

Commodities – The Race Continues

Key Influencing Factors in 2022

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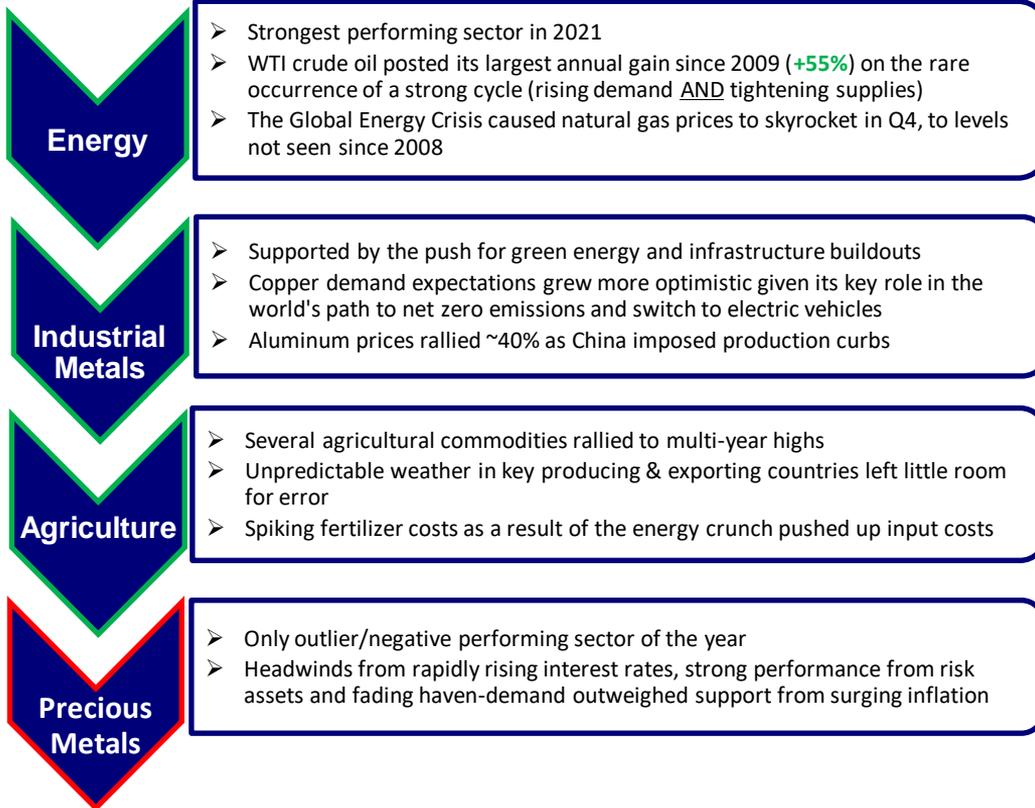
Commodities & Alts Analyst

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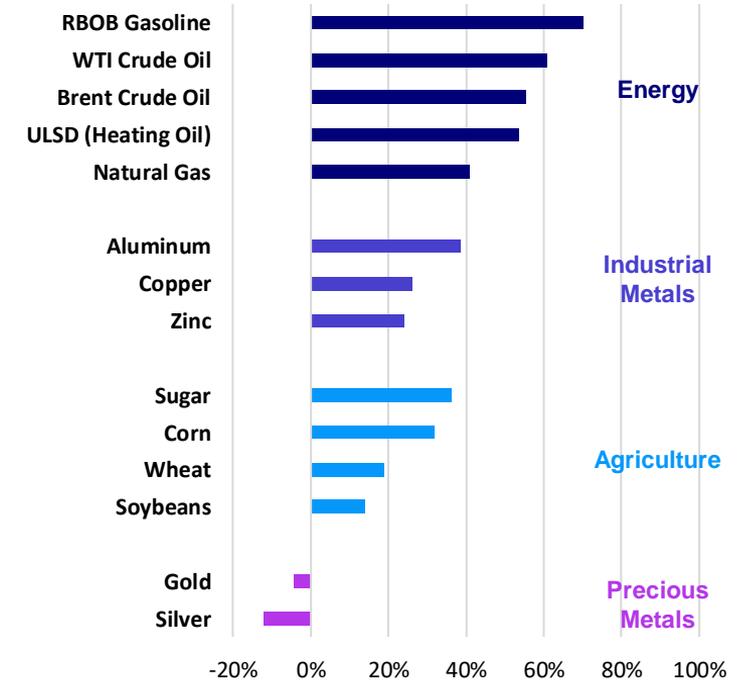
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A Year in Review: The Best Performing Asset Class in 2021¹

2021 proved to be a strong year for commodities as the world emerged from the global pandemic and inflation soared



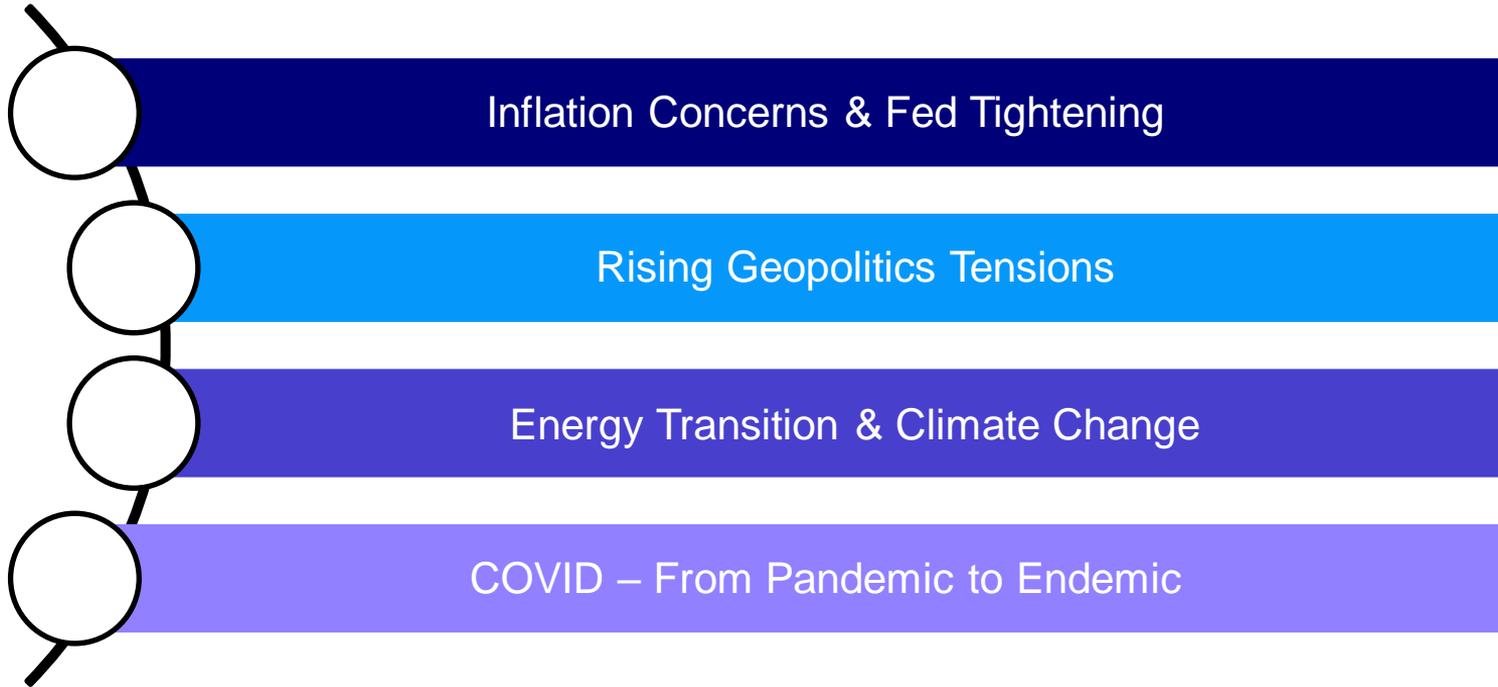
Components of the DBIQ Optimum Yield Diversified Commodity Index
Percentage change since first trading day of 2021



Source: Deutsche Bank, Invesco ETFs, FactSet as of December 31, 2021

¹Seeking Alpha, *Asset Class Scoreboard: December 2021*, January 09, 2022. Commodity performance was represented by the iShares S&P GSCI Commodity Indexed Trust ETF (GSG)

Commodities in 2022: At The Crossroads of Important Investment Themes



Industry analysts advise overweighting commodities, suggesting we are in the early innings of a **strong commodity cycle**.

Inflation Concerns & Fed Tightening – **Bullish**

- Current Environment & Future Drivers
- The Inflation / Commodities Relationship
- Inflation Sensitivity to Different Asset Classes
- Asset Class Performance During Fed Hike Cycles

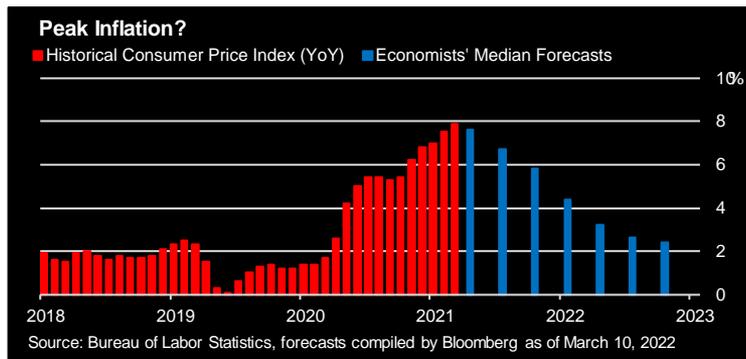
Inflation – Current Environment & Future Drivers

Risk of above target inflation are the most pronounced since the 1970's

Current Environment & Inflation Drivers in 2022

The YoY Consumer Price Index (CPI)¹ was at a **40-year high** of 7.9% in February 2022

- Geopolitical risks limiting commodity supplies globally, combined with strong demand for raw materials as the global economy continues to “return to normal”, could keep inflationary pressures elevated
- “**Greenflation**” could benefit commodities needed for the green energy transition²
- Labor shortages due the ‘Great Resignation’ and the rising cost-of-living could perpetuate **wage pressures**



¹**Consumer Price Index (CPI)** is a measure of the average change over time in the price of a market basket of consumer goods & services (transportation, food, medical care etc.) to assess changes in cost of living and identify periods of inflation/deflation

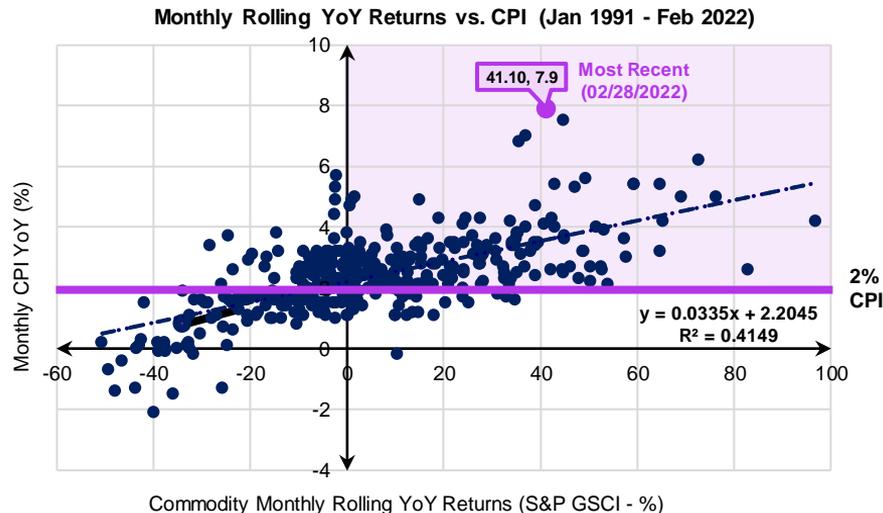
Forward-looking statements are not guarantees of future results. They involve risks, uncertainties and assumptions, there can be no assurance that actual results will not differ materially from expectations.

²Barron's, *It's Time to Invest in Commodities. How to Do It*, January 07, 2022

Source: Bloomberg L.P., Jan 1991 - Feb 2022. Past performance is not a guarantee of future results. An investment cannot be made into an index. See page 24 for index definition.

The Inflation / Commodities Relationship

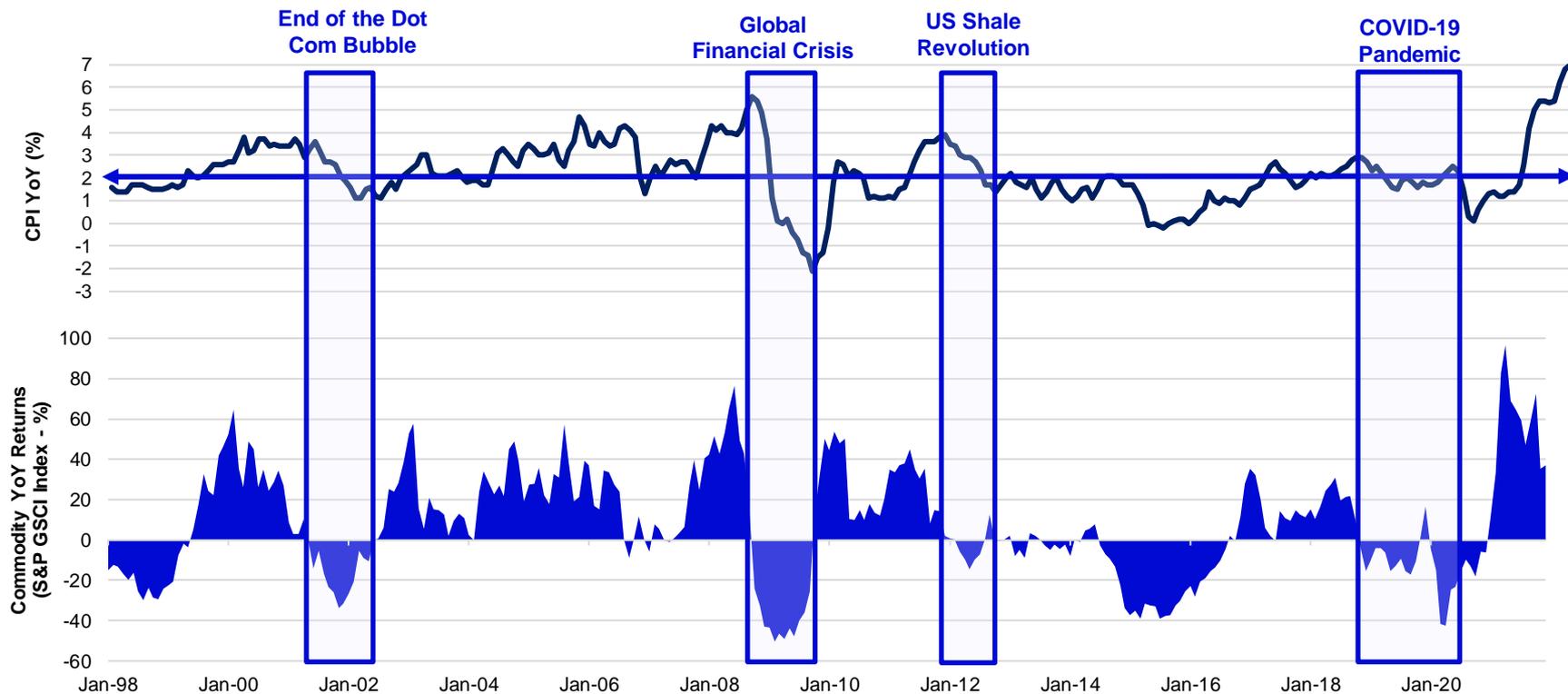
Commodity returns were largely positive when YoY CPI was greater than 2%



When CPI was greater than 2%:		When CPI was less than 2%:	
Positive Returns	73%	Positive Returns	26%
Negative Returns	27%	Negative Returns	74%

What About the 27% – When Did Commodities Not Work When CPI > 2%?

Most instances of negative commodity performance while CPI was >2% occurred during market corrections, when CPI crossed below the 2% threshold. See examples below:

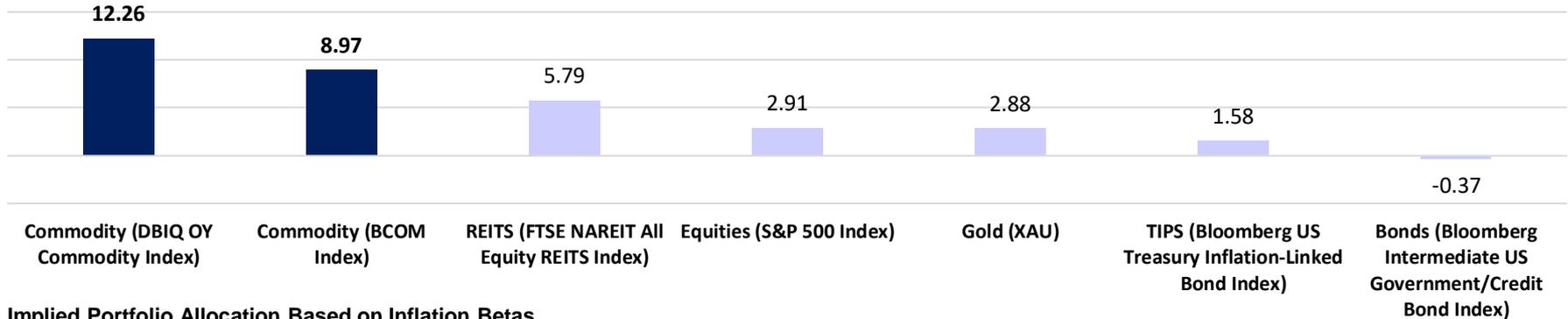


Source: Bloomberg L.P., Jan 1998 - Dec 2021. Past performance is not a guarantee of future results. An investment cannot be made into an index.

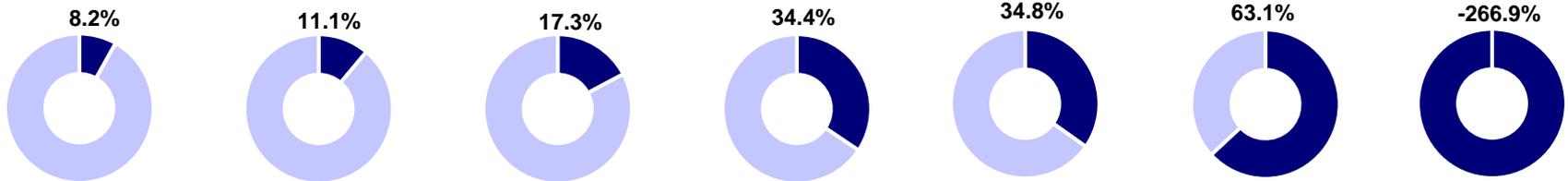
Inflation Sensitivity to Different Asset Classes

Commodities are historically the most efficient hedge for inflation

Inflation Betas¹ (1998 - 2021)



Implied Portfolio Allocation Based on Inflation Betas



Reality Check: For FY 2021, the DBIQ OY Commodity Index returned ~70% while CPI was up 6.2% y/y, representing an inflation beta of **-11.27**

¹**Inflation Beta** is a metric used to evaluate an asset class' ability to hedge inflation. It measures the change in inflation against the return of the asset class over a specific time period (1998 – 2021 in the chart above)

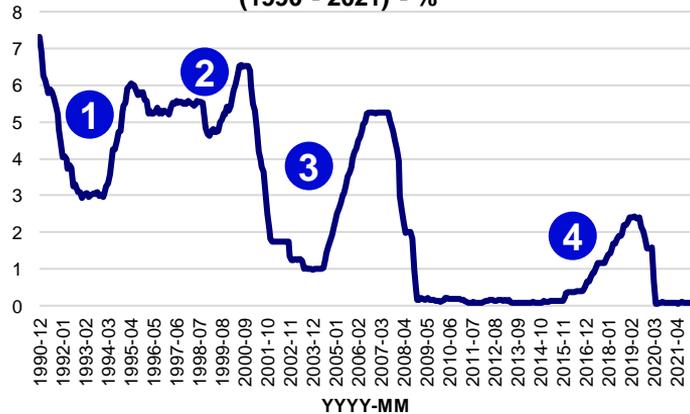
Inflation Beta = slope of the regression line between the asset's yearly returns and YoY CPI on the last day of each year (Ex: For 2021, use YoY CPI on Dec 31, 2021)

Source: Bloomberg L.P., US Bureau of Labor Statistics, as of December 2021
An investment cannot be made into an index. See page 24 for index definitions.

Fed Tightening – Asset Class Performance During Fed Hike Cycles

Commodities tended to provide greater returns than other asset classes during historic rate hike cycles

Historical Federal Funds Effective Rate¹
(1990 - 2021) - %



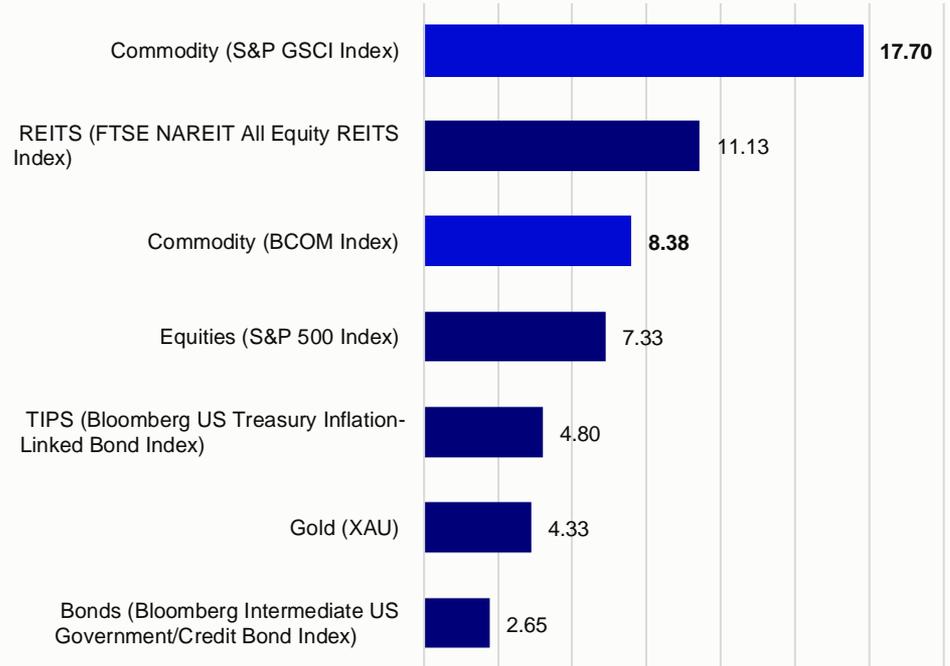
	Rate Hike Period	Total Change in FFER (%)	Number of Months in Period	Rate Change/ Month (%)
1	94-95 period	3.00	16	0.19
2	99-00 period	1.66	20	0.08
3	04-06 period	4.21	27	0.16
4	15-19 period	2.29	41	0.06

¹**Federal Funds Effective Rate (FFER)** – The interest rate banks charge each other for overnight loans to meet their reserve requirements, which can influence short-term rates on consumer loans and credit cards. This is set by the Federal Open Market Committee (FOMC), the branch of the U.S. Federal Reserve that makes decisions on monetary policy

Source: Bloomberg L.P. as of December 2021

Past performance is not a guarantee of future results. An investment cannot be made into an index. See page 24 for index definitions.

Asset Class Average Annualized Returns During Rate Hike Periods (1991 – 2021) - %



Rising Geopolitical Tensions – **Bullish**

- Top of Mind: The Russian/Ukraine Impact
- Key Risks Ahead



Top of Mind: The Russian/Ukraine Impact – Bullish

Given Russia and Ukraine's key roles as commodities powerhouses, escalating tensions caused significant disruptions in every commodity sector, further accelerating global inflation

Energy	Agriculture	Metals
<ul style="list-style-type: none"> ➤ Crude Oil – Russia is the 3rd largest oil producer after the US and Saudi Arabia, with a ~12% global market share¹ ➤ Natural Gas – Russia is the 2nd largest natural gas producer, accounting for ~17% of global supplies. It also supplied ~45% of the European Union's gas imports in 2021¹ ➤ Coal – Russia is the world's 3rd largest coal producer. Europe is reliant on Russia's particular quality of coal (can't be easily replaced)¹ 	<ul style="list-style-type: none"> ➤ Wheat – Russia is the world's #1 wheat exporter (~17% market share). Ukraine accounts for ~12%² ➤ Corn – Ukraine is the 4th largest exporter globally, making up ~17% of global exports² ➤ Sunflower Oil – Russia and Ukraine together, account for ~80% of exports² ➤ Fertilizers – Russia is one of the world's largest exporters of all three primary fertilizers³ 	<ul style="list-style-type: none"> ➤ Aluminum – Russia is the world's largest producer behind China, accounting for ~6% of global supplies¹ ➤ Gold – Russia is the 3rd largest producer of gold¹; the crisis has boosted interest in gold as a safe haven ➤ Nickel – Russia is the 3rd biggest producer, accounting for ~7% of global output (Nickel is a key component in the production of stainless steel and electric vehicle batteries)¹

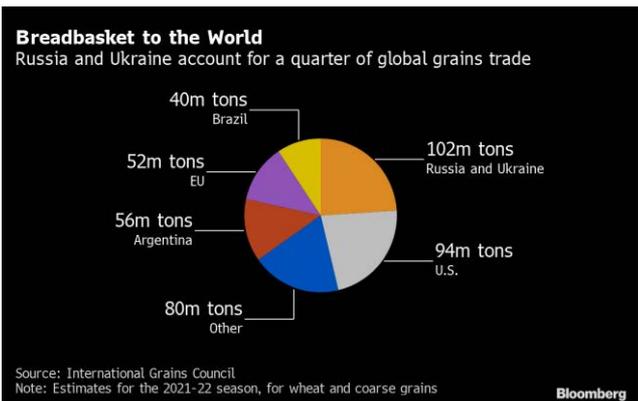
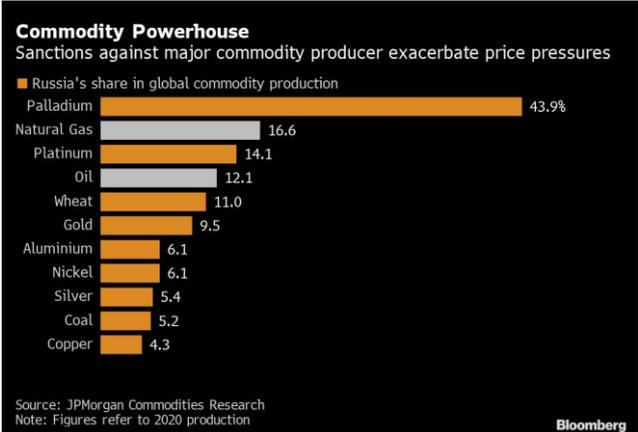
Rising energy prices will cause a spillover affect into industrial metals and agricultural commodities through higher input costs

Source:

¹Markets Insider, 'Too big to sanction'? 10 key facts about Russia's oil and commodity exports, Mar 07, 2022

²ING, Russia-Ukraine conflict: What it means for grain and oilseed market, Mar 07, 2022

³Bloomberg, How Ukraine Crisis Threatens Even Higher Oil, Gas and Food Costs, January 29, 2022



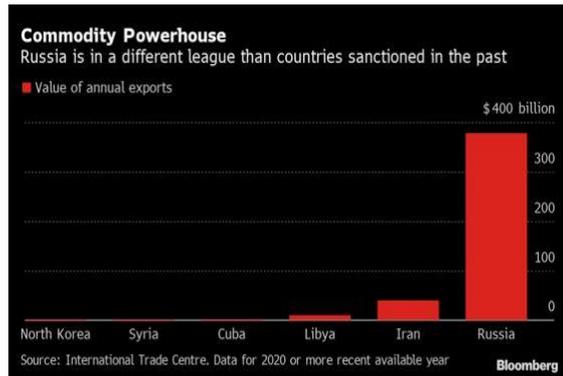
Rising Geopolitical Tensions – Top Risks Ahead – Bullish (Generally)

Tensions between key market players can threaten the flow of goods, potentially driving up commodities

Russia/Ukraine

Russia's invasion of Ukraine has severely impacted commodities to start 2022 and may continue to do so:

- Russia and Ukraine are both commodity powerhouses – supply disruptions caused by war and global sanctions could dislocate markets for years to come



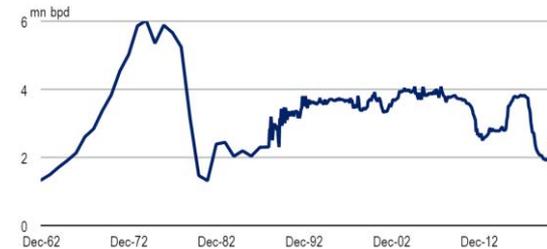
Iran Nuclear Deal

Iran continues to pose a rising nuclear threat:

- Despite rounds of negotiations, US and Iran still failed to reach a nuclear deal. Iran continues to close the gap in becoming a nuclear threshold state (currently at 60% enrichment)
- A final deal could bring back ~1 mb/d of Iranian oil exports but the “flood of Iranian barrels would not come with a mere stroke of a pen”¹

Exhibit 1: Iran crude oil production, 1962-2022

Iranian crude oil production has rebounded, but more upside if a nuclear deal is reached



Source: Bloomberg, BofA Global Research.

BoFA GLOBAL RESEARCH

US/China

Tensions remain escalated between US & China:

- Taiwan and the South China Sea - Potential for a military confrontation is a clear and present danger in 2022²
- China is the world's leading commodity consumer and a significant raw material producer



Source:

¹RBC Research, *Iran/Saudi Arabia: Moving Parts*, February 09, 2022

²Seeking Alpha, *Commodities In 2022: Key Global Drivers Will Continue The Bullish Relay Race - PDBC Has No K-1*, December 28, 2021

Energy Transition & Climate Change – **Bullish**

Why is “Net Zero” Actually Long-Term Bullish Commodity Prices?

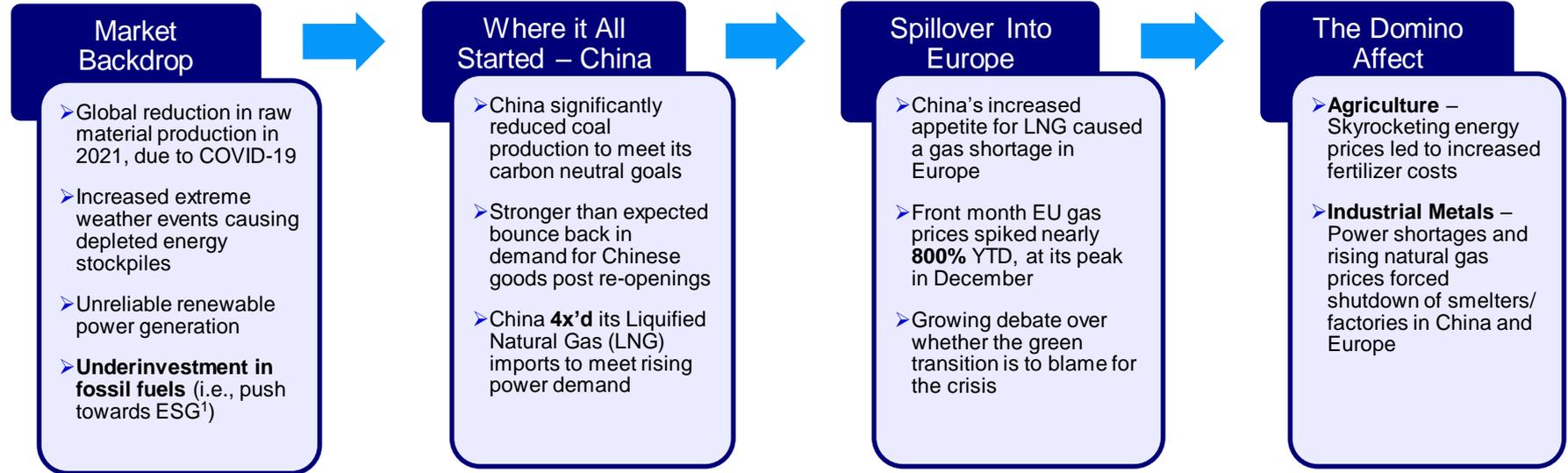
- The Energy Crisis of 2021: Explained
- Energy
- Industrial Metals
- Agriculture



The Energy Crisis of 2021: Explained

Was 'Green Transition' the culprit behind China/Europe's Energy Crunch?

The Perfect Storm



Key Takeaways

- “The world’s need for affordable oil isn’t going to disappear anytime soon. If supply doesn’t pick up, that won’t bode well for any of us.”¹
- It is important to build greater contingency into the energy system to avoid future extreme price volatility

Source: Forbes, *China's Energy Crisis Deepens With Potentially Fatal Consequences*, October 19, 2021

Forbes, *Energy Crisis 2021: How Bad Is It, And How Long Will It Last?*, October 19, 2021

¹ESG = Environmental, Social & Governance

²Bloomberg, *Saudis Are Right to Warn of a Collapse in Oil Supply*, December 19, 2021

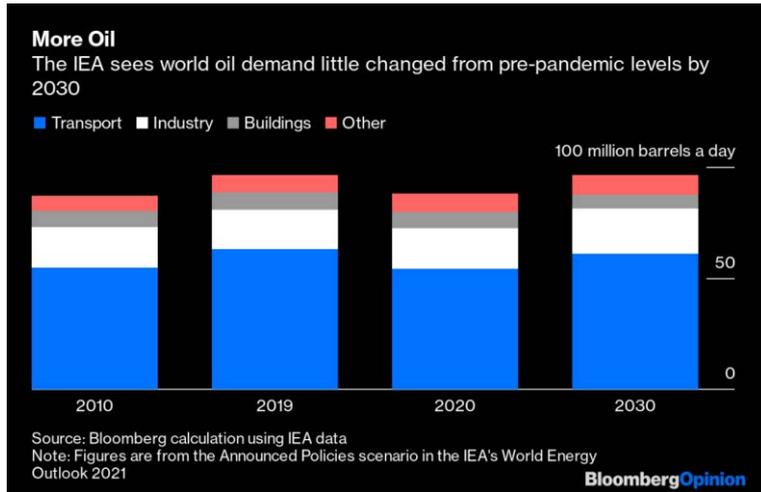
The Impact on Energy

Underinvestment in energy could lead to more pronounced supply risks and unprecedented volatility

1) Continued Fossil Fuel Demand, But...

A smooth energy transition will require ensuring **supply reliability** through continued investment in oil infrastructure¹

- The International Energy Agency (IEA) estimated that oil demand will continue for 10+ years²



Source:

¹Citi Research, *Deflation, Divergence, De-Bottlenecking...and More Volatility Ahead*, December 06, 2021

²Bloomberg, *Saudis Are Right to Warn of a Collapse in Oil Supply*, December 19, 2021

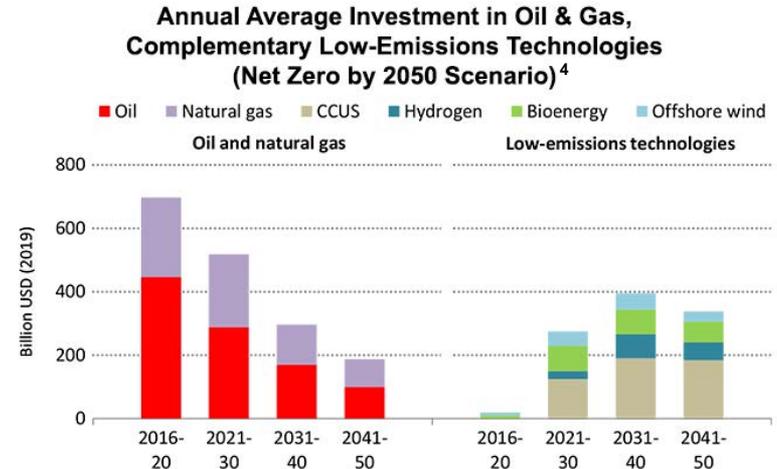
³Morgan Stanley, *Powering Ahead – Five Enduring Tailwinds for Commodities*, January 26, 2022

⁴Natural Gas Intelligence, *No More Oil, Natural Gas Fields Needed on Road to Net Zero*, IEA says, May 18, 2021

2) Underinvestment in Energy

Oil companies have been reluctant to fund large new projects and grow production due to **unfavorable ESG scrutiny**

- **Supply Shortage** – Current levels of oil & gas investments are already consistent with the IEA's 'Net Zero by 2050' scenario which assumes oil & gas demand will fall 30% and 10% respectively by 2030 – actual demand shows no such trend³



Note: CCUS = carbon capture, utilization and storage.

Source: IEA

Supportive Oil Fundamentals – Bullish

A looming “Triple Deficit” leaves the oil market highly susceptible to supply side shocks

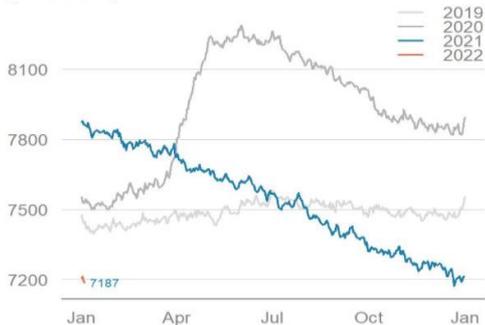
Low Inventories

Observable inventories fell by ~1.9 million barrels per day (mb/d) in 2021 and at a 5+ year low:

- US Shale producers have largely been disciplined in keeping growth moderate; private companies are ramping up
- **Band-Aid on a Bullet Wound** – Hypothetically, even if the US emptied its entire SPR (not possible), crude forecasts would only drop by \$17 per barrel¹

Observable oil inventories

(million bbl)



Source: IEA, EIA/DOE, PJK, IE, PAJ, Platts, Kpler, BP Statistical Review, IHS, Rystad Energy, Morgan Stanley Research analysis

Source: Morgan Stanley Research, *Heading for a Triple Deficit*, January 06, 2022, unless otherwise noted.

¹RBC Research, *2022 Oil Strategy Outlook: Stress Testing Our Global Balances*, December 14, 2021

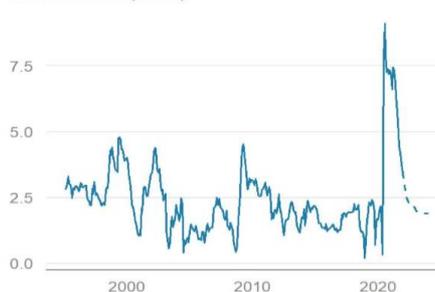
Low Spare Capacity

OPEC+ spare capacity likely to fall below 2 mb/d by 2H 2022 despite growing production:

- OPEC+ has consistently failed to meet its output quotas as members struggle to ramp up
- OPEC appears comfortable with \$80 oil and may remain disciplined, achieving a balanced market
- **Low Offline Production ex-Iran:** Energy Information Administration (EIA) estimated unplanned outages in Nov 2021 at ~2.6 mb/d, with 50% due to Iran

OPEC+ spare capacity

Incl. forecast (mb/d)



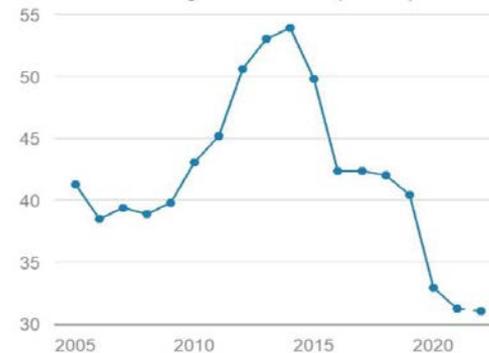
Low Investment Levels

Investments were pressured in 2021 and unlikely to rebound in real terms in 2022:

- The number of exploration wells completed was down 27%, and global discoveries fell to a 20+ year low, in 2021
- Oil companies approved new investments for **just 12.6 Bln barrels** of future production which outside of 2020, is a 15+ year low

Real-term capex

Per mtoe of oil & gas consumed (\$/mtoe)



\$/Mtoe = US dollar per megatonne of oil equivalent

3) The Technical Story for Energy

The Energy Transition may continue to cause shortages and underinvestment, which could prolong backwardation

What is Backwardation?

- Market condition where the price to secure a commodity at a future date is lower than the cost to acquire immediately—sign of **scarcity**

Why Do Investors Like It?

- **Positive Roll Yield** – Spot prices don't need to rise to earn a return. By investing in a later-dated futures contract, the investor can wait for the contract to move towards the spot price as it “ages up the curve”

Prolonged Backwardation in Energy

- Investors expect backwardation (scarcity) to persist in the energy markets as activists continue efforts to constrain capital flows into fossil fuel production—resulting in rolling supply shortages and underinvestment

The WTI Crude Oil¹ futures curve is currently in backwardation (February 28, 2022)



← Appreciates towards expiration

Above is for illustrative purposes only

¹West Texas Intermediate (WTI) – WTI is one of the two major pricing benchmarks for the oil market, representing crude produced in North America. WTI Crude Oil futures are listed on the New York Mercantile Exchange (NYMEX) and are delivered in Cushing, Oklahoma upon expiry

Source: Bloomberg L.P. as of February 28, 2022

The Impact on Industrial Metals

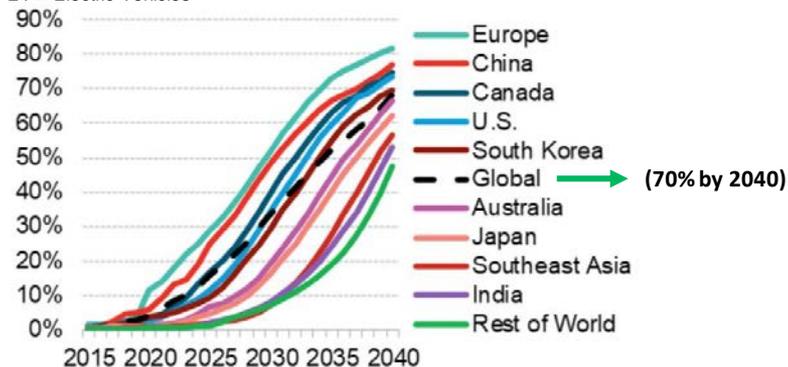
Long Term Structural Bull Market Driven By:

1) “Green” Demand Growth

- Global “net-zero” efforts should lead to higher demand for industrial metals – Metal consumption in renewables is **5-7x** higher than traditional power¹
- **Potential sustained global deficits for several years ahead** – “Green” demand continues to surprise to the upside with the electrification of global transport fleets accelerating, while supplies remain constrained

EV share of new passenger vehicle sales outlook by market - Economic Transition Scenario²

EV = Electric Vehicles



Source: BNEF. Note: EVs include battery-electric and plug-in hybrid electric vehicles. Battery-electric vehicles represent 88% of total electric vehicle sales in 2030. Europe includes the EU, the U.K. and EFTA countries.

Source:

¹Goldman Sachs, 2022 outlook: Cyclical weakness priced in, structural upcycle remains intact, January 13, 2022

²Bloomberg New Energy Finance (BNEF), Electric Vehicle Outlook 2021, June 09, 2021

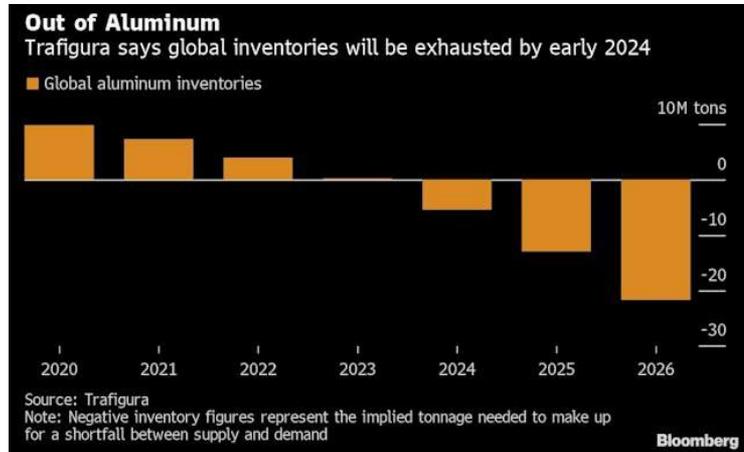
³Citi Research, Deflation, Divergence, De-Bottlenecking...and More Volatility Ahead, December 06, 2021

⁴Bloomberg, Could Aluminum Stockpiles Disappear by 2024? Trafigura Thinks So, February 12, 2022

2) Aluminum – “Out of Stock” in 2022?

Global supply growth has grounded to a halt, likely leaving the market undersupplied in 2022:

- **90%** of supply growth came from China over the past two decades³ – Going forward, power shortages and increased scrutiny on emissions could keep Chinese supplies constrained
- Aluminum smelting is heavily dependent on power (~40% of operating costs) and could see electricity costs rise substantially in 2022
- **Citi’s Base Case: 40-50%** upside for back-end prices, over the next 3 years³



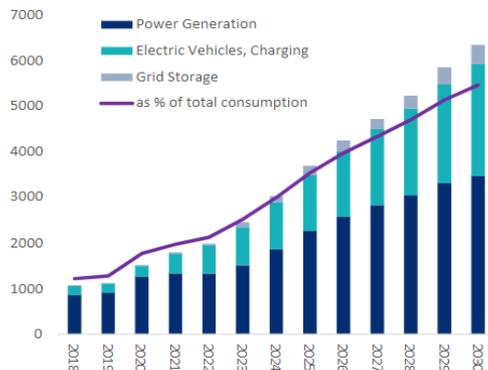
The Impact on Industrial Metals (2)

Long Term Structural Bull Market Driven By:

3) Copper – A Strong Cycle

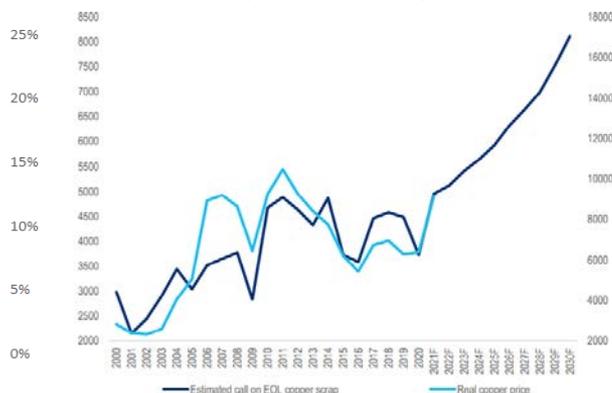
- Copper could be entering a strong multi-year fundamental cycle due to green demand, mine supply disruptions (Chile and Peru) and continued smelter bottlenecks in China
- Copper miners are predicting supply will outpace demand until 2024, after which higher demand for electric vehicles (EV) could challenge output¹
- **“Call on Scrap”** is expected to rise over the next 10 years – when copper demand exceeds mine supply, there is a call on copper scrap to fill the gap²

Citi – In our base case, copper consumption in decarbonization is forecast to grow ~5 million tons per annum 2020-2030²



Source: BNEF, Wood Mackenzie, Citi Research estimates

Decarbonization-led demand growth is set to drive the “call on scrap” up sharply over the decade by over 3 metric tons²



Source: Citi Research, Wood Mackenzie, Bloomberg

¹Source: Argus Media, *Viewpoint: Copper outlooks remain murky for 2022*, December 23, 2021

²Citi Research, *Deflation, Divergence, De-Bottlenecking...and More Volatility Ahead*, December 06, 2021

³Reuters, *Surpluses on the horizon to douse fire under copper prices*, December 22, 2021; Reuters, *Column: China's super-charged buying reshapes the copper market*, May 05, 2021

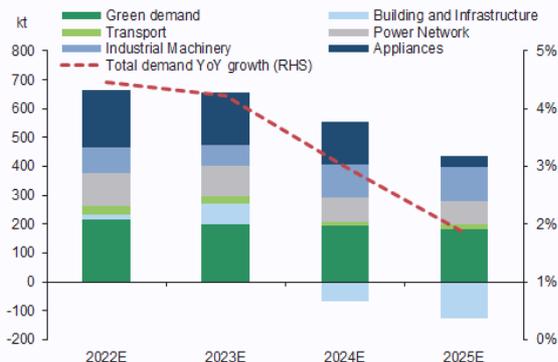
⁴Goldman Sachs Research, *2022 outlook: Cyclical weakness priced in, structural upcycle remains intact*, January 13, 2022

Looming Headwinds

- 1) Excess mine supply, currently expected to rise 3.9%³
- 2) Waning growth in China, the largest copper consumer⁴

Exhibit 11: China's common prosperity policy and strategic decarbonisation will likely more than offset the impact of a slowing property sector on metals

Decomposition of China copper demand yoy difference, Gse



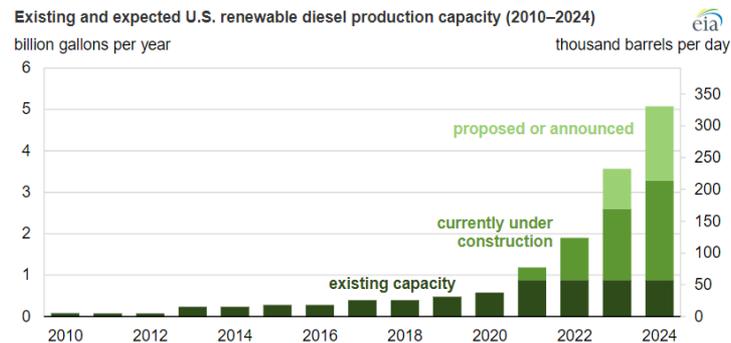
Source: Goldman Sachs Global Investment Research

The Impact on Agriculture

1) Rising “Green” Demand

- The push for “Energy Transition” has supported demand for biofuels like ethanol, which could drive up prices for energy crops
- Corn and sugar are inputs for ethanol, which may see higher price as supply continues its struggle to meet demand¹
- S&P Global Platts Analytics forecasts US biodiesel production to reach 4.1bn gallons annually by 2025, a growth of 760% from 2020 levels²

U.S. renewable diesel capacity could increase due to announced and developing projects



Source: US Energy Information Administration, S&P Global Platts, Jul 29, 2021²

Source: ¹Argus Media, *Viewpoint: US ethanol to stay imbalanced in early 2022*, December 23, 2021
²S&P Global Platts, “Biden push to cut emissions likely to pressure US soybean oil supply in coming years”, August 18, 2021
³J.P. Morgan Research, *Agricultural Commodities Outlook 2022/23 Chart Pack*, December 02, 2021

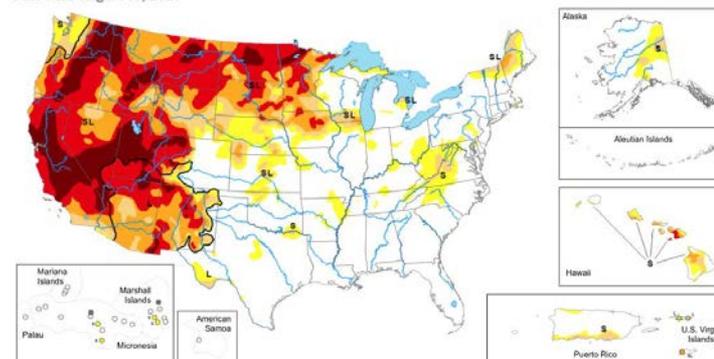
2) Heightened Volatility – Climate Change & More

“Extreme weather appears to be a core symptom of climate change, suggesting such events, and hence uncertainty, will become an increasingly common feature in agriculture markets going forward”³

- In 2021, adverse weather in key producing/exporting countries, coupled with skyrocketing energy costs used in farm equipment/ fertilizers, drove several agricultural commodities to multi-year highs
- J.P. Morgan– World balances show a sustained tightness in inventories through 2021/22 and 2022/23³. Rising consumer inflation, continued labor shortages, La Nina intensity and elevated fertilizer costs may support the complex in 2022

Map released: August 12, 2021

Data valid: August 10, 2021



Source: USDA U.S. Drought Monitor as of Aug 12, 2021

COVID – From Pandemic to Endemic

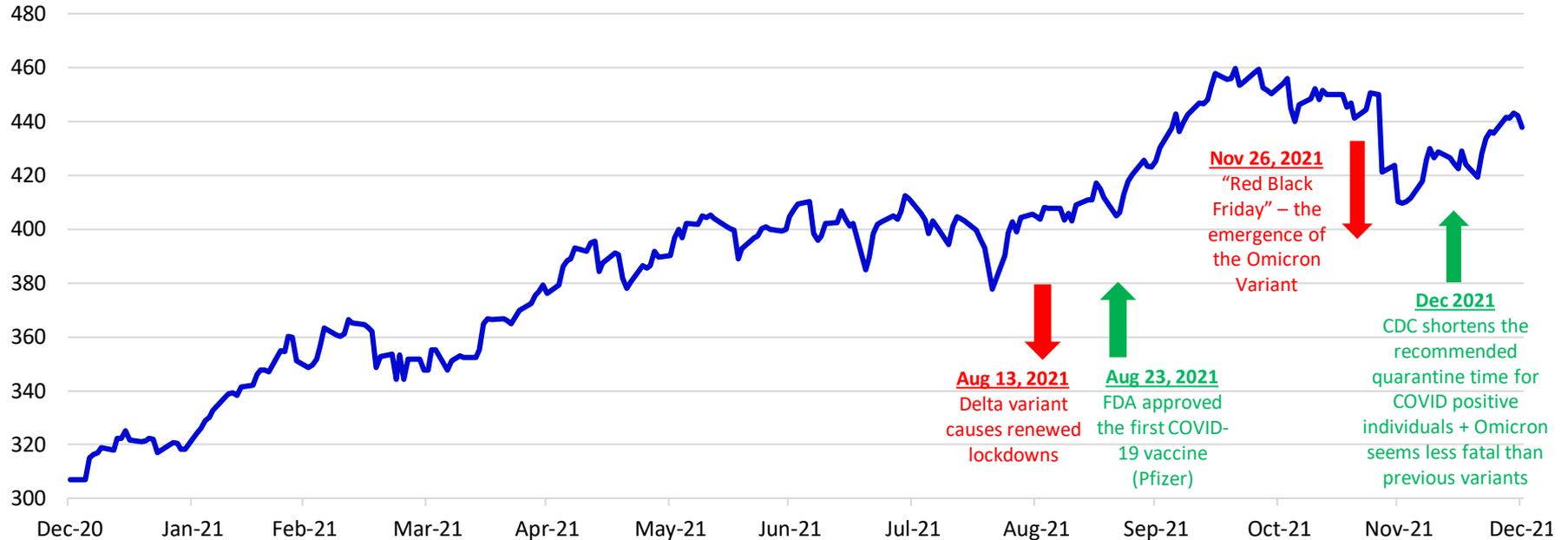
- Market Impact of COVID News
- Endemic in 2022? How the World Learns to Live With COVID-19



Market Impact of COVID News

Commodities continue to trade in line with both positive and negative COVID infection news. However, these bearish demand effects tend to be temporary while the bullish supply effects from low investment tend to be persistent (Goldman Sachs)

DBIQ OY Commodity Index YTD Historical Price (USD)



Source: Bloomberg L.P. as of December 31, 2021



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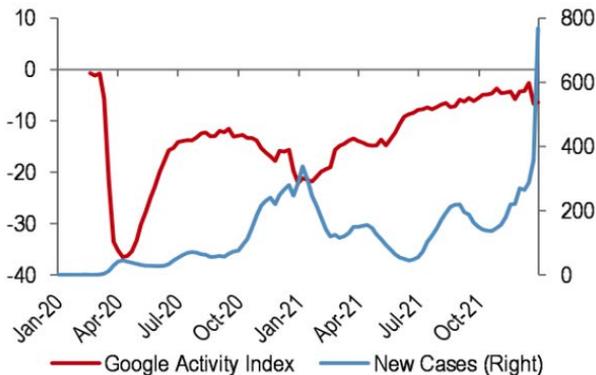
Endemic in 2022? How the World Learns to Live With COVID-19

1) Reduced Elasticity to COVID?

- Soaring global COVID infections at the end of 2021, despite surpassing previous peaks, failed to cause the activity weakness of earlier waves¹
- Going forward, we could see reduced demand elasticity to COVID-19 surges, with the buffer from increasing vaccinations and 'COVID fatigue' as the world learns to live with the virus

The Omicron Spike: Global mobility and new Covid cases per million¹

New Cases (RHS), Google Mobility Index (LHS)



Source: Google, Our World in Data, J.P. Morgan

Source:

¹JPM Research, *Oil Weekly: The next leg higher in oil prices*, January 05, 2022

²EIA, *Less production and more demand have reduced U.S. jet fuel inventories*, December 13, 2021

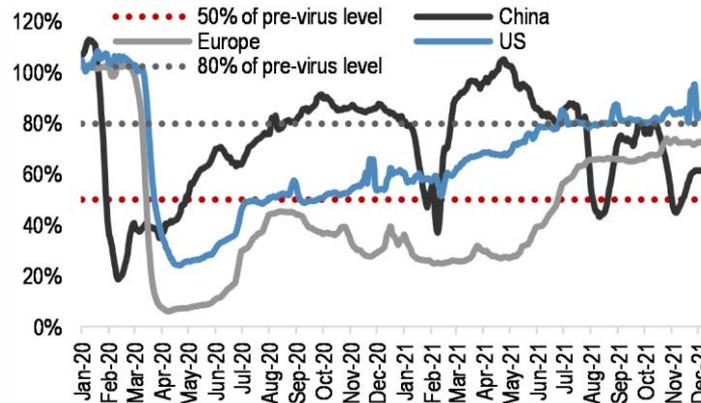


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2) Jet Fuel – The Laggard To Make a Comeback

- Jet fuel demand was well below its 2019 average of 1.74mb/d since the onset of the COVID-19 pandemic. Since mid-August, consumption has largely been within 20% of 2019 levels²
- In December, global daily flights reached 76% of 2019 levels – flight cancellations amid targeted travel bans and staffing shortages remain a prevalent risk

Daily Flights – Percent vs 2019, 7-day Moving Average¹



Source: FlightAware, J.P. Morgan

Key Thesis Risk Cases



Geopolitical Relief

Easing geopolitical tensions could alleviate market disruption concerns



Government Action

Governments intervene to lower commodity prices (Ex: US Strategic Petroleum Reserve Release)



Oil Supply Growth

Risk of OPEC releasing spare capacity, US producer discipline ceasing if prices go higher



Slow Chinese Growth

Persistent stalled growth in China could threaten demand for several commodities



Demand Destruction

Record demand could die down if prices move higher and initial pent up demand eases



Shifts in Spending

Spending shifts from goods to services, potentially easing supply chain bottlenecks



Hawkish Federal Reserve

Tightening policies could lower inflation and consumption while supporting the dollar



COVID-19 Variants

New strains/variants are immune to vaccines causing a slowdown in the global economic recovery

About risk and other important information

Index Definitions

- **S&P Goldman Sachs Commodity Index (GSCI)** – Diversified benchmark commodities index tracking the performance of the global commodities market
- **DBIQ OY Commodity Index** – The DBIQ Optimum Yield Diversified Commodity Index is a rule-based index composed of futures contracts of the 14 most heavily-traded and important global commodities
- **BCOM Index** – The Bloomberg Commodity Index (BCOM) tracks the performance of a diversified basket of global commodities
- **REITs (FTSE NAREIT All Equity REITs Index)** – Real Estate Investment Trusts are companies that own and/or operate income-producing real estate. The index is an unmanaged index considered representative of US REITs
- **S&P 500 Index** – This is an unmanaged index considered representative of the U.S. stock market. It is widely regarded as the best single gauge of large-cap U.S. equities and includes 500 leading companies
- **XAU** – Gold spot price quoted in US Dollars
- **TIPS (Bloomberg US Treasury Inflation-Linked Bond Index)** – Treasury Inflation-Protected Securities are Treasury bonds indexed to inflation to protect investors against a decline in purchasing power. The index measures the performance of the US TIPS market
- **Bloomberg Intermediate US Government/Credit Bond Index** – The index is a broad-based benchmark that measures the non-securitized component of the US Aggregate Index with less than 10 years to maturity. The index is comprised of the Intermediate U.S. Treasury and U.S. Agency Indices

Forward-looking statements are not guarantees of future results. They involve risks, uncertainties and assumptions, there can be no assurance that actual results will not differ materially from expectations.

Commodities may subject an investor to greater volatility than traditional securities such as stocks and bonds and can fluctuate significantly based on weather, political, tax, and other regulatory and market developments.

In general, stock values fluctuate, sometimes widely, in response to activities specific to the company as well as general market, economic and political conditions.

Interest rate risk refers to the risk that bond prices generally fall as interest rates rise and visa versa. An issuer may be unable to meet interest and/or principal payments, thereby causing its instruments to decrease in value and lowering the issuer's credit rating.

The use of environmental, social and governance factors to exclude certain investments for non-financial reasons may limit market opportunities available to funds not using these criteria. Further, information used to evaluate environmental, social and governance factors may not be readily available, complete or accurate, which could negatively impact the ability to apply environmental, social and governance standards.

This does not constitute a recommendation of any investment strategy or product for a particular investor. Investors should consult a financial professional before making any investment decisions.

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