Macquarie Research

MACQUARIE

Commodities

GLOBAL

LME cash price

	US$/tonne	% change day on day
Aluminium	1,813	-0.4
Copper	5,780	-1.0
Lead	2,344	-0.3
Nickel	10,300	-0.9
Tin	18,894	-1.5
Zinc	2,794	0.1
Cobalt	38,250	1.3
Molybdenum	14,896	0.0

Other prices

		% change day on day
Gold (US$/oz)	1,231	0.3
Silver (US$/oz)	17.60	0.0
Platinum (US$/oz)	1,005	-0.3
Palladium (US$/oz)	767	-0.2
Oil WTI	52.00	-2.5
USD:EUR exchange rate	1.070	-0.3
AUD:USD exchange rate	0.765	0.0

LME/COMEX stocks

	Tonnes	Change
Aluminium	2,254,650	5,525
LME copper	253,450	-275
Comex copper	95,879	814
Lead	189,325	0
Nickel	383,292	1,116
Tin	5,830	25
Zinc	386,675	-2,800

Source: LME, Comex, Nymex, SHFE, Metal Bulletin, Reuters, LBMA, Macquarie Research, February 2017

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7 February 2017

Commodities Comment

The 2017 battery metal story might well be cobalt

Feature article

- If last year was lithium's time, for 2017 its battery peer cobalt may be the one receiving more attention. Prices have accelerated to levels last seen in 2011, and with demand from the core portable electronics sector recovering and supply growth relatively stagnant, this can be fundamentally justified. China has next to no domestic mine supply, and is highly reliant on the Democratic Republic of Congo (DRC) for its cobalt units. Moreover, the prioritisation of higher quality battery development by the Chinese government may even open up the coveted new energy vehicle market to greater cobalt penetration.
- Risks remain – technological on the demand side and geopolitical on the supply side – but for now the perennial underperformer in metals markets looks well placed to shine.

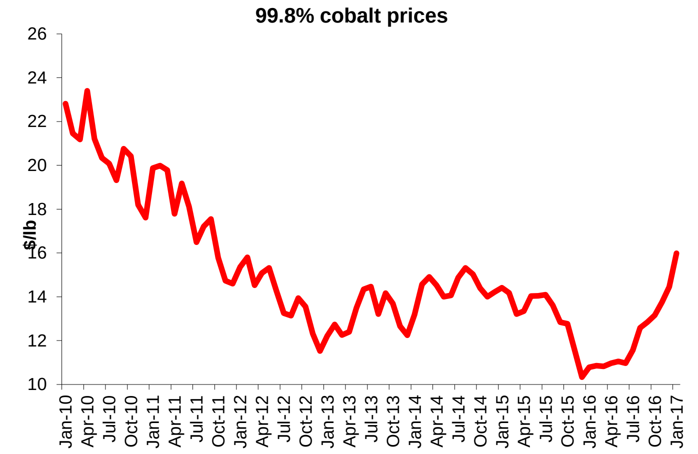
Latest news

- LME **tin** 3-month continued its slide today, falling 1.5% to <$19,000/t as the forward curve softened at the front. Cash-3s are now out to ~$46/t contango – an extraordinary move given the spread was in a backwardation of $270/t just over two months ago. Stocks have barely changed since the latest price downslide, however, remaining flat at ~5.8kt since 27 January.
- A recent article written by Chinese Premier Li confirmed that China has closed more than 65mtpa of outdated **steel**-making capacity and 290mtpa of **coal**-mining capacity in 2016, both higher than the original target of 45mtpa steel-making and 250mtpa coal-mining capacity cut set for 2016. 700,000 workers from the above industries were relocated in the same year. Over the next 3-5 years the Premier said China would continue cutting to make total cuts of 140mtpa of steel-making capacity and 800mtpa coal-mining capacity. We see the target of the steel capacity cut at the higher end of the originally planned range of 100~150mtpa for 2016~2020, and the target of coal-mining capacity cut is in line with the latest 13th five year plan for coal industry (note). Official target for 2017 capacity cuts have not yet been released, but consensus expects the number to be higher than the original 2016 target for steel and coal, and it is possible that more industries may be included into "supply side reform". Signals from the government suggest that for "over-supplied" industries in China the first three years of 2016~2020 will focus on outdated capacity cut, and the last two years will focus on industry consolidation.
- The European **steel** industry is "on the cusp of consolidation" according to a new report from our European mining equity analyst, Patrick Morton. He believes Thyssenkrupp is the most likely beneficiary, with press reports citing potential JVs with counterparties including Salzgitter, Tata Steel Europe and Tata Steel UK. A combined entity with any of these European names would solidify the company as the #2 European steel producer, giving it output of >20Mtpa.
- The Chinese central bank purchased no **gold** in January, according to reserves data released on Tuesday. This was the third consecutive month it has not bought any, a worrying trend.

The 2017 battery metal story might well be cobalt

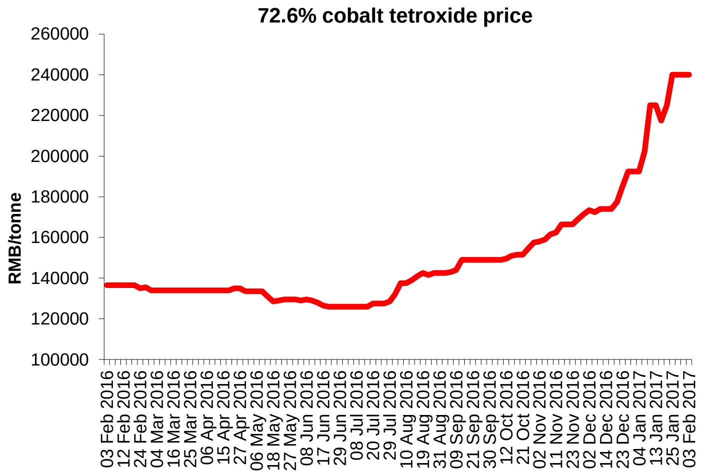
- If last year was lithium's time, for 2017 its battery peer cobalt may be the one receiving more attention. Prices have accelerated to levels last seen in 2011, and with demand from the core portable electronics sector recovering and supply growth relatively stagnant, this can be fundamentally justified. China has next to no domestic mine supply, and is highly reliant on the Democratic Republic of Congo (DRC) for its cobalt units. Moreover, the prioritisation of higher quality battery development by the Chinese government may even open up the coveted new energy vehicle market to greater cobalt penetration. Risks remain – technological on the demand side and geopolitical on the supply side – but for now the perennial underperformer in metals markets looks well placed to shine.
- There has been a long wait for cobalt prices to start moving upwards in a conspicuous fashion. From a peak at ~$50/lb in 2007, to ~$25/lb coming out the GFC, prices steadily ground lower through 2010 (even as peers were rising), 2011 and 2012 before finding some stability. After dropping to ~$10/lb in late 2015, from July 2016 onwards we have seen recovery, and one accelerating into 2016. Latest spot metal prices are above $17/lb, a level we only expected over the medium term.
- This move has been matched and even slightly exceeded by moves in cobalt chemical prices, the raw material crucial for the global rechargeable battery industry. Cobalt tetroxide prices in China have roughly doubled in RMB terms since mid-2016, suggesting battery demand has been improving over this period.

Fig 1 Cobalt prices are starting to gain momentum, with 99.8% now above $17/lb…



Source: Metal Bulletin, Macquarie Research, February 2017

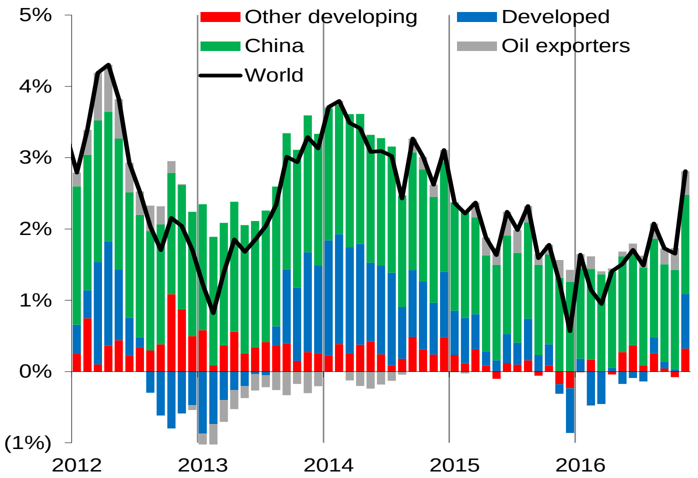
Fig 2 ...while cobalt chemical prices have also moved rapidly higher



Source: Metal Bulletin, Macquarie Research, February 2017

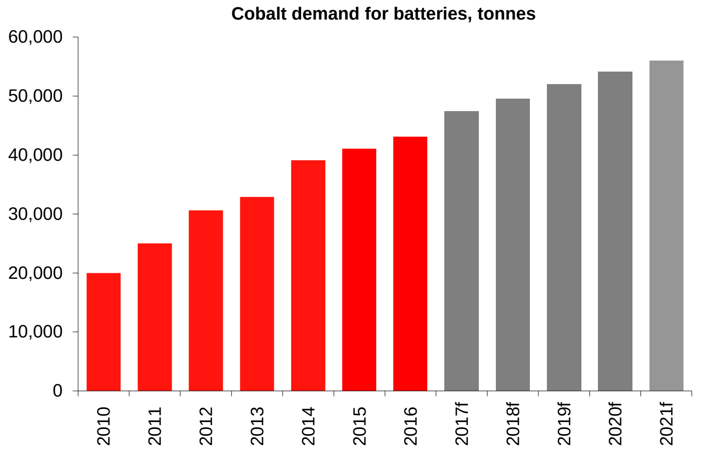
- Much of this improvement has to do with the wider industrial recovery. Cobalt has always tended to benefit from the maturing period of such recoveries, where the industrial consumer is feeling more confident. And, as we noted recently, into year-end 2016 the pace of IP growth is clearly accelerating, reaching 2.8% YoY in November, its fastest since December 2014. The main improvement has been in the developed markets, which are seeing synchronised growth for the first time in years. PMI data, which we think gives a heads up to the output data over the next few months, suggests that recovery continued into January.
- Cobalt is distinct among peer metals through roughly half of current consumption being in battery manufacture. While lithium is often thought of as the battery metal, this sector currently only accounts for around a third of total demand, and may only reach cobalt's current levels on a 5-10 year view. The past decade has seen almost 10% CAGR growth for cobalt in this area, however the pace of growth both in absolute and percentage terms has been weakening in recent years, even with lower cobalt pricing.

Fig 3 As the global industrial recovery matures…



Source: National Statistics, Macquarie Research, February 2017

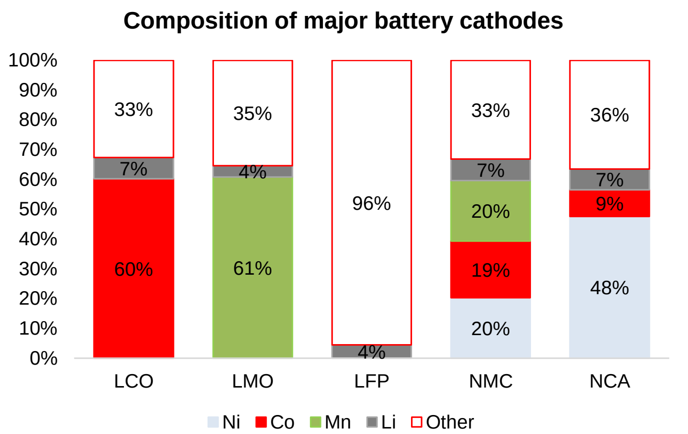
Fig 4 ...we see an acceleration in battery demand



Source: CDI, CRU, Macquarie Research, February 2017

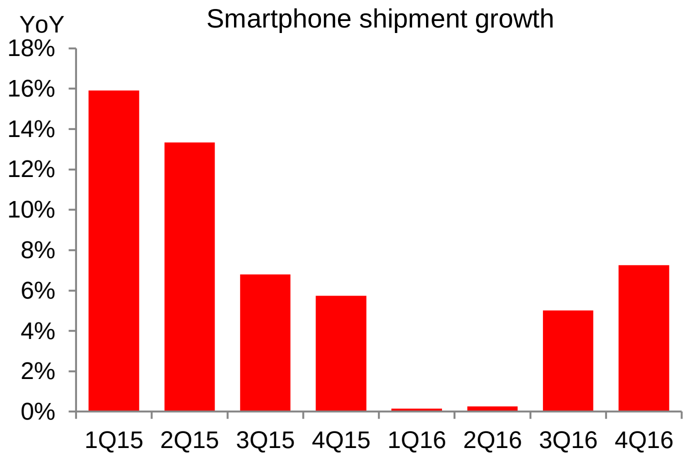
- Much of this growth slowdown is related to the portable electronics sector. Lithium-cobalt (LCO) batteries are the staple of consumer electronics, and have suffered as core areas have declined – both laptop and tablet shipments dropped over 10% YoY in 2016. However, smartphones (whose batteries are smaller but sales significantly higher) did pick-up strongly in H2 2016 after a stagnant Q1. Indeed, Q4 shipments were up 7.3% YoY according to industry statistics. This is highly beneficial for cobalt, while LCO batteries also continue to gain penetration in other areas, notably power tools. Thus for 2017 we see an acceleration in cobalt demand for batteries to 10% YoY.

Fig 5 LCO batteries are most important for cobalt demand, and dominate portable electronics…



Source: Avicenne, Macquarie Research, February 2017

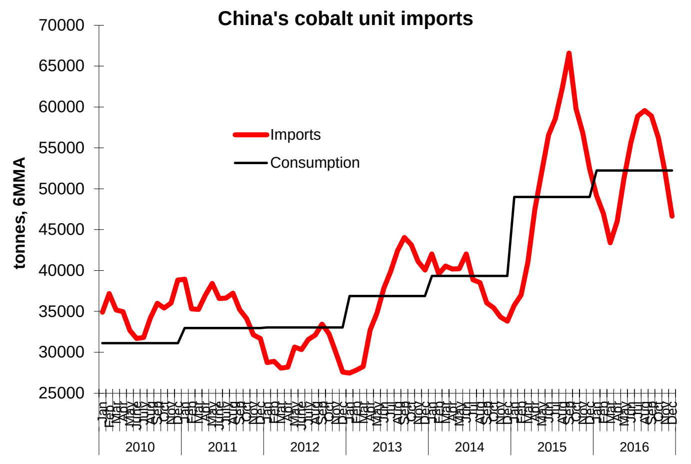
Fig 6 …where smartphone shipment growth is accelerating once more, after a poor H1 2016



Source: IDC, Macquarie Research, February 2017

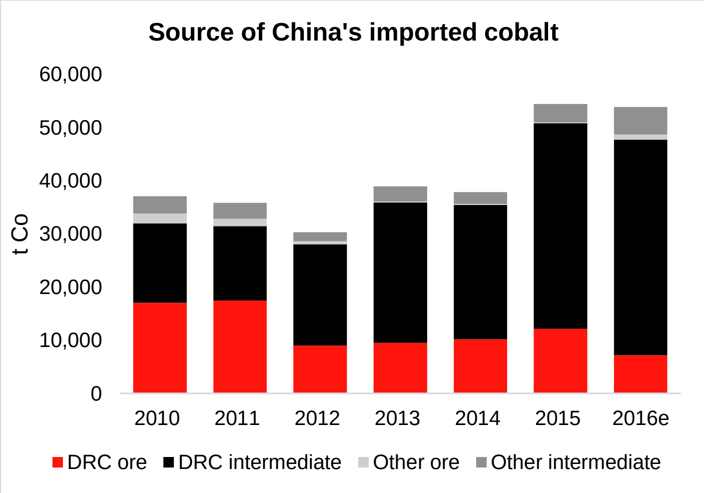
- This improving demand perspective is clearly pressurising Chinese battery manufacturers to seek more cobalt. After strong imports in 2015, 2016 was a year where cobalt ore and intermediate stocks were run down – the raw material overhang which depressed prices in early 2016 is gone.
- Of the ~54kt of recoverable cobalt units imported into China last year, 48kt came from the DRC, making this China's most concentrated supply risk in an individual commodity. This is helped by the distinct lack of Chinese domestic resource, which supplies less than 3% of Chinese cobalt units. We reiterate our view that the ongoing Chinese purchases of DRC assets (most notably Tenke Fungurume) are with one eye on securing supply of cobalt.

Fig 7 China's cobalt unit imports have swung aggressively in recent times…



Source: China Customs, Macquarie Research, February 2017

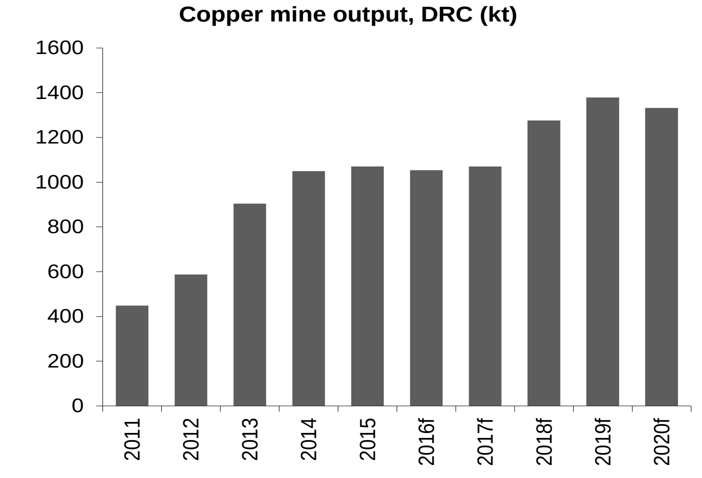
Fig 8 …but remain highly reliant on DRC supply, increasingly in intermediate form



Source: China Customs, Macquarie Research, February 2017

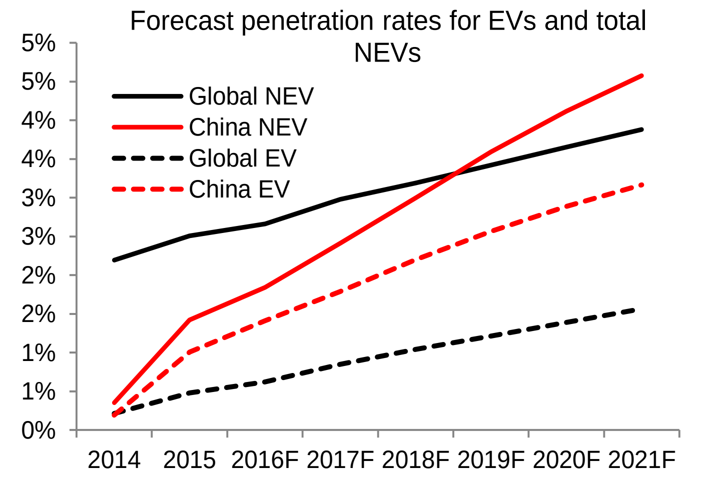
- Just as with many other markets, cobalt has limited new supply projects coming through. Meanwhile, refined output in key supply countries such as Australia, Russia and Zambia are well down on levels seen a decade ago. As a result, the global cobalt market is becoming ever more dependent on supply from the DRC, a country where geopolitical risk is once again rising after a period of relative stability, with a transfer of presidential power due next year, a process which has not gone smoothly over history. Moreover, it is also a country under increasing pressure domestically to add more value to mined products in the country, and under increasing pressure internationally to clamp down on artisanal mining – with cobalt extraction the poster child for this.
- Much of DRC cobalt supply comes as a co-product with copper, hence the copper price (and therefore copper projects) are crucial. Given the steady downtrend in copper pricing until October last year, investment in the DRC has been limited while certain existing assets (most notably Glencore's operations) have seen a supply decline. Indeed, DRC copper output has been stagnant for the past three years, with 2017 expected to continue this trend. We do however expect some growth in 2018-19. We see cobalt supply growing 2.9% this year, the lowest rate since 2012, with the swing up and down from this number highly dependent on the performance of small-scale DRC supply. The fundamental outlook does look to be improving for 2017, and on our modelling we see a sustained deficit and stock draw through the end of the decade.
- So where are the risks to this view? First, let's consider the upside risk. Currently we are assuming little cobalt penetration into the rapidly growing electric vehicle and new energy vehicle market. China, most notably BYD, has been progressing down the LFP (zero cobalt content) battery route for the bus sector while LCO batteries are not deemed practical for the larger scale needed for NEVs. However, here technology could be shifting in cobalt's favour.
- On December 30th 2016, China announced a revised E-bus subsidy policy – please see this note by our China autos analyst Allen Yuan for further details. While overall subsidies were lowered, the policy introduced more technology metrics, such as energy density and battery weight/total vehicle weight ratio. It also lifted the minimum travel range to 200km, and lowered the maximum E-kg requirement to 0.24Wh/km.kg. Essentially, this is prioritising the higher battery quality technologies, which should see a decline in use of LFP batteries and potential replacement with NMC (19% cobalt by weight in cathode) and NMA (9% cobalt), which means our demand forecast risk is skewed to the upside. While our team expects a 24% YoY decline in China E-bus sales over 2017 given the subsidy removal, this is still seen as a sector targeted for growth by the government to alleviate environmental concerns. We forecast a 8.2% CAGR over the coming years.

Fig 9 DRC copper output has been stagnant since 2014



Source: ICSG, Macquarie Research, February 2017

Fig 10 If cobalt can gain more share of the rising NEV market, demand growth may be quicker than forecast



Source: National Data, Macquarie Research, February 2017

- However, a rising cobalt price may also slow the relatively rapid decline we have seen in battery manufacturing costs over recent years. For LCO batteries, cobalt is significantly more important than lithium in terms of pricing, and with both now well up YoY there is a risk that companies look at alternative technologies to the detriment of cobalt. Moreover, while the DRC-China link clearly brings supply side risk, it also creates potential problems on the demand side. Material buyers rarely feel comfortable being beholden to such concentrated supply, and when coupled with concerns over the social and environmental impact of DRC mining, there is certainly potential that cobalt is thrifted or engineered out of battery technology over the longer term horizon.
- Lastly, the battery demand story has attracted a new source of cobalt demand in recent times – investors. With strong expectations of growth in rechargeable batteries and energy storage, and cobalt having lagged lithium pricing significantly, it is viewed as the catch-up trade. And with limited equity exposure options, this has often resulted in taking physical metal positions. This of course can accentuate upside moves, but can also pose risk of a correction should cycles turn.

Fig 11 Cobalt supply-demand balance

Cobalt Demand (t)	2012	2013	2014	2015	2016	2017F	2018F	2019F	2020F	2021F
Superalloys	13,115	14,595	15,750	16,264	16,755	17,261	17,508	17,737	17,981	18,202
Batteries	30,600	32,900	39,100	41,055	43,108	47,419	49,552	52,030	54,111	56,005
Dyes & Paints	6,178	6,363	6,554	6,620	6,818	7,023	7,233	7,450	7,674	7,904
Catalysts	2,233	2,345	2,521	2,647	2,779	2,918	3,064	3,217	3,378	3,547
Other Chemicals	7,977	8,417	8,864	8,991	9,318	9,662	10,097	10,445	10,807	11,125
Magnets	3,623	3,405	3,473	3,543	3,649	3,686	3,722	3,760	3,797	3,835
Diamonds & Hard Facing	8,964	9,144	9,144	9,235	9,327	9,421	9,515	9,610	9,706	9,803
High Strength Steel	1,660	1,710	1,744	1,709	1,709	1,726	1,744	1,761	1,779	1,779
Total Demand	**74,350**	**78,879**	**87,151**	**90,064**	**93,464**	**99,115**	**102,436**	**106,011**	**109,233**	**112,201**
% change YoY	10.4%	6.1%	10.5%	3.3%	3.8%	6.0%	3.4%	3.5%	3.0%	2.7%

Primary/Secondary Cobalt Supply (t)	2012	2013	2014	2015	2016	2017F	2018F	2019F	2020F	2021F
Zambia	5,735	5,000	4,317	2,997	3,500	3,500	3,500	3,500	3,500	3,500
DRC	2,999	3,000	3,300	3,300	1,900	3,500	3,500	3,500	3,500	3,500
Russia	2,186	2,368	2,302	2,040	3,200	3,200	3,200	3,200	3,200	3,200
India	580	295	100	150	100	100	100	100	100	100
China	29,725	33,200	35,400	44,100	47,000	51,500	53,500	54,588	55,702	56,845
Finland	10,547	10,010	11,452	8,582	11,000	11,000	11,000	11,000	11,000	11,000
Australia	4,869	4,981	5,419	5,150	3,000	2,100	2,100	2,100	2,100	2,100
Canada	5,682	5,559	5,261	5,591	5,900	6,150	6,150	6,150	6,150	6,150
Secondary sources	2,800	3,050	3,050	3,050	3,000	3,000	3,000	3,000	3,000	3,000
Other	10,942	14,331	15,845	17,389	18,155	15,551	15,501	15,669	15,641	15,613
Total Supply	**76,065**	**81,794**	**86,446**	**92,349**	**96,755**	**99,601**	**101,551**	**102,806**	**103,893**	**105,007**
% change YoY	0.7%	7.5%	5.7%	6.8%	4.8%	2.9%	2.0%	1.2%	1.1%	1.1%
Balance	**1,715**	**2,915**	**-705**	**2,285**	**3,291**	**486**	**-885**	**-3,205**	**-5,340**	**-7,194**
Stocks	**26,627**	**29,542**	**28,837**	**31,123**	**34,414**	**34,900**	**34,015**	**30,810**	**25,470**	**18,277**
Weeks of Consumption	18.6	19.5	17.2	18.0	19.1	18.3	17.3	15.1	12.1	8.5

Source: CDI, CRU, Macquarie Research, February 2017

Tuesday 07 February 2017

Prices

	Closing price *		Closing price *				
	07-Feb-17	**07-Feb-17**	**06-Feb-17**	**06-Feb-17**	**% ch. day**	**2017 YTD**	**Ave 2016**
	US$/tonne	**US¢/lb**	**US$/tonne**	**US¢/lb**	**on day**	**US$/tonne**	**US$/tonne**
LME Cash							
Aluminium	1,813	82	1,821	83	-0.4	1,704	1,605
Aluminium Alloy	1,601	73	1,591	72	0.6	1,507	1,555
NAASAC	1,844	84	1,834	83	0.5	1,667	1,704
Copper	5,780	262	5,836	265	-1.0	5,456	4,863
Lead	2,344	106	2,351	107	-0.3	2,125	1,872
Nickel	10,300	467	10,397	472	-0.9	9,513	9,609
Tin	18,894	857	19,173	870	-1.5	19,794	18,006
Zinc	2,794	127	2,793	127	0.1	2,577	2,095
Cobalt	38,250	1,735	37,750	1,712	1.3	33,188	25,655
Molybdenum	14,896	676	14,898	676	0.0	14,524	14,453
LME 3 Month							
Aluminium	1,831	83	1,835	83	-0.2	1,700	1,610
Aluminium Alloy	1,615	73	1,605	73	0.6	1,522	1,577
NAASAC	1,860	84	1,850	84	0.5	1,687	1,725
Copper	5,795	263	5,846	265	-0.9	5,477	4,867
Lead	2,345	106	2,348	107	-0.1	2,125	1,878
Nickel	10,355	470	10,450	474	-0.9	9,566	9,657
Tin	18,930	859	19,220	872	-1.5	19,762	17,912
Zinc	2,795	127	2,793	127	0.1	2,592	2,102
Cobalt	38,250	1,735	37,750	1,712	1.3	33,200	25,758
Molybdenum	15,000	680	15,000	680	0.0	14,524	14,472

***** *LME 2nd ring price - 1700 hrs London time. Year-to-date averages calculated from official fixes.***

Gold - *LBMA Gold Price (US$/oz)*	1,231		1,227	0.3	1,135	1,249
Silver - *LBMA Silver Price (US$/oz)*	17.60		17.60	0.0	15.96	17.14
Platinum - *London 3pm price (US$/oz)*	1,005		1,008	-0.3	921	987
Palladium - *London 3pm price (US$/oz)*	767		769	-0.2	710	613
Oil WTI - *NYMEX latest (US$/bbl)*	52.00		53.32	-2.5	50.14	43.24
EUR : USD exchange rate - *latest*	1.070		1.074	-0.3	1.012	1.107
AUD : USD exchange rate - *latest*	0.765		0.765	0.0	0.711	0.745

Exchange Stocks

			Change since last report		Cancelled	End-16	Ch. since
(tonnes)	**07-Feb-17**	**06-Feb-17**	**Volume**	**Percent**	**warrants**	**stocks**	**end-16**
LME Aluminium	2,254,650	2,249,125	5,525	0.2%	598,900	2,202,175	52,475
Shanghai Aluminium	136,970	136,970	0	0.0%	0	100,722	36,248
Total Aluminium	**2,391,620**	**2,386,095**	**5,525**	**0.2%**	**598,900**	**2,302,897**	**88,723**
LME Copper	253,450	253,725	-275	-0.1%	108,525	311,825	-58,375
Comex Copper	95,879	95,065	814	0.9%	-	80,112	15,767
Shanghai Copper	223,853	223,853	0	0.0%	-	146,598	77,255
Total Copper	**573,182**	**572,643**	**539**	**0.1%**	**108,525**	**538,535**	**34,647**
LME Zinc	386,675	389,475	-2,800	-0.7%	113,600	427,850	-41,175
Shanghai Zinc	162,063	162,063	0	0.0%	-	152,824	9,239
Total Zinc	**548,738**	**551,538**	**-2,800**	**-0.5%**	**113,600**	**580,674**	**-31,936**
LME Lead	189,325	189,325	0	0.0%	66,975	194,900	-5,575
Shanghai Lead	46,918	46,918	0	0.0%	-	28,726	18,192
Total Lead	**236,243**	**236,243**	**0**	**0.0%**	**66,975**	**223,626**	**12,617**
Aluminium Alloy	13,280	13,280	0	0.0%	440	12,980	300
NASAAC	107,960	107,080	880	0.8%	1,280	97,380	10,580
Nickel	383,292	382,176	1,116	0.3%	115,164	372,066	11,226
Tin	5,830	5,805	25	0.4%	310	3,750	2,080

Source: CME, LBMA, LME, Reuters, SHFE, Macquarie Research

Important disclosures:

Recommendation definitions

Macquarie - Australia/New Zealand
Outperform – return >3% in excess of benchmark return
Neutral – return within 3% of benchmark return
Underperform – return >3% below benchmark return

Benchmark return is determined by long term nominal GDP growth plus 12 month forward market dividend yield

Macquarie – Asia/Europe
Outperform – expected return >+10%
Neutral – expected return from -10% to +10%
Underperform – expected return <-10%

Macquarie – South Africa
Outperform – expected return >+10%
Neutral – expected return from -10% to +10%
Underperform – expected return <-10%

Macquarie - Canada
Outperform – return >5% in excess of benchmark return
Neutral – return within 5% of benchmark return
Underperform – return >5% below benchmark return

Macquarie - USA
Outperform (Buy) – return >5% in excess of Russell 3000 index return
Neutral (Hold) – return within 5% of Russell 3000 index return
Underperform (Sell)– return >5% below Russell 3000 index return

Volatility index definition*

This is calculated from the volatility of historical price movements.

Very high–highest risk – Stock should be expected to move up or down 60–100% in a year – investors should be aware this stock is highly speculative.

High – stock should be expected to move up or down at least 40–60% in a year – investors should be aware this stock could be speculative.

Medium – stock should be expected to move up or down at least 30–40% in a year.

Low–medium – stock should be expected to move up or down at least 25–30% in a year.

Low – stock should be expected to move up or down at least 15–25% in a year.
* Applicable to Asia/Australian/NZ/Canada stocks only

Recommendations – 12 months
Note: Quant recommendations may differ from Fundamental Analyst recommendations

Financial definitions

All "Adjusted" data items have had the following adjustments made:
Added back: goodwill amortisation, provision for catastrophe reserves, IFRS derivatives & hedging, IFRS impairments & IFRS interest expense
Excluded: non recurring items, asset revals, property revals, appraisal value uplift, preference dividends & minority interests

EPS = adjusted net profit / efpowa*
ROA = adjusted ebit / average total assets
ROA Banks/Insurance = adjusted net profit /average total assets
ROE = adjusted net profit / average shareholders funds
Gross cashflow = adjusted net profit + depreciation
*equivalent fully paid ordinary weighted average number of shares

All Reported numbers for Australian/NZ listed stocks are modelled under IFRS (International Financial Reporting Standards).

Recommendation proportions – For quarter ending 31 December 2016

	AU/NZ	Asia	RSA	USA	CA	EUR	
Outperform	57.53%	50.72%	45.57%	42.28%	60.58%	52.79%	(for global coverage by Macquarie, 8.71% of stocks followed are investment banking clients)
Neutral	33.90%	33.97%	43.04%	50.11%	37.23%	35.62%	(for global coverage by Macquarie, 8.05% of stocks followed are investment banking clients)
Underperform	8.56%	15.30%	11.39%	7.61%	2.19%	11.59%	(for global coverage by Macquarie, 4.63% of stocks followed are investment banking clients)

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