The New J. Hutton

16 March 2021

Mining

Markets, Gold, Iron Ore & Energy Transition Materials

Summary

- **Short-term liquidity measures indicate further market appreciation**
- **Cryptocurrency valuations entirely based on intangible assets**
- **Recent gold price decline driven by drop in jewellery & bullion demand**
- **Gold durability will outperform all currencies in LT**
- **Iron ore demand supported by strong Chinese infrastructure growth**
- **Chinese shifting developmental focus to rural, 3rd and 4th tier cities**
- **Continued relative growth in Palladium consumption**
- **Synthetic fuel revolution reliant on advent of hydrogen economy**
- **Geothermal energy increasingly the only green baseload alternative**

In evaluating the investment thesis behind Bitcoin, and the recent belief by its proponents that it has now reached safe-haven status; we contrast it to gold and conclude that Bitcoin as an investment is not fit for purpose. Our concerns include its sustainability, the general conceptual misunderstanding of what a currency is, the fact that its valuation is reliant on the collective Zeitgeist of our age, transaction speeds and increasing latency.

We continue our narrative on the energy transition, starting with the usual EV suspects, lithium and PGMs. Examining the possibility of synthetic fuels, and cellulosic ethanol, which underlie the importance of establishing a hydrogen economy in the face of insufficient current nuclear and/or wind turbine construction. Then ask, does unconventional geothermal power holds the promise of unlimited baseload power? With minimal operational costs, and the ability to be established almost anywhere globally, is it the only realistic green alternative able to underwrite large-scale electrolysis cost effectively?

Lastly, we examine China's latest five-year plan and how it relates to sustaining growth within its ferric complex, and conclude that demand will continue to be robust for longer.

Analyst

Gaius L.L. King

gaius@fox-davies.com

Table of Contents

	Page
The Market – What do we Actually Know & Understand?	3
Is Bitcoin the New Gold? No, it's the New Tulip 2.0!	7
Gold - on the Road to Perdition?	11
Iron Ore – Lather, Rinse, Repeat	14
China's "Beef" with Australia: Politics & Commodities	16
Probability of Chinese Iron Ore Tariffs?	18
PGM & Lithium Update	20
Synthetic Fuels – Awaiting the Hydrogen Economy	22
Cellulosic Ethanol - Replacement of First-Generation Biofuels	23
Geothermal –Basis for a Future Hydrogen Economy?	25
REEs - Pssst, the EV transition has little to do with Batteries!	26
Copper Update	27
Disclosures	29

The Market – What do we Actually Know & Understand?

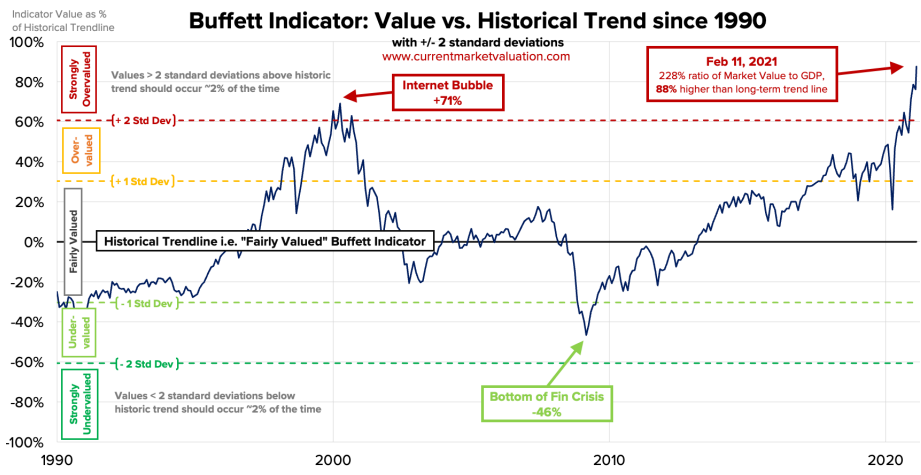
After several decades as an active market participant, you begin to re-evaluate what you have been told and much of what you learned as fact. The largest assumption underlying much of our understanding associated with market dynamics is based on Efficient Market Hypothesis (EMH), or in Economics, the Perfect Market Theory. EMH states that the market price for any share incorporates all the known information about that stock, demand, supply and pricing. It implies that any particular equity is in fact valued at any point in time, until a future event changes that valuation (negatively or positively).

Adherents to Capital Asset Pricing Model (CAPM) use EHM theory as a basis to diversify risk, the theory following that if successful, the expectant returns will be greater over time by selecting noncorrelatable sectors as part of a portfolio. It assumes a passive stance, that an investor, in the long-run, will be far better off owning a wide swathe of stocks and profiting from the general rise of the market.

We have always held a degree of scepticism regarding EHM, but in more recent times, its theoretical shortcomings have become all too pronounced. If EMH is held to be true, why does the market have a regular periodicity in extreme market valuations? In Figure 1, the US Market Cap to GDP Ratio (also known as the Buffett Indicator), is used as a form of Price/Sales valuation multiple for an entire country, to assess whether the country's stock market is overvalued or undervalued, compared with an historical average. Its current ratio is at its highest level since the Dotcom Bubble.

Over the past decade, US share market appreciation has dramatically outperformed GDP growth.

Figure 1: US Market Cap (~US$49.6tn) to GDP Ratio (US$21.7Tn).



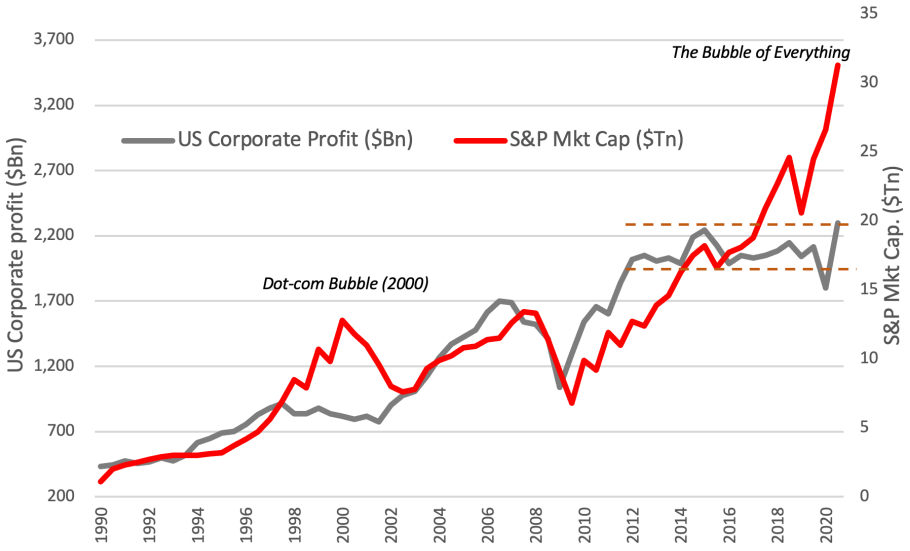
Source: Currentmarketvaluation (2021)

Why is this happening? The most obvious candidate is the widespread adoption of unorthodox MMT [1] measures globally. This has resulted in >US$17Tn (out of a total ~$35Tn globally) of negative-yielding debt, and for the first time ever, short-term US bond yields will soon be negative. The increasing probability of zero, or below, rates on US debt will, in our opinion, propel further lowering of interest quotients on virtually all other global fixed income (even those with existing negative rates – especially the UK, EU and Japan) as beggar-thy-neighbour policies become a global phenomenon.

Which I find even more remarkable when you consider that in Figure 2, corporate profits have largely plateaued for a decade, yet total S&P market capitalisation has increased >160% over that period. Steve Blumenthal[2] asks whether EMH is telling us that (i) US company profits are about to double? alternatively: (ii) the S&P market capitalisation is about to halve? or (iii) a combination of both? In any case, if Figure 2 is a true representation of current events, it suggests that any oncoming market correction will be more akin to 2000, rather than 2008.

Despite recent jump in corporate profitability, S&P market capitalisation is still at extreme levels.

Figure 2: US corporate profits (US$Bn) on a semi-annual basis (left); versus S&P Market (US$Tn) (right).



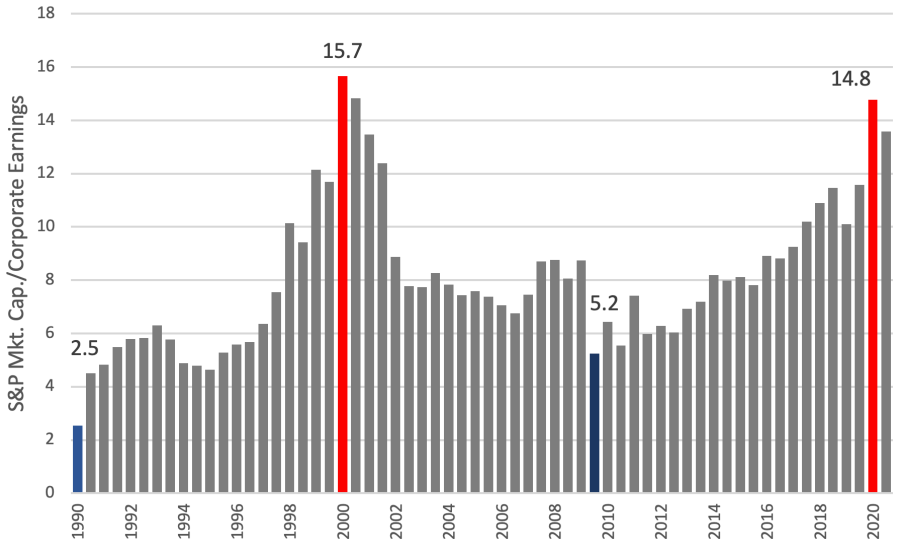
Source: Bloomberg (2021), BEA (2021), Statista (2021), Ycharts (2021), Piper Sandler (2020), Steve Blumenthal (2020), FD
NB: S&P Mkt Cap. correct as at the end of January 2021

The widespread breadth and participation in this market has been extraordinary. We are aware of a UK mining PR participant reputedly making upwards of 1,500% over the past 18-months trading juniors, slavishly following chat rooms to see what the next hot story is. Although history doesn't repeat, it has certainly been known to rhyme[3]; and with widespread interest in the

[1] Modern Monetary Theory (MMT) is a macroeconomic framework that suggests monetarily, sovereign countries/entities such as the Euro, US, and the UK are not constrained by incoming revenues because they have their own fiat currencies and can create as much as they desire when it comes to operational government spending.
[2] https://www.cmgwealth.com/ri-category/on-my-radar/
[3] https://www.youtube.com/watch?v=FAZjlxWNszw

market across all sections of society, from Doctors wanting to quit their day jobs, mechanics day trading, or calls from former colleagues hoping to catch the latest hot story. The feeling of general optimism is pervasive, that the market cannot fall, is universally understood. The opportunity to buy fractional shares using margin borrowing and Apps has introduced an entirely new generation to appearance of 'free money".

Figure 3: S&P Market (US$Tn) (left) divided by US Corporate profits (US$Bn) (right). The highest observed ratio (16.8) Q320, exceeding the peak of 2000 Dot-Com boom, but the current ratio has declined as a result of increased corporate profitability measures (see Figure 2).



Source: Bloomberg (2021), BEA (2021), Statista (2021), Ycharts (2021), Piper Sandler (2020), Steve Blumenthal (2020), FD
NB: S&P Mkt Cap. correct as at the end of December 2020

Short-term liquidity measures suggest that this market will continue to appreciate.

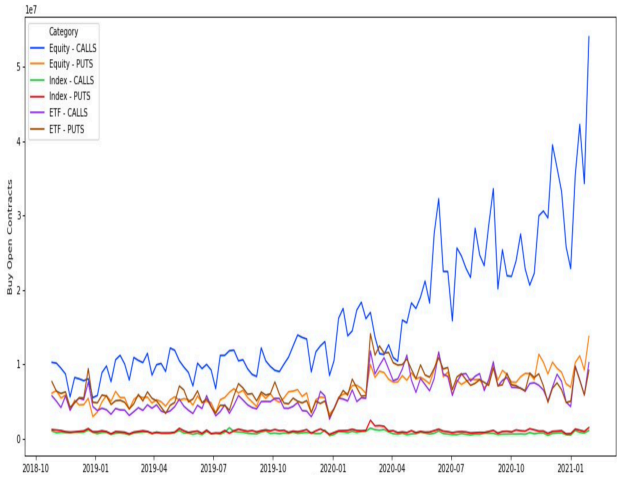
Recent liquidity measures suggest that share prices are likely to continue to rally in the short-to-medium term, with more than 38m options traded in a single day on the 28th January 2021. The mechanics behind the disproportionate rise in calls has meant that market makers have had to purchase relevant stocks, reducing volatility, whilst further pushing up equity prices; in turn raising expectations of investors thereby creating a feed-back loop (see Figure 5). We believe that this mechanism has been particularly responsible for the large upward movements in this current business and financial cycle.

Returning to our original question, how realistic is EMH as a basis in understanding market behaviour? It could be argued that at the present time, market price for any share is only incorporating animal spirits, that demand is outstripping supply; that nothing is rational nor efficient about current investor behaviour.

We believe the current market is related to the declining cost of money. The widespread use of MMT means holding costs for cash will continue to become strongly negative (i.e. NPV working in reverse as well). Looking at bonds, the convexity curve of pricing increases dramatically as you approach zero, particularly once you go below. In Denmark, mortgage rates are -0.5% pa. Savings rates are substantially lower again. You cannot afford to leave money

in the bank. WSJ reports that banks in Germany are telling Customers to move their deposits elsewhere, with Deutsche Bank offering clients five different other banks for their deposits, including ones in Italy, Austria and France. There is an expectation for investors that interest rates will go lower, the corollary of which, is that equity prices will rise. In a sense, based on deflationary expectations, market participants are in equilibrium, in that, if any changed their strategy, it would leave that particular investor to earn less via capital gains.

Figures 4 & 5: Puts and calls by option type (Equity, ETF, Index), demonstrating underlying pressure placed on the equity system (Left); and small trader call buying. Record net leverage (-$333Bn), investors having $465Bn in credit in cash/margin accounts, but owe $798Bn against the value of their securities (Right).



Source: SpotGamma (2021), Elliot Wave International (2021), SentimenTrader (2021), FD

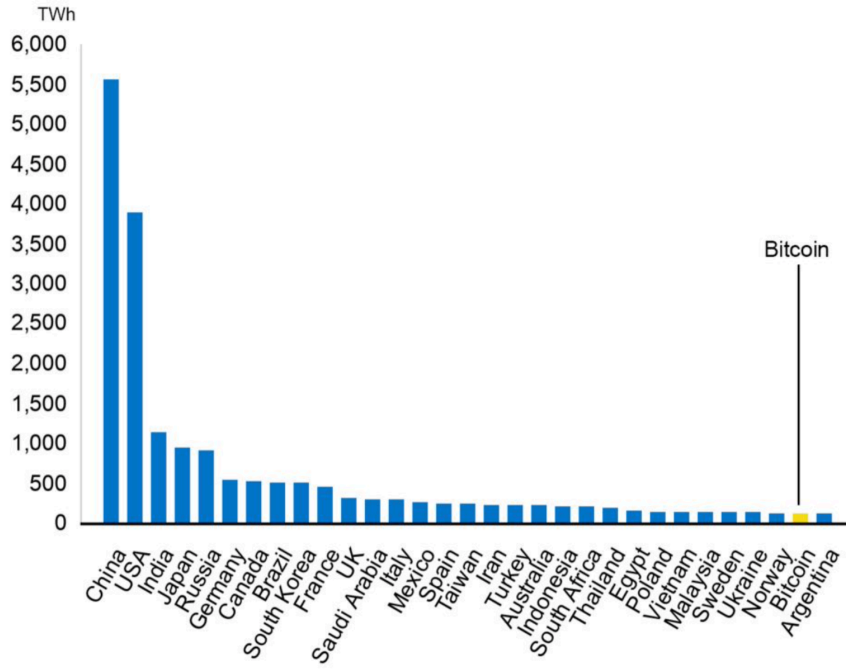
However, if those expectations suddenly changed and became inflationary, the real cost to borrowers would rise, the number of purchased call options falls, market-makers will start to off-load the underlying securities, as the options value becomes increasingly worthless; in turn creating a negative feed-back loop, increasing volatility. At that point, current buoyant sentiment would reverse and the imperative for any investor would be to exit all held positions instantly.

Is Bitcoin the New Gold? No, it's the New Tulip 2.0!

Idi Amin once opened a bank account in which he deposited £10, within a few hours he had written nearly £2,000 worth of cheques. Thinking it was a new form of free money, and was astounded that he was required to have sufficient funds to cover the outflows. Which demonstrates that nothing in this world is free. When we consider the legions of Bitcoin acolytes, some of whom are personal friends and financial market experts, we ask the question "Has Bitcoin joined US Treasuries, gold, and the Swiss Franc as a safe-haven asset?"

Bitcoin is benefiting from a wave of institutional interest which is accelerating mainstream acceptance, with underlying conviction that, the cryptocurrency is a genuine asset class, a credible alternative asset to golds monopoly, backed by corporate sponsorship from the likes of PayPal, MicroStrategy, and more, with recent endorsement from Blackrock and Tesla. The key determinant regarding our outlook on whether various blockchain currencies could ever be a trusted monetary medium, however, pertains to its transactional attributes, such as durability, divisibility, transportability and non-counterfeitability; collectively, whether it meets our definition of money? There are a number of unique claims made by cryptocurrencies, in particular Blockchain, which we will examine in turn.

Figure 6: National energy usage (TWh). Bitcoin consumes more energy than Argentina.



Source: BBC (2021), Cambridge Bitcoin Electricity Consumption Index (2021)

Bitcoin consumes more energy than Argentina. Is this an environmentally sustainable financial medium?

Is it sustainable? It is estimated that Bitcoin consumes "more electricity than Argentina". Why? When a transaction occurs, an additional entry is made to the existing digital record; but before it is accepted, it has to be verified. A computer solves a crypto-puzzle, the unique solution is then shared amongst

all other computers on the network. These mathematical miners work as auditors, verifying the legitimacy of every Bitcoin transactions, eradicating the possibility of double spending. Machines that perform the computations consume enormous amounts of energy, an ongoing cost component that can never diminish in time so long as the Bitcoin model exists. For comparison, the amount of energy consumed by a single Bitcoin transaction, equates to ~451,700 VISA transactions[4].

All major currencies are already digital.

Digital currency meeting the need for the modern era: There is a widespread belief that cryptocurrencies will annul depreciation over time, replacing current fiat currencies. This thematic was recently strengthened by policy makers from the Bank for International Settlements and seven other central banks including the Federal Reserve, European Central Bank and the Bank of England, collectively published a report laying out some key requirements for central bank digital currencies, with public announcements that they were to "compliment, but not replace" other forms of legal tender. The irony missed by most financial commentators covering the topic is that all major global currencies are already "digital". That only a tiny fraction of money in the economy at any point in time has any physical representation. So, the announcement should have read – "*Central Banks are investigating the establishment of digital currencies in addition to their current digital monetary platforms, that will replicate all existing functions, with no added benefits, for reasons that are completely unfathomable*".

Cryptocurrencies, strictly speaking, have no assets – they have no fungibility.

Trust: Crypto-currencies, by definition, have no external assets to under-write its existence and are entirely reliant on human trust, that the algorithms are theoretically unbreakable, with the belief that only a limited number of tokens will be issued so inflation doesn't become rampant. In previous discourse, we have noted that this is not an entirely new idea, that there are literally hundreds of documented instances of currency failure; although all have idiosyncratic histories, there are some distinctive themes, which all result in a single outcome, the lack in physical (either financial, territorial, or commodity) leading to the individual losing faith in the longevity of the medium for financial exchange. With an increasing array of proposed and existing cryptocurrencies, from Facebooks own "Libra"[5] digital currency, Starbucks currency, or Elon Musk's proposed "Marscoin", is there enough trust to go round? Who is more trustworthy, Zuckerberg or Musk? Will that perception change over time? The truth is, without asset backing, ***the key determinant on how to value Bitcoin (or any cryptocurrency) – is basically, how much do you think it is worth!***

Transaction speeds: The current critical limiting technological factor on a public blockchain is scalability, primarily as a result of increasing block-sizes

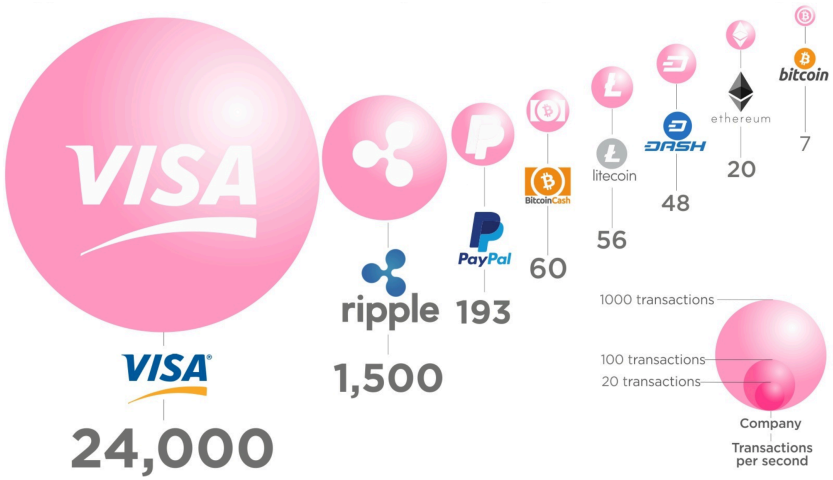
[4] https://digiconomist.net/bitcoin-energy-consumption/

[5] Strictly speaking, Libra is a stablecoin, with the new currency pegged to an assemblage of low-volatility assets, that may include bank deposits, AAA corporate debt and multiple currencies. It appears, from initial released documents, that when you purchase Libra coinage, your initial deposit would be used collectively to acquire these assets. The annuity returns from these assets, however, are not distributed but retained by the Libra corporate entity itself as its source of revenue. Libra's corporate entity is ultimately related to Facebook's balance sheet, coupled with the purchase of low-volatility assets. Held assets by Libra with no returns will degenerate in time; meaning its per unit monetary backing will inevitably decline as a result of future inflation expectations.

(over time), thereby increasing latency (Syvertsen, E., 2019, *pers. com*. Oxford). Bitcoin is currently only able to complete three to four transactions per second, Ethereum approximately 20, whilst the Mastercard network is able to process >40k transactions per second[6]. Taking an hour to complete a single transaction explains Bitcoins limited use in the retail and commercial marketplace, in comparison with its apparent main use by speculators. Tesla recently announced it bought $1.5Bn of Bitcoin, to give it liquidity in the cryptocurrency once it starts accepting it for payments[7]. But this is an exception, even after a decade of operation, Bitcoin and many other cryptocurrencies have no real applicable use in the wider economy.

Figure 7: Cryptocurrencies transaction speeds compared to Visa & Paypal. In 2019, the average speed of a Bitcoin transaction was estimated to take 60 minutes, precluding it from ever being a widespread currency.

The largest use of Bitcoin appears to be purely for speculative purposes.



Source: howmuchnet (2021), Statista (2019)

Latency: We acknowledge that, in time, all technological obstacles are temporary. However, given Bitcoin's unique hashtag methodology[8], the larger problem in the future will be increasing ledger sizes which will in turn increase latency and storage requirements; which will, inevitably, necessitate some form of centralised storage. If/when this occurs, it would negate the immutability argument of the blockchain having tens of thousands of identical records on numerous computers to eliminate fraud. We think it inevitable that at some stage, blockchains will have to be dismembered after reaching a

[6] Sproule, C., 2019, *pers. com*. Oxford – note the differences quoted in Figure 7, is actuals versus capacity

[7] If Tesla is a low-carbon company, why invest in a payments system that consumes more energy than a mid-sized country every year?

[8] Blockchain technology is essentially a trusted ledger/record of data in chronological order. When a new event occurs, an additional entry is made to the existing digital record, but before it is accepted, it has to be verified. A computer solves a crypto-puzzle, the unique solution is then shared amongst all other computers on the network. Once verified, a new block of information is tagged onto the existing ledger, with tens of thousands of identical copies stored on every network computer as a permanent record. If the data is subsequently tampered with, its unique "hash-code" will change and be in conflict with all other identical archives recorded. Because every block ledger is verified, the collective (network) register imbues trust that the information provided is indeed correct, and, therefore, can then be relied upon.

certain size, and stored at a third-party facility, because the current trajectory is unsustainable.

Summary

We re-iterate our assertion that the creation of national currencies ultimately relies on their territory domain, productive assets and other strengths (e.g. military) associated with a nation state, as collateral to underwrite a countries medium of exchange. Historically, the reason why various failed currencies occur (usually associated with hyperinflation) is primarily the result of a fundamental change in statehood, for example, a military defeat, or too much accumulated debt, in that the assets behind the medium no longer match outstanding liabilities (i.e. the mortgage is greater than the value of the house), so the collective trust in that currency medium fails.

Cryptocurrencies typically have no assets, their collective trust is purely market based. Their primary use appears to be speculative trading (Greater Fool Theory). Although every bubble is different, a common element underlying virtually every financial exuberance is the willingness of the "investor" to suspend disbelief and steadfastly believe the narrative that this time is different. Although there is some debate over the severity of the historical financial impact on 17th Century Holland (Goldgar vs Galbraith), what is not in dispute was that the upper trader class in Dutch society with large disposable incomes (in the middle of a pandemic), became fixated on tulip bulbs. With a single bulb trading up to ten times a day, with an individual bulb documented to have reached 5,000 guilders, which was the equivalent of a single, well-appointed house.

History may not repeat, but it certainly does rhyme. We are certain that in the future, historians will look back and say that the after-effects of the cryptocurrency bubble were relatively muted and its financial impact selective. However, we suspect it certainly won't feel so at the time. Historians who know little about finance, fail to appreciate secondary effects and unintended consequences of periods associated with financial excess.

Gold - on the Road to Perdition?

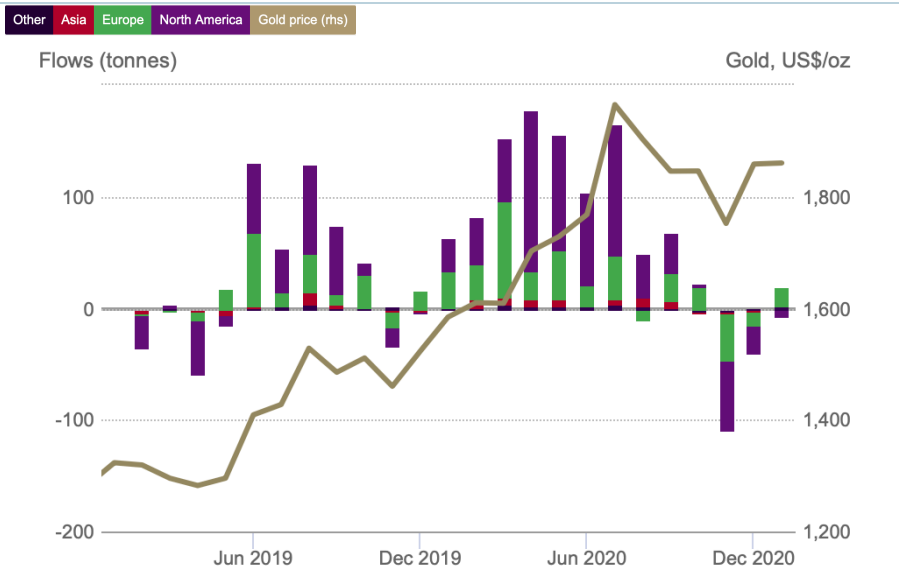
We recall a well-known London practitioner saying that "*just because you are an expert in gold, does not endow you with additional ability to predict its future price*".

The 13% decline in the gold price over the past four months in an environment where everything else appears to be appreciating is disconcerting when you don't have a ready explanation for the dissonance; for example, silver has only fallen ~3%. The main reason is related to fundamental negative demand and supply (see Figure 8) dynamics, with global gold supply in 2020 coming in at 4,633t Au (4% lower y-o-y), as global demand dropped to 11-year lows at below 4kt Au. In spite of record inflows into Gold EFTs (877t Au); this was offset by a 25% fall in bar and coin demand (896t Au), a 34% fall in gold jewellery consumption (1,412t Au), and a 59% fall in Central Bank buying (273t Au).

Worryingly, according to REFINITIV, Gold ETF liquidation resumed in Feb, with outflows at 66t Au, the largest monthly selling since Dec'16; the bulk of which came from North American funds. YTD, ETF investors have liquidated nearly 44t, contrasting with a net addition of 85t Au over the pcp. That means, there is no single sector of gold demand that is not in decline.

Figure 8: Global gold-backed ETF holdings movements on a monthly basis, per region. Global gold assets under management now stands at 3,765t, 4% shy of the intra-month record of 3,915.8t set in early November.

Gold demand at a 11-year low, with supply in surplus.

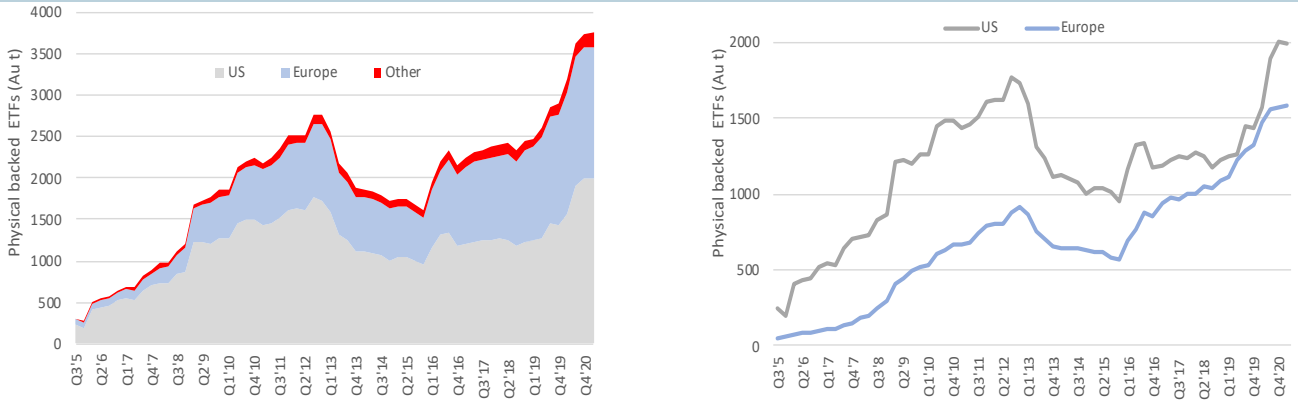


Source: WGC (2021)

Gold prices are increasingly independent of other commodities, and of the market in general. It has dramatically underperformed all other commodities, including its closest analogue, silver. More importantly, despite many market commentators likening cryptocurrencies to a modern form of gold holdings, from a CAPM perspective, golds' increasing lack of correlation is growing its potential as a hedge for overall portfolio diversification.

What we continue to highlight is that the largest gold buyers are not Central Banks or even Developing Nations, but entirely European or US personal investors! Therefore, special attention needs to be paid to EFT inflows/outflows. We are entering the twilight zone whereby Developed Nations are almost entirely reliant on unorthodox financial practices employing negative rates, considered improbable even five years ago; whilst most Developing Nations engage in traditional conservative monetary policy.

Figures 9 & 10: Global EFT Gold assets under management (Top); and comparison of EFT quantities bought by US and European investors (Bottom). Fifteen years ago, European EFT purchases were ~20% that of the US, but in more recent years, now approximates ~80%.

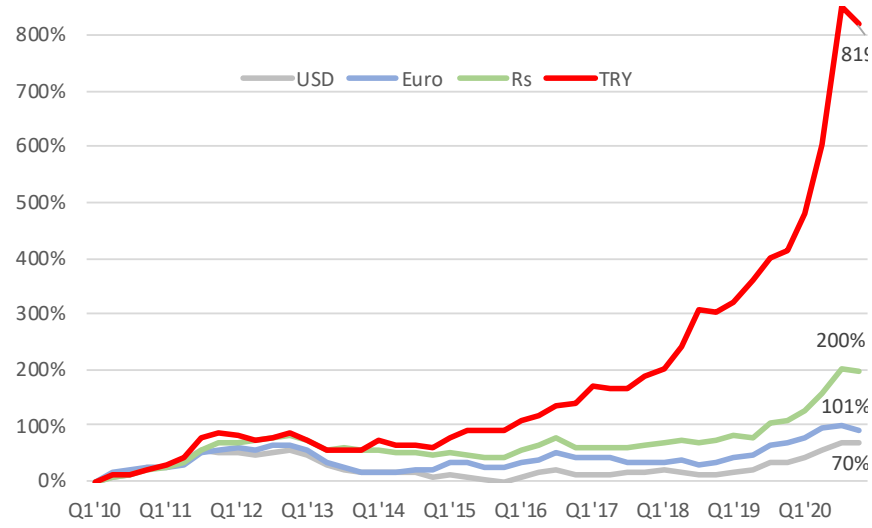


Source: WGC (2021), FD

With Euro rates at zero percent and the reduction of the deposit facility rate to levels of -0.50%, the Euribor is entering its fifth consecutive year of negative rates; with huge swathes of depositors experiencing interest rates at below zero percent. The German three-year bond is -0.71%, Holland -0.69%, Switzerland -0.75%, France -0.58%, even Greece's have turned negative reaching -0.04%. On that basis, the US two-year yield (0.12%) looks increasingly unsustainable, and is likely to go negative inside a month or two.

Negative rates, in effect, pay businesses and individuals to borrow funds; which in theory, encourages investment and consumer spending resulting in a growing economy. It also forces various European banks to charge savers who store their monetary funds (est. 25% of all deposits and growing), making it increasingly unattractive in the long-term for anyone to retain savings in Euros. This feeds into the European central bank's strategy of actively (beggar-thy-neighbour) lowering the Euro to increase its collective international trade competitiveness. This deliberate policy, in effect, forces the saver to deploy their funds on other hard assets, or equities and has been attributed to be a part of the reason why synchronised EU house prices since 2016 have risen on average 4.6% pa, outperforming both wages and GDP growth. With equities in certain sectors appearing to be at extremely high valuations, part of the opportunity-cost for a saver is the purchase of an asset (e.g. gold), that cannot be duplicated, with long-term storage effectively cost-free. Although we admit that this narrative has temporarily lost its impetus due to widespread speculation into alternatives, such as Bitcoin, its long-term argument remains intact.

Figure 11: Selection of currencies priced per ounce over time (Q110 to Q420). Being a Reserve currency, the USD has depreciated the least (70%), and as a result of unorthodox economic policies, the Turkish Lira the most (819%).



Source: World Gold Council (2021), FD

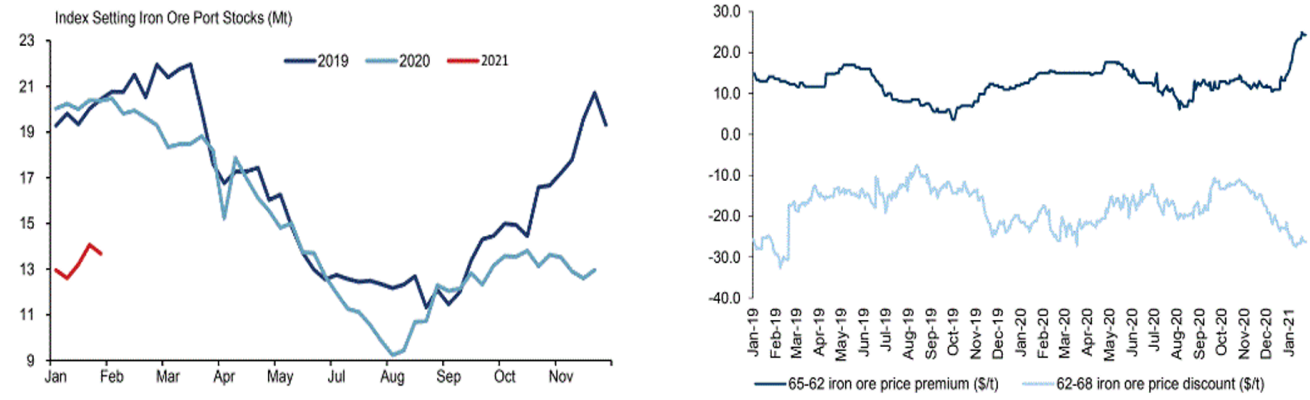
In the long-term, all currencies depreciate against gold.

In the past decade, the Euro has lost more than half its relative value to gold. While Turkey, with a large current account deficit, dwindling central-bank reserves, debt mostly denominated in USD, and an unorthodox interest rate policy (whereby real rates are significantly below zero), has lost >800%, potentially facing a near-term hyperinflation event. The USD is relatable to the size of the American economy, military prowess, and the fact it is relatively politically stable, which endows the currency with substantial levels of trust. Likewise, Gold has numerous millennia of history, actual rareness, does not degenerate geochemically, but with the added benefit that it cannot be replicated outside of primary mining supply.

Iron Ore – Lather, Rinse, Repeat

Chinese iron ore consumption in 2021 is likely to exceed forecasts. According to CISA, major steel mill output is 28% higher than the pcp, which was affected by the covid pandemic, but recovered strongly H220 in response to government stimulus. In recent weeks, output in February has reached 2.3Mtpd, to put that in perspective, that's 21% higher than output in 2019, 24% higher than that in 2018.

Figures 12 & 13: Continued supply disruptions from Vale has resulted in iron ore port stocks being at multi-year lows (Left); and political shenanigans with Australian metallurgical/coking coal supplies have raised premiums for higher-grade iron ore products (Right).



Source: GS (2021)

China has embraced five-year plans since the 1950s, borrowing from the former USSR. Why are they important? Because each five-year plan is accompanied with significant government, debt and subsidy support; and have historically been largely supporting the growth of domestic iron ore production and consumption. The current manifesto headlined China's technological shortcomings, mentioning "innovation" >200 times, espousing a "Made in China 2025"; with programmes ranging from semi-conductors, high-end manufacturing, big data and smart grids to cyberspace security.

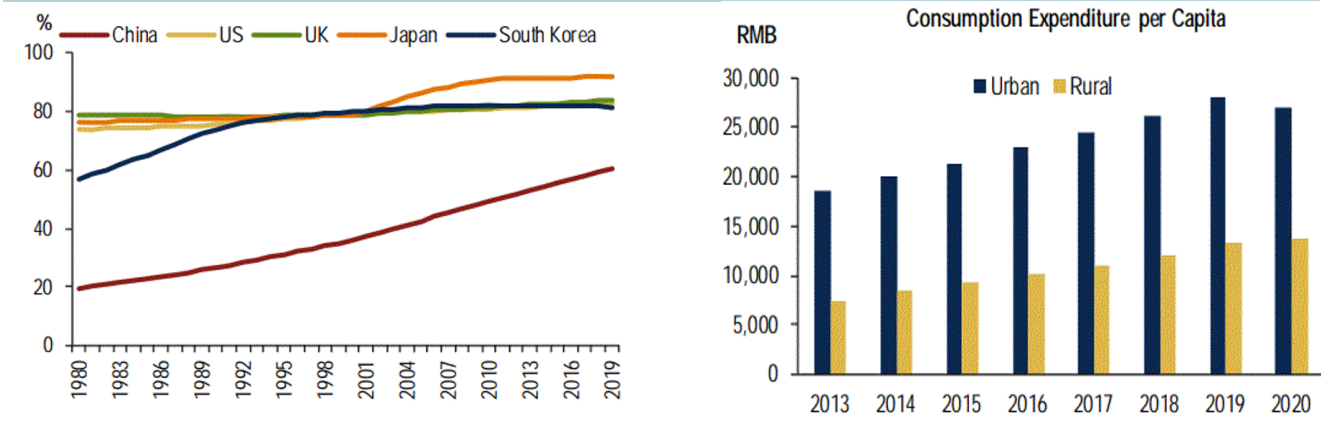
Underlying Chinese infrastructure demand still growing.

What the five-year plan didn't say (in regards to future iron ore demand) was equally important. Many policy makers were expecting official guidance against increased residential speculation and a decrease in state sponsored infrastructure spending; which has been criticised by many economists as unsustainable, and has been blamed, in part, for China's worsening debt burden. Recent announcements have, in fact, proven the opposite, with massive infrastructure spending programmes, including increasing the national high-speed railway network to 70,000 km (84% increase), adding 162 civilian airports (68% increase), all by 2035. Property investment in China remains strong, so much so, that 22 cities including Beijing, Shanghai and Shenzhen will limit the number of land sales this year, with a number of Commercial banks ordered to limit lending to developers.

However, we feel the key emphasis of the latest five-year plan, that virtually every economics commentator ignored, was the change in focus on productivity and rebalancing economic development across sectors/regions,

aiming to "leave no one behind". In China, there are two distinct classes of citizen, those with "hukous" registered in megacities such as Beijing and Shanghai, allowing them priority access to the most advanced hospitals, schools and pension schemes. In contrast, those who have their "hukou" registered in the countryside, are allowed to work in Tier one Chinese cities, but are unable (in most instances) to gain permission to buy a home in a city, thereby limiting their access to localised health care, their children are excluded from local education and other benefits. This strict Mao-era household registration system is estimated to actively restrain ~40% the population (~600m people) from any form of permanent internal migration.

Figures 14 & 15: China's urbanisation ratio remains low (Left); and urban consumption expenditure substantially exceeds rural levels (Right). This may simply reflect market forces, and create a propensity for property speculation in urban areas.



Source: BoA (2021)

Future Chinese infrastructure focus will be reorientated toward equalising the urban and rural development divide, which will probably take decades.

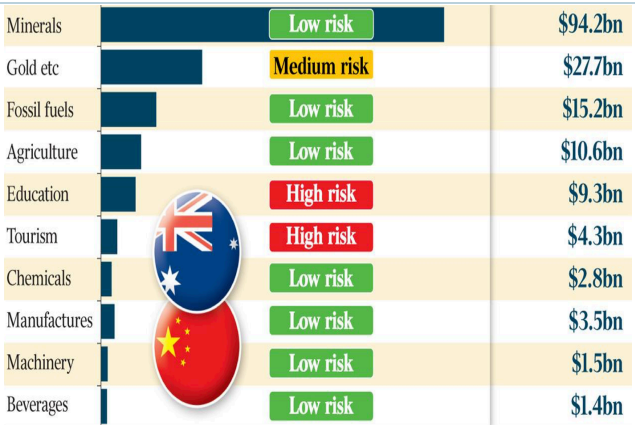
Figure 14 demonstrates the urbanisation gap between Chinese and Developed Nations, whilst Figure 15 illustrates the income discrepancy between urban and rural expenditure per capita. Income inequality is rising rapidly in China, in order to pre-empt social unrest, the Communist Party is wisely investing in regional centres to raise living standards, hence the emphasis on developing third and fourth tier centres in terms of infrastructure and housing. All of which will require substantial future iron ore supplies. It also implies that rather than peaking in the mid 2020s (BHP & Rios base case), Chinese domestic iron ore consumption could grow up for another decade before plateauing, albeit at a slower pace than the previous several decades.

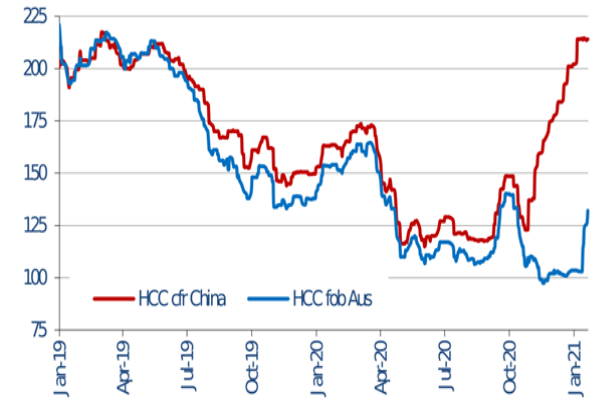
China's "Beef" with Australia: Politics & Commodities

Like all great feuds, after a while no one remembers how it originally started[9], as current events have continued their spiral downwards. Chinese coal quotas first implemented (first thermal, later including metallurgical products) in early 2019, have subsequently been extended to import restrictions (in varying measures) on Australian wheat, barley, sugar, cotton, copper, wine, seafood, wood products and beef. More recently, reports suggest that Chinese authorities have instituted a recommendation for students studying overseas not to commence studies in Australia, whether this is a directive or indirect pressure on agents is unknown, but this ban will have a disproportionate impact financially on the University sector.

The strategic problem for China is that, in many instances, any specific ban on Australian commodities is a zero-sum game, because in most instances, they are fully fungible. In the case of metallurgical coal, China ended up paying substantially higher prices (when able) for Canadian HCC seriously diminishing the profitability of down-stream SOE steel mills. Banning any particular commodity typically means that China has to source an alternative from another country to replace the underlying demand. The impact on many Australian exports (to-date) has been less than negligible, with Australia's rural exports up 18.4% in December, following gains in both October and November of 7.6% and 3.8%, respectively[10].

Figures 16 & 17: Australia's top 10 exports to China (2019). Two-way trade between the countries is worth ~US$171Bn, with China purchasing ~39% of all Australia's exports (Left); and comparison between Australian-Chinese HCC prices as a result of port bans (Right). The recent jump in Australian FOB prices on speculation that the Chinese will lift the ban.





Source: The Australian (2020), MS (2021)

This fungibility analysis fails when it comes to Australia's largest export, iron ore. China consumes 57% of global output accounting for more than 70% of world iron ore imports. This contrasts with Australia producing 53% of all world seaborne tonnages (906Mt), of which, ~85% is sent to China. If Australia's

[9] For the record, it started in earnest in 2016 when Australia strongly criticised China's territorial ambitions in the South China Sea.

[10] Coal exports hit four-month high despite China trade rift https://www.afr.com/policy/economy/coal-exports-hit-four-month-high-despite-china-trade-20210204-p56zhe

market disappears in China, there is no probable alternative for the majority of its seaborne tonnages elsewhere, other than displacing existing higher-cost suppliers, which would mean drastically lower the pricing for everyone globally.

China's global iron ore supply-chain cannot vary significantly for at least the next two decades.

The only other large-scale supply alternative other than what BHP, Rio and Vale can bring online is from Simandou in Guinea, which has the potential to supply 70-150Mt pa (dependent on whether one or both the northern and southern blocks can be brought into production). The southern blocks are a JV between Rio Tinto and Chinalcom; while the majority of the northern area is controlled by a separate Chinese[11] consortium. The project faces significant logistical issues, infrastructure costs projected to be >US$20Bn (an underestimate?), requiring 650km heavy gauge railway through, at times, mountainous and inaccessible terrain, a new deep-water port, and extensive complementary supporting investments. To-date, neither consortium has commenced any large-scale sites works, and have released no detailed plans as to when they will commence. Even if they did, it would be a minimum of five years before any commercial production could occur. Given little has occurred over the past decade, we doubt any of these deposits will enter production before 2030 at the earliest.

Figure 18: Simandou developmental map. NB – no one wants to build in Liberia.

Source: Africa-confidential.com (2015)

In any case, from a macro perspective, the seaborne iron ore market is currently >1.8Bt pa, with the need for replacement mines in the coming decade. Given maximum proposed tonnages will amount to an additional 8% of seaborne supply in a decade's time, there is little doubt (in our minds) that there will be sufficient growth in global iron ore demand, that the future development Simandou is unlikely to contribute to any global oversupply.

[11] Including Guinea's Societe Miniere de Boke, Singapore's Winning International Group, Chinese aluminium producer Shandong Weiqiao, and Yantaï Port Group.

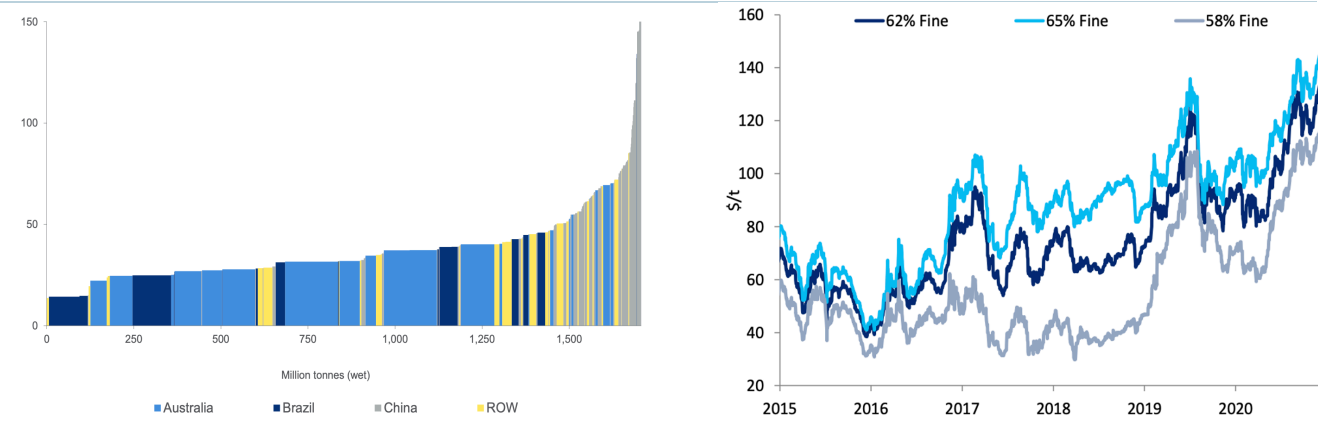
Probability of Chinese Iron Ore Tariffs?

We maintain that it is well within China's right to bestow privilege on whom it chooses, iron ore is now very much in the realm of affairs of state, critically, the CCP does not differentiate between politics and business. The prevalent argument against China's imposition of iron-ore tariffs on Australia is the necessity for the seaborne trade to supply rebar product to sustain its domestic infrastructure and housing programmes. This is a dangerous assumption and supposes that each party is equally reliant on the other. It is true that it would take decades for China to replicate Australia's supply-chain, at we suspect a at higher cost FOB for ultimately a lower-quality product. Pilbara BIFs are geologically unique, with their geographical proximity to China, lends to their own economic moat in cost efficiency.

But as we have recently seen with HCC, China was willing to keep Australian ships sitting at sea indefinitely and pay $100/t more for Canadian supplies; at the same time sending their own steel mills into loss-making as a result of a domestic $140/t rise in coke prices over a four-month period. This points to larger geopolitical considerations driving this fractious divide. It is becoming increasingly difficult to determine what, if any, actions Australia has purported to have done to perpetrate such "special" attention; which is slowly being ratcheted upward over time.

We do not believe that China's actions are petulant whims, rather part of a very deliberate strategy to achieve certain strategic outcomes. The best way to understand China's strategy is via Game Theory. China needs Taiwan to allow it to project its Bluewater navy into the Pacific. Likewise, if it absorbs Australia into its political orbit, it effectively controls the entire Asia Pacific region.

Figures 19 & 20: CFR North China Cash Cost (62% Fe fines equivalent) (Left); and iron ore prices at six-year highs (Right). Differential between the various benchmarking prices have closed toward each other, underlying strong demand and minimal discounting, compared with 2017 to the beginning of 2019.



Source: Wood Mackenzie (2020), FMG (2020), CB (2021)

The cost curve in Figure 19 shows that iron ore costs CFR to China by the three majors (including royalties and ocean freight) is <US$36dmt, with virtually all production <US$42dmt. FMG, RIO and BHP have iron ore C1

costs ~ US$11-$14wmt with Tianjin Spot (Rio Spec fines) currently ~US$170dmt. Figure 20 demonstrates the tightening of various benchmarks. That means that Australian iron ore producers are, on average, making ~370% margins EBITDA. These are extraordinary profits, unmatched by any other commodities sector.

The Nash Equilibria suggests that if you know the eventual players aim, one can deduct the steps needed to reach a desired outcome; a process known as Backward Induction. This type of game calls for a form of coercive economic warfare, and the largest leverage China has over Australia is iron ore. Therefore, we maintain our belief that there is a certain level of inevitability regarding the imposition of iron ore tariffs on Australian producers. Given ongoing political dissonance and China's increasing rhetorical narrative, there is no real possibility of détente without total political abdication by the Australian populace; which is an unrealistic expectation.

According to latest pricing, China could theoretically impose import duties of ~US$100dmt on Australian ferric products without materially impacting seaborne volumes. The impact would inevitably send benchmark prices higher, but China could redistribute proceeds raised by import tariffs as a direct subsidy to existing SOE's. This would, in effect, transfer gross revenue from the primary producer to the relevant steel mill. The political implications globally, from such a move, however, would be profound.

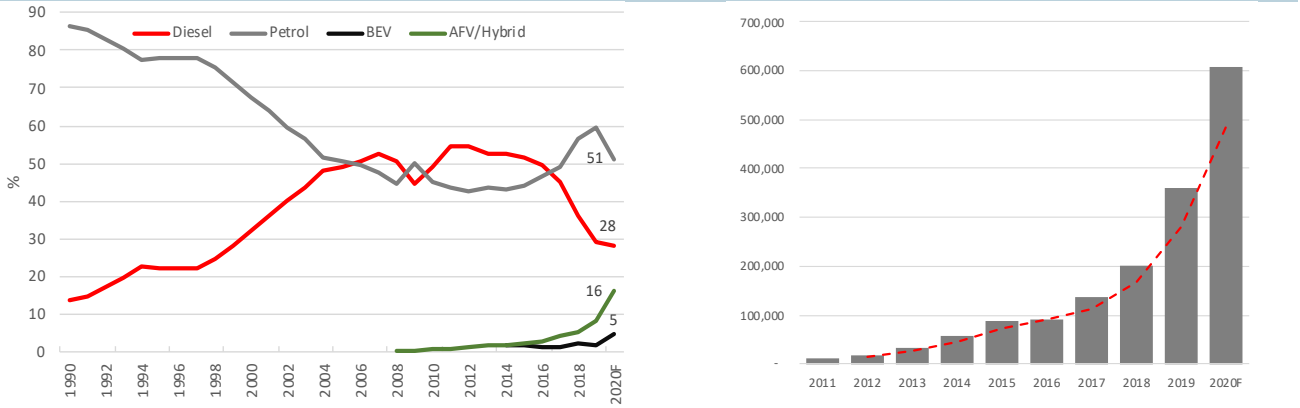
Figures 21 & 22: The imposition of a tariff shifts up the world supply curve to *World Supply + Tariff*; although we would expect higher pricing, given operating margins (>300%) by Australian iron ore producers dependent on tariff pricing, we wouldn't expect any drop in exported tonnages (Left); and tariff revenue (area K, L, M, N), still results in a net welfare loss (represented by the triangles X and Y). We feel Australia has more to lose from this move than China (Right).

Source: Economicsonline (2021)

PGM & Lithium Update

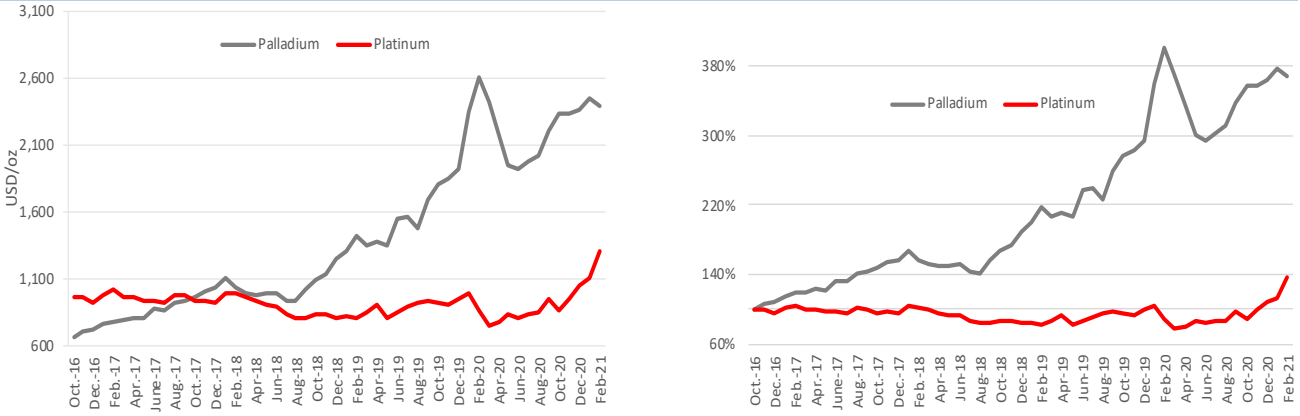
The transition from diesel powerplants to alternatives in Europe is well on the way, interestingly, not the result of legislative edicts but from an underlying change in consumer demand. That despite diesels producing >15% less CO_2 than equivalent petrol engines, they emit >400% NO_2 and up to 22x times more particulates; their continual decline (utilising Platinum based catalysts) has diesels now only making up 28% of all unit sales. The relative rise in hybrid popularity (now selling on a ratio 4:7 in the EU with their diesel counterparts) will continue to depress relative Platinum demand/prices (taking into account some degree of substitution). This contrasts with the relative growth in petrol combustion engines, in particular if one considers that the vast majority of hybrid models utilise petrol/electric power plants and will continue to favour Palladium. In the long-term we believe Palladium demand will continue to grow, and expect modest surpluses in Platinum.

Figures 23 & 24: European car registration by fuel-type, updated to October 2020. (Left); and Newly registered EVs in Europe from 2011 to 2020E (Right).



Source: Assoc. JATO (2021), Auxiliarie de L'Automobile (2020), European Automobile Manufactures Assoc. (2019), Cargreencongress (2020), Inside EVs (2020), Wikipedia (2020), FD

Figures 25 & 26: Platinum/Palladium prices (October 2016 to January 2021) (left); and both commodities recalculated to 100%. Palladium has increased 276%; by contrast, Platinum has risen only by ~14% over the same period, with no real signs of recovery (right).

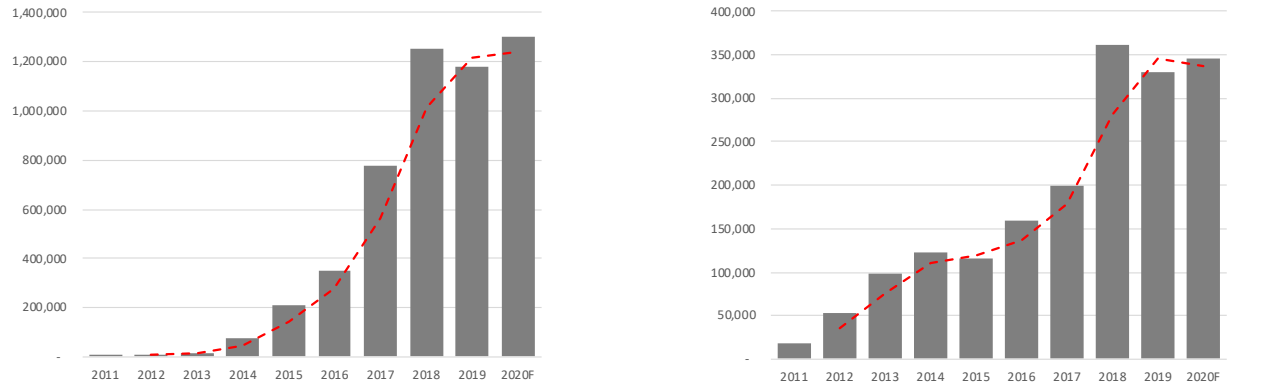


Source: Business insider (2021), Plats Metals (2020), USGS (2020), APMEX (2020), FD

The other major observable propulsion trend in Europe is the growth in hybrid sales, up 700% without any State financial intervention, whilst BEV sales have risen ~163% over the same period despite substantial Governmental subsidies. We estimate that an average BEV uses 7x more lithium than a hybrid vehicle, the eventual product mix will have a dramatically different quantum outcome in final demand.

China has historically been the largest EV market globally, accounting for half of the world's consumer EV vehicles sold and >95% of the commercial EVs in operation. The Chinese government intends to cut current subsidies by 20% this year for private vehicles and 10% for EV public transport, including buses and taxis. The result, we believe, will be a drop in this year's EV sales to around 2019 levels (see Figure 27). Whilst in the US, BEV sales appear to have peaked (see Figure 28), but this may be a temporary aberration, highly dependent on environmental legislation the new Biden administration introduces. The range of potential lithium demand outcomes is enormous, for example, on current growth trends (see Figure 24), the European BEV market could numerically exceed that of China's within two years.

Figures 27 & 28: Number of newly registered EVs in China from 2011 to 2020E (Left); and Number of newly registered EVs in US from 2011 to 2020E (Right). Both markets appear to be maturing.



Source: S&P Global (2021), CAAM (2018), SCMP (2020), EV volumes (2021), Inside EVs (2020), CleanTechnica (2019), FD

What is indisputable, however, despite enormous support for EVs from various governments globally for over a decade, and a plethora of experts publishing articles of faith for the populace to prepare for a new era, overall consumer EV uptake is extremely muted, with adoption rates ranging from 2 to 5% among major markets. Consequently, any forecast in the growth of the EV sector is fraught with danger as its success (or failure) is almost entirely reliant on Government policy and not technological obsolescence.

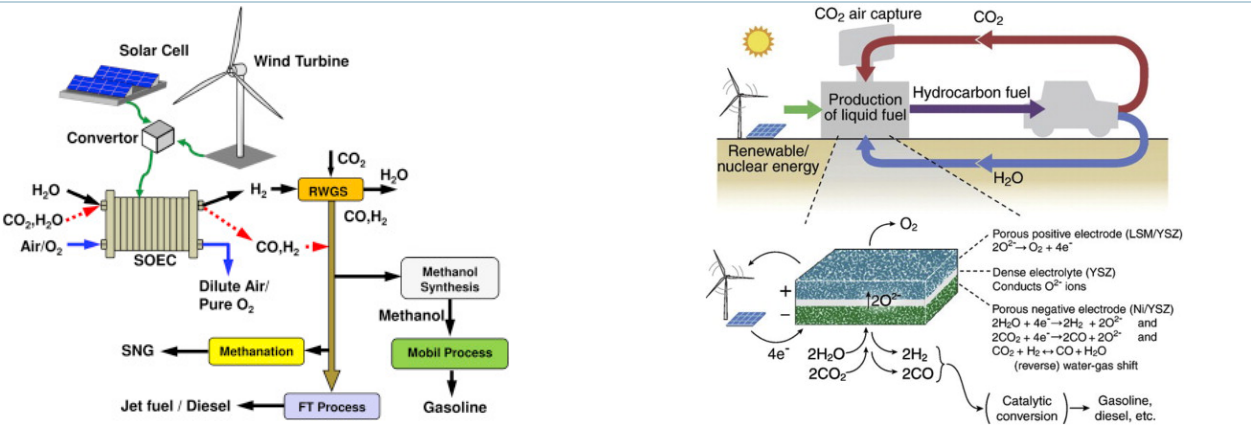
This highlights ongoing hubris in our analysis, in that we have historically focussed on Europe as being a technological precursor to what future adoption type and uptake rates could be elsewhere. We acknowledge this implies certain political parameters which cannot be quantified. The irony being, that although Europe now has the highest EV adoption rates, and on current trajectory will be the largest EV market in two or three years; it wasn't the first to introduce this technology, nor is it the leader in manufacturing, design or

engineering; being 90% reliant on raw commodity imports from other vested parties. Not a picture of sustainability then?

Synthetic Fuels – Awaiting the Hydrogen Economy

Following other propulsion trends that could be commercial competitors to EVs, we include the development of synthetic fuels. In a first stage, hydrogen is produced from water via electrolysis, with carbon added to produce a liquid fuel. This carbon can be sourced from industrial processes or even captured from the air using filters. Combining CO_2 and H_2 results in a synthetic fuel, which can be tailor made to be either petrol, diesel, gas, or even kerosene. According to Bosh, cost studies suggest that synthetic fuel (excluding any excise duties) could total between €1.0 and 1.4/ litre.

Figures 29 & 30: Proposed hydrogen and syngas production model via solid oxide electrolysis cells from renewable energy resources (Left); and the process of electrochemical conversion of carbon dioxide via a solid oxide electrolysis cell (Right).



Source: Kazempoor (2015)[12], Uhm[13]

However, these new fuels are strongly related to the future widespread success of the hydrogen industry, which is experiencing unprecedented political and economic support, potentially opening a new field of PGM demand. The vast majority (~ 96%) of hydrogen is manufactured via steam-reforming, using natural gas as its source. The only other commercial process to manufacture hydrogen is by the way of electrolysis, the process by which water is decomposed into oxygen and hydrogen gas (H+ and OH- ions) when an electric current is passed through it. The greatest shortcoming of water electrolysis is you receive substantially less calorific value back than your initial input ranging from 58-75% (i.e. energy output divided by energy consumed creating the hydrogen). The more efficient Polymer electrolyte membrane (PEM) process requires electrocatalysts, including noble metals such as Pt/Pd

[12] Kazempoor, P. & Braun, R.J. (2015) "Hydrogen and synthetic fuel production using high temperature solid oxide electrolysis cells (SOECs)". *International Journal of Hydrogen Energy*, v. 40(9), p. 3599-3612, https://doi.org/10.1016/j.ijhydene.2014.12.126.

[13] Uhm, S. & Kim, D. Y. (2014) "Electrochemical conversion of carbon dioxide in a solid oxide electrolysis cell". *Current Applied Physics*, v. 14 (5), p. 672-679, https://doi.org/10.1016/j.cap.2014.02.013.

for the hydrogen reaction at the cathode, and IrO2/RuO2 for the oxygen reaction at the anode; making it a substantially more expensive process than alkaline water electrolysis.

For the process to be considered carbon neutral requires the adoption of electrolysis on a monumental scale, needing either a massive expansion in capacity of wind turbines and/or nuclear power. Ignoring the politics surrounding nuclear power, electrical infrastructure policy paralysis in many Developed Nations mean that many currently experience power generation shortfalls at peak-load. The whole business model for synthetic fuel, therefore, is reliant on redundant capacity to capture intermittent surplus outside peak loads, to manufacture and supply sufficient product so that widespread syngas becomes a commercial reality.

The lack of infrastructure, however, is the fundamental impediment to the emergence of the hydrogen economy. In addition, there are particular structural barriers to large scale investment within the UK as a result of the dismemberment and privatisation of many national electricity grids, which prevent long-term investment incentivisation. If this investment is to ever occur, it will need enormous levels of governmental funding, possibly using a publicly owned corporate structure.

Cellulosic Ethanol – Replacement of First-Generation Biofuels

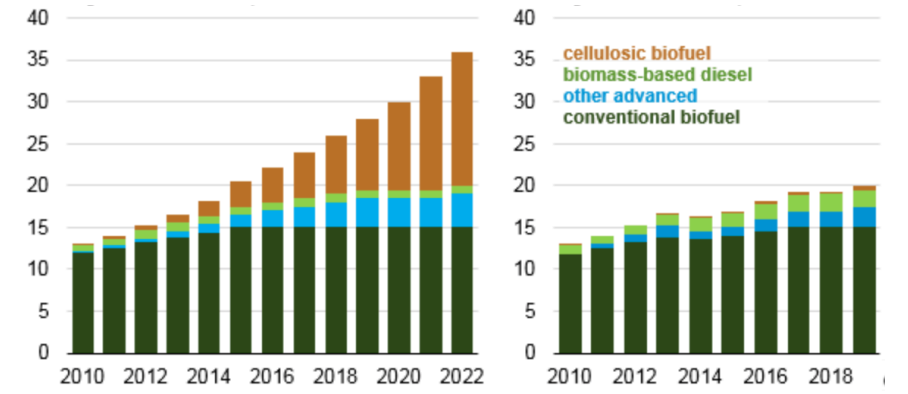
Cellulosic ethanol could envelop the biofuel industry, utilising the whole plant, rather than food crops. At present, ethanol production is centred around the fermentation of sugars into alcohol, utilising a variety of plant sources or feedstocks. Corn is the most common feedstock in the US, sugar cane in Brazil, with sorghum and other feedstock grains in parts of Europe. In terms of production, around 78Mt of ethanol was produced globally in 2018, most of which was from the US (56%), followed by Brazil (28%), EU (5%), and China (4%)[14].

Cellulosic ethanol is a process that produces biofuel from wood, organic wastes, grasses, agricultural residues and non-edible parts of plants, municipal biowaste, used vegetable oils, even biological sludge from urban water purification plants, via cellular hydrolysis using enzymes. There are several commercial scale plants operational in Norway, US, and Brazil. Conversion is achieved either via specialised enzymes/microbes that break down pre-treated biomass-based cellulose into sugars, which are then fermented into alcohols. Alternatively, by thermochemical methods, include gasification (using a third of the oxygen needed for complete combustion to produce monoxide and hydrogen – more commonly known as syngas) or

[14] Renewable Fuels Association. http://www.ethanolrfa.org/resources/industry/statistics/#1454098996479-8715d404-e546

pyrolysis (heating the biomass in the absence of oxygen to produce bio-oils), both are possible avenues for large-scale biofuel production methods.

Figures 31 & 32: EISA Volumes (2010-2022) billion gallons (US), ethanol equivalent (Left); and Renewable Fuel Standard volume requirements (2010-2019) billion gallons (US), ethanol equivalent.



Source: EIA (2018)

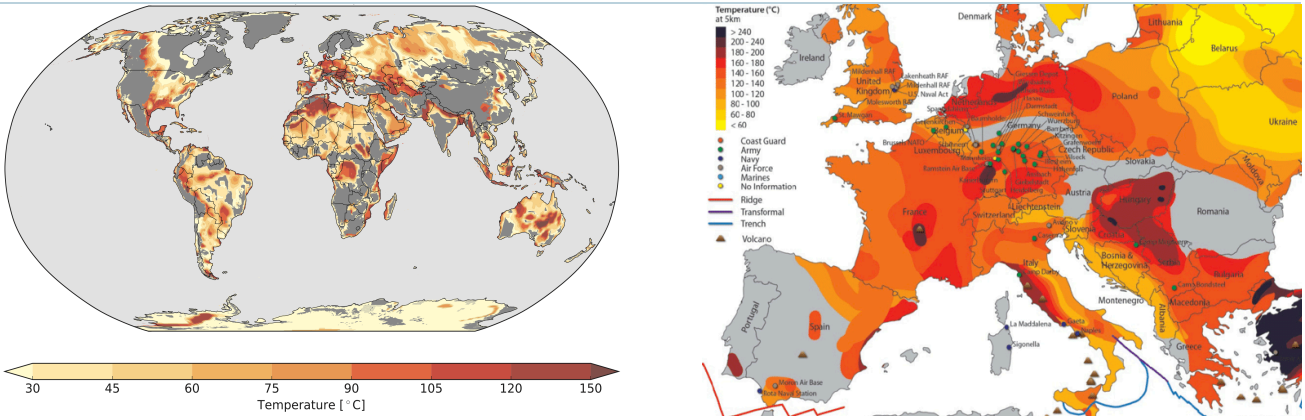
Despite limited production, due to technical difficulties (pre-treatments, fermentation, hydrolysis, and by-products) and high energy costs. Species such as Miscanthus[15] (also known as "elephant grass") is of particular interest, as it can be harvested annually with a standard sugar cane harvester, has high productivity per acre and can be grown in cool climates such as northern Europe. Critically, they do not compete with agricultural production for the food market, replacing current first-generation biofuel production utilising food crops. An important consideration with biofuels is the fact that they can be mixed with traditional hydrocarbons, allowing an immediate reduction in greenhouse production without burdensome upfront infrastructure requirements.

[15] Default value associated to cellulosic ethanol is 16 gCO2eq/MJ resulting in 83% GHG emission reduction compared with fossil fuels. https://www.clariant.com/en/Corporate/News/2018/09/Groundbreaking-for-Clariantrs quos-sunliquidreg-cellulosic-ethanol-plant-in-Romanianbsp

Geothermal –Basis for a Future Hydrogen Economy?

Unconventional Geothermal Energy involves utilising the earth's latent heat, by (historically) tapping regions of high temperatures containing water or steam to generate electrical power. Total global installed geothermal power generation has now passed 14kMw, enough to meet the annual needs of up to 84m people. While this may sound impressive, the US alone has enough geothermal energy to supply the entire world's electrical needs for the next 30,000 years. High temperature geothermal resources (>160°C) are typically used for electricity generation, although some binary systems can theoretically generate electricity down to temperatures ~ 70°C; with medium-to-low temperature resources typically used for industrial purposes. Direct use applications include space heating for residential buildings, offices or greenhouses, food production, aquatic centres, etc. For example, a district heating system in the Paris Basin uses ~70°C water from a permeable limestone aquifer, generating ~230MWt, providing heat to about 100k homes.

Figures 33 & 34: Computed (3km) maximum aquifer temperatures (Left); and projected temperature for Europe at 5km depth (Right).



Source: Kazempoor (2015)[16], Anderson *et al.*[17]

Historically, technical limitations have constrained exploration into existing hotrock environments in and around surficial volcanic terranes. Starting with the Fenton Hill 'Hot Rock' project in New Mexico, back in 1971, now in recent decades, a number of development projects have aimed to prove the engineered geothermal system (EGS) concept and develop technology primarily targeting the high-temperature/low-permeability end of the spectrum.

Recent developments (predominantly from the oil industry) in drilling technologies, fracking (fracturing rocks at depth to create porosity) have dramatically lowered drilling costs; which rise exponentially with increasing depth. Drilling costs represent the main outlay for geothermal plants, historically accounting for more than half of development capex. We would highlight what occurred within the US oil shale industry. Initially, many

[16] Limberger, J. *et al*. (2018) "Geothermal energy in deep aquifers: A global assessment of the resource base for direct heat utilization". *Renewable and Sustainable Energy Reviews*, v. 82(1), p. 961-975. https://doi.org/10.1016/j.rser.2017.09.084.
[17] Anderson, E. *et al*. (2011) *Broad Overview of Energy Efficiency and Renewable Energy Opportunities for Department of Defense Installations*. 10.2172/1023698.

considered it an uneconomic venture, with initial LT breakeven in 2009/10 at around US$125boe, but as the oil price dropped, drilling companies and operators were forced to refinedthe technology to such a degree that many companies now indicate that they can operate profitably in West Texas' Permian basin for <$40boe (with all drill costs included). The point being that once a sector gets into production, new technologies, techniques and efficiencies continue to drive down the operational cost base.

In addition, the development of hole hydration techniques, coupled with technological innovations that allow more efficient heat exchange in steam turbines, have transformed the modern geothermal sector. There are a number of projects underway in Europe (e.g. Germany, France, Switzerland, Hungary, UK) targeting resources for power-production and combined heat-and-power projects, earmarking sedimentary and deeper, low permeability systems. Importantly, unconventional geothermal has the potential to solve the world's baseload power needs. If nuclear power is no longer an option (politically), unconventional geothermal energy offers the best alternative of limitless power at virtually a zero-operating cost, with very marginal CO2 production, which in turn, could potentially sustain an emerging hydrogen economy.

REEs - Pssst, the EV transition has little to do with Batteries!

Recently, we were lucky enough to be asked onto a round table discussion (https://naturalresourcesforum.com/companies/rare-earths/) on REEs. We give a brief summary covering the general market in the beginning, and examine how green Chinese powered EVs are (at around an hour and nine minutes).

Despite the presentation being two hours long, the participants were experts in their fields, with substantial insights to share; from Charles Cockell (University of Edinburgh) whose research could be applied to metallurgical recoveries here on earth; Paul Atherley (Pensana Rare Earths) about his efforts to establish downstream processing in the UK; George Bennett (Rainbow Rare Earths), whose highlight we felt, came several weeks later with his announcement regarding their Phalaborwa rare earths project; Christian Taylor-Wilkinson (Altona Energy) on project selection. The overall discussion was ably Chaired by Opedimeji Sule.

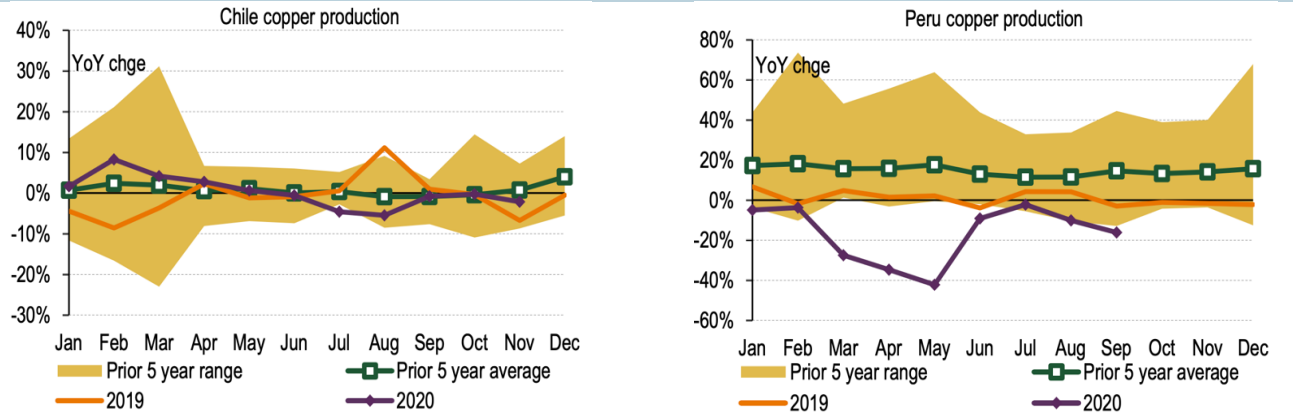
Special mention has to go out to Natalia Egorova, who organised, cajoled the participants, gave suggestions, and edited. Evidence that often, the most important people are those behind the scenes.

Copper Update

Copper is the consummate industrial metal, its demand a direct reflection of the global economy, and more recently, the electrification and industrialisation of countries such as India and China. However, as a result of economic disruption caused by COVID-19, there have been falls in demand in both the US (-5%), EU (-11%), and Japan (-17%). Despite this bleak situation, Chinese 2020 copper consumption was up 4% y-o-y, now estimated to be >13Mt. With primary mine supply estimated at around 20Mt, the Middle Kingdom now consumes ~65% of primary supply, or 52% including secondary stocks (up from 10% in 2000).

Copper supply has effectively plateaued over the past four years, with the advent of the covid pandemic, and production declines from Chile and Peru, which collectively account for ~40% of global primary supply. Declining Chilean production is the result of lower grades, strikes and weather-related disruptions. In Peru, Q320 production was down 9% y-o-y, including Antamina and Las Bambas, with strikes at the Candelaria. Zambian mined and refined copper output was negatively affected by new import duties on concentrate. ***The copper market in 2021 is likely to be in deficit.***

Figures 35 & 36: Chile's copper production keeps contracting YoY (Left); as does Peru's production profile (Right).



Source: BofA (2021)

In China's most recent five-year plan (commencing in 2021), it highlighted the need for dramatic increases in state reserves of crude, strategic metals (including copper, cobalt and REEs) and farm goods. Bloomberg has reported that the State Reserve Bureau (SRB)[18] has been actively buying copper on-market to meet this strategic objective. Coupled with its deteriorating relations with the U.S. and its allies, fear of economic boycotts/retribution may have spurred additional purchases.

Purported future growth centres around the evolution of EVs and associated power infrastructure. Citi believe that primary demand is set to grow over the

[18] The SRB is the agency responsible for managing most of China's raw material stockpiles, its role is to maintain China's economic and geopolitical security by ensuring the country's industry can continue to function during major interruptions to commodities supply.

next five years by ~450ktpa (2% pa) in its base case, and ~670ktpa (3% pa) in the bull case.

Research Disclosures


Gaius L.L. King

Gaius L.L King has 25 years' experience in mining, exploration, corporate finance, mineral economics and as a resource analyst. As a geologist, he worked five years in various underground operations, and was involved in discovering and delineating ~2.6 Mt @ 3.5% Ni from a variety of ore bodies. Gaius has analysed fundamental supply and demand of iron ore, nickel, PGE, uranium, gold, REE, borate and lithium, among others. As an analyst, he has specialised in the mid-tier/junior sectors, covering mining stocks on the ASX and AIM.

Investment analyst certification

All research is issued under the regulatory oversight of Fox-Davies Capital. Each Investment Analyst of Fox-Davies Capital whose name appears as the Author of this Investment Research hereby certifies that the recommendations and opinions expressed in the Investment Research accurately reflect the Investment Analyst's personal, independent and objective views about any and all of the Designated Investments or Relevant Issuers discussed herein that are within such Investment Analyst's coverage universe.

Disclaimer - Important Information

This document is not independent and should not be relied on as an impartial or objective assessment of its subject matter. Given the foregoing, this document is deemed to be a marketing communication for the purpose of the European Markets in Financial Instruments Directive (MiFID), the Financial Conduct Authority's Rules and Dubai Financial Services Authority's Conduct of Business Rules and as such has not been prepared in accordance with legal requirements designed to promote the independence of investment research and Fox-Davies Capital is not subject to any prohibition on dealing ahead of dissemination of this document as it would be if it were independent investment research.

This document has been issued by Fox-Davies Capital Limited and Fox-Davies Capital (DIFC) Limited (collectively "Fox-Davies Capital") for information purposes only and should not be construed in any circumstances as an offer to sell or solicitation of any offer to buy any security or other financial instrument, nor shall it, or the fact of its distribution, form the basis of, or be relied upon in connection with, any contract relating to such action. This document is not based upon detailed analysis by Fox-Davies Capital of any market; issuer or security named herein and does not constitute a formal research recommendation, either expressly or otherwise. This document has no regard for the specific investment objectives, financial situation or needs of any specific entity. Fox-Davies Capital and/or connected persons may, from time to time, have positions in, make a market in and/or effect transactions in any investment or related investment mentioned herein and may provide financial services to the issuers of such investments. The information contained herein is based on materials and sources that we believe to be reliable, however, Fox-Davies Capital makes no representation or warranty, either express or implied, in relation to the accuracy, completeness or reliability of the information contained herein. Opinions expressed are our current opinions as of the date appearing on this material only. Any opinions expressed are subject to change without notice and Fox-Davies Capital is under no obligation to update the information contained herein. None of Fox-Davies Capital, its affiliates or employees shall have any liability whatsoever for any indirect or consequential loss or damage arising from any use of this document.

This report has been approved in the UK by Fox-Davies Capital Limited solely for the purposes of section 21 of the Financial Services and Markets Act 2000. In the UK, this report is directed at and is for distribution only to persons who (i) fall within Article 19(1) (persons who have professional experience in matters relating to investments) or Article 49(2) (a) to (d) (high net worth companies, unincorporated associations, etc.) of the Financial Services and Markets Act 2000 (Financial Promotions) Order 2005 (as amended) or (ii) are professional clients or eligible counterparties of Fox-Davies Capital (all such persons together being referred to as "relevant persons"). This report must not be acted on or relied up on by persons in the UK who are not relevant persons. In accordance with the Dubai Financial Services Authority's Conduct of Business Rules, this marketing material is intended only for professional clients and market counterparties, and no other person should act upon it

Neither the information nor the opinions expressed herein constitutes, or is to be construed as, an offer or invitation or other solicitation or recommendation to buy or sell investments.

Neither this report nor any copy of part thereof may be distributed in any other jurisdictions where its distribution may be restricted by law and persons into whose possession this report comes should inform themselves about, and observe any such restrictions. Distribution of this report in any such other jurisdictions may constitute a violation of UK or US securities law, or the law of any such other jurisdictions.

Investments in general involve some degree of risk, including the risk of capital loss. The value of investments contained herein may go up or down. Where investment is made in currencies other than the base currency of the investment, movements in exchange rates will have an effect on the value, either favourable or unfavourable. Securities issued in emerging markets are typically subject to greater volatility and risk of loss. The services, securities and investments discussed in this document may not be available to nor suitable for all investors. Investors should make their own investment decisions based upon their own financial objectives and financial resources and, if in any doubt, should seek advice from an investment advisor. Past performance is not necessarily a guide to future performance and an investor may not get back the amount originally invested. Where investment is made in currencies other than the investor's base currency, movements in exchange rates will have an effect on the value, either favourable or unfavourable. Levels and bases for taxation may change. When we comment on AIM or OFEX shares you should be aware that because the rules for those markets are less demanding than the Official List of London Stock Exchange plc, the risks are higher. Furthermore, the marketability of these shares is often restricted.

Fox-Davies Capital and/or its associated companies may from time-to-time provide investment advice or other services to, or solicit such business from, any of the companies referred to in this document. Accordingly, information may be available to Fox-Davies that is not reflected in this material and Fox-Davies Capital may have acted upon or used the information prior to or immediately following its publication. In addition, Fox-Davies Capital, the directors and employees thereof and/or any connected persons may have an interest in the securities, warrants, futures, options, derivatives or other financial instrument of any of the companies referred to in this document and may from time-to-time add or dispose of such interests. Neither the whole nor any part of this material may be duplicated in any form or by any means. Neither should any of this material be redistributed or disclosed to anyone without the prior consent of Fox-Davies Capital. Fox-Davies Capital Limited is authorised and regulated by the Financial Services Authority and is a member of the London Stock Exchange. Fox-Davies Capital (DIFC) Limited is authorised and regulated by the Dubai Financial Services Authority.

Fox-Davies Capital Limited may distribute research in reliance on rule 15a-6(a)(2) of the Securities and Exchange Act 1934 to persons that are major US Institutional investors, however, transactions in any securities must be effected through a US registered broker-dealer. Any failure to comply with this restriction may constitute a violation of the relevant country's laws for which Fox-Davies Capital does not accept any responsibility. By accepting this document you agree that you have read the above disclaimer and to be bound by the foregoing limitations/restrictions.

Please note that unless otherwise stated, the share price used in this publication is taken at the close of business for the previous day. This document has been prepared on the basis of economic data, trading patterns, actual market news and events, and is only valid on the date of publication. Fox-Davies Capital does not make any guarantee, representation or warranty, (either expressly or implied), as to the factual accuracy, completeness, or sufficiency of information contained herein. This document has been prepared by the author based upon information sources believed to be reliable and prepared in good faith.

This note is confidential and is being supplied to you solely for your information and may not be reproduced, redistributed or passed on, directly or indirectly, to any other person or published in whole or in part, for any purpose.

Fox-Davies Capital Ltd

12 Hay Hill, Mayfair

London W1J 6DQ

United Kingdom

Member of the London Stock Exchange.
Authorised and Regulated by the Financial Conduct Authority.
Registered in England and Wales with company number 10165213 and registered address 5 Technology Park, Colindeep Lane, Colindale, London, United Kingdom NW9 6BX

Fox-Davies Capital (DIFC) Ltd.

Emirates Financial Towers, N1702D

Dubai International Financial Centre

P.O. Box 507268, Dubai

United Arab Emirates

Authorised and Regulated by the Dubai Financial Services Authority.
Registered in the Dubai International Financial Centre with commercial license number CL2950

Markets, Gold, Iron Ore & Energy Transition Materials