

BASE METALS IN 2019: EXCLUSIVE REFINITIV ANALYSIS





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INTRODUCTION

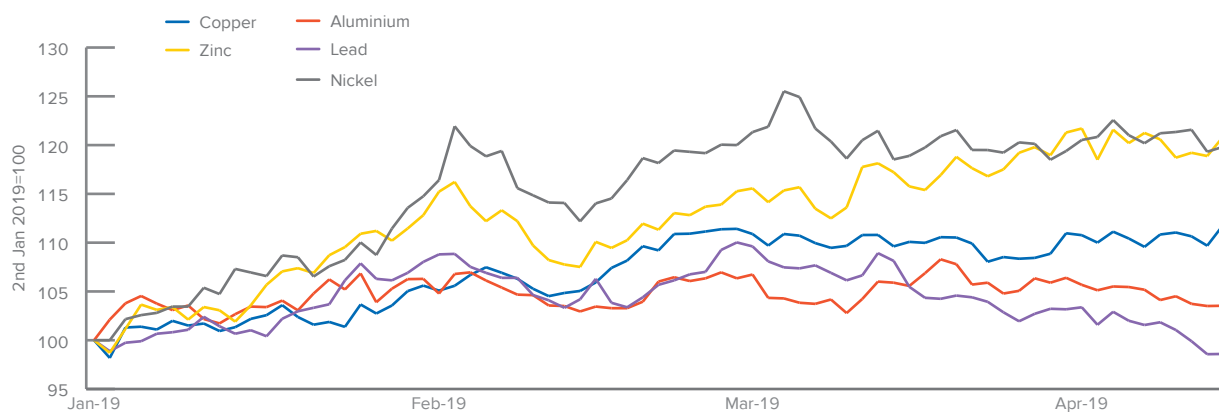
BUCKLE UP, BASE METALS MAY BE IN FOR A ROCKY RIDE

Macro-economic developments suggest that the LME-traded industrial metals might be in for a rocky ride in the next year or so, and the fundamentals of several increasingly support this view.

A year or two ago, some metals were expected by this stage to be facing structural deficits, due either to an acute lack of new supply, or ahead of surging demand from a new end-use. Step forward copper, nickel and to a lesser extent zinc perhaps which at least partially has had its day in the sun. Either way, those views have since been reined in amid growing fears for recession in the United States and Europe while China continues to stumble along the path in its transition to consumer-based economy.

Nevertheless, some market watchers still strive to seek out the good news wherever possible, and opt to focus on what fits that narrative. Bellwether copper best reflects this. Hence, news of Chinese stimulus measures, though a far cry from 2008, and highly likely to remain so, still manages to set pulses racing and prices rising. Equally so Trump tweets on positive progress in trade talks with China.

INDEXED LME METAL PRICES



Source: LME, Refinitiv Metals Research

It is notable that some well-respected research houses are now tempering their views on expected shortfalls in copper. Certainly this gravitates closer to our own forecasts of continued surplus at least out to next year, and the macro-economic section of this report highlights the concerns.

Nickel, which has benefited from the electric vehicle battery narrative, of course will not shake off that mantle, but again views have been tempered. A sharp dose of reality was administered by a recently under-performing stainless steel sector, accounting as it does for more than two-thirds of nickel demand.

True, visible inventories have been falling, but market watchers are generally well aware of the large stocks sitting outside exchange sheds. Nickel may have gained more than one-fifth since the start of the year, and almost 8% quarter on quarter in January to March, but on a year-on-year basis the picture is less positive.

Other metals such as aluminium have barely kept their head above water so far this year, with little fundamentally from which to derive comfort. Similarly, lead sits 3% lower at time of writing than it did at the beginning of 2019.

In zinc, rising mine production last year inevitably dented sentiment. But the key question remains. When will Chinese producers be able to overcome the current smelter bottleneck and benefit properly from current higher treatment charges (TCs) amid plentiful concentrate supply. In the near term, multi-year low global exchange stocks and still low production growth from China continue to underpin prices. But we believe that zinc's bearish medium to long term outlook still holds.



MACRO/BUSINESS CYCLE

GLOBAL TRADE, US BUSINESS CYCLE AND TRADE DYNAMICS SUGGEST TOUGH TIMES AHEAD FOR BASE METALS

The US business cycle has continued to weaken since the August 2018 peak in the US ISM Index at 60.8. We have seen a slight bounce from the recent low of 54.2 in February 2019 but overall metal prices are telling a different story with all metals showing a negative year on year % performance – in order of worst performers we see lead down 17.2%, aluminum -12.2%, zinc -10.9%, copper -5%, nickel -1.8% and tin -1.4% as of 10th April 2019.

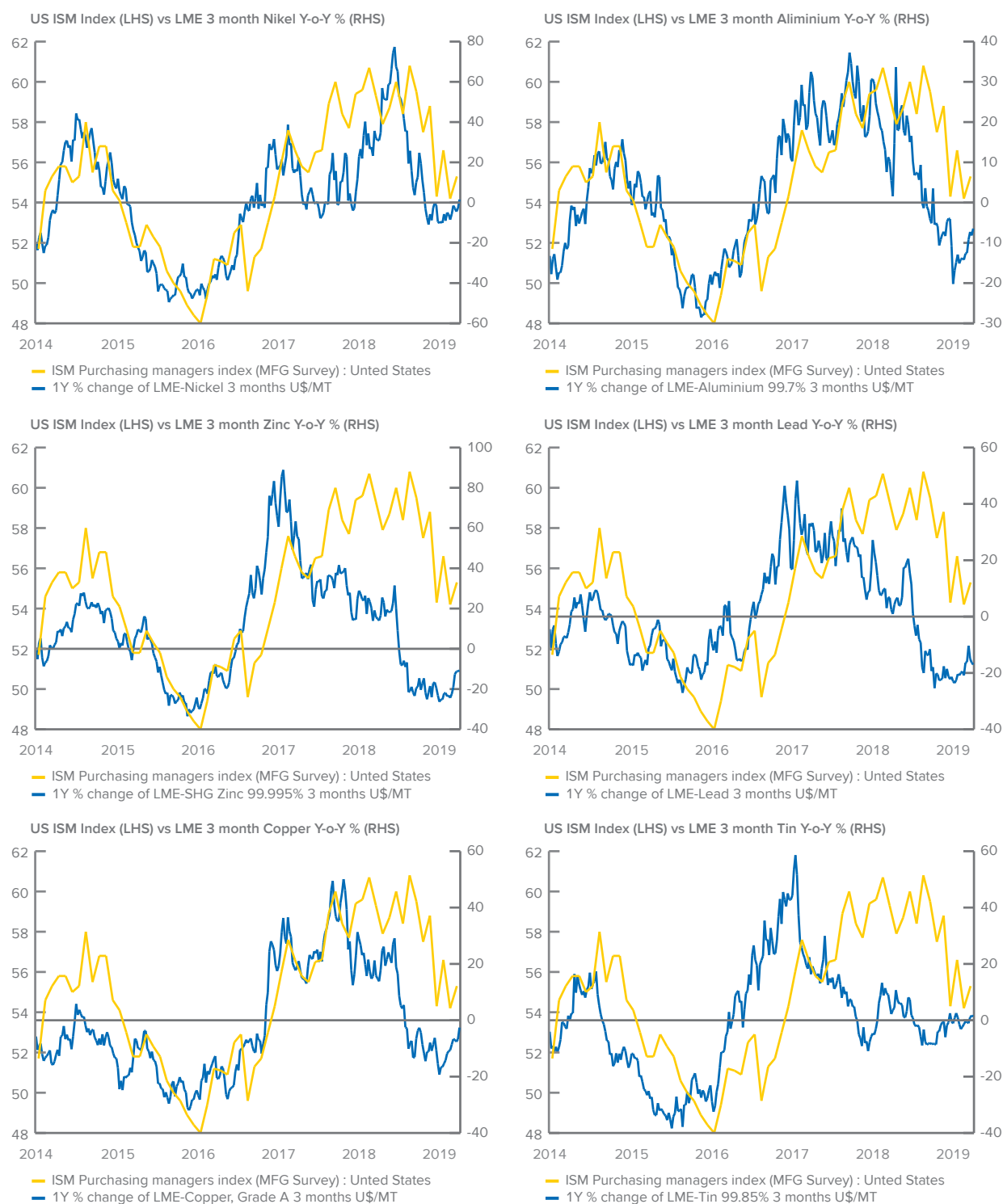
A key dynamic since the kick-off of the trade wars has been the global trade environment. The last time global trade slowed was in early in 2016 when we saw a brief contraction of the US ISM index below 50. However, a repeat of the recession patterns we saw in 2008 and the early 2000s was averted. The Fed had only recently started hiking interest rates so they were substantially lower than today.

This time around interest rates as measured by 3 month USD libor rates are 300% higher than in 2016 after the Fed continued to hike through to December 2018. Since the last increase the Fed has made an almost 180 degree turn and suggested a more dovish stance towards further interest rate hikes. This indicates that central banks are now acknowledging that their economies might be not as robust as they had anticipated.

Latest available data for January shows that the global CPB Export Volume index compiled by the Netherlands Bureau for Economics Policy Analysis contracted by 1% on a year-on-year basis. The picture looks even bleaker if we turn to China where exports and imports are down 20.7% and -5.2% year-on-year respectively.

It feels that global equity markets in particular are pricing in a favourable resolution to the US-China trade negotiations, helped perhaps by the almost daily headlines in the news and on Twitter of the “amazing” progress that has been made .

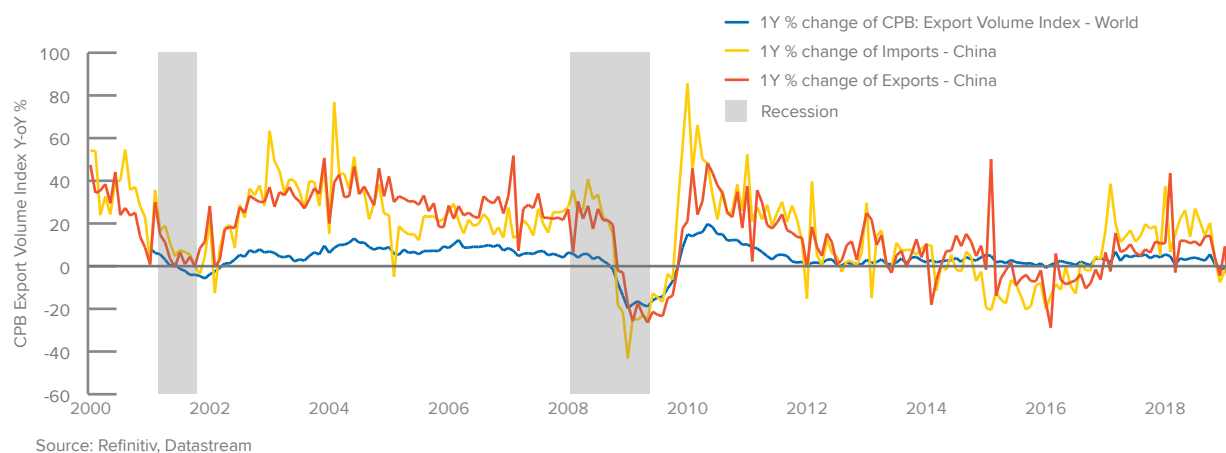
LME BASE METAL PRICES AND THE US BUSINESS CYCLE



Source: Refinitiv, Datastream

When the group think sets in it is always dangerous not to consider the other side of the coin which might be a continued slowdown in global growth. This as we all know, should lead to a continued negative performance by base metals.

GLOBAL TRADE IS CONTRACTING FOR THE FIRST TIME SINCE 2016



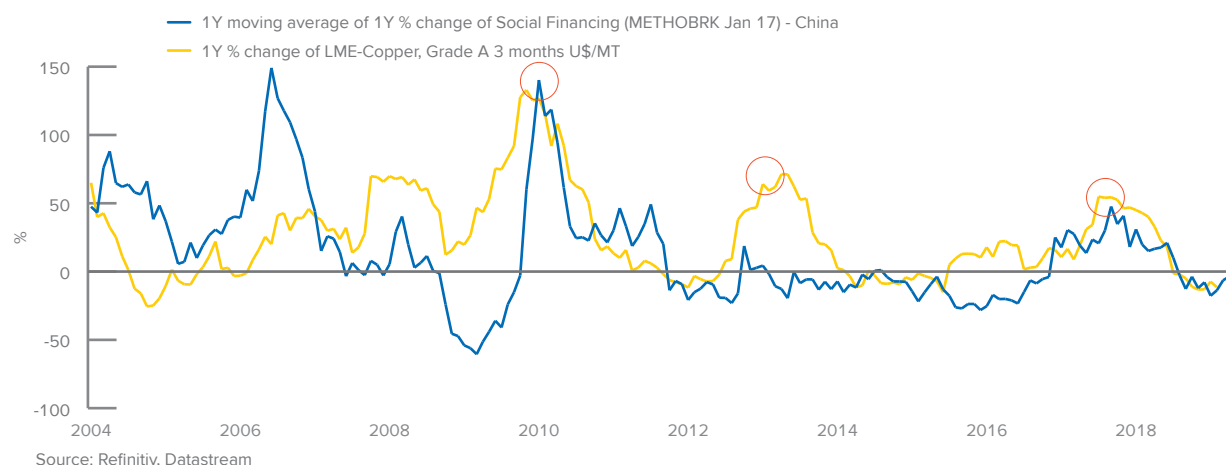
Chinese stimulus which saw a record number of RMB loans this January is another factor that has excited many

If we look at this data over the longer term we also see a clear contraction in the size of the stimulus that has been injected into the Chinese economy. It is interesting to note that it is highly correlated to the price of copper and that the size of stimulus has been falling since the peak in January 2010. We are currently running at -11% using a one year moving average year-on-year % change.

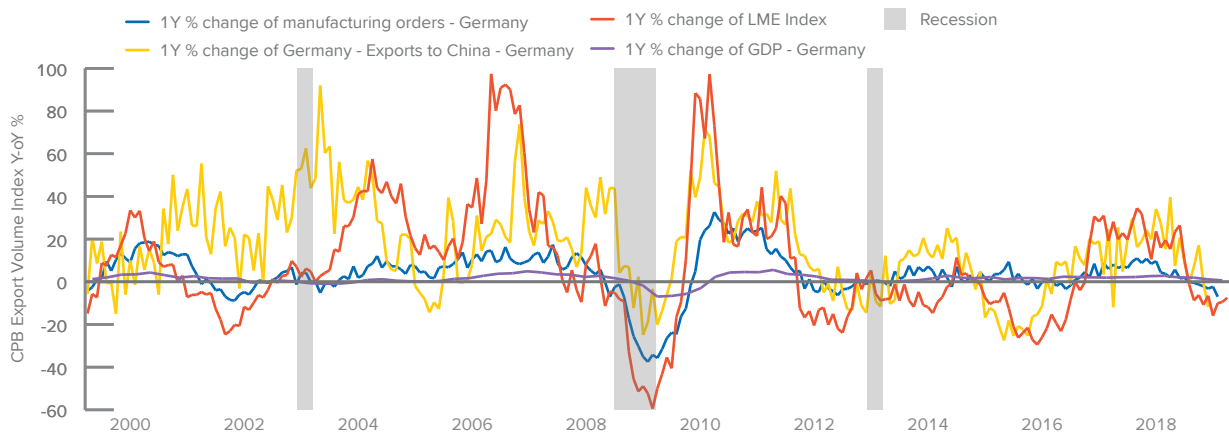
In line with a weaker global trade environment we are also starting to see significant underperformance of developed countries which rely heavily on export trade such as Germany. Germany just about avoided a recession after the release of the latest GDP numbers, but the more forward-looking macro indicators such as manufacturing orders are deep in negative territory falling by 7% year-on-year. This overall weakness is also reflected on the other side with Germany's trade partners such as China. Since the recent peak in early 2018, German exports to China have collapsed, and in December 2018 were down -11.8% on a year-on-year basis

Summing up, we acknowledge that the current macro environment is in a soft patch with economic data in both emerging and developed nations deteriorating.

CHINA SOCIAL FINANCING (1Y MA) Y-O-Y % CHANGE VS LME COPPER Y-O-Y & CHANGE



BASE METALS PRICES AND GLOBAL RECESSIONS

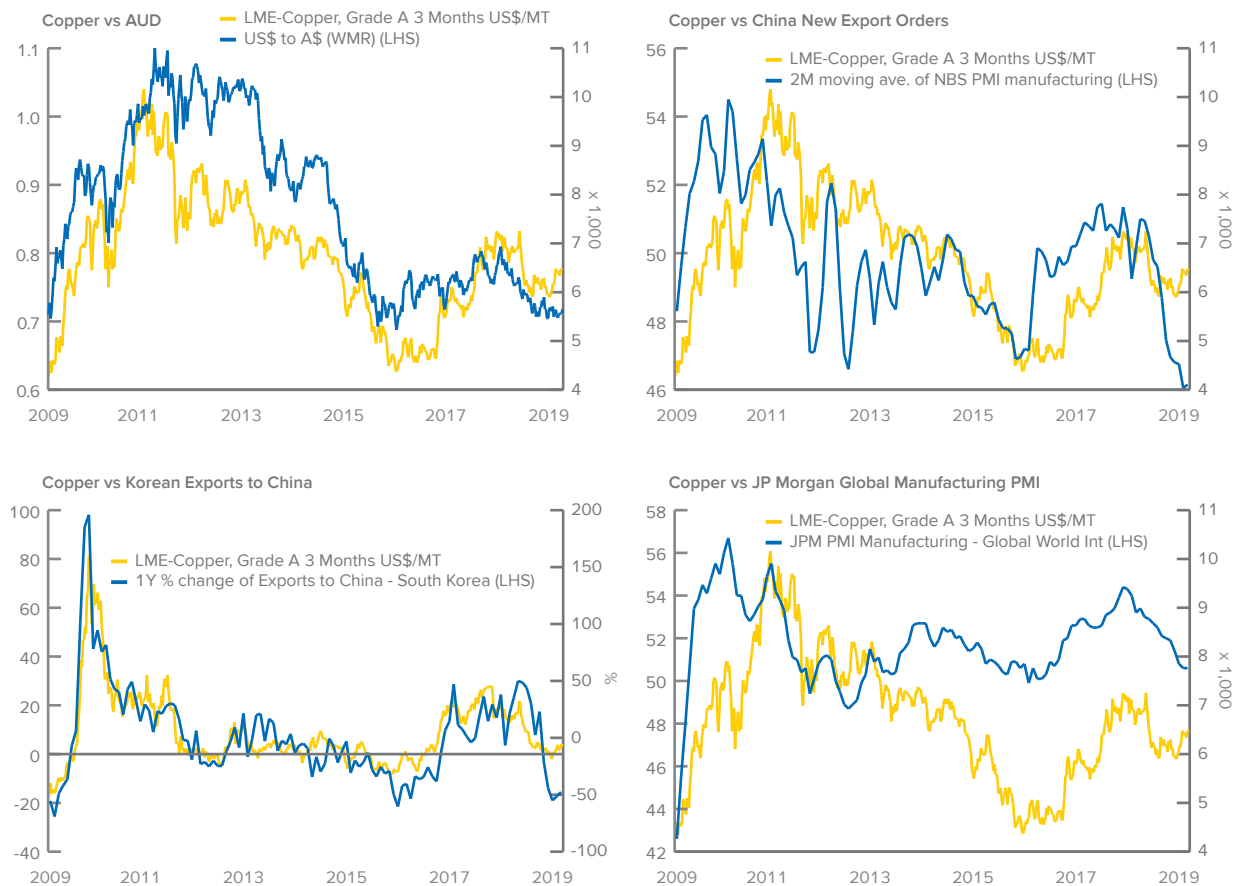


Source: Refinitiv, Datastream

The market and prices are currently only looking at the positives such as increases to Chinese stimulus and expectations of a positive resolution to the trade talks. Time will tell if we are to see a reversal of the slowdown in trade and global growth or if the slowdown will continue and potentially lead to recession in a number of countries later this year or in 2020.

We will leave you with a closing chart where we highlight four key drivers of the copper price. Not one suggests that we should see higher prices.

LET'S TRY TO FIND A BULLISH COPPER ARGUMENT . . .



Source: Refinitiv



OPTIONS

LME OPTIONS ANALYTICS: ZINC BEARS, COPPER BULLS

Refinitiv Metals Research produces daily reports on Eikon for options and futures covering LME options for copper, zinc, nickel, aluminium and lead; COMEX options for copper, gold, silver, platinum and palladium; SGX iron ore options and SHFE future contracts for copper, zinc, lead, aluminium and nickel.

The options analytics reports display a summary of options showing the change in open interest from the previous trading day. All open strikes and new strikes are included. Data is in table format and downloadable in Excel but we also use heat maps, enabling users to quickly identify key trades.

LME OPEN INTEREST AND 1 WEEK CHANGE



Source: LME, Refinitiv

And while the options positioning cannot tell us where the price is going, it at least gives us an indication of where the market thinks the price might be going.

Assessing recent activity on the LME, the set of charts below show open interest reported on 10th April 2019 and the one week change (from 3rd April 2019). Options positioning across the front three months (May-June-July) generally turned more bearish over the week to 10th April, with puts, which confer the right to sell, growing at a faster pace than calls, which confer the right to buy. With regard to the positioning for each metal the field remains split with the market taking a bearish view on zinc and aluminium and a more bullish one on copper, nickel and lead which are skewed towards calls.

Zinc and copper are the most marked in terms of skew, with the former showing a strong bias towards put options, while copper positioning is skewed to calls. Open interest on puts for zinc totalled 30,300 lots through to July 2019, while open interest on calls stood at just 11,453 lots over the same period. Further down the forward curve the position becomes more balanced with puts and calls roughly matched in December.

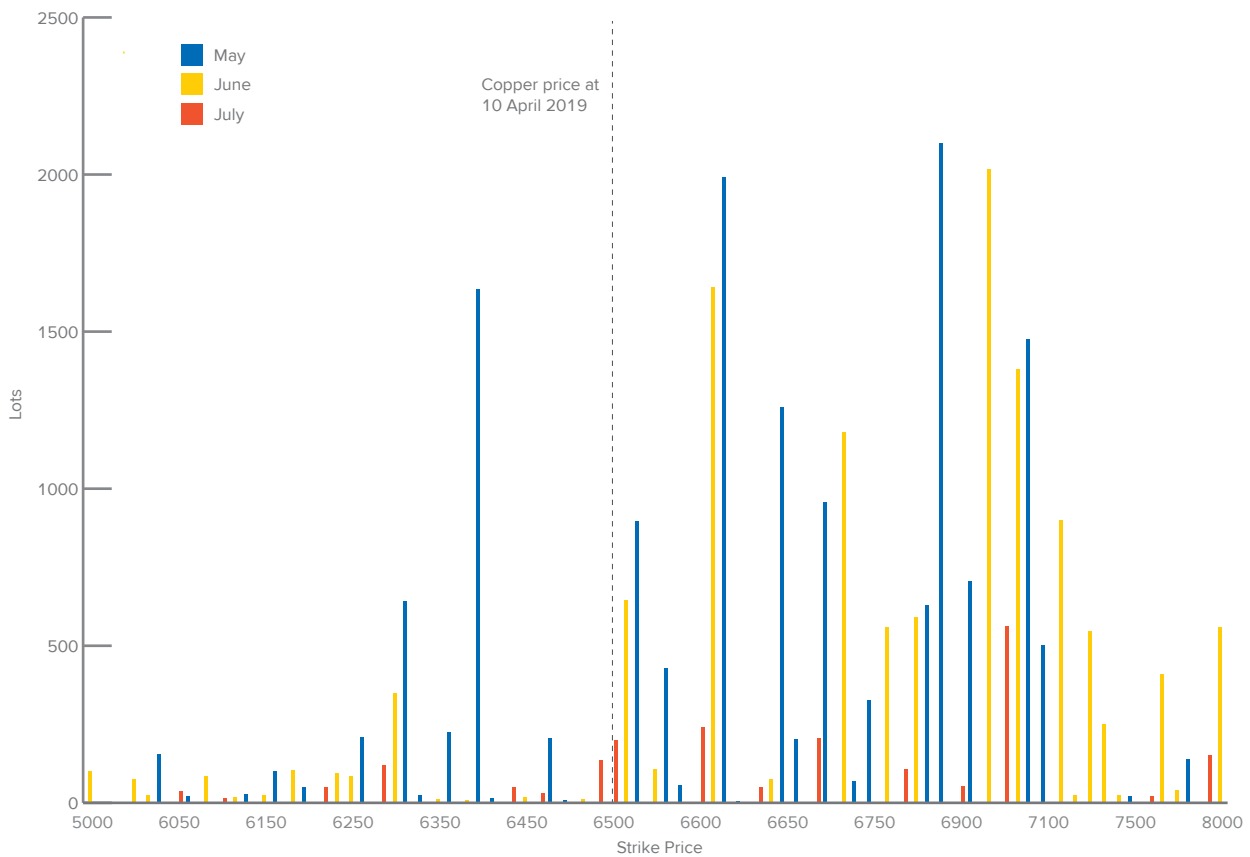
Copper offers a more positive picture, with the front three months skewed towards calls with a total of 29,056 lots versus total puts at 22,880 lots. In the week prior to 10th April, meanwhile, there was fresh bullish positioning which was concentrated in June and July. This was accompanied by some fresh bullish positioning further down the curve in October and December. The volumes were modest, and while not a signal of all-out bullish positioning, it suggests a more constructive view on the outlook for copper prices than that for zinc.

COPPER AND ZINC: OPEN INTEREST AND OTM/ITM CALCULATION BASIS 10TH APRIL

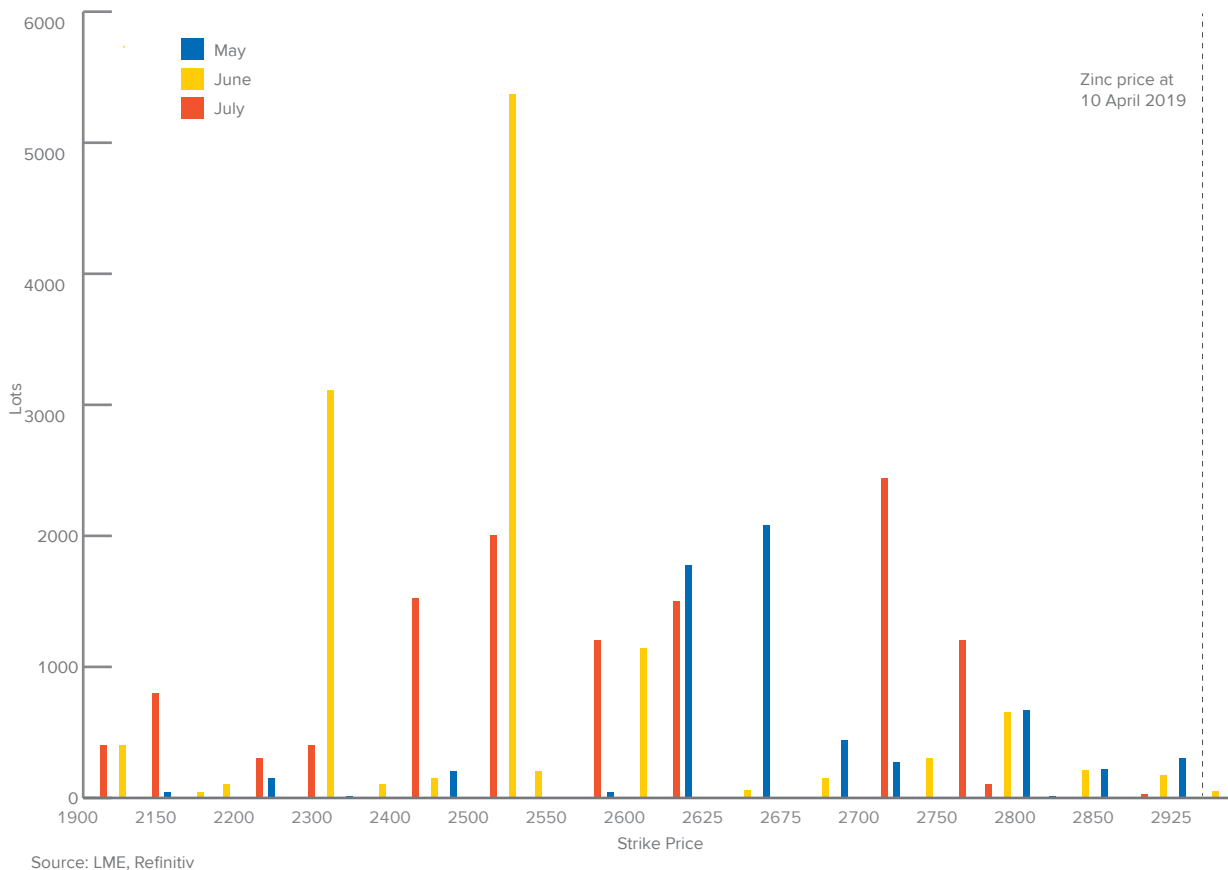
	May	May	June	June	July	July	TOTAL	TOTAL	TOTAL	% of Total	% of Total
	OTM	ITM	OTM	ITM	OTM	ITM	OTM	ITM	OTM+ITM	OTM	ITM
Total # Open Copper Calls	11,970	3,104	10,977	981	1,752	272	24,699	4,357	29,056	85%	15%
Total # Open Copper Puts	9,534	500	10,762	286	1,518	280	21,814	1,066	22,880	95%	5%
Total # Open (Calls - Puts)	2,436	2,604	215	695	234	-8	2,885	3,291	6,176		
	May	May	June	June	July	July	TOTAL	TOTAL	TOTAL	% of Total	% of Total
	OTM	ITM	OTM	ITM	OTM	ITM	OTM	ITM	OTM+ITM	OTM	ITM
Total # Open Zinc Calls	3253	1420	2646	2314	850	970	6749	4704	11453	59%	41%
Total # Open Zinc Puts	6207	0	12156	50	11887	0	30250	50	30300	100%	0%
Total # Open (Calls - Puts)	-2954	1420	-9510	2264	-11037	970	-23501	4654	-18847		

Source: LME, Refinitiv

LME COPPER CALL OPTIONS - MARKET OPEN INTEREST



LME ZINC PUT OPTIONS - MARKET OPEN INTEREST





COPPER FORECAST

LIMITED COPPER SUPPLY GROWTH NARRATIVE PLAYS OUT, BUT DEMAND WORRIES CAST SHADOW

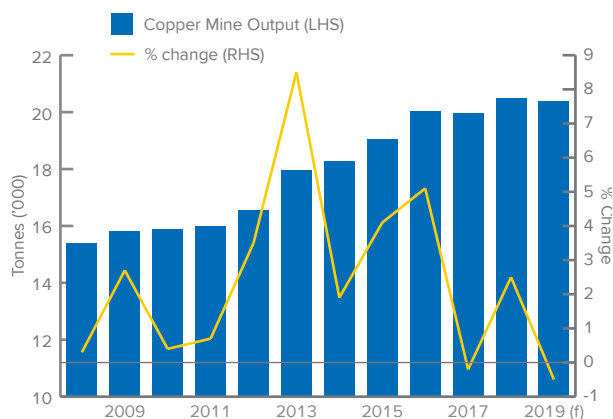
Despite its recent relative show of strength, the copper market's prospects are largely soft to neutral in 2019 with another modest surplus on the cards. As has long been predicted, supply growth is being constrained by the dearth of mine projects coming through as a direct consequence of weak prices in 2014/16.

But the argument for significantly higher prices has been confounded latterly by a weaker than expected demand picture and growing concern for recession in some of the world's major economies.

We expect global copper mine production to fall for the second time in three years in 2019 by around 1%, with the declines this year and in 2017 sandwiching reasonable, but unspectacular and below trend growth of 2.5% in 2018. This gives a compound average growth rate of 1% over the period, compared with 2.6% over the previous decade.

Indeed, as data shows in Refinitiv's recently relaunched Metals Fundamentals Database (MFD) for copper mines, world copper output will remain constrained out to 2022. The upgraded Eikon product includes a ten-year supply forecast (currently to 2028) based on mine-by-mine information, including new projects. It shows the wave of new mines currently slated to come through that should alleviate any tightness that may have emerged in the intervening period. (It is worth noting that this data excludes a disruption allowance and includes medium and low probability projects.)

GLOBAL COPPER MINE OUTPUT



Source: Metals Fundamentals Database

We expect refined production growth to be relatively restrained this year, but not exceptionally so. A larger number of maintenance closures than usual (two million tonnes on an annualised basis) are planned in top producer China over the second quarter. Meanwhile the restrictions on Category 6 scrap material to come into force from July will also affect the country's secondary output.

Nevertheless, Chinese copper cathode production is still expected to grow by somewhere in the order of 5-6% this year, helped by new projects including the recent doubling of capacity at Guangxi Nanguo to 600,000 tonnes per year (tpy). As always though, it makes sense to allow for some hiccups as new capacity ramps up.

Elsewhere, refined production growth in the Democratic Republic of Congo will be pegged back by the problems at Glencore's Mutanda operation. The company recently announced a near term step-down in production there to around 100,000 tonnes per year, based on its latest understanding of oxide and transitional ore reserves. This compares with production of just below 200,000 tonnes last year. In India, Vedanta's 400,000 tpy Sterlite smelter has been shut for almost a year due to environmental protests and its reopening does not look imminent. However, this and the longer than expected closure of Codelco smelting operations after work to make them environmentally compliant will serve to ease a tight concentrate market. The material will find a home.

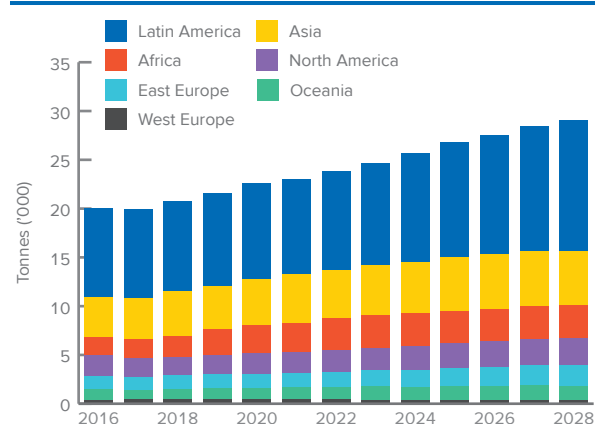
What's more, supply is no longer the overriding issue for copper over the medium term with a series of downgrades to economic forecasts for some of the world's major metal consuming regions giving increasing cause for concern. The potential for recessions in the United States and Germany, and the knock on implications for the rest of the EU region, some of which is already struggling, cannot be disregarded.

True, infrastructure spending and tax cuts have generated some optimism around the world's No. 1 consumer China. But while we expect Chinese consumption to continue to grow, helped in part by increased fabricator demand for primary metal due to lower scrap imports, it is still likely to be relatively sluggish, albeit of course from a high base.

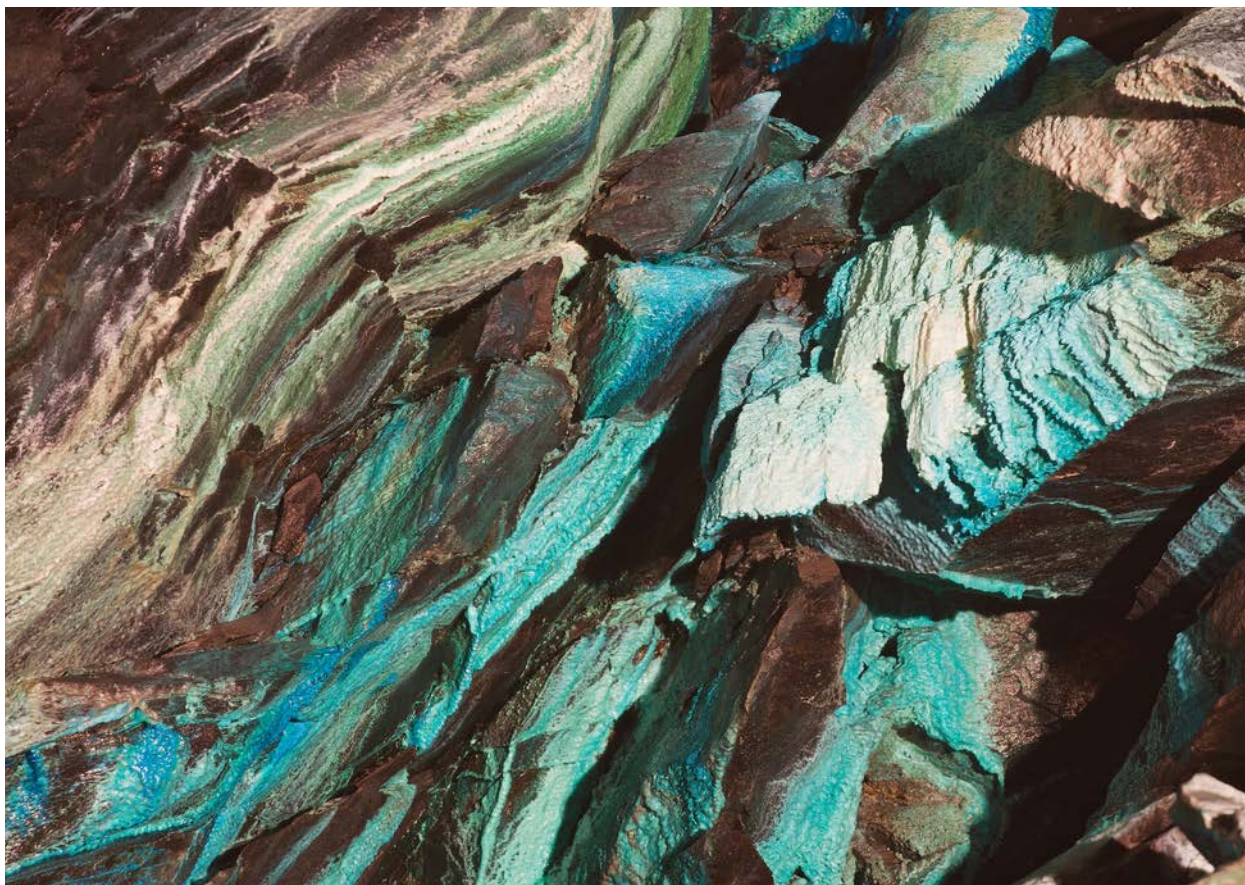
Overall, we see the pace of Chinese demand growth almost halving in 2019, and remaining subdued over the next couple of years. This alone should weigh on sentiment, especially if the market becomes more cautious about the extent of the positive impact of a drip feed of stimulus measures from China. While supportive, it is clear further such steps will not set this market alight.

The long held predictions of limited supply growth over a lengthy period are coming to fruition. But that will not translate into a tightening copper market this year. Prices should reflect this, and while we are currently forecasting them to fall only marginally in 2019, gathering storm clouds are increasing the risk of more significant downside potential.

GLOBAL COPPER MINE PRODUCTION TO 2028



Source: Metals Fundamentals Database



COPPER SCRAP

CHINA'S POLICY ON COPPER SCRAP IMPORTS IS RE-SHAPING THE INDUSTRY

Scrap is an important source for Chinese copper consumers, such that the country's policies on dealing with solid waste or so-called 'foreign garbage' are re-shaping the industry and have had a significant influence on copper prices.

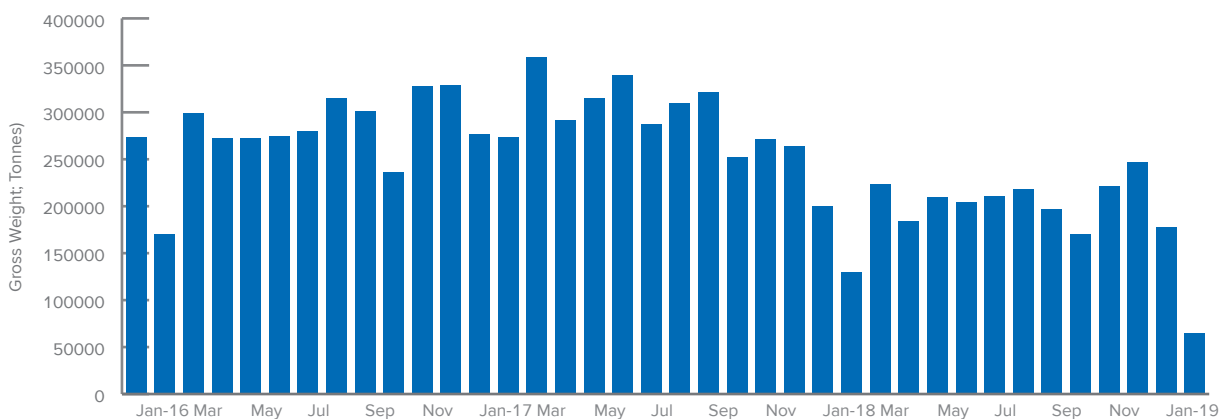
The effects became obvious in 2018 after Beijing imposed restrictions on copper scrap imports, including the introduction of a tighter quota system. The ban on category 7 copper scrap imports came into effect at the beginning of 2019 and will be extended to category 6 material from 1st July.

Last year, the quality of copper scrap imported by China improved, suggesting that at least some of the material was being dismantled elsewhere before entering the China market. Despite the fact that the gross weight of total scrap imports was lower last year, the metal content was higher. In 2018, total scrap imports decreased by 32% year-on-year in gross weight terms. Meanwhile, the average implied grade in 2018 was over 53% compared to 42% in 2017. In terms of metal content, total scrap imports declined by 13% year-on-year, less dramatic than the gross weight numbers suggest.

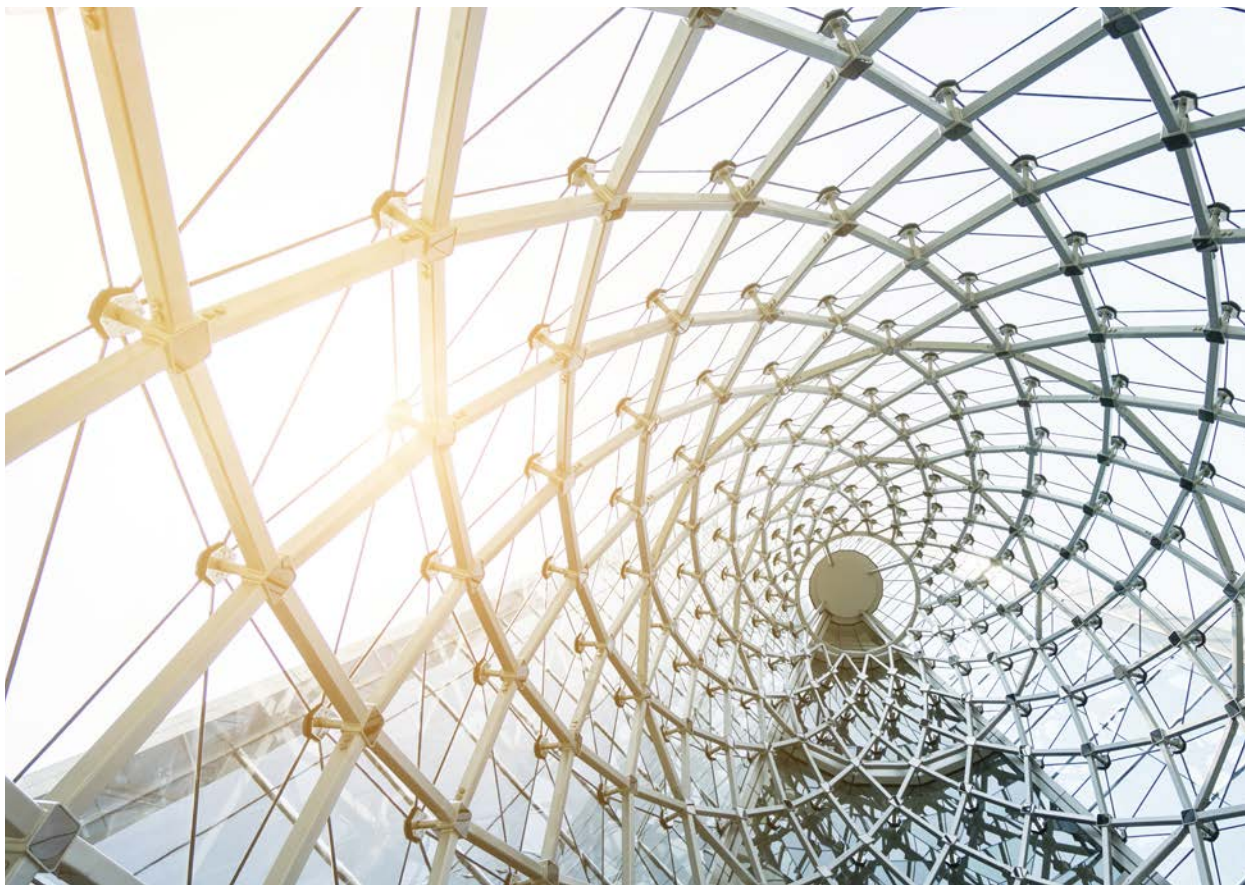
The decline in scrap imports reduced availability to some rod producers who use scrap as feed. Some downstream users had to switch to primary cathode which helped to boost China's copper consumption numbers. What has been unclear is whether policies in this area face further changes. This has deterred business from responding and coming up with next step strategies. Going forward, much will also depend on how the Chinese authorities classify copper scrap. There have been discussions on changing the categorisation of some types of copper scrap from 'solid waste' to some form of 'secondary resources' whereby high copper content scrap can be imported, but details have been lacking.

So far, we have seen a strong increase in scrap exports from Malaysia to China, with the implied grade also rising over the last few years. The average grade was only 32% in 2017 and jumped to 83% in 2018, rising further still to 90% during the first two months of 2019. This verifies some anecdotal stories suggesting that some dismantling plants had been set up in Malaysia to turn scrap into category 6 standard, enabling it to be exported to China. Ever since China revealed its plan to ban some scrap imports, there have been discussions on finding a way to set up such plants in south-east Asian countries. So the rise in Malaysia's exports is not a surprise. Investors are still waiting for clear policies, but we anticipate more changes to come that will further re-shape the industry.

CHINA COPPER SCRAP IMPORTS



Source: Refinitiv Eikon, China Customs



BASE METAL COSTS

MINE COST ANALYTICS

The fall in copper prices from mid-June 2018, which went on to develop into a full scale meltdown under the threat of a US-China trade war, left the average copper price in Q3 11% lower quarter-on-quarter at \$6,117. And with strong headwinds from weaker data from China, and the ongoing trade dispute, metal prices (until recently) tracked sideways. The Q4 average copper price came in at \$6,192, while Q1 2019 recorded an average of \$6,218, or a 0.4% improvement.

Lower prices coupled with rising cash costs, which we estimate increased by 12% quarter-on-quarter (QoQ) in Q4, meant that cash margins dropped to around 37%. Total cost margins, meanwhile, stood at 19%. In both cases Q4 represented the lowest figure for the year. Cash margins fell by 10% from the start of the year.

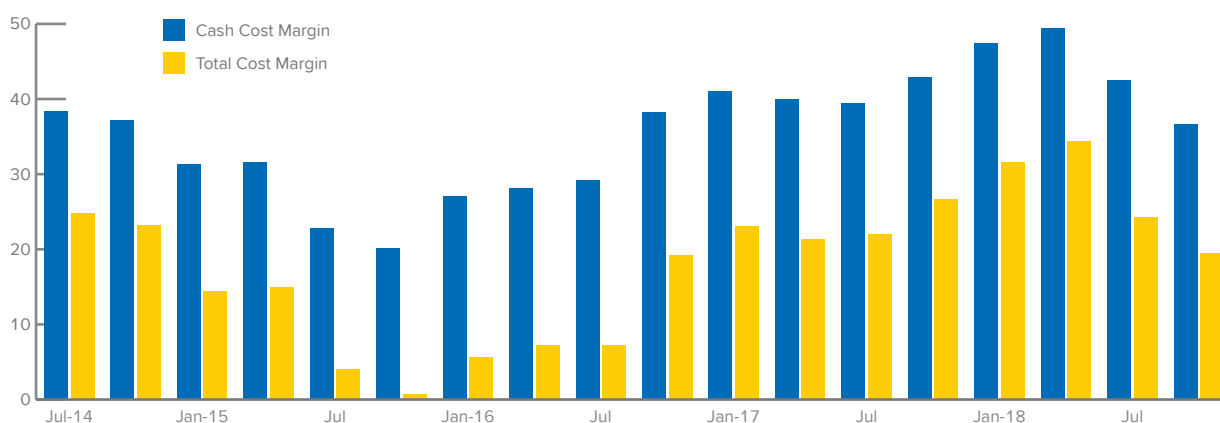
QUARTERLY COST REPORT

CO-Product Copper Mine	Q3 2017	Q4 2017	Q1 2018	Q2 2018	Q3 2018	Q4 2018
Copper Sold (Tonne)	2,658	2,910	2,668	2,822	2,758	2,802
Net Cash Unit Cost (\$/Tonne)	3,848	3,892	3,659	3,479	3,518	3,924
Depreciation (\$/Tonne)	1,104	1,109	1,097	1,033	1,117	1,064
Total Unit Cost (\$/Tonne)	4,952	5,000	4,756	4,513	4,635	4,988
LME Cash Price (\$/Tonne)	6,351	6,822	6,958	6,883	6,117	6,192
Cash Cost Margin (%)	39.4	43	47.4%	49.5%	42.5%	36.6%
Total Cost Margin (%)	22	26.7	31.6%	34.4%	24.2%	19.4%

Source Refinitiv Metals Research

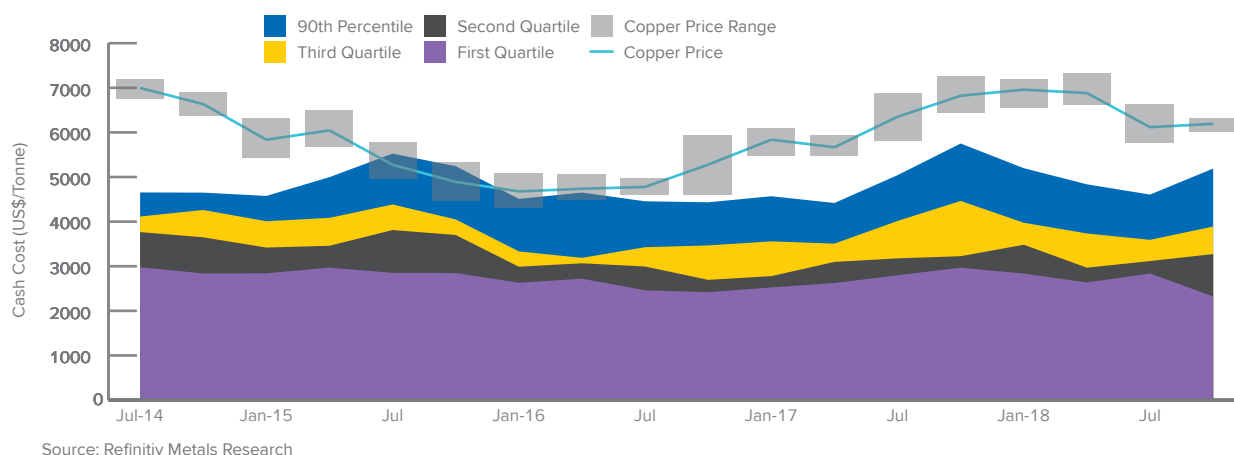
There is still breathing room, however. A snapshot of the industry cost structure or industry quartiles, shows the marginal producer (90th percentile) at \$5,190 and with a long term average of around \$4,850. On this basis copper prices will have to sink lower before we revisit the possibility of noteworthy early closures and suspensions.

COPPER COST MARGIN



Source: Refinitiv Metals Research

CASH COST QUANTILES OF COPPER MINING

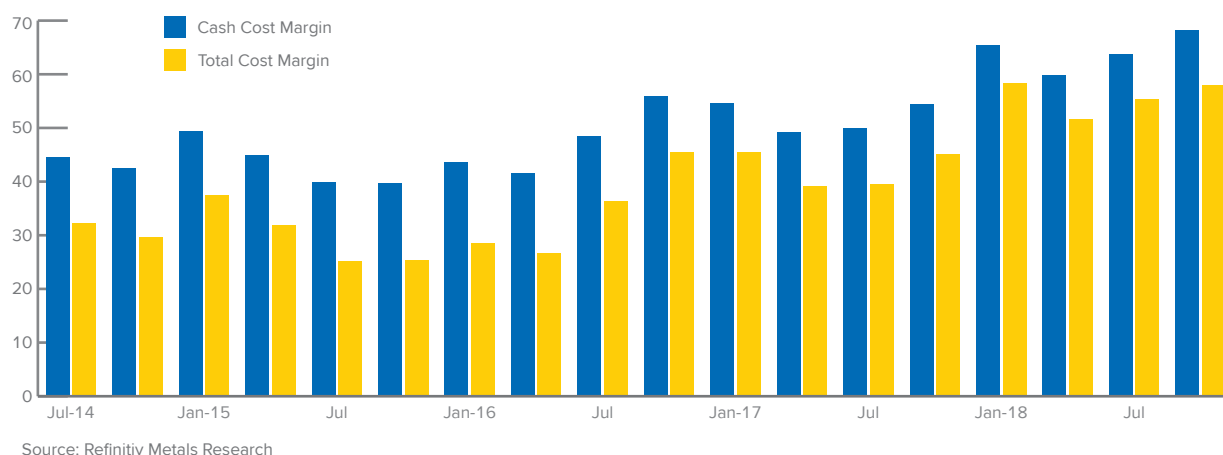


Zinc prices fell faster and harder with Q2 falling around 9% QoQ (versus 1% for copper), and Q3 prices dropping 19% (11% for copper). The recovery, on the other hand, has also been stronger with the Q4 and Q1 2019 recording respective 4% and 3% improvements QoQ versus copper's lacklustre 1% and 0.4% upticks.

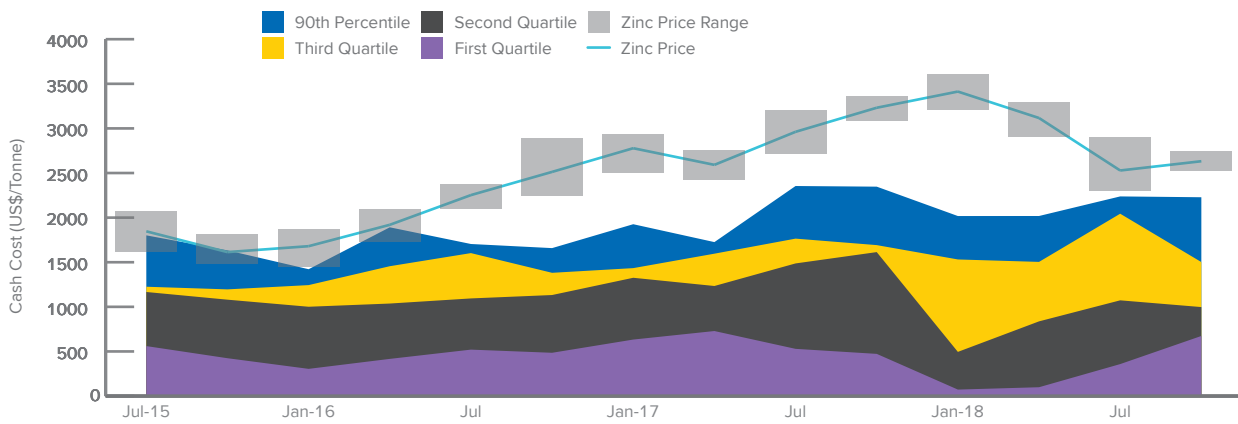
In contrast to the copper miners, climbing zinc prices and falling average unit cash costs have seen margins steadily improve over the last two consecutive quarters, with the margin for Q4 at an estimated 68%, a close to 3% improvement from the start of the year.

Turning to the cost structure of the zinc miners – and on a co-product basis (see notes below for methodology) the “marginal” zinc producer (90th percentile) recorded cash costs at close to \$2,230 and with a long term average of around \$1,925. Measured next to an average zinc price in 2018 of around \$2,900, cash margins for zinc miners remain at a premium to copper miners. w

ZINC COST MARGIN



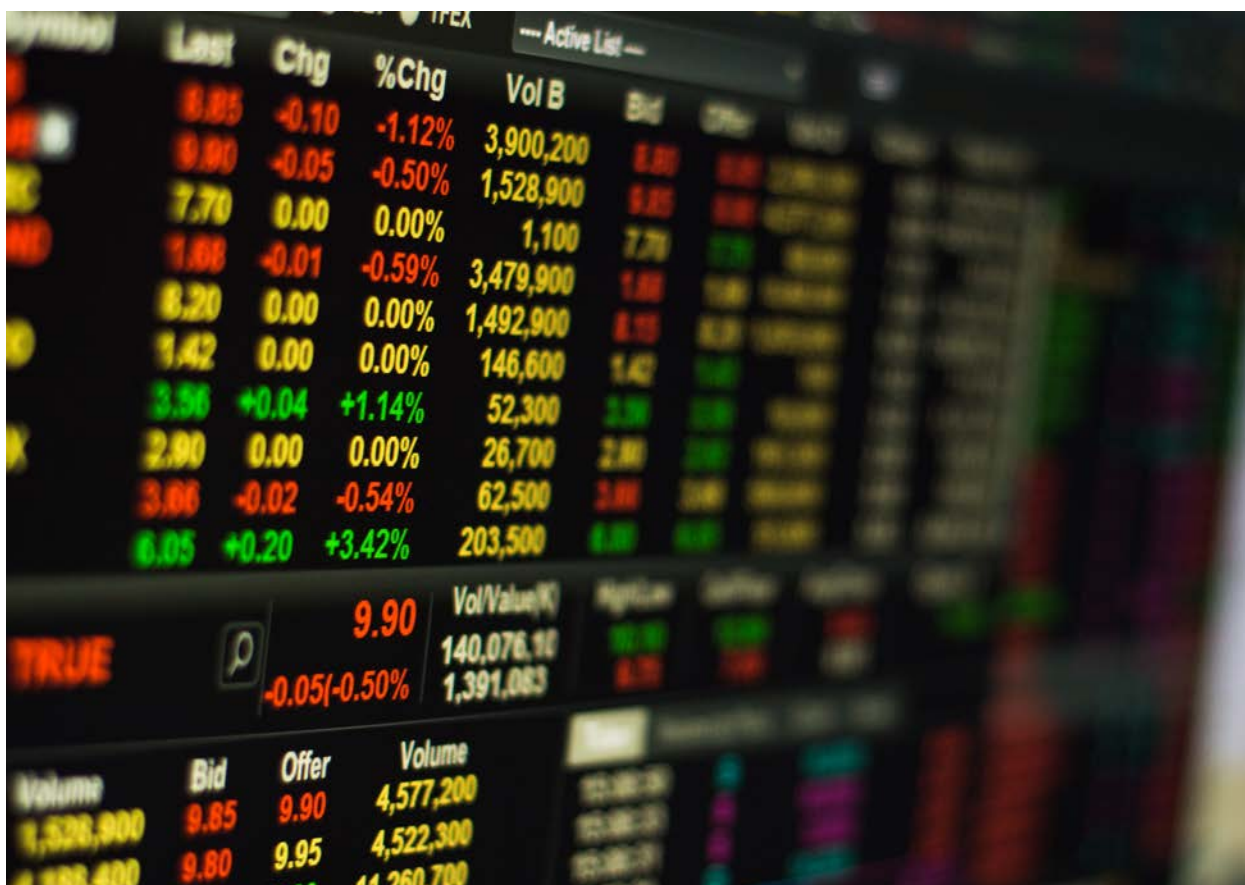
CASH COST QUANTILES OF ZINC MINING



Model notes and methodology

In our cash cost model we consider costs from ore to refined metal. If a mine is not integrated (i.e. concentrate is sold onto smelters) then the treatment charges (TCs) and in the case for copper mines refining charges (RCs) paid to the smelter and refinery are considered as cash costs. Our primary cost measure is termed “net cash unit cost” (NC) and is a direct cash cost measure, expressed in US dollars per tonne of paid metal sold. It includes mining, milling and treatment costs and on site administrative costs, but excludes royalties and taxes, capitalised development of stripping, head office costs, financing costs, and depreciation and amortisation. Net cash unit costs (NC) are presented on a co-product costing method. For co-product costing, costs are allocated to each metal on the same proportion as revenue.

As a capital-intensive industry, it is important to account for costs that are not cash expenses but which relate to the ongoing exploitation of the ore body, for example, stripping costs, underground development, equipment replacement, and new haul roads. Such costs are depreciated on a systematic basis over their expected useful life. Our second measure of industry costs, therefore, is termed “total unit costs” (TC) and is net cash unit costs plus a depreciation charge. This measure provides a better proxy for the cost of sustaining production levels at any particular mine.



INCENTIVE PRICE UPDATE/PROJECTS

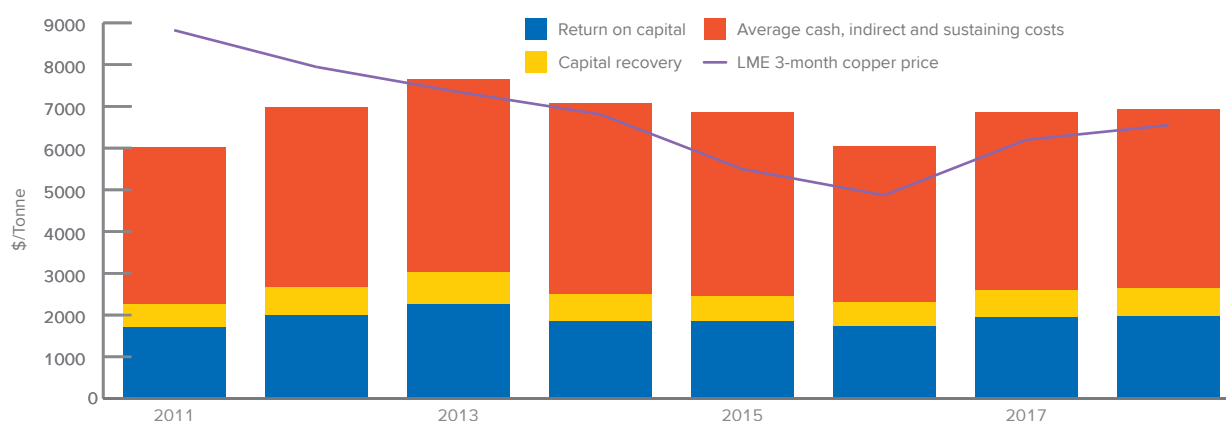
INCENTIVE PRICE COMES UP SHORT IN 2018, BUT COPPER DEMAND WORRIES OUTWEIGH

The gap between the copper price and the incentive price for new mine projects narrowed by close to \$300/tonne in 2018 to give a figure of \$6,930/tonne, according to latest figures from the metals team at Refinitiv. But that was a meagre 1.1% increase from the 2017 number, which had represented a 13% gain from the previous year and followed three consecutive annual declines.

Though in itself a fairly crude measure, since cost pressures also rise in a cyclical upturn, the \$7,000/tonne level is widely viewed as the long term average incentive price.

Certainly surging copper prices in the first half of 2018, which left them around 20% higher year-on-year, gave rise to the view that new projects would be encouraged to fill the relatively depleted pipeline. And at that stage, copper prices and the incentive price more or less matched. Second half price weakness, however, widened the gap again, and in late 2018/early 2019 there were instead reports of closures of some admittedly small high cost mines.

INCENTIVE PRICE FOR COPPER



Source: Refinitiv Metals Research

Lean times

While the copper market looks set to continue to experience a lean time in terms of new projects over the next few years, the more pressing question right now might actually be just how many will be needed in what looks to be a deteriorating economic environment over 2019/20.

Our own base case view is that while mine production growth will be limited through to 2022, and even fall this year, demand growth will also be constrained. Fears of potential recessions in the United States and Germany have not receded, and with China's growth still slowing the huge deficits previously predicted in copper do not look to be looming in the medium term.

Conversely, since we last reviewed the pipeline, our high probability category has grown to 24 projects from 20 in mid-2018, and at that point it had already almost doubled. It must be said that a number of these additions are relatively small scale operations, but they would still add around 1.1 million tonnes to annual production capacity over the next four years. Projects we have assigned medium and low probabilities have the potential to add a similar amount over the same period and a total of 8.5 million tonnes out to 2028.

Projects sparse in 2019

This year new projects are sparse. The main event will be the ramp up of Cobre de Panama's new mine, with a 350,000 tonnes per year (tpy) capacity. Otherwise there is just a smattering of mainly small scale projects, including Pumpkin Hollow and Gunnison in the United States, Carrapateena in Australia, Pumpi in the Democratic Republic of Congo (DRC) and Mirador in Ecuador. Most of these are due to start later in the year and so their contributions will be limited. Hence, in conjunction with problems at major mines such as Grasberg (Indonesia) and Mutanda (DRC), Las Bambas (Peru), the expected fall in global mine production this year.

Further ahead, some miners still look to be positioning for the next copper market bull run. The Quebrada Blanca Phase II expansion project is now set to come on stream in the second half of 2021 where previously we had a 2023 start. For now, given the current uncertain environment we have opted to give this project a medium probability. Other projects owned by majors, and about which we have been conservative, may well also proceed as planned and add to the bottom line for supply.

Our stance is cautious though, and points to mine production growth averaging little more than 1% out to 2022. This may actually prove a blessing in a softening demand environment and help to limit the downside for copper prices. If producers can hold their nerve and remain committed to their existing project plans they should be in a position to reap the benefits once the storm is weathered.



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