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THE GOLD BULL MARKET IS HERE

Table of Contents

The Gold Bull Market is Here
What Catalyst Will Finally Kill the Bear?
2019 Q2 Natural Resource Market Commentary
Stranger Things: Do Anomalies Signal the Waning Days of a Bear Market?
Heading into a Tight Second Half: Implications for the Oil Market
Our Neural Network Makes a Startling Prediction
The Biggest Story No One Talks About: Aramco Reserves Post 2077
Will This Natural Gas Bear Market Ever End?
Copper Supply Takes a Hit
Musings on the Gold Bull Market Few Saw Coming
Could Sunspots Responsible for the Wettest Spring in U.S. History?

"Ray Dalio says gold will be a top investment during upcoming 'paradigm shift' for global markets." CNBC, July 17, 2019

"Though Donald owned no publicly traded stock, he was already claiming that he'd made a fortune in gold..." Trump: The Deals and the Downfall by Wayne Barrett (HarperCollins, 1992)

"There is no fever like gold fever." Richard Russell, Dow Theory Letters

Our loyal readers well know that we believe a huge new gold bull market lies in the not-too-distant future. The large 45% pullback in the gold price from 2011 to the end of 2015, the severe undervaluation relative to financial assets, the unprecedented money creation by global central banks, and last fall's extreme bearish investor psychology has placed gold in radically undervalued territory.

Gold's last bull market, which started in 1999, began with gold being radically undervalued relative to oil as well. However, ever since both gold and oil bottomed back in January 2016, gold has refused to become cheap relative to oil. For the last three and a half years, we have sat on the sidelines waiting for gold to move into undervalued territory. We now believe the threshold for what we once considered undervalued may have shifted up considerably over the last five years—a subject we will discuss in this essay.

"HOWEVER, IT NOW LOOKS LIKE GOLD IS EMERGING AS THE EARLY LEADER OF THIS UPCOMING BULL MARKET. IF WE ARE RIGHT, GOLD COULD STAY OVERVALUED RELATIVE TO OIL FOR A SIGNIFICANT TIME, ESPECIALLY ONCE THE UPCOMING BULL MARKET STARTS IN EARNEST. "

In the commodity bull market, that started in 1999, oil was the leader and gold only took on leadership in the final years. However, it now looks like gold is emerging as the early leader of this upcoming bull market. If we are right, gold could stay overvalued relative to oil for a significant time, especially once the upcoming bull market starts in earnest.

Whether you compare the value of gold holdings relative to the amount of money printed by the central banks, the global stock of financial assets, or just the price of the Dow Jones Industrial Average, there is no denying that gold is as cheap or nearly as cheap as it was in 1929, 1970, and 1999. Each of these years proved to be excellent times to have significant gold exposure.

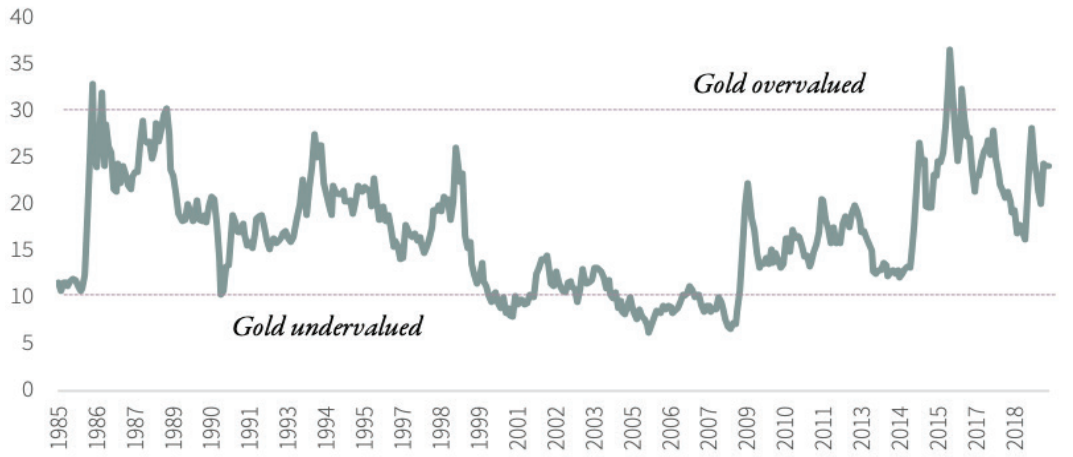
Last fall's pullback in gold and silver produced extreme levels of bearish sentiment that indicated the bear market in both metals was drawing to a close. For the first time in 16 years, commercial traders on the COMEX ("the smart money") had finally positioned themselves net long in both gold and silver markets, while speculators ("the trend followers") finally went net short in both markets. Furthermore, it was the first time in 21 years that commercial traders had been net long and speculators net short in both markets at the same time. We believe commercials being net long and speculators being net short is a necessary but not sufficient condition for a major market bottom. While commercials in gold and silver markets went net long in the summer of 1997, the precious metals bull market took another four years before breaking out in 2002. Even with that lag, buying gold and silver in 1997 turned out to be an excellent investment decision.

Next, we would like to turn to the gold-silver ratio. Since the US government ended the dollar's gold peg back in 1971, the relationship between gold and silver has exhibited certain predictable patterns. In precious metal bull markets, the gold-silver ratio usually contracts as the price of silver rises faster than the price of gold. On the other hand, during severe bear markets, the ratio expands as the price of silver falls faster than the price of gold. Since 1971, there have been five times when the gold-silver ratio has surpassed 80:1 (i.e., an ounce of gold buys 80 ounces of silver), and in four of those instances, it paid to accumulate significant positions in both metals. Last week, the gold-silver ratio hit 93:1--the second highest reading ever.

The only thing that had concerned us was the price of oil relative to gold. Over the last three years, we have been very bullish on global oil markets. We explained how we were waiting for gold to become undervalued relative to oil, just like it did back in the 1999-2000 period. A "cheap" gold-oil ratio would give us our final signal that gold's three-and-a-half-year corrective phase had come to a close.

As we have written, gold and oil have traded in a consistent band that has been in place since oil's discovery in 1858. During periods of gold undervaluation, one ounce can only buy 10 barrels of oil. Following these periods, gold usually significantly outperforms oil. During periods of gold overvaluation, one ounce can buy 30 or more barrels of oil, and following these periods oil usually outperforms gold. As you can see from the chart below, (between 1999 and 2008, gold was undervalued relative to oil for nearly eight years. On the other hand, since the gold-oil ratio surpassed 40:1 in December 2016 (the highest level ever in the 160 years of data that we keep), the gold-oil ratio has never approached anywhere near its 10:1 lower band.

CHART 1 Gold-Oil Ratio



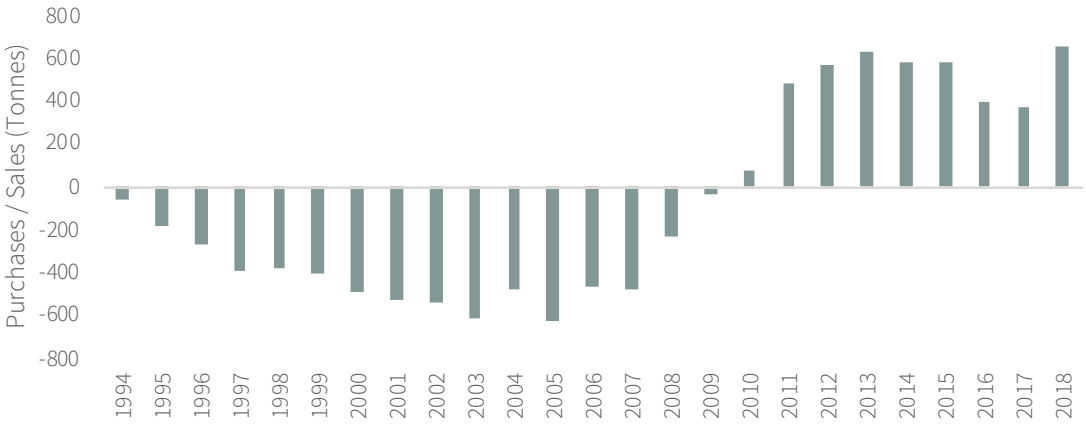
Source: Bloomberg

The question for us is whether there has been a fundamental shift in how oil is priced relative to gold. For example, back in September of last year, West Texas Intermediate crude (WTI) rallied to $76 per barrel while Brent reached $83 per barrel and gold fell to $1,180 per ounce. At that point, one ounce of gold bought 15 barrels of WTI or 14 barrels of Brent crude. Even though we did not get anywhere near the 10:1 that had previously signaled gold undervaluation, gold has now spent the last nine months significantly outperforming oil.

Starting in 1999, gold was able to stay severely undervalued relative to oil for over nine years. Are we now in a period where gold will remain overpriced to oil for an extended time? Could the gold-oil ratio spend the next nine years trading between 25:1 and 35:1? Can a gold bull market break out with gold starting from an overpriced position relative to oil, as it is today? We have thought long and hard about these questions and have concluded that we have indeed likely experienced a paradigm shift in how gold and oil are priced relative to each other, at least in the first stages of this upcoming commodity bull market.

We believe this paradigm shift has occurred because, over the last 25 years, central banks have swung from being large sellers to large buyers of gold which has impacted how gold is valued.

CHART 2 Central Bank Gold Purchases/Sales



Source: World Gold Council

Central banks (primarily European) began a campaign to aggressively sell their gold holdings in the mid-1990s. Believing that gold had lost any monetary purpose, these central banks were convinced that gold could only move in one price direction – down. As you can see from the chart, central banks steadily increased their sales as the gold bear market dragged on. By the summer of 1999, central bank selling had reached such panicked proportions that the newly formed European Central Bank actually imposed selling restrictions. By September 1999, a group of 14 European central banks agreed to limit their gold sales to 400 tonnes per year in what became known as the first "Washington Agreement."

But it just wasn't central banks that put immense pressure on gold markets back then. Starting in the mid-1990s, central banks had also become more amendable to lending their gold at very attractive interest rates to borrowers. This surge of borrowed gold created two new sources of artificial "supply." First, bullion banks (the banks arranging physical gold transactions) used the surge in "lendable" gold to create a number of derivative gold-forward sale strategies that gold producers could use to protect themselves against falling gold prices. The most widespread was the "spot-deferred" contract which allowed producers to sell forward future production and lock in a price while retaining the option of when to deliver the physical metal. If prices at expiry were higher than the forward contract, the holder could "defer" delivery and earn interest. Given the flexibility of a "spot-differed" sale, a large number of gold producers sold forward huge volumes of future gold production. By the late 1990s, for example, many Australian gold producers had actually sold forward 100% of their reserves.

The most aggressive North American producer to sell forward their gold was Barrick Corp. By the early 2000s, they had sold forward nearly six years of future production. In order to offset the exposure from the long side of these contracts, bullion banks hedged themselves by selling short the gold borrowed (at de minimis costs) from central banks. Although it is hard to quantify, we believe producers had sold forward several thousand tonnes of gold by the early 2000s.

The third source of selling pressure came from the bullion banks themselves. Sizable amounts of borrowable gold from the central banks allowed the bullion banks to "front-run" their own clients – both central banks themselves and the gold producers. Given that almost every central bank announced their intention to liquidate their gold holdings and, given that many gold producers similarly announced their desire to increase forward sales, it was a low-risk trade for bullion banks to borrow central bank gold, sell it, and "front run" their own clients. While it represented highly unethical behavior on the part of the bullion banks, it was also extremely profitable.

By 2000, the gold market was flooded with physical supply. Gold became radically undervalued and negative sentiment towards the precious metals market reached extreme levels. Although it was not quite the bottom, the famous "Death of Gold" cover story in the December 13, 1997 edition of the *Financial Times* (written when gold was below $300 per ounce) fully captured the extreme bearish consensus view.

Today, the investment attitude of global central banks has swung 180 degrees regarding gold. Central bank selling peaked in 2005 at 675 tonnes as Austria, Belgium, Netherlands, Portugal, Spain, Sweden, and Switzerland all liquidated their holdings. As you can see from the chart above, central bank selling slowed significantly in 2007 and 2008 (a seven-year bull

market finally convinced them to stop) and by 2010, central banks had actually become net purchasers of gold for the first time in 25 years.

At the same time central banks stopped selling, producers stopped forward-selling as well. As the gold bull market progressed in the early 2000s, companies that had aggressively sold forward their gold now saw the liabilities embedded in their hedge-book explode – in some cases violently. Several large Australian gold producers went bankrupt and Barrick Corp eventually incurred a multi-billion dollar loss in closing out its hedge-book. Terribly burned by what happened in the mid 2000s, few gold producers sell any gold forward today.

In retrospect, gold's long period of undervaluation relative to oil was caused primarily by torrents of physical gold sales from central banks, producers, and bullion banks. With central banks becoming significant buyers of gold instead of sellers and with producers no longer forward- selling their production, the only potential source of physical supply over the last eight years has come from the physical gold ETFs. Since their introduction in 2004, ETFs have become significant players in physical gold markets. Over an uninterrupted 8-year stretch, physical gold ETFs accumulated 2,600 tonnes of gold by the end of 2012.

CHART 3 Gold ETF Holdings

Source: Bloomberg

Although it is hard to quantify, our research suggests that after the 2008 financial crisis, most of the inflows into the physical gold ETFs came from investment firms and hedge funds. In total, this net increase amounted to 1,550 tonnes. Once the gold price started to pull back in 2013, ETF liquidations surged, putting extreme downward pressure on the gold price. Between 2013 and 2015,ETFs liquidated 1,170 tonnes of gold, representing 45% of their holdings. The heavy selling pressure from the ETFs combined with a drop in price-sensitive sources of physical demand (i.e. coin, bars, and jewelry) pushed the gold market into surplus, which resulted in the 45% sell-off between 2011 and 2015.

Although, the ETF selling pressure was intense, it never approached the extremes reached in the late 1990s and early 2000s. The combination of central banks, gold producers, and bullion banks produced a depression in the gold price that has never been surpassed. By the summer of 1999, the Dow Jones Industrial Average traded for 44 ounces of gold, a level nearly 40% higher than the previous record of 30 set back in 1966.On the other hand,

between 2011 and 2015, all of the selling pressure came from only one source – the ETFs. Once the ETF selling abated, the gold market bear market ended.

The 2012-2015 gold bear market lacked the massive selling pressure from multiple sources experienced 15 years ago, and prices never became as depressed as they did back in 1999. At its most expensive, the Dow Jones once traded for 23 ounces of gold this cycle – less than half the level we saw in 1999. The same is true when you compare gold with oil. Back in the oil-selling panic of 1999, an ounce of gold purchased 28 barrels of oil, however, in the oil-selling panic of January 2016, an ounce of gold could buy up 44 barrels of oil. We believe oil experienced a massive selling panic in 2016, very similar to the selling panic that took place back in 1999. However, the selling pressure in gold in 2016 was far less than the gold selling pressure experienced back in 1999.The difference between 1999 and 2016 was the behavior of central banks: in 1999 they were panicked sellers, while in 2016 they had become systematic buyers.

As we will discuss in the "Precious Metal" section of this letter, both gold and silver ETFs have entered into a sustained period of accumulation. At the same time, central banks are still buying large volumes of gold. The World Gold Council believes central banks purchased an additional 374 tonnes in the six months of 2019 alone (the most recent data available). As central banks now seek to accumulate physical gold alongside the ETFs, we believe gold could remain overvalued relative to oil for an extended period of time. This is just the opposite of what happened in the 1990s when central bank, producer and bullion bank selling left gold undervalued for an extended period of time.

With all of our pieces having fallen into place and with gold having broken out of its multi-year trading range, we are ready to make our bull market price targets. Back in May of 2000, I was profiled in Forbes Magazine where I said gold would be the best-performing asset in the next decade, ultimately hitting $2,500. At the time, gold was $280 per ounce and investor psychology was incredibly bearish. A $2,500 price target seemed outlandish. Gold did peak out at $1,900 per ounce in September of 2011 and, although it fell short of my $2,500 price target, it got pretty close.

"USING A SIMILAR METHODOLOGY TODAY, WE PROJECT A $12,000-$15,000 PER OUNCE TARGET. ALTHOUGH IT MIGHT ONCE AGAIN SEEM OUTLANDISH, OUR RESEARCH TELLS US THESE VALUATION EXTREMES HAVE OCCURRED MULTIPLE TIMES OVER THE PAST 100 YEARS. "

Using a similar methodology today, we project a $12,000-$15,000 per ounce target. Although it might once again seem outlandish, our research tells us these valuation extremes have occurred multiple times over the past 100 years. For those who are interested, please consult the precious metals section of our 2Q2018 letter, where we discuss a variety of valuation techniques.

We also want to stress another important trend we believe will emerge in precious metal markets in the coming years. The gold bull market from 1999 to 2011 was driven by Chinese and Indian buyers and exhibited little in the way of speculation. Instead, these buyers believed gold was "cheap" and they bought in a very orderly and measured manner. When gold advanced in price, they stopped buying. When prices fell they bought more aggressively. Western investors were largely absent through most of this period. In fact, hedge funds (preying on the central banks) were actually short through most of the 1999 to 2008 period. As we discussed earlier, while Western investors did finally return to the gold market post the 2008 financial crisis (mostly through the ETFs), all of this gold was liquidated by 2016. We believe that as the upcoming gold bull market unfolds, the Western investor will become heavily involved, very much like they were during the 1970s.

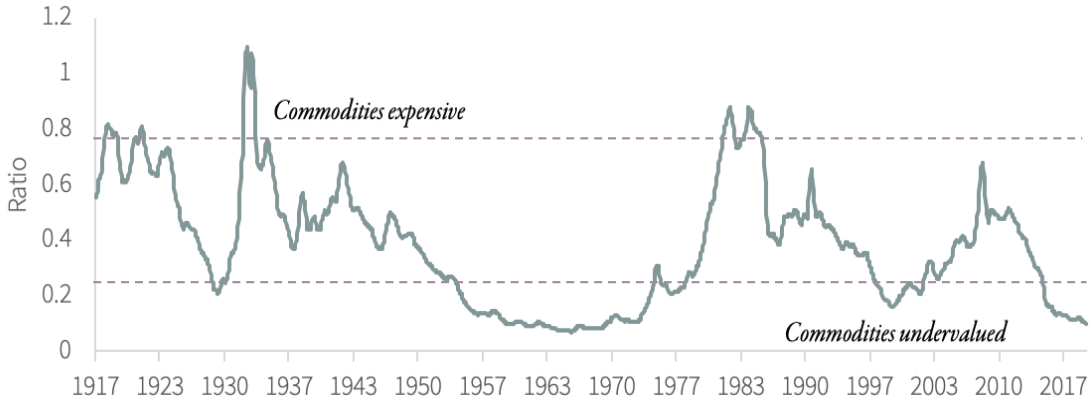
Various large investors have already signaled their intensions regarding gold. Last quarter we discussed the recent *Bloomberg BusinessWeek* cover story on the "Death of Inflation." If we are right, the magazine signaled an inflection point regarding inflationary expectations. The 1970s precious metals bull market was largely driven by Western investment and by the late 1970s a huge amount of speculation had entered the market. Those with long memories will remember that gold and silver surged over 100% in the final months of 1979 alone, as the Hunt brothers tried and ultimately failed to corner the silver market. Large financial speculators have already entered the gold market, announcing their bullish intentions. Once this bull market starts, we believe the general public will aggressively follow. While buying gold in the 1970s was complicated (you either had to buy gold futures, physical coins or bars, or gold equities), today the GLD ETF has made buying gold extremely accessible. Public participation in the coming bull market will be comparatively easy.

We believe the bear market in gold has run its course and a new bull market has begun. All investors should have significant investments in precious metals and the related equities. For those making their precious metal investments today, profits could be huge as we progress throughout the coming decade. If a speculative "fever" emerges in precious metal markets (which we expect to happen), our price targets just mentioned could easily be surpassed.

What Catalyst Will Finally Kill the Bear?

In past letters we have published a chart comparing the price of commodities to the price of the stock market over the past 100 years. We explained how commodities tend to go through long pronounced cycles that often last several decades. During these cycles, commodity prices become extremely depressed relative to the broad stock market and represent excellent investments, while at other times they become radically overvalued and represent poor investments.

CHART 4 Commodity Index/Dow Jones Industrial Average



Source: Bloomberg, Barron's, G&R Models

In the summer of 2017, we wrote a detailed analysis of each cycle and identified several factors that led to the major commodity market bottoms in 1929, 1969 and 1999. In summary, all three major commodity market bottoms were preceded by huge levels of investor bearishness. Natural resources were thought to represent the "old economy" whose best days were

behind it. Furthermore, at each cycle bottom a new stock market mania had gripped investors. By 1929, it was a broad-based equities bubble that centered around "new economy" media stocks such as RCA. By 1969, it was the conglomerate craze, followed by the "gunslinger" mutual fund craze, and finally the "Nifty Fifty" (a portfolio of 50 stocks, each with a P/E multiple of over 50). In the 1990s, it was the dot-com bubble. Today, we have multiple investment manias occurring simultaneously: FAANG stocks, passive investing, risk parity, cryptocurrencies, and the Canadian cannabis craze, among others.

During each market cycle, these crazes served dual roles. First, they helped bid up the price of equity markets broadly. Second, they reinforced the notion that commodities no longer held any valid place in the "modern" investor's portfolio. Furthermore, all three historical market bottoms were preceded by very loose monetary policies that helped to propel these trends further than otherwise possible.

As you can see above, commodities are as cheap today as they have ever been relative to the broad equity market. In every prior case of radical undervaluation, commodities and the related natural resource equities have been excellent long-term investments and we believe this time will not be any different. Since we published our first report, we have often been asked when the current period of resource undervaluation will finally end. The truth is that no one can say with any certainty. We will discuss two potential catalysts that could propel commodity and natural resource markets much higher.

First, we will examine some remarkable similarities that signaled the end of each of the previous commodity bear markets. Second, we will revisit an old investment adage that a trend will continue until it can no longer. We have reason to believe we are at that point today.

On the surface, the late 1920s, 1960s, and 1990s appear to be very different eras. Yet, they share one notable similarity: each period experienced a monumental shift in the global monetary order. During World War I, most European countries suspended the convertibility of their currencies into gold to accommodate wartime deficit spending and aggressive money printing. The Bank of England suspended its gold standard in 1914. By 1925, after spending a decade trying to deflate its economy, the UK attempted to re-back the pound with gold.

After extensive debate, Winston Churchill (by that time Chancellor of the Exchequer) decided to put the pound back on a gold standard at its pre-war rate which, in retrospect, was a massive mistake. The pound was now severely overvalued and gold flowed from the UK to the US. To help the situation in the UK, Federal Reserve New York Governor Benjamin Strong kept US interest rates low despite a roaring economy. In his most controversial move, he lowered short-term interest rates in 1927 and admitted that he had given the stock market "un petit coup de whisky." That small shot of whisky was actually much more potent than originally thought and the stock market began a speculative parabolic blow-off.

After Strong died in 1928, his expansive monetary policies were reversed and many scholars agree that this precipitated the stock market crash of 1929, the banking panic of 1932, and the Great Depression. As the stock market was peaking, the value of commodities relative to the broad market made its first massive bottom in September 1929. Over the next three years, the Dow Jones Industrial Average fell by nearly 90% while commodity prices declined by only 15%.

By early 1933, Roosevelt suspended the gold exchange standard except for foreign exchange and by 1934 he passed the Gold Reserve Act increasing the statutory price of gold from $20.67 to $35 per ounce. The commodity bull market had begun and by 1947 commodity prices had advanced by 50%. At that point, commodity prices were 30% above their pre-Depression highs while the Dow Jones Industrial Average was 50% lower. In retrospect, the end of the decades-long commodity undervaluation coincided perfectly with the dismantling of the traditional global monetary system that had existed for nearly 100 years.

By the end of the 1960s, the situation had completely reversed itself. Between 1947 and 1969 the stock market advanced by 500% while the commodity index fell by 15%, taking the ratio of the two even lower than it was in 1929. While the absolute price of commodities bottomed in the mid-1960s, the recovery was lackluster, particularly compared to the huge surge in broad equity markets (very similar to today). Just like in the late 1920s, this period of commodity undervaluation ended in perfect conjunction with a major monetary upheaval. Throughout the 1960s, the US ran increasing budget deficits as Great Society programs and the Vietnam War took their toll. The US dollar became extremely overvalued relative to gold. Under the Bretton Woods exchange standard, all global currencies were pegged to the US dollar which in turn was pegged to gold at the rate of $35 per ounce.

By 1968, a two-tied gold pricing system was introduced. Monetary authorities would continue conducting transactions at $35 per ounce, but other transactions could be conducted at fluctuating prices. Gold prices in London began to consistently trade above the official rate of $35 per ounce. The result was massive gold outflows from the US. In 1971, President Nixon suspended convertibility of the dollar into gold, in effect ending the Bretton Woods exchange standard. For the first time since Alexander Hamilton was treasury secretary (except for the 16 year "Greenback" era during and after the Civil War), the US dollar had no metal backing. Once again, the period of commodity undervaluation ended exactly as one global monetary regime was ending and a new one was beginning. From 1968 (when Johnson first introduced the dual price system) to 1980, commodity prices surged nine-fold while the stock market was range bound.

The price of commodities relative to the stock market again bottomed in 1999 at levels comparable with their 1929 low. While initially we had not identified a major monetary shift that occurred in conjunction with this market bottom, Professor Russell Napier informed the audience at the Grant's Interest Rate Observer spring conference that just such a shift had indeed taken place. In an article in the *Financial Times* that mirrors his presentation, Professor Napier writes: "[Today's monetary system] is a system patched together in the embers of the Asian economic crisis, when many countries intervened in the foreign exchange markets to prevent the appreciation of their currencies." Professor Napier goes on to explain how this resulted in a $10 trillion rise in world foreign exchange holdings between 1999 and 2014, the majority of which were US Treasuries. In China, this had the effect of rapidly increasing the monetary base which in turn accelerated growth. In other words, what Professor Napier calls his "no-name system" replaced the post-Bretton Woods fiat system at exactly the moment the 1980-1999 period of commodity undervaluation ended. From 1999 until 2011, the commodity index increased by over five-fold while the Dow Jones Industrial Average advanced by less than 40%.

What will end the current period of commodity undervaluation? We are more and more

"WHAT WILL END THE CURRENT PERIOD OF COMMODITY UNDERVALUATION? WE ARE MORE AND MORE CONVINCED THAT IT WILL ONCE AGAIN BE RELATED TO A SHIFT IN THE GLOBAL MONETARY REGIME. "

convinced that it will once again be related to a shift in the global monetary regime. It may spring from the US adopting a version of Modern Monetary Theory or potentially from a large devaluation in the renminbi. Chinese monetarists face a difficult decision today. In order to maintain the current exchange rate, they must either deplete their foreign reserve holdings or else grow their broad money supply more slowly than they would like. A third option, of course, would be to devalue the renminbi which in our estimation is looking more and more likely. Prudent long-term investors need to consider a natural resources allocation to protect themselves against such a shock.

Given the stresses now being exhibited by the current monetary regime, we believe there is a high probability of a massive shift in monetary regimes. For example, central banks have all had to explode their balance sheets in recent years in response to various financial stresses. A great example is what's happened to the balance sheet of the Swiss National Bank which used to be considered the world's most conservative institution. The Swiss franc was the last currency to be fully convertible into gold--its link was in place as late as 2000. But how things have changed. Because of unwanted capital flow, The Swiss National Bank balance sheet has exploded in the last nine years as it has been forced to create Swiss francs in order to depress the franc's exchange rate with the euro. The Swiss National Bank's balance sheet used to be sized at approximately 20% of GDP. Today the size of the Swiss National Bank's balance sheet is over 120% of GDP.

"PRUDENT LONG-TERM INVESTORS NEED TO CONSIDER A NATURAL RESOURCES ALLOCATION TO PROTECT THEMSELVES AGAINST SUCH A SHOCK."

Also, the fact that $13 trillion of sovereign debt today sports negative yields is a sign that investors are losing faith in the current system. Just like during previous changes in monetary regimes, the upcoming monetary regime shift will have severe repercussions across many markets. Historically, having an allocation to natural resources has been one of the few (and perhaps only) way to insulate a portfolio against such a shock. Investing in a natural resource portfolio to either protect against or profit from the upcoming change in global monetary regimes has never come at a cheaper price.

A TREND WILL CONTINUE UNTIL IT CAN NO LONGER

This saying ultimately has two related meanings. First, a trend may persist far longer than reason or logic would dictate. Second, the trend will finally reverse when it can't be pushed any further. The recent trend that has pushed commodity prices down to relative levels not seen in nearly a century has certainly gone on longer and further than we believe reason dictates. The question is whether it has now gone as far as it can go.

We believe the recent period of commodity valuation is only one half of a broader trend. The other half represents a surge of capital into various asset classes and strategies. For example, huge capital flows into passive strategies, FAANG stocks, and bonds represent the flip side of the capital flow out of commodities and natural resource-related investments. Over the last 12 months alone, we estimate that natural resource-related mutual funds have lost nearly 10% of their assets via net outflows. At the same time, we are nearing the point where more assets are held in passive vehicles than active ones.

The now 39-year-old bond bull market is perhaps the most impressive of all and the inflows into bond ETFs continue to surge. Since peaking in the summer of 1981 (the US 30-year Treasury bond reached 15.3% yields), government bond yields have fallen relentlessly. While a sensible investor might think that the zero bound represented a reasonable limit for bond

prices, that clearly did not stop bonds from rising further and pushing yields negative. As we write, $13 trillion of sovereign credit carries negative interest rates. Clearly the trend has persisted much further than reason would dictate.

With that in mind, we found it incredibly interesting to read Ray Dalio's comments from several weeks ago. Bridgewater Associates pioneered the risk parity strategy that recommends (among other things) maintaining a levered exposure to fixed income. As such, we believe he is a bellwether when it comes to the bull market in bonds. In his article he outlines two key investment philosophies. First, he believes it is important to identify the trend in place and invest in such a way as to profit from it. Second, it is critical to identify the inflection point marking a change in trend.

Mr. Dalio goes on to explain how today's bond market has been bid up to the point where it can no longer deliver the returns that most investors expect. While we agree with Mr. Dalio's comments, the same argument could have been made any time over the last several years. Why now?

The bond bellwether is telling you that he believes the inflection point in the nearly four-decade-long bond trend is now upon us. Mr. Dalio has been incredibly prescient in recognizing this trend and in understanding just how far it can go. The fact that he believes it has now been pushed too far is extremely telling. If he is correct, then the massive unwinding of several related investment manias will likely follow.

Last quarter, we wrote extensively about the significance of the recent *Bloomberg BusinessWeek*'s cover story "Is Inflation Dead?" Combining the investment significance of the *Bloomberg BusinessWeek* cover story with Mr. Dalio's comments gives us additional conviction that a massive shift in capital flows is about to take place.

All of these trends in capital flows have helped push the price of various assets to unsustainable levels. On the other side of the trade, commodities and natural resources have been pushed far too low. The combination of these trends helped push the relative valuation of commodities to the broad market to levels nearly as low as they have been in 100 years. A massive shift in capital flow is about to take place into an asset class where no one has any exposure. The profits for investors in the natural resource and commodity-related investments are going to be large.

2019 Q2 Natural Resource Market Commentary

Escalating trade war rhetoric from the Trump administration, combined with worries over slowing Chinese growth, cast weakness over global resource markets in Q2. Oil prices were again volatile. WTI traded as high as $66 per barrel in April before pulling back to a low of $51 in June amid worries surrounding slowing global oil demand. The International Energy Agency (IEA) cut its oil demand growth estimates for the first quarter of 2019 to only 310,000b/d y/y and they lowered Q2 growth to 800,000 b/d.

Oil prices did rebound to almost $60 per barrel by the end of June, as OPEC successfully rolled over its production agreement from last November. Energy-related stocks continued to underperform the actual commodity. For example, while WTI and Brent prices declined 3% for the quarter, the XOP (the S&P E&P ETF) fell 11%and the OIH (the Oil Services ETF) fell almost 14%. We have seen a radical underperformance of energy-related equities

versus the oil prices over the past three years. Since bottoming in Q1 of 2016, oil rallied over 125%, while E&P stocks (as measured by the XOP) are up barely 10% and the oil service stocks are now down almost 30%. The radical underperformance of energy-related equities has produced tremendous value and we remain bullish on the group.

Although the IEA believes the global oil market is in surplus, we vigorously disagree with their analysis. Both WTI and Brent oil prices remain extremely backwardated and this backwardation has not decreased in the last 3 months. If market balances had loosened as much as portrayed by IEA data since the beginning of 2019, we should have seen both WTI and Brent markets swing into contango, which has definitely not happened. (For those unfamiliar with the terms "contango" and "backwardation," they refer to the position of future prices versus today's spot price. A market where the future price is higher than spot is "contangoed," indicating that supply is greater than demand and that inventories are building. A market where the future price is lower than today's spot price is "backwardated," indicating that demand is greater than supply and that inventories are tight.) We remain bullish on oil prices and believe the second half of the year will see significant strength. Please refer to the "Oil Section" of this letter where we will discuss market balances, the "missing barrels," Q1 demand disruptions, and the outlook for both the US shales and non-OPEC/non-US oil supply. Contrary to consensus opinion, the oil market today is very tight and we believe it will continue to tighten as 2019 unfolds.

Natural gas prices were very weak in Q2. Henry Hub prices fell by 13%.The reason for the pronounced weakness was simple: supply continued to surge. The latest IEA data suggests that US natural gas supply continues to grow at near record rates. According to the last published data for May, US dry gas supply is growing at almost 9 bcf/day, or by almost 10% year-over-year. Surging production from the Delaware side of the Permian Basin remains the strongest source of production growth. LNG exports continue to surge and should grow by 6 bcf this year. However, LNG export capacity growth will slow significantly in 2020. Without any slowdown in supply or further drops in the natural gas rig count, the natural gas market will remain in structural surplus. Please see the natural gas section where we discuss the problems facing the US natural gas market.

Base metals were weak in Q2. Trump-related trade war fears and manufacturing weakness in China weighed on all the base metals. Zinc was the weakest, falling by 14%, while copper fell 8%. Aluminum and nickel were down 6% and 3%, respectively. A number of developments occurred in global copper markets since our last letter which underpin our bullish copper thesis. First, RioTinto (RIO) announced a significant delay in first production from its massive Oyu Tolgoi underground mine in Mongolia. Rio Tinto has experienced underground rock conditions that were "more challenging" than expected. The company admitted that a reinterpretation of the underground rock mechanics would require design changes and that first production would be pushed out between 18 months to 2 ½ years. First copper production was originally scheduled for year-end 2020, but this could now be pushed out to mid-2023. Underground production from Oyu Tolgoi was scheduled to eventually surpass 400,000 tonnes per day, representing about 2% of global mine production. Given the problems with rock mechanics and the associated capital cost "blow-out," we would not be surprised to see Oyu Tolgoi's first production delayed further.

Frist Quantum's Cobre Panama (now ramping up) and Oyu Tolgoi are the only two large "greenfield" mines scheduled to come on-line in the next three years. The delay of Oyu

Tolgoi's underground operation almost guarantees that the contraction of global copper mine supply (which has already turned negative in the last six months) will accelerate. Also, we are hearing rumors of problems at Codelco's massive Chuquicamata mine. The Chuquicamata mine, in production for over 100 years, is now transitioning from an "open-pit" to an underground block caving operation. If the rumors are true, this will further confirm that problems have now developed in global copper mine supply. Also, we visited Ivanhoe's Komoa/ Kakula "greenfield" copper project in the Democratic Republic of Congo. In the copper section of this letter, we will discuss this very exciting project, and the potential impact on global copper balances as we progress through the next decade.

Precious metals were strong last quarter, as more and more central bankers talked about cutting interest rates and undertaking additional quantitative easing. Gold rose 9% while silver once again lagged, rising less than 1%.Platinum fell 2% and palladium (again being pushed because of restrictive diesel regulations in Europe) rose 11%. Gold stocks were also strong during the quarter, advancing by 14%. As we wrote in the introduction, given gold's breakout above $1,400 per ounce, we now believe the great gold bull market has begun. This bull market will be driven by Western investors, and their buying pressure may have already started. We have seen a large increase in the physical accumulation by both gold and silver ETFs over the last several months. Please read our comments on the ETF's behavior in the precious metals section of this letter.

Last quarter, we wrote extensively about sunspots and how changing energy output from the sun might impact global weather patterns in the coming decade. We speculated that the huge warming cycle over the last 70 years has been extremely positive for global grain conditions (significantly expanding the growing seasons in the Northern Hemisphere, for example). Evidence continues to mount that we are entering a period of reduced sunspot activity which could extend for several decades.

Could a reduction in sunspot activity result in a period of significant global cooling which would seriously disrupt global grain growing conditions? As most of you know, we have just set all-time records for rainfall in the United States which has severely delayed the planting of this year's corn and soybean crop. The National Weather Service declared on May 30 that the continental US experienced the wettest 12-month period in 125 years of records. Could this recent record rainfall be related to sunspot activity? Our hunch is that it isn't, but it is something we will watch closely. In response to delayed planting, grain prices strongly advanced in May.

Corn bottomed at $3.43 cents per bushel in May before surging to over $4.50 in June, ultimately finishing up almost 20% for the quarter. Soybeans bottomed in May at $7.90 per bushel before rising to $9.15 by mid-June. For the quarter soybeans finished flat. Wheat bottomed in May at $4.20 per bushel and then surged over 30% to reach almost $5.50 per bushel by mid-June. Wheat finished up 16% for the quarter. Because of the late plantings, excess moisture, and the fact that root development for both corn and soybean are now suboptimal (which makes them vulnerable to any extended dry periods), the USDA significantly cut corn harvest estimates. Also because of the late starts, both corn and soybeans are now susceptible to potential early frosts--something that will become more prevalent if our theory regarding sunspots is correct. Please turn to the agricultural section of this letter where we discuss current growing conditions, global grain demand, the USDA estimates and how they will effect global grain inventories, and the growing evidence from solar scien-

tists that we are entering a period of reduced sunspot activity. It now looks as though the agricultural bull market is upon us.

Global uranium markets were largely flat during Q2 after a weak start earlier this year. So far in 2019, uranium spot prices declined by 11% yet remain 10% higher than this time last year. The largest uranium development in recent months occurred in July with the rejection of the so-called Section 232 enquiry. In early 2018, two US uranium producers filed a petition with the Commerce Department requesting quotas be placed on domestic uranium production in the interest of national security. Under the proposal, US nuclear power plants would be required to source 25% of their fuel from domestic mines. According to the World Nuclear Organization, the US required 22k tonnes of U3O8 in 2017 while total production totaled less than 2k tonnes. Had the Section 232 petition been approved, the global uranium market would have bifurcated. In the US, domestic uranium prices would have surged to incentivize the additional 4k tonnes of local supply necessary for quota compliance. At the same time, international prices would have been very weak as a comparable amount of uranium (previously destined for US utilities) was pushed back into the international spot market. Given this uncertainty, many uranium buyers chose to wait on the sidelines until the proposal was finally resolved. Now that the proposal has been rejected, many fuel buyers must re-enter the market to secure utility supply. This impact could be material as we enter the second half of the year. Several fuel buyers hold expiring long-term contracts that must be renewed and the recent stalemate around Section 232 has further shortened this fuse. At the same time, neither Cameco nor Kazatomprom has brought back any of its curtailed production. Cameco, in particular, has communicated that it will once again need to access the spot market during the second half to meet its long-term commitments. When Cameco entered the spot market last year, uranium spot prices rallied by 30% and we believe that this time the move could be even sharper. While global uranium markets are incredibly opaque, we think the second half could be one of the strongest in recent memory. The long-term secular growth story remains intact and mine supply is tight. The deadlock surrounding a Section 232 decision has now been lifted and we believe utility buyers are eager to renew their long-term contracts. At the same time, a large market player (Cameco) has shifted from selling incremental volumes in the spot market to purchasing tonnes to fulfill their existing long-term contracts. The bull market in uranium is now firmly underway and we believe the price action going forward will surprise investors to the upside.

Stranger Things: Do Anomalies Signal the Waning Days of a Bear Market?

In our previous letter, we stressed the importance of the recent *Bloomberg BusinessWeek* cover story, "The Death of Inflation." In 1979, *BusinessWeek* published one of the most famous business magazine covers ever: "The Death of Equities." Because of deeply embedded inflation, the cover story concluded that financial assets had little investment appeal while assets that performed well in an inflationary environment were preferred. As we all know, this was one of the worst market calls ever made. Inflation peaked in the summer of 1980 and has been declining now for two full generations. Financial assets (both stocks and bonds) have provided investors with superb returns for almost 40 years.

For 40 years prior to the 1979 cover, inflation had been a huge problem in the US economy.

World War II, the Korean War, the Cold War, the Vietnam War, and a massive expansion of the US welfare state had produced an inflationary bias in the US economy that everyone, including the editors of *BusinessWeek*, believed would continue.

Except that everyone was wrong. Today we live in world where inflation seems to do nothing but decline and every investor has positioned himself in investments that have priced in continued declining inflationary expectations -- just think of the $14 bn of sovereign debt that trades with negative interest rates. In 1979, everyone had invested in assets that needed inflation for them to do well. Those same investors had no exposure to assets that would do well in an era of declining inflation. Today, everything is reversed. Everyone has made the bet that inflation will decline further while no one has exposure to any investment classes that would do well if inflation were to return.

It wasn't long before the investment recommendations suggested by the 1979 *BusinessWeek* cover story started to unravel. It ultimately took three years for the stock market (the most hated asset class at the time) to literally explode off the bottom in 1982, but there were signs all along that a change was taking place. We believe that, if history is our guide, a number of clues will emerge signaling that inflationary assets (the despised asset class) are beginning to outperform deflationary asset classes (the asset class loved by everyone). In that vein, we thought we would discuss a number of anomalies that have developed in global resource markets since our last letter, which have caught our attention.

At Goehring & Rozencwajg, we are deep-value, contrarian investors. For nearly 30 years, we have been studying long, drawn-out bear markets. One of our observations over the years has been that distinct anomalies develop at or near the bottom of these protracted periods of investor negativity. As investors become increasingly panicked, reason often give way to strong emotional responses. As value investors, we are inclined to doubt the efficient-market hypothesis. However, we do agree that the broad market serves as an aggregate measure of investor expectations. Therefore, whether the market is right or wrong, you would expect its views to be internally consistent. While this is true most of the time, there are distinct periods where emotion takes over entirely and Mr. Market appears to offer contradictory advice. We believe these periods are often associated with major market turning points and so we study them intensely. Today we would like to touch on three major anomalies currently underway that we hope are signs we're nearing a capitulation bottom in the commodity markets.

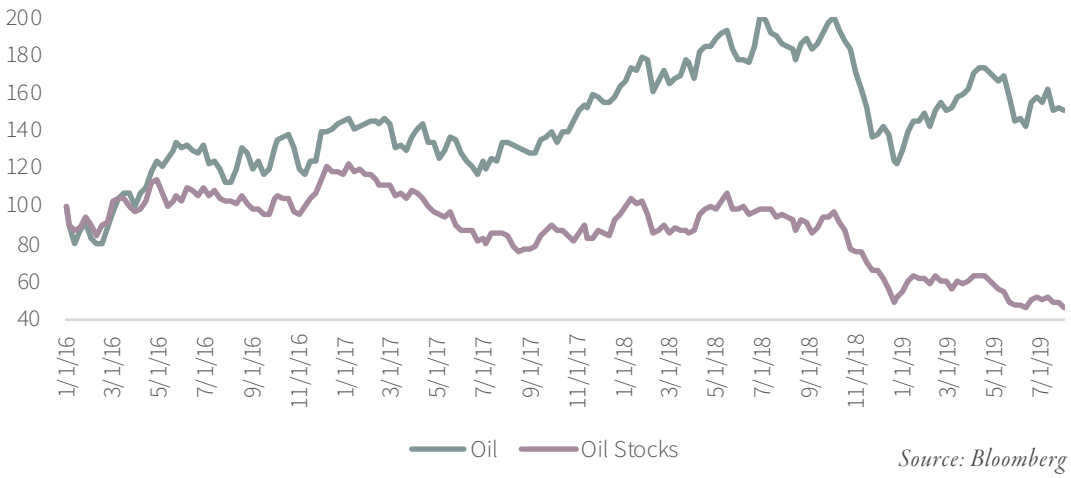
COMMODITIES VS. COMMODITY STOCKS

The largest anomaly we see today is the price action between commodities and commodity stocks. We were quoted in Barron's on June 28th, 2019. The article discussed how the first half of 2019 was the strongest start for commodity prices in 11 years. The Goldman Sachs Commodity Index advanced by 13% over the first six months of the year to end at 2,497, the highest first-half advance since 2008. Since the bottom in February 2016, the index has advanced by 32%. Focusing on oil, WTI advanced by 30% during the first six months of the year, making it the second highest reading in 11 years. Oil prices are now 125% above their February 2016 lows.

An energy equity investor, however, experienced something very different. For the first six months of the year, the S&P Oil & Gas Exploration and Production Index was up only 3%, the sixth worst start to the year in the past two decades. Since oil bottomed in February 2016, this same group is up less than 5%, lagging the commodity price by 120 percentage

points. While larger capitalization energy stocks did better since the market bottomed in 2016, even the market-cap weighted natural resource stock index only returned 21% over the same period. The discrepancy in the oil service stocks has been even more stark. For example, since the oil market bottomed in February 2016, the OSX is down 41% despite the doubling of the oil price. So far this year, it is down 3% despite the best start for the commodity markets in over a decade.

CHART 5 WTI vs. OSX Index



Source: Bloomberg

"THE PHYSICAL COMMODITY MARKETS AND THE NATURAL RESOURCE EQUITY MARKETS ARE TELLING TWO DRASTICALLY DIFFERENT STORIES. "

The physical commodity markets and the natural resource equity markets are telling two drastically different stories. The physical markets are telling you that chronic tightness has emerged in several commodities, while the equity market is telling you the whole sector is nearing distress. Notably, this alleged distress is not being reflected at all in natural resource-related bond prices, often a good indicator of potential trouble. We believe this divergence is incredibly important. Rarely do the commodity markets and natural resource equity markets differ so materially. This divergence should not be ignored.

OIL MARKET TERM STRUCTURE

As we will discuss in the oil section of this letter, there is a widely held belief among investors that the oil markets are currently oversupplied. The fact that U.S. inventory behavior has been weak during the first half has only added to this bearish outlook. We believe that recent inventory behavior has been skewed by various short-term issues stemming largely from issues surrounding the US sanctions against Iran. Moreover, in June the IEA updated its outlook for 2019 and released projections for 2020 that again suggest oil markets will be oversupplied.

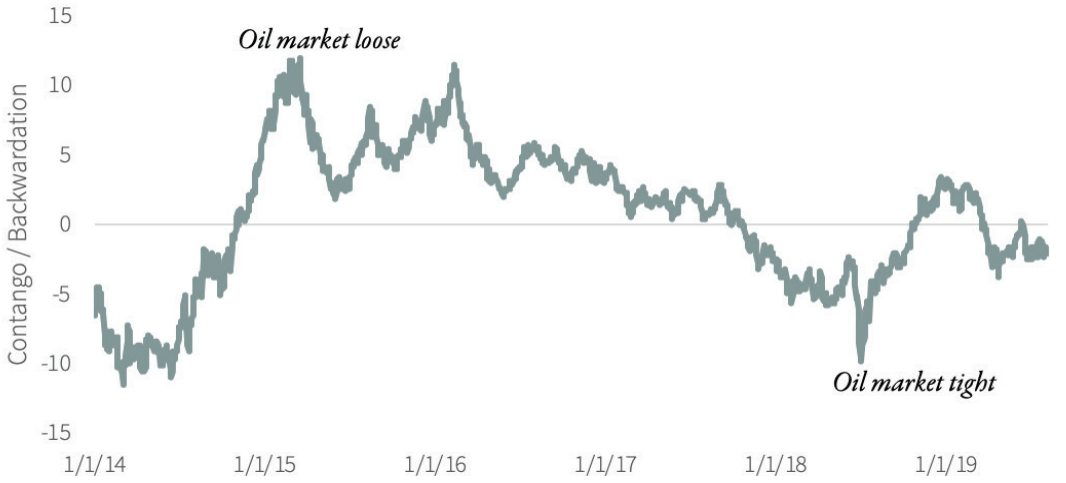
There is an important anomaly that is pointing to sustained tightness in the physical market: the term structure. An oil market is said to be in contango when the future price for oil is higher than the current spot price. When the future price is below the spot price, the market is said to be backwardated. While it may seem counterintuitive, when the oil market is well supplied, the future price trades above the spot price (contango). In a physically tight market,

the future price actually trades below the spot price (backwardation).

To understand why, consider that the future price of oil equals the current spot price plus the cost of capital and the storage cost less the "scarcity premium." This last term is the premium an oil trader is willing to pay to have crude delivered immediately. In a normal, well-supplied market, the scarcity premium is de minimis relative to the cost of capital and storage cost and the future price trades above the spot price resulting in contango. However, when the physical market is very tight, the scarcity premium will overwhelm the cost of capital and storage and the spot price will actually trade higher than the far-dated futures contracts.

Despite the fact that most analysts continue to think the oil market is oversupplied, both WTI and Brent were backwardated from October 2017 to November 2018 and once again from early 2019 to present. Today, the 12-month WTI backwardation is running at $2.11 per barrel while the Brent backwardation is $2.61 per barrel.

CHART 6 12-Month WTI Term Structure



Source: Bloomberg

"WHILE THE CONVENTIONAL WISDOM SUGGESTS THE OIL MARKETS ARE IN A SUSTAINED GLUT, THE PRONOUNCED BACKWARDIZATION TELLS US THAT THERE IS NO TRUTH IN THIS BELIEF."

While the conventional wisdom suggests the oil markets are in a sustained glut, the pronounced backwardization tells us that there is no truth in this belief. There is enough physical tightness in today's market to bid up the near-term oil price for immediate delivery in excess of the future-dated contracts. This is a very unusual divergence and one that suggests the consensus bearish view is ultimately wrong.

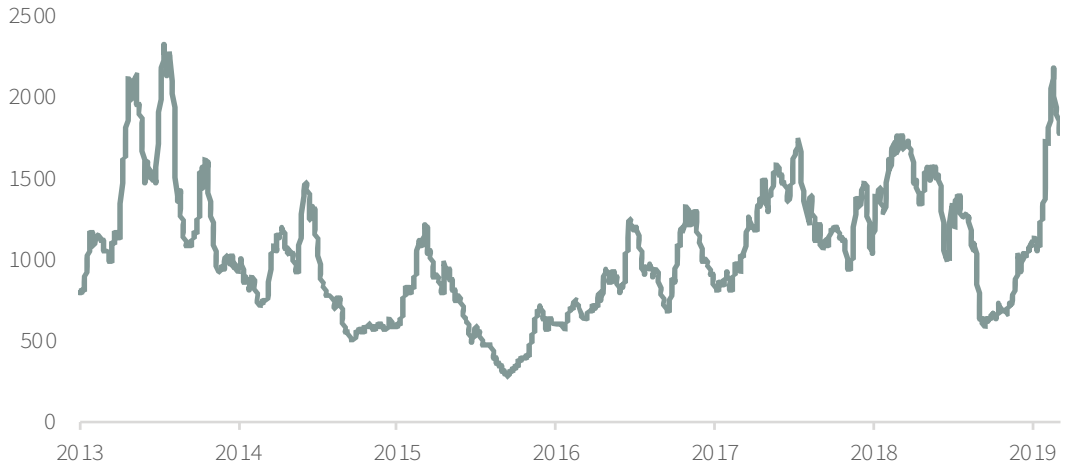
BALTIC DRY INDEX

The other common refrain we hear is that global real asset demand has been negatively impacted by trade wars with China. While we admit that a protracted trade war could certainly have negative effects, we should point out that most analysts believe global demand has already been adversely impacted today.

One interesting measure of global commodity demand is the BDI Baltic Exchange Dry Index (BDIY). This index represents the price to ship dry bulk goods and is a composite of Capesize, Panamax and Handysize vessel day rates. While other factors, including the supply of new vessels, can certainly impact this index, it is often used as a real-time barometer of

global commodity demand. For example, during the global financial crisis, the BDIY fell by 94% between May and December 2008 and broke a full two months before the top in the Goldman Sachs Commodity Index (GSCI).

CHART 7 Baltic Dry Index



Source: Bloomberg

"IF GLOBAL COMMODITY DEMAND WAS FALLING SHARPLY TODAY, WE WOULD EXPECT TO SEE THE BDIY PLUMMETING. INSTEAD, JUST THE OPPOSITE IS HAPPENING."

If global commodity demand was falling sharply today, we would expect to see the BDIY plummeting. Instead, just the opposite is happening. After bottoming in February, the index surged nearly four-fold to reach 2,191 by July 22nd. Instead of falling dramatically (as you would expect if global demand were slowing), the BDIY is growing at the second-fastest rate ever. The only time it surged faster was immediately following the 95% decline during the global financial crisis. Today, the Baltic Dry Index is the highest it has been in five and a half years.

The recent surge has been attributed to several iron ore mine restarts in Brazil, but nevertheless we cannot reconcile the idea that global commodity demand is slowing at the same time as the cost to ship that demand is surging at the second-fastest rate ever.

While none of these anomalies on their own prove that we are nearing a turning point, we do believe they point to a natural resource equity market that has been gripped by fear and panic. Natural resource equities continue to underperform the general market, but if the recent *Bloomberg BusinessWeek* cover story performs it fated function, we believe that strong relative outperformance for natural resource equities will emerge and will last for many years.

For many investors, last fall was the final straw and we keep hearing of clients who swear never to re-enter the natural resource markets again. As contrarian value investors, these are precisely the markets we like to get involved with. We believe these anomalies are indications that equity investors are not acting rationally, but rather are extrapolating a never-ending trend. The indications are stacking up that this bear market is living on borrowed time and that a turning point is fast approaching.

Heading into a Tight Second Half: Implications for the Oil Market

Oil prices were volatile during Q2. Rising at first by nearly 10%, they then sold off by almost

25%. WTI then rallied back to finish the quarter within a few dollars of where it started--$60/ barrel. Investor sentiment remained extremely negative throughout the quarter. Despite the fact that oil is now up 125% from its bottom in February 2016, the S&P E&P equity index during Q2 came within three points of its cycle low. We track the short interest in E&P stocks. Last week, short interest reached and then exceeded February 2016 levels. More amazing still, the Oil Service Sector Index today is 45% lower than it was when oil was $26 per barrel.

Given all the increase in trade war rhetoric, investors have become very worried about global oil demand. These concerns appeared validated during Q2 as crude and refined product inventories in the United States grew more than expected. During April and May, US core inventories grew by 30 mm bbl--a period that normally sees no growth. These figures suggested a market that was oversupplied by 500,000 b/d.

These inventory builds caught the market off guard and we admit they surprised us as well. However, we have reason to think they were temporary in nature. First, inventories have drawn hugely over the last seven weeks. Core US inventories have drawn by 30 mm bbl relative to seasonal averages (one of the largest seven-week drops ever), suggesting the market has slipped back into deficit by over 600,000 b/d. Next, the figures were not confirmed by global inventory numbers released by the IEA. Recall that the US Energy Information Agency (EIA) releases weekly inventory figures for the US while the IEA released total OECD inventory figures (a proxy for global stocks) with a two-month lag. According to the IEA's most recent release, OECD inventories grew by 35 mm bbl in April and May – exactly in-line with averages for those months. This suggests the global oil markets were balanced and not in surplus at all.

Furthermore, the US inventory figures do not make sense. For example, according to the EIA, US demand for April and May was down 36,000 b/d year-on-year. This represents one of the largest year-on-year declines for those two months in all of our data going back to 1984. The only time year-on-year demand has declined greater than this was post-September 11th, following the global financial crisis, and after the S&L crisis in the early 1990s. While we do not doubt that a full-blown global trade war could impact energy demand, no other indicator we look at suggests we are in a period nearly as bad as the post-2008 financial crisis.

What could explain the US inventory behavior in April and May? There are several possible explanations. First, extreme rainfall in April and May delayed planting of huge portions of the corn and soy crop (see our Agriculture section). Planting is extremely diesel-intensive and we believe this explains several hundred thousand barrels per day of lost demand. Next, there were an unusual number of refinery fires and outages during the first half of 2019. In fact, we never recall so many refinery outages occurring at the same time. These outages, along with problems in the Houston Ship Channel, could very well have significantly distorted commercial inventory figures, thereby making "apparent" demand fall --remember, US demand is an "apparent" demand figure that is calculated indirectly from production, imports, exports, and inventories, and is not directly observed. Finally, we have heard rumors that increased crude shipments arriving before Iranian sanctions took hold could explain some of the difference as well. In any event, we remain bullish given that US inventories have now resumed their steep declines relative to seasonal levels. Moreover, the buildup in the US during April and May appears to have been at least partially met by inventory draws in the rest of the world, leaving global stocks in better

shape that the US figures alone would suggest.

Adding to investor bearishness during Q2, the IEA released updated figures for 2019 oil balances as well as their first estimates for 2020. Over the last three months, the IEA lowered global demand estimates for 2019 by 300,000 b/d while raising non-OPEC supply estimates by 500,000 b/d, reducing the so-called "call on OPEC" by a fairly large 800,000 b/d for the full year. Looking forward to 2020, the IEA expects that global demand will grow by 1.4 m b/d to average 101.7 m b/d. Non-OPEC production will grow by a sizable 2.1 m b/d to reach 72.6 m b/d, leaving the call on OPEC at 29.1 m b/d. On the surface, these figures suggest that OPEC will need to cut production by an incremental 800,000 b/d to balance global oil markets next year.

As long-time readers of these letters will quickly realize, the problem with the IEA estimates continues to be the so-called "missing barrels." As a reminder, "missing barrels" occur when, according to IEA data, oil is produced but is neither consumed nor added to inventory. Although this oil is labelled as "missing," our research has always attributed these "missing barrels" to underestimation of demand. Over time the IEA makes these "missing barrels" disappear again by quietly rising their demand numbers higher, often years after the "missing barrels" first appear.

At the same time as the IEA released their bearish forecast for the rest of 2019 and 2020, they quietly raised the number of "missing barrels" for Q1 of 2019 by a huge amount – 1.6 m b/d. We cannot ever recall a higher reading. If this is truly underreported demand, which we believe it is, then this surge in "missing barrels" severely conflicts with the slowing demand narrative consensus. For 2018 as a whole, the IEA still lists its balancing item (that is "missing barrels") at 1.2 mm b/d (also a record for a full-year figure). We believe these "missing barrels" are a clear indication that the IEA demand figures are going to be revised significantly higher in the coming months.

Looking forward to the second half of 2019, the IEA expects global oil demand to average 101.4 mm b/d and for non-OPEC production to total 71.1 m b/d. This would leave the call on OPEC at 30.3 m b/d – or 375,000 b/d higher than what OPEC is producing today. Considering OECD inventories typically draw by ~250,000 b/d during the second half of the year, this would suggest the market will remain moderately undersupplied by only 100,000 b/d for the rest of the year. However, if we assume the balancing item persists at even half the rate of Q1, then global oil demand will average 102.2 mm b/d and the oil market will be undersupplied relative to seasonal levels by nearly 1 m b/d for the remainder of the year. In this case, OECD inventories will finish the year nearly 80 mm bbl below long-term averages – an all-time record deficit.

These market balances should help propel the oil price higher during the second half of 2019. As we enter 2020, we believe balances will get even tighter. As mentioned, the IEA is projecting global demand of 101.7 mm b/d and total non-OPEC supply of 72.6 mm b/d leaving a call on OPEC at 29.1 mm b/d – 800,000 b/d less than current production. If Q1's balancing item of 1.6 m b/d were to persist throughout 2020, then OECD inventories would draw for the full year by 800,000 b/d or nearly 300 mm bbl to finish at their lowest level since 2004. However, even if the balancing item were to come down (indicating a market less tight), we believe the IEA's projections for non-OPEC oil supply growth is too high for 2020 and will need to be revised lower.

The problem once again surrounds non-OPEC production outside of the US and Russia. This group has seen production disappoint for the past several years and we expect 2020 to be no different. Over a year ago, when the IEA first released 2019projections for non-OPEC supply ex the US and Russia, they estimated it would grow by nearly 500,000 b/d year-on-year. In their latest report, they have revised this figure down to less than 200,000 b/d. In our past letters, we have explained why even this figure is too high. Over the past decade, the global oil industry has not been able to discover any material sources of new supply outside of the shale. As aging fields decline, we have argued that conventional non-OPEC production will plateau and roll over and this is exactly what we have seen happen. Nevertheless, the IEA is projecting that next year's non-OPEC production outside of the US and Russia will break a decade-long trend of disappointment and grow sharply. In aggregate, they expect production will rebound by nearly 1 m b/d from this group – the fastest rate in over a decade.

While it is true that Norway and Brazil will both bring on new projects in 2020, our models tell us this will not be enough to offset declining legacy production and grow anywhere near the rates the IEA is calling for. In total, even if we make aggressive assumptions, we cannot see how conventional non-OPEC production will grow by more than 300,000 b/d next year – and this figure could disappoint. Moreover, post-2020 major new project startups grind to a virtual standstill and we expect conventional non-OPEC production will fall dramatically.

Finally, the IEA is projecting total US production to grow by 1.7 m b/d in 2019 and 1.3 m b/d in 2020. Earlier in this letter, we explained how our new "neural network" can be used to try and project future production levels. According to our models, this year's growth projections may be attainable, but next year's figures seem too aggressive. However, we should point out that so far in 2019 shale basin production has lagged both the consensus models and even the models being produced by our new neural network. For example, for the first five months of the year, the Eagle Ford has declined by 26 k b/d while the Bakken is basically flat and the Permian has grown by 170 k b/d. This represents the slowest start to the year since production declined outright in 2016, a deceleration of 68% compared to the first five months of last year. As a result, we believe both the IEA's and our own projections may have to come down significantly.

"WHILE THE CONSENSUS CROWD REMAINS WORRIED ABOUT AN OIL GLUT NEXT YEAR, WE ARE CONCERNED ABOUT A MARKET THAT IS TOO TIGHT. "

While the consensus crowd remains worried about an oil glut next year, we are concerned about a market that is too tight. The backwardation that persists in both the WTI and Brent market today confirms that the physical market is very tight. The strange apparent demand behavior from April and May appear to have been isolated incidences and both US and OECD inventories are once again drawing relative to seasonal averages. As inventories continue to draw in the second half, the oil price should move sharply higher. At the same time, investor sentiment is as negative as we have ever seen it. This has created unbelievable value in the space today with many names trading below their 2016 levels when oil was $26 per barrel. We rarely see opportunities like this and recommend a full allocation to oil-related investments.

Our Neural Network Makes a Startling Prediction

Developments in the US shale basins have never been more important for global crude fundamentals. Over the past decade, the US has represented more than 100% of total

non-OPEC growth and this growth has come exclusively from the shales. Had it not been for the US shales, the global oil market would have been in serious deficit. We have been shale investors since their start over 15 years ago and have followed the trends extremely closely. In our last letter, we explained how we took our knowledge of the shales and combined it with the latest statistical techniques. Using artificial-intelligence tools from Google, cloud computing resources from Amazon, and well data from ShaleProfile, we built a "deep neural network" to analyze trends in the three major shale oil basins (the Eagle Ford, Bakken, and Permian).

We invite you to read last quarter's letter in which we discussed our results in great detail. In summary, we concluded that the prevailing narrative about the shale plays was incorrect. Most people (including us), believed that improvements in drilling and completion techniques had driven the recent increase in well productivity. Instead, our models now tell us that the E&P industry had undertaken a massive high-grading exercise. Operators had gone from drilling approximately 50% Tier 1 wells in 2014 to nearly 70% today. We also confirmed a long-held belief (echoed by shale pioneers such as Mark Papa) that a Tier 1 well was approximately twice as productive as a Tier 2 well (all else being equal). Furthermore, we realized that enhancements in drilling and completion techniques (namely, longer wells and larger, more sand-intense frac jobs) were not delivering nearly as much productivity gains as originally believed. The implications were tremendous. Considering the rapidly dwindling inventory of undrilled Tier 1 acreage (primarily in the Bakken and Eagle Ford), we stated that drilling productivity was set to slow dramatically as companies were forced to drill increasing amounts of less productive Tier 2 acreage. We concluded that the only source of non-OPEC growth over the past decade was at risk of disappointing materially.

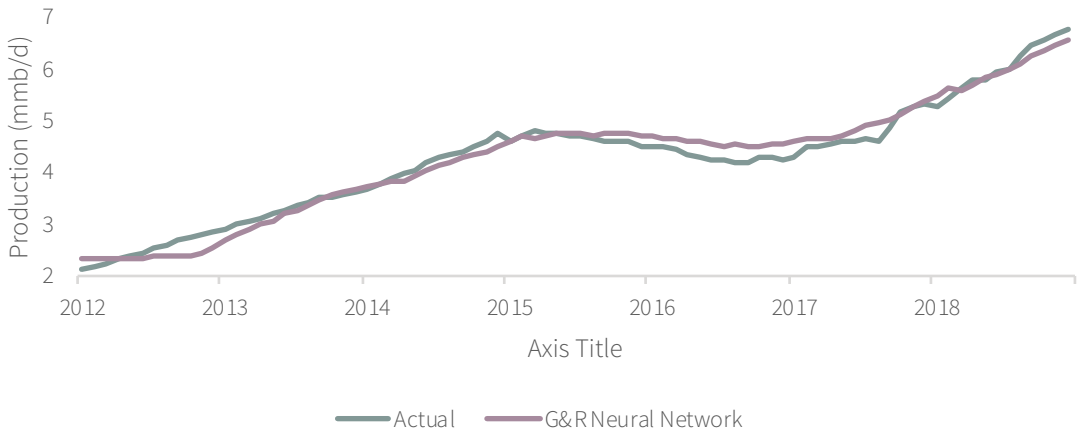
Since we wrote this last quarter, two things have happened to help validate our conclusions. First, the US shale plays unexpectedly grew at their slowest rate over the first half since 2016 and 60% slower than the same period last year. Second, Rystad Energy (the widely followed Norwegian oil consultants) released a report confirming the proportion of Tier 1 wells has increased materially. They warned that the recent surge in drilling productivity was likely the result of such high-grading. We hold Rystad in high regard and feel their report validates many of our own conclusions.

Over the past quarter, we have been busy improving our neural-network. In the first version, we used a well's six-month cumulative oil production as a proxy for well productivity. While this method is intellectually sound (and computationally convenient), our newest model now predicts a well's full production profile. This new methodology has two distinct advantages. First, a well's six-month cumulative production can be skewed by variation early in the well's life. For example, if a well were shut-in for even a few days, the impact on six-month cumulative production could be as high as 5%, despite no difference in the well's true underlying productivity. By asking the neural network to instead predict the full production profile, the model is less impacted by "noise" early in the well's life. This, in turn, allows the neural network to better hone in on the true signals affecting full-life performance. Second, instead of simply predicting whether a drilling location is "Tier 1" or "Tier 2," we can now attempt to make accurate estimates of both a well and a field's future production. In other words, we can now estimate both the drivers of current trends as well as make predictions about future supply levels.

Applying our neural network historically, we can very accurately model production in the

Eagle Ford, Bakken, and Permian using only a well's location, lateral length and proppant size as inputs. In the following chart we have graphed historical production from these three basins against the predicted output from our neural network. As you can see, the results are excellent with an R2 in excess of 0.9.

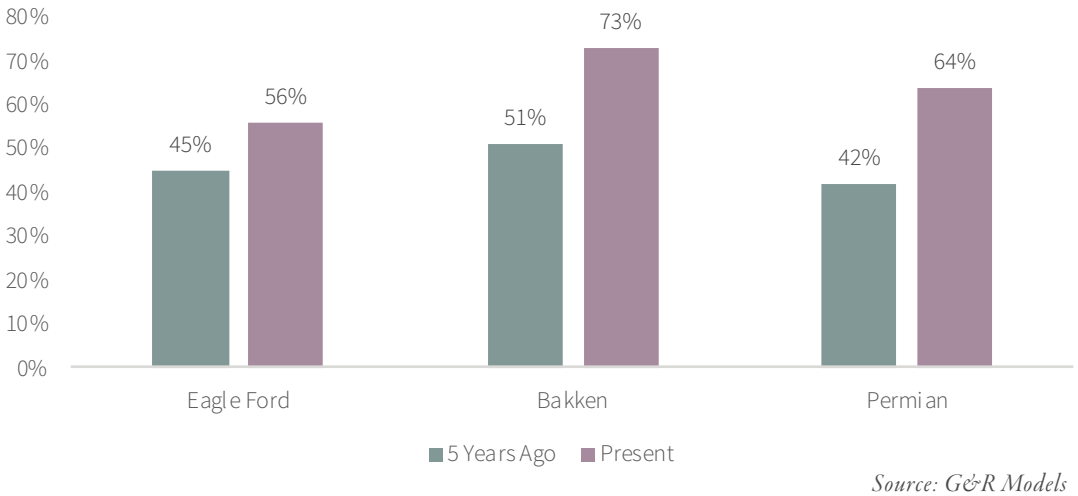
CHART 8 Major Shale Production



Source: EIA and G&R Models

Before we continue, we should point out that our new model largely confirmed our previous results. For example, we confirmed that a Tier 1 well is slightly more than twice as productive as a Tier 2 well in the Eagle Ford, Bakken, and Permian. Next, while proppant loading per foot has nearly tripled over the last five years, production per foot has increased by less than 100%. For the most part this is not enough to merit the additional cost of the proppant and we believe this explains why many companies have dialed back their completion intensity. We continue to believe the rise in drilling productivity has come from a sustained migration into Tier 1 areas. For example, in the Eagle Ford the percentage of Tier 1 wells drilled went from 45% in 2010 to nearly 60% today. From 2014 to today, Tier 1 wells in the Bakken went from 50% to 73% and from 40% to 64% in the Permian. These figures are all largely consistent with our results from last quarter.

CHART 9 High Grading



Source: G&R Models

The critical question for global oil markets going forward is what level of growth we can expect from the major shale basins. We turned to our neural network for guidance. For each basin we modeled two scenarios. We used the average rig count over the last few months as our starting point (which may be too optimistic given we're currently shedding rigs). Our base case assumes the current high-grading continues for as long as possible. For example, operators in the Eagle Ford will continue to drill 60% Tier 1 wells until they run out of inventory. Similarly, operators in the Bakken and Permian will drill ~70% and ~65% Tier 1 wells, respectively, for as long as possible. Our downside case assumes that future wells are drilled according to their remaining inventory. For example, of the remaining wells in the Eagle Ford, only 45% are Tier 1 and so future drilling will also be 45% Tier 1. For the Bakken this figure is 48% and 52% for the Permian. For each basin, we assumed that all future wells were drilled and completed using the most recent advanced techniques.

"UNDER ANY SCENARIO, FUTURE SHALE GROWTH LOOKS SET TO SLOW DRAMATICALLY."

Under any scenario, future shale growth looks set to slow dramatically. In our past letters, we explained how we believed the Eagle Ford and Bakken would only grow moderately from here (if at all). Our neural network now confirms these views. Our base case (which assumes continued high grading) suggests the Eagle Ford can only grow another 380,000 b/d cumulatively over the next decade (or ~35,000 b/d per year) while our conservative case suggests the field will only grow by another 280,000 b/d (or 25,000 b/d per year). To put these figures into context, the Eagle Ford grew by 330,000 b/d on average each year between 2012 and 2015 and by 120,000 b/d in 2018.

Similarly, the Bakken can grow another 500,000 b/d cumulatively over the next 16 years (or ~35,000 b/d per year) before peaking under the base case. Under the conservative case, the Bakken will grow another 300,000 b/d over the next 23 years or 13,000 b/d per year. This compares with 250,000 b/d average annual growth in each of the last two years. As we have discussed previously, the Permian still has room to grow production. Under both scenarios, the Permian should grow production by another 2 m b/d before peaking around 6.5 m b/d sometime between 2029 and 2032. This explains why most of our E&P investments today are in the Permian basin. However, while this growth is impressive, it only represents growth of ~200,000 b/d per year, far below the ~700,000 b/d of yearly growth over the last two years.

In total, we expect the three major US shale basins will grow by another 2.7 to 2.9 m b/d in total before peaking around 10 m b/d sometime between 2027 and 2029. This equates to somewhere between 275,000 and 360,000 b/d of growth per year compared with nearly 1 m b/d of annual growth from the three basins each year between 2017 and 2019. We should point out that these figures may be slightly higher in the early years and 2019 could actually see growth in excess of 700,000 b/d from January 1st to December 31st. However, we believe 2019 will be the last time growth exceeds 500,000 b/d as production starts to slow dramatically. Furthermore, we expect our projections are somewhat optimistic given that oil companies tend not to drill at an even pace until the entire drilling inventory is exhausted. Instead, drilling rates will likely taper as we progress through the next several years. As a result, the peak may occur further out in time but at a lower maximum level.

These levels of growth are simply not adequate to meet global oil demand especially given expected disappointments in the rest of the non-OPEC world. The only bright spot in non-OPEC production growth is on the verge of slowing dramatically. Notably, shale production growth is off to a very slow start in 2019. For the first six months of the year, we estimate that total shale production grew by less than 250,000 b/d – 60% less than the first six months of last year. We believe we are beginning to see the first signs of the trends we

have just described and if we are correct, the recent slowdown is just the start.

We are now using our neural network to predict reserves and production profiles at the individual company level. If we are successful, we should be able to much more accurately project our company models both in terms of production and cash flow as well as in terms of future reserve bookings and capital efficiency. Our next letter will reveal our results.

The Biggest Story No One Talks About: Aramco Reserves Post 2077

Last quarter, we analyzed the reserve data contained in Aramco's April 2019 bond prospectus. Analysts have long debated the size of Aramco's crude oil reserves. Between 1979 and 2018, Saudi Arabia claimed its remaining proved crude reserves were unchanged at 260 bn bbl. This was remarkable, considering more than 100 bn bbl of oil was produced over that time and only two new major fields (Khurais and Manifa) were developed. In 2005, Matt Simmons published *Twilight in the Desert* arguing that Saudi Arabia's remaining reserves were much less than widely believed and he ignited a significant debate that has now largely faded away. Talks of an Aramco IPO led us to once again revisit and revive the debate and we wrote extensively about the issues in our last three letters.

This past January, Aramco issued a press release stating that DeGolyer & MacNaughton (a highly reputable reserve auditor) confirmed their reserves were indeed 260 bn bbl. However, when Aramco released their bond prospectus in April, it raised more questions than it answered.

For example, D&M did indeed perform a reserve audit; however, their report only covered 160 bn bbl of crude oil. After carefully parsing the prospectus, we believe we can bridge D&M's figure (160 bn bbl) to Aramco's figure (260 bn bbl). First, sometime in the last 18 months, Saudi Arabia changed the terms of Aramco's concessions from being perpetual to expiring in 2077. While it is largely a moot point, considering the state is the sole holder of Aramco, it does affect the reserve accounting. Aramco shows both corporate reserves (202 bn bbl) and Kingdom reserves (260 bn bbl). The difference appears to be those reserves post the 2077 concession period. D&M's report confirms that its audit only goes through 2077. The remaining ~40 bn bbl discrepancy comes from reserves that D&M considers too small, remote, and costly to verify.

"GIVEN THE IMPORTANCE OF THE SAUDI RESERVE QUESTION, WE FIND IT SHOCKING THAT NO ONE PICKED UP ON THE FACT THAT THE D&M REPORT DID NOT MATCH SAUDI ARABIA'S LONG-MAINTAINED RESERVE FIGURE."

Given the importance of the Saudi reserve question, we find it shocking that no one picked up on the fact that the D&M report did not match Saudi Arabia's long-maintained reserve figure. Instead, the consensus reaction is summed up by comments from Ellen Wald on CNBC stating, "Whether they have 260 or 266 billion barrels isn't really the issue. The point is that they had DeGolyer & MacNaughton, which is a very respected source, do an audit…I think it's designed to put to rest the controversy that's always plagued them since the publication of *Twilight in the Desert.*"

In a future letter, we will dissect the 40 bn bbl of reserves attributed to fields that are too small to be counted. Today, we focus on the larger of the two figures: the ~60 bn bbl of reserves that are expected to be produced post-2077. Our analysis suggests that most of these reserves simply do not exist. While our claim may sound controversial, we consider it telling that no reserve auditor has attempted to verify these volumes at all.

According to their bond prospectus, D&M has verified that crude reserves between now and 2077 are 160 bn bbl. At the same time, Aramco claims that the difference between their reserves and Kingdom reserves is 60 bn bbl. The difference represents oil produced after the concession period ends in 2077. Simple math suggests these figures are not internally consistent. The chart below shows a possible Hubbert Linearization for Saudi Arabia. As a reminder, a Hubbert Linearization plots cumulative oil production against the ratio of current production to cumulative production. After a period of time, the relationship settles into a straight line which can be used to make projections.

CHART 10A Saudi Arabia Hubbert Linearization

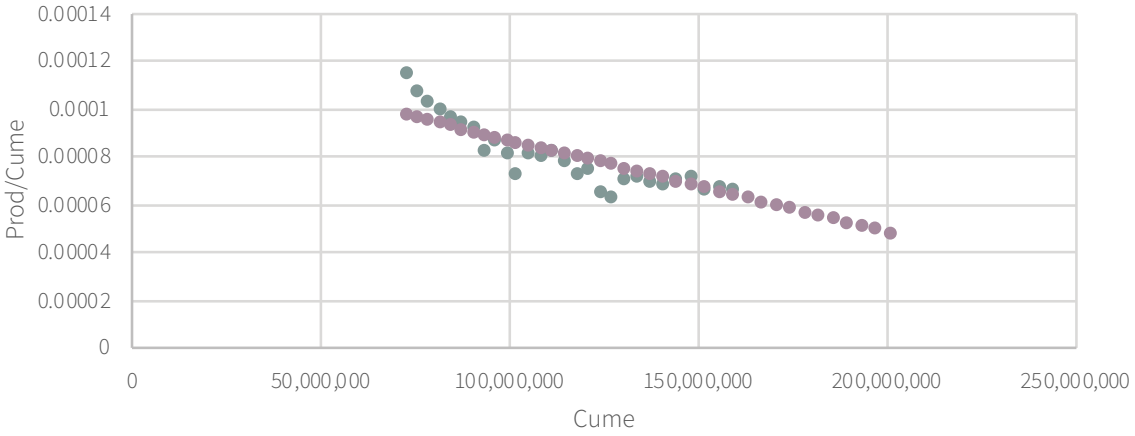
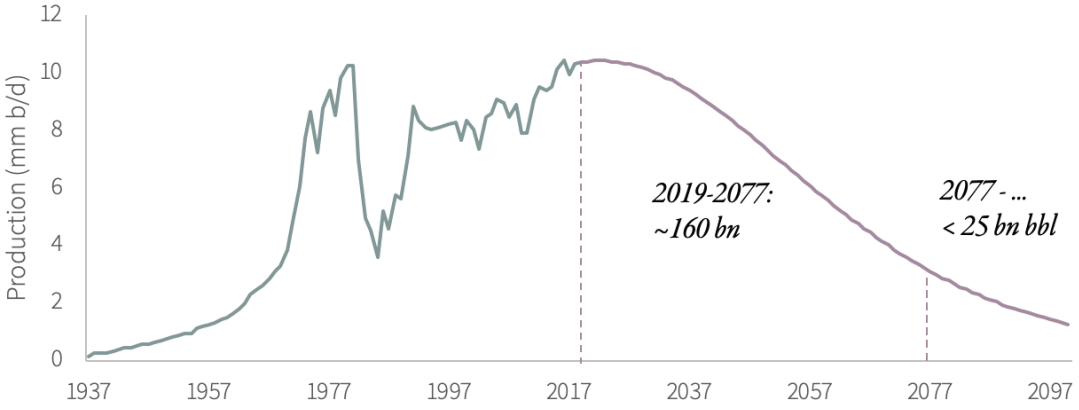


CHART 10B Saudi Arabia Production Profile



Source: BP and G&R models

The chart above implies that cumulative production between now and 2077 would in fact be 158 bn bbl – very much in line with the Aramco reserve report. The inconsistency comes in the period after 2077. Aramco implies that reserves post-2077 equal an incremental 60 bn bbl. However, according to this production profile implied by the Hubbert Linearization, Aramco will produce 3.1 mm b/d in 2077 and this level will be declining by ~4% per annum. Using these figures, Aramco will never produce more than 25 bn incremental barrels, even after several hundred years.

We believe it is much more likely that this incremental 60 bn bbl of post-2077 reserves is simply far too optimistic. The fact that no reserve auditor has offered to verify these figures

only reinforces our view. While these discrepancies may seem abstract (especially considering we are discussing production many decades in the future), the implications are very real. There is reason to believe that a field or basin faces serious challenges and begins its terminal decline once half of its recoverable reserves have been produced (please see our 3Q2018 letter for a detailed explanation of why). To date, we estimate that Saudi Arabia has produced 165 bn bbl of crude oil. If its remaining reserves are actually 260 bn bbl (as Aramco claims), then total reserves equal 422 bn bbl of which 39% have been produced. If Aramco ultimately increased production to 12 m b/d (a big if), they would not reach the halfway point before 2030. On the other hand, if their remaining reserves are actually 185 bn bbl (the 160 bn bbl verified by D&M plus our estimate of 25 bn bbl incremental barrels post-2077), then total reserves equal only 350 bn bbl of which 45% have already been produced. At today's production levels, Aramco will hit the 50% mark within a few years. This suggests that Saudi will struggle to increase production from here and may not even be able to hold production flat. Consistent with this view, we heard rumors last fall that Saudi had to sell crude from its stockpiles in order to hit its targets.

Will This Natural Gas Bear Market Ever End?

North American natural gas prices were weak during Q2 as surging shale production continued to outpace robust demand. Henry Hub natural gas peaked most recently in November at $4.93 per mmbtu as an early start to winter increased domestic heating demand. In our past letters we explained how any weather-related imbalances would be short-lived and in retrospect we were correct. After peaking in November, Henry Hub gas prices fell by more than 50%, ending Q2 at $2.30 per mmbtu. The North American natural gas market continues to be challenged by near-endless shale supply. According to the most recent data, US production grew by an incredible 9.8 bcf/d year-on-year in April. This growth is nearly as robust as October's all-time record (10.4 bcf/d y/y) and is nearly twice the previous record set in 2014.

Furthermore, there are less than half as many rigs drilling for gas today compared with 2014, implying that productivity continues to grow. While natural gas inventories started Q2 600 bcf below 10-year averages (after the colder-than-normal winter and 2018's extreme summer), surging supply has narrowed this deficit to less than 250 bcf today. Our models suggest US natural gas inventories will shift back into surplus later in 2019.

Despite today's relatively bleak fundamentals, we believe opportunities exist in certain natural gas-related equities. In particular, Range Resources controls some of the highest-quality acreage in the world and yet its valuation compared to intrinsic value is the lowest we have ever seen. For example, in Range's 2018 annual report, total proved reserves are listed at 18 trillion cubic feet. Using a $3.55 natural gas price, Range reported an SEC PV-10 discounted value of $11 bn. Netting out their $4 bn of debt and dividing across 250 mm shares outstanding suggests a fair value of $28 per share compared with a share price approaching $5.00 today. We cannot recall a company that traded at such a deep discount to its proved-reserve SEC PV-10 value (itself a very conservative measure), let alone a company with some of the most profitable rock in the world.

In principle, natural gas represents the type of market we like to get involved with: investor sentiment is incredibly negative, prices are depressed, companies are operating with little

to no profitability and valuations are low. However, we have largely stayed away from natural gas equities in recent years as our models (accurately) predicted that surging supply would far exceed any increase in demand. At some point down the road, we expect natural gas production will level off and eventually decline and at that point natural gas equities will represent excellent investments.

While we do not believe that time has yet arrived, we are at present undertaking a large research project to help guide our outlook going forward. We are "re-training" the neural network models we discussed in the oil section to accurately estimate natural gas production as well. We will then try to use this model to determine how much Tier 1 acreage remains (especially in the Marcellus--by far the largest gas field in the US) and when total US production growth could finally slow. We hope to have this analysis completed for the next letter.

North American natural gas has now entered the fourteenth year of a grinding bear market that has seen prices collapse by 86% from their peak in 2005. Investor interest in natural-gas-focused equities is as negative as we have seen it, with the highest-quality companies seeing over 30% of their float sold short. In many ways the industry is the victim of its own success, but if the relentless surge in production were ever to abate, there would be a massive bull market ahead.

Copper Supply Takes a Hit

Over the last three and a half years, we have remained committed copper bulls. On the demand side, a number of important trends have emerged suggesting that copper has the best demand profile of all the base metals. First, strong Chinese demand growth will continue. Next, investments in renewable energy sources remains incredibly copper-intensive and are set to accelerate. Finally, India (which has the world's second largest population) has an extremely low level of copper invested in its economy. We believe this is about to change as India enters into a period of accelerated copper consumption that could last for decades.

Each of these copper demand sources are in and of themselves significant, but our research tells us that all three are now taking place simultaneously. This has the potential to overload the global copper market as we progress into the next decade. Because of Trump-related trade war fears, we are seeing some weakness in Chinese copper demand. For the first five months of 2019, the World Bureau of Metal Statistics (WBMS) indicated Chinese copper demand fell 3.5% year-over-year, however this appears to have abated as Chinese demand rebounded strongly in April and May. Given the recent up-tick in Chinese manufacturing data and steel production, we believe the Chinese economy is not slowing to the degree many bears fear.

At the same time, there have been very large developments regarding copper mine supply that have received little attention. In previous letters, we discussed how copper mines supply would cease to grow, after having surged by over 5% in both 2015 and 2016 as six new mines came on line in Peru and Kazakhstan. Few new "greenfield" mines were scheduled to come after 2016, while "brownfield" mine developments would not be enough to overcome global copper mine depletion.

Since 2016, copper mines supply has indeed been flat. Going forward, the only significant

source of new mine supply will come from the development of the Cobre Panama mine where production is now starting to ramp up. Next year, Cobre Panama is expected to produce 150,000 tonnes of copper and production should ramp to 350,000 tonnes in 2021. In 2022, the company plans to begin a mine expansion and ultimately double production by 2024-2025.

After Cobre Panama ramps up, the next large "greenfield" project to come on line is the massive Oyu Tolgoi underground block-cave in Mongolia. Copper production from Oyu Tolgoi underground was estimated to reach 75,000 tonnes in 2022, 275,000 tonnes in 2023, and ultimately 425,000 tonnes by 2024.

The next great "greenfield" project to come on line would be Ivanhoe's Kamoa-Kakula project in the Democratic Republic of Congo, expected to commence production sometime in 2023. We just visited the Kamoa-Kakula project, and in a moment we will discuss our observations. First, we must discuss the recent problems plaguing Oyu Tolgoi in Mongolia.

I first visited Oyu Tolgoi back in the summer of 2002, just before the "Hugo North" discovery was made. At the time of my visit, the Oyu Tolgoi mining camp was abuzz with excitement regarding the upcoming drilling targeting a huge magnetic anomaly just to the north of the original deposit. A huge Soviet Antonov An-225 cargo plane had been contracted to deliver the drill rig to the Ulaanbaatar airport. Drilling was scheduled to commence a few weeks later. Just as the geologists had expected, the drilling program discovered a huge extremely high-grade copper-gold deposit that was named "Hugo North" in honor of Hugo Dummett, the distinguished geologist who worked for the predecessor to Turquoise Hill Resources (TRQ), and had just been killed in a highway accident in 2002. The "Hugo North" discovery was one of greatest copper discoveries made in the latter half of the 20th century. It is unique in that it is both high grade and large. Assuming 400,000 tonnes of copper production per year, the mine will still be producing 60 years from today.

In July, Turquoise Hill Resources, in conjunction with its operating partner Rio Tine, announced that start-up of the underground block-cave had been delayed for up to two years as the company wrestled with rock geotechnical conditions that were not previously understood. The company announced that design of the underground mine might have to be changed and that the capital needed to complete the project would be 25% to 35% higher than originally expected.

"THE ANNOUNCEMENT RAISED A NUMBER OF QUESTIONS THAT WERE NOT ANSWERED BY THE COMPANY WHICH SUGGESTS THE UNDERGROUND START-UP MIGHT BE SIGNIFICANTLY DELAYED AGAIN. "

The announcement raised a number of questions that were not answered by the company which suggests the underground start-up might be significantly delayed again. The company has determined that the present mine design is sub-optimal and significant changes will likely be required. However, exactly what the problems are and how they will be resolved remain unknown.

Given the inherent complexities involved with block-cave operations, and the huge amount of underground development work that has already taken place, we would not be surprised if further delays ultimately end up pushing the start-up out much further. Making matters worse, rumors have emerged that the Mongolian Government is unhappy about both the delay and the surge in capital costs. It was only back in 2015, after a lengthy stoppage in underground development, that the present fiscal agreement between Turquoise Hill, Rio Tinto, and the Mongolian government was reached.

The Mongolian government controls 34% of the Oyu Tolgoi project, but will not receive

any payouts until 2041. This is because the loan to fund the purchase of the 34% interest first needs to be repaid. Given the delay and the capital cost increase, the payback period is going to be pushed out even further. In response to the further delay of any potential dividends, the Mongolian Government has said it might "rip up" its 2015 fiscal agreement. Given the uncertain fiscal conditions, Rio Tinto, the operator of the Oyu Tolgoi project, stopped underground development for two years before the 2015 fiscal agreement was put in place. If the government were to reopen the 2015 fiscal agreement, another stoppage in underground development would be likely. While at this point we cannot know how serious the Mongolian threats are, it is something we will monitor will great interest. As things stand today, the Oyu Tolgoi underground will not commence before mid-2023 The net result is that 400,000 tonnes of copper production (or 2% of world mine supply) that was scheduled to hit the market in 2021, may not start until mid-decade. The problems at Oyu Tolgoi highlight the difficulty in growing copper mine supply as we move into the 2020s.

This bring us to Kamoa-Kakula, Ivanhoe Mines' (IVN) project in the DRC. We visited the project back in the beginning of May. The deposit is clearly world-class. The project economics rank among the best we have seen based on the current resource. Moreover, there is strong reason to believe that new large discoveries will be made across Ivanhoe's exploration concession immediately to the west of the Kamoa North discovery.

The project sits on the western side of the historical Congo copper belt in an area that geologists never before explored. Consensus geological wisdom held that copper mineralization ended immediately west of the mining village of Katanga and as a result little exploration ever took place.

Ivanhoe reinterpreted the geological theories and their exploration success in this new area has changed the conventional wisdom.

The total capital cost to develop the Kamoa-Kakula deposits is estimated at $1.1 bn while the project will generate an after-tax NPV of $10 bn using a $3.10 copper price. For those unfamiliar with modern mining economics, these figures are basically unheard-of. Initial production is expected to start at the Kakula mine in 2023 and will eventually ramp up over the next 10 years to almost 475,000 tonnes of annual copper production. Given the high probability that additional new deposits will be discovered, the ultimate copper production from the project might end up being significantly higher.

We believe the biggest risk to the project comes from the DRC government.

Since the original Kamoa discovery was made, the DRC government has already changed the mining royalty structure, including the addition of a "super-profits" tax which kicks in when the commodity price rises 25% above the assumed price used in the project's feasibility study. Given how governments chronically change mining fiscal terms, we believe there is a strong possibility that the DRC could very well change the terms again, long before the Kamoa-Kakula project comes on line resulting in project delays.

Further negotiations between the project consortium (besides Ivanhoe, two large Chinese SOEs are involved with the project) and the government have still not concluded. We believe the most contentious issue will be the government's stated intention that IVN build a copper smelter to process the mine's concentrate. Such a smelter would represent a large additional capital cost for the project. While the project's economics are so robust that building a smelter would only slightly diminish the ultimate returns, there are other problems aside

from economics. As of today, we do not believe the region's electrical supply is either large enough or reliable enough to justify a smelter. While these problems will ultimately be resolved, in the meantime that could present problems for the project's aggressive start-up date For a good example of the problems surrounding smelters, just look at what befell Freeport Copper and the Indonesian government as a result of the government's demand for a new copper smelter to be built in Indonesia.

The Kamoa-Kakula copper project is incredibly robust and we believe there are few (if any) technical issues (like the problems that surround the underground project at Oyu Tolgoi). However, the complexities of dealing with the DRC government could ultimately make the ramp-up of the project by 2023 too optimistic.

Deeply embedded problems have emerged in copper mine supply over the last several years. Increased mine depletion and the lack of large scale "greenfield" projects top the list. To this, we must now add issues surrounding Oyu Tolgoi. Making matters more complicated, several of the world's largest copper mines are in the process of transitioning from open-pit to underground. As Grasberg (the world's second largest copper mine) and Chuquicamata (13th largest copper mine) both go underground, the risk of additional disappointments grows. Given all these issues, we believe it will extremely difficult to see any copper mine supply growth in the next five years.

We think that the copper market will be the best performing base metal as strong demand trends are met by a dearth of mine supply growth. Today, investors are bearish as worries about trade-war dislocations and Chinese copper demand take center stage. However, the demand and supply trends just discussed will exert themselves over the next several years.

Copper bottomed in January 2016 at $1.95 per pound before rallying to $3.30 over the next 18 months. Given the fear surrounding Chinese growth and trade-related demand impacts, copper prices today have pulled back to $2.60 per pound. We believe the pullback has presented investors with an excellent buying opportunity.

Musings on the Gold Bull Market Few Saw Coming

In our introduction, we explained how the great bull market in precious metals has begun. Over the last several years, just about every piece needed to complete our precious metals bull market puzzle has fallen into place. Using various valuation methodologies, gold is as cheap as it was in 1929, 1970, and 1999. Investor psychology has reached levels only seen as gold made its last great bear market bottom. Silver reached valuation levels relative to gold that signaled to us the bear market had reached extremes. The only piece out of place was for gold to become cheap relative to oil, which, due to a paradigm shift, we no longer believe will happen this cycle.

Aggressive central bank selling in the late 1990s and early 2000s left gold cheap relative to oil for almost eight years. Given that central banks today are buying as much gold as they were selling back then, we believe that gold will now stay "expensive" relative to oil for an extended period of time. Gold experienced a strong breakout over the last two months and we now believe the great precious metals bull market has begun.

If we are right that this bull market will be driven by Western investors, we should start to see robust physical accumulations of both gold and silver through the various ETFs which

we believe will be the Western investment community's vehicle of choice. In the last several months, physical accumulation has indeed developed in both gold and silver physical ETFs.

Since the beginning of 2017, the 17 gold ETFs we track have shown a steady pattern of accumulation. They have added 470 tonnes of gold and their total holdings now approach 2,350 tonnes. In the last two months, we have seen another surge in accumulation. From the beginning of May until mid-July, the ETFs accumulated an additional 150 tonnes. ETF gold holdings are now approaching their old highs reached back in 2012.

Silver ETFs have also begun been rapidly accumulating metal. Over the last two years, physical silver ETFs have seen little in the way of investor interest. Over the last 18 months, they have actually shed 500 tonnes representing about 3% of their total holdings. The lack of silver investment interest added further confirmation that we were still in a corrective phase in precious metal markets. However, starting in June, silver ETFs have gone on a binge. Over the last seven weeks, they have added over 1,550 tonnes, an increase of 10%.

If this is truly the beginning of the great precious metals bull market, we should start to see aggressive purchasing of silver. We will carefully monitor the behavior of silver accumulation going forward. If it persists, it will be further proof that a new gold market has indeed begun.

We now recommend all investors have a full allocation to precious metal investments in their portfolios.

Could Sunspots Responsible for the Wettest Spring in U.S. History? Either Way Its Bullish for Grains

Global agricultural markets remain on a knife's edge. Because of rising incomes across the developing world, global grain demand has accelerated. Between 1980 and 2000, we estimate that global grain demand grew by ~2% per year. Over the last 10 years, grain demand has surged to 3% of yearly growth -- an acceleration of 50%.

The sharp acceleration in global grain consumption since 2010 has been met by near-perfect growing conditions in every major grain growing area in the world. The resulting surge in global yields has not only met strong demand, but has created surpluses that have pushed down grain prices to the marginal cost of production. For example, US corn prices have averaged approximately $3.50 per bushel over the last four years, producing little in the way of economic returns for the farmer.

However, as we wrote in last quarter's letter, we believe the sun's energy output (as observed through the number of sunspots) is beginning a long period of decline. Although the amount of energy emitted by the sun and its potential impact on the Earth's weather is a subject open to debate, climatologists and astrophysicists both concede that previous periods of low sunspot activity have often been associated with periods of cooler and more disruptive weather patterns. We believe we are entering a sustained period of reduced sunspot activity, which will eventually produce a period of extended global cooling. Such a period will result in much more challenging growing conditions.

Although it is most likely coincidental, we admit we are intrigued by the record-breaking weather patterns that have emerged this spring. The US has experienced its wettest 12 months on record,

which produced extensively flooding in the Midwest and delayed US crop plantings.

In their June World Agricultural Supply and Demand Estimates (WASD), the USDA slashed its estimates of US corn acreage harvest by 3 mm acres to only 82.4 mm acres and lowered its yield estimate from 176 bushels per acre to only 166 bushels. The USDA now projects the 2019-2020 US corn carryout will total 1.675 bn bushels, down dramatically from its previous estimate of 2.485 bn bushes, made only two months earlier. The USDA also sharply reduced their estimates for global corn carryout from 314.7 mm tonnes to 290.5 mm tonnes -- a drop of almost 8%.

In their most recent WASD report released July 11th, the USDA actually increased their estimate of harvested corn acreage to 83.6 mm, but it kept its yield assumption at the very low level of 166 bushels per acres. While they have raised their 2019-2020 US carryout number from 1.675 to 2.0 bn bushels, it is still significantly below their original 2.485 bn bushel carryout estimate.

On a global basis, the USDA raised their corn carryout number to 298 mm metric tonnes, which is still significantly below last year's 328 mm carryout number. Of particular interest to us is the continued drop in Chinese corn inventories. Chinese corn prices last decade were subsidized which led to corn production significantly exceeding domestic demand. Chinese inventories built and import demand fell to zero. Subsidies were eliminated in 2016 and production has now begun to contract. Corn demand in China is estimated to be almost 30 mm tonnes greater than production and Chinese corn inventories (which at one point were estimated to be as high as 250 mm tonnes) are now shrinking rapidly. In just two years, Chinese corn inventories fell an additional 30 mm tonnes and the USDA estimates that inventories will stand at only 190 mm tonnes in the 2019-2020 carryout year.

China has also mandated a 10% ethanol-gasoline blending requirement. China plans to have 6.6 mm tonnes of domestic ethanol capacity built by 2020, which we estimate will consume almost 15 mm tonnes of corn (net of the dry distiller grain produced). This alone will boost China's corn consumption by almost 5% and further accelerate the drawdown in corn inventories.

The corn market has undergone a significant tightening in just the last two months and corn prices have already jumped 30% off their May bottom. We are now more than halfway through the northern hemisphere growing season, but this is where it really starts to get interesting. Because of the late planting, the US corn crop is weeks behind in its growth cycle. Its health condition is below average which puts it in danger of being negatively impacted by an early fall frost. The poor condition of both the corn and soybean crop is reflected in the recent USDA crop reports. For example, for the sixth straight week, less than 60% of the corn and soy crop is listed in "good" or "excellent" condition. Last year at this time, the USDA estimated over 70% of the corn and soy crops were in "good" or "excellent" condition.

Although we haven't had a serious early frost in several years, we believe that later spring frosts and earlier fall frosts will become a bigger and bigger problem as we progress into the next decade, given the expected reduction in sunspot activity. People forget, but one of the biggest positive factors associated with the warming cycle of the past 70 years has been the lengthening of the North American growing season.

We cannot say with any level of certainty that the record rainfall in the US had anything to

do with a changing sunspot cycle, but it is something to monitor closely as we go forward. As of now, both the US corn and soybean crop are behind in their development, leaving them susceptible to an early frost should one appear. The excessive rain this spring has left both crops with a condition known as "wet feet." Lacking the need to seek water at deeper soil depths, both corn and soybean plants now have shallow root structures. Given this suboptimal root development, both crops are susceptible to further yield impairments if we have a significant dry spell in the Midwest.

We believe the six-year grain bear market has now drawn to a close. Challenging weather conditions, such as the excessive rain experienced this spring, will continue to present themselves over the next five years, as we enter into the first stages of a global cooling cycle. We recommend that investors increase their weighting in agricultural-related equities.