Goldman Sachs | Commodities Research

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Metals: Copper Outlook 2019: A Delayed Climb

- The copper market has surprised us on both the macro (EM weakness, USD strength, and trade tensions) and micro fronts (lack of labor strikes and low disruption rate) so far in 2018. While some of the surprising developments actually affect the physical supply and demand, others are more about sentiment. After reviewing the copper balance, we still see healthy fundamentals in the copper market.
- We are optimistic about global copper demand, especially over the long term. We see China demand growing for another decade, the copper intensity of ex-China growth moving higher, and the EV and electrification trend continuing. While 2019 may face some temporary headwinds, we expect global copper demand growth to accelerate thereafter.
- Elevated uncertainties about China's long-term copper demand may have caused miners to focus on today rather than the future. In our view, this is leading to lower disruption rates and higher supply in the near-term. However, we believe the current lack of investment in long-cycle large-scale greenfield projects may be setting the copper market up for potentially severe deficits 5-10 years down the road.
- All in, our supply and demand balance points to a broadly stable inventory path over the next few years before large deficits emerge in 2023-2025. We maintain our 2018 year-end price target of $6,500/t and expect prices to stay in the $6,500-7,000/t range in 2019. After a few years of flat prices in real terms in 2020-2022, sizeable deficits should push prices sharply higher in 2023-2025, approaching $10,000/t by the end of our forecast window.

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Copper Outlook 2019: A Delayed Climb

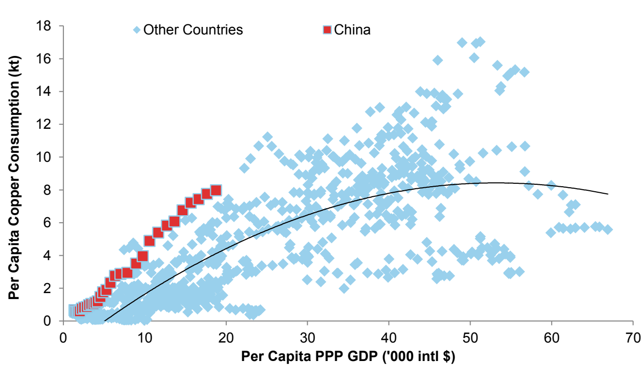
Developments in the copper market have surprised a number of observers, including ourselves, so far this year. We were expecting strong EM growth (which boosts copper demand) and a weaker dollar (which pushes up production costs in dollar terms). Instead, China worries re-emerged, the broader EM growth came under pressure, and the US dollar strengthened. In addition, we did not anticipate the extent to which the US-China trade disputes escalated and affected metals prices. With 2018 drawing to its end and 2019 quickly approaching, where do we see copper prices going from here? After reviewing demand and supply dynamics, we remain constructive and expect higher copper prices in the coming years, although the climb may come later than our previous forecasts.

More demand, especially later

China demand for copper is not rolling over

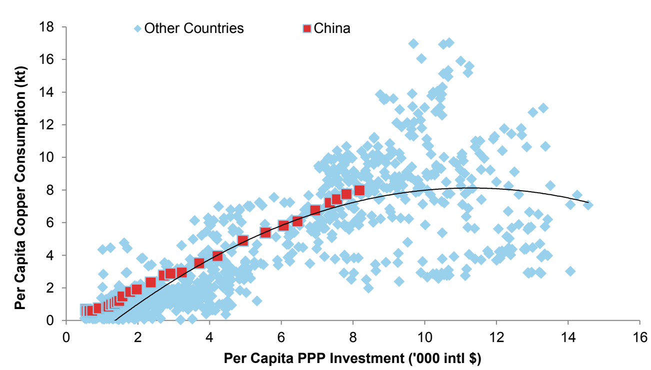
In the context of other countries' development history, China stands out for its outsized copper consumption given its income level. Exhibit 1 shows that per capita copper consumption in China is twice as high as what other countries experienced at similar levels of per capita income. Based on our conversations, the main concern among a number of investors has been that, if China were to "revert to the mean" and follow the experience of other countries, global copper demand would drop precipitously. We think such fears are unwarranted. The reason why China looks like an outlier in Exhibit 1 is its high investment share of GDP (42% in China vs. 23% global). When plotting copper consumption against per capita investment rather than per capita GDP, we find that China has been moving in line with the historical average (Exhibit 2). In other words, in the absence of an outright decline in investment, we believe Chinese copper demand should remain supported.

Exhibit 1: China looks like an outlier in its copper consumption given its income level...



Source: Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 2: ...But in line with historical average based on its investment level



Source: Haver Analytics, Goldman Sachs Global Investment Research

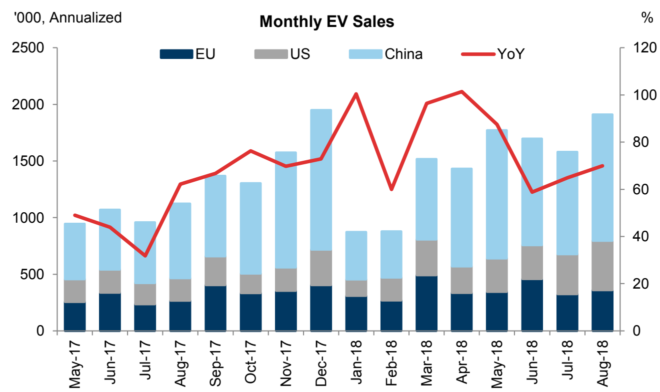
What is the likelihood that investment in China will outright fall? Not very high, in our view. Although the much-watched Fixed Asset Investment (FAI) series has decelerated significantly this year, our China Economics team's investment tracker – which removes much of the measurement issues associated with the FAI and tracks closely with the investment concept (GFCF) in national accounts – has been much more resilient (Exhibit 3). Even as China gradually rebalances toward a consumption-driven new economy, we expect investment to continue to grow. As a result, we do not see much room for Chinese copper consumption to move down over our forecast horizon.

On the contrary, we see reasons for China copper demand to rise. For example, China accounts for half of the global electric vehicle (EV) sales and continues to be the fastest-growing EV market (Exhibit 4). Even under our relatively conservative assumptions, we calculate that annual copper consumption will increase 700kt by 2025 on rising EV production, with roughly half of that coming from China.

Exhibit 3: GS Investment Tracker points to resilient investment growth in China

Source: CEIC, Goldman Sachs Global Investment Research

Exhibit 4: China accounts for half of global EV sales and robust growth supports its copper demand

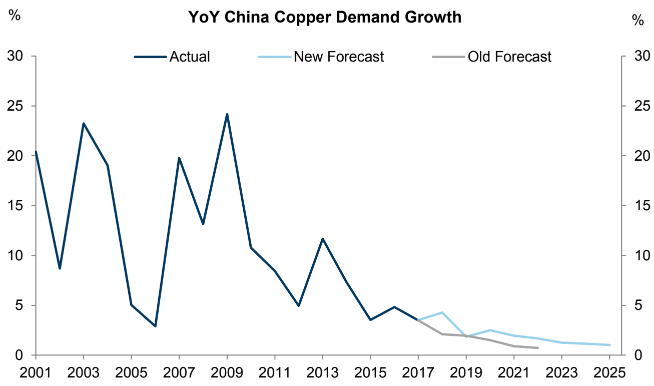


Source: CleanTechnica.com, Goldman Sachs Global Investment Research

Taken together, we believe that China copper demand should continue to grow, although at a slowing pace, over our forecast horizon of 2018-2025. One datapoint that we find reassuring, is the historical experience of the US. As our previous work shows, copper is more an "opex" (vs. "capex") and "new-economy" (vs. "old-economy") metal than steel. Therefore, a country's copper consumption tends to peak much later than its steel consumption as the country's income grows. In the US, for example, steel consumption peaked in the 1970s and copper consumption peaked nearly 30 years later. We believe Chinese steel consumption has just peaked, suggesting that the runway is still long for Chinese copper demand growth.

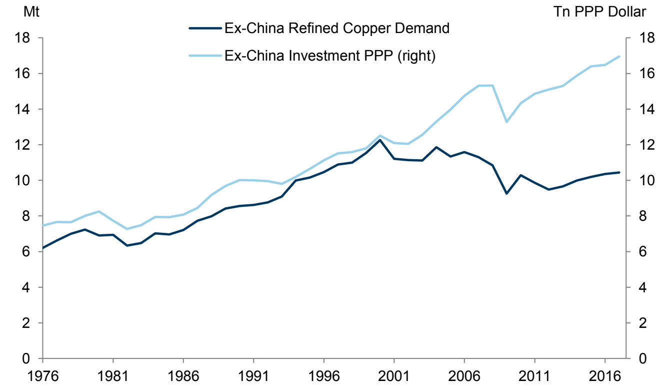
Overall, we have revised our China demand forecast higher (Exhibit 5). For 2018, our revision is significant and driven mainly by the impact of policy-driven scrap shortages in China, which in turn led to scrap-to-refined substitution and strong refined apparent demand. We expect some reversal of this impact in 2019. Over the five-year period from 2018 to 2022, we raise our China demand growth forecast from an average annual rate of 1.4% previously to 2.4%.

Exhibit 5: We revise up our China demand forecast



Source: Wood Mackenzie, Goldman Sachs Global Investment Research

Exhibit 6: Ex-China copper demand has lagged



Source: Wood Mackenzie, Haver Analytics, Goldman Sachs Global Investment Research

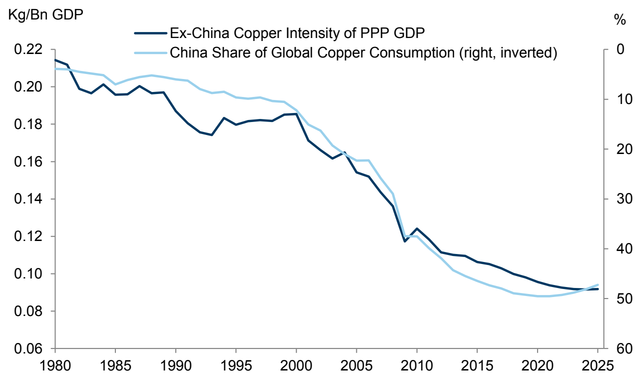
Ex-China to step in China's void

For ex-China, copper demand growth has lagged economic growth notably over the past two decades. Exhibit 6 shows that while investment in PPP terms increased 35% from 2000 to 2017 in ex-China, refined copper consumption actually fell by 15%. If this trend were to continue, global copper consumption would face significant headwinds.

However, we think that the trend should not be extrapolated. Exhibit 8 shows the copper intensity of GDP growth for ex-China declined at the same time when Chinese copper consumption increased sharply. In our view, China began to consume refined copper on behalf of other countries after entering the WTO and developing into a manufacturing powerhouse. Exports as a share of China's GDP jumped from 20% in 2000 to 35% in 2007. Wire and cable production accounts for 60% of refined copper consumption in China, and 15% of these semis products are exported to other countries. As copper demand growth decelerates in China and its share of global copper consumption stabilizes and eventually declines in our model, we expect the copper intensity of GDP growth in other countries to reverse the recent trend and to increase in the coming decades.

Admittedly, this process will be gradual. Over the next few years, we expect ex-China's copper demand to grow only modestly. Economic growth in EM ex-China has seen challenged this year by rising rates in the US and a stronger dollar. As US growth remains strong and the Fed continues to hike policy rates, EM ex-China may need time to regain growth momentum.

Exhibit 7: The decline in ex-China's copper intensity of GDP is mainly due to China



Source: Wood Mackenzie, Haver Analytics, Goldman Sachs Global Investment Research

Exhibit 8: We expect ex-China copper demand growth to accelerate after 2020

Source: Wood Mackenzie, Goldman Sachs Global Investment Research

Exhibit 8 shows our copper demand forecast for ex-China. For reasons described above, we expect demand growth to be stable during 2018-2020 but to gather steam thereafter. We note that our economists believe that US recession risk is still low and EM ex-China is still early-cycle, adding up to a constructive cyclical macro backdrop. At the same time, the structural trends of rising income and recovering copper intensity outside of China support ex-China demand in the long run. Overall, our forecast for 2018-2022 annual average growth rate of ex-China copper demand is similar to before (1.6% vs. 1.7% previously), but we expect it to accelerate to 3.5% in 2023-2025. Adding up both our China and ex-China forecasts, we expect global copper demand growth to decelerate from 2.3% in 2018 to 1.7% in 2019 before accelerating again after that.

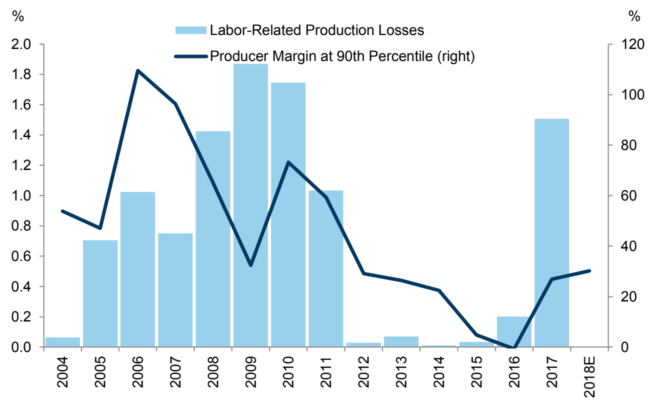
More supply, for now

A large number of labor contracts were scheduled for renegotiation in 2018, yet no major strike has taken place so far this year. As a result, disruption rate at copper mines ran meaningfully lower than their historical average and production accordingly surprised to the upside. This is quite unusual especially considering the elevated margins enjoyed by mining companies (Exhibit 9). Historically when producer margins were high (like in 2007 and 2011), labor strikes often resulted in significant production losses.

We think the difference between now and then is in part due to the cloudier outlook for China's long-term copper demand. Back in 2007 and 2011, China copper demand was growing double-digit year-over-year and few were worried that the country's seemingly insatiable demand for metals would come to an end. Those environments made it crucial for mining companies to control multi-year labor costs and to invest in long-term projects.

By contrast, nowadays investors regularly question the sustainability of China metals demand. Given that China consumes about half of world's copper annual production, even a small decline in Chinese demand could result in significant market surpluses. It is this uncertainty, in our view, that has caused producers to focus on the next few years when copper prices are likely to remain high rather than the next decade where copper prices could potentially fall dramatically on declining Chinese demand (Exhibit 10).

Exhibit 9: Labor disruptions surprised to the downside in 2018...



Source: Wood Mackenzie, Goldman Sachs Global Investment Research

Exhibit 10: ...Potentially because of uncertainties about China

Source: policyuncertainty.com

Exhibit 11 shows the list of copper projects committed to since the beginning of 2017. The 31 projects add approximately 1.5mt of annual production, according to Wood Mackenzie estimates. Of these projects, two thirds are brownfield "expansion" or "restart" projects. They increased our forecast of mine supply over the next few years notably, reducing the deficits in 2019 and moving the 2020-2022 market from broadly balanced to moderate surpluses.

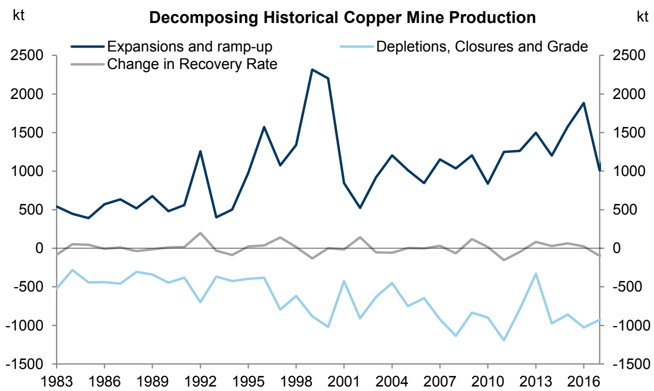
Exhibit 11: Copper projects committed to since the start of 2017
(as of Wood Mackenzie 2018Q3 LTO)

Region	Country	Mine	Type
Russia and Caspian	Kazakhstan	Aktogay Expansion	Expansion
Latin America	Argentina	Alumbrera Underground	Expansion
North America	Mexico	Aranzazu	Restart
Africa	Zambia	Baluba	Restart
North America	Mexico	Buenavista	Greenfield
Oceania	Australia	Capricorn Copper	Restart
Oceania	Australia	Carrapateena	Greenfield
Asia	China	Chengmenshan	Expansion
Asia	China	Dabaoshan	Expansion
Africa	Congo DR	Deziwa Ecaille C SxEw	Greenfield
Asia	China	Jiama	Expansion
Asia	Philippines	Lepanto	Restart
North America	USA	Lone Start SxEw	Expansion
Latin America	Chile	Mantoverde SxEw	Expansion
Latin America	Peru	Mina Justa	Greenfield
Latin America	Peru	Mina Justa SxEw	Greenfield
Africa	Botswana	Mowana	Restart
Oceania	Australia	Olympic Dam	Expansion
Africa	Congo DR	Panda Tailings	Expansion
Africa	Congo DR	Panda Tailings SxEw	Expansion
Europe	Spain	Proyecto RioTinto	Restart
Africa	Congo DR	Pumpi SxEw	Greenfield
North America	USA	Pumpkin Hollow Underground	Greenfield
Latin America	Peru	Quellavaco	Greenfield
Asia	China	Shaxi	Greenfield
Latin America	Chile	Spence	Expansion
Latin America	Chile	Spence SxEw	Expansion
Middle East	Iran	Tarom SxEw	Greenfield
Latin America	Peru	Toromocho Exp	Expansion
Oceania	Australia	Woodlawn Tailings	Restart
Asia	China	Yulong SxEw	Expansion

Source: Wood Mackenzie

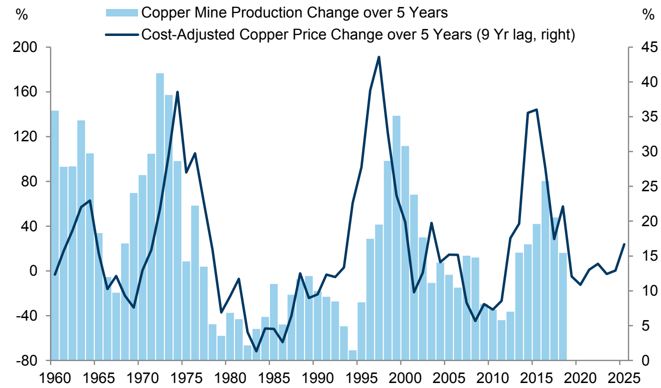
Ironically, the lack of long-cycle greenfield projects, combined with our constructive long-term demand outlook, leads the 2023-2025 market to severe deficits. As shown in Exhibit 12, we estimate that the copper market needs approximately 1mt additional mine supply each year just to cover natural depletions and grade declines. At the same time, copper is a long-cycle commodity, with projects needing 8-10 years to come online (Exhibit 13). The lack of large greenfield projects being committed today implies that supply would likely fall significantly short of demand 5-10 years down the road. For example, our balance points to c.900kt copper deficits by 2025.

Exhibit 12: 1mt additional mine supply needed each year just to offset depletions, closures and grade declines



Source: Wood Mackenzie, Goldman Sachs Global Investment Research

Exhibit 13: Copper mine supply increases lag price increases by 8-10 years



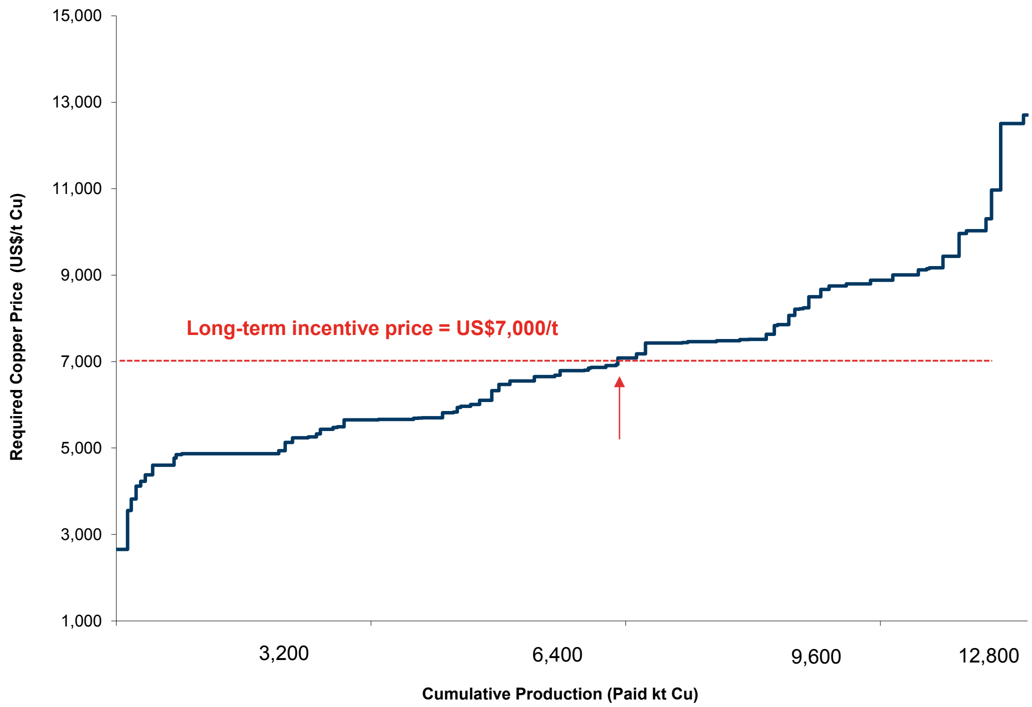
Source: Wood Mackenzie, Goldman Sachs Global Investment Research

A delayed climb

After the summer sell-off, copper has become undervalued in our view. On the macro side, trade fears, China concerns, and USD strength are holding down copper prices. On the micro side, current price is cutting into incentive prices at a time when miners face rising costs. Although the latest China manufacturing PMI disappointed and macro risks remain elevated, we expect copper prices to normalize to the $6,500-$7,000/t range in 2019 on valuation and on the ability of Chinese policymakers to employ easing measures to support demand.

From 2020 to 2022, we project that copper inventory in days of use will remain stable and we expect copper prices to stay flat in real terms during this period. Starting in 2023, we believe much higher copper prices will be needed to encourage supply and ration demand given the significant market deficits. Based on the detailed bottom-up work done by our equity colleagues (see Copper Top Projects 2018: Deficit delayed, not denied), we estimate long-term incentive price to be $7,000/t (Exhibit 14).

Exhibit 14: We estimate $7,000 long-term incentive price



Source: Goldman Sachs Global Investment Research

We previously projected copper prices to reach $8,000/t by the end of 2019. In light of both macro and micro developments this year, we are revising down our forecasts. Although still constructive and above consensus, we now expect copper prices to stay around $7,000/t over the next few years before rising sharply toward the end of the forecast horizon. For example, our model points to $8,500/t copper price in real 2018 dollars in 2025 (c.$10,000/t in nominal terms). In other words, we believe the outlook for higher copper prices remains intact, but the path now shows a delayed climb.

Appendix

Exhibit 15: GS Copper Supply and Demand Table

('000 tonnes)	2011	2012	2013	2014	2015	2016	2017	2018E	2019E	2020E	2021E	2022E	2023E	2024E	2025E
Consumption - DM															
US	1757	1762	1795	1815	1847	1853	1811	1721	1724	1708	1695	1689	1690	1696	1710
% change y/y	*-0.5%*	*0.3%*	*1.9%*	*1.1%*	*1.8%*	*0.3%*	*-2.3%*	*-5.0%*	*0.2%*	*-0.9%*	*-0.8%*	*-0.4%*	*0.1%*	*0.4%*	*0.8%*
Europe	4083	3735	3773	3835	3670	3701	3754	3822	3867	3918	3974	4030	4088	4147	4207
% change y/y	*1.5%*	*-8.5%*	*1.0%*	*1.6%*	*-4.3%*	*0.8%*	*1.4%*	*1.8%*	*1.2%*	*1.3%*	*1.4%*	*1.4%*	*1.4%*	*1.4%*	*1.4%*
Japan	1003	985	990	1050	1008	985	1025	1046	1078	1077	1074	1071	1067	1062	1058
% change y/y	*-5.4%*	*-1.8%*	*0.5%*	*6.1%*	*-4.0%*	*-2.3%*	*4.1%*	*2.0%*	*3.1%*	*-0.1%*	*-0.3%*	*-0.3%*	*-0.4%*	*-0.5%*	*-0.4%*
Other DM	1774	1626	1637	1600	1588	1625	1648	1608	1575	1547	1531	1523	1521	1526	1537
% change y/y	*-10.2%*	*-8.3%*	*0.7%*	*-2.3%*	*-0.7%*	*2.3%*	*1.4%*	*-2.4%*	*-2.1%*	*-1.8%*	*-1.0%*	*-0.5%*	*-0.1%*	*0.3%*	*0.7%*
Sub-Total DM	**8617**	**8108**	**8195**	**8300**	**8113**	**8164**	**8238**	**8197**	**8244**	**8250**	**8274**	**8313**	**8366**	**8431**	**8512**
% change y/y	*-2.3%*	*-5.9%*	*1.1%*	*1.3%*	*-2.3%*	*0.6%*	*0.9%*	*-0.5%*	*0.6%*	*0.1%*	*0.3%*	*0.5%*	*0.6%*	*0.8%*	*1.0%*
Consumption - EM															
China	7815	8204	9165	9836	10185	10678	11054	11526	11739	12033	12267	12472	12628	12773	12903
% change y/y	*8.5%*	*5.0%*	*11.7%*	*7.3%*	*3.5%*	*4.8%*	*3.5%*	*4.3%*	*1.9%*	*2.5%*	*1.9%*	*1.7%*	*1.3%*	*1.1%*	*1.0%*
Other EM	3175	3262	3326	3485	3628	3727	3748	3853	3995	4147	4363	4637	4974	5375	5846
% change y/y	*-0.1%*	*2.7%*	*2.0%*	*4.8%*	*4.1%*	*2.7%*	*0.6%*	*2.8%*	*3.7%*	*3.8%*	*5.2%*	*6.3%*	*7.3%*	*8.1%*	*8.8%*
Sub-Total EM	**10990**	**11466**	**12491**	**13321**	**13813**	**14405**	**14802**	**15379**	**15734**	**16180**	**16630**	**17109**	**17602**	**18148**	**18749**
% change y/y	*5.9%*	*4.3%*	*8.9%*	*6.6%*	*3.7%*	*4.3%*	*2.8%*	*3.9%*	*2.3%*	*2.8%*	*2.8%*	*2.9%*	*2.9%*	*3.1%*	*3.3%*
Total Global Consumption	**19607**	**19574**	**20686**	**21621**	**21926**	**22569**	**23040**	**23576**	**23978**	**24430**	**24904**	**25422**	**25968**	**26579**	**27261**
% change y/y	*2.1%*	*-0.2%*	*5.7%*	*4.5%*	*1.4%*	*2.9%*	*2.1%*	*2.3%*	*1.7%*	*1.9%*	*1.9%*	*2.1%*	*2.1%*	*2.3%*	*2.6%*
Total Global Production															
Mine Production	16037	16660	18068	18477	19194	20169	20086	20272	20743	21504	21885	22271	22150	22262	22240
% change y/y	*-0.1%*	*3.9%*	*8.5%*	*2.3%*	*3.9%*	*5.1%*	*-0.4%*	*0.9%*	*2.3%*	*3.7%*	*1.8%*	*1.8%*	*-0.5%*	*0.5%*	*-0.1%*
Refined Copper	19727	20156	20820	21757	21998	22743	23094	23449	23977	24537	25086	25527	25834	26136	26388
% change y/y	*4.1%*	*2.2%*	*3.3%*	*4.5%*	*1.1%*	*3.4%*	*1.5%*	*1.5%*	*2.3%*	*2.3%*	*2.2%*	*1.8%*	*1.2%*	*1.2%*	*1.0%*
Global Supply/Demand Balance	120	582	134	136	72	174	54	-126	-1	107	182	105	-134	-442	-873
Inventory															
Exchange (Comex, LME, SHFE)	545	589	507	307	482	539	543								
Other	2867	3405	3621	3957	3855	3972	4022								
Total	3412	3994	4128	4264	4337	4511	4565	4438	4437	4545	4727	4831	4697	4255	3382
Stock days of consumption	64	74	73	72	72	73	72	69	68	68	69	69	66	58	45
Cash Prices (annual average)															
Current Dollars ($/t)	8810	7949	7322	6862	5494	4862	6166	6550	6885	7023	7163	7306	7729	8446	9764
Current Dollars (c/lb)	400	361	332	311	249	221	280	297	312	319	325	331	351	383	443
Real 2018 Dollars ($/t)	9812	8674	7874	7261	5807	5075	6292	6550	6750	6750	6750	6750	7000	7500	8500
Real 2018 Dollars (c/lb)	445	393	357	329	263	230	285	297	306	306	306	306	318	340	386

Source: Goldman Sachs Global Investment Research

Disclosure Appendix

Reg AC

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