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INVESTING IN THE UN-INVESTABLE

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“But when it comes to bullion (gold) as an investment, and as a measure of national weather, gold is a goner.”

“Whereas gold used to be seen as a good asset, it is now seen as the bottom of the pile.”

“Gold has fallen from favor and is now a mere metal -- and a bad investment.”

Quotes from the famous “Death of Gold” cover story in the *Financial Times*
December 13, 1997

Gold at the time was \$283 per ounce.

What happens when you buy into a radically undervalued, un-investable asset class? If history is any guide, the answer is: “Great things.”

Today’s indisputable un-investable asset class is energy broadly and crude oil specifically. Oil has been (and remains) the most important input to economic growth in the post-World War II world. However, in the span of only a few short years, oil’s importance has gone from

being widely accepted to thoroughly rejected. The financial press argues that oil should be avoided at all costs.

Investors are convinced that global oil demand has already peaked and will decline steadily going forward. In such a world, the oil industry's billions of dollars of upstream capital investments would become economically unviable or "stranded." Environmentalists meanwhile are beginning to clamor for the oil industry to pay "damages" for the carbon released over the last 50 years, leaving investors to ponder whether energy assets are actually liabilities.

Back in 1980, energy was by far the largest component of the S&P 500 Index at 30% while six of the 10 largest stocks in the world were oil companies. Today, energy's representation in the S&P 500 stands at just 2.4%, making it the index's smallest sector behind materials, real estate, and utilities. Adding insult to injury, Exxon, the oldest member of the venerable Dow Jones Industrial Average, was removed from the Index on August 25th, 2020.

Oil's future is currently perceived as dismal and has been aggressively thrown into what we call the "un-investable" bucket.

Over the last 50 years, asset classes deemed to be as "un-investable" are rare. Although open to all levels of interpretation, we roughly define "un-investable" as:

- Any asset class that has been in existence for an extended period with a prominent place in the economy and/or in the global financial markets.
- The fundamental backdrop changes in a way investor perceive as negative.
- Prices enter into a long-term bear market as investors become convinced the change in the underlying fundamentals are permanent and not cyclical.
- The long-term viability of the asset class becomes universally accepted as suspect.

Although hard to believe given their extreme popularity today, stocks and bonds in the late 1970s were both universally accepted as "un-investable." In response to ever-rising inflationary pressures and interest rates, stocks had traded sideways for the prior 15 years while bonds had only moved in one direction for the prior 40 years: down. Inflationary pressures had been increasing for 20 years leaving investors convinced the problem was intractable. Bonds, dubbed "certificates of confiscation" by a famous Wall Street strategist, had become the most un-investable asset class in global financial markets. Thirty-year US treasury bonds offered by far their highest inflation-adjusted yields in history and yet attracted only the most contrarian investors.

Even though stocks traded at near record-low valuations and sported 6% dividend yields, investors believed that (like bonds) stocks could not be bought at any price-- no matter how cheap they became relative to book value, yields, and price-earnings ratios. The appearance of the now infamous "Death of Equities" cover story by *BusinessWeek* magazine in August of 1979, gave investors convincing proof that stocks had become "un-investable." Except for Warren Buffet, few investors showed any interest in either stocks or bonds at all.

In retrospect, we know this was the missed investment opportunity of a lifetime. Today, 30-year US Treasuries trade with yields below 1.5%, down from 15% reached in 1981. For the first time in history, some \$15 trillion of sovereign debt, sports negative yields. Since the publication of the *BusinessWeek* cover story over 40 years ago, the stock market has surged upwards by 35-fold--by far the longest and likely the biggest advance of any asset class in financial market history.

"OIL'S FUTURE IS CURRENTLY PERCEIVED AS DISMAL AND HAS BEEN AGGRESSIVELY THROWN INTO WHAT WE CALL THE "UN-INVESTABLE" BUCKET."

"ALTHOUGH HARD TO BELIEVE GIVEN THEIR EXTREME POPULARITY TODAY, STOCKS AND BONDS IN THE LATE 1970S WERE BOTH UNIVERSALLY ACCEPTED AS "UN-INVESTABLE.""

What fundamental change caused investors to shift their attitudes towards both bonds and stocks? Inflation, which had been increasing for 40 years and was universally accepted as permanent, was solved. In the same month that *BusinessWeek* magazine pronounced the death of equities, a new chairman took the helm of the US Federal Reserve. Over the next eight months, Paul Volker raised the Fed Fund's rate to over 20%, producing real short yields never seen before in US history. Inflation's back was broken, and it receded over the next 40 years. Massive returns accrued to investors willing to keep an open mind towards the two most "un-investable" asset classes of the day.

Does anyone remember the last asset class to be thrown into the "un-investable" bucket? It is an asset class that has been around for thousands of years and, just like bonds and stocks, has historically played a central role in global economic and financial markets. The asset class we are talking about is the gold market of the late 1990s.

Even though the official link between gold and fiat money was broken with the dissolution of the Bretton Woods gold exchange standard, most people still viewed gold as an asset class that would protect them against adverse economic shocks, inflation and general financial market instability. This belief was challenged when European central banks began a policy of reducing their gold holdings starting in the early 1990s. 12 years of falling gold prices and rising bond prices convinced global central banks gold had little use in a financial system backed entirely by paper assets. Why hold an asset that earned no interest and cost money to store, when you could instead earn a decent yield on a bond whose price seemed to only move higher. The selling frenzy kicked off after the Dutch central bank announced they had sold 400 tonnes of gold in a "secret" transaction at the end of 1992. Central bank gold sales gathered strength as each rushed to "front-run" the other as the decade progressed. Near panic began when the United Kingdom announced their intention to sell half their gold reserves. Shortly thereafter, Switzerland (the last country with a gold backed currency) announced it would sever the Franc's gold link and look to sell half their reserves – a massive 1,500 tonnes. Precious metals analysts warned central banks would eventually sell all their gold in a process that could take well over 30 years.

Making matters worse, central banks began lending out their gold in the mid-1990s. The surge in "borrowable" gold wound up creating two new sources of gold "supply." First, bullion banks such as UBS and Goldman Sachs used this borrowable gold to create a large number of gold forward sale strategies to protect miners against falling prices. Led by the "spot-deferred contract", (which enabled producers to forward sell their gold while retaining the option with regards to delivery date), large numbers of producers, began selling forward large amounts of future production. By the late 1990s, many Australian gold producers had sold forward over 100% of their reserves. The most aggressive North American producer to sell forward its gold was Barrick Corp which by the early 2000s had sold nearly six years' worth of future production. The contracts arranged by bullion banks were then hedged with physical gold sales borrowed from central banks. By the early 2000s we estimate several thousand tonnes had been sold forward.

Another huge source of selling pressure came from the bullion banks themselves. Large amounts of borrowable gold from central banks enabled the bullion banks to "front-run" their gold producing and central bank clients. It was a low risk trade for bullion banks (and hedge funds) to borrow central bank gold, physically sell it into the market, and buy it back later at lower prices. The famous "Death of Gold" front cover story in the December 13,

1997 issue of the *Financial Times* explained this issue of “front-running”: “Some big US commercial banks have made a killing in the last years or so by selling gold short—selling gold they do not own in the expectation they can buy it back at a lower price, before they have to deliver.”

By the end of the 1990s, the supply of physical gold offered for sale kept growing as central banks, gold producers, and speculators all raced to sell. Negative sentiment in precious metal markets had reached a level very seldom seen. Investors, speculators, central banks, gold producers, and the financial press — everyone was convinced gold had no future.

Compared to financial assets, gold had never been cheaper. By August 1999, the Dow Jones Industrial Average traded at 45 times the price of gold, significantly eclipsing the previous records set in 1970 (30 times) and 1929 (20 times). Gold was also extremely cheap compared to other hard assets. By the summer of 2000, one ounce of gold bought 7 ½ barrels of oil, the lowest reading since 1919.

"AN ASTUTE INVESTOR SHOULD HAVE USED THE PERVASIVE BEARISH PSYCHOLOGY AS AN INVESTMENT OPPORTUNITY."

An astute investor should have used the pervasive bearish psychology as an investment opportunity. From 1996 to 2008, central banks (predominantly European) indeed sold almost 6,000 tonnes of gold, adding an additional 20% to mine supply during those twelve years. However, even in the face of heavy central bank selling the gold price managed to advance. While Western investors completely gave up on gold, the same was not true in the East. Stimulated by low prices and a cultural affinity to precious metals, India and China bought almost all this new supply.

Just when investors couldn't get worse a funny thing happened: the great bearish arguments all disappeared. European central banks stopped selling their gold in 2008 and other central banks, led by China and Russia, turned into huge net buyers of gold. Since 2009, central banks have purchased on average over 500 tonnes of gold per year.

Although the gold market had been flooded with new supply starting in the late 1990s, the underlying fundamentals of the gold market as an asset class had not changed. Gold had never been priced cheaper and an astute investor should have recognized that the emergence of new demand would eventually bring the gold market back into balance. Throwing gold into the un-investable bucket in the late 1990s was exactly the wrong thing to do. If one had purchased gold on the date the *Financial Times*' "Death of Gold" cover story appeared, it would have outperformed every other asset class. Since December 1997, gold has appreciated by 8.7% annually. The stock market as measured by the S&P 500 with all dividends reinvested in comparison only returned 7.7%. The bond market, as measured by the return on zero coupon US Treasury bonds, returned 6.8%.

Which brings us to today's un-investable asset class: oil. With energy now the smallest industry group in the S&P 500, we have a clear indication the bearish case for oil is accepted by everyone. Is oil today the same as stocks and bonds were in the late 1970s and gold was in the late 1990s? Are the factors keeping oil prices low permanent or will they prove transitory? Is oil the buying opportunity of a generation?

We believe global oil demand will continue to grow as the decade unfolds, driven by emerging markets. Even with the COVID-19 lockdown, Chinese oil demand for the first eight months of 2020 is running 1 mm b/d above 2019 levels. EVs will never achieve the penetration promised by the industry for the very same reason that we all didn't fly to Europe on the

Concord: energy efficiency., Furthermore, supply, which everyone assumes will keep growing strongly, is about to disappoint greatly in the coming years.

If you had made a wildly bullish case for the stocks or bonds in 1970, you would have been called crazy. If you made a wildly bullish call for gold in 1999, you would have been called foolish. (I would know -- I did make such a bullish call in my profile featured in the May 2000 issue of *Forbes Magazine* titled, "Gold 2,500?")

We continue to make a bullish call on oil and know that many people call us crazy, out of touch or simply wrong. Nonetheless, our analysis tells us that oil and oil-related assets, remain the buy of a lifetime. The disruptions imposed on the oil market from the COVID-19 pandemic, has given investors one more chance to buy into this radically undervalued asset class.

No one wanted to buy bonds or stocks in 1979, no one wanted to buy gold in 1997, and no one wants to buy oil today. Huge returns accrued to those who made the unpopular choice in the past and we believe today is no different. Investing in un-investable assets is seldom easy but the rewards are often immense.

Where Has Shale Productivity Gone?

In 2Q 2020, amid rapidly slowing drilling activity, a significant historical development occurred in the US shale patch. In previous drilling cycles, sharp slowdowns in activity produced large offsetting increases in drilling productivity. Drilling productivity normally rises as activity falls because of a phenomenon known as "high-grading." In a period of low commodity prices, operators stop drilling their least productive prospects first. The remaining activity is focused almost exclusively on the areas with the highest average well productivity. Because of this high-grading phenomenon, oil production often falls far less than activity during periods of drilling retrenchment. In extreme examples, there have been instances where increases in drilling productivity have more than made up for the drilling slowdown itself. A great example of this occurred in the Permian Basin between 2014 and 2016 where production grew by 500,000 b/d or 30% despite a 60% fall in the rig count.

High grading is typically associated with the mining industry. As metal prices fall, mine operators focus on their highest-grade ore to protect cash operating margins. The greatest example took place in gold mining back in the late 1990s. In response to gold prices that fell to as low as \$250 per ounce, miners severely high-graded their operations, and for a short period of time got their cash costs as low as \$175 per ounce. However, high grading produced huge problems for the gold mining industry over the following 10 years. When gold prices eventually recovered, miners were never able to capture this increased margin. The gold industry, it turns out, had mined out their best ore inventory right at the bottom. Mining costs skyrocketed as gold companies were forced to mine lower and lower quality ore.

The energy industry also adopted this strategy over the last five years as the shales were dramatically high-graded. We estimate that in 2014 the average shale well in the major three basins (the Eagle Ford, Bakken and Permian) achieved a peak three-month production rate of 400 barrels per day. As prices collapsed from \$100 to a low of \$27 in 2016, producers dramatically slowed their activity. Between 2014 and 2018 shale well completions fell by 40%. Operators high-graded their acreage dramatically over this period and stopped drilling their least productive wells first. In 2014, we estimate that half of wells drilled were in

top-quality “Tier 1” areas. By 2018 this had climbed to over 70% and average productivity responded accordingly. The average well went from having a peak production rate of 400 barrels per day in 2014 to 625 barrels per day in 2018. The surge in high-grading and its huge impact on drilling productivity largely offset the entire slowdown in drilling activity that occurred between 2014 and 2018.

"INSTEAD, INITIAL PRODUCTION RATES DETERIORATED IN EACH OF THE MAJOR SHALE BASINS DURING Q2 DESPITE THE SHARP SLOWDOWN IN ACTIVITY."

Earlier this year, in response to oil prices that fell to negative levels for the first time in history, rig counts collapsed. Between March and August, operators laid down eight out of every ten rigs running, resulting in the sharpest slowdown ever. Given the magnitude and pace of the drop, productivity ought to have surged as companies curtailed drilling their least productive prospects and focused only on their best. Instead, initial production rates deteriorated in each of the major shale basins during Q2 despite the sharp slowdown in activity. In the Bakken, producers went from adding 300 wells in Q1 to only 100 in Q2. Instead of seeing a huge surge in productivity, the average well went from initially producing 700 barrels of oil per day to only 575 barrels – a nearly 20% decrease. In the Permian, operators went from bringing on 1,200 wells in Q1 to only 475 in Q2 (a slowdown of 61%) while initial production per well was down modestly. The same was true in the Eagle Ford where operators went from bringing on 470 wells in Q1 to only 130 wells in Q2 with a modest decrease in productivity. This drop in productivity is in sharp contrast to what happened between 2014 and 2017.

"SINCE NO ADDITIONAL PRODUCTIVITY BOOSTS WERE LIKELY FORTHCOMING, FUTURE DRILLING SLOWDOWNS WOULD NO LONGER ENJOY THE COUNTERBALANCING BENEFITS OF RISING PRODUCTIVITY."

While the deterioration in initial production per well surprised most analysts, we have long argued that future productivity gains would be difficult if not impossible because shale producers had already high-graded their acreage as much as possible. In all three major shale basins, Tier 1 locations went from representing half of all drilling in 2014 to nearly 80% today. At the same time, the remaining inventory of undrilled locations has now skewed sharply Tier 2. We concluded the industry was in the early stages of depleting its best quality acreage and that productivity would likely plateau and begin rolling over. Furthermore, since the average well was now much more productive to begin with, any future reduction in drilling activity would have to occur by dropping your most productive (instead of your least productive) rigs. Since no additional productivity boosts were likely forthcoming, future drilling slowdowns would no longer enjoy the counterbalancing benefits of rising productivity.

This is exactly what we are seeing today, and the implications are profound. For example, between Q1 2014 and Q4 2016, total shale activity fell by over 50% but aggressive high grading increased the average well productivity by 65%, blunting the impact of the slowdown. On balance, new production only fell by 20% during that period and once drilling activity picked up again in 2017 total production quickly resumed its robust growth.

This time, however, a 75% reduction in activity actually led to lower average productivity in all three basins leaving new production materially impaired. It will be impossible to get production to grow from here without a much higher oil price and increased drilling activity. Over the last 10 years, E&P companies have relied on ever increasing drilling productivity to grow production. Consensus opinion believes that much of these productivity increases occurred because of changes in completion techniques —longer laterals, more frac stages, and more proppants. However, our research tells us the boost in drilling productivity has been the result of old-fashioned high grading. Now that Tier 1 drilling prospects are dwindling, we are going to see drilling productivity begin a long, sustained decline. The

shales have been the only source of non-OPEC growth over the past decade and they are now experiencing signs of exhaustion.

Despite the implications of falling productivity, few analysts have commented on the shift. The reason could have to do with producer behavior earlier this year in response to the novel coronavirus. Due to logistical bottlenecks at US oil storage facilities (notably in Cushing, Oklahoma) and the perception of “full storage,” shale producers proactively curtailed large volumes of production. These so-called “shut-ins” (followed by their subsequent return) made the aggregated production data difficult to analyze. Many analysts measure productivity indirectly by looking at the change in total production and the observed rig count. By assuming a certain base decline rate, analysts infer the average productivity from newly completed wells. While this type of analysis works well most of the time, it is prone to mis-estimation during periods of market volatility such as earlier this year. For example, as the shut-in wells are turned back on over a period of several months, it becomes impossible to determine how much new production is coming from drilling activity and how much is coming from returning shut-ins. In turn, it is difficult to infer the average productivity of each newly drilled well. We have seen articles mistakenly argue that drilling productivity has surged in 2020. Upon closer inspection, we believe they are confusing new well productivity with shut-in wells being turned back on.

Our models are fundamentally different. Instead of looking at aggregated field data, we build our models on a bottoms-up well-by-well basis. We use our neural network to compute a well’s expected production profile. By comparing the well’s actual production with our expected profile, we can determine if a well was proactively shut-in and if it was subsequently returned to service. Using these models, we confidently conclude Q2 saw modest productivity declines in the Eagle Ford and Permian despite the massive 60-70% reduction in drilling activity. In the Bakken, productivity appears to have fallen by a huge 20% during the quarter. We admit this sequential drop seems severe and would like to see if it persists in Q3 before drawing conclusions.

We can also use our models to shed light on why productivity stagnated or fell during the most recent slowdown. In the case of the Permian and Eagle Ford, the average well design in Q2 was materially unchanged. Lateral length increased slightly while proppant loadings and fluid volumes were flat. Our models tell us the mild degradation in well productivity was driven instead by well location. In other words, Permian and Eagle Ford operators were unable to further high-grade their acreage. In the case of the Bakken, both proppant loading and fluid volumes appear to have fallen by 10% in Q2. It is possible this change in well design partially explains the weak productivity in the basin. Nevertheless, even taking this into account, our models tell us operators were unable to overcome the change in completion design with additional high grading.

In our last letter, we explained how 2019 marked the first time in history shale oil productivity fell. It now appears 2020 is on track to be the second consecutive year, despite the sharpest drilling slowdown ever. This suggests the shales are starting to exhaust their inventory of high-quality Tier 1 locations and suffer early stage exhaustion.

An article published in the October 14th 2020 *Financial Times* confirms the shales may be entering a new phase of their development: “Wil VanLoh, chief executive of Quantum Energy Partners, a private equity firm that through its portfolio companies is the biggest

US driller after ExxonMobil, said too much fracking had 'sterilized a lot of the reservoir in North America.' Mr. VanLoh goes on to explain how aggressive drilling densities and intense completions created inter-well communication, rendering some reserves unrecoverable. If Mr. VanLoh is correct, there are fewer remaining drilling locations than originally expected which makes it unlikely the shales will ever recover from their recent drilling slowdown.

Record Oil Deficits Are Here

"INVENTORIES ARE FALLING AT THE FASTEST RATE ON RECORD."

Global oil markets are now in structural deficit. Few people agreed with us when we argued crude markets would begin dramatically tightening by mid-year despite the demand impacts of COVID-19. Since our last quarterly letter, inventories are now drawing rapidly, suggesting extreme tightness will soon emerge in physical crude balances. In the US (where the data is the most real-time), inventories are falling at the fastest rate on record. Total petroleum inventories in the US reached nearly 180 mm barrels above long-term seasonal averages in July as of October they stood at less than half that level. Since peaking, inventories have drawn by nearly 920,000 b/d – nearly 30% faster than the previous record set in 2017. On a global basis, the most recent data is for August and suggests OECD inventories fell by 1.4 m b/d relative to long-term seasonal averages. Given that US inventories make up the largest component of the global total, more OECD draws are most likely coming in September and October.

At this rate, inventory overhangs will be exhausted early next year. In the US, petroleum stocks are now 80 mm bbl above their long-term seasonal averages and are drawing by ~ 1 mm b/d. At this rate, inventories will reach normal levels by January 2021. As of August, OECD inventories were 335 mm bbl above long-term seasonal averages and were drawing by 1.4 mm b/d suggesting they will normalize by May 2021. When we first made similar estimates three months ago, we were by far the most optimistic in the industry. As of October, our models appear to be correct.

Despite the bullish inventory data, demand worries dominate the headlines. As the second wave of COVID-19 ramps up, analysts debate the impact on global consumption. On the other hand, we continue to believe the most important developments relate to supply. Rising inventory levels in April left traders worried storage facilities would run out of capacity. This led to the shut-in of existing producing wells on an unprecedented scale. These measures, along with milder-than-expected demand weakness, helped to stem the buildup and left inventories even less bloated relative to seasonal averages than in 2016 during the last period of oversupply.

While producers curtailed existing production, they also largely stopped drilling new wells. In the United States, the oil rig count fell by 75% from 683 to 172 rigs between March and August – the lowest reading in 20 years. As of October 2020, the rig count is only up marginally. Given the high decline rates in the shale basins, production from new wells is constantly needed to offset depletion. In the Bakken, we estimate 100 wells per month are needed to hold production flat; only 13 wells were completed in June. In our last letter, we argued that the issue of the drilling slowdown would overshadow the impact of the shut-in wells.

Our models tell us this is precisely what happened. Between June and August, according to the Energy Information Agency (EIA), shale production grew by approximately 1 m b/d

"SHALE PRODUCTION MEANWHILE IS STILL EXPECTED TO BE DOWN 1.3 M B/D YEAR-ON-YEAR, ACCORDING TO THE EIA. THE ONLY OTHER TIME THE SHALES DECLINED ON A YEAR-ON-YEAR BASIS WAS IN 2016, WHEN PRODUCTION FELL BY 620,000 B/D – OR LESS THAN HALF THE CURRENT RATE."

as shut-in production rushed back online. Some analysts argued this was a repeat of 2016 when shale production rebounded sharply despite only a mild increase in drilling activity. As we discussed in the previous essay, these two periods are extremely different. In 2016, production was able to rebound as massive high-grading efforts boosted drilling productivity which offset the lost rigs. This time however, the industry enjoyed no such boost in productivity. Instead, production only grew because shut-in wells were brought back online creating a one-time surge in supply.

As of October, our models suggest that almost all shut-in production has returned to the market. Shale production meanwhile is still expected to be down 1.3 m b/d year-on-year, according to the EIA. The only other time the shales declined on a year-on-year basis was in 2016, when production fell by 620,000 b/d – or less than half the current rate. These declines will only get more severe as we progress through Q1 of 2021.

In its most recent estimates, the EIA projects US production will grow by 500,000 b/d between June and December as more shut-ins are turned back to production. We believe these estimates are likely too optimistic but will depend on the exact timing of the last wells to be turned back online. More important, the EIA is calling for US production to fall by only 250,000 b/d from Q4 of 2020 to Q4 of 2021. It is very difficult to see how this will be possible without a major increase in drilling activity. At the current rig count, our neural network expects total US production to fall next year by 1.5 m b/d from January to December. Furthermore, our models assume producers drill the most optimized set of wells next year to maximize aggregate production. Given the huge cutbacks in capital spending and rapidly accelerated industry consolidation, this may prove difficult. Our models might be too optimistic regarding production next year.

On the demand front, the impacts of COVID-19 related lockdowns seem to be receding. In the US, every category of petroleum demand except for jet fuel is nearing pre-COVID levels. Core petroleum demand (gasoline, distillate, jet fuel, and residuals) is approaching 95% of normal. Removing the impact of jet fuel, demand is 98% of pre-COVID levels. Preliminary data from the rest of the world suggests a strong international recovery as well. Customs data continues to imply a very strong Chinese demand recovery while Indian demand is finally returning as well. While it is unclear what impact a second wave of COVID-19 cases will have on demand, it seems unlikely global coordinated lock-down measures will be implemented to the same extent as earlier this year.

In our last letter, we provided controversial data suggesting air *traffic* was approaching 10% of normal. We received a lot of questions regarding this figure and decided a deeper study was in order. The confusion likely came from the distinction between passenger travel and air cargo. While the former is down sharply, the latter is up materially year-on-year. We estimate that air cargo made up 25% of jet fuel demand last year and grew double digits. Next, while passenger travel is down dramatically, the airlines have not cut the number of flights to the same extent. Therefore, we estimate that load factors have likely declined from over 80% last year to 40% this year. Since a plane is counted in traffic data regardless of its load factor, this helps partially explain the discrepancy. Lastly, we should also point out that global jet fuel demand is off by more than air traffic. For example, we reported air traffic is down 10% and our recent data suggests that jet fuel demand is off closer to 30%. The difference is explained by the fuel intensity of the impacted air traffic: longer distance travel is still down dramatically while shorter haul regional flights have recovered more. The net

impact is the same: air traffic is recovering albeit more slowly than other forms of transportation. Hopefully this explanation helps to clear any confusion.

Looking to the end of 2021, we continue to expect inventories will draw to dangerously low levels much faster than investors believe possible. Using the IEA's latest estimates, inventories will draw by nearly 5 m b/d in Q4. Even without making any adjustments to supply or demand, this will reduce inventories relative to seasonal averages by nearly 400 mm b/d, removing all of the accumulated inventory overhang by early next year.

As we move into 2021, investors are focused on how quickly OPEC+ will bring supply back to the market, but our models tell us falling non-OPEC+ supply and returning demand will absorb any such increases, leaving inventories even lower. Driven by strong non-OECD demand, (for example, Chinese oil demand is now up 1 mm b/d in the first eight months of 2020 versus the same period last year even with all the COVID-19 related disruptions), we believe global oil demand will return to its old high of 100 mm b/d much faster than anyone anticipates. At that point, the global oil market will be several million barrels in deficit, even with OPEC producing at 100% of capacity.

We get a lot of questions about how the outcome of the election will affect the energy markets in the US. At this point, it's very hard to say what the impact will be. If Trump wins, we expect very little to change, as Trump has championed the expansion of the US energy industry. If Biden is elected, the future for oil and gas is harder to predict because his message has been muddled at various points during the campaign. While at times supporting elements of the "Green New Deal," Biden and Harris were later adamant they would not look on ban fracking outside of Federal lands. As of today, about 8% of US hydrocarbon production comes from federal land. His latest policy paper indicates that he supports the US achieving "carbon neutrality" by 2050 and he intends to heavily subsidize the production of "green" renewable energy, although he is vague on outright policies. We believe the impact on energy related securities would be small since their valuations are already at extremely depressed levels suggesting much of the impact is already priced in. Our contrarian side says that, although a Biden victory would be considered a negative for the US oil and gas industry, it very well might turn out to be a situation of "buy the rumor, sell the fact". Investors have already priced in the "worst-case" scenario for the energy industry. In an unexpected outcome, we could see a substantial rally in energy related securities if Biden were elected.

Q3 2020 Natural Resource Market Commentary

Commodity prices continued their recovery. The CRB All Commodities Index rose almost 13%. The Goldman Sachs Commodity Index, which has a much greater oil weighting rose 8%. Related natural resource equities were mixed during the quarter. The S&P North American Natural Resource Sector stock index, which is very heavily weighted towards North American energy stocks, fell 8% during the quarter, while the S&P Global Natural Resource Index, which has heavier weightings in both metals and agriculture eked out a small gain of 2%. Overall, the general market, as measured by the S&P 500 stock index, rose a strong 8%, again driven by large capitalization technology stocks.

Oil

Oil prices, after rebounding strongly in the in Q2, traded sideways in Q3. West Texas Intermediate prices rose over 2%, whereas Brent oil prices fell 1%. In a trend now firmly in place for the last four years, energy related equities underperformed the oil price. Exploration and production stocks, as measured by the XOP S&P E&P ETF, fell 19%. The XLE broad based energy ETF, which holds not only E&Ps, but large cap integrated oil companies, pipelines, and refiners also fell nearly 20%. Oil service stocks, as measured by the Philadelphia Oil Service index fell 17%. For the year, oil is now down approximately 34% while most energy names—E&P, diversified energy, and oil service stocks—are down approximately 50%.

After swinging into record surplus because of COVID-19 pandemic demand disruptions in Q2, the oil market in Q3 has now swung into steep deficit with both US and global crude and product inventories drawing down aggressively. This leaves global oil markets in an extremely interesting situation going into 2021. US oil production today (which now includes most of the return in shut-in production that occurred in April and May) is still down 1 mm b/d from a year ago. Energy analysts believe that 2021 will see a resurgence of growth in the oil shales and believe markets will be thrown back into significant surplus once OPEC+'s cut-backs in production are reversed in 2021. We differ greatly from this consensus outlook. Our research tells us that US shale production declines will continue in the fourth quarter and further declines of 1 mm barrels per day or greater will take place in 2021.

With non-OPEC oil supply growth continuing to fall in 2021, a “structural gap” has emerged between oil supply and demand, even once all the curtailed OPEC+ production returning to the market in 2021. We remain extremely bullish on oil prices

Natural Gas

Natural gas prices were extremely strong in Q3, rising almost 50%. A hot 2020 summer (the seventh hottest on record), three major hurricanes that disrupted Gulf of Mexico production, slumping natural gas production, and a return of LNG export demand that has now approached pre-COVID pandemic disruption levels, were all factors pushing up prices. However, we believe the most important factor pushing gas prices higher in the upcoming years will be the plateauing of US production. After nearly doubling in the last 15 years, we believe the relentless growth in US natural gas supply has finally come to an end. Nearly all of the 45 bcf per day in new natural gas supply has come from just three fields: the Marcellus, the Haynesville, and the associated gas from the Permian. In our last two letters, we discussed how the massive production growth from these three fields is now coming to an end. Although most investors believe these shale gas fields have unlimited abilities to ramp up production, we believe this opinion is incorrect. We like to highlight the production history of two gas fields that disprove this notion. The first two shale gas field to be developed, the Barnett in the early 2000s and the Fayetteville in the mid-2000s, clearly demonstrate the eventual outcome of the production profiles of all shale gas fields. By 2011, the Barnett field began to plateau at over 5 bcf per day. At the end of 2012, the Barnett began to decline and today, production stands at just a little over 2 bcf per day, down almost 60% from its peak. The Fayetteville began a rapid ramp up in 2006 and by mid-2012 the field plateaued at 2.9 bcf per day. By mid-2014 the field began to decline. Today the Fayetteville is producing only a little more than 1 bcf per day, also down 60% from its peak. Neither field has any drilling activity today.

What caused both fields to plateau and then decline? We posed both these questions to our neural network and it came back with the following observations. First, our neural network computed total recoverable natural gas reserves of both fields. Once half of these total recoverable reserves were produced, volumes from both fields plateaued and then declined. Our neural network also divided all the potential drilling locations (both drilled and undrilled) into Tier 1 and Tier 2 locations. Production from both fields plateaued and then declined once 60% of all Tier 1 locations were developed.

Our neural network tells us that over 50% of the Haynesville's total recoverable gas reserves have been produced and that 60% of all Tier 1 drilling locations have been drilled. The Haynesville's production began to plateau last July of 2019 and it looks like declines have now set in. Production peaked at 9.7 bcf per day in March of this year and has already fallen by 400 mcf/day. Given the dwindling Tier 1 locations, the Haynesville's rig count continues to decline. After averaging close to 50 rigs in 2019, there are only 36 rigs operating today. Given what our neural network tells us, plus the weakness in the rig count, we are confident that gas production from the Haynesville will continue to decline.

Regarding the Marcellus, our neural networks tell us approximately 92 tcf of gas should be ultimately recovered. Since production started to ramp up in 2009, the field has produced 45 tcf or 49% of the total recoverable reserves. Our neural network also tells us that only 40% of the Marcellus Tier 1 locations have been drilled. Although we have not reached the 60% threshold, the fact that we have produced almost 50% of the field's total recoverable reserves, tells us the field has started to plateau. Similar to the Haynesville, the Marcellus rig count continues to show weakness. Drilling activity peaked at 68 rigs back in April of 1999 and today stands at just 25, down almost 60%. After growing by 2 bcf per day in 2019, Marcellus production has shown no growth in the last 10 months. Given this weakness and the fact that it has produced almost 50% of its recoverable reserves, we should see gathering production weakness into 2021. In the next several years, declines from both the Haynesville and Marcellus fields should accelerate materially.

Recent EIA data tells us natural gas production declines have already set in. Since natural gas production peaked in December 2019, production has now fallen 8 bcf per day and, on a year-over-year basis, production is now almost 5 bcf per day lower. Natural gas inventory levels remain 8% higher than average as we approach the beginning of the winter withdrawal season however large inventory drawdowns should occur in the next six months as supply continues to roll over assuming we have a normal winter here in North America. The massive 15-year bear market in gas has been driven by unrelenting supply increases brought about by the shale revolution. Based on our research, we will see continued disappointments in supply as both the Haynesville and the Marcellus roll over. A new bull market in gas has begun and we recommend investors have exposure to high quality natural gas related equities.

Precious Metals

Precious metals continued to show strength in Q3. Gold advanced almost 6%, finally surpassing its August 2011 record of \$1,900 per ounce and setting a new all-time high of \$2,060 at the beginning of August. Since then, gold has pulled back almost 10%. However, the standout precious metal for the quarter was silver which advanced 27%, peaking at \$29 per ounce, up almost 150% from its March low of \$11. Golds stocks, as measured by the

GDX gold stock ETF, advanced 7% and silver stocks, as measured by the SIL silver stock ETF, reflected the strength in silver and advanced over 17%.

Silver's huge Q3 catch-up confirms our belief that precious metals may have entered into short-term overbought territory. Another ominous near-term signal is that two sources of demand (central banks and China), are now beginning to show signs of potential weakness. Please read our "Will Gold Take A Breather?" section of the letter to learn more.

In previous letters, we discussed how this gold bull market will be dominated by western investors -- a very different situation from the 1999-2011 gold bull market which was dominated by eastern gold demand. Western gold demand continued to be extremely strong in Q3. The 17 physical gold ETFs we follow accumulated 240 tonnes of gold which is down slightly from the 395 tonnes of gold they accumulated in Q2. For the first three quarters of the year, these ETFs have accumulated 865 tonnes, up significantly from the 328 tonnes accumulated in the first three quarters of 2019.

The nine physical silver ETFs we track also continued their aggressive accumulation in Q3. These physical silver ETFs accumulated almost 2,700 tonnes of silver, down from the record inflow of 4,100 tonnes of silver in Q2 but still very strong. For the first three quarters of the year, physical silver ETFs have accumulated 8,200 tonnes, up significantly from the 3,350 tonnes accumulated in the first three quarters of 2019.

Although physical gold buying in the west remains strong, Chinese gold demand is beginning to exhibit signs of weakness. In previous letters, we have said that as this bull market unfolds and gold prices trend higher, eastern gold buyers will eventually drop out, as gold no longer represents value. Although we don't believe we have approached such prices yet, we are watching to see if this weakness is temporary or the start of a longer-term trend.

For aggressive investors, we believe now is the time to continue favoring oil over gold. Oil has never been priced cheaper relative to gold and the underlying trends that have forced the massive divergence between gold and oil are about to be reversed. For an update on the gold-oil ratio, and what it's telling us, please read the essay "The Gold-Oil Ratio Revised -- For the Third Time" in this letter. For those who prefer not to switch into oil, we recommend using any price weakness in the precious metals complex to add to investments. Even though we believe the first leg of the gold bull market has ended, we remain very bullish on gold prices as we progress through this decade.

Base Metals and Copper

Base metals were another bright spot in the commodity sector as they continued their strong rebound in Q3. Zinc was the best performing base metal during the quarter, rising 17%. Copper and nickel rose 12% and aluminum rose 10%. Copper remains our favorite metal in the base metals complex, as robust projections of demand and constrained supply will force copper prices significantly higher as the decade progresses. Demand for the first seven months of 2020 stands almost 4% higher than the first seven months of 2019, according to World Bureau of Metal Statistics (WBMS). Demand trends are largely bifurcated. Copper consumption in countries outside of China (which itself represents approximately 50% of world consumption) now looks to have fallen about 630 tonnes or 9%. Countries particularly hard hit by the COVID-19 virus experienced big drops in copper consumption. For example, Belgium fell by 20 tonnes (13%); Italy fell by 75 tonnes, (22%), Brazil fell by 40

tonnes (about 23%); Mexico fell by 70 tonnes (27); and India fell by about 76 tonnes(about 25%.) However, for the first six months of 2020, China’s copper consumption surged by 1,110 tonnes or almost 16% over the same period last year

Although the growth in Chinese consumption is partially related to inventory restocking following Presidents Trump’s trade war rhetoric last year, growing evidence suggests a strong recovery in China’s copper-intensive construction and manufacturing industries is fueling the growth as well. Also, as we have highlighted multiple times over the years, China must significantly increase its copper consumption if it wants to avoid the “middle-income trap;” the point where growth potential in export-driven low-skilled manufacturing is exhausted before a country attains the innovative capability needed to compete with developed countries in higher value-chain industries.

"OUR MODELS TELL US THAT AT THIS LEVEL OF PER CAPITA GDP, THE CHINESE ECONOMY WILL NEED APPROXIMATELY 300 POUNDS OF COPPER PER PERSON INSTALLED IN THE ECONOMY -- UP FROM 185 POUNDS TODAY."

For example, today China’s per capita GDP is approximately \$17,000 which places it in the upper tier of “middle income.” According to our models, China needs an installed copper investment of 200 pounds per person to support this level of per capita GDP. As of today, we calculate China has 185 pounds of copper per capita invested in its economy which places it exactly where it should be. If the Chinese economy resumes growth of 6% per year for the next seven years, its per capita GDP will hit \$24,000 and they will have left the “middle-income” bracket. Our models tell us that at this level of per capita GDP, the Chinese economy will need approximately 300 pounds of copper per person installed in the economy -- up from 185 pounds today.

In order to reach this level of installed copper, Chinese annual consumption will need to grow from 12.8 mm tonnes in 2019 to nearly 19 mm tonnes in 2025 – or an average annual growth of 1 mm tonnes per year. Considering world mine supply has only grown by 230,000 tonnes per year over the last five years this will clearly keep the market tight for some time to come.

Between China, the rest of the emerging market, and the positive impacts on demand coming from the push to expand the production of renewable energy, we believe copper has one of the best demand profiles of any metal market.

Regarding supply, much of the COVID-19 related mine shutdowns has been brought back online and global supply has now regained its pre-pandemic lockdown levels. However, global copper mine supply has now experienced a five year stretch with very little growth. According to WBMS data, global copper mine supply averaged 20.4 mm tonnes of copper over the last five years and, according to our models, global copper mine supply should reach 20.7 mm tonnes in 2021 -- an increase of only 300,000 tonnes.

We see little copper mines supply growth over the next five years. The number of large-scale projects being brought online has decreased dramatically in the last five years and underlying mine depletion continues to accelerate.

Global copper inventories continue to decline. Since the highs made in the spring of 2020, the combined Shanghai, COMEX, and LME copper inventories have declined by about 300,000 tonnes and are nearly back to where they started the year. Copper future prices actually backwardated in September for the first time in years—another sign that the copper market is very tight.

Agricultural Markets

Grain prices showed significant strength during Q3. Corn prices rose 12%, soybean prices were up 17% and are now back over \$10 per bushel, and wheat prices rose 18%. Several factors are pushing grain prices higher. Because of a severe “derecho” (a line of intense thunderstorms and related windstorms) that hit Iowa on August 20th 2020, 1.5 mm prime corn acres were severely damaged and removed from the USDA’s estimate of corn acres harvested. These losses, combined with the COVID-19 related loss of 5 mm acres that were never planted, have led the USDA to reduce their original 2020-2021 corn carryout estimates from 3.3 bn bushels (the highest level since the great grain gluts of the 1980s) to 2.2 bn bushels.

Regarding soybeans, the USDA reduced their harvest estimate by 700,000 acres. In the USDA WASD report, they raised soybean demand estimates by about 75 mm bushels driven primarily by exports to China. Incorporating these two data points, the USDA reduced its estimate of soybean carry-out from 460 mm bushels to 290 mm bushel, the lowest level since 2015.

The expected surge in both corn and soybean ending stocks originally estimated by the USDA back in May, has failed to materialize. Although yields have been near all-time highs, disappointments in the size of the US corn harvest and extremely strong soybean demand from China have led estimated carry-out levels to normalize. The 2020-2021 corn ending stocks figure is now only 13% above the five-year average compared with the USDA estimate from May suggesting it would be 70% above average. Soybean ending stocks now sit almost 40% below five-year averages.

Grain prices could trade sideways for the next six months as the 2020 North American harvest comes to a close and news flow diminishes. Speculative interest in grain markets, (especially in soybeans), hit near record levels, suggesting that risk-reward has now shifted to the downside.

Uranium Market

Spot uranium prices fell by 10% during the third quarter to finish at \$30 per pound after having risen sharply by 20% during the second quarter. Term contract prices were flat during the quarter after having advanced by 9% during the second quarter. Year-to-date, spot uranium prices have advanced by 20% while term contract prices are 8% higher. Shares of uranium producers were mostly flat during the quarter and are up 15% for the year-to-date. The most important recent supply development was Cameco’s decision to restart the Cigar Lake mine in Saskatchewan.

The most important recent supply development was Cameco’s decision to restart the Cigar Lake mine in Saskatchewan. Operations at the mine were suspended in March due to COVID-19 concerns, removing 18 mm lbs. of annualized mine supply (12%) from the market. The mine closure was categorized as “indefinite” when first announced and most analysts expected the closure to last only several weeks. Instead, Cameco opted to extend the shut-down through the summer and only ramp up production again in September. Uranium prices and the related equities sold off when the restart was ultimately announced at the end of July.

On the regulatory front, the US Department of Commerce extended the Russian Suspension Agreement through 2040. The new agreement takes effect in 2021 and limits the volume of Russian uranium allowed into the US. Furthermore, the agreement makes a distinction between so-called “natural uranium” (or mine supply) and enriched uranium. The agreement could require US buyers of Russian enriched uranium to send non-Russian “natural uranium” back in exchange. Since Russia controls much-needed enrichment capacity, there is no straightforward way for US fuel buyers to circumvent this dynamic. Similar provisions in European-Russian trade agreements make it unclear what will happen to the “natural uranium” that is imported into Russia but the agreement could in theory take these volumes out of practical circulation, artificially tightening the market.

Meanwhile, China is pushing ahead with its nuclear power ambitions, approving several more reactors this year. Emerging market demand growth (most notably from China and India) will ultimately drive demand growth over the coming years and so this represents a continued bullish development.

We have written that Cameco needs to procure uranium on the spot market to fulfill its obligations. After curtailing production at McArthur River in 2018 and Cigar Lake this spring, Cameco found themselves unable to produce enough mine supply to meet long-term contractual agreements. In 2019, Cameco announced they would meet the shortfall by purchasing material in the spot market instead of drawing down their commercial inventories. Cameco’s stockpiles nevertheless declined by 75% last year as they seemed unable to source the necessary material in the spot market.

Given their depleted inventories, we argued Cameco would finally be forced into the spot market to meet its obligations. Over the past several months, it appears this is exactly what happened. Cameco’s stockpiles bottomed in March at 7 mm pounds while purchased spot market material surged to 19 mm pounds through June. It is unclear who provided this material, but it is interesting to note that Kazatomprom’s stockpiles have moved materially lower. Most of the industry’s excess material -- whether it be from US or European utilities or producers -- has now likely been absorbed.

The uranium market has stabilized ahead of another move higher. Cigar Lake’s restarting caused some price weakness, but we expect that will be short lived. Even with the restart, Cameco must buy significant spot volumes next year. Given the lack of readily available material, we expect this will help lift prices. Q4 is typically a period of robust fuel buying activity and we would not be surprised if prices began to rise again in the near future as buyers are faced with a tight physical market. We continue to believe that uranium has started its bull market—prices have already risen 60% off their lows established three years ago, and yet, investor interest in both the uranium metal and in the uranium equities remains near zero. For example, Uranium Participation Corp., the listed vehicle on the Toronto stock exchange that holds physical uranium, recently traded at the biggest discount to net asset value since the Fukushima nuclear plant meltdown in 2011—a clear sign of extreme investor disinterest. We recommend large investment exposure to uranium and to the related equities.

"THE URANIUM MARKET HAS STABILIZED AHEAD OF ANOTHER MOVE HIGHER. CIGAR LAKE'S RESTARTING CAUSED SOME PRICE WEAKNESS, BUT WE EXPECT THAT WILL BE SHORT LIVED. EVEN WITH THE RESTART, CAMECO MUST BUY SIGNIFICANT SPOT VOLUMES NEXT YEAR."

Will Gold Take A Breather?

In gold bull markets over the last 50 years, silver has shown a strong tendency to lag the

advancing gold price, often for many years before catching up suddenly in a spasm of speculative activity. Following silver's advance, both metals often spend years correcting in price. Why this happens remains a mystery to us at Goehring & Rozencwajg, but it is a pattern that has played out multiple times over the last half-century and may have just repeated itself again. After President Nixon took the US off the Bretton Woods gold exchange standard in August 1971, gold staged a massive rally. In three years, the gold price soared 350% from \$40 to over \$180 an ounce. Silver lagged the gold price consistently over that period. Prior to this policy move, the gold-silver ratio stood at 25 (one ounce of gold bought 25 ounces of silver). As gold strongly advanced and silver lagged, ratio peaked out at 47 in the summer of 1973. Silver then staged a massive catch-up rally that saw the silver price advance 120% in just three months. The gold-silver ratio collapsed from 47 in August of 1973 to just 19 by February 1974. Although gold was able to eke out a new high (\$185 per ounce) in Q4 of 1974, the first leg of the gold bull market was clearly over. Gold spent the next four years correcting and it wasn't until the summer of 1978 that it was able to surpass its 1974 high. Silver's next explosive catch-up rally occurred in 1979 during the final parabolic blow-off phase of the 1970s great precious metals bull market. By the end of 1978 the gold-silver ratio was again approaching 40. In one of the most powerful bull markets moves ever, silver advanced almost 800% over the next 12 months, briefly piercing \$50 per ounce in January of 1980. The massive rally in silver again tipped investors off that the precious metals bull market was about to end, which it did in spectacular fashion. Both gold and silver peaked in January of 1980 and spent the next 20 years grinding away in a bear market that saw both gold and silver prices fall 70% and 95%, respectively.

At the end of the great 2000s gold bull market, silver again made a huge catch-up move, signaling that gold was about to experience a significant period of weakness. Starting at the end of 2006, silver lagged the gold price for the next four years. The gold-silver ratio bottomed at the end of 2006 at 45 and by 2010 the gold-silver ratio had broken 70. Starting in Q4 2010, silver undertook a huge catch-up rally and bested its all-time high price of \$50 set 31 years earlier. In just six months, the silver price more than doubled and the gold-silver ratio collapsed, falling from 70 to below 32. Again, the huge speculative move in silver predicted a lengthy period of precious metals price weakness. Gold prices peaked at \$1,900 per ounce four months after silver peaked in 2011. Both metals entered a five-year bear market which saw gold prices fall by 45% and silver prices fall by over 70%.

Since gold prices bottomed in Q4 2015, silver prices have lagged the gold price advance. In Q2 2016, the gold-silver ratio bottomed at 65 and by 2019 the gold-silver ratio was flirting with its highest readings ever, in the mid-90s. Then the COVID-19 pandemic hit.

In response to the deflationary forces unleashed by the COVID-19 economic lockdowns, silver prices collapsed and the gold-silver ratio skyrocketed to over 120 -- by far the highest reading ever recorded in the 2,000-year history of gold and silver prices we keep. The previous peak was registered in Q1 1991 when the ratio hit 100. After bottoming at \$12 per ounce in March, silver has staged another impressive catch-up rally over the last six months. Silver prices have more than doubled and the gold-silver ratio has collapsed, falling from its peak of 123 to 70.

In 1973, the huge catch-up move in silver brought about a four-year corrective phase in the precious metals bull market that ultimately would last another 10 years. On the other hand, the silver catch-up moves that occurred in 1979 and 2010 -- 10 years after both precious

"HOWEVER, GIVEN SILVER'S HUGE MOVE IN THE LAST SIX MONTHS, GOLD AND PRECIOUS METALS COULD NOW GO THROUGH A POTENTIAL CORRECTION PHASE WITHIN A LARGER BULL MARKET. "

metals bull markets started -- represented a serious warning that the good times were ending. We are extremely bullish on gold and do not believe we are repeating the 1979 and 2010 experience. However, given silver's huge move in the last six months, gold and precious metals could now go through a potential correction phase within a larger bull market. We recommend investors use any such corrective phase to build up significant positions in both physical gold and silver and related equities.

There are two additional bearish demand stories that have developed in the last several months confirming our belief that gold might be entering a corrective phase. First, central banks have significantly slowed their gold purchases. Last year, central banks bought a record 660 tonnes of gold, capping off a 10-year buying binge that saw them accumulate 5,000 tonnes of gold. Since 2009, central banks have repurchased 70% of the gold they sold between 1990 and 2008. In the first six months of 2020 however, central banks slowed their purchases dramatically. Central banks bought 233 tonnes in the first six months of 2020 versus 385 tonnes in the same period last year. The biggest source of the slowdown has come from the Bank of Russia. Since 2007, Russia has been a consistent gold buyer; over the last five years, the Bank of Russia has represented over 40% of all central bank purchases. However, after buying an additional 28 tonnes in Q1, the Bank of Russia announced it would suspend all additional gold purchases. The collapse in oil prices combined with the COVID-19 pandemic have significantly strained the government's finances. Central banks actually turned into net sellers in August. Although this has happened five times over the last 60 months, the 12 tonnes of net sales in August is by far the largest amount in years. Making matters worse, almost 80% of the 250 tonnes of central bank buying since the beginning of 2020 was done by the Turkish Central Bank. Although Turkey is attempting to diversify away from the US dollar given that Turkey has been threatened with trade sanctions, it remains unclear how much longer Turkish gold purchases can continue given their precarious financial situation.

Second, bearish data has emerged from China. Over the last 20 years, China has surpassed India as the world's largest gold buyer. In 2000, Indians bought approximately 850 tonnes of gold annually while China bought only 200 tonnes. By 2013, Indian gold consumption had grown to only 980 tonnes, while China's annual gold consumption had exploded by over six-fold to 1,300 tonnes. Clearly, China has become the most important demand force in global gold markets but for the first time in a long time, there are mounting signs of demand weakness.

Over the last five years, gold traded on the Shanghai exchange has consistently traded at a significant premium (\$5-\$15) to the world gold price. Even with large inflows of physical gold into China, physical prices have traded with persistent premiums over world gold prices. Most gold analysts have attributed these premiums to extremely strong demand. In the last six months, these premiums have evaporated. Shanghai spot market prices have traded with discounts as great as \$50 per ounce, which continues as we write. In previous letters, we have repeatedly made the case that the bull market in gold would be very different from the bull market of 2000-2011 in which western buyers were completely absent while eastern buyers were the dominant force. In this gold bull market—which we believe has started—western buyers will be the driving force and we might see eastern buyers turn into actual sellers as the gold price moves higher. This dynamic occurred in India back in the late 1970s. Are high gold prices beginning to dampen Chinese gold demand? It is something that needs to be watched closely and could add downward pressure to gold prices as we enter this corrective phase.

The Gold-Oil Ratio Revisited (Part Three)

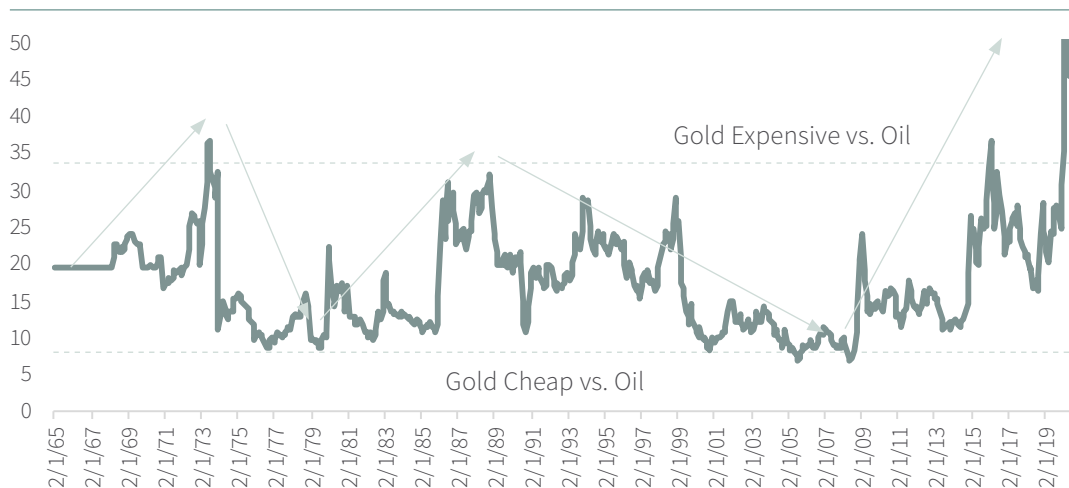
Oil has rarely been priced more cheaply relative to gold. Only twice in history has oil ever been comparably cheap: in February 2016 when the ratio hit 47x and in 1934 at the bottom of the depression when the ratio hit 39x. In response to COVID-19 back in March and April, the gold-oil ratio hit levels that were truly “black-swan” events. Using West Texas Intermediate oil prices, which went negative in April, the gold-oil ratio went to infinity. Switching to Brent oil prices (the benchmark price for North Sea crudes), the gold-oil ratio surged to 80x. According to its historical distribution, a ratio of 80x is a six-sigma event that is expected once every 5,000 years. The gold-oil ratio currently trades in the high 40s which, if you exclude the crisis readings observed in April and May, would still make for an all-time record high.

We believe the gold-oil ratio will undergo a huge contraction in the next five years, implying that oil will significantly outperform gold. In an essay entitled “The Gold-Oil Ratio Revisited”, we made the observation that the gold-oil ratio has traded multiple times from its level of 30 (when gold is expensive relative to oil) to 10 (when gold is cheap relative to oil) over the last 60 years. We also made the case that the fundamental forces that caused the gold-oil ratio to fluctuate between 10 and 30 were relative the growth in supply of both oil and gold. When the supply of gold grows faster than the supply oil, gold underperforms oil, and the gold oil ratio falls to 10 or below. When the oil supply grows faster than the gold supply, oil underperforms gold, and the gold-oil ratio rises to 30 or above. Since 2008, the supply growth in oil (primarily US shales), has vastly outstripped the growth in the supply of gold. It should be no surprise that the gold-oil ratio has hit all-time record highs.

As discussed earlier in this letter, we believe we will see five years of extremely disappointing oil supply growth. Because central banks are now showing signs of slowing their decade-long torrid pace of gold buying, we believe that total gold supply, when adjusted for central bank activity, will show significant growth as we progress into the upcoming decade. Given our analysis of both oil and gold supply growth over the next five years, we believe that we should see huge outperformance of oil versus gold and a huge contraction in the gold-oil ratio.

The table below shows the gold-oil ratio since 1960 as well as the changes in global oil and gold supply.

FIGURE 1 Gold / Oil Ratio



Source: Bloomberg, EIA and G&R Models.

Period	1965	1973	1979	1988	2008	2020
Gold	\$35.00	\$120.00	\$300.00	\$420.00	\$890.00	\$1,600.00
Oil	\$1.80	\$3.30	\$35.00	\$13.00	\$130.00	\$20.00
Gold Oil Ratio	19.4x	36.4x	8.6x	32.3x	6.8x	80.0x
Non OPEC Oil Supply Growth		60%	26%	21%	15%	24%
Gold Supply Growth		-5%	30%	-3%	46%	7%
Gold Price Appreciation		243%	150%	40%	112%	80%
Oil Price Appreciation		83%	961%	-63%	900%	-85%

Source: Bloomberg, EIA and G&R Models.

Over the past 60 years there have been three periods when the gold-oil ratio exceeded 30: 1973 when it peaked at 36; 1988 when it peaked at 33, and April 2020 when it peaked at 80. Conversely, there have been two times in the last 60 years when the gold-oil ratio traded below 10: 1979 where it bottomed at 8.6, and 2008 where it bottomed at 6.8.

Between 1965 and 1973, non-OPEC oil supply surged 60% and gold supply actually decreased 5%. In that time, gold prices rose 240% significantly outpacing oil which rallied 85%. By the spring of 1973, gold reached \$120 per ounce while oil reached \$3.30 per barrel leaving the ratio at 36, the highest ratio since the Great Depression. At this point gold was extremely overvalued relative to oil.

Between 1973 and 1979, the growth differentials between gold and non-OPEC oil supply switched. Non-OPEC oil supply rose 26% and the gold supply rose 30%. Oil prices surged 960% and gold prices advanced 150%. With the oil price hitting \$35 per barrel, and gold prices lagging, the gold-oil ratio fell to 8.6 in the summer of 1979. At this point oil was extremely overvalued relative to gold.

Between 1979 and 1988, the growth differentials between oil and gold supply switched again. Non-OPEC oil supply grew a strong 21% whereas gold supply fell 3%. Gold prices rose 40%, whereas oil prices collapsed by over 60%. With a gold price of \$420 per ounce and oil priced at \$13 per barrel, the gold-oil ratio peaked at 32 in November of 1988. At this point, gold had again become extremely overvalued relative to oil.

Between 1988 and 2008, the relative growth between non-OPEC oil supply and gold supply reversed yet again. Non-OPEC oil supply grew by only 15% whereas gold supply, swelled by huge amounts of central bank selling, surged by almost 50%. Oil prices surged by over 900% and gold prices rose by only 120%. In June of 2008, with oil prices hitting \$130 per barrel and with gold rising but still lagging, (\$890 per ounce) the gold-oil ratio hit a low of 6.8—its lowest reading since 1919. At this point, oil had become, for the second time in 60 years, radically overvalued relative to gold.

Finally, between 2008 and today, the growth rates between gold and oil have switched yet again. Because of surging production growth from the US shales, non-OPEC oil supply growth has again handily outpaced the growth in gold supply. Over the last 12 years, non-OPEC oil supply has grown by 30%. In comparison, global gold supply has only grown by 7%, strongly influenced by central banks which have turned from aggressive sellers of gold and into net buyers. Gold prices have advanced 85% since 2008 whereas oil prices have collapsed by 85%. In a bout of panic selling in February of 2016, the gold-oil ratio hit 47. This was by far the highest gold-oil ratio since at least 1858 and we went on record stating oil prices had never been more undervalued relative to gold.

We commented at the time that oil should spend the next several years significantly outperforming gold. Between February 2016 and September 2018, that is indeed what happened. Oil prices advanced 188%, from \$26 to \$75, whereas gold prices went from \$1,100 per ounce to only \$1,200, an advance of less than 10%. Although we saw a significant retreat in gold-stock ratio to 16 in September 2018, we never saw gold become radically undervalued relative to oil.

Since 1970, whenever oil became radically undervalued relative to gold (in 1973 and 1988), oil spent the next six years and 10 years, respectively, outperforming gold. However, after making a bottom in February 2016, oil spent less than two years outperforming gold before gold resumed its leadership position. With the COVID-19 pandemic, gold prices have surged, and oil prices have collapsed.

We would like to bring up another potential underlying factor pushing the gold-oil ratio to “black-swan” levels. The trend of gold supply contracting, and non-OPEC oil supply surging continued after the gold-oil ratio made its previous all-time high in 2016. Since 2016, gold supply, adjusted for continued large central bank buying, actually fell 3% over the last four years. In contrast, because the US shales have shown one more strong growth spurt, non-OPEC oil supply has surged another 12%. To us, the combination of COVID-19 related economic dislocations, combined with the large differential between the growth in oil and gold supply, is what caused the gold-oil ratio to hit 80.

Looking into the coming decade, we believe we can see another large switch in the supply differential between gold and oil, which will have large implications for the gold-oil ratio.

As we discussed in the Precious Metals section of this letter, central bank selling has already weakened in the last eight months. Because of low oil prices, the largest central bank gold buyer over the last five years (Russia) has announced it intends to stop purchasing gold for the foreseeable future. Although it is hard to predict how central banks will act given the strain now being placed on all governments’ budgets throughout the world, they could very well turn into net sellers in the next several years as they seek sources of liquidity.

On the other hand, non-OPEC oil supply is set to slow. The US shales have been the only source of growth in the non-OPEC world for the last 10 years. Once US shale oil production growth begins to decline, we believe we will see large declines in global non-OPEC production.

Together, this suggests we will see a contraction in the gold-oil ratio.

Oil has never been more undervalued relative to gold and we believe oil and oil related investment will outperform precious metals investments over the next several years. The underlying fundamental reasons for the gold-oil ratio to transverse from its upper bounds (oil is cheap relative to gold) to its lower bounds (gold is cheap relative to oil) have now been put in place.

On the Verge of a Commodity Cycle

In August 19th, 2020, Adam Rozenchwajg, Managing Partner of Goehring & Rozenchwajg, made the following presentation at the Finanz und Wirtschaft conference in Zurich, Switzerland:

Good morning everyone. My name is Adam Rozenchwajg and I make up one half of Goehring & Rozenchwajg, along with my partner Leigh Goehring.

With the time I have this morning I would like to explain our research that tells us we are on the verge of a new, potential explosive commodity cycle that could send prices much higher. We have just finished a classic massive bear market in commodities that has now dragged on for 10 years, and which has created massive profit potential for investors. We are at a critical inflection point in global commodity and natural resource markets, and for those willing to listen carefully to what I have to say today, the profit potential is going to be huge.

Commodities and financial assets trade in long cycles that are often inversely correlated. As I will carefully outline in today's presentation, the forces that create these cycles have repeated themselves over and over again and are doing so almost exactly again today. If you recognize these forces, and the investment opportunity they have created, you will make a fortune as we progress into the coming decade. Today is no different than the late 1920's, the late 1960's and the late 1990's—each was great time to make the switch from Financial to hard assets. In my presentation today, I will carefully outline how these forces emerged in previous cycles, and how all of them have again reappeared and are strongly at work today. The strong move in Gold is giving you a tip off what the future holds, and I am going to give more evidence to reinforce the message that gold is strongly sending today. The market is sending you strong signals that the time has come significantly change the positioning of your assets. Unfortunately, no one is listening. Hopefully today, I can convince you that the time to switch from financial to hard asset investments is right now. For those who heed this warning, the result will be strong outperformance.

For those unfamiliar with Goehring & Rozenchwajg, we are a firm that is dedicated to undertaking deep and comprehensive research on all aspects of global commodity markets. We pride ourselves in research process, and we specialized in recognizing, researching, recognizing, and understanding trends in various global commodity markets long before these trends become obvious to the general investment public. Our research often uncovers extremely important trends and inflection points missed by most investors—trends that many times signal the end of long grinding bear markets and conversely the top of extended bull markets. We are deep value investors, and we love to get involved at the bottom of commodity bear markets when investors are extremely bearish and huge value exists. For example, here is a profile of my partner Leigh Goehring in *Forbes Magazine* back in 2000 calling for gold to be the best performing assets of the coming decade, which it did indeed become. At the time gold was trading at only \$275, and because of central bank selling had become “un-investable”, but our research told us that gold as an asset class had never been cheaper and offered tremendous value, which of course investors recognized as the decade progressed.

Our research process is something that we are extremely proud of, and for those who are interested, we invite to follow us closely. We published all our research, and it is all available on our website.

Leigh and I have over 45 years of experience researching and investing in almost every natural resource market. As the vicious commodity has dragged on over the last decade, many firms shut their commodity teams, we find ourselves as one of the longest tenured teams in the market today. Between Leigh and I we have experienced multiple bull and bear market cycles and have brought this experience to bear in the research I will present to you today.

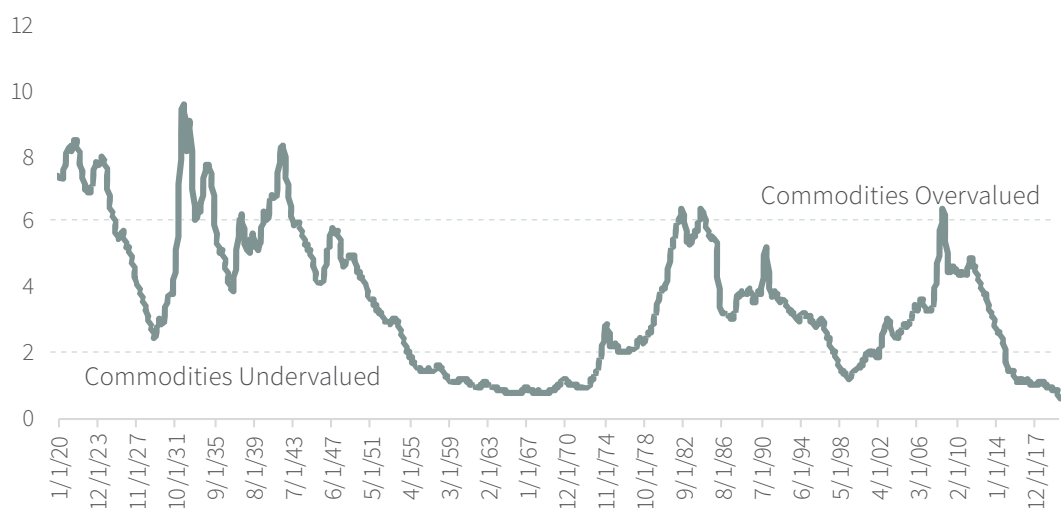
If there is one thing, I would like you all to come away with today it is that natural resources move in long cycles from radical undervaluation to radical overvaluation. It is a cycle that has repeated itself 3 times over the last 100 years, and our research tells us that a fourth cycle has now started. We are presently in a period of extremely low commodity prices (except for gold which we will discuss) but this is about to reverse itself. No one has any exposure to this sector today and if we are right, rethinking your views on real assets and commodities will be critical to you and your clients' portfolios going forward. We are on the verge of a new, huge bull market cycle in natural resources investments and this shift will likely be the most important investment theme of the coming decade.

Let me show you why. Today's presentation is as much about financial history as it is about supply and demand. Even though the three cycles I will discuss today, occurred in three completely different economic eras, the same underlying forces that pushed both commodities prices and the prices of financial assets in different directions were all strongly present in each. All these conditions are strongly in evidence right now as I speak. What follows is an investment saga that goes back over 100 years and demonstrates a regular pattern of boom and bust, and the emergence of recognizable forces that have repeated themselves over and over again.

Our study started with a fairly simple idea. Given that commodities are one of the major inputs in an economy, and the stock market is a proxy for the value of the economy, there should be some relationship between commodity prices and stock prices over time.

You may have seen this chart in the past. It tracks the price of commodities divided by the S&P 500 since 1920. A more common version of this chart starts in 1980 because that was the starting point of the most used commodity price index: the Goldman Sachs Commodity Index or GSCI.

FIGURE 2 Commodities vs. S&P 500



Source: G&R Models, Bloomberg.

Unfortunately, commodity cycles can last up to two or three decades and so a chart that begins in 1980 is not very helpful. Instead, we created our own commodity price index that closely follows the GSCI methodology and extended it back to 1920.

"THAT IS HISTORICALLY WHY PEOPLE INVEST IN RESOURCES – THEY ARE UNCORRELATED. THEY WORK WHEN OTHER INVESTMENTS DO NOT AND HELP TO PROTECT A PORTFOLIO OVER TIME. THEY MAY NOT SEEM TO MAKE SENSE FOR LONG PERIODS, BUT TIME AFTER TIME THEY EVENTUALLY DO. THE RISK IS ALWAYS THAT INVESTORS BECOME FRUSTRATED AND GET RID OF THEIR ALLOCATIONS AT EXACTLY THE WRONG MOMENT. THAT IS WHAT WE BELIEVE IS HAPPENING TODAY."

What we found was fascinating. While most of the time our index averaged 4-5 times the S&P 500, there were distinct periods where commodities became radically overvalued compared to stocks and represented terrible investments and other times when commodities became radically undervalued and represented excellent investments.

Other than today there have been three distinct periods of radical commodity undervaluation over the last 100 years and in each case, it was a great time to accumulate commodities and commodity stocks. In fact, following these periods of undervaluation, typically only natural resource **related investments produced positive returns, and they helped an investor make it through a very turbulent time in other areas of the financial markets.** That is historically why people invest in resources – they are uncorrelated. They work when other investments do not and help to protect a portfolio over time. They may not seem to make sense for long periods, but time after time they eventually do. The risk is always that investors become frustrated and get rid of their allocations at exactly the wrong moment. That is what we believe is happening today.

The key question for all of you is whether we are about to enter a new phase of the cycle today. This would impact many things including asset allocation, inflationary expectations, and sector leadership. Despite the important consequences few people seem to be taking the time to think about resources at all today.

We believe that the roadmap investors have used for the last 10 years is now obsolete. The recent years of benign commodity prices is ending and going forward we will have to contend with rising prices. Inflation is coming back – something few investors are prepared for.

For resource stocks this would mark a particularly important shift because no one has any exposure left at all. ESG, index investing, and years of poor performance have left investor's exposure at record low levels. From a high of one-third of the S&P 500 in 1980 energy stocks today make up less than 2.5% of the market while materials only add another 1%. Investors today are extremely vulnerable to a shift away from high-priced growth stock to resource stocks because they have such little exposure. On the other hand, in a world where active managers fight desperately for outperformance resources could add some much-needed alpha if they indeed turn around. In the event resource stocks begin to rally we can envision a market where capital rushes in to establish positions driving prices much higher much faster.

Looking at this chart, it is clear that commodities today are radically undervalued – in fact as of April commodities have never been cheaper in the 100 years of data we track. The key question is will we see a repeat of the huge bull markets that followed prior periods of similar undervaluation? If so, will the asset class that has been in favor – this time FANG stocks and index funds – go through a massive period of underperformance.

Analysts are quick to point out the differences this time around. For example, ESG considerations, electric vehicles and surging shale production were not factors in any of the prior periods of undervaluation. While this is true, the more research we did the more we were amazed by how much each of the past cycles had in common instead of their differences.

They each had an extremely unique set of features in place leading up to the inflection point. In every case these very unusual features presented themselves and then commodities surged higher.

Had an investor only been able to identify these features in past cycles they could have positioned themselves accordingly and both enjoyed substantial outperformance and avoided major collapses.

Every single one of these features we identified in past cycles are present again today.

Before we discuss the common factors themselves, let's define the four great periods of radical commodity undervaluation of the last 100 years.

The first period – and in many ways the most interesting – occurred in 1929 right before the depression. After World War I, and the depression of 1920-1921, commodities languished. Stocks on the other hand went through their famous bubble of 1927-28. By 1929 commodities were extremely undervalued relative to stocks and reached a low point that would not be repeated for another 40 years.

Because of the depression, few people talk about the bull market in commodities between 1929 and 1947. Indeed, given how tied commodities are to economic growth, you would think resources would have led the way down over the coming 15 years.

Instead commodities did much better and rebounded much faster. Although you still had the depression and bank panic ahead, if you had bought commodities in 1929 by 1932, they would have only fallen by 30-40%. I say only because over that time the stock market fell by nearly 90% -- resources were the only place to hide. A decade later, the SP 500 was still nearly 50% lower while gold and silver were up 70% and 20%. Oil was only down 11%. Gold stocks meanwhile had surged 700%, mining stocks 15% and even oil stocks were up 3%. Ironically, resource investments (and particularly stocks) were the only thing that would have saved you during the Depression.

The second period of radical undervaluation was reached in 1968. Just when investors couldn't get more bearish on resources, the commodity bull market of the 1970's took off. Nagging inflation throughout the decade drove commodities up over 10-fold between 1970 and 1980 while the natural resource related stocks surged between 5 and 10-fold. By 1980, cocktail party conversations centered on owning gold coins and other hard assets. The stock market was not even able to double throughout the 1970s and its performance in real terms was decidedly negative.

Because of inflation, investors by 1980 believed all your money had to be invested in natural resources, and conventional wisdom held that stock and bonds both had become un-investable. Even 10-year US Treasury Bonds yielding over 16%% were to be avoided at all costs—They were deemed certificates of confiscation by most. By 1980 the pendulum had swung completely, and commodities were extremely overvalued relative to financial assets. Just when investors felt that stocks and bonds must be sold and gold was the only safe investment, just the opposite occurred and financial assets entered into the largest bull market in history that took stocks and bonds up over 30-fold.

From 1980 to 2000, commodities did poorly while the stock market surged until the ratio again reached an extreme level of undervaluation in 1998-1999. The bull market in resources that followed truly surprised everyone. After 20 years of weak commodity prices, no one was expecting a sudden turn around. Gold in particular spent most of the 90's being rejected as a barbarous relic as central banks rushed to sell their reserves, ultimately driving prices

as low as \$252 per ounce in 1999. Over the next 10 years gold prices surged 10-fold while the S&P barely regained its old highs.

Today commodities are again radically undervalued relative to financial assets. In fact, today's undervaluation is greater than it was in 1929, 1968 and 1998-1999. Few investors today believe resources can do well over the coming decade. ESG, electric vehicles and shale supply dominate investors' concerns. Banks have been closing entire natural resource divisions and investors often hold no allocation to the sector at all.

So, will history repeat itself this time? Are we on the verge of a massive bull market in resources and real assets? An investor sitting in 1929 1968 or 1998-1999 would have been called crazy if they were bullish on commodities but in all cases, it was the right decision and the only thing that would have generated outperformance. Will this time be the same?

Every other major period of undervaluation had several very unusual factors in place beforehand that signaled a major reversal was coming. Today all of those factors are again in place.

The first factor needed for commodities to reach radical undervaluation, unsurprisingly is a severe bear market in the commodities themselves.

Over the last 100 years, oil and gas prices have advanced by 4% on average while gold advanced by 5% and copper by 3%. Corn prices, the laggard, has advanced by 2% per annum. Because of the earnings leverage, the stocks have done better averaging between 6-9% (total return) depending on the commodity.

The years leading up to the periods of major undervaluation however were extremely different.

For example, from 1920 to 1929 commodity prices collapsed as excess production from the war effort exceeded demand. Oil prices collapsed from \$3 to \$1.17 or 62% and gas fell a comparable amount. Copper fell by 25%, corn by 30% to 71 cents a bushel. Gold was flat in US dollars because of the gold standard and silver was also unchanged.

In the 10 years leading up to 1968 corn prices fell by 25% and copper by 15% in nominal terms while oil fell by 7%. While not as severe nominally as the 1920's, it is still a huge deviation from the long-term growth rates we mentioned above. Moreover, on a real basis we estimate that prices collapsed by nearly 50% over the period.

The huge price spike in the 1970's helped bring on a wave of commodity production while the fall of the Soviet Union in 1989 resulted in a shock of excess material flooding the markets. Commodity prices utterly collapsed from 1980 to 1999 with precious metals faring the worst. Central banks around the world decided they no longer needed gold as their reserve asset. Gold prices reached \$800 per ounce in 1980 but 20 years of relentless central bank selling took gold to a mere \$255 by the summer of 1999 – a fall of nearly 70%. Silver did even worse. After having peaked at \$35 per ounce in early 1980 prices collapsed an incredible 87% to \$4.46 by 1997. Oil meanwhile peaked at \$40 per barrel on concerns over the Iraq war in the fall of 1990 but by 1998 it too had fallen 72% to \$11 per barrel. No commodity was spared: corn, gas, and copper all fell between 50-70%. It is amazing when you think about it how little time and attention has been paid to such spectacular collapses in asset prices compared to say even relatively minor stock market corrections.

The recent bear market has been equally as impressive in magnitude and even more severe when you look at how fast it happened. Oil prices peaked at \$140 per barrel in the summer

of 2008 amid concerns that global production had peaked. 12 years later, prices actually turned negative on a daily basis, and on a monthly basis finished April at \$18.80 – a decline of 85% amid COVID dislocations. Natural gas fared even worse, falling from a peak of \$14 in 2005 to a low of \$1.65 in March – a fall of nearly 90%. Silver fell 71% from a high of \$48 in spring of 2011 to a low of less than \$14 at the end of 2015. Corn copper and gold all fell over 50%.

During these severe bear markets, low prices helped lay the seeds for the next bull market. Investor interest and capital was directed into other sectors. Resource companies drastically reduced their expenditures and delayed or deferred their next generation of mines and oil fields. Since all commodity assets naturally deplete over time the industry has to be constantly developing new projects to offset these declines. Once capital dries up and projects are cancelled supply inevitably follows and the market begins to tighten.

The next factor common to all of our periods of radical commodity undervaluation is a general stock market investment boom.

Over the last 90 years the S&P 500 has generated a total return averaging just over 9% per year – but leading up to each period of radical commodity undervaluation (and strong subsequent rally) the market did much better.

The 1920s found most of Europe trying desperately to get their currencies back on the gold standard after World War I. Britain did so in 1925 after having deflated its economy by nearly 35% resulting in massive economic dislocation. When gold still wouldn't flow to Britain, the US Federal Reserve bank led by Benjamin Strong decided to cut interest rates to help the situation despite a strong US economy and nascent stock market boom. In a discussion with his French counterpart, Strong declared that his actions -- while necessary -- would no doubt give the stock market "un coup de whisky." Indeed, it did with the S&P surging by 3-fold over 4 years or nearly 30% per annum – more than 3 times the long-term rate. In this case the "mania" was not in any particular sector but rather was in the market itself.

The 1960's or "go-go years" as they have come to be known enjoyed a very strong bull market with several investment fads throughout notably the "gun slinger" mutual fund craze, the growth stock mania of the mid 1960's and the conglomerate boom whereby companies with higher P/E ratios bought lower P/E companies for stocks leading to growth and further boosting their multiple. The most famous investment formula of the decade however was the nifty fifty: a collection of 50 stocks each with a PE of 50 or greater. It was argued that all an investor had to do was own these stocks in perpetuity for guaranteed prosperity. Over the period the S&P rose nearly four-fold generated a total return of 13% or 50% higher than its long-run average. Various sub sectors within did even better – with many members of the Nifty Fifty compounded growth in excess of 30%.

After a slow start to the 1990s investors once again turned very positive to stocks. The S&P 500 surged fivefold for a full decade of 18% compounded growth with remarkably few drawdowns aside from the Asian currency crisis and collapse of Long-Term Capital Management in 1997-1998. A stock mania once again spread around the world as more and more first-time investors entered the market. The mania was centered around the technology sector which literally exploded upwards as the decade progressed. From 1995 to 1999 the entire Nasdaq advanced by an incredible 40% per year.

In each of these periods, commodity stocks were left behind – which helped set up the supply response in the subsequent bull market. Each time there was a feeling that commodities represented the “old economy” while prosperity was to be found ahead in the new investment craze of the day.

In the 1920s investors were fixated on all stocks, but growth stocks in particular did well. RCA was the investment darling of the day having just commercialized the biggest new technology of the day: radio.

In the 1960s, the common wisdom held that inventors should own conglomerates and high valuation stocks. Financial engineering would allow them to generate profits from thin air for all the time to come. Petroleum engineering or mining engineering on the other hand was thought to horribly passe now that large parts of Europe had been rebuilt following the end of World War II.

In the 1990s technology became the new holy grail – earnings clearly did not matter as long as websites enjoyed ever growing traffic. They would figure out how to make money later.

Presently there are two investment crazes captivating investors’ attention and capital. The first is a sort of redux of the technology boom of the 1990s with Facebook, Google Netflix Apple and Amazon growing without bound. The other investment craze is passive index investing. This system recommends owning companies according to their market capitalization without any active management at all. As value-investing and bottoms-up stock picking has underperformed growth and the broad-market, capital has left active management and moved into passive further pushing these trends and reinforcing the feedback loop.

Today’s market feels a lot like the late 1960s investment craze: instead of buying the Nifty-Fifty and holdings them forever, today’s magic formula says to buy the broad market and add additional exposure to FANG. The rest is automatic. And likely equally as dangerous as in the past.

So far we have shown that by the end of each period of commodity undervaluation, resources had entered into a severe bear market at the same time as investor’s attention has become captivated by a catch-all investment craze supposedly “guaranteed” to deliver strong ongoing returns. In each case, resources were thought to be passe and sold as a source of funds to invest in the craze of the day.

Credit has also played a strong role. Immediately before each period of radical commodity undervaluation, credit conditions have been extremely accommodating. This has helped push the manias and crazes we just discussed much further than otherwise possible and extended the commodity undervaluation into record territory.

After World War I the United States found itself with much of the world’s gold stock. The major economies of Europe had all suspended their gold standard during the war and through the 1920s were fixated on returning to gold at the pre-war rates. Unfortunately, with all of the gold in the United States it was difficult to do so. Britain eventually tried by deflating its economy by nearly 40% and suffering a massive economic malaise in 1925. Eventually, Benjamin Strong at the Federal Reserve realized he would have to cut rates to encourage gold to move back to Europe despite the fact the US was in the middle of a boom. As we mentioned, this easing of credit conditions when the economy was already strong led to a

massive stock bubble in 1927 and 1928 that extended the commodity undervaluation further than it otherwise would have gone.

Throughout the 1960s, the US ran its “guns and butter” policy of simultaneous war expenditures in Vietnam and a huge increase in domestic social programs. The US deficit exploded as the decade progressed and by 1966 there was concern the dollar would break its fiduciary gold backing of 40%. With the economy heating up and gold flowing out, the natural course of action would have been to raise rates but instead president Johnson convinced Fed Chairman William Martin to cut rates from 6% to 4% in 1967 to boost the economy ahead of the election. The result was again a stock market boom that went much further than it should have. 1967 also saw Great Britain devalue the pound which eased credit conditions.

Throughout the 1990s you will doubtlessly recall the so-called Greenspan-put that referred to the policy of continually reducing interest rates in the face of the S&L crisis of the early 90s, the Asian Currency crisis in 1997-1998, the collapse of the Ruble in 1998 and LTCM shortly thereafter. And most amazingly in retrospect was the cut ahead of concerns over the Y2K software bug that foresaw planes falling out of the skies and networks crashing.

The last ten years have also been characterized by extremely accommodating credit policies following the Global Financial Crisis. Every major economy cut interest rates to zero for some period of time while central bank balance sheets went from having grown at 3% per annum over the past 60 years to doubling following the Great Recession and then doubling it again. The response to the recent COVID pandemic has been even more extreme and swift. The US has nearly doubled its balance sheet in a matter of months instead of years and the ECB, Bank of England have followed suit. The Swiss National Bank while not having grown as aggressively is rapidly expanding as well. That \$15 tr of sovereign debt now commands a negative interest rate is testament to how accommodating the credit conditions currently are. Broad money as measured by M2 is now growing at the fastest rate in peacetime history.

Our research has also uncovered that the late 1920s, late 1960s, 1990s and today were all periods of surging margin loans for stock purchases also signaling how easy credit conditions had become.

Indeed, the periods in question all saw large expansions of the financial system in general. The 1920s were characterized by a large increase in the number of banks available in both the US and Europe as per capita GDP grew and the banking system went mainstream. The 1960s saw the birth of the professional asset manager as individuals poured their savings into stock ownership. The 1990s saw the rolling back of bank regulation put in place during the depression and the middle 2000s saw a massive increase in structured financial products. In every case a boom in the financial system seems like it is a necessary factor in our study and indeed we have that in place today.

Lastly, inspired by some of the writing of Professor Napier from the University of Edinburgh we noticed that all of our periods in question had another very unusual similarity. They were all periods that enjoyed high real and nominal GDP growth along with low inflation. Classical macroeconomics suggests that strong growth is associated with inflationary pressures and weakness is associated with deflation.

The Philips Curve formalizes that as unemployment moves down inflation moves up. There have only really been 4 periods where this tradeoff has not held true – and you guessed it: the late 1920s the late 1960s, the 1990s and today. Each period enjoyed above average

economic growth along with below average inflation – something that traditional economics teaches is unlikely if not impossible.

Why is this important? In a period of strong economic growth and little cost inflation companies that hold few assets tend to do well because they can enjoy the growing economy without having to tie up capital owning assets to help avoid cost pressures. Think of owning Uber today compared with owning a fleet of taxis. Clearly everyone would prefer to not tie up the capital associated with a fleet of taxis.

Asset-light investing is not always preferred, however. In periods with relatively low to average economic growth and rising inflation, it becomes difficult to pass along your rising costs to the customer. In this case, the only saving grace is to own the asset itself whose value will keep pace with inflation.

Therefore, asset light and asset heavy investing fall in an out of favor and go through cycles as well that repeat themselves. These cycles line up perfectly with the periods we're talking about.

When we look at the late 1920s the best sectors in the market were asset-light: specialty chemicals, electronic equipment, business consultants for example. Among the worst were mining, steel works and manufacturing. In the late 1960s the best performing sectors were restaurants, hi-tech medical equipment, leisure products, computer hardware and software – all asset light. Autos, steel, transportation shipbuilding were among the worst performing. Clearly in the 1990s the best performing sectors were computer technology, financial services, microchip makers, banks, telecoms while the worst performing were again mining, textiles, steel works and real estate. Since 2010 the best industries have once again been microchips, software, retail, lab equipment and business services while traditionally asset heavy industries have lagged.

If history is a guide this will not continue to be the case in the decade to come.

Turning back to the chart, we can clearly see that commodities and real assets today have gone through a severe bear market that has left them as undervalued as they have ever been relative to financial assets.

Moreover, after my talk thus far I hope you will agree that while today may feel unique it is in fact simply repeating a cycle in place after every major commodity bear market and preceding every major commodity boom.

In the other periods of major undervaluation no one believed real assets would ever get better but ended up being the only way to protect wealth. The key was identifying the factors showing where you were in the cycle. Today is no different – please treat energy as un-investable the way they treated gold in 1999. We are here again but no one is heeding the warnings of the past.

The next question is what will serve as the catalyst triggering a shift from commodity bear market to a new surging bull market. As you can see in the 1960s commodities remained cheap relative to stocks for quite some time. In the investment industry being early is often as bad as being wrong: our chart tells us commodities are cheap but says nothing about when that will end, and the new bull market will begin.

Luckily, we can again look at history as a guide. We will next turn our attention to catalysts: in past cycles what broke the bear market psychology and is there any similarity today.

A keen student of financial history might notice that 1929, 1968 and 1998 all have something in common. They were all years in which the prevailing monetary systems collapsed and radically changed.

The reasons for these shifts are extremely complex but they relate at least partially to the factors we have just discussed: credit conditions, asset prices, sector leadership and the size of the financial system. When these are pushed to extremes imbalances emerge. These imbalances can trigger feedback loops and grow on themselves until they can no longer be sustained. Finally, the imbalance collapses under its own weight and a shift in the prevailing system results.

When people think of 1929, they immediately think of the Depression, but it also represents the end of the classical gold standard in place since the early 19th century. From the Napoleonic wars to the start of WWI every major world economy was on a strict gold and or precious metal standard.

In 1914 most countries suspended gold convertibility to help finance their war effort. Once hostilities ended, countries spent most of the 1920s trying to reestablish their link with gold. Between 1924 and 1926, Germany Britain and France all went back on gold at various rates that led to massive dislocations and problems. Since most of the gold was trapped in the US, they finally had to cut rates in 1927 to promote gold to flow to Europe. This was Benjamin Strong's "coup de whiskey" that helped inflate the stock market bubble of 1927-28. By October 1928 Strong had died and his successors quickly restricted credit resulting in the Depression but also the end of any hope in maintaining the classical gold standard. 1928 also marked the low point in commodities relative to financial assets and set in motion the first period of massive resource outperformance that we discussed earlier.

After World War II, major economies adopted the Bretton Woods exchange system. This system linked the various exchange rates with the US which itself was convertible into gold at \$35 per ounce. This system stayed in place over the next 25 years. As I discussed throughout the 1960's the US pursued its "guns and butter" policy – Vietnam war expenditures along with massive social programs at home. As concerns over the US financial health increased, people rushed to convert their dollars into gold. By 1967 every US dollar was backed by 42 cents of gold – perilously close to its 40-cent legal limit.

While most historians remember the 1971 Nixon Shock – when the President canceled the convertibility of us dollars into gold – representing the largest default in human history – few people talk about the events of 1968 and 1969.

In fact, it was President Johnson that suspended the legal requirement that the dollar be backed by 40 cents of gold in 1968. This shift caused the London gold market to suspend activity for 2 weeks and the London Gold Pool – in place since 1960 to defend \$35/oz gold price -- collapsed. The Zurich gold pool was immediately created to take its place. While the Nixon officially suspended the dollar's convertibility in 1971, the Bretton Woods system actually ceased functioning practically speaking in 1968 – exactly the same moment as commodities bottomed relative to financial assets and began their massive bull market that would last a decade and take gold to from \$35 to \$800 per ounce and oil from \$2.92 to \$26 per barrel.

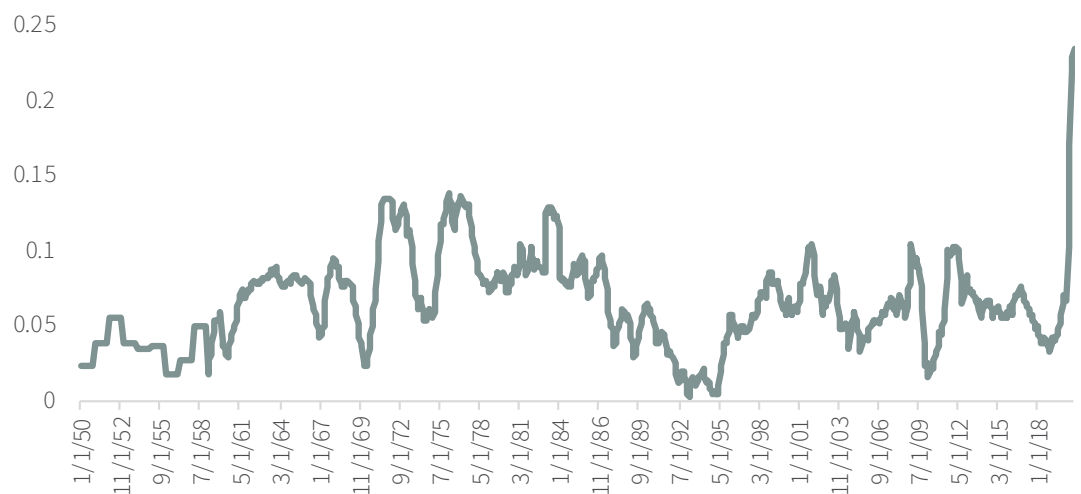
Even a keen student of history might have missed the monetary shock of the late 1990s. It was less recognizable but equally as important and involves the emerging markets. Once the Bretton Woods system officially ended in 1971, most major currencies became freely floating.

On the other hand, emerging markets chose to maintain a US dollar peg in an effort to promote stability at home and confidence in their local currency. This system worked for the next 25 years until investor interest in the emerging markets surged in the 1990s. As the US maintained low interest rates, these economies boomed and attracted “hot capital.” Most Asian economies grew in excess of 10% per year, which attracted even more foreign money. Once conditions shifted this money quickly flowed back out leaving the emerging market countries unable to defend their currency pegs.

In 1997 this system collapsed beginning with the failure of the Thai Bhat peg. Indonesia, the Philippines, Malaysia and South Korea all saw their currencies collapse by between 35 and 80% over the next 18 months. By 1999, the crisis was over as the IMF helped stabilize the region and most countries moved to a managed-floating exchange rate regime that has persisted since. Even though this period is less obvious as the ending of the gold standard or the Bretton Woods system, it was no less important. Trillions of dollars of global capital flows were altered very quickly and have resulted in the massive buildup of Treasuries held in China and south east Asia. Just like the other periods, this shift corresponds exactly with the moment when commodities and real assets boomed relative to financial assets.

I was originally supposed to deliver this speech in April and since then things have changed dramatically. Instead of speculating about the end of the current monetary regime, I think we are living history – it is happening today as we speak. We are now seeing massive shifts in global monetary orders both in the United States and Europe due to the impact of COVID-19. The US has served as the world’s reserve currency for decades and we believe that period is now over.

FIGURE 3 M2 Y/Y Growth



Source: FRED.

Since the outset of COVID-19, the US has grown its monetary base from under \$4 trillion to \$7 trillion today. This, in turn, has led to broad money or M2 growth in excess of 26% year-on-year – the highest peace time reading in history. Modern monetary theory thought to be completely unorthodox only 12 months ago is now upon us. The Fed has directly monetized nearly 100% of the US deficit in 2020 compared with less than 20% last year. The Bank of England has followed suit and monetized all of the UK’s COVID related debt.

Whether anyone admits it or not, at this point the Fed and the BoJ are actively controlling the yield curve and the ECB is likely not far behind. European fiscal unity once thought to be impossible is now a reality.

While we can't say for sure what will take the place of the current system, the monetary regime has not faced such dramatic changes since the collapse of Bretton Woods.

Not only are every single factor that has led to massive commodity bull market now in place, but the catalyst – a change in monetary regimes – is also upon us.

Gold is already telling us the shift is here. Commodities, which have underperformed for the past decade are emerging from their slumber and if history is any guide will go through a period of massive outperformance.

In the interest of time, I cannot go into all of the fundamentals of the various commodity markets but I would invite anyone interested to please read our quarterly letters available on our website, where we discuss these trends in depth.

As a brief summary, the lack of capital in the industry over the last decade has had a huge impact on new projects. Before COVID started, gold production had peaked as had US oil production, gas production. Copper production was likely set to peak in 2021. COVID has simply served to pull all these trends forward. We have actively curtailed nearly 15% of existing global oil production, and reduced drilling activity by 60%. Several large-scale mining operations have been curtailed and new projects have been shelved. This has always laid the groundwork for commodity bull markets and this time will be no exception. Production across the board is set to slow dramatically after a decade of fairly sizable growth. Demand on the other hand has rebounded faster than most have thought possible and this will continue. There are currently nearly 4 billion people going through their period of intense commodity consumption – nearly 6 times the number of people historically at any one time. This is a unique moment in the history of commodity demand that has not been and cannot be repeated again.

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Commodities go through large cycles that last decades. **Our research tells us that we have clearly reached the bottom of this cycle today. As I outlined in my presentation today, this cycle has been just like all the other before.** Multiple factors seem to repeat themselves time and again and all of these factors are in place today. The catalyst that historically ends one bear market and ushers in a new bull market has revolved around a shift in the monetary regime – and while it may have been audacious to say so even a year ago, we find ourselves at that point today.

Very few investors have any exposure to this sector, but if history is any guide it may be the only way to generate returns over the coming decade. The next commodity bull market is now upon weather investors recognize it or not. Gold is certainly telling you so and over the coming years most every other commodity is likely to follow. Most investors have become used to a mild deflationary environment, low input prices and ample growth. That roadmap is now behind us and a new period of inflationary pressure lays ahead.

Even a small allocation to this sector will help fulfill its roll to diversify returns and help maintain long-term value. How you are positioned today could make all of the difference going forward. Unfortunately, as of today no one is heeding the warning – that will change as the cycle progresses and weather you recognize it today will make the difference for your clients.