

November 1, 2021 06:00 AM GMT

metal&ROCK | Europe

What's Driving Gold?

Gold prices are being buffeted around by diverging rates and inflation/stagflation concerns. We look at what's priced in and where it could go from here.

Is gold over or undervalued? It depends if you are looking at real or nominal rates. Both can be used as inputs into gold price analysis, but right now, they tell very different stories. [Exhibit 1](#) illustrates this - using a regression back to 2004, the US 10y real rate at -1.06% implies gold should be pricing ~\$1870/oz. However, based on the 10Y US nominal yield at 1.57%, the price should be ~\$1540/oz. The spread between these two scenarios, at \$330/oz, is at a record high in dollar terms, and close to it as a % of the current spot gold price. This uncertainty goes some way to explain the recent gold price action and relatively muted movements in ETF holdings.

Why the disconnect between real and nominal yields? Our [strategists](#) estimate the market is pricing nearly 3 US rate hikes in 2022, driving nominal yields higher. However, real yields have disconnected, pushing inflation breakevens to the widest in nearly a decade. They attribute this to investors searching for inflation protection and **acknowledge that the stagflation narrative continues to capture attention**. In particular, they point to flattening yield curves - implying markets believe inflation is supply-side driven (leading to stagflation), rather than demand driven. On top, they note that lower real yields in the 5y sector and below "suggest that markets do not see a strong enough response from the Fed to offset the rise in inflation breakevens".

So where next? Our strategists expect the Fed to announce the start of tapering from November 15, and to acknowledge that high inflation readings could last longer at [next week's FOMC meeting](#). Price action will depend on commentary around inflation, the pace of hikes and demand. They see room for disappointment versus market expectations if the Fed emphasises that tapering is not tightening. However, with the disconnect between real and nominal yields, they think real yields still look very low on all of the valuation metrics they look at. Thus, "a mention of the rising demand impulse, or improving growth, could spark a move higher in real yields". They also call for continued strengthening of the USD, and in particular, would see higher real yields and tighter breakevens as the most USD-positive regime. Both of these could take some of the shine off gold's recent price action, in line with our forecasts outlined in [The Price Deck](#).

The bull case for gold: Although not our strategists' base case (see [Stagflation? No. Inflation? Yes](#)), we consider a stagflation scenario, with inflation persisting and some signs of demand growth slowing (US Q3 GDP up just 2% YoY and our [China team](#) cutting their 4Q GDP forecast by 70bps to 3.3% YoY). Looking at the 1970s and also 2004-2005, gold has typically performed well during stagflation ([Exhibit 5](#)). Our equities teams note that stocks are pricing in almost nothing of this bull scenario (see [here](#) and [here](#)).

MORGAN STANLEY & CO. INTERNATIONAL PLC+

Amy Sergeant, CFA

EQUITY ANALYST AND COMMODITIES STRATEGIST

Amy.Sergeant@morganstanley.com +44 20 7677-6937

Dan Shaw

EQUITY ANALYST

Dan.Shaw@morganstanley.com +44 20 7425 5853

RMB MORGAN STANLEY PROPRIETARY LIMITED+

Jared Hoover

EQUITY ANALYST

Jared.Hoover@rmbmorganstanley.com +27 11 282-1082

MORGAN STANLEY & CO. INTERNATIONAL PLC+

Marius van Straaten

COMMODITY STRATEGIST

Marius.Van.Straaten@morganstanley.com +44 20 7677-5632

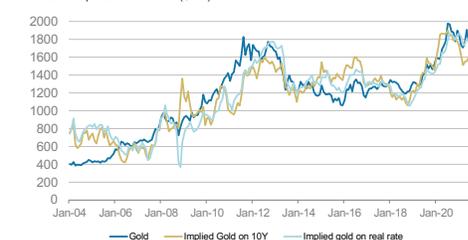
Martijn Rats, CFA

EQUITY ANALYST AND COMMODITIES STRATEGIST

Martijn.Rats@morganstanley.com +44 20 7425-6618

Exhibit 1: Real and nominal yields tell different narratives about the gold price

Gold and Implied Gold Price (\$/oz)



Source: Bloomberg, Morgan Stanley Research

Exhibit 2: Real yields have disconnected from nominal yields

10Y and Real Rates (%)



Source: Bloomberg, Morgan Stanley Research

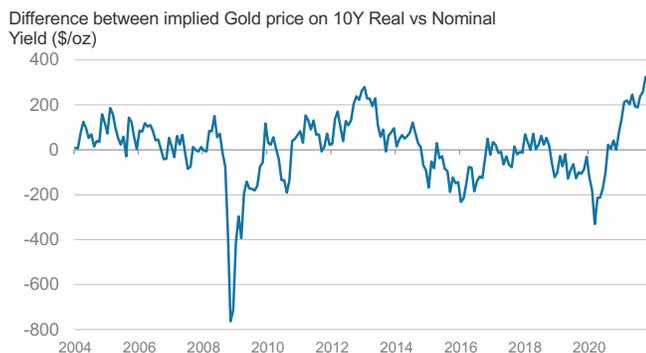
Morgan Stanley does and seeks to do business with companies covered in Morgan Stanley Research. As a result, investors should be aware that the firm may have a conflict of interest that could affect the objectivity of Morgan Stanley Research. Investors should consider Morgan Stanley Research as only a single factor in making their investment decision.

For analyst certification and other important disclosures, refer to the Disclosure Section, located at the end of this report.

+ = Analysts employed by non-U.S. affiliates are not registered with FINRA, may not be associated persons of the member and may not be subject to FINRA restrictions on communications with a subject company, public appearances and trading securities held by a research analyst account.

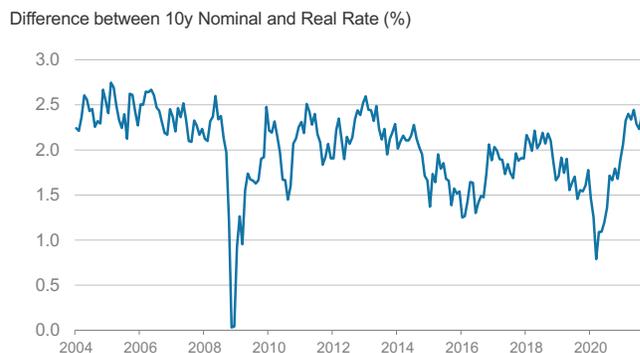
Additional Charts

Exhibit 3: The disconnect between real and nominal implied gold price is at a record level in \$ terms



Source: Bloomberg, Morgan Stanley Research

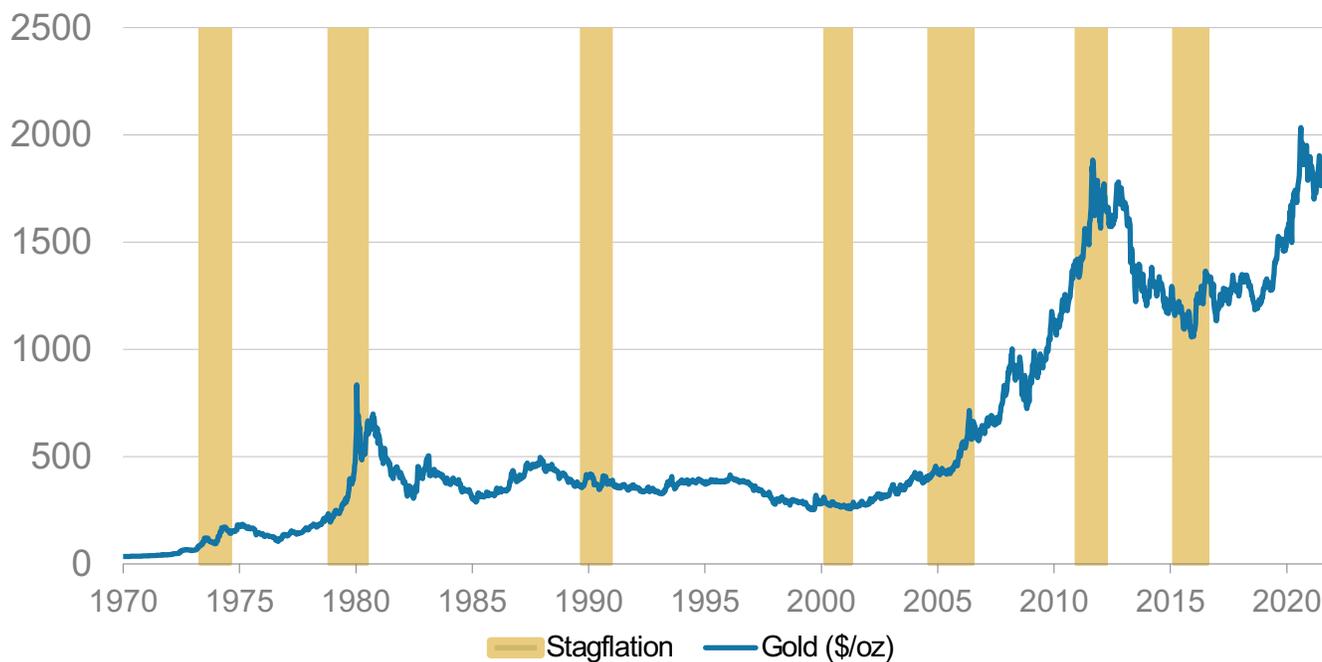
Exhibit 4: Inflation breakevens are also at decade highs



Source: Bloomberg, Morgan Stanley Research

Exhibit 5: Stagflationary periods have typically been supportive for gold prices

Gold Price (\$/oz) and Stagflation



Source: Note: Stagflation periods based loosely on periods highlighted by WGC data from <https://www.gold.org/goldhub/research/investment-update-stagflation-rears-its-ugly-head>

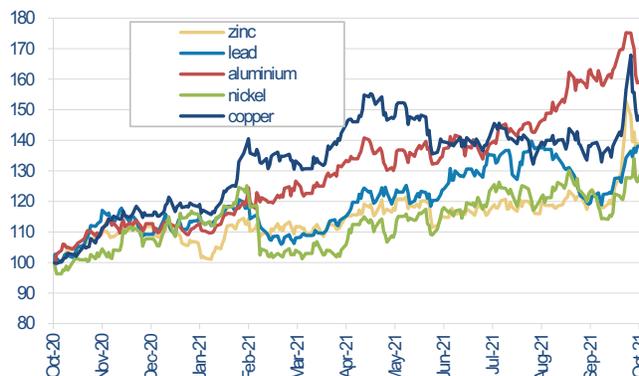
Week in Review

Base Metals: Base metal prices continued to come under pressure, led by aluminium and zinc as China proposed price controls on coal prices and pushed for higher supply. Copper held up on a relative basis as LME available inventories remain low. Our economists have revised their Q4 China [GDP growth forecast](#) down by 70bps to 3.3%.

Precious Metals: Gold hovered around \$1,800/oz as real rates weakened. Both platinum and palladium moved lower as uncertainty remains around the chip shortage recovery (see [Weekly Widget](#)).

Bulks : The iron ore price continued to trade lower, ending the week at \$107/t, as further blast furnace restrictions were enforced in Tangshan and China's iron ore port stocks expanded by almost 5Mt (+3%) on the week. Seaborne thermal coal prices came under further pressure, as the domestic sell-off on the back of China's proposed price cap spilled over in the seaborne market. Despite the sliding thermal coal price, met-coal held up well, as the market remains tight.

Exhibit 6: Base metals price indices (12-mth rolling)



Source: Bloomberg, Morgan Stanley Research

Exhibit 7: Precious metals indices



Source: Bloomberg, Morgan Stanley Research

Exhibit 8: Bulk commodity price indices (12-mth rolling)



Source: Platts, Bloomberg, Morgan Stanley Research

Morgan Stanley Price Forecasts

Exhibit 9: Summary of Morgan Stanley's commodity price forecasts (as at 28 Sep 2021)

commodity group	unit	1Q 21	2Q 21	3Q 21e	4Q 21e	1Q 22e	2Q 22e	3Q 22e	4Q 22e	2020	2021e	2022e	2023e	2024e	2025e	LT real	LT nom.
Base Metals																	
Aluminium	US\$/lb	0.95	1.09	1.20	1.36	1.30	1.28	1.18	1.13	0.77	1.15	1.22	1.05	1.10	1.15	0.93	1.05
	US\$/t	2,094	2,396	2,638	2,998	2,866	2,822	2,601	2,491	1,704	2,532	2,695	2,315	2,425	2,535	2,050	2,323
Copper	US\$/lb	3.85	4.39	4.26	4.15	4.00	3.85	3.60	3.20	2.80	4.16	3.66	3.05	3.11	3.19	2.82	3.20
	US\$/t	8,490	9,679	9,394	9,149	8,818	8,488	7,937	7,055	6,178	9,178	8,074	6,724	6,862	7,022	6,217	7,045
Nickel	US\$/lb	7.96	7.87	8.68	9.00	8.75	8.50	8.00	7.50	6.26	8.38	8.19	6.81	7.54	7.80	6.90	7.82
	US\$/t	17,545	17,354	19,147	19,842	19,290	18,739	17,637	16,535	13,794	18,472	18,050	15,019	16,617	17,196	15,212	17,238
Zinc	US\$/lb	1.25	1.32	1.36	1.35	1.25	1.15	1.10	1.08	1.03	1.32	1.15	1.05	1.08	1.10	1.05	1.19
	US\$/t	2,749	2,913	2,990	2,976	2,756	2,535	2,425	2,381	2,267	2,907	2,524	2,320	2,370	2,414	2,315	2,623
Lead	US\$/lb	0.91	0.96	1.06	1.03	1.00	0.95	0.90	0.85	0.83	0.99	0.93	0.80	0.80	0.84	0.80	0.91
	US\$/t	2,011	2,125	2,340	2,271	2,205	2,094	1,984	1,874	1,825	2,186	2,039	1,764	1,764	1,852	1,764	1,999
Precious Metals																	
Gold	US\$/oz	1,795	1,814	1,792	1,725	1,675	1,650	1,600	1,560	1,769	1,782	1,621	1,550	1,475	1,390	1,155	1,309
Silver	US\$/oz	26.2	26.7	24.4	23.0	22.9	23.6	22.9	22.3	20.5	25.1	22.9	22.2	21.1	22.0	20.0	22.6
Platinum	US\$/oz	1,165	1,187	1,031	950	1,000	1,040	1,080	1,120	888	1,083	1,060	1,245	1,375	1,375	1,100	1,247
Palladium	US\$/oz	2,419	2,798	2,490	2,000	2,150	2,300	2,150	2,000	2,208	2,427	2,150	1,538	1,219	1,233	1,100	1,247
Bulks																	
Iron Ore (fines 62% Fe, cfr N.China)	US\$/t	167	200	155	85	90	110	95	85	108	152	95	81	61	63	56	63
Hard Coking Coal (spot, fob Aus)	US\$/t	128	138	270	340	270	220	170	180	125	219	210	151	144	145	134	152
Thermal coal (spot, fob Newc)	US\$/t	87	107	165	190	170	150	130	120	60	137	143	95	75	76	69	78
Other																	
Manganese ore (44%)	US\$/mtu	5.1	5.0	5.2	5.2	5.0	5.0	5.0	5.0	4.6	5.1	5.0	4.9	4.7	4.5	4.1	4.6
Alumina (spot, fob Aus)	US\$/t	299	277	322	380	340	290	285	285	271	319	300	288	304	320	321	364
Lithium carbonate (contract, fob Chile)	US\$/t	7,505	9,167	11,500	13,000	14,000	15,000	13,000	11,000	6,859	10,293	13,250	8,563	7,000	7,050	6,590	7,468
Cobalt	US\$/lb	21.9	20.8	23.5	23.0	20.0	19.0	18.0	18.0	16.2	22.3	18.8	17.3	15.0	16.0	15.0	17.0
Uranium - spot	US\$/lb	28.9	30.6	35.0	55.0	45.0	40.0	37.0	37.0	29.7	37.4	39.8	41.0	48.5	45.8	35.0	39.7
Exchange Rates																	
1 AUD = USD		0.77	0.77	0.74	0.75	0.75	0.75	0.75	0.75	0.69	0.76	0.75	0.75	0.74	0.73	0.71	0.72
1 USD = BRL		5.47	5.29	5.22	5.11	5.08	5.15	5.15	5.11	5.14	5.27	5.12	5.15	5.21	5.28	5.39	5.39
1 USD = CAD		1.27	1.23	1.26	1.25	1.26	1.27	1.29	1.30	1.34	1.25	1.28	1.29	1.27	1.25	1.26	1.23
1 USD = ZAR		14.96	14.12	14.61	14.50	14.91	15.33	15.74	16.15	16.42	14.55	15.53	17.19	18.47	19.12	15.60	20.10
1 EUR = USD		1.21	1.21	1.18	1.18	1.19	1.19	1.19	1.19	1.14	1.19	1.19	1.20	1.21	1.22	1.31	1.23
1 USD = CNY		6.48	6.46	6.47	6.25	6.24	6.23	6.22	6.20	6.90	6.42	6.22	6.25	6.33	6.41	6.48	6.52

Source: LME, Bloomberg, Platts, Morgan Stanley Research estimates (e). Exchange rate forecasts are the assumptions that are compiled and used by Global Resources Equity Team; all prices are nominal, unless otherwise indicated.

Commodity Thermometer

Exhibit 10: Metals & Mining Commodity Thermometer

Rating	Commodity	Bearish	Neutral	Bullish	Thesis
6	Lithium Carbonate				Surging EV demand leaves supply to play catch-up, significantly tightening the market. We see this as transitory, with price gradually normalising from 2Q22.
5	Uranium				Physical investor buying is likely to extend the current price rally, but we see the recent rate of inflows as unsustainable, and expect a price correction through 2022.
4	Platinum				Rebalancing ahead, driven by platinum for palladium substitution, further heavy duty/diesel emission tightening and industrial demand strength, while recycled supply capacity stays constrained.
4	Aluminum				China's power challenges keep aluminium supplies tight and prices supported over winter, but pressure should ease into 2022 as power and logistical constraints ease.
4	Palladium				Some upside on 2022/23 deficit and inflection in global auto production, but longer-term structural challenges.
4	Nickel				Price impact of slowing demand from China's stainless steel production cuts is offset by the looming risk of an Indonesian export ban, providing price support into 1H22.
3	Silver				Some room to outperform versus gold on industrial demand as autos production rates improve, but overhang from higher rates and stronger USD.
3	Lead				Ex-China balance remains tight, and high freight rates prevent surplus volumes flowing from China. Expect price to ease in 2022 as mine supply recovers.
3	Manganese Ore				We see a further loosening of a market that is already weighed down by higher inventories, and expect limited price upside.
3	Thermal Coal				China's continued coal shortage and seaborne supply disruptions should keep the market tight and price relatively resilient.
2	Copper				Underpinned by China restocking demand and sentiment drivers around COP26 and infrastructure stimulus, but supply growth drives surplus in 2022-23. Long-term structural demand story remains intact.
2	Gold				Higher rates partly priced in but our economists call for further increases as asset purchase tapering starts, driving a stronger USD and weighing on the gold price.
2	Alumina				Supply disruptions should ease in 2022 as Jamalco and Alumar return to full production. Keep an eye on China refinery versus smelter cuts for future balance.
1	Zinc				We see price supported in Q4 as China power shortages keep production constrained but zinc's exposure to steel end markets means demand headwinds are building, weighing on price into 2022.
1	Cobalt				Accelerating mine supply growth, as the rate of demand growth eases, should tip the market back into surplus.
1	Hard Coking Coal				Looking overpriced vs iron ore now, but the supply recovery and easing of elevated price is likely to take time.
1	Iron Ore				We believe iron ore can dip further into 4Q/1Q, but expect a bounce by 2Q22, as China's steel production curbs are lifted and infrastructure stimulus filters through.

Source: Morgan Stanley Research. Note order of preference based on MSe 1Q22e vs 3Q21e average prices

Recent Reports + Upcoming Events

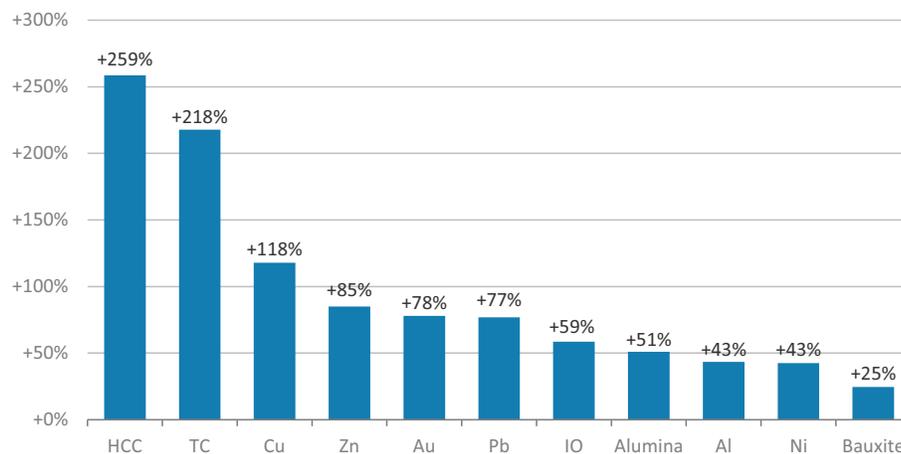
Recent Research	Date
Commodity Matters: 10 Takeaways from Magnesium Expert Call	25-Oct-21
metal&ROCK: Defiant nickel	25-Oct-21
Commodity Matters: Magnesium Madness	20-Oct-21
Commodity Matters: Lessons from the iron ore majors	20-Oct-21
Commodity Matters: China coal supply uplift?	19-Oct-21
metal&ROCK: P + P = P	18-Oct-21
Commodity Matters: Iron ore – lifting the floor	13-Oct-21
Commodity Matters: Zinc - A tightening European market	13-Oct-21
China Materials: Sep Trade Data – Material Rebound in Coal Imports	13-Oct-21
metal&ROCK: Iron ore – more downside	11-Oct-21
metal&ROCK: Aluminium: Staying Tight	04-Oct-21
metal&ROCK: The Price Deck – 4Q 2021	28-Sep-21
metal&ROCK: Nickel's next supply shock	20-Sep-21
metal&ROCK: Uranium rediscovered	13-Sep-21
Rust Review: A rapidly loosening market	07-Sep-21
Commodity Matters: Alumina awakes	07-Sep-21
metal&ROCK: Met-coal rebuffs iron ore	31-Aug-21
metal&ROCK: Commodities – Seeking entry	23-Aug-21
Commodity Matters: Iron ore – washout	19-Aug-21
metal&ROCK: Thermal coal's relentless rally	16-Aug-21
metal&ROCK: Iron ore's bear market lessons	09-Aug-21
China Materials: Jul Trade Data – Softened Steel Exports	08-Aug-21
Metal & Rock: Copper – Triple Supply Threat	02-Aug-21

Exhibit 11: Upcoming China economic data relevant to Commodities

Date	Event
7-Nov	Exports YoY CNY
7-Nov	Imports YoY CNY
7-Nov	Trade Balance CNY
10-Nov	CPI YoY

Source: Bloomberg, Morgan Stanley Research

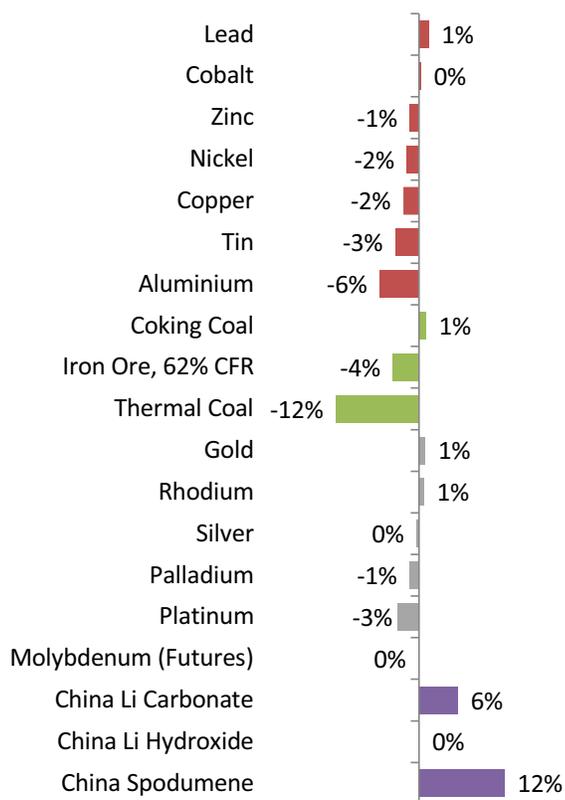
Exhibit 12: Spot commodity prices vs. the marginal cost of production



Source: Wood Mackenzie, Bloomberg, Morgan Stanley Research. Note: Marginal cost (year 2021); dataset Q3 2021; C1 cash costs. Coal dataset is 3Q 2021.

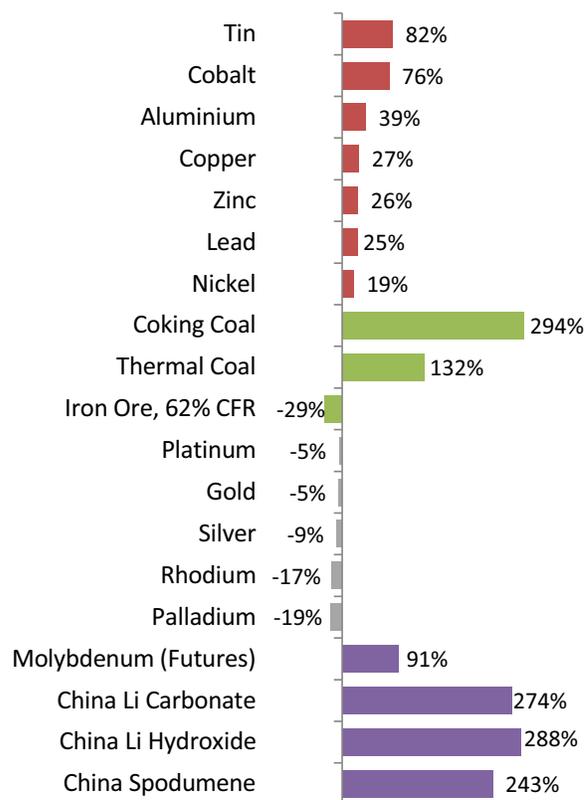
Commodity Price Snapshot

Exhibit 13: Key metals: one-week absolute performance, 21-Oct-21 to 28-Oct-21



Source: Bloomberg, Morgan Stanley Research

Exhibit 14: Key metals: YTD absolute performance, through 28-Oct-21



Source: Bloomberg, Morgan Stanley Research

Exhibit 15: Base Metals: price snapshot

Base Metals	28-Oct-21	21-Oct-21	WoW Change (%)
Copper	4.47	4.57	-2.2%
Aluminium	1.24	1.31	-5.6%
Zinc	1.56	1.58	-1.3%
Nickel	8.93	9.08	-1.7%
Lead	1.12	1.10	1.3%
Tin	16.95	17.53	-3.3%
Cobalt	25.52	25.45	0.3%

Source: Bloomberg, Morgan Stanley Research; WoW = Week on week

Exhibit 16: Bulks: price snapshot

Bulks	28-Oct-21	21-Oct-21	WoW Change (%)
Iron Ore, 62% CFR	113.2	117.5	-3.7%
Thermal Coal	132.5	150.1	-11.8%
Coking Coal	404.0	400.0	1.0%

Source: Bloomberg, Morgan Stanley Research; WoW = Week on week

Exhibit 17: Precious Metals & PGMs: price snapshot

Precious Metals and PGMs	28-Oct-21	21-Oct-21	WoW Change (%)
Gold	1,799	1,783	0.9%
Silver	24.08	24.16	-0.3%
Platinum	1,021	1,053	-3.0%
Palladium	1,991	2,018	-1.3%
Rhodium	14,100	14,000	0.7%

Source: Bloomberg, Morgan Stanley Research; WoW = Week on week

Exhibit 18: Other Metals: price snapshot

Other	28-Oct-21	21-Oct-21	WoW Change (%)
Molybdenum, LME Cash (US\$/lb)	19.1	19.2	-0.1%
Uranium UxC-Ux U3O8 Spot (US\$/lb)	43.1	43.1	0.0%
China Lithium Carbonate 99.5% Ex-VAT (US\$/t)	25,962.7	24,608.6	5.5%
China Lithium Hydroxide 56.5% Ex-VAT (US\$/t)	24,614.0	24,608.6	0.0%
China Spodumene 5% min CIF Ex-VAT (US\$/t)	1,198.3	1,069.0	12.1%

Source: Bloomberg, Morgan Stanley Research; WoW = Week on week

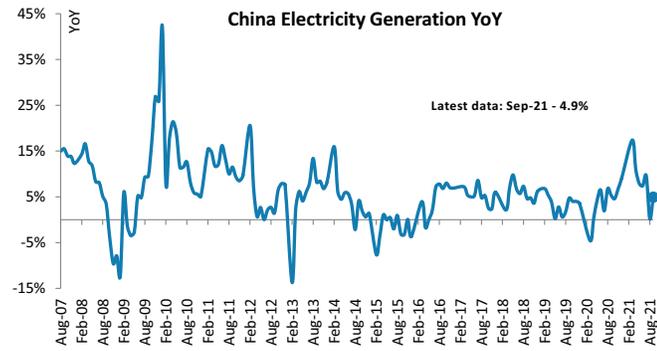
Exhibit 19: Exchange rate snapshot of major metal-producing countries

FX Rates of Key Commodity Countries	28-Oct-21	21-Oct-21	WoW Change (%)
1 AUD = USD (Australian \$)	0.75	0.75	1.0%
1 EUR = USD (Euro)	1.17	1.16	0.5%
1 USD = BRL (Brazilian Real)	5.65	5.66	-0.3%
1 USD = CAD (Canadian \$)	1.23	1.24	-0.2%
1 USD = CLP (Chilean Peso)	806	818	-1.4%
1 USD = CNY (Chinese Renmimbi)	6.39	6.39	0.0%
1 USD = KZT (Kazakh Tenge)	428	426	0.4%
1 USD = MXN (Mexican Peso)	20.37	20.30	0.3%
1 USD = NOK (Norwegian Krone)	8.33	8.36	-0.4%
1 USD = PEN (Peruvian New Sol)	3.98	3.95	0.8%
1 USD = SEK (Swedish Krona)	8.52	8.60	-1.0%
1 USD = ZAR (S. African Rand)	15.13	14.69	3.0%
1 USD = ZMW (Zambian Kwacha)	17.24	17.10	0.8%

Source: Bloomberg, Morgan Stanley Research; WoW = Week on week

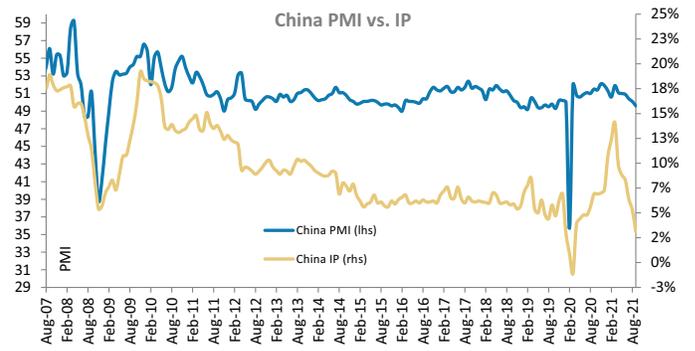
China's Macro Indicators

Exhibit 20: China's electricity generation



Source: CEIC, Morgan Stanley Research

Exhibit 21: China's Purchasing Managers Index and Industrial Production (IP)



Source: CEIC, Morgan Stanley Research

Exhibit 22: China's M2 money supply



Source: CEIC, Morgan Stanley Research

Exhibit 23: China's machinery sales



Source: CEIC, Morgan Stanley Research

Exhibit 24: China's Infrastructure Fixed Asset Investments (FAI)



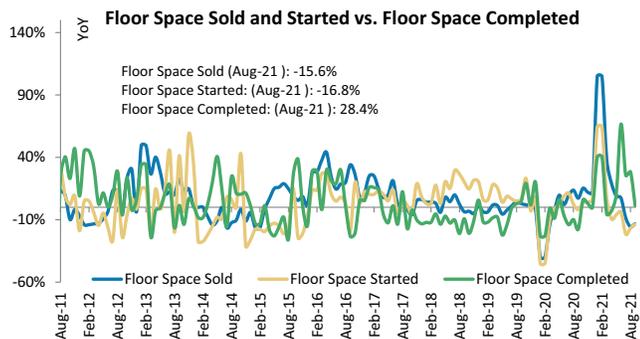
Source: CEIC, Morgan Stanley Research

Exhibit 25: China's land sales



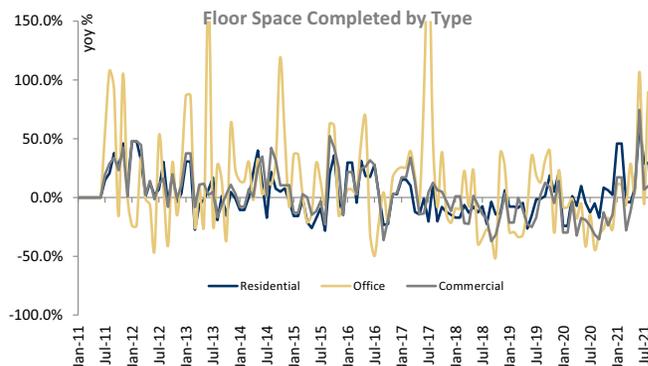
Source: CEIC, Morgan Stanley Research

Exhibit 26: China's floor space started and sold vs floor space completed



Source: CEIC, Morgan Stanley Research

Exhibit 27: Floor space completed by type of establishment



Source: CEIC, Morgan Stanley Research

Exhibit 28: China's national average property sales



Source: CEIC, Morgan Stanley Research

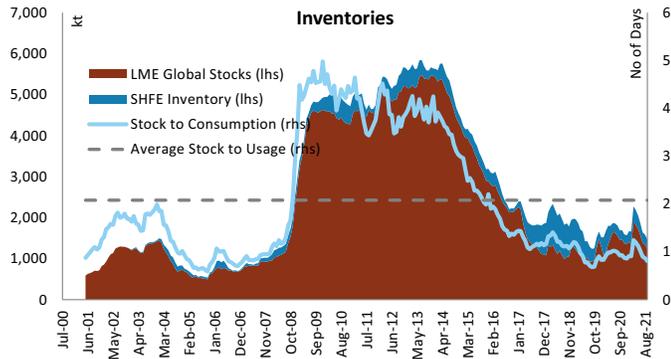
Exhibit 29: MS China Economic Index vs. China IP



Source: Bloomberg, Morgan Stanley Research

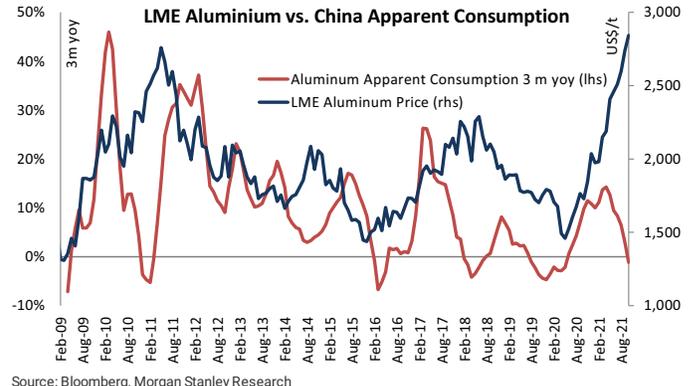
Aluminium

Exhibit 30: Aluminium exchange inventories and days of consumption



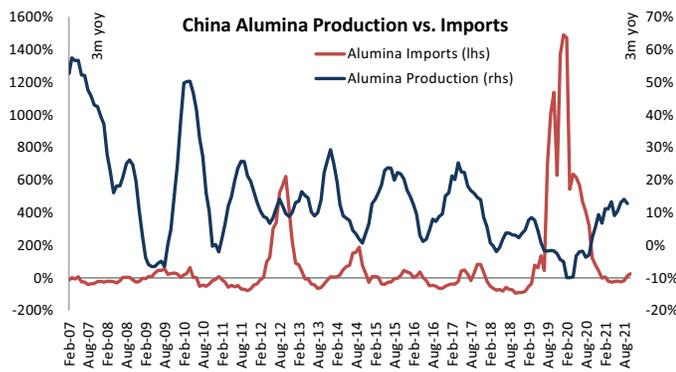
Source: Bloomberg, WBMS, Morgan Stanley Research

Exhibit 31: China's apparent consumption vs. price



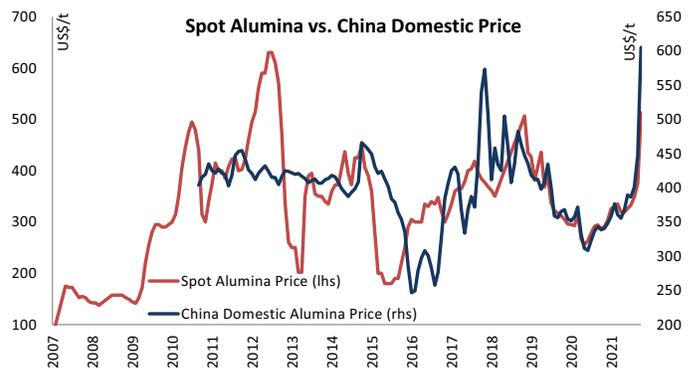
Source: Bloomberg, Morgan Stanley Research

Exhibit 32: Raw materials: China's alumina production vs. imports



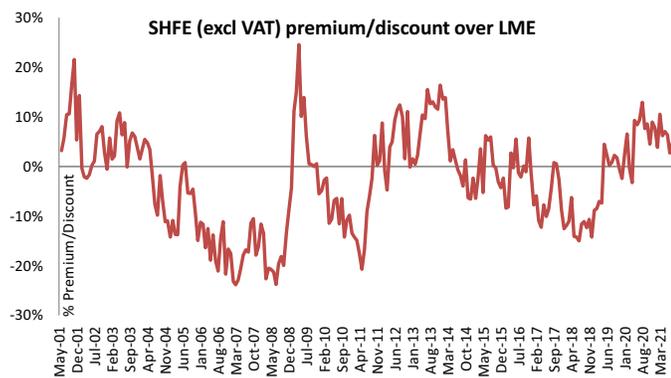
Source: Bloomberg, Morgan Stanley Research

Exhibit 33: Raw materials: spot alumina vs. China's domestic price



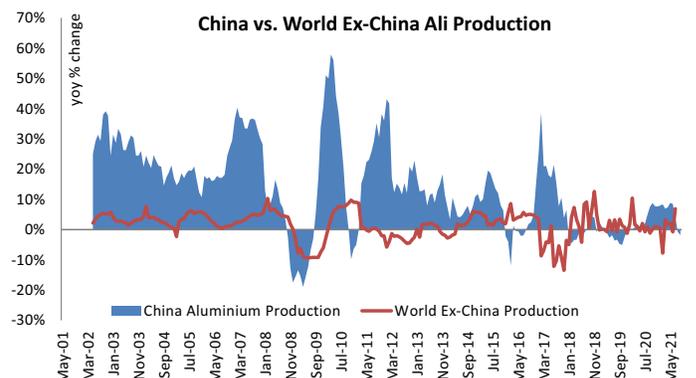
Source: Bloomberg, Morgan Stanley Research

Exhibit 34: Price differentials: SHFE vs. LME



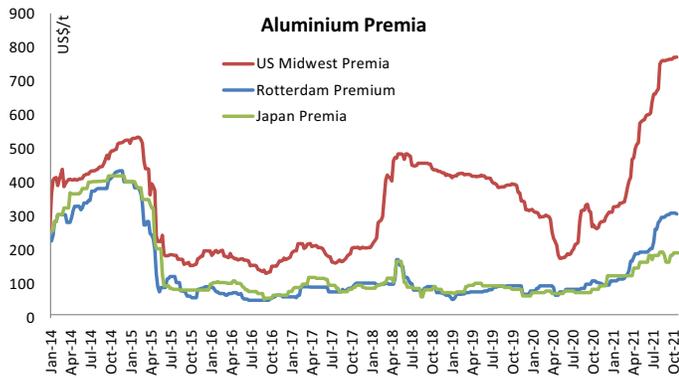
Source: Bloomberg, Morgan Stanley Research

Exhibit 35: Aluminium world production ex-China



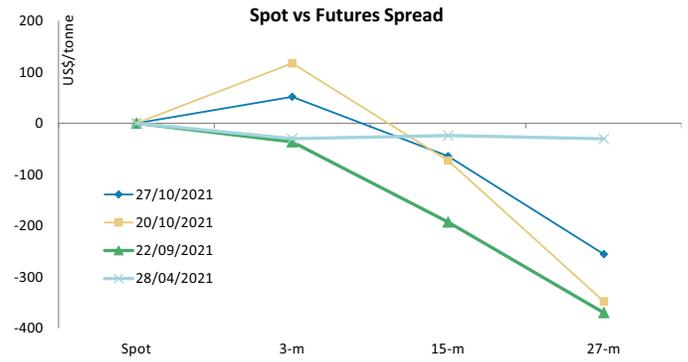
Source: Bloomberg, Morgan Stanley Research

Exhibit 36: Physical demand: aluminium premia, by region



Source: Bloomberg, Morgan Stanley Research

Exhibit 37: Contango vs. Backwardation: aluminium futures curve movement



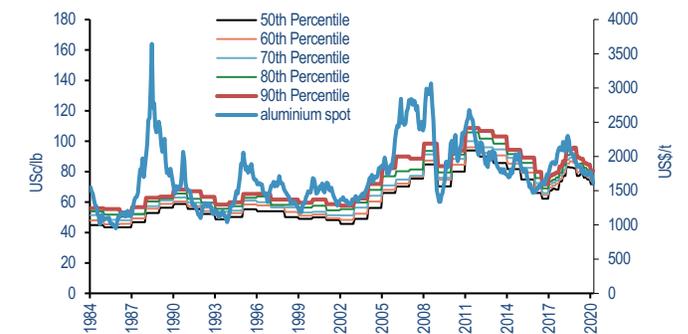
Source: Bloomberg, Morgan Stanley Research

Exhibit 38: China's aluminium exports, by product type



Source: Bloomberg, Morgan Stanley Research

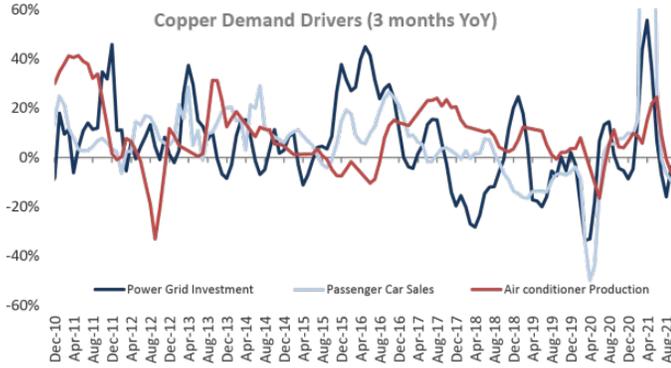
Exhibit 39: Aluminium cost curve evolution



Source: Wood Mackenzie, Morgan Stanley Research

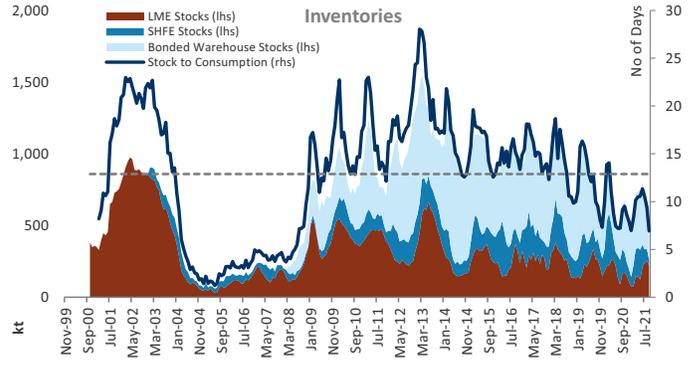
Copper

Exhibit 40: China demand – grid investments, car sales, and air conditioner sales



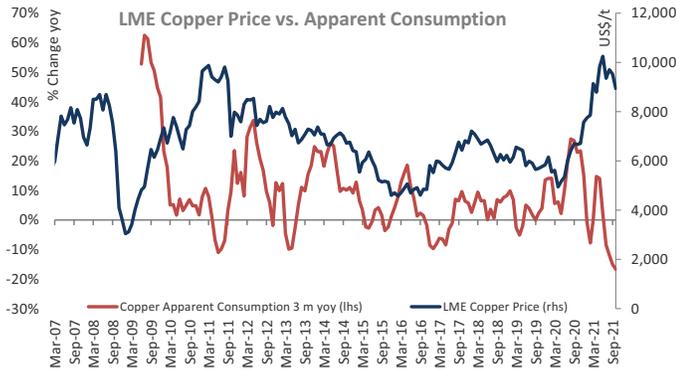
Source: Bloomberg, Morgan Stanley Research

Exhibit 41: Copper exchange and bonded warehouse inventories vs. days of consumption



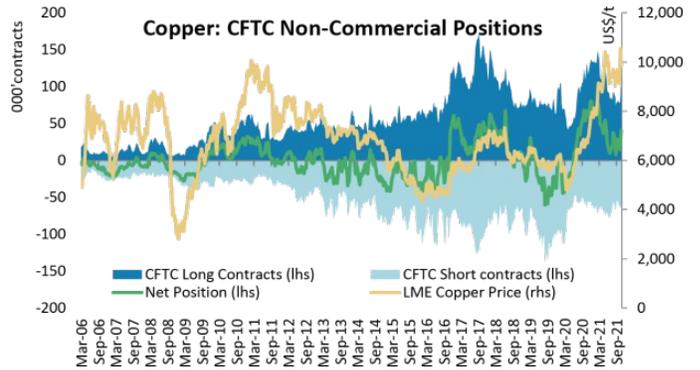
Source: Bloomberg, Morgan Stanley Research

Exhibit 42: China's copper price vs. apparent consumption



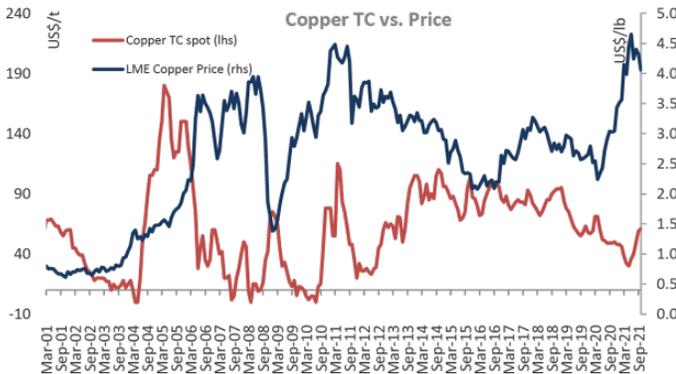
Source: Bloomberg, Morgan Stanley Research, * Apparent Consumption is calculated as refined production less net exports and change in SHFE stocks.

Exhibit 43: CFTC speculative net length



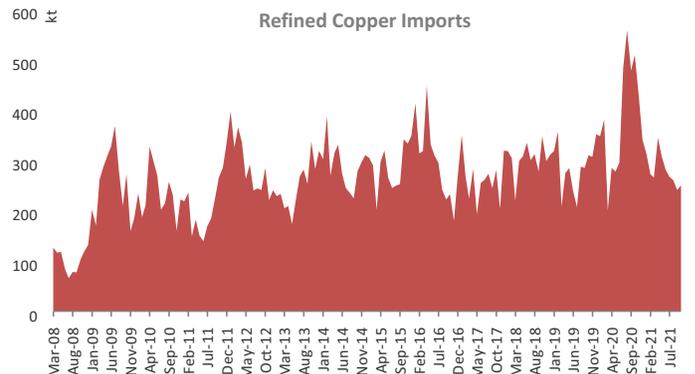
Source: Bloomberg, CFTC, Morgan Stanley Research

Exhibit 44: Copper treatment charges (TCs) vs. price



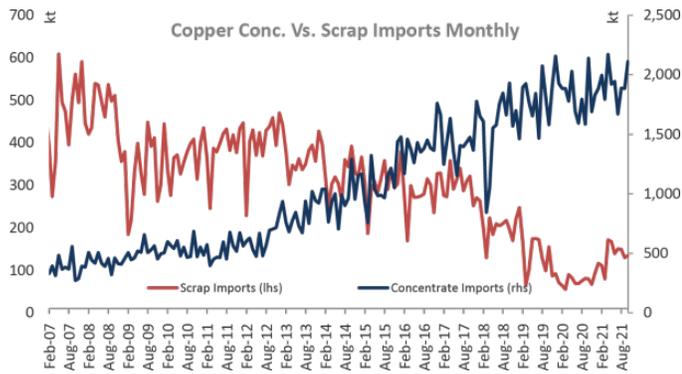
Source: Bloomberg, Wood Mackenzie, Morgan Stanley Research

Exhibit 45: China's refined copper imports



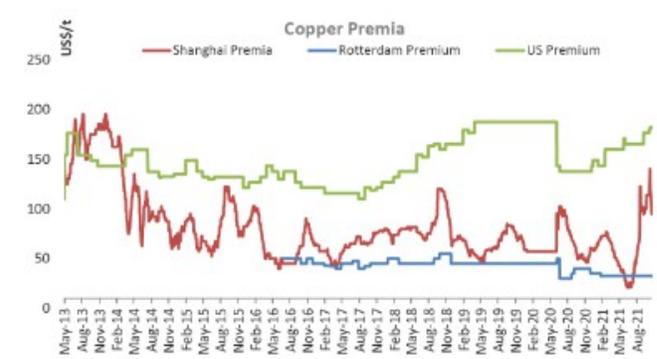
Source: Bloomberg, Wood Mackenzie, Morgan Stanley Research

Exhibit 46: Raw materials: China's copper concentrate and scrap monthly imports



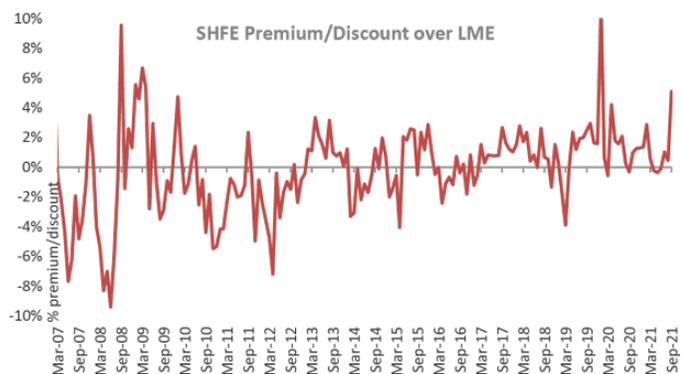
Source: Bloomberg, Morgan Stanley Research

Exhibit 47: Physical demand: copper premia by region



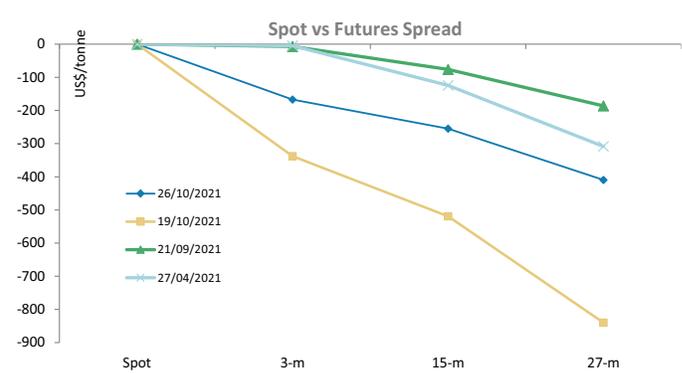
Source: Bloomberg, Morgan Stanley Research

Exhibit 48: Price differentials: SHFE vs. LME



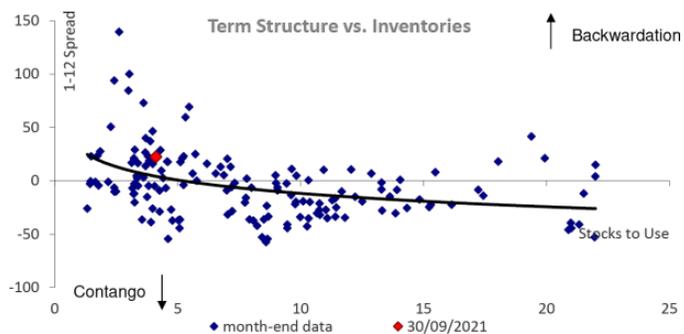
Source: Bloomberg, Morgan Stanley Research

Exhibit 49: Contango vs. Backwardation: copper forward curve



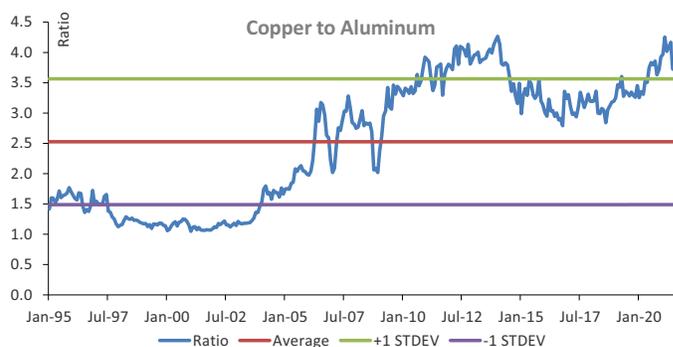
Source: Bloomberg, Morgan Stanley Research

Exhibit 50: Copper term structure vs. inventories



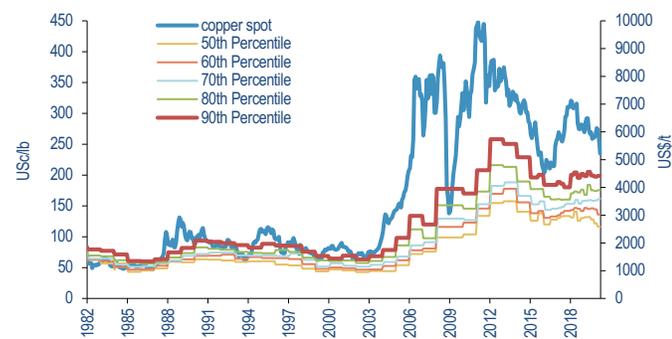
Source: Bloomberg, Morgan Stanley Research

Exhibit 51: Copper to aluminium ratio



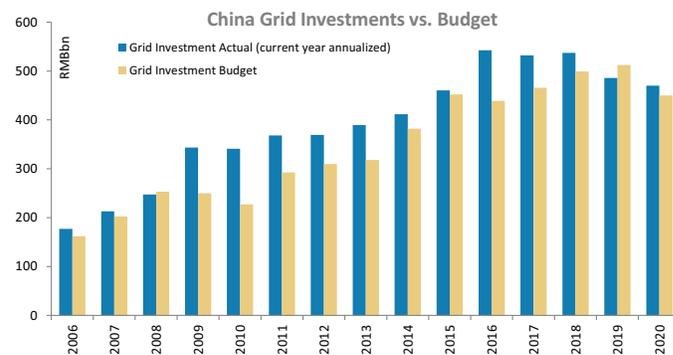
Source: Bloomberg, Morgan Stanley Research

Exhibit 52: Copper cost curve evolution



Source: Wood Mackenzie, Morgan Stanley Research

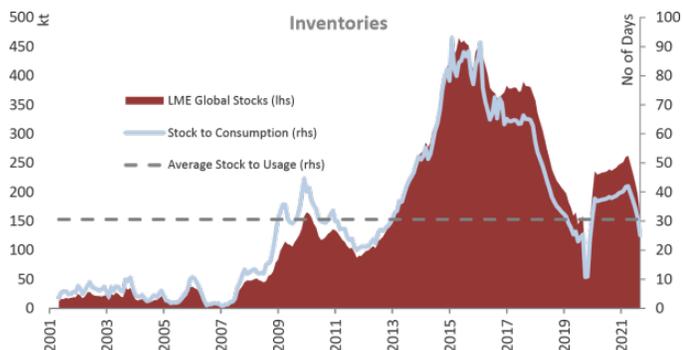
Exhibit 53: China grid investments (annualised) vs. government spending budget



Source: China State Grid, Bloomberg, Morgan Stanley Research

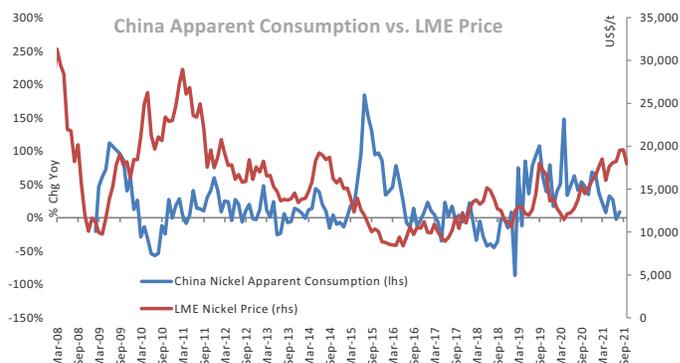
Nickel

Exhibit 54: Nickel exchange inventories and days of consumption



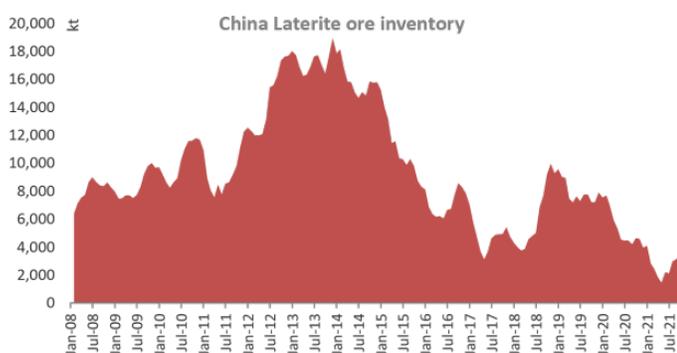
Source: Bloomberg, INSG, Morgan Stanley Research

Exhibit 55: China's apparent nickel consumption vs. LME price



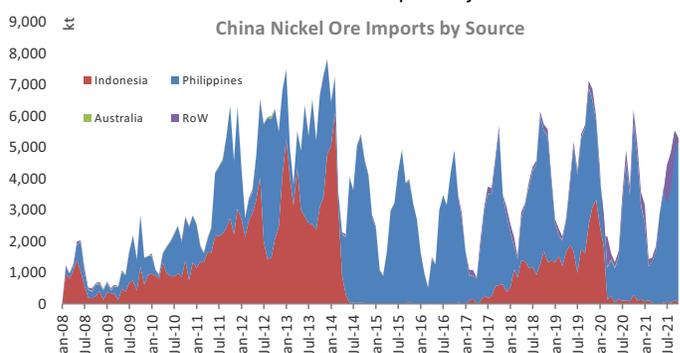
Source: Bloomberg, INSG, Morgan Stanley Research

Exhibit 56: Raw materials: nickel laterite ore inventories



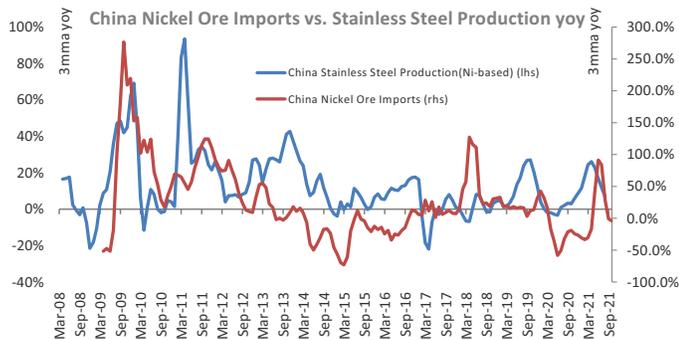
Source: Bloomberg, Morgan Stanley Research

Exhibit 57: Raw materials: China's ore imports by source



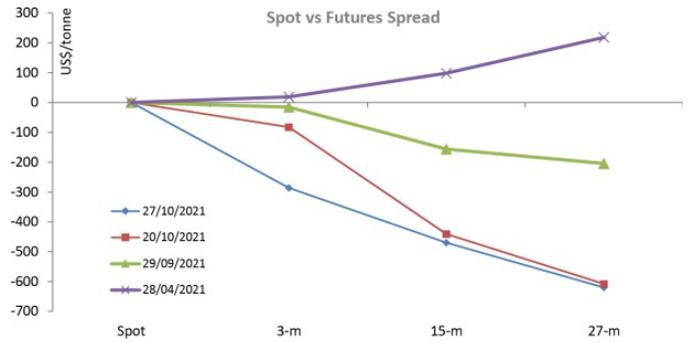
Source: Bloomberg, Morgan Stanley Research

Exhibit 58: China's nickel ore imports vs. stainless steel production



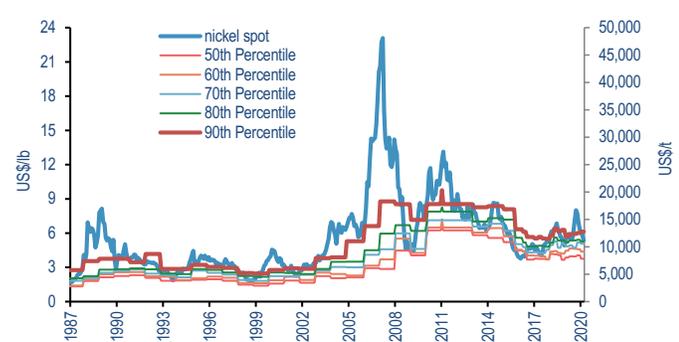
Source: Bloomberg, Morgan Stanley Research

Exhibit 59: Contango vs. Backwardation: nickel futures curve movement



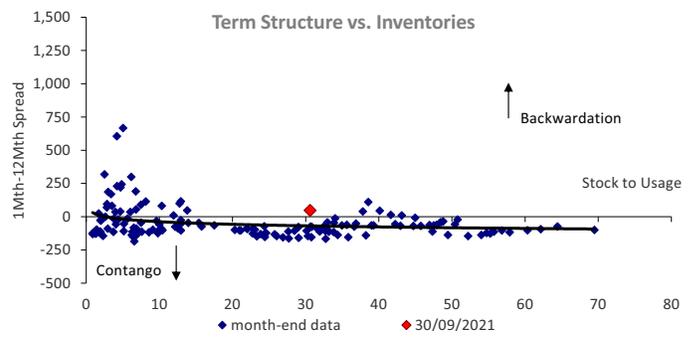
Source: Bloomberg, Morgan Stanley Research

Exhibit 60: Nickel cost curve evolution



Source: Wood Mackenzie, Morgan Stanley Research

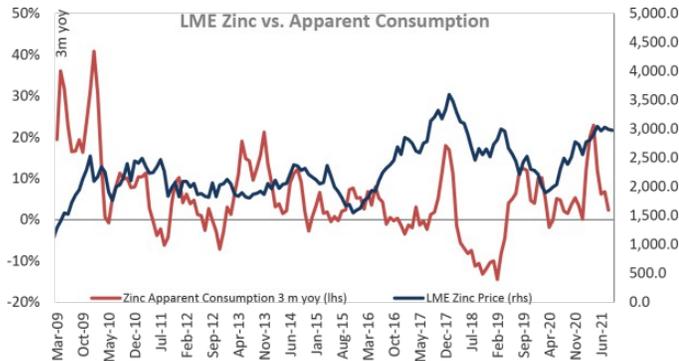
Exhibit 61: Nickel term structure vs. inventories



Source: Bloomberg, Morgan Stanley Research

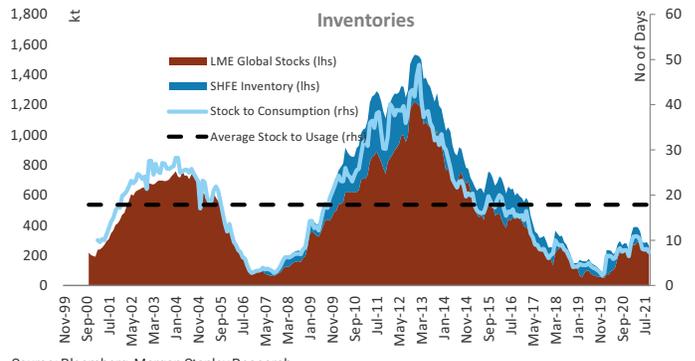
Zinc

Exhibit 62: China's apparent zinc consumption vs. LME price



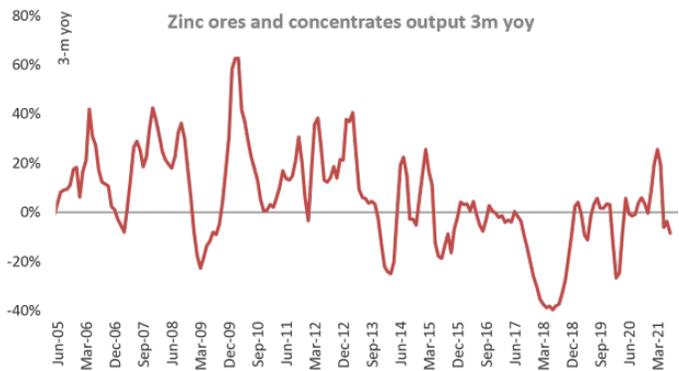
Source: Bloomberg, Morgan Stanley Research

Exhibit 63: Zinc exchange inventories and days of consumption



Source: Bloomberg, Morgan Stanley Research

Exhibit 64: Supply drivers: China's zinc ore and concentrate output



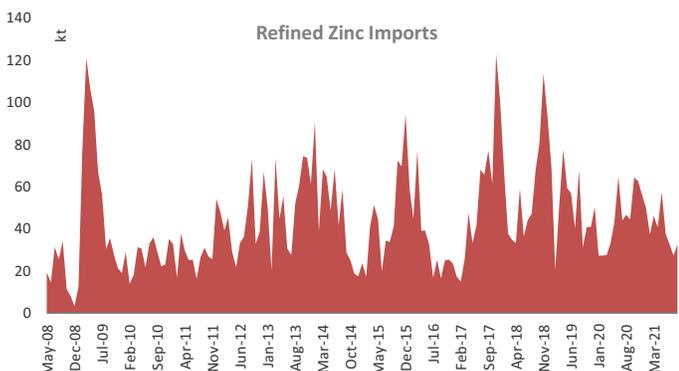
Source: Bloomberg, Morgan Stanley Research

Exhibit 65: Demand drivers: China's galvanised steel production and auto sales



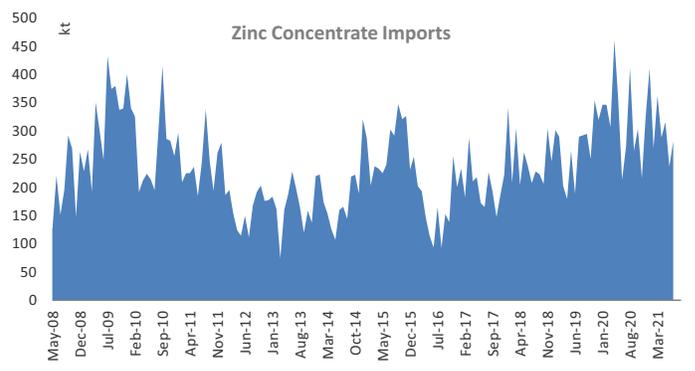
Source: Bloomberg, Morgan Stanley Research

Exhibit 66: Finished metal: China's refined zinc imports



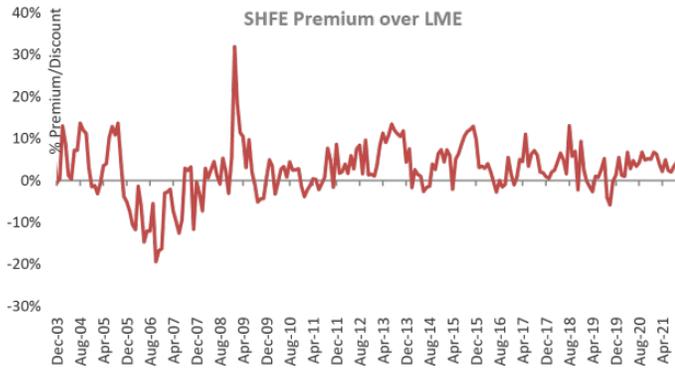
Source: Bloomberg, Morgan Stanley Research

Exhibit 67: Raw materials: China's zinc concentrate imports



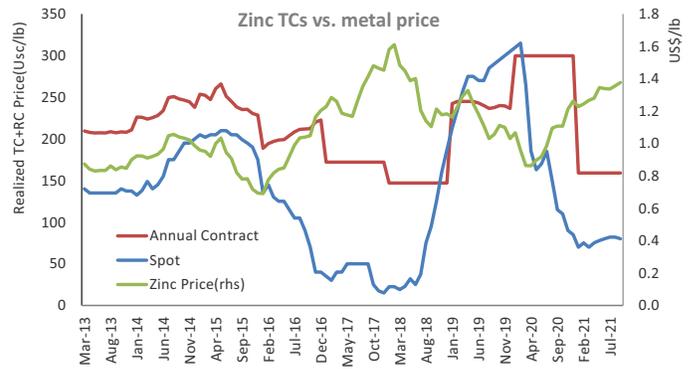
Source: Bloomberg, Morgan Stanley Research

Exhibit 68: Zinc price differentials: SHFE vs. LME



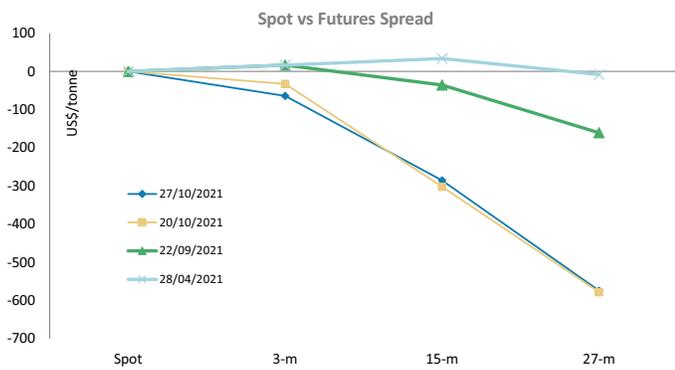
Source: Bloomberg, Morgan Stanley Research

Exhibit 69: Zinc TCs vs. metal price



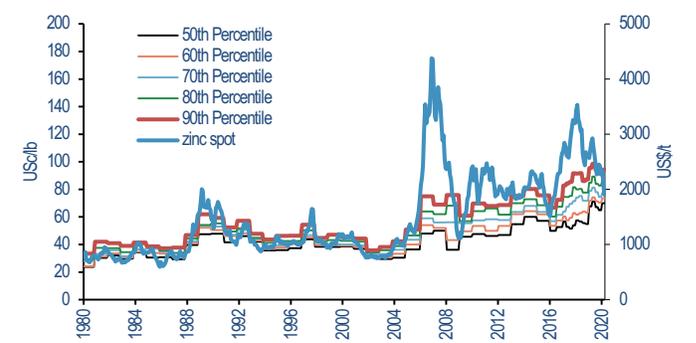
Source: Wood Mackenzie, Morgan Stanley Research

Exhibit 70: Contango vs. Backwardation: zinc futures curve movement



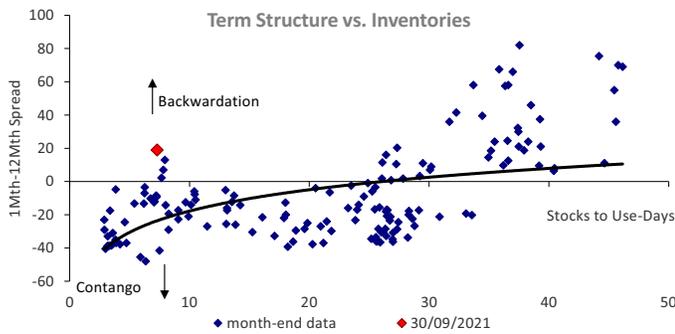
Source: Bloomberg, Morgan Stanley Research

Exhibit 71: Zinc cost curve evolution



Source: Wood Mackenzie, Morgan Stanley Research

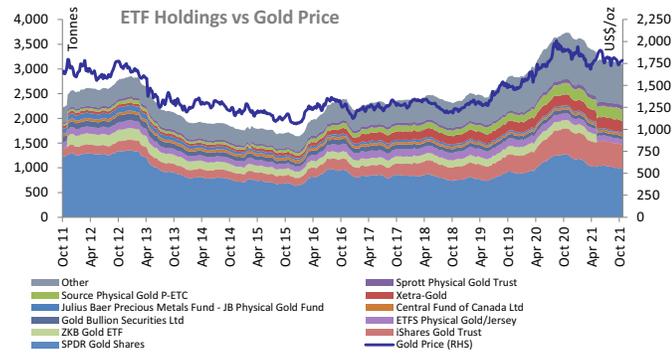
Exhibit 72: Zinc term structure vs. inventories



Source: Bloomberg, Morgan Stanley Research

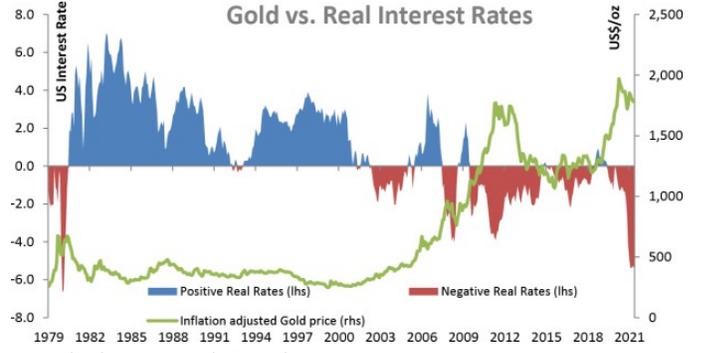
Gold + other precious metals

Exhibit 73: ETF gold holdings vs. gold price



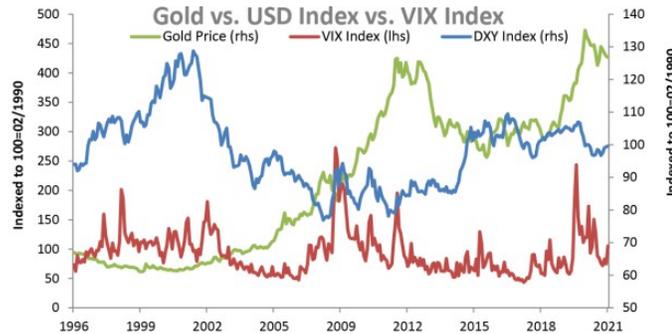
Source: Bloomberg, Morgan Stanley Research (Other includes: ETFS Gold Trust, Central GoldTrust, Royal Canadian Mint - Canadian Gold Reserves, iShares Gold Bullion ETF, db Physical Gold ETC, UBS ETF CH-Gold CHF hedged CHF, db Physical Gold Euro Hedged ETC, Pictet CH Precious Metals Fund - Physical Gold, iShares Gold CH, iShares Gold CHF Hedged CH, db Physical Gold ETC EUR, ETFS Physical Swiss Gold, Goldman Sachs Gold Exchange Traded Scheme - GS Gold BeES, Mitsubishi UFJ Japan Physical Gold ETF)

Exhibit 74: Gold price vs. real interest rates



Source: Bloomberg, Morgan Stanley Research

Exhibit 75: Gold performance vs. volatility index vs. dollar index



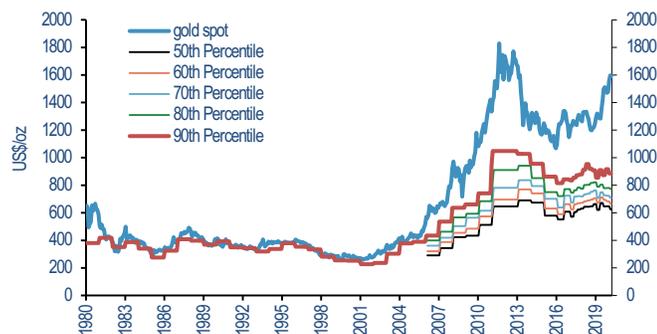
Source: Bloomberg, Morgan Stanley Research

Exhibit 76: Gold to Silver Ratio



Source: Bloomberg, Morgan Stanley Research

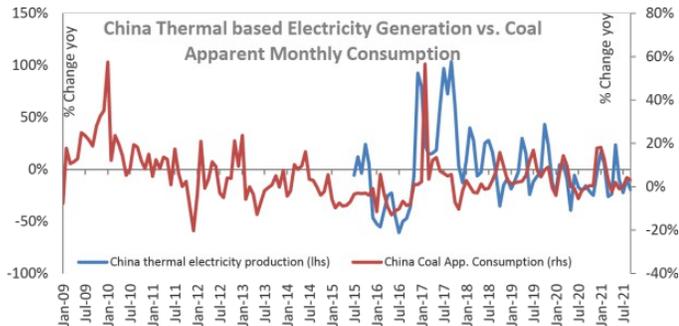
Exhibit 77: Gold cost curve (C1) evolution



Source: Wood Mackenzie, Morgan Stanley Research

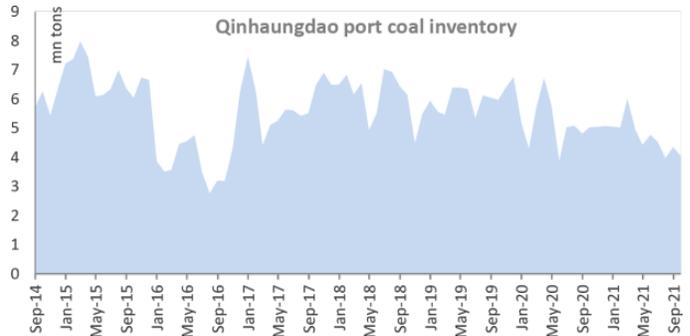
Coal

Exhibit 78: China's thermal based power generation vs. coal apparent monthly consumption



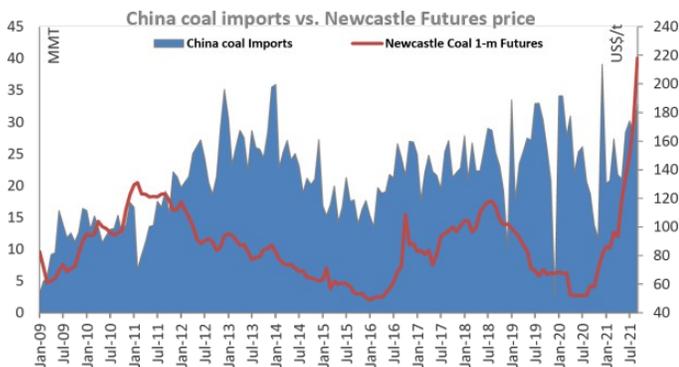
Source: NBS, Bloomberg, Morgan Stanley Research. Apparent Consumption is calculated as Domestic raw coal output less net coal exports

Exhibit 79: Coal inventories: Qinhuangdao port



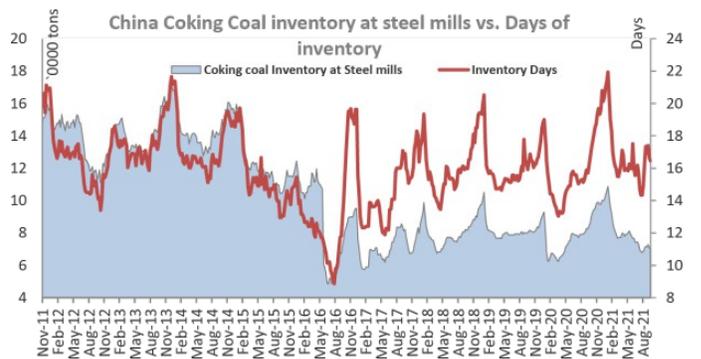
Source: Bloomberg, Morgan Stanley Research

Exhibit 80: China's coal imports vs. prices



Source: Bloomberg, Morgan Stanley Research

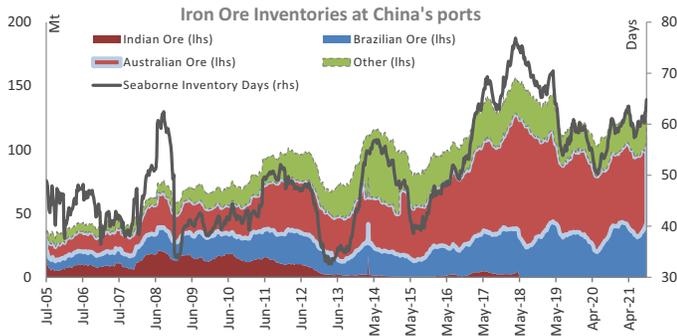
Exhibit 81: Inventories: China's coking coal inventories at steel mills vs. days of consumption



Source: Mysteel, Bloomberg, Morgan Stanley Research

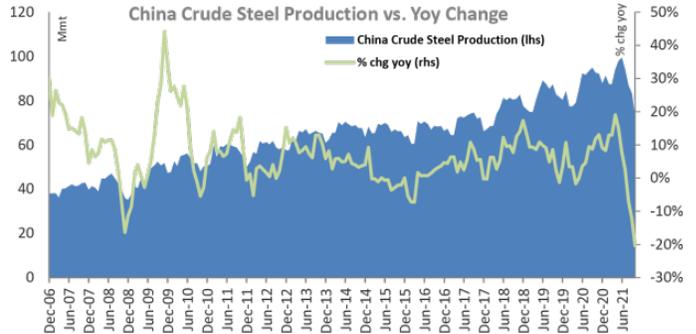
Iron Ore

Exhibit 82: Iron ore inventories at China's sea ports and inventory days of consumption



Source: Mysteel, Morgan Stanley Research

Exhibit 83: China's crude steel production, absolute and YoY change



Source: NBS, Bloomberg, Morgan Stanley Research

Exhibit 84: China's iron ore prices vs. steel prices



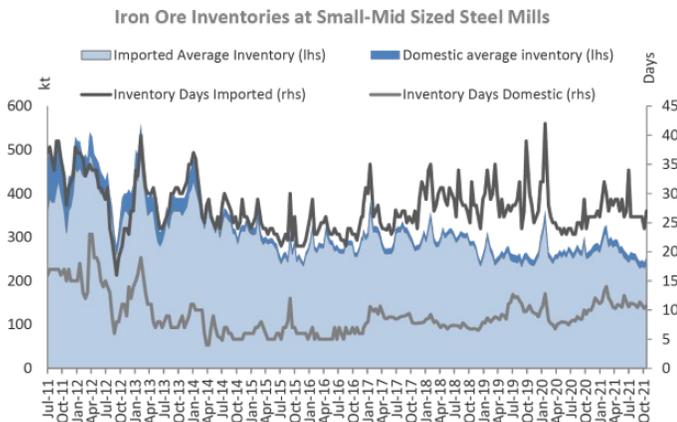
Source: Bloomberg, Morgan Stanley Research

Exhibit 85: Freight rates from key shipping regions to China



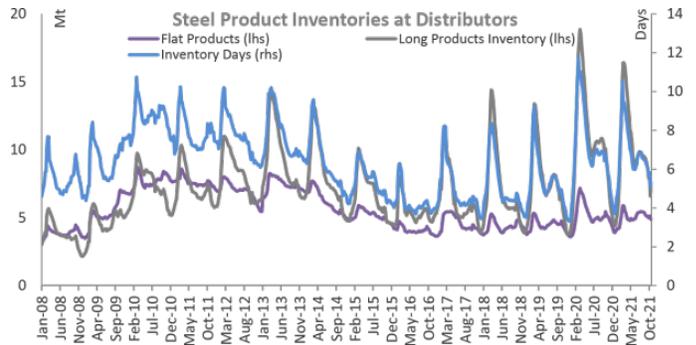
Source: Bloomberg, Morgan Stanley Research

Exhibit 86: China's iron ore inventories at small and mid-sized steel mills



Source: Mysteel, Morgan Stanley Research

Exhibit 87: China's steel product inventories at distributor level



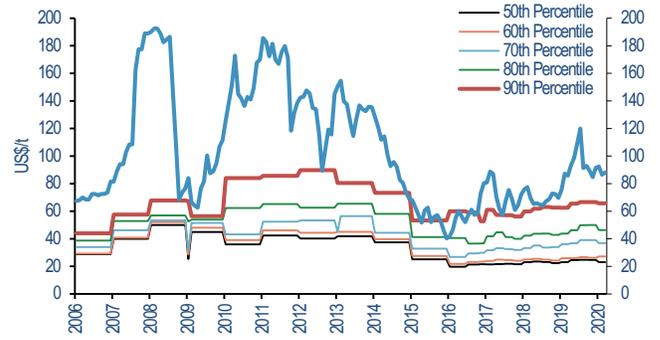
Source: Mysteel, Bloomberg, Morgan Stanley Research

Exhibit 88: China's iron ore imports



Source: Bloomberg, Morgan Stanley Research

Exhibit 89: Iron ore cost curve evolution

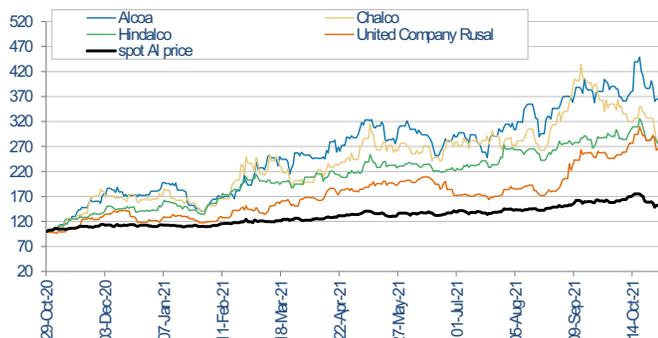


Source: Wood Mackenzie, Bloomberg, Morgan Stanley Research

Equity vs. Commodity – Relative One-Year Performance

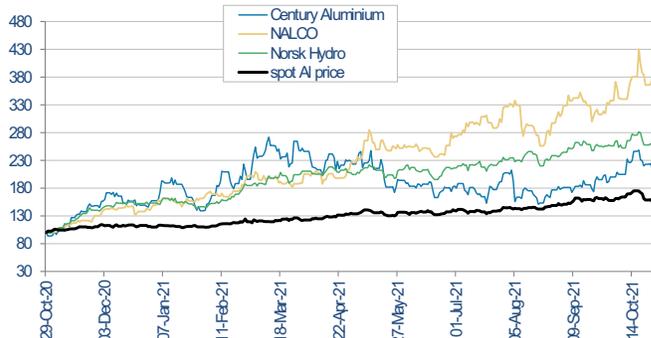
Aluminium, Alumina

Exhibit 90: Aluminium (large cap)



Source: Bloomberg, Morgan Stanley Research

Exhibit 91: Aluminium (small-medium cap)



Source: Bloomberg, Morgan Stanley Research

Exhibit 92: Alumina



Source: Bloomberg, Morgan Stanley Research

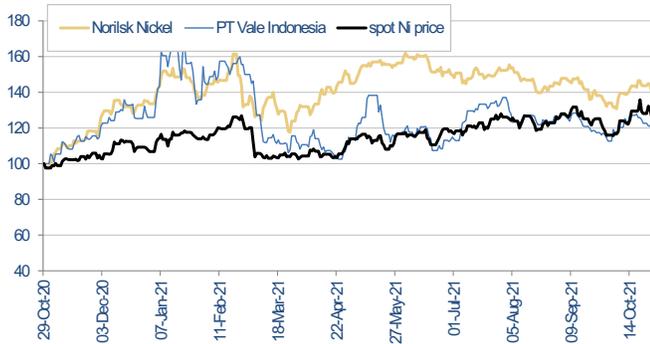
Exhibit 93: Copper



Source: Bloomberg, Morgan Stanley Research

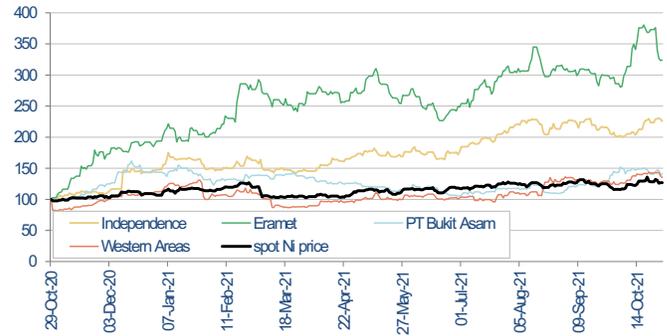
Nickel

Exhibit 94: Nickel (large cap)



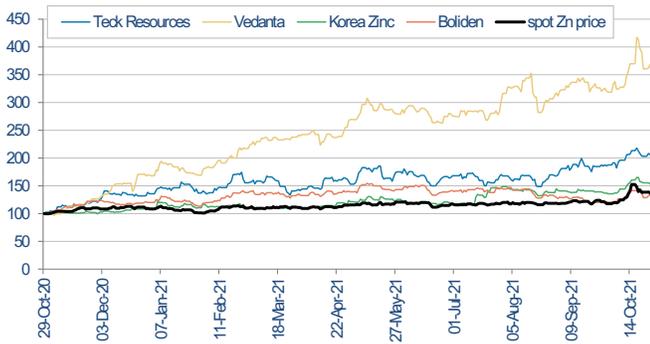
Source: Bloomberg, Morgan Stanley Research

Exhibit 95: Nickel (small-medium cap)



Source: Bloomberg, Morgan Stanley Research

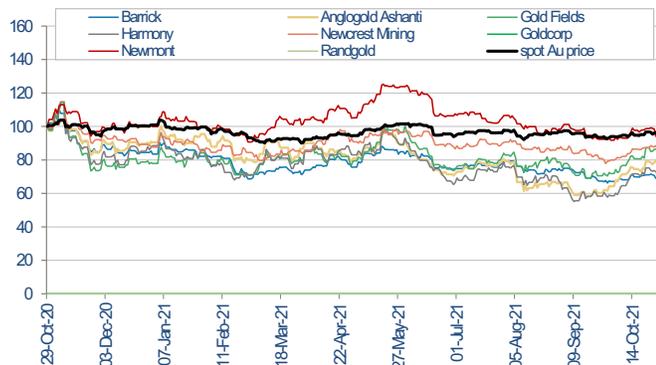
Exhibit 96: Zinc



Source: Bloomberg, Morgan Stanley Research

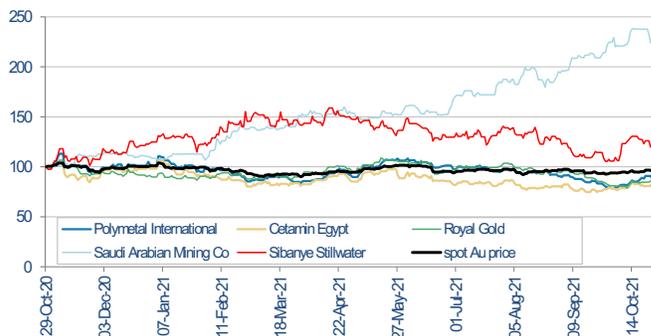
Precious Metals

Exhibit 97: Gold (large cap)



Source: Bloomberg, Morgan Stanley Research

Exhibit 98: Gold (small cap)



Source: Bloomberg, Morgan Stanley Research

Exhibit 99: Gold (small cap)



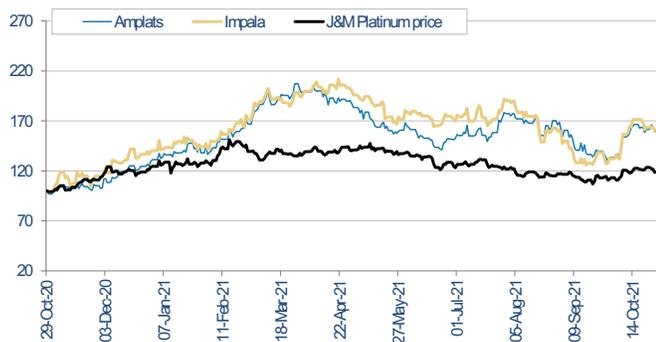
Source: Bloomberg, Morgan Stanley Research

Exhibit 100: Silver



Source: Bloomberg, Morgan Stanley Research

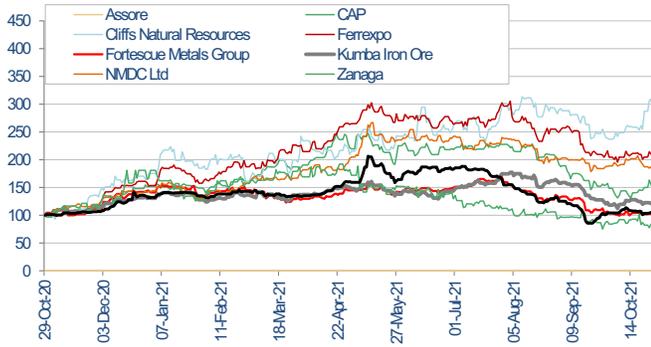
Exhibit 101: PGMs



Source: Bloomberg, Morgan Stanley Research

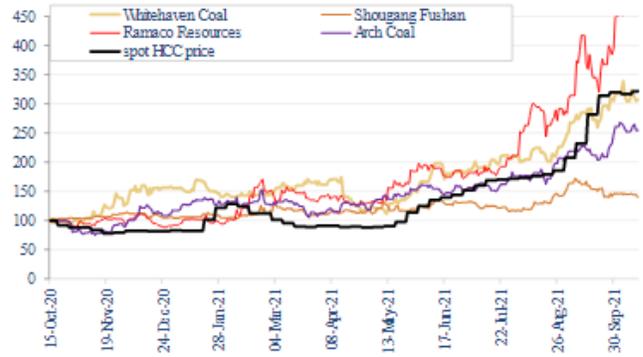
Bulks – Iron Ore, Metallurgical Coal

Exhibit 102: Iron ore



Source: Bloomberg, Morgan Stanley Research

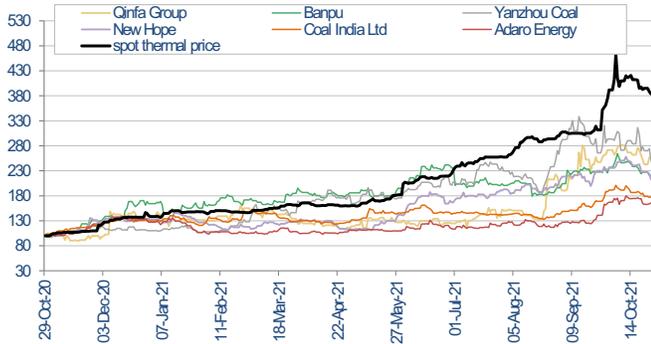
Exhibit 103: Metallurgical coal



Source: Bloomberg, Morgan Stanley Research

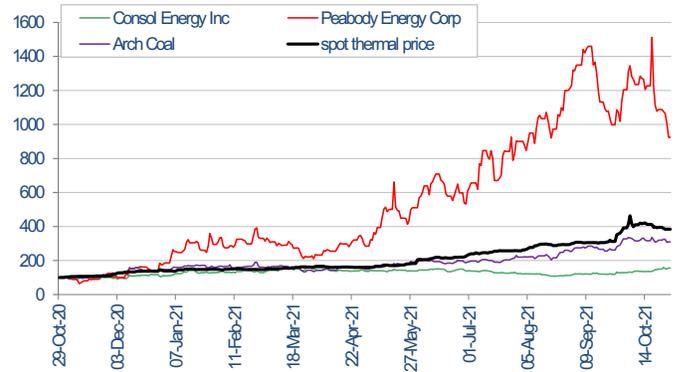
Energy – Thermal Coal, Uranium, Oil

Exhibit 104: Thermal coal – Asia



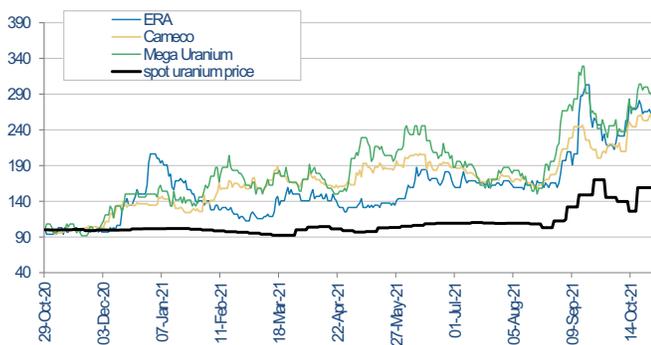
Source: Bloomberg, Morgan Stanley Research

Exhibit 105: Thermal coal – North America



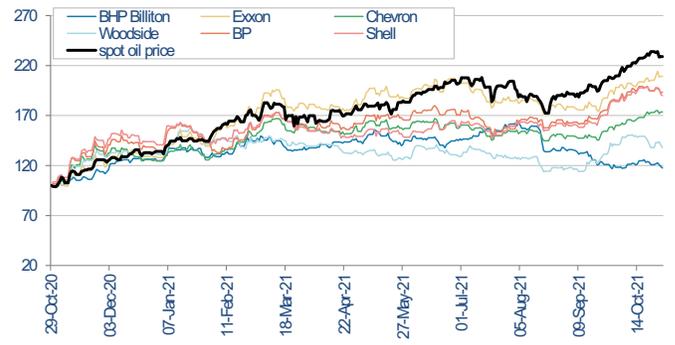
Source: Bloomberg, Morgan Stanley Research

Exhibit 106: Uranium



Source: Bloomberg, Morgan Stanley Research

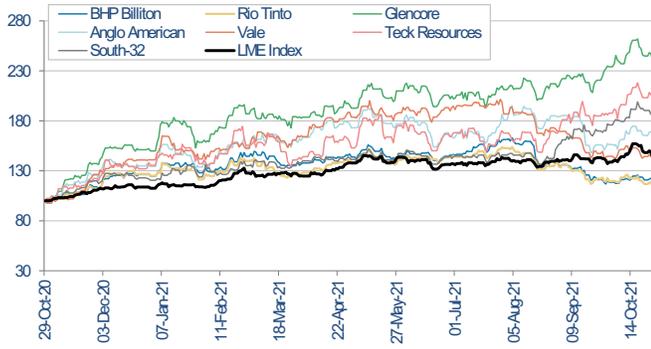
Exhibit 107: Oil



Source: Bloomberg, Morgan Stanley Research

Diversified

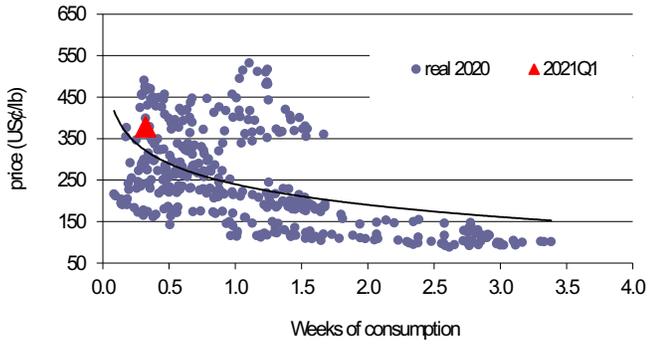
Exhibit 108: Diversified



Source: Bloomberg, Morgan Stanley Research

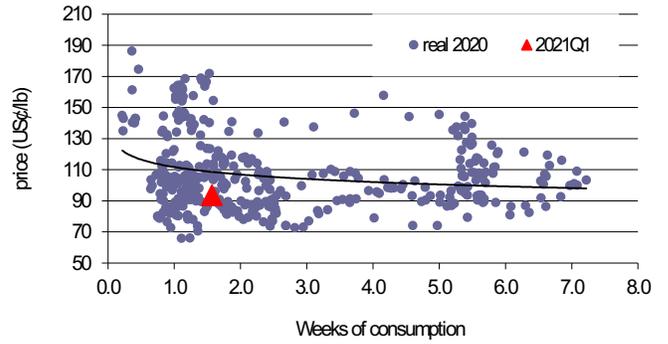
Pinch diagrams

Exhibit 109: Copper



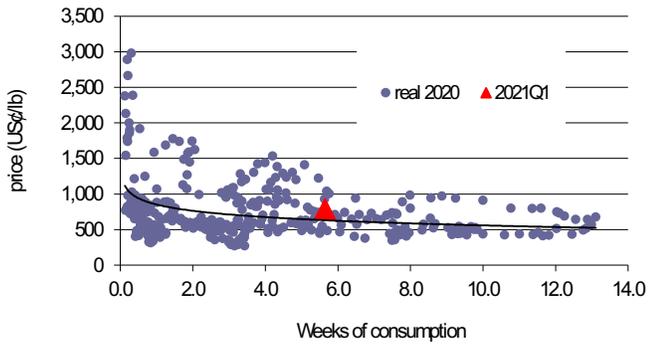
Source: LME, Bloomberg, WBMS, Morgan Stanley Research

Exhibit 110: Aluminium



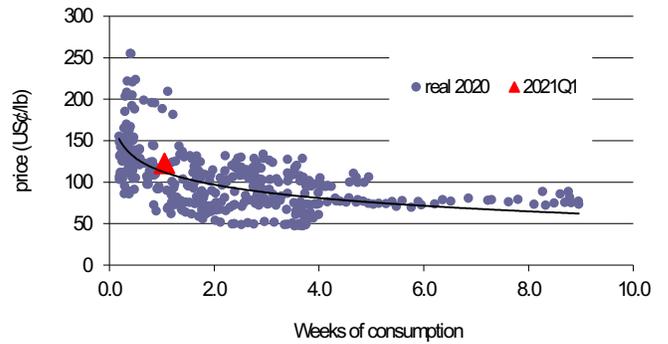
Source: LME, Bloomberg, WBMS, Morgan Stanley Research

Exhibit 111: Nickel



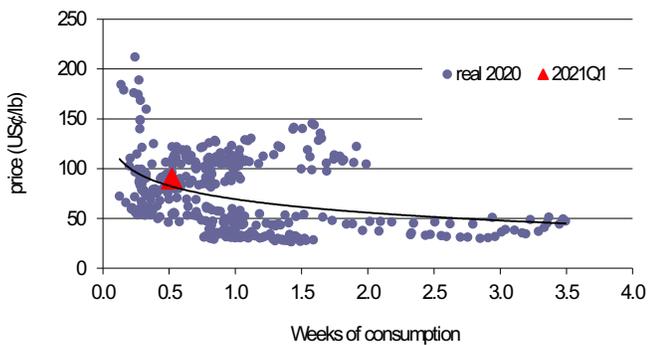
Source: LME, Bloomberg, WBMS, Morgan Stanley Research

Exhibit 112: Zinc



Source: LME, Bloomberg, WBMS, Morgan Stanley Research

Exhibit 113: Lead



Source: LME, Bloomberg, WBMS, Morgan Stanley Research

Key Morgan Stanley Forecasts

Exhibit 114: Base metal price forecasts

Period	Aluminium			Copper			Nickel			Zinc		
	Bull	Base US\$/lb	Bear	Bull	Base US\$/lb	Bear	Bull	Base US\$/lb	Bear	Bull	Base US\$/lb	Bear
2021e	1.18	1.15	1.11	4.27	4.16	4.06	9.05	8.38	7.93	1.39	1.32	1.27
2022e	1.41	1.22	1.04	4.76	3.66	3.30	12.28	8.19	6.55	1.43	1.15	1.03
2023e	1.28	1.05	0.84	3.97	3.05	2.75	10.22	6.81	5.45	1.37	1.05	0.95
2024e	1.32	1.10	0.88	4.20	3.11	2.80	10.55	7.54	5.28	1.40	1.08	0.97
2025e	1.36	1.15	0.92	4.46	3.19	2.87	10.14	7.80	5.46	1.37	1.10	0.99
2026e	1.20	1.05	0.84	4.19	3.22	2.90	9.48	7.90	5.53	1.40	1.17	0.99
LT nom	1.15	1.05	0.89	4.14	3.18	2.70	9.34	7.78	5.45	1.30	1.18	0.95

Source: Morgan Stanley Commodities Research estimates (e)

Exhibit 115: Precious metals price forecasts

Period	Gold			Silver			Platinum			Palladium		
	Bull	Base US\$/oz	Bear	Bull	Base US\$/oz	Bear	Bull	Base US\$/oz	Bear	Bull	Base US\$/oz	Bear
2021e	1,868	1,782	1,747	26.52	25.08	23.64	1,131	1,083	1,036	2,527	2,427	2,277
2022e	1,946	1,621	1,459	27.50	22.91	18.33	1,272	1,060	848	2,795	2,150	1,505
2023e	1,938	1,560	1,395	31.08	22.20	18.87	1,619	1,245	1,121	1,845	1,538	1,076
2024e	1,918	1,475	1,372	31.69	21.13	19.01	1,788	1,375	1,238	1,463	1,219	853
2025e	1,946	1,390	1,321	31.90	22.00	19.80	1,788	1,375	1,238	1,479	1,233	863
2026e	1,880	1,350	1,283	32.63	22.50	20.25	1,706	1,313	1,181	1,500	1,250	1,000
LT nom	1,824	1,303	1,173	29.30	22.54	19.15	1,613	1,241	1,117	1,489	1,241	983

Source: Morgan Stanley Commodities Research estimates (e)

Exhibit 116: Bulks price forecasts

Period	Iron Ore (spot)			Hard Coking Coal (spot)			Thermal Coal			Manganese ore (44%)			Lithium (lbc/Lat/tn)			Uranium (spot)		
	Bull	Base US\$/t	Bear	Bull	Base US\$/t	Bear	Bull	Base US\$/t	Bear	Bull	Base US\$/lb	Bear	Bull	Base US\$/lb	Bear	Bull	Base US\$/lb	Bear
2021e	162	152	145	253	219	194	206	137	128	7.6	5.1	3.6	13,381	10,288	9,264	46	37	32
2022e	152	95	57	420	210	188	242	143	107	6.0	5.0	4.0	19,875	13,290	10,600	60	40	30
2023e	163	81	57	272	151	121	152	95	71	5.9	4.9	4.0	13,700	8,563	7,706	62	41	31
2024e	135	61	49	230	144	115	105	75	56	5.7	4.7	3.8	10,500	7,000	6,300	68	49	39
2025e	125	63	56	203	145	116	106	76	57	5.4	4.5	3.6	9,870	7,050	5,640	64	46	37
2026e	117	65	55	189	145	116	101	78	59	5.4	4.5	3.6	9,480	7,300	5,840	55	39	32
LT nom	109	63	49	197	151	121	101	78	58	5.5	4.6	3.7	8,922	7,435	5,948	59	39	32

Source: Morgan Stanley Commodities Research estimates (e)

Global Metals & Mining Team

GLOBAL METALS & MINING TEAM

Global Metals & Mining – Commodity Strategists

Any Sergeant ³ , COMMODITY STRATEGIST	Any.Sergeant@morganstanley.com	+44 20 7677 6637
Marius van Straelen ³ , COMMODITY STRATEGIST	Marius.VanStraelen@morganstanley.com	+44 20 7677 5632

EMEA Metals & Mining, Steel (London)

Alain Gabriel ³ , EQUITY ANALYST	Alain.Gabriel@morganstanley.com	+44 20 7425 6959
Ioannis Masvoulas ³ , EQUITY ANALYST	Ioannis.Masvoulas@morganstanley.com	+44 20 7425 0427
Dan Shaw ³ , EQUITY ANALYST	Dan.Shaw@morganstanley.com	+44 20 7425 5853
Sandeep Peety ³ , EQUITY ANALYST	Sandeep.Peety@morganstanley.com	+44 20 7677 6242

South Africa Metals & Mining, Steel (Johannesburg)

Christopher Nicholson ¹⁰ , EQUITY ANALYST	Christopher.Nicholson@mtbmorganstanley.com	+27 11 252 1154
Brian Morgan ¹⁰ , EQUITY ANALYST	Brian.Morgan@mtbmorganstanley.com	+27 11 252 8999
Jared Hoover ¹⁰ , EQUITY ANALYST	Jared.Hoover@mtbmorganstanley.com	+27 11 252 1092

Americas Steel, Metals & Mining, Pulp & Paper (New York/São Paulo/Mexico)

Carlos de Alba ¹ , EQUITY ANALYST	Carlos.deAlba@morganstanley.com	+1 212 761 4927
Sarena Rocha Calejon ¹ , RESEARCH ASSOCIATE	Sarena.Rocha.Calejon@morganstanley.com	+1 212 761 0144
Jens Spiess ² , EQUITY ANALYST	Jens.Spiess@morganstanley.com	+52 55 5282 6614

Japan Metals & Mining, Steel (Tokyo)

Takato Watabe ⁷ , EQUITY ANALYST	Takato.Watabe@morganstanley.com	+81 3 6836 5436
Yu Shirakawa ⁷ , EQUITY ANALYST	Yu.Shirakawa@morganstanley.com	+81 3 6836 5432

Australia Metals & Mining, Steel (Sydney)

Rahul Anand ⁶ , EQUITY ANALYST	Rahul.Anand@morganstanley.com	+61 2 9770 1136
Shannon Sirha ⁶ , RESEARCH ASSOCIATE	Shannon.Sirha@morganstanley.com	+61 2 9770 1334

China Metals & Mining, Steel (Hong Kong)

Rachel Zhang ⁵ , EQUITY ANALYST	Rachel.Zhang@mtbmorganstanley.com	+852 2239 1520
Sara Chan ⁵ , EQUITY ANALYST	Sara.Chan@morganstanley.com	+852 2848 5292
Hannah Yang ⁵ , EQUITY ANALYST	Hannah.Yang@morganstanley.com	+852 2239 7079
Yujie Wang ⁵ , RESEARCH ASSOCIATE	Yujie.Wang@morganstanley.com	+852 2239 1502

Korea Metals & Mining, Steel (Seoul)

Young Suk Shin ¹¹ , EQUITY ANALYST	Young.Shin@morganstanley.com	+82 2 399 4594
---	------------------------------	----------------

Asia Oil & Gas & Coal (Hong Kong/Jakarta)

Andy Meng ⁵ , EQUITY ANALYST	Andy.Meng@morganstanley.com	+852 2239 7699
Jack Lu ⁵ , EQUITY ANALYST	Jack.Lu@morganstanley.com	+852 2848 5044

Global Energy

Martijn Rats ³ , EQUITY ANALYST and COMMODITIES STRATEGIST	Martijn.Rats@morganstanley.com	+44 20 7425 6618
---	--------------------------------	------------------

1 Morgan Stanley & Co. LLC 2 Morgan Stanley C.T.V.M. SA+ 3 Morgan Stanley & Co. International plc+
 4 Morgan Stanley India Company Private Limited+ 5 Morgan Stanley Asia Limited +6 Morgan Stanley Australia Ltd+
 7 Morgan Stanley M.F.G. Securities Co., Ltd+ 9 C.O. Morgan Stanley Bank 10 RMB Morgan Stanley (Proprietary) Ltd+
 11 Morgan Stanley & Co. International plc, Seoul Branch+ 12 PT. Morgan Stanley Asia Indonesia+
 + Analysts employed by non-U.S. affiliates are not registered with FINRA, may not be associated persons of the member
 and may not be subject to NASD/NYSE restrictions on communications with a subject company,
 public appearances and trading securities held by a research analyst account.

Disclosure Section

The information and opinions in Morgan Stanley Research were prepared or are disseminated by Morgan Stanley Europe S.E., regulated by Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin) and/or Morgan Stanley & Co. International plc, authorized by the Prudential Regulatory Authority and regulated by the Financial Conduct Authority and the Prudential Regulatory Authority. Morgan Stanley & Co. International plc disseminates in the UK research that it has prepared, and approves solely for the purposes of section 21 of the Financial Services and Markets Act 2000, research which has been prepared by any of its affiliates. As used in this disclosure section, Morgan Stanley includes RMB Morgan Stanley Proprietary Limited, Morgan Stanley Europe S.E., Morgan Stanley & Co International plc and its affiliates.

For important disclosures, stock price charts and equity rating histories regarding companies that are the subject of this report, please see the Morgan Stanley Research Disclosure Website at www.morganstanley.com/researchdisclosures, or contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY, 10036 USA.

For valuation methodology and risks associated with any recommendation, rating or price target referenced in this research report, please contact the Client Support Team as follows: US/Canada +1 800 303-2495; Hong Kong +852 2848-5999; Latin America +1 718 754-5444 (U.S.); London +44 (0)20-7425-8169; Singapore +65 6834-6860; Sydney +61 (0)2-9770-1505; Tokyo +81 (0)3-6836-9000. Alternatively you may contact your investment representative or Morgan Stanley Research at 1585 Broadway, (Attention: Research Management), New York, NY 10036 USA.

Analyst Certification

The following analysts hereby certify that their views about the companies and their securities discussed in this report are accurately expressed and that they have not received and will not receive direct or indirect compensation in exchange for expressing specific recommendations or views in this report: Jared Hoover; Martijn Rats, CFA; Amy Sergeant, CFA; Dan Shaw; Marius van Straaten.

Global Research Conflict Management Policy

Morgan Stanley Research has been published in accordance with our conflict management policy, which is available at www.morganstanley.com/institutional/research/conflictolicies. A Portuguese version of the policy can be found at www.morganstanley.com.br

Important Regulatory Disclosures on Subject Companies

The equity research analysts or strategists principally responsible for the preparation of Morgan Stanley Research have received compensation based upon various factors, including quality of research, investor client feedback, stock picking, competitive factors, firm revenues and overall investment banking revenues. Equity Research analysts' or strategists' compensation is not linked to investment banking or capital markets transactions performed by Morgan Stanley or the profitability or revenues of particular trading desks.

Morgan Stanley and its affiliates do business that relates to companies/instruments covered in Morgan Stanley Research, including market making, providing liquidity, fund management, commercial banking, extension of credit, investment services and investment banking. Morgan Stanley sells to and buys from customers the securities/instruments of companies covered in Morgan Stanley Research on a principal basis. Morgan Stanley may have a position in the debt of the Company or instruments discussed in this report. Morgan Stanley trades or may trade as principal in the debt securities (or in related derivatives) that are the subject of the debt research report.

Certain disclosures listed above are also for compliance with applicable regulations in non-US jurisdictions.

STOCK RATINGS

Morgan Stanley uses a relative rating system using terms such as Overweight, Equal-weight, Not-Rated or Underweight (see definitions below). Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold and sell. Investors should carefully read the definitions of all ratings used in Morgan Stanley Research. In addition, since Morgan Stanley Research contains more complete information concerning the analyst's views, investors should carefully read Morgan Stanley Research, in its entirety, and not infer the contents from the rating alone. In any case, ratings (or research) should not be used or relied upon as investment advice. An investor's decision to buy or sell a stock should depend on individual circumstances (such as the investor's existing holdings) and other considerations.

Global Stock Ratings Distribution

(as of September 30, 2021)

The Stock Ratings described below apply to Morgan Stanley's Fundamental Equity Research and do not apply to Debt Research produced by the Firm. For disclosure purposes only (in accordance with FINRA requirements), we include the category headings of Buy, Hold, and Sell alongside our ratings of Overweight, Equal-weight, Not-Rated and Underweight. Morgan Stanley does not assign ratings of Buy, Hold or Sell to the stocks we cover. Overweight, Equal-weight, Not-Rated and Underweight are not the equivalent of buy, hold, and sell but represent recommended relative weightings (see definitions below). To satisfy regulatory requirements, we correspond Overweight, our most positive stock rating, with a buy recommendation; we correspond Equal-weight and Not-Rated to hold and Underweight to sell recommendations, respectively.

STOCK RATING CATEGORY	COVERAGE UNIVERSE		INVESTMENT BANKING CLIENTS (IBC)			OTHER MATERIAL INVESTMENT SERVICES CLIENTS (MISC)	
	COUNT	% OF TOTAL	COUNT	% OF TOTAL IBC	% OF RATING CATEGORY	COUNT	% OF TOTAL OTHER MSC
Overweight/Buy	1500	43%	399	47%	27%	668	43%
Equal-weight/Hold	1510	43%	380	44%	25%	683	44%
Not-Rated/Hold	0	0%	0	0%	0%	0	0%
Underweight/Sell	506	14%	77	9%	15%	192	12%
TOTAL	3,516		856			1543	

Data include common stock and ADRs currently assigned ratings. Investment Banking Clients are companies from whom Morgan Stanley received investment banking compensation in the last 12 months. Due to rounding off of decimals, the percentages provided in the "% of total" column may not add up to exactly

100 percent.

Analyst Stock Ratings

Overweight (O). The stock's total return is expected to exceed the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Equal-weight (E). The stock's total return is expected to be in line with the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Not-Rated (NR). Currently the analyst does not have adequate conviction about the stock's total return relative to the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Underweight (U). The stock's total return is expected to be below the average total return of the analyst's industry (or industry team's) coverage universe, on a risk-adjusted basis, over the next 12-18 months.

Unless otherwise specified, the time frame for price targets included in Morgan Stanley Research is 12 to 18 months.

Analyst Industry Views

Attractive (A): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be attractive vs. the relevant broad market benchmark, as indicated below.

In-Line (I): The analyst expects the performance of his or her industry coverage universe over the next 12-18 months to be in line with the relevant broad market benchmark, as indicated below.

Cautious (C): The analyst views the performance of his or her industry coverage universe over the next 12-18 months with caution vs. the relevant broad market benchmark, as indicated below.

Benchmarks for each region are as follows: North America - S&P 500; Latin America - relevant MSCI country index or MSCI Latin America Index; Europe - MSCI Europe; Japan - TOPIX; Asia - relevant MSCI country index or MSCI sub-regional index or MSCI AC Asia Pacific ex Japan Index.

Important Disclosures for Morgan Stanley Smith Barney LLC & E*TRADE Securities LLC Customers

Important disclosures regarding the relationship between the companies that are the subject of Morgan Stanley Research and Morgan Stanley Smith Barney LLC or Morgan Stanley or any of their affiliates, are available on the Morgan Stanley Wealth Management disclosure website at www.morganstanley.com/online/researchdisclosures. For Morgan Stanley specific disclosures, you may refer to www.morganstanley.com/researchdisclosures.

Each Morgan Stanley research report is reviewed and approved on behalf of Morgan Stanley Smith Barney LLC and E*TRADE Securities LLC. This review and approval is conducted by the same person who reviews the research report on behalf of Morgan Stanley. This could create a conflict of interest.

Other Important Disclosures

Morgan Stanley Research policy is to update research reports as and when the Research Analyst and Research Management deem appropriate, based on developments with the issuer, the sector, or the market that may have a material impact on the research views or opinions stated therein. In addition, certain Research publications are intended to be updated on a regular periodic basis (weekly/monthly/quarterly/annual) and will ordinarily be updated with that frequency, unless the Research Analyst and Research Management determine that a different publication schedule is appropriate based on current conditions. Morgan Stanley is not acting as a municipal advisor and the opinions or views contained herein are not intended to be, and do not constitute, advice within the meaning of Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act.

Morgan Stanley produces an equity research product called a "Tactical Idea." Views contained in a "Tactical Idea" on a particular stock may be contrary to the recommendations or views expressed in research on the same stock. This may be the result of differing time horizons, methodologies, market events, or other factors. For all research available on a particular stock, please contact your sales representative or go to Matrix at <http://www.morganstanley.com/matrix>.

Morgan Stanley Research is provided to our clients through our proprietary research portal on Matrix and also distributed electronically by Morgan Stanley to clients. Certain, but not all, Morgan Stanley Research products are also made available to clients through third-party vendors or redistributed to clients through alternate electronic means as a convenience. For access to all available Morgan Stanley Research, please contact your sales representative or go to Matrix at <http://www.morganstanley.com/matrix>.

Any access and/or use of Morgan Stanley Research is subject to Morgan Stanley's Terms of Use (<http://www.morganstanley.com/terms.html>). By accessing and/or using Morgan Stanley Research, you are indicating that you have read and agree to be bound by our Terms of Use (<http://www.morganstanley.com/terms.html>). In addition you consent to Morgan Stanley processing your personal data and using cookies in accordance with our Privacy Policy and our Global Cookies Policy (http://www.morganstanley.com/privacy_pledge.html), including for the purposes of setting your preferences and to collect readership data so that we can deliver better and more personalized service and products to you. To find out more information about how Morgan Stanley processes personal data, how we use cookies and how to reject cookies see our Privacy Policy and our Global Cookies Policy (http://www.morganstanley.com/privacy_pledge.html).

If you do not agree to our Terms of Use and/or if you do not wish to provide your consent to Morgan Stanley processing your personal data or using cookies please do not access our research.

Morgan Stanley Research does not provide individually tailored investment advice. Morgan Stanley Research has been prepared without regard to the circumstances and objectives of those who receive it. Morgan Stanley recommends that investors independently evaluate particular investments and strategies, and encourages investors to seek the advice of a financial adviser. The appropriateness of an investment or strategy will depend on an investor's circumstances and objectives. The securities, instruments, or strategies discussed in Morgan Stanley Research may not be suitable for all investors, and certain investors may not be eligible to purchase or participate in some or all of them. Morgan Stanley Research is not an offer to buy or sell or the solicitation of an offer to buy or sell any security/instrument or to participate in any particular trading strategy. The value of and income from your investments may vary because of changes in interest rates, foreign exchange rates, default rates, prepayment rates, securities/instruments prices, market indexes, operational or financial conditions of companies or other factors. There may be time limitations on the exercise of options or other rights in securities/instruments transactions. Past performance is not necessarily a guide to future performance. Estimates of future performance are based on assumptions that may not be realized. If provided, and unless otherwise stated, the closing price on the cover page is that of the primary exchange for the subject company's securities/instruments.

The fixed income research analysts, strategists or economists principally responsible for the preparation of Morgan Stanley Research have received compensation based upon various factors, including quality, accuracy and value of research, firm profitability or revenues (which include fixed income trading and capital markets profitability or revenues), client feedback and competitive factors. Fixed Income Research analysts', strategists' or economists' compensation is not linked to investment banking or capital markets transactions performed by Morgan Stanley or the profitability or revenues of particular trading desks.

The "Important Regulatory Disclosures on Subject Companies" section in Morgan Stanley Research lists all companies mentioned where Morgan Stanley owns 1% or more of a class of common equity securities of the companies. For all other companies mentioned in Morgan Stanley Research, Morgan Stanley may have an investment of less than 1% in securities/instruments or derivatives of securities/instruments of companies and may trade them in ways different from those discussed in Morgan Stanley Research. Employees of Morgan Stanley not involved in the preparation of Morgan Stanley Research may have investments in securities/instruments or derivatives of securities/instruments of companies mentioned and may trade them in ways different from those discussed in Morgan Stanley Research. Derivatives may be issued by Morgan Stanley or associated persons.

With the exception of information regarding Morgan Stanley, Morgan Stanley Research is based on public information. Morgan Stanley makes every effort to

use reliable, comprehensive information, but we make no representation that it is accurate or complete. We have no obligation to tell you when opinions or information in Morgan Stanley Research change apart from when we intend to discontinue equity research coverage of a subject company. Facts and views presented in Morgan Stanley Research have not been reviewed by, and may not reflect information known to, professionals in other Morgan Stanley business areas, including investment banking personnel.

Morgan Stanley Research personnel may participate in company events such as site visits and are generally prohibited from accepting payment by the company of associated expenses unless pre-approved by authorized members of Research management.

Morgan Stanley may make investment decisions that are inconsistent with the recommendations or views in this report.

To our readers based in Taiwan or trading in Taiwan securities/instruments: Information on securities/instruments that trade in Taiwan is distributed by Morgan Stanley Taiwan Limited ("MSTL"). Such information is for your reference only. The reader should independently evaluate the investment risks and is solely responsible for their investment decisions. Morgan Stanley Research may not be distributed to the public media or quoted or used by the public media without the express written consent of Morgan Stanley. Any non-customer reader within the scope of Article 7-1 of the Taiwan Stock Exchange Recommendation Regulations accessing and/or receiving Morgan Stanley Research is not permitted to provide Morgan Stanley Research to any third party (including but not limited to related parties, affiliated companies and any other third parties) or engage in any activities regarding Morgan Stanley Research which may create or give the appearance of creating a conflict of interest. Information on securities/instruments that do not trade in Taiwan is for informational purposes only and is not to be construed as a recommendation or a solicitation to trade in such securities/instruments. MSTL may not execute transactions for clients in these securities/instruments.

Morgan Stanley is not incorporated under PRC law and the research in relation to this report is conducted outside the PRC. Morgan Stanley Research does not constitute an offer to sell or the solicitation of an offer to buy any securities in the PRC. PRC investors shall have the relevant qualifications to invest in such securities and shall be responsible for obtaining all relevant approvals, licenses, verifications and/or registrations from the relevant governmental authorities themselves. Neither this report nor any part of it is intended as, or shall constitute, provision of any consultancy or advisory service of securities investment as defined under PRC law. Such information is provided for your reference only.

Morgan Stanley Research is disseminated in Brazil by Morgan Stanley C.T.V.M. S.A. located at Av. Brigadeiro Faria Lima, 3600, 6th floor, São Paulo - SP, Brazil; and is regulated by the Comissão de Valores Mobiliários; in Mexico by Morgan Stanley México, Casa de Bolsa, S.A. de C.V which is regulated by Comisión Nacional Bancaria y de Valores. Paseo de los Tamarindos 90, Torre 1, Col. Bosques de las Lomas Floor 29, 05120 Mexico City; in Japan by Morgan Stanley MUFG Securities Co., Ltd. and, for Commodities related research reports only, Morgan Stanley Capital Group Japan Co., Ltd; in Hong Kong by Morgan Stanley Asia Limited (which accepts responsibility for its contents) and by Morgan Stanley Asia International Limited, Hong Kong Branch; in Singapore by Morgan Stanley Asia (Singapore) Pte. (Registration number 199206298Z) and/or Morgan Stanley Asia (Singapore) Securities Pte Ltd (Registration number 200008434H), regulated by the Monetary Authority of Singapore (which accepts legal responsibility for its contents and should be contacted with respect to any matters arising from, or in connection with, Morgan Stanley Research) and by Morgan Stanley Asia International Limited, Singapore Branch (Registration number T11FC0207F); in Australia to "wholesale clients" within the meaning of the Australian Corporations Act by Morgan Stanley Australia Limited A.B.N. 67 003 734 576, holder of Australian financial services license No. 233742, which accepts responsibility for its contents; in Australia to "wholesale clients" and "retail clients" within the meaning of the Australian Corporations Act by Morgan Stanley Wealth Management Australia Pty Ltd (A.B.N. 19 009 145 555, holder of Australian financial services license No. 240813, which accepts responsibility for its contents; in Korea by Morgan Stanley & Co International plc, Seoul Branch; in India by Morgan Stanley India Company Private Limited; in Canada by Morgan Stanley Canada Limited, which has approved of and takes responsibility for its contents in Canada; in Germany and the European Economic Area where required by Morgan Stanley Europe S.E., authorised and regulated by Bundesanstalt fuer Finanzdienstleistungsaufsicht (BaFin) under the reference number 149169; in the US by Morgan Stanley & Co. LLC, which accepts responsibility for its contents. Morgan Stanley & Co. International plc, authorized by the Prudential Regulatory Authority and regulated by the Financial Conduct Authority and the Prudential Regulatory Authority, disseminates in the UK research that it has prepared, and approves solely for the purposes of section 21 of the Financial Services and Markets Act 2000, research which has been prepared by any of its affiliates. RMB Morgan Stanley Proprietary Limited is a member of the JSE Limited and A2X (Pty) Ltd. RMB Morgan Stanley Proprietary Limited is a joint venture owned equally by Morgan Stanley International Holdings Inc. and RMB Investment Advisory (Proprietary) Limited, which is wholly owned by FirstRand Limited. The information in Morgan Stanley Research is being disseminated by Morgan Stanley Saudi Arabia, regulated by the Capital Market Authority in the Kingdom of Saudi Arabia, and is directed at Sophisticated investors only.

FirstRand Limited and Rand Merchant Bank (a division of FirstRand Limited) may presently hold a 1% or more of a class of common equity securities, in any companies covered in this report. This may include holding a net long or short position of US\$1 million or more of Debt securities. Within the last 12 months, FirstRand Limited may have co-managed a public offering, received compensation for investment services, or services other than investment services, or expects to receive or intends to seek compensation for investment services not disclosed in this report. Additionally, FirstRand limited does make a market in securities or acts as a corporate broker not disclosed in this report. FirstRand Limited (or its directors, officers or employees) may, to the extent permitted by law, own or have a position in the securities of any company or related company referred to herein, and may add to or dispose of any such position or may make a market or act as a principle in any transaction in such securities or financial instruments. Directors of FirstRand Limited may also be directors of any of the companies mentioned in this report. FirstRand Limited may from time to time provide or solicit investment banking underwriting or other financial services to, for, or from any company referred to herein. FirstRand Limited (or its directors, officers or employees) may, to the extent permitted by law, act upon or use the information or opinions presented herein, research or analysis on which they are based prior to the material being published. FirstRand Limited may have issued, or may in the future issue other advice, which is inconsistent with, and reaches different conclusions from the information presented in this report.

The information in Morgan Stanley Research is being communicated by Morgan Stanley & Co. International plc (DIFC Branch), regulated by the Dubai Financial Services Authority (the DFSA), and is directed at Professional Clients only, as defined by the DFSA. The financial products or financial services to which this research relates will only be made available to a customer who we are satisfied meets the regulatory criteria to be a Professional Client.

The information in Morgan Stanley Research is being communicated by Morgan Stanley & Co. International plc (QFC Branch), regulated by the Qatar Financial Centre Regulatory Authority (the QFCRA), and is directed at business customers and market counterparties only and is not intended for Retail Customers as defined by the QFCRA.

As required by the Capital Markets Board of Turkey, investment information, comments and recommendations stated here, are not within the scope of investment advisory activity. Investment advisory service is provided exclusively to persons based on their risk and income preferences by the authorized firms. Comments and recommendations stated here are general in nature. These opinions may not fit to your financial status, risk and return preferences. For this reason, to make an investment decision by relying solely to this information stated here may not bring about outcomes that fit your expectations.

The trademarks and service marks contained in Morgan Stanley Research are the property of their respective owners. Third-party data providers make no warranties or representations relating to the accuracy, completeness, or timeliness of the data they provide and shall not have liability for any damages relating to such data. The Global Industry Classification Standard (GICS) was developed by and is the exclusive property of MSCI and S&P.

Morgan Stanley Research, or any portion thereof may not be reprinted, sold or redistributed without the written consent of Morgan Stanley.

Indicators and trackers referenced in Morgan Stanley Research may not be used as, or treated as, a benchmark under Regulation EU 2016/1011, or any other similar framework.