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Through the Looking Glass: Cobwebs, Turkeys and Our Views on Global Natural Resources

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THROUGH THE LOOKING GLASS: COBWEBS, TURKEYS, AND OUR VIEWS ON GLOBAL NATURAL RESOURCES

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INTRODUCTION

The ‘lost commodity decade’ is firmly in the rearview mirror, and the landscape of the asset class has changed dramatically nearly one year on from our last global natural resources article. In this paper, we examine the dynamics of the current commodity cycle. We are fully cognizant that while history rhymes, nuances and supply/demand fundamentals drive the duration and magnitude of commodity cycles. In our view, we are just passing through to a new commodity paradigm, for which investors are underprepared both financially and physically. We begin by examining environmental, social and governance (ESG) investment opportunities through the lens of broad investment themes. We then discuss the influence of the volatile geopolitical environment, followed by a curious discussion of cobwebs and, yes, turkeys.

“IN OUR VIEW, WE ARE JUST PASSING THROUGH TO A NEW COMMODITY PARADIGM, FOR WHICH INVESTORS ARE UNDERPREPARED BOTH FINANCIALLY AND PHYSICALLY”

COMMODITIES THROUGH THE ESG LENS

In our view, when considering the transition and disruption themes, ESG trends will generate very attractive opportunities for the global natural resources sector over the coming years. One of the most misunderstood impacts of ESG investing is the unintended consequences could have on the prices of commodities. Two of the overarching themes that the commodities complex faces today are:

1. In order for the energy transition to happen, markets must incentivize more supplies of the critical materials required for the physical buildout, such as copper, aluminum and lithium.

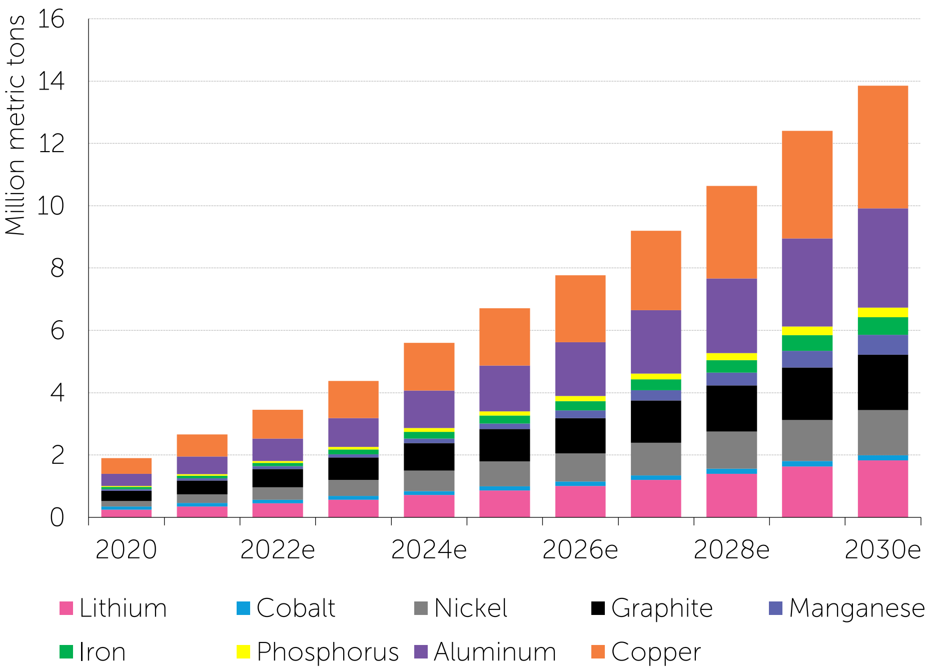
2. For the hydrocarbon replacement cycle to happen without causing massive economic disruption, both materials and traditional hydrocarbons must be priced higher, and for longer, to facilitate an orderly transition.

Transition: Materials and Bridge Fuels

From an environmental perspective, the drive to create a cleaner future will be very material intensive. The physical buildout of solar and wind capacity, the revamp of the global grid for increased electrification and the need for safe nuclear, among other investment needs, is expected to create an intense demand for the material building blocks required for the generational physical shift. According to BloombergNEF (BNEF), the total investment required in energy supply and infrastructure over the next 30 years could range from $92 - 173 trillion. Furthermore, BNEF estimates that lithium-ion battery demand will grow more than threefold by 2030.[1] Beyond the battery, the buildout of the smart grid and infrastructure that is required for electric-vehicle (EV) penetration and increased electrification could be one of the most material-intensive endeavors in recent times. BHP Group Ltd (BHP) estimates that the base metal capital expenditure (capex) required for a 1.5 degrees Celcius outcome is $2 trillion.[2] For context, the global copper market is $140 billion at 2019 prices. We believe that higher prices on a more sustained time frame will be needed to incentivize the massive supply response to propel the energy transition.

The call for all low carbon emission fuel source is apparent.

Metals Demand from Lithium-ion Batteries



Source: Bloomberg, June 2021.

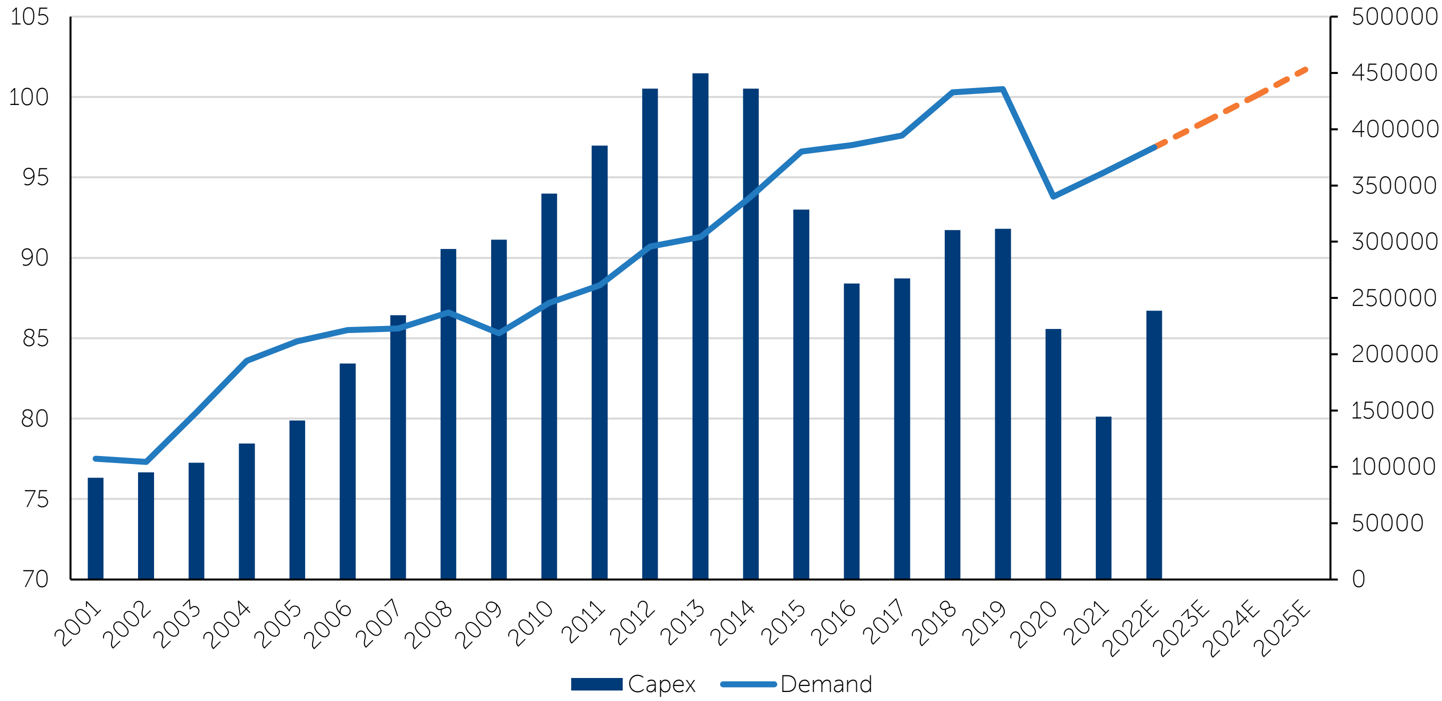
Furthermore, the role of bridge fuels like natural gas and nuclear are expected to play an important part in the path to zero emissions. Bernstein estimates that if EVs reach penetration of 45% in 2040, there is an estimated additional demand of approximately 550,000 kilowatt hours (KwH) of electricity or roughly 15% of today's generation.[3] While renewables like solar and wind are likely to garner the majority of the growth, the storage technology and infrastructure are simply not sufficient to reach net zero in the necessary time frame. The call for low-carbon-emission fuel sources is apparent. Natural gas is one of the cleanest-burning fossil fuels and already accounts for about 25% of global electricity generation. The International Energy Agency (IEA) expects natural gas demand to grow strongly in all scenarios, with peak demand reached between 2030 - 2040. Like natural gas, nuclear generation is also crucial for net-zero goals; we believe there will be a nuclear renaissance. Nuclear is one of the cleanest energy sources and technological developments have made it safer and more scalable than ever before.[4] The IEA believes that a doubling in annual addition of new nuclear capacity is needed in order to reach net-zero goals, and an absence of plant extensions and new projects could result in an additional four billion tonnes of carbon-dioxide emissions.

Disruption – The Path of Traditional Hydrocarbons

An often-misunderstood aspect of the carbon transition is the price path of traditional hydrocarbons. Energy transition is likely to have a hyper-inflationary effect on the price of traditional energy. The reality is that even at an accelerated pace, the shift to zero emissions could take decades to achieve but will likely cause extreme dislocations in the interim. Consider EV penetration, for example. According to the IEA, EVs are expected to reach 50% of the automobile market by 2040. Traditional oil companies are facing this increasingly accepted outlook and negative 'peak demand' sentiment. In this situation, when does the oil and gas sector allocate capital away from oil projects? Certainly before EV penetration rates reaches 50%; in fact, we believe the allocation is already underway. We believe the energy transition will require significant shifts in investment patterns, effectively inversing over the next 30 years. Goldman Sachs estimates that an incremental $1.5 trillion of capex is needed per year by 2032.[5]

The second question to this scenario is: what is the trajectory of oil prices as EV penetration rates approach 50%–higher or lower? The unfortunate answer is materially higher oil prices, in our view. Investments will be diverted, but the physical markets will still demand it. The financial markets can reallocate capital and sentiment much faster than the physical markets can transition. This is an over-simplification as reality will have numerous other factors at play, but the general direction is clear. In the following chart, we highlight the estimated capex by a group of global integrated and independent oil companies. Oilfield capex peaked in 2013 and the forecasted capex for 2022 will be down more than 40% from the peak despite robust oil prices. For context, oilfield capex (in real dollars) will be near 2006 levels when global crude production was roughly 20% lower than current levels. In the meantime, demand is expected to continue to recover in a post Covid-19 world and breach previous highs over the next several years. It is also very important to understand that an oil well has a decline rate. The IEA estimates that the decline rate for mature non-OPEC fields is 8% per year[6] with OPEC decline rates estimated to be in the 4 - 6% range. Active investment is needed to offset this decline and grow production to meet demand.

Oilfield Capex vs Demand



Source: Bloomberg, Newton calculations, April 2022

The global buffer, in the form of inventory and reserves, is at cyclical lows. Goldman Sachs estimates that since 2014, underinvestment in the oilfield has consumed 25 years of resource life.[7] Energy density is also an important consideration in the renewable transition. Technology is improving but the current state of the industry is still nowhere near as efficient as traditional hydrocarbons. On an apples-to-apples basis, it is estimated that low-carbon energy developments are nearly two times more capex-intensive than hydrocarbons. While we are firm believers that the renewable cost curve will continue to improve and the sector will benefit from technological gains, the process and evolution will take time. It should also require a tremendous amount of capital and resource investments, which have come at the expense of traditional hydrocarbon investments. Until an adequate supply investment response is seen, energy prices are likely to continue to rise to the point of physical constraint and corresponding demand destruction.

Furthermore, it is convenient to think that oil is only used for mobility. Approximately 55 - 60% of a barrel is used for road, aviation, rail and shipping (road demand is approximately 40 - 45% of total oil demand). The remaining 40 - 45% is used in a variety of industrial sectors such as petrochemical and metals. While EV growth is evolving at an exponential rate, other efforts to wean oil consumption have lagged.

If oil investment continues to decline too dramatically, without planning for proper oil alternatives in non-road sectors, the unintended consequence could be inflationary pressure across multiple supply chains.

Another area of unintended consequences is the growing movement of renewable biofuels. In the US, between 30 - 40% of the annual corn crop is directed to the production of ethanol to be blended into the gasoline pool. As the global energy mandate shifts towards cleaner fuels, there has been a renewed focus on renewable biodiesel and other forms of biofuels. BNEF projects six billion gallons of renewable diesel production capacity by 2024, representing 13% of the US diesel pool. This renewable diesel production will require 50 billion pounds of soybean oil feedstock or approximately two times the current production levels. Given the potential for peaking global grain yields and geopolitical disruptions, the acceleration of 'food for fuel' will present another area where we may see unintended price dislocations and inflationary consequences.

Commodities Through the Geopolitical Lens

Geopolitics – It's Everyone's Problem

The recent conflict between Russia and Ukraine reminds global investors just how fragile the geopolitical system and commodity supply chains are. The natural resource world is populated with 'haves' and 'have nots.' The resource-blessed regions are often the most geopolitically unstable. As an example, the combined exports of Ukraine and Russia account for approximately 30% of the global wheat market, and Russia alone supplies 40% of the natural gas consumed in the European Union.[8] Flush with higher commodity prices and captive buyers, state actors could be further emboldened to 'weaponize' strategic commodity advantages and embark on destabilizing geopolitical actions. The resulting rise in price volatility and the need for supply-chain redundancies ('onshoring') can lift many commodity cost curves. Furthermore, the list is not limited to traditional commodities like natural gas and wheat. There is also a race developing in the energy-transition supply chain with strategic commodities like lithium and rare earths that can present significant speed bumps in the shift to renewables.

The resource-blessed regions are often the most geopolitically unstable.

The Chinese Export Shift

Another structural trend that is likely to have profound commodity and global economic impact is a change in China's role as a global 'deflator.' For the last several decades, China has acted as the factory for the world, effectively importing pollution and exporting deflation through an exponentially growing manufacturing base. As the Chinese economy matured, there has been a shift to diversify the economy from a purely manufacturing and export model. In addition, the government has enacted several high-impact environmental campaigns over the last several years, such as Blue Sky and Clean Water initiatives. Using aluminum as an example, China produces over 55% of the world's aluminum and is the largest exporter of aluminum globally.[9] However, between 30 - 40% of the cost of producing aluminium is from energy that is required for the smelting process. For the last decade plus, China was importing both coal and natural gas, converting it to electricity to smelt and produce aluminum which it then re-exports. We believe that this export trend has now peaked and should decline owing to the high cost of feedstock and the shift in China's environmental policies. This is not limited to aluminum as this export scenario is playing out across the Chinese commodity-production base, from gasoline to fertilizers.

US Energy: Constraints and Potential

In a commodity world of 'haves' and 'have nots,' the US is uniquely blessed with one of the lowest cost energy-resource bases. The resource sits in some of the most prolific basins in the world, Permian for oil and Marsellus for natural gas, rivaling Middle Eastern and Russian assets. In addition to a well-developed energy industry and geopolitical stability, the resource base also has one of the lowest emission footprints relative to global peers owing to the fact that US crude is light and sweet (requires less refinement). Owing to this resource advantage, there is a wide energy arbitrage between US-based commodities that use natural gas as a feedstock/input (aluminum, fertilizers, refiners) versus the rest of the world that relies on expensive liquefied natural gas (LNG) or unstable Russian supply. As an example, US-based Henry Hub natural gas averaged $3.73 per metric million British thermal unit (mmbtu) for 2021 while the European gas title transfer facility (TTF) averaged over $20 per mmbtu. There are challenges that the US faces, namely policy misalignment that restricts production activity and inadequate infrastructure development. In the above natural gas example, the US natural gas infrastructure system is running into physical constraints as a decade-long bear market has limited new infrastructure additions. In a period where the global market is desperate for alternatives to Russian natural gas, the US is constrained as further LNG sendouts are limited by export facilities. The impact will probably not be limited to natural gas. As Permian oil production ramps up, natural gas will likely run into takeaway capacity ceilings. Once the capacity utilization is reached, the Permian producer could be faced with a decision to either slow oil production or flare associated gas. The best mechanism to correct this misalignment will be the realization that commodity prices are likely to remain higher, and for a longer period than consensus expects, and to incentivize investments.

Cobwebs and Turkeys

Putting together the various perspectives listed above, we can begin to form an evolving picture of the emerging commodity cycle. In this section, we will start with a cobweb.

Commodities and Cobweb Theorem

An interesting aspect of commodity cycles can be explained by the Cobweb Theorem. A simplified explanation of this economic model explains that supply/demand imbalances amplify volatility in commodity prices owing to the inherent information failure and time lag between producer response and consumer demand. In cyclical markets, the amount produced must be chosen before prices are observed. Using wheat as an example, a farmer must decide how much crop to plant well ahead of the harvest season and has only present prices and current expectations as a guide, with futures curves having little-to-no predictive power. After the fields are planted in a limited planting window, numerous factors can affect the supply and demand. In this example, after the wheat crop has been planted, a major wheat exporter experiences a blight and its crops destined for export markets will now be severely affected. Wheat prices shoot up but supply in the short run cannot adjust to this move. Let us also assume that wheat demand is fairly inelastic in the short-to-mid run. Prices quickly soar and the farmer will see higher prices as they are preparing for their next planting season when they will plant record amounts of wheat. Unfortunately, the weather was favorable all season and consumers were shifting to wheat substitutes, such as corn. The farmer will now harvest a record wheat crop in the face of a glut in supply and decline in demand. This is the quintessential cycle that repeats across all commodities (whether energy, metals, grains, etc). The specific factors may differ but the cycles all have the same rhythm. A true static equilibrium price is rarely reached as the forces of the cycle will keep the supply/demand balance in a spiraling cobweb pattern, oscillating between a bull and bear market.

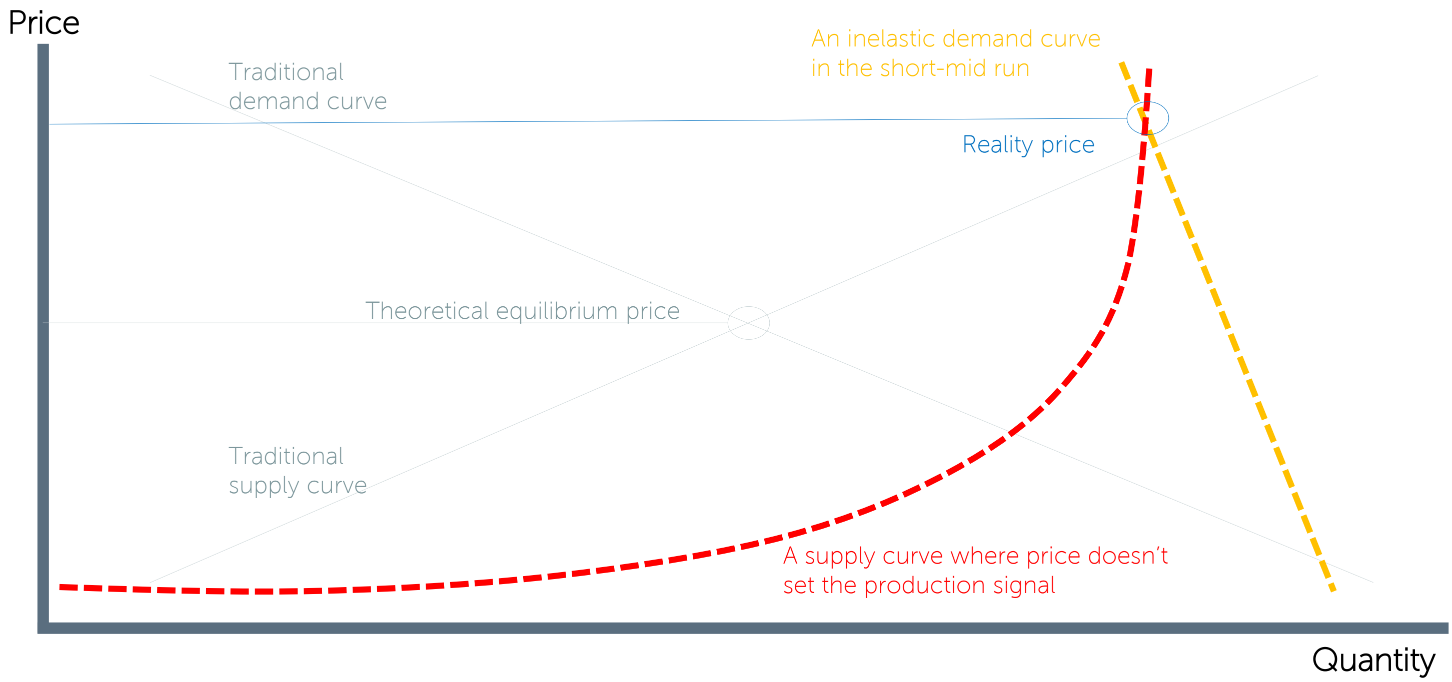
What If?

The Cobweb Theorem helps to explain price volatility and time lags in a commodity cycle. What now? What if we are now in a slightly different paradigm? What if price signals don't reach producers any more or only do so in an even more deferred time frame? What if demand is much more inelastic in the short-to-mid run than the consensus thinks? In effect, what if supply and demand lines aren't linear but have abrupt non-linear walls. In our ESG narrative explained above, and using oil as an example, the price signal being sent by the heavily backwardated physical markets are telling the oil companies to ramp production. This is in sharp contrast to the message from Wall Street, governments and media where the narrative is one of terminal demand decline. We are currently looking at a paradigm shift where the cure for high prices will not be high prices. How can the supply and demand curves balance again?

1. Demand response: The curve has to shift left/lower. In the short run by lower economic demand, which is a painful option given a world that is just recovering from the Covid-19 pandemic. In the long run by a structural shift in oil substitution, which would take years even in the most optimistic scenarios.

2. Supply response: Price signals get strong enough to force a more 'normal' supply curve and production response.

Supply and Demand Equilibrium Price: Theoretical vs Current Reality

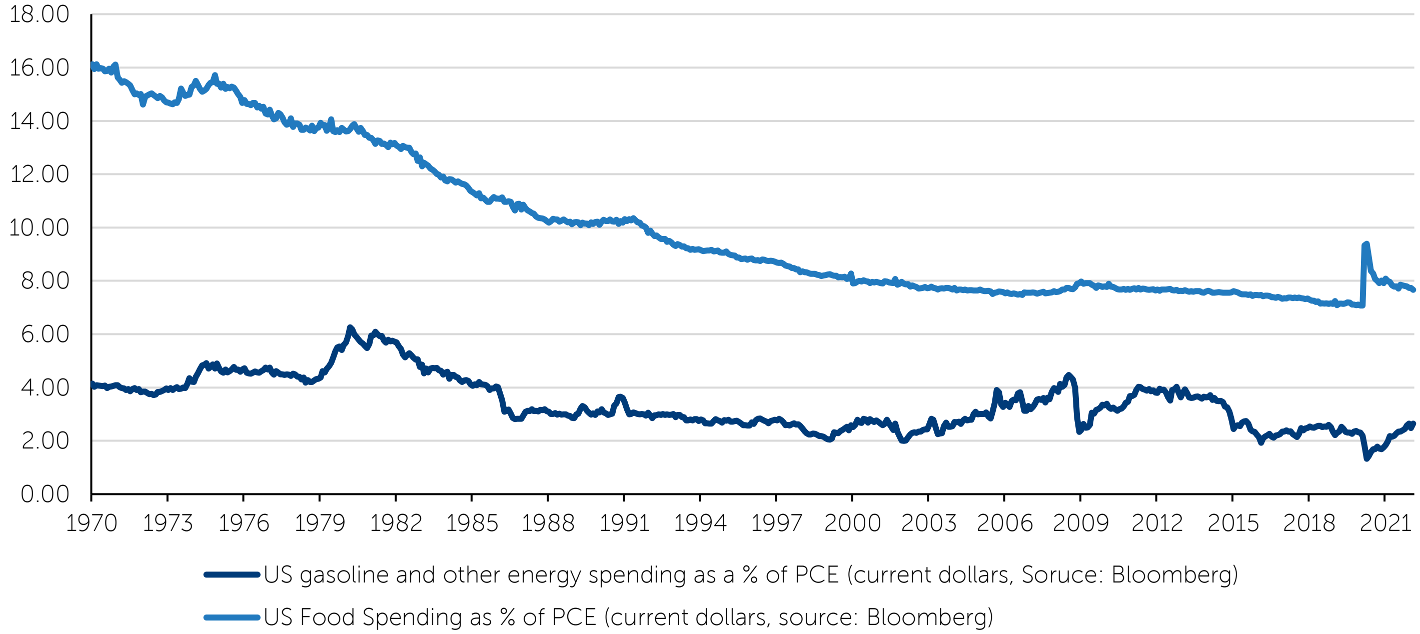


Source:Newton calculations, April 2022.

Physical Tightness and Demand Destruction

The financial markets can reallocate capital and sentiment much faster than the physical markets can shift fundamental supply/demand. Inventories across the commodities complex are at cyclical lows, with some prices at all-time highs. Normally, this would portend timing that is closer to mid-late innings. However, as discussed above, owing to, factors such as the natural time lag (cobweb) to the ESG price wall, the duration and magnitude of this cycle is prolonged and amplified. Supply should be slow to react even in the face of low global inventories. When relatively inelastic demand collides with supply that is constrained by artificial price factors, the result is often spiking commodity prices. European natural gas is a perfect example, as the TTF rallied over 800% from trough to peak in 2021. Unlike many other financial assets, commodity prices are heavily governed by the physical market. The consensus underestimated how low oil prices could go in 2020 as tanks were filled to the brim (prices briefly dipped negative) and the consensus may also underestimate how high oil can go when the same tanks reach empty. Given such a dramatic rally in commodity prices, we believe concerns will emerge on potential demand destruction. However, compared to the past, the average US consumer spends less now on gasoline and food than most periods in the past. When adjusted for inflation, the real price for crude is well below previous peaks. The overall economy is also more resilient to increasing oil prices. Over the last decades, oil-use efficiency has improved dramatically. During the Oil Embargo in the 1970s, it took roughly one barrel of oil to produce $1,000 of GDP. By 2019, that figure has dropped to 0.43 barrel per $1,000.[10] We also believe that energy consumption is relatively inelastic in the short-mid term owing to a lack of substitution, its importance in everyday activity and as it represents a relatively low percentage of consumer expenditure. Indeed, if we observe historical patterns, there is little to suggest that the current oil price represent a physical demand peak. We view the real risk in demand destruction as the point at which the market has problems supplying actual physical oil to consumers.

US Gasoline and Other Energy Spending



Source: Bloomberg Finance L.P, April 2022

A Happy Turkey?

Consider the turkey living on a farm, waking each day to a sunny morning. It is fed a generous portion of food and has a comfortable barn that is safe from predators, unlike its wild cousins. The turkey has all of its needs supplied in preparation for that fateful day in late November, for which it is utterly unprepared. Much like the turkey, we are accustomed to having our needs met; with stable and secure food supplies and well-supplied oil and natural-gas markets. This extends to the range of commodities that make up the building blocks of our economy, both present and future. In our view, the global economy is underprepared for the potential magnitude and duration of the current commodity cycle. We face a generational shift in inflation, geopolitical tensions, growing ESG impacts and secular energy-transition demands. As investors, we need to be aware of the structural shifts that are subtly changing the shape of commodity supply/demand curves in order to navigate these times. As such, we continue to believe in the attractiveness of the global natural resources sector and its place in a well-diversified portfolio.

AS INVESTORS, WE NEED TO BE AWARE OF THE STRUCTURAL SHIFTS THAT ARE SUBTLY CHANGING THE SHAPE OF COMMODITY SUPPLY/ DEMAND CURVES IN ORDER TO NAVIGATE THESE TIMES.

Endnotes

[1]BNEF New Energy Outlook 7/21/2021
[2]https://www.bhp.com/news/prospects/2022/04/pathways-to-decarbonisation-episode-5-the-energy-transition-dilemma
[3]Electric Revolution 2021 6/22/21
[4]https://www.iea.org/reports/natural-gas-fired-power
[5]Carbonomics: Security aof Supply and the Return of Energy Capex 3/17/2022
[6]https://www.iea.org/data-and-statistics/charts/decline-rates-for-mature-non-opec-fields-2000-2019
[7]Carbonomics: Security aof Supply and the Return of Energy Capex 3/17/2022
[8]IEA data
[9]https://www.nrcan.gc.ca/our-natural-resources/minerals-mining/minerals-metals-facts/aluminum-facts/20510
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