still influenced by swollen inventories related to last winter's record warmth, fell by 26%. Asian gas also continued its retreat—falling 5%.

With the restart of the Freeport LNG export facility, US inventories have begun to decline

versus historical averages, even in the face of highly cool weather at the beginning of the 2023 air conditioning season. Adjusted for population, cooling degree days were 33% below average for May and June. US natural gas inventories peaked relative to ten-year averages in mid-March, just before the Freeport facility returned to service, and now sit only 6% above ten-year averages. We remain incredibly bullish on natural gas prices. The Natural Gas section of the letter discusses the rollover in Marcellus natural gas production and how the 40% plunge in the Haynesville rig count over the last six months will severely impact its output in the next six months. In the next eighteen months, we will add close to 6 bcf per day in LNG export capacity, and our modeling continues to suggest that US natural gas supply will begin a prolonged contraction starting now. Convergence of US natural gas prices—presently at \$2.50 per MMBtu with international prices—presently at \$12mmbtu—is practically unavoidable given our modeling of both US natural gas demand and supply. Much of the turmoil in global gas markets, weather-related over the last twelve months, has given investors another extremely opportunistic chance to invest in North American natural gas markets.

Uranium rose 10% from \$50 to \$55 per pound in the second quarter. In the Uranium section of the letter, we discuss our updated supply and demand models for uranium and their implications. Since 2011—post-Fukushima—the global uranium market has been in massive surplus as Japan’s 50 reactors came offline and global uranium supply surged—primarily from Kazakhstan. Between 2011 and 2018, we calculate global uranium inventories built by over 265 m lbs, resulting in substantial downward price pressure—uranium prices bottomed in the fourth quarter of 2018 at \$18 per lb. However, as our models suggest, the uranium market has now slipped firmly back into deficit. Also, the Yellow Cake and Sprott Uranium Trust closed-end physical uranium investment vehicles have removed over 80 mm lbs of uranium over the last five years. Since 2020 we calculate that uranium has shifted back to deficit and that commercial inventories have been drawn down by 180 mm tonnes. We calculate excess commercial uranium inventories related to the Fukushima-related shut-downs have now been 50% worked down and stand at approximately 250 mm lbs, covering reactor demand by less than 18 months. Depending on how much physical uranium the two closed-end vehicle buy in 2023 and 2024, we calculate that 100% of the excess Fukushima-related inventory will have been consumed by the end of 2024. Given the deficit between power generation demand and mine supply, and given that almost all easily mobilized Fukushima-related inventory has been removed from the market, we believe uranium prices could move chaotically to the upside.

Global agricultural markets fell in the second quarter. Corn fell 16%, wheat fell 8%, and soybeans rose 3.5%.

Fertilizers also sold off. Urea (the solid form of nitrogen) fell 10%, phosphate fell 27%, and potash fell 3%. We believe the correction has run its course, and markets have now set up for another crisis. Dry weather continues to plague the corn belt. In their latest World Agricultural Supply and Demand Estimate report (WASDE), the United States Department of Agriculture (USDA) significantly reduced their US corn yield estimate from 181.5 to 177.5 bushels per acre.

Food nationalism has also reemerged. Once again, India banned rice exports as adverse growing conditions lowered the expected harvest. India is the largest rice exporter, representing almost 50% of the seaborne trade. Finally, Russia suspended its agreement allowing

Ukrainian grain shipments via the Black Sea. Also, the Russian military has now started to systematically target Ukrainian grain infrastructure over the last month, including Ukraine's grain export facilities on the Danube River.

Ukrainian wheat and corn exports were already halved compared with their peak two years ago. After the recent destruction, a further reduction in export volumes is a distinct possibility. In 2021, we predicted a coming agricultural crisis. Our same models now call for a new crisis to develop as we progress through the rest of the year and into 2024. The recent pullback presents an attractive entry point for long-term investors.

Precious metals were weak in the second quarter. Gold fell 2.5%, while silver fell 5%. Platinum and palladium fell 10% and 17%, respectively.

Gold and silver equities were also weak. The GDX and SIL ETFs (which track gold and silver equities) fell by 7% and 15%, respectively.

Earlier in this letter, we outlined the fundamental underpinnings of the upcoming gold bull market and provided a framework for how high gold prices might go.

Since the summer of 2020, precious metals have been in a corrective phase. We believe things are about to turn much more bullish.

On a short-term basis, one headwind remains. Western investors have again started to liquidate their precious metals holdings.

We track the behavior of 18 gold ETFs. For the twelve months ending March 2023, the ETFs liquidated 450 tonnes of gold. Beginning in April, the ETFs stopped shedding. For a moment, it appeared they were starting a period of accumulation. The same ETFs added 60 tonnes of gold holdings from March to May. Unfortunately, western investors returned to shedding over the last two months, this time by 100 tonnes.

The ETFs indicate Western interest in gold remains bearish. Western investors, we believe, will drive the upcoming bull market. Thus far, they remain uninterested.

On a more positive note, central banks continue to buy gold. In the first six months of 2023, central banks purchased 387 tonnes of gold – a record first-half result, according to the World Gold Council. China accumulated 103 tonnes in the first six months of 2023 and has continuously purchased gold over the last nine months.

Since the start of the corrective phase in mid-2020, the ETFs have shed over 600 tonnes of gold.

Over the same period, open interest in the COMEX gold futures contract contracted by over 300,000 contracts – or 900 tonnes of “paper gold,” the majority of which were likely matched with physical gold. In total, we estimated western speculators have shed 1,500 tonnes. Central banks, meanwhile, have more than offset this liquidation. Between 2020 and mid-2023, central banks accumulated 2,200 tonnes of physical gold. It stands to reason that prices are now re-testing the mid-2020 highs. Even though western investors have been gold sellers, all selling has been met with central bank buying. We believe western investors will turn into aggressive buyers once central banks turn dovish. When that happens, western demand will collide with central bank buying and gold prices will move dramatically higher.

As outlined in our introductory essay, gold prices are heading much higher than anyone

envisions today. We recommend all investors have significant positions in various precious metal investments, both physical and equities.

The Uranium Bull: Defying Trends and Redefining Energy Markets

Why has uranium rallied while every other energy commodity has collapsed? Over the past twelve months, spot uranium advanced 12% while oil, natural gas, and coal all fell anywhere from 30-70%. Our models suggest uranium's strong performance has just started. Uranium has likely reached a pivotal inflection point that could force the price higher by as much as three- to four-fold over the next several years. For the first time in history, uranium has slipped into a persistent and widening deficit. We believe the results will be dramatic. Uranium is much less transparent than other commodity markets; in this essay, we will help shed light on the forces driving uranium over the course of the decade.

URANIUM HAS LIKELY REACHED A PIVOTAL INFLECTION POINT THAT COULD FORCE THE PRICE HIGHER BY AS MUCH AS THREE- TO FOUR-FOLD OVER THE NEXT SEVERAL YEARS. FOR THE FIRST TIME IN HISTORY, URANIUM HAS SLIPPED INTO A PERSISTENT AND WIDENING DEFICIT. WE BELIEVE THE RESULTS WILL BE DRAMATIC.

From the start of the nuclear age in 1945 until 2019, the uranium industry has gone through four distinct periods. Each period has been unique in terms of supply and demand, leading to wild price swings that lasted decades. The market has now definitively entered its fifth major period, likely defined by persistent severe deficits.

Period 1: 1945-1969

The first period took place between the mid-1940s and the late 1960s. Governmental stockpiling, for both weapons programs and nuclear power advancement, drove demand. Following the Trinity test in Los Alamos and the subsequent bombings of Hiroshima and Nagasaki in 1945, attention quickly turned to nuclear's commercial applications. The USSR and England inaugurated the first two nuclear power stations in 1954 and 1956, with England's being the first truly commercial reactor. Despite these early reactors, commercial demand remained extremely low. Throughout the Manhattan Project, a persistent shortage of uranium (along with enrichment bottlenecks), presented ongoing challenges. Protection of supply remained a pivotal point of national security after the war as first the US and then the USSR built up their atomic arsenals. Between 1945 and 1969, Nuclear Engineering International estimates global uranium mine supply totaled 900 mm lbs of triuranium octoxide (U₃O₈). Roughly half of this material was purchased by the US Atomic Energy Commission (AEC), while 40 mm lbs was purchased by the nascent commercial nuclear energy industry. Although the remaining 226 mm lbs was officially unaccounted for, it likely made its way to a combination of American, British, French, and Soviet government stockpiles.

Period 2: 1970-1983

The uranium market began to change in the early 1970s as commercial nuclear power gained adoption. Private sector utility buying became a dominant source of demand. Total installed capacity grew from 1 GWe in 1960 to 10 GWe by 1970 and 100 GWe by 1980. The arrival in earnest of the nuclear age also stoked a speculative boom in uranium mining. Production in the US peaked in 1980 at nearly 45 mm lbs of U₃O₈ per year. Despite the widespread adoption of nuclear power, mine supply actually grew faster than reactor demand throughout

the decade. The 1970s were a period of rolling energy crises and insecurity. As a result, commercial buyers were more than happy to build up excess uranium inventories. From 1970 to 1983, mine supply exceeded reactor demand by 450 mm lbs of U₃O₈, all of which ended up in commercial inventories. Adding to the glut, the AEC reclassified approximately 100 mm lbs of its stockpiles from “governmental” to “commercial,” making it available to the nuclear power industry. By 1983, commercial inventories were 550 mm lbs – enough to cover reactor demand for nearly eight years. Prices peaked in 1982 at nearly \$40 per pound and started a decades-long collapse.

Period 3: 1983-2010

Uranium mine supply peaked in 1982 and fell modestly during the decade. Reactor demand meanwhile grew robustly and finally exceeded mine supply in 1991. For the first time since the days of the Manhattan Project, uranium entered into a primary deficit. The deficit would persist for the next twenty-seven years, until the Fukushima incident. Unlike during the Manhattan Project, however, secondary sources of uranium filled the shortfall. Between 1983 and 2010, Nuclear Engineering International estimates reactor demand exceeded mine supply by an incredible 1.1 bn lbs of U₃O₈. Mine supply fell by nearly half from 170 mm lbs in 1982 to a plateau of 75 mm lbs by 1995. Reactor demand was nearly the mirror image, growing from 65 to 175 mm lbs over the 27-year period. Secondary supply made up the shortfall.

In 1993, Russia and the US entered into the so-called “Megatons for Megawatts” program, through which Russia pledged to decommission 20,000 nuclear warheads and convert the highly enriched uranium into 15,000 tonnes of low-enriched uranium suitable for manufacturing into reactor fuel. Russia also sold additional material outside of the program to provide much-needed funding following the collapse of the Soviet Union. Fuel recycling became widespread in the UK and France during this period as well, as did enrichment-tailing reprocessing. Secondary sources supplied a combined 630 mm lbs of U₃O₈-equivalent between 1983 and 2010. Commercial inventory destocking contributed another 500 mm lbs. The Department of Energy (the successor to the AEC), reclassified another 75 mm lbs of U₃O₈ from governmental to commercial, adding more material to the commercial market. All of this secondary supply put extreme downward pressure on uranium. Prices bottomed at \$7.10 per pound in 2000.

By the mid-2000s, commercial inventories had fallen dramatically. The Russian disarmament program was due to expire in 2013, threatening to reduce secondary supplies materially. Uranium began to firm in 2003; by 2005 the price had tripled from \$7 to \$21 per pound. By the late 2000s, commercial inventories had fallen nearly 70% and stood at only 200 mm lbs. Commercial inventory coverage went from eight years in 1983 to less than two years by 2007. Utility buyers scrambled and speculators swooped in.

Spot prices reached a high of \$136 per pound in June 2007, with long-term contracts settling at \$95 per pound: an increase of between twelve- and eighteen-fold in seven years. Uranium collapsed during the Global Financial Crisis, but resumed its rally in 2010. By February 2011, uranium was once again over \$70 per pound and commercial inventories stood at a mere 150 mm lbs.

Period 4: 2011-2020

On March 11 2011, the Tohoku earthquake and tsunami led to a partial meltdown of Japan's Fukushima Daishi reactor. Japan shut down all its nuclear reactors over the next several years. European demand, led by German decommissioning, fell by 25%. Global reactor demand fell sharply from 182 mm to 150 mm lbs between 2010 and 2012 before beginning a slow recovery. Meanwhile, responding (with a lag) to the prior uranium boom, primary supply grew for the first time in decades. In-situ leach production in Kazakhstan grew by nearly 50%, or 20 mm lbs, between 2010 and 2016. Primary production nearly satisfied reactor demand in 2015 – a first in over twenty-five years.

FIGURE 4 Uranium Inventory Over Time

	Changes Comm Inv.		Comm Inv.
	Increase	Decrease	
Phase 1: 1945-1969			
Mine Supply	876		
AEC Purchase		613	
Other Countries		226	
Commercial Inventory			37
Phase 2: 1970-1983			
Surplus	413		
Reclassification	100		
Commercial Inventory			550
Phase 3: 1984-2010			
Deficit		1,100	
Secondary Sources	630		
Reclassification	75		
Commercial Inventory			155
Phase 4: 2011-2020			
Surplus	265		
Commercial Inventory			420
Phase 5: 2021-2023			
Deficit		100	
Financial Buyer		80	
Commercial Inventory			240
Phase 6: 2023-2030(est.)			
Deficit		240	
Commercial Inventory			0

Source: Nuclear Engineering International, G&R Models

Secondary supplies weighed on the market as well. Although the Russian disarmament program ended in 2013, tailings reenrichment, DOE surplus sales, recycling and under-feeding continued to contribute as much as 40 mm lbs of U3O8-equivalent by 2016.

Between 2011 and 2018, the uranium market was in surplus by 265 mm lbs., all of which ended up in commercial inventories. Commercial stockpiles, which started the period at a record-low 150 mm lbs., reached 415 mm lbs. by 2018, covering reactor demand for three years.

We became interested in uranium producers this cycle in late 2017, when Cameco announced they would curtail production at its flagship MacArthur River Mine. Kazatomprom followed suit, announcing it would curtail production. Our models told us these cuts would push

WE BECAME INTERESTED IN URANIUM PRODUCERS THIS CYCLE IN LATE 2017, WHEN CAMECO ANNOUNCED THEY WOULD CURTAIL PRODUCTION AT ITS FLAGSHIP MACARTHUR RIVER MINE. KAZATOMPROM FOLLOWED SUIT, ANNOUNCING IT WOULD CURTAIL PRODUCTION. OUR MODELS TOLD US THESE CUTS WOULD PUSH REACTOR DEMAND FIRMLY ABOVE TOTAL SUPPLY, INCLUDING SECONDARY SOURCES. IN RETROSPECT, WE WERE CORRECT.

reactor demand firmly above total supply, including secondary sources. In retrospect, we were correct. Commercial inventories peaked in 2018 and declined slightly in 2019 and 2020. The era of persistent deficits had started.

The uranium price meanwhile remained depressed, averaging less than \$25 per pound between 2016 and 2020.

Period 5: 2021-Present

Uranium's structural deficit has accelerated dramatically since 2021. Reactor demand bottomed in 2020 at 161 mm lbs of U₃O₈ and is expected to reach 188 mm lbs this year. After spending a decade decommissioning its nuclear reactors, Europe and the US appear to have finally reversed course. We have long argued that wind and solar simply cannot provide efficient base-load carbon-free electricity. We warned that grid instability and energy insecurity would soon follow. Russia's invasion of Ukraine in 2022 put Europe's natural gas supply at risk, bringing renewables' shortcomings to the fore. Primary uranium production remained depressed through 2022 at 120 mm lbs – a multi-decade low. Secondary supply averaged only 22 mm lbs, leaving a deficit of nearly 30 mm lbs in 2021 and 2022.

A new source of demand burst onto the scene in 2021 as well: the financial buyer. Led by the Sprott Physical Uranium Trust, financial vehicles have acquired between 25 and 30 mm lbs each year in 2021 and 2022. Unlike open-ended funds such as the GLD, the financial uranium vehicles are closed-ended, meaning the material cannot readily flow back into the commercial market. Once material is purchased it is permanently locked up.

As a result, the uranium market experienced a deficit of nearly 180 mm lbs between 2020 and 2023. The deficit was met by materially depleting the commercial inventories that had accumulated following Fukushima. By the end of this year, we expect commercial inventories will be back to 250 mm lbs, covering reactor demand by less than 18 months. The last time commercial inventories reached these levels in the mid-2000s, prices spiked to their all-time highs of \$145 per pound. We expect the same now.

Looking to the end of the decade, global uranium markets are set to tighten to unprecedented levels. Looking only at nuclear power plants that are currently under construction, reactor demand is set to grow from 188 to 240 mm lbs by 2030. If every uranium-producing country gets back to its maximum output (a big if), primary production will only grow from 140 to 174 mm pounds by 2030. Assuming secondary supply stays flat at 20 mm lbs per year, the annual uranium market deficit will grow from 27 to 45 mm lbs by the end of the decade, before factoring in further financial buying. The cumulative deficit between 2023 and 2030 will likely exceed 250 mm lbs, completely depleting all commercial stockpiles.

These figures are likely too conservative. There are presently fifty-nine reactors under construction with a total capacity of 66 GWe. Every new reactor requires three years of uranium fuel for its initial core loading. We believe this will consume an additional 60 mm lbs of U₃O₈ between now and 2030. Over the past twenty years, new reactors have been mostly offset by retirements. When a reactor is decommissioned, it is able to harvest its final core loading without requiring a replacement. Therefore, new reactor loadings have been offset by retiring old reactors. This will not be possible going forward.

THE URANIUM INDUSTRY HAS BEEN DRAMATICALLY STARVED OF CAPITAL FOR MANY YEARS. IN OUR VIEW, THE PERSISTENT BEAR MARKET – IN MANY WAYS PRESENT SINCE THE 1980S WITH ONLY A SINGLE REPRIEVE – IS OVER. INVESTORS SHOULD ACT ACCORDINGLY.

Furthermore, financial accumulation is likely to accelerate once speculators realize the small size of the market and the precarious commercial inventory situation. How large financial buying can get is an open question, however adding another 100 mm lbs of U3O8 would only cost \$6 bn and would dramatically tighten balances even further.

Utilities remain dramatically under-contracted post-2025. Fuel buyers have been very complacent in recent years, due to the persistent commercial inventory overhang following Fukushima. Simply put, it has paid to wait to secure supplies. That dynamic is quickly changing as fuel buyers feel insecure and under-covered for the first time in nearly fifteen years.

Although it is an opaque market, all signs point to uranium entering into a sustained and frenetic bull market. Prices have rallied from a 2018 low of \$18 to nearly \$60 per pound already. However, even at these prices, it is unlikely many new greenfield uranium deposits can be economically developed.

The uranium industry has been dramatically starved of capital for many years. In our view, the persistent bear market – in many ways present since the 1980s with only a single reprieve – is over. Investors should act accordingly.

The Coming Surge: Oil's Bullish Horizon Amid Investor Apathy

WE ARE ADAMANT IN OUR BELIEF THAT THIS BULL MARKET HAS ONLY BEGUN AND PRICES WILL INCREASE. ALL OF THE BULLISH ELEMENTS WE HAVE DISCUSSED REMAIN FIRMLY IN PLACE: THE INDUSTRY IS STILL HIGHLY CAPITAL-STARVED, OIL DEMAND IS STRONG, AND THE US SHALES ARE DEPLETING.

We believe oil is on the verge of a sharp rally. As we write this, West Texas Intermediate and Brent trade for \$84 and \$87 per barrel, respectively. We believe it will not be long before both are well above \$100. Since the COVID bottom in March 2020, energy equities have been the best-performing sector of the S&P 500, while spot crude has been the best-performing asset class. However, for the twelve months ending June 2023, spot crude fell by 33%. The question has been whether the recent selloff was a consolidation amidst a broader rally or the start of a new bear market.

We are adamant in our belief that this bull market has only begun and prices will increase. All of the bullish elements we have discussed remain firmly in place: the industry is still highly capital-starved, oil demand is strong, and the US shales are depleting.

The recent selloff resulted from massive liquidations from various strategic petroleum reserves. For 2022, the US released 220 mm from its SPR, amounting to 607,000 b/d. Other countries liquidated 40 m b or 100,000 b/d. The US continued liquidating its SPR into 2023 as well. Although concerns surrounding Russia's invasion of Ukraine may have prompted SPR liquidations last spring, this year's sales were part of the Bipartisan Budget Act of 2018, which mandated the US to sell oil from the SPR to fund spending bills. During the second quarter, the US released 25 mm bbl from the SPR or 260,000 b/d.

Our last letter explained the tight relationship between price and seasonally-adjusted inventory levels. Oil is fairly valued at \$75 per barrel based only on commercial inventories. Including the now-depleted SPRs, oil should be trading at \$120. Therefore, we estimate the impact of the SPR releases at anywhere between \$30-40 per barrel. It is no coincidence that as soon as the US stopped liquidating its SPR at the end of June, oil bottomed and has since rallied 20%.

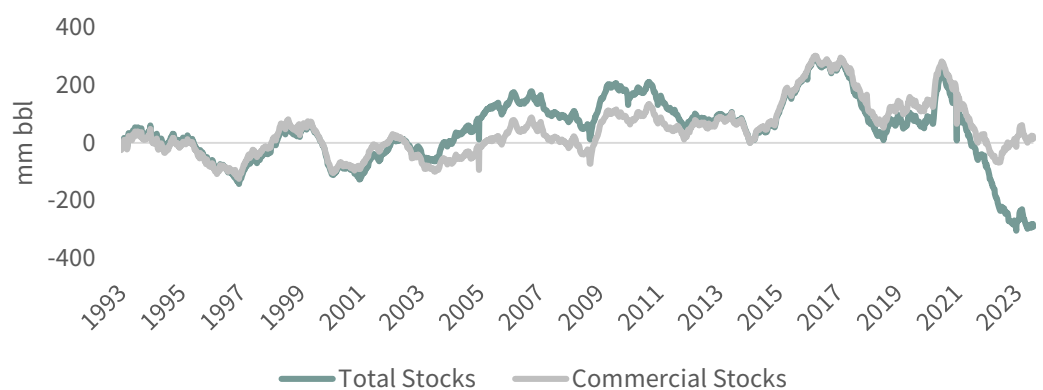
The Bipartisan Budget Act SPR sales automatically “phased out” if reserves reached 350 mm barrels. When Congress passed the Act, the SPR held 650 mm barrels, and it is likely few policymakers ever expected to use the “phase out” provision. However, with the SPR now at just 347 mm barrels, the Act no longer allows further liquidation. Just last week, the administration announced it would cancel all additional planned sales from the SPR. With the US no longer selling several hundred thousand barrels per day from its strategic reserves, commercial inventories are set to fall sharply throughout the rest of the year, pushing prices higher.

Even with the unprecedented SPR liquidation, commercial inventories remained subdued. Inventories peaked at 280 mm barrels above and bottomed at 60 mm below the five-year average in 2020 and 2022, respectively. Presently, inventories are in line with the five-year average. Including the SPR, inventories are 300 mm barrels below five-year averages – a record deficit.

Global inventories are just as tight. OECD commercial inventories went from 300 mm bbl above to 300 mm bbl below five-year averages between 2020 and 2022 and currently stand at 95 mm bbl below average. Including government stockpiles, inventories remain 400 mm bbl below average – another record.

Based upon our supply and demand estimates, inventories could draw by 360 mm bbl between now and yearend, leaving commercial and total inventories at dangerously-low levels.

FIGURE 5 US Inventories Relative to Five-Year Seasonal Average



Source: EIA

Despite headlines to the contrary, the oil market remained extremely tight over the past twelve months. Governments effectively hindered the bullish price signal by liquidating vast quantities from their strategic reserves. This is unlikely to continue, clearing the way for prices to increase.

Most analysts attribute the selloff to recession fears and weak demand, but our data tells us consumption remains robust. For nearly fifteen years, headlines have called for the “end of oil demand.” As recently as 2020, many agencies, including the International Energy Agency (IEA), predicted that 2019 was the peak in global oil demand. Hardly four years later, consumption set a new record and shows no signs of slowing. Any worries about long-term structural oil demand are entirely misguided for at least the next decade.

The oil market will be driven higher by lackluster supply caused by years of underinvest-

ment. Demand, meanwhile, will enjoy a persistent tailwind and continue to consistently surprise to the upside. In our following letter, we will write extensively on global commodity demand; today, we offer a preview.

Energy consumers fall into two categories: those in the developed world and those in emerging markets. The former comprises 17% of the world's population and consumes 170 GJ per person of primary energy. The latter makes up 83% of the population (or seven billion people) and annually consumes less than 60 GJ per person. Each year, millions begin their move from emerging-market to lower-middle-income energy consumers.

As they prosper, their primary energy consumption triples from 60 to 170 GJ annually. This phenomenon will be the primary growth driver over the next twenty years. Analysts pontificate on EV penetration, but even the most aggressive scenarios cannot overcome this dramatic increase in primary energy demand per capita. Others worry about energy efficiency. Again, the move from emerging markets to lower middle-income energy consumers will eclipse any improvement in energy efficiency.

For example, over the last fifteen years, OECD per capita energy demand fell by 11%, primarily due to improved energy efficiency. However, non-OECD per capita demand surged by 25%, pushing global per capita demand higher by 5%: the so-called "S-Curve" at work. While it is true that, in theory, making something more energy efficient should reduce demand, in practice, the trend has been towards more demand, not less. More people are in the energy-intensive period of their development, moving from 60 GJ to 170 GJ of primary energy demand. According to Jevons' Paradox, efficiency may lead to faster growth. In 1865, Jevons postulated that improved energy efficiency would lower costs and ultimately increase demand. While his Paradox is controversial, we believe there is evidence of this phenomenon in emerging market economies.

Amazingly, in their latest long-term forecast, the IEA projects global per capita primary energy demand will fall between now and 2035. Simply put, this cannot happen. The IEA (and others) will chronically miss the mark until they realize this.

The IEA has also warned about near-term oil demand; we believe these worries are similarly unfounded. In their latest Oil Market Report, the IEA revised down 2Q23, 3Q23, and 4Q23 demand estimates by 250,000 b/d. In their summary (which is released to the press ahead of the full report), they warned that "persistent macroeconomic headwinds, apparent in a deepening manufacturing slump, have led us to revise our 2023 growth estimate lower for the first time this year, by 220 kb/d."

The IEA neglects to mention how they quietly revised historical demand higher for 2020, 2021, and 2022. They also revised 2024 estimates higher as well. Furthermore, the 1Q23 balancing item ran at a near-record 1.4 m b/d, suggesting global demand likely reached 101.9 m b/d – a record level for any quarter and a full 2.5 m b/d above 1Q22. In their longer-term Oil 2023 report, the IEA expects oil consumption to grow by 6% between now and 2030, or by 900,000 b/d, not materially lower than the fifteen years between 2005 and 2019 despite all the talk of EVs and efficiency. In 2020, the IEA predicted 2019 marked peak oil demand. Only a few years later, the IEA pushed its prediction to 2030. We have no doubt this revised out further as well.

While investors remain fixated on demand, they seem to neglect problems in the global oil

AMAZINGLY, IN THEIR LATEST LONG-TERM FORECAST, THE IEA PROJECTS GLOBAL PER CAPITA PRIMARY ENERGY DEMAND WILL FALL BETWEEN NOW AND 2035. SIMPLY PUT, THIS CANNOT HAPPEN. THE IEA (AND OTHERS) WILL CHRONICALLY MISS THE MARK UNTIL THEY REALIZE THIS.

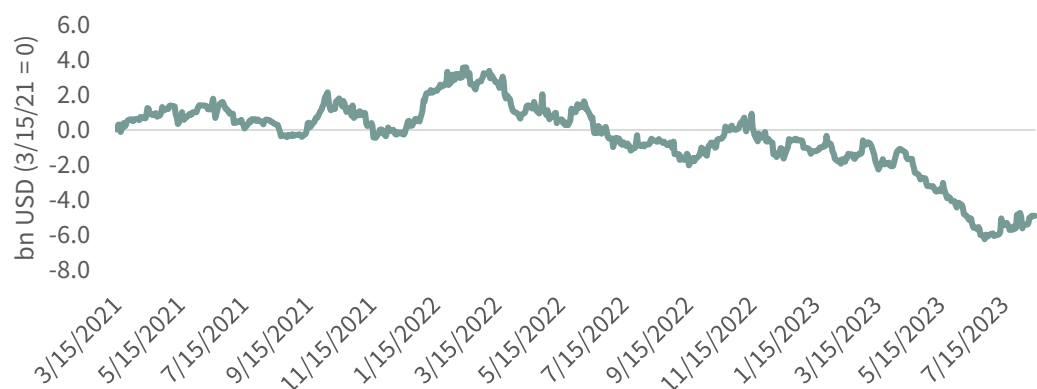
supply. In our last letter, we wrote about depletion problems in the Permian basin. Over the past 15 years, the US shales were the only material source of non-OPEC+ growth. In turn, the Permian has represented most of all shale growth over the past five years. We warned that emerging depletion in the Permian would have a massive impact on global oil markets.

Since we last wrote, Permian depletion has accelerated. Last year marked the first time Permian productivity per lateral foot decreased year-over-year, falling by 7%. For the first three months of 2023, productivity per foot fell by a further 4% compared with 2022. According to the Energy Information Agency (EIA), by August, the Permian will be growing by only 360,000 b/d year-on-year, compared with nearly 700,000 b/d as recently as February. Our models suggest that year-on-year Permian growth will be less than 100,000 b/d by year-end and turn negative in early 2024. Although the next few months may be bumpy, we believe the Permian will definitively roll over sometime in 2024 as companies run out of their best drilling prospects. Despite high prices, producers dropped fourteen rigs in the Permian over the past three months, potentially signally inventory exhaustion. The other US shales are not faring any better. Shale production outside the Permian has not grown in nearly three years, despite oil rallying from \$20 to \$75 per barrel. The only material source of non-OPEC+ growth over the past fifteen years is about to peak.

The IEA meanwhile predicts non-OPEC+ production ex-US to grow by 400,000 b/d this year. However, we believe this is too optimistic. Since first releasing their projections last summer, the IEA has systematically revised non-OPEC+ ex-US production lower by 300,000 b/d and we believe this trend will continue.

As non-OPEC+ production falters, OPEC+ will gain market share and pricing power. In early August, Saudi Arabia announced they would extend their production cuts by at least another month. Saudi produced less than 10 m b/d in May and June – a thirteen year low. Some analysts view the cuts as an admission of weak global demand. Based on our demand analysis, we disagree. We and other analysts believe the cuts are necessary to rest aging fields, including Ghawar. Still, others argue the Saudis are merely offsetting government SPR liquidations. Whatever the case, several years ago, the Saudis would have been far too worried about losing market share to the growing shales to cut production. That concern is now gone.

FIGURE 6 Energy ETF Cumulative Net Flows



Source: Bloomberg.

According to the IEA, demand will average 103.2 m b/d in the second half of 2023. Global

WE ARE AMAZED AT THE LEVEL OF INVESTOR APATHY AND DISINTEREST. DESPITE THREE YEARS OF MARKET-LEADING PERFORMANCE, FUNDS CONTINUE TO FLOW OUT OF SIGNIFICANT ENERGY ETFS, INCLUDING THE XOP AND XLE.

supply (including OPEC NGLs, processing gains, and biofuels) will only reach 101.5 m b/d, leaving the market undersupplied by a massive 1.7 m b/d. We think this understates the problem. The balancing item ran at 1.3 m b/d in the first quarter, suggesting demand was understated. Adjusting demand higher by 1 m b/d for the rest of the year implies a 2.7 m b/d deficit that would take inventories down by over 400 mm bbl by December 31st. At that point, commercial inventories would reach a record 500 mm bbl deficit while total inventories would reach a record 820 mm bbl deficit – the lowest levels since our data begins.

We are amazed at the level of investor apathy and disinterest. Despite three years of market-leading performance, funds continue to flow out of significant energy ETFs, including the XOP and XLE.

The past six months saw the lowest level of energy IPOs and secondary offerings in nearly 25 years. Capital spending trends remain depressed and corporate valuations are at record lows. Energy remains less than 4% of the S&P 500, nearly two-thirds below its long-term average. Perhaps unsurprisingly, Mr. Buffett has steadily added to his Chevron and Occidental Petroleum positions. Berkshire Hathaway added to his Occidental Petroleum position in the second quarter and now owns 25% of the company. Investors have radically undercapitalized the energy industry over the past ten years, and the results are becoming apparent. The only way to attract capital back to the space will be through solid returns. We believe that by the end of this bull market, everyone will argue that energy is again the “must-own” sector. Still, for the time being, contrarian value investors are being offered an excellent opportunity with solid fundamentals and attractive valuations. Investors will not be able to remain apathetic for much longer.

Natural Gas Markets on the Verge

In our view, natural gas prices are reaching a turning point. Gas spiked to decade highs last spring following Russia’s invasion of Ukraine, only to fall back on milder-than-normal winter weather. Instead of running out of gas, traders worried about running out of storage as prices collapsed to near-all-time lows.

During market panic or euphoria, investors make the mistake of linearly extrapolating current trends. As a result, they fail to see the ground shifting underneath them and miss out on excellent opportunities. Natural gas represents a classic buying opportunity, and we believe investors are again focused on all the wrong issues.

Only several weeks ago, we heard many analysts openly question whether the US would run out of natural gas storage before the end of the injection season. Such an event would create the dreaded “gas on gas competition,” potentially driving prices to zero (or below). With the injection season half complete, these concerns were unfounded. Inventories started the year in line with seasonal averages. Extremely mild weather resulted in nearly 5% fewer heating degree days between January and April, significantly reducing heating demand. Inventories grew to 382 bcf above seasonal averages by April. Mild winter weather was followed by a mild start to summer. Cooling degree days in April, May, and June were nearly 30% below the five-year average, reducing air conditioning demand. Despite the milder-than-normal start to summer, US inventories did not grow relative to seasonal averages. By

mid-June, inventories remained 385 bcf above average. As the weather turned warmer in July, inventories have started to come down and currently stand at 320 bcf above average, the lowest level since February. Notably, July was 3% milder than average, suggesting the market would be in an even more significant deficit had temperatures been average. Liquefied Natural Gas (LNG) exports help explain why US inventories declined relative to seasonal averages despite mild weather. LNG demand reached a record of 12.5 bcf/d in May as Freeport returned online after a damaging fire left it inoperable for over a year. Based upon our analysis, the likelihood of full storage by the end of the injection season in the fall is very low; gas prices will likely rally from here.

Over the next two years, an additional six billion cubic feet of LNG exports will come online at Golden Pass, Plaquemines, and Corpus Christi. Another 1.6 bcf/d is due to come online at Port Arthur in 2027. Where will these facilities source their gas?

In our last letter, we explained how the same depletion issues plaguing the oil shales are also at work in the gas shales. The Marcellus represents 25% of all US dry gas supply and has not grown in nearly two years. Production peaked in late 2021 at 26.5 bcf/d – almost one bcf/d higher than current levels. The Permian produces natural gas alongside oil, but declining productivity across the basin suggests sustained growth will be difficult.

The Haynesville surged to nearly eight bcf/d by 2011 before declining by half through 2017. Renewed interest led to a second period of growth, until by late 2022, production peaked at 14.3 bcf/d. Unfortunately, production has now been flat for eight months. The Haynesville is deep and highly over pressured, resulting in elevated drilling and completion costs. Companies raced to lay down rigs as prices fell from \$7.00 per mcf in December 2022 to \$2.00 by February 2023. After peaking at seventy-two rigs in December, there are now only forty-four rigs operating in the play, with most of the decline occurring in June. Production often follows drilling with a several-month lag. If seventy-two rigs cannot produce much growth in the first few months of 2023, then production will likely fall from here. High prices would likely incentivize increased drilling in Haynesville, similar to what happened in 2017. However, the field had only produced 20% of its reserves back then compared with nearly 50% presently. It will likely be more challenging—if not impossible-- to boost production this time once basin-level declines take hold, considering it is a much more mature play.

Our models tell us we have overbuilt our LNG export capacity without adequately considering where the upstream feedstock will come from. US natural gas remains by far the cheapest unit of energy globally by as much as 75%. Once demand, driven by LNG expansion, exceeds domestic supply, our expectation is that this discount will evaporate, sending US gas prices up several-fold, as US prices converge with international prices.

Turning to Europe, hot summer weather was not enough to offset their record mild winter (air conditioning in Europe remains less prevalent than in North America). European gas storage is now 88% full compared with an average of 74% for this time of year – a surplus of 14 percentage points. While still high, this is much lower than the record set after the winter on March 26th when inventories reached 56% full, a 22% surplus compared with seasonal averages. In March, the German energy minister Klaus Mueller warned that Germany would run out of natural gas by January 2024 on colder than average weather. Considering inventories at the time were running further ahead of seasonal averages than they are today, we would expect his concerns have not lessened.

OUR MODELS TELL US WE HAVE OVERBUILT OUR LNG EXPORT CAPACITY WITHOUT ADEQUATELY CONSIDERING WHERE THE UPSTREAM FEEDSTOCK WILL COME FROM. US NATURAL GAS REMAINS BY FAR THE CHEAPEST UNIT OF ENERGY GLOBALLY BY AS MUCH AS 75%. ONCE DEMAND, DRIVEN BY LNG EXPANSION, EXCEEDS DOMESTIC SUPPLY, OUR EXPECTATION IS THAT THIS DISCOUNT WILL EVAPORATE, SENDING US GAS PRICES UP SEVERAL-FOLD, AS US PRICES CONVERGE WITH INTERNATIONAL PRICES.

Both US and global natural gas markets rest on a knife's edge. After last year's incredibly mild winter, inventories are no longer at dangerously low levels. However, the longer-term supply and demand trends point to extreme tightening, particularly in the US. Investors are extrapolating current trends but missing the significant shifts taking place. They should take heed.

Copper Inventory Not Signaling Recession

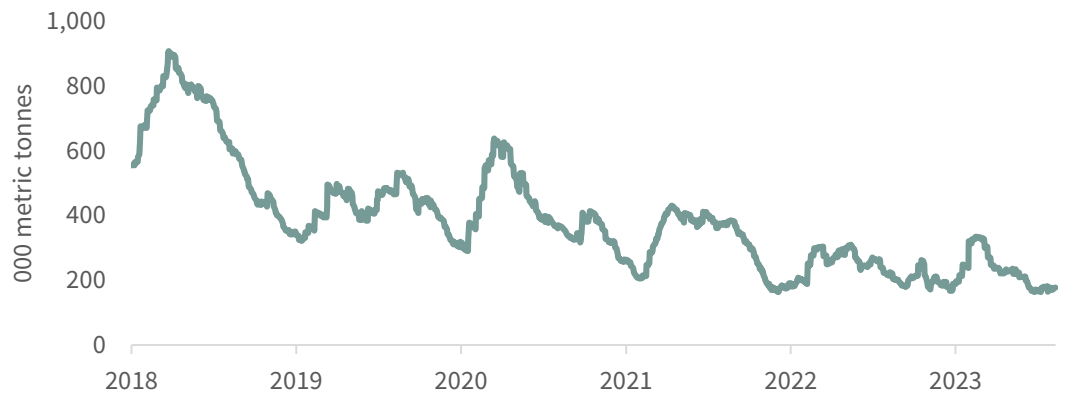
Driven by concerns of an impending global recession, copper sentiment remained bearish during the second quarter. On the other hand, copper's short-term fundamentals became increasingly bullish. Mine supply disappointed again in the first four months of 2023, according to the World Bureau of Metal Statistics (WBMS). Chilean production continues to be particularly problematic. For the first four months of the year, Chilean mine supply fell by nearly 2% compared to last year. Codelco warned that production could hit the lowest level in twenty-five years. In June, André Sougarret abruptly resigned as Codelco's Chief Executive Officer after only one year on the job. Mr. Sougarret cited the numerous "complexities" facing the Chilean copper mines. Chile supplies almost one-quarter of all copper production and, in past letters, we have discussed the issues plaguing their copper industry; in particular, declining ore grades, water shortages, labor issues, and uncertain fiscal regimes all negatively impacted production. Unfortunately, we do not expect any of these issues to improve going forward. Global copper mine supply contracted by 0.2% in the first four months of 2023 compared to last year, driven by disappointments in Chile.

Meanwhile, global copper demand remained robust in both OECD and non-OECD countries. For the first four months of 2023, OECD copper demand increased by a robust 3.7%. Despite countless bearish articles in the financial press, Chinese copper demand continues to surge, with refined demand rising by 8% year-on-year. While China always dominates the headlines, we believe the pivotal element of Asian copper demand is India. We first wrote in 2018 that Indian copper demand was set to surge, very similar to China in 1999-2000. Even though few analysts have paid any attention, India's copper consumption grew by almost 30% during the first four months of 2023 compared to last year. Global consumption in aggregate has surged 6% so far this year. Strong demand and weak mine supply continue to drive inventories to near all-time lows.

Exchange inventories on the Shanghai, London Metal Exchange (LME) and COMEX fell from a high of 900,000 tonnes reached in 2018 to only 170,000 tonnes today. Although inventories are twice as high as the all-time low of 75,000 tonnes reached in 2005, production has grown by nearly 60% over that time. As a result, when measured in days of consumption, exchange inventories are almost as low as in 2005.

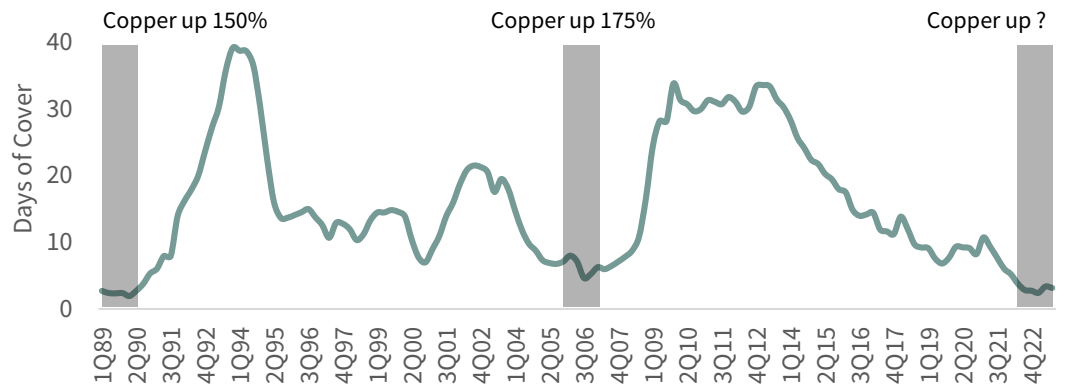
Given the low exchange inventories and the bullish supply/demand trends, we believe speculators will soon panic much as they did back at the end of 2005 into 2006. Low inventories, combined with massive short covering, spiked copper prices higher by almost 200% in just six months. We are now potentially set up for a recurrence of that 2005-2006 copper price spike.

FIGURE 7 Copper Exchange Inventories



Source: Bloomberg.

FIGURE 8 Copper Exchange Inventory Days of Cover



Source: Bloomberg.

Although we remain concerned about the universally bullish outlook adopted by the global metal analytic and investment community—a topic discussed in last quarter’s letter—we believe the rapidly tightening underlying fundamentals will push copper prices significantly higher in the next six to twelve months. For those investors that have exited their copper investments on global recessionary fears, we believe the copper’s weakness in the second quarter has given investors another excellent opportunity to increase their exposure.

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