Deutsche Bank
Markets Research

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Commodities Quarterly

Punishing Blows

Overview: Commodities have reached multi-decade lows relative to equities and bonds, having fulfilled our expectations of new lows in the second half. Although fundamentals remain broadly weak and curve structures in contango, a closer look reveals palladium and zinc as presenting attractive opportunities while the oil market may balance sooner than some expect.

Crude Oil: US crude oil production has begun to turn lower, and revised supply estimates suggest that non-OPEC supply will contract next year for the first time since 2008. Adding in the impact of stronger demand growth this year, we believe the market may see its first quarter of undersupply in Q4-16 and require prices to incentivise a re-acceleration of US supply growth in 2017. However, H1-16 balances remain oversupplied by 1.0 mmb/d with the assumption of OPEC at 31.3 mmb/d.

Natural Gas: Medium term balances now appear weaker owing to a lower expectation of industrial demand growth, with the result that we expect the market to be balanced with lower rates of supply growth through 2017. In the nearer term El Niño presents downside risks for winter demand.

Precious Metals: As long as doubts persist over the timing of US monetary policy normalization, gold may enjoy short-lived upturns. However we believe the medium term path for real rates is clear, and that this will inevitably spell weakness for gold. For PGMs, the fallout from Dieselgate will weigh heavily on the sector as battery/hybrid vehicles take market share. Palladium may be the relative winner as gasoline engines are better placed to take market share from diesels in the short term.

Industrial Metals: The industry still has to adjust to structurally lower Chinese demand growth. In many instances this needs to be in the form of supply curtailments, which have been slow in coming. Weakening producer currencies, the ability to cut costs aggressively and in some cases political intervention have kept some marginal mines open. Until there is a critical mass of curtailments or a convincing cyclical recovery in Chinese demand, we see downside risks to prices.

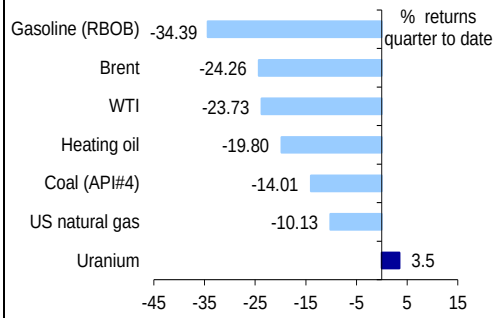
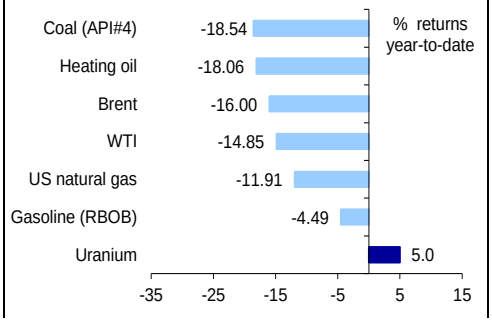
Bulk Commodities: The iron ore market has started to curtail capacity in the form of domestic Chinese production and non-traditional suppliers, and is ahead of the pack. However, the market needs further curtailments to accommodate supply ramping up elsewhere. These necessary curtailments will only happen at prices at USD45/t or lower. In thermal coal, we see lower Chinese coastal demand and a threat of rising exports as a persistent negative in the medium term for seaborne prices overall while FOB Richards Bay may benefit from a more resilient Indian seaborne demand outlook.

Punishing Blows

Table of Contents

Commodity Performers

Energy

Δ quarter to date	Δ year to date	View
		

Precious Metals

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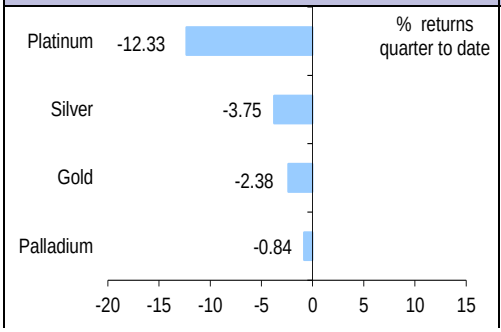	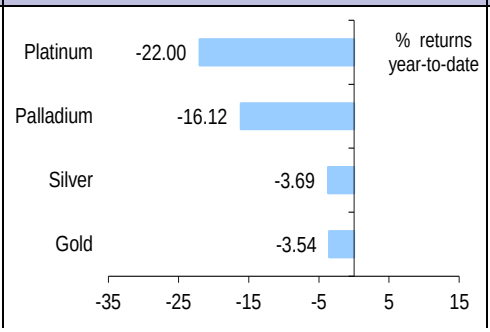	

Industrial Metals

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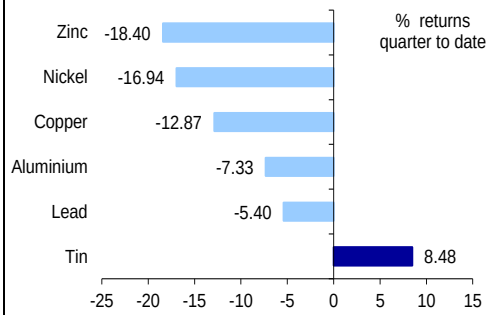
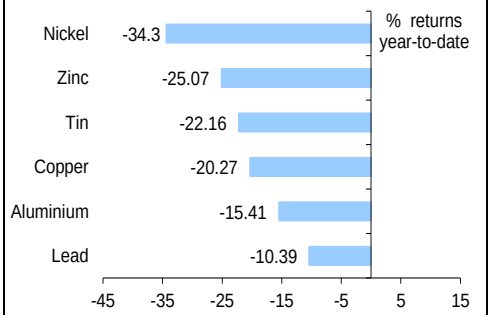
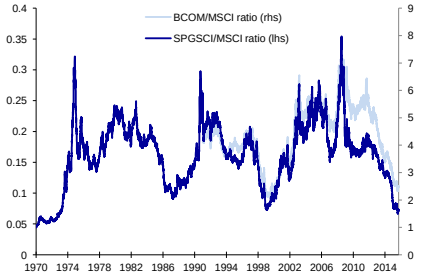
		

Sources: Deutsche Bank, Bloomberg Finance LP (Prices as of close of business Friday September 25, 2015. Dials refer to the coming quarter)

#1 Executive Summary

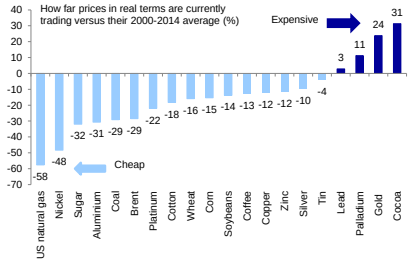
- Commodities remain at multi-decade lows relative to equities and bonds, although they have now been joined by equities in having negative returns over the year to date. Yet fundamentals remain weak across sectors, with curve structures predominantly expressing front-end weakness (18 of 22 commodities in contango).
- Therefore investors seeking to re-establish long exposure should approach with caution, although we note negative roll-yields can be minimized further along the futures curve and options strategies exploiting the volatility risk premium may offer more attractive opportunities.
- Commodity correlations with financial markets rose in Q3, most noticeably between crude oil and equities (5% to 47%) and between gold and the dollar index (-34% to -45%), thereby raising realized volatility.
- The **crude oil** market can be expected to recover more quickly than most, owing to upward revisions in current year demand and expectations for the first contraction in non-OPEC supply since 2008. Although H1-16 is still likely to be oversupplied by 1.0 mmb/d and higher OPEC production remains a risk, we now see a balanced market in 2017 on an annual average basis, suggesting that prices could slowly trend higher from H2-16.
- In **natural gas**, we believe the outlook has turned weaker. Our lowered expectations of structural demand growth over the next two years means that slower rates of supply growth will be needed to match demand than we saw in the last two years. In addition, if gas prices were to move significantly higher, demand would be lost as utilities switch back to coal, likely capping the upside.
- **Gold** will likely experience turbulence as long as the market holds doubts about the commitment of the US FOMC to embark on the path to normalization, which we believe is now long overdue. In our estimation, the fundamentals for gold will deteriorate as confidence in the path of monetary policy rises and real interest rates move higher.
- The fallout from the "Dieselgate" scandal is likely to accelerate the decline in market share for diesel engines in Europe. The likely increase in battery vehicles is a negative for **PGM** demand, especially **platinum** and **rhodium**. **Palladium** may however be a short-term beneficiary should gasoline cars increase their market share in Europe. Although prices are well below the marginal cost the industry has a number of barriers to exit, which means that supply rationalization will be driven by a slow starvation of capital. Although we expect this supply rationalization to take some time, we see prices recovering next year due to a high probability of strike action.
- We forecast Chinese demand growth rates in the **metals** will slow over the next five years, approaching that of a developed country as the economy weans itself of an investment-heavy growth model. The structural slowdown has been compounded by cyclical weakness in the property sector, further depressing demand and weighing on sentiment. In many instances, the supply side has failed to respond to slowing demand growth, resulting in prices well below marginal cost, which could persist for an extended period until cuts are made. Although we expect a cyclical recovery in China, the speed at which an individual commodity responds depends on industry structure and the extent of losses.

Figure 1: Ratio of commodity to equity returns



Source: Bloomberg Finance LP, Deutsche Bank

Figure 2: Valuing commodities in real terms



Source: Bloomberg Finance LP, Deutsche Bank

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#2 Commodity Indices

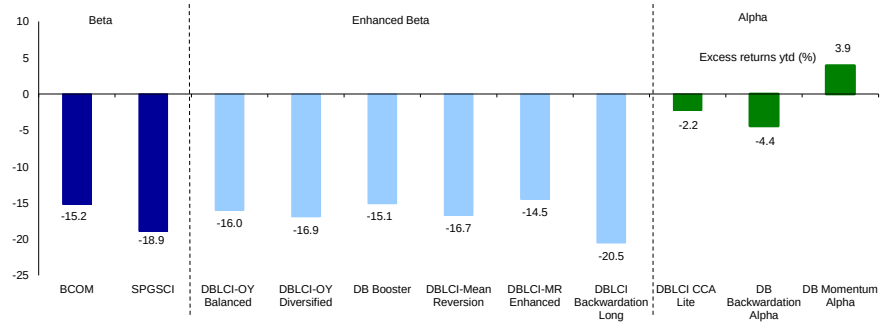
- The margin of underperformance of commodity indices has widened dramatically in the last quarter relative to the broad asset classes. Among risk factor 'alpha' strategies only momentum has managed to eke out positive returns owing to predominantly short positioning.
- The short volatility index strategy currently offers an attractive entry point for crude oil, as historical experience shows entry points above 40% implied volatility providing strong returns over a 1Y investment horizon.
- Equities have now joined commodities in having sizeably negative year-to-date returns, with attendant questions over whether this represents a canary in the coal mine regarding global growth prospects.
- Our view from the macroeconomic perspective is that China's growth will slow only modestly to 6.7% in 2016, that a robust services sector has offset much of the weakness in manufacturing. Partly owing to the fact that world economic output is still heavily weighted towards advanced economies, we see global growth accelerating from 3.2% to 3.6% in 2016.
- Of course this does nothing to shield commodities from the fact that we expect Chinese demand growth rates for a number of basic materials to slow in the medium term, with the result that market balances in most commodities are weak and forward curves in contango.
- In addition, although the US dollar's appreciation has paused in the last quarter on a trade-weighted basis, its strength against commodity currencies has been unabated. Further dollar strength through the end of 2017 as we forecast could well compound difficulties in the commodity sector.
- However, looking more closely at individual market balances reveals potential winners. Within industrial metals and PGMs, palladium and zinc stand out as attractive opportunities, while amongst energy commodities, crude oil may surprisingly turn out to be the earliest to rebalance although not before H2-16.

Figure 1: Excess returns in 2015

(USD terms)	Δ WTD	Δ MTD	Δ YTD	Sharpe
DBLCI-OY Balanced	0.94	-0.61	-15.95	-1.84
DBLCI-OY Diversified	1.32	-0.97	-16.92	-1.80
DB Booster	0.84	-0.98	-15.05	-1.72
DBLCI-Mean Reversion	1.63	-0.36	-16.72	-1.12
DBLCI-MR Enhanced	1.26	0.11	-14.52	-1.43
DBLCI Backwardation Long	-1.46	-2.09	-20.51	-2.11
Risk factors				
DB Commodity Curve Alpha Lite	0.01	-0.29	-2.16	-1.90
DBLCI Backwardation Alpha	-0.95	0.70	-4.39	-0.38
DBLCI Momentum Alpha	-1.06	1.50	3.93	1.94
SPGSCI sector performance				
Energy	1.62	-2.74	-21.38	-1.41
Industrial Metals	-3.51	-3.32	-20.85	-1.38
Precious Metals	0.58	1.32	-3.74	-0.45
Agriculture	3.25	2.66	-14.05	-0.34
Livestock	-0.11	-3.19	-13.92	-1.13
Performance of other benchmark indices				
SPGSCI	1.24	-1.71	-18.88	-1.68
BCOM	0.87	-0.97	-15.18	-1.62

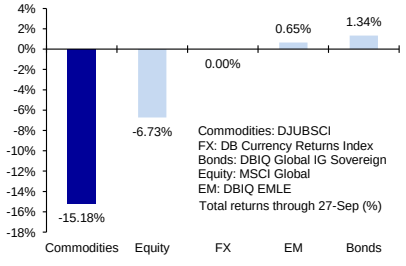
Sources: Deutsche Bank, Bloomberg Finance LP
(Figures are cob September 25, 2015. Sharpe ratios are calculated on a YoY basis)

Figure 2: 2015 commodity index scorecard



Source: Bloomberg Finance LP (Data as of 24 Sep 2015), Deutsche Bank

Figure 3: 2015 asset class scorecard



Source: Deutsche Bank, Bloomberg Finance LP (Data as of 27 Sep 2015)

#3: Crude Oil

Working Off The Excess

- US crude oil production has begun to turn lower more sharply than we had expected, making it likely that non-OPEC production growth will turn from expansion to contraction in 2016 for the first time since 2008, helping to close the oversupply gap introduced in 2014. We revise our US oil supply growth expectation for 2016 to a modest annual decline of -180 kb/d yoy, with the implication that non-OPEC supply contracts by -280 kb/d yoy.
- We have also increased our assumption of 2015 oil demand growth from 1.35 to 1.46 mmb/d in 2015 as a result of strong Q3 demand in the US, while leaving our 2016 assumption unchanged at 1.2 mmb/d as the positive impact to demand from lower prices becomes somewhat less evident as prices rise again.
- Even so, we estimate the oil market will remain oversupplied in 2016 by an annual average of 370 kb/d (down from 1.3 mmb/d in 2015) split between oversupply of 1.0 mmb/d in H1-16 and undersupply of -310 kb/d in H2-16. This assumes OPEC production at 31.3 mmb/d in 2016.
- Balances beyond 2016 are more speculative given the rapidly evolving US supply sector in terms of both drilling activity and efficiency gains. However, we believe that a trend rate of demand growth at 1.1 mmb/d in 2017 will require the market to incentivise a gradual increase in US drilling activity over the course of 2016, resulting in 6M and 1Y forward prices drawing closer to the long-term equilibrium defined by incentive prices.
- A downside risk to the central scenario can be identified in the latent supply represented by above-normal inventories of both crude oil and oil products in the US and the OECD, which we would expect to be withdrawn as the curve structure moves away from contango towards neutral. These inventory withdrawals could buffer periodic instances of unplanned supply outages.
- Secondly, an assumption of OPEC at 31.3 mmb/d for the duration of the forecast period may be considered too low given the distinct possibility that Saudi Arabia and OPEC as a whole may fail to accommodate new Iranian volumes which some expect may begin to reach the market at the end of the year.
- In an environment of continued oversupply in H1-16, there is a non-negligible risk that inventory levels straining against capacity may trigger a retesting of price lows. At least in the US, however, we do not believe that this will occur over the balance of the year.
- Angola and Saudi Arabian production fell in August, bringing OPEC total production down to 31.6 mmb/d. If further Saudi reductions mirror the 5Y average profile of domestic direct use, then overall OPEC production could fall back to 31.4 mmb/d by the end of the year.

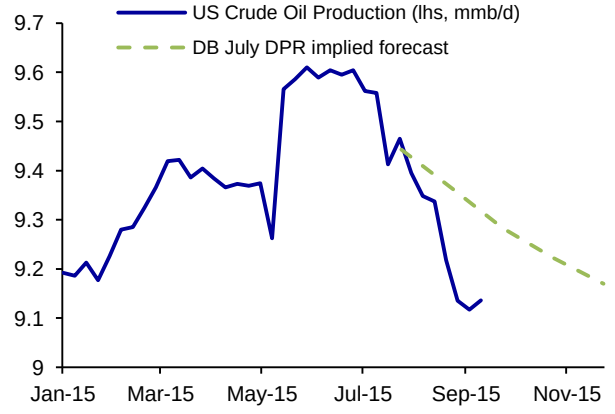
US crude production tracking lower… finally

As laid out in our note *Limiting US Oil Supply Growth* 31 Aug 2015, we believe that the oil market is in a multi-year process of adjusting to a new reality foisted upon it by US tight oil supply growth and the OPEC response to this challenge. Accordingly, we believe that global oil prices are balancing at a level which constrains US supply growth and that US incentive prices will continue to be the most relevant price reference in 2016.

Indeed recent data regarding both the extent of drilling activity and actual weekly production suggest that prices are largely below the level necessary to incentivise increased investment in the US. The squeeze on investment is driven not only by lower cash flow from operations, but also by tighter financing conditions. The cost of financing has increased, as measured by high-yield Energy credit spreads, and at the same time, its availability has fallen has a result of banks' redetermination of the collateral value of oil reserves backing reserve-based lending facilities.

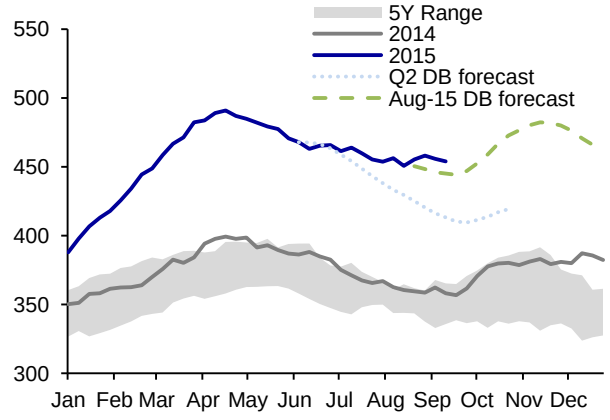
So it should come as no surprise that US production rates have begun to drop after the oil-directed rig count bottomed at 628 in late June, representing a 61% fall from the peak. And yet reported production rates have quickly dropped below our end-of-year expectations based on the EIA's Drilling Productivity Report (DPR) since July, Figure 1. At the same time, US inventory has remained higher than we modeled since early summer based on our production forecasts, reported refinery outages, and the expectation that imports would fall gently from 7.4 mmb/d at the end of May to 7.2 mmb/d in December, Figure 2.

Figure 1: US weekly field production



Source: US EIA, Deutsche Bank

Figure 2: US crude oil inventories (excl. SPR)

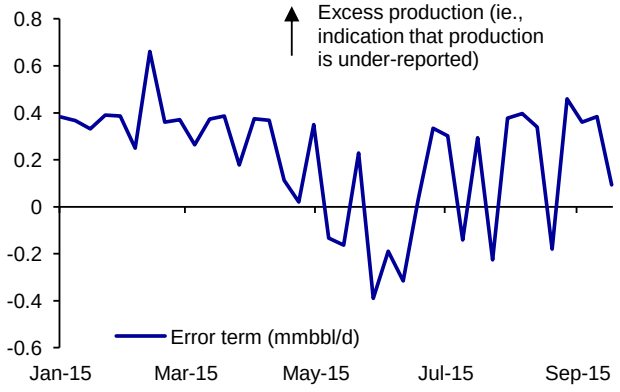


Source: US EIA, Deutsche Bank

These two facts together suggest that we may be missing some hidden production not contained in the weekly field estimates. Certainly the error term computed by taking the difference between actual and inventory-implied production has been more consistently positive since dipping below zero in May and June. In August and September month-to-date, the error term has averaged 264 kb/d, suggesting that production may be under-reported by as much as that amount. This would bring the adjusted production figure up closer to the DPR-implied forecast as of September.

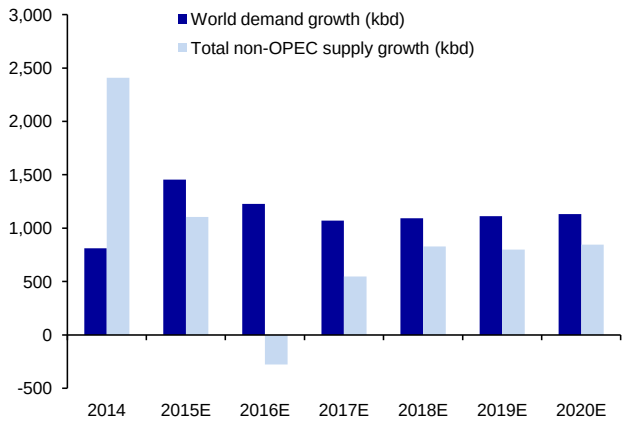
With the decline in production finally having taken hold, we lower our estimates of 2016 US crude oil production to reflect a greater degree of confidence in figures derived from the Drilling Productivity Report. Instead of modest growth of +190 kb/d yoy in total liquids we assume a decline of -190 kb/d yoy in 2016, which also reflects the resumption of small declines in weekly oil-directed rigs since late August from 675 to 644 currently. Assuming there is some degree of lag in the drilling response, it seems reasonable to expect that rig counts remain weak at least through the end of October, and perhaps to the end of the year.

Figure 3: Error term between implied and actual US crude oil production (mmb/d)



Source: US EIA, Deutsche Bank

Figure 4: World demand growth and non-OPEC supply growth



Source: US EIA, Deutsche Bank

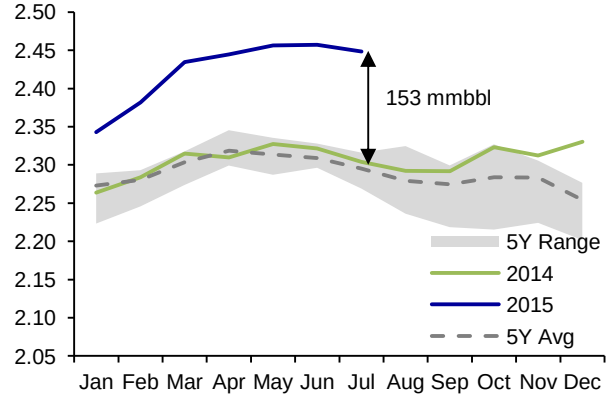
Global balance on a tightening path

With a lower US production forecast in 2016, non-OPEC production is set to decline in 2016 by -300 kb/d. This together with a higher demand estimate in 2015 tightens balances substantially and reverses much of the surplus introduced in 2014, Figure 4. The model now also indicates the largest quarterly undersupply in Q4-16 of -640 kb/d since Q3-13.

For the 2016 annual average, these model changes raise the calculated Call on OPEC from 29.5 mmb/d in 2015 to 30.9 mmb/d. Despite significant progress in closing the oversupply gap, it still leaves 2016 with a modeled surplus of 370 kb/d on average (assuming OPEC at 31.3 mmbb/d) to which we see some downside risks.

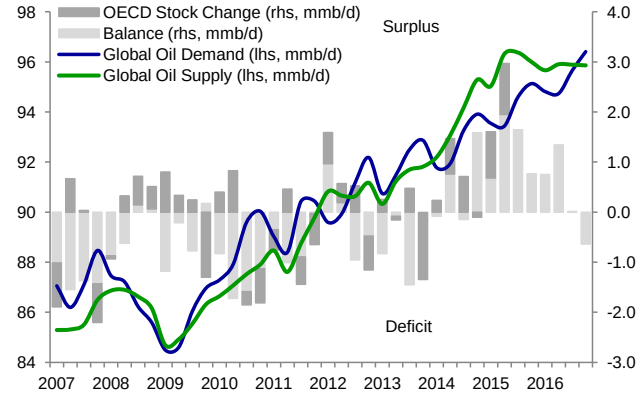
First, the balances exclude the possibility of withdrawals from oil storage as prices rise and the forward curve structure shifts from contango back towards neutral. As an example, if the modeled global undersupply of -310 kb/d in H2-16 were met entirely by withdrawals from OECD crude oil storage, this would still only bring down the current excess versus the 5Y average by 1/3 (from 153 mmbbl to 97 mmbbl), Figure 5.

Figure 5: OECD crude oil stocks (billion barrels)



Source: IEA, Deutsche Bank

Figure 6: World oil supply and demand



Source: IEA, Deutsche Bank

Second, upside to Iranian production of 400 kb/d in the short term following Implementation Day could add to overall OPEC production if other volumes are not simultaneously reduced. However, we believe the influx of new supply would be considerably less damaging to the oil market if it occurs in the second half of 2016, owing to seasonally higher oil demand.

Beyond 2016, balances now appear to require the incentivisation of new supply from the US as global demand growth gradually chips away at the surplus. We believe our 2016 forecasts of WTI 52/bbl and Brent 57/bbl are at a level consistent with a gradual redeployment of rigs and investment capital in the US tight oil industry next year, contributing to modest US supply growth in 2017.

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Figure 7: Global oil supply & demand

Unit: Million bbl/day	2007	2008	2009	2010	2011	2012	2013	2014	*2015E*	*2016E*	*2017E*	*2018E*	*2019E*	*2020E*	ANNUAL AVERAGE RATE '00-05	'05-10	'10-15
CONSUMPTION																	
OECD Americas	25.9	24.6	23.7	24.2	24.1	23.6	24.1	24.1	*24.5*	*24.7*	*24.6*	*24.6*	*24.5*	*24.5*	1.2%	-1.3%	0.2%
USA	20.7	19.5	18.8	19.2	18.9	18.5	19.0	19.1	*19.5*	*19.7*	*19.7*	*19.6*	*19.6*	*19.5*	1.1%	-1.6%	0.4%
OECD Europe	15.6	15.4	14.7	14.7	14.2	13.8	13.6	13.4	*13.6*	*13.6*	*13.5*	*13.4*	*13.4*	*13.3*	0.6%	-1.4%	-1.6%
Germany	2.4	2.5	2.4	2.5	2.4	2.4	2.4	2.4	*2.4*	*2.3*	*2.3*	*2.3*	*2.3*	*2.3*	-1.1%	-1.2%	-0.9%
OECD Asia-Pacific	8.6	8.3	7.9	8.1	8.2	8.5	8.4	8.2	*8.1*	*8.1*	*8.1*	*8.1*	*8.0*	*8.0*	-0.1%	-1.7%	0.1%
Japan	5.0	4.8	4.4	4.4	4.4	4.7	4.6	4.4	*4.3*	*4.2*	*4.1*	*4.1*	*4.1*	*4.0*	-0.7%	-3.5%	-0.8%
TOTAL OECD	50.2	48.4	46.3	47.0	46.4	45.9	46.0	45.7	*46.2*	*46.3*	*46.2*	*46.1*	*45.9*	*45.8*	0.8%	-1.4%	-0.3%
FSU	4.1	4.2	4.0	4.3	4.6	4.6	4.7	4.9	*4.8*	*4.9*	*5.0*	*5.1*	*5.2*	*5.3*	0.6%	1.9%	2.3%
Europe	0.8	0.8	0.7	0.7	0.7	0.7	0.7	0.7	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	*0.7*	4.5%	-1.4%	-0.5%
China	7.6	7.8	7.9	9.1	9.5	9.9	10.3	10.6	*11.0*	*11.3*	*11.7*	*12.1*	*12.4*	*12.8*	7.8%	6.1%	3.9%
Other Asia	9.8	9.7	10.1	10.7	11.0	11.4	11.8	12.0	*12.4*	*12.6*	*12.9*	*13.2*	*13.4*	*13.7*	2.9%	3.6%	3.0%
Latin America	5.3	5.7	5.7	6.1	6.3	6.5	6.7	6.8	*6.9*	*7.0*	*7.1*	*7.2*	*7.3*	*7.4*	1.3%	3.9%	2.3%
Middle East	6.4	6.8	7.2	7.3	7.5	7.9	7.9	8.1	*8.2*	*8.4*	*8.6*	*8.9*	*9.1*	*9.3*	4.6%	4.0%	2.5%
Africa	3.1	3.3	3.4	3.6	3.6	3.8	3.9	4.0	*4.0*	*4.2*	*4.3*	*4.5*	*4.6*	*4.8*	3.5%	4.1%	2.3%
TOTAL NON-OECD	37.1	38.2	39.2	41.7	43.1	44.8	45.9	47.0	*47.9*	*49.1*	*50.3*	*51.5*	*52.8*	*54.0*	3.6%	4.0%	2.8%
GLOBAL OIL DEMAND	**87.2**	**86.6**	**85.5**	**88.7**	**89.6**	**90.7**	**91.9**	**92.7**	***94.2***	***95.4***	***96.5***	***97.6***	***98.7***	***99.8***	1.9%	0.9%	1.2%
SUPPLY																	
OECD Americas	13.8	13.3	13.6	14.1	14.5	15.8	17.2	19.0	*19.6*	*19.7*	*20.3*	*21.2*	*22.1*	*22.9*	-0.4%	0.2%	6.9%
USA	7.0	6.9	7.4	7.8	8.1	9.1	10.3	12.0	*12.7*	*12.5*	*13.0*	*13.6*	*14.2*	*14.8*	-2.4%	1.8%	10.4%
Mexico	3.5	3.2	3.0	3.0	2.9	2.9	2.9	2.8	*2.6*	*2.6*	*2.7*	*2.7*	*2.8*	*2.8*	1.8%	-4.7%	-2.6%
Canada	3.3	3.2	3.2	3.3	3.5	3.7	4.0	4.3	*4.3*	*4.5*	*4.7*	*4.9*	*5.1*	*5.3*	2.2%	1.8%	5.3%
OECD Europe	5.0	4.7	4.5	4.2	3.8	3.5	3.3	3.3	*3.4*	*3.3*	*3.0*	*2.8*	*2.6*	*2.4*	-3.5%	-6.0%	-3.9%
North Sea	4.6	4.3	4.1	3.8	3.4	3.1	2.9	2.9	*3.0*	*2.8*	*2.6*	*2.4*	*2.2*	*2.0*	-3.9%	-6.4%	-4.4%
Other OECD	0.6	0.6	0.6	0.7	0.6	0.6	0.5	0.5	*0.5*	*0.4*	*0.4*	*0.4*	*0.4*	*0.3*	-7.6%	1.9%	-6.5%
TOTAL OECD	19.4	18.7	18.8	18.9	18.9	19.8	21.0	22.9	*23.5*	*23.4*	*23.8*	*24.4*	*25.1*	*25.7*	-1.6%	-1.3%	4.5%
FSU	12.8	12.8	13.1	13.5	13.6	13.6	13.8	13.9	*13.9*	*13.8*	*13.8*	*13.7*	*13.6*	*13.6*	8.2%	2.7%	0.6%
Non-OECD Europe	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	*0.1*	-3.3%	-2.4%	-0.3%
China	3.7	3.8	3.8	4.1	4.1	4.2	4.2	4.2	*4.3*	*4.2*	*4.2*	*4.3*	*4.3*	*4.3*	2.2%	2.3%	1.1%
Other Asia	3.6	3.6	3.6	3.7	3.7	3.7	3.5	3.5	*3.6*	*3.6*	*3.5*	*3.4*	*3.3*	*3.2*	0.1%	-0.5%	-0.5%
Latin America	3.6	3.7	3.9	4.1	4.2	4.2	4.2	4.4	*4.6*	*4.7*	*4.8*	*5.0*	*5.2*	*5.4*	2.1%	3.2%	2.3%
Middle East	1.7	1.7	1.7	1.8	1.7	1.5	1.4	1.3	*1.2*	*1.2*	*1.1*	*1.1*	*1.0*	*1.0*	-3.3%	-1.0%	-6.9%
Africa	2.6	2.6	2.5	2.5	2.7	2.3	2.3	2.3	*2.3*	*2.2*	*2.3*	*2.3*	*2.4*	*2.4*	4.4%	0.5%	-2.0%
TOTAL NON-OECD SUPPLY	28.2	28.4	28.8	29.9	30.0	29.5	29.5	29.8	*30.1*	*29.8*	*29.8*	*29.8*	*29.9*	*30.0*	3.9%	1.8%	0.2%
PROCESSING GAINS	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	*2.2*	*2.2*	*2.3*	*2.3*	*2.3*	*2.4*	1.3%	1.2%	1.3%
GLOBAL BIOFUELS	1.0	1.4	1.6	1.8	1.9	1.9	2.0	2.2	*2.3*	*2.4*	*2.5*	*2.6*	*2.7*	*2.8*	17.3%	23.9%	5.1%
TOTAL NON-OPEC SUPPLY	**50.7**	**50.5**	**51.2**	**52.6**	**52.9**	**53.3**	**54.6**	**57.0**	***58.1***	***57.9***	***58.4***	***59.2***	***60.0***	***60.9***	1.5%	1.0%	2.0%
***TOTAL SUPPLY**	85.7	86.6	85.4	87.3	88.7	90.8	91.3								1.9%	0.6%	
OECD STOCK CHANGE	-0.24	0.32	0.01	0.07	-0.28	0.21	-0.17										
Industry	-0.31	0.32	-0.09	0.08	-0.20	0.18	-0.20										
Government	0.07	0.01	0.11	-0.01	-0.08	0.03	0.03										
OPEC NGLS	4.3	4.5	5.1	5.5	5.9	6.2	6.2	6.4	*6.6*	*6.7*	*6.7*	*6.7*	*6.8*	*6.8*	7.1%	5.5%	3.7%
**Other & Balance	-1.32	-0.31	-0.18	-1.50	-0.65	-0.11	-0.47	0.56	*1.26*	*0.38*	*-0.04*	*-0.27*	*-0.55*	*-0.80*			
OPEC CRUDE OIL	30.7	31.6	29.1	29.2	29.9	31.3	30.5								2.0%	-1.0%	
***IEA's Call on OPEC Crude	32.2	31.6	29.3	30.6	30.8	31.2	31.1	29.3									
***DB's Call on OPEC Crude								29.3	***29.5***	***30.9***	***31.4***	***31.6***	***31.9***	***32.1***			

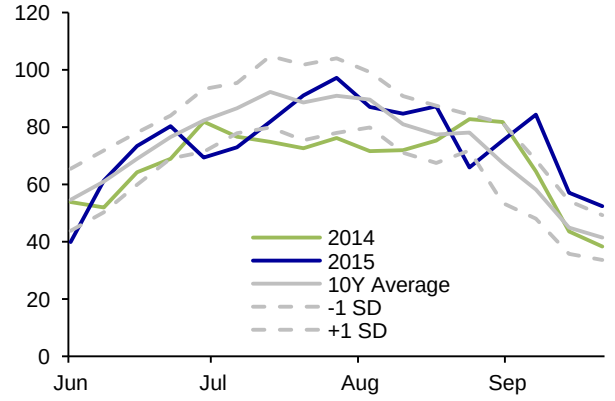
**Total supply excludes inventory change and other categories. **Other & Balance includes Misc. to balance and Floating Storage. ***Call on OPEC crude includes stock change and other.*
Source: US DOE/EIA, IEA, Deutsche Bank

#4: US Natural Gas

Slowdown To Come

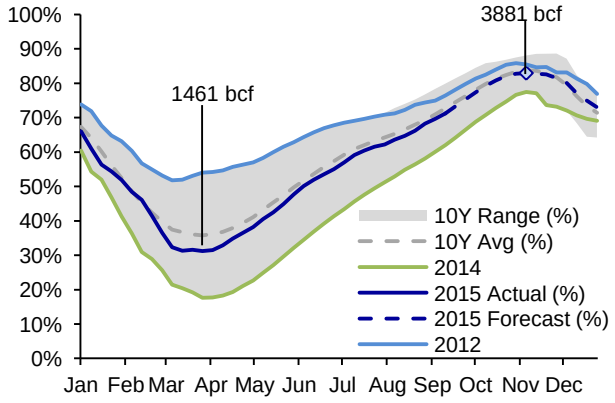
- The fundamental outlook has weakened as lower-than-expected industrial demand this year has not been entirely made up for by increased utility demand as a result of switching away from coal. With gas prices remaining below coal for all of the year, electric utility demand has been the strongest component of gas demand growth at +2.5 bcf/d yoy.
- While seasonal weather expectations would not normally enter our considerations, NOAA's El Niño forecast for the fall and winter is unusual not only for its high degree of confidence but also the strength of the warming event. This represents a downside risk for Northern United States winter gas demand.
- From the supply side, we have observed a similar extent of cost deflation in well costs as that seen in oil production, while associated gas production through the first half of the year still grew by 0.6 bcf/d yoy.
- The production pause expected for the summer has extended through September, with the flattening of supply growth likely to last through November, in our view. We expect the Marcellus to lead an upswing in supply beginning in December through Q2-16, supported by infrastructure completions, offsetting a small decline in the Gulf of Mexico in 2016.
- However, with prices staying toward the lower end of costs for new drilled gas supply, we expect that productivity improvement will continue to play a major role in driving supply growth. Wood Mackenzie notes estimated ultimate recovery rates have risen in the Northeast with improved technology, while well costs have declined by 14%.
- Longer term investments in gas pipeline infrastructure are moving forward, with capacity commitments announced for gas gathering lines in the Eagle Ford through 2017 and new pipelines to Mexico being planned through 2018. We expect average pipeline export growth of 0.4 bcf/d per annum through 2017.
- Cheniere's Sabine Pass commissioning of trains 1 & 2 is now underway. LNG liquefaction and export is set to become a consistent and expanding component of gas demand rising to 0.7 bcf/d in 2016 and then doubling to 1.5 bcf/d in 2017.
- Overall, we see the market growing more slowly than previously expected over the next two years, indicating that less supply growth will be necessary to balance in 2016 and 2017 (+2.0 bcf/d yoy) as compared with 2014 and 2015 (+3.8 bcf/d yoy).

Figure 1: Weekly US cooling degree days



Source: US EIA, Deutsche Bank

Figure 2: US gas inventory by % of working capacity

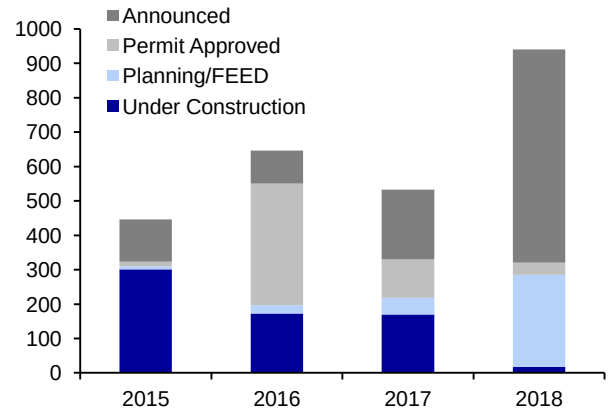


Source: US EIA, Deutsche Bank

Weakening outlook

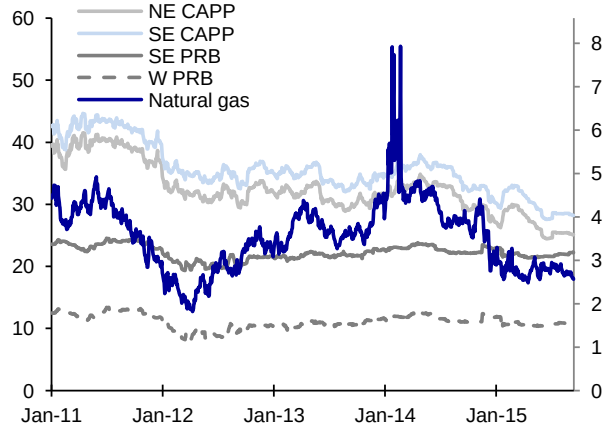
Despite abnormally warm temperatures from the start of September, inventory injections have exceeded our expectations by 22 bcf since mid-August while Q1-16 prices fell by USD0.10/mmBtu from the start of the month. Downside risks to the 2016 forecast deck now appear to be more prominent, given that industrial demand growth has fallen short of our assumptions this year. Based on new assessments of the capacity of projects scheduled through 2017, we revise lower our expectations of incremental gas demand through 2017 as a result of new investments primarily in chemical and fertilizer production. From our earlier expectation of 1 bcf/d per annum through 2017, we lower this to an average of 0.6 bcf/d per annum.

Figure 3: US industrial projects by status (mmcf/d)



Source: Bloomberg Finance LP, Deutsche Bank

Figure 4: US natural gas and coal (lhs $/MWh, rhs $/mmBtu)



Source: Bloomberg Finance LP, Deutsche Bank

Utility demand enjoyed a strong boost this year as a result of lower gas prices relative to coal. Since the start of the year, gas prices have been at a consistent discount to delivered coal costs, for an average discount of USD -1.27/mmBtu against Central Appalachian coal. As a result, coal demand for power generation was down 12% yoy (61 million short tons) in the first seven months of 2015 and estimated 2015 utility gas demand will be up by 11% (2.5 bcf/d).

However, this boost is unlikely to be seen again next year as a sustained advantage against coal would be necessary just to maintain the strong demand seen in 2015, and because of a very weak power demand growth trend (~1% yoy). Moreover, gas prices rising much above USD3.50/mmBtu would almost certainly detract from utility demand as the advantage erodes and some switching back into coal is incentivized. Thus we see the potential for switching back as limiting the potential for gas prices to rise significantly.

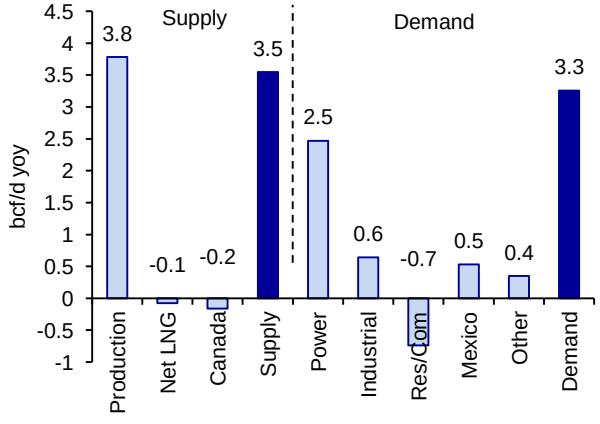
Implications of a strong El Niño event

The El Niño-Southern Oscillation (ENSO) is a climate phenomenon that can take one of three phases: El Niño (warming), neutral, and La Niña (cooling), with respect to sea-surface temperatures in the central and eastern tropical Pacific Ocean, according to NOAA. In the El Niño phase, the warming of the ocean results in changes in global atmospheric circulation. Associated climate anomalies across large distances are termed teleconnections. While these effects are numerous, the most immediate and prominent of the teleconnections causes dry conditions across a wide expanse of the Western Pacific Ocean encompassing Southeast Asia and Australia. For North America, a stronger and more southerly Pacific jet stream is associated with wetter and cooler conditions across the Southern United States and warmer and drier conditions across the Northern United States.

Early indications that the El Niño pattern this year would be a strong one have largely been confirmed to date, with sea-surface temperature (SST) anomalies in the equatorial Pacific Ocean being measured at greater than 2°C. In addition, the atmospheric response to the SST anomaly is the strongest since 1948, according to WSI. NOAA expects the phenomenon to last through Winter 15-16.

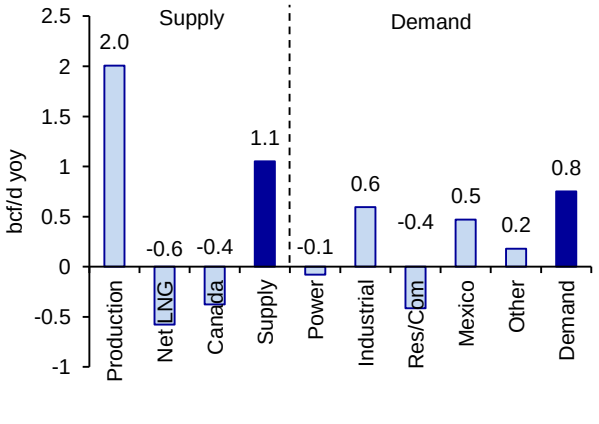
However, while there is a correlation between the strength of the El Niño warming and the severity of climatic effects, there is no one-for-one relationship, according to NOAA. While we note the downside risks of a potential for a warmer weather this winter, we do not build in any quantified assumption (other than a return to normal from abnormally cold weather in Q1-14 and Q1-15) owing to the difficulty in judging both the likelihood and magnitude of weather deviation.

Figure 5: Supply-demand yoy changes (2015 v. 2014)



Source: US EIA, Deutsche Bank

Figure 6: Supply-demand changes (2016 v. 2015)

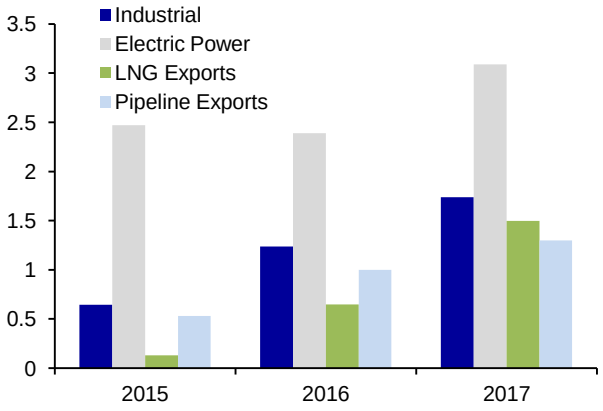


Source: US EIA, Deutsche Bank

Revised balances suggest slower market growth

The revised balance accounts for revised lower industrial demand growth and the low likelihood of a repeat in 2016 of this year's strong utility demand growth. We also maintain expectations for slow but steady growth in pipeline exports to Mexico to supply power generation projects as part of its power sector reform and associated spending plans. Finally, LNG liquefaction is on its way to becoming a reality with the commissioning of Sabine Pass Train 1 in process.

Figure 7: Cumulative demand growth by sector to 2017 (versus 2014)



Source: US EIA, Deutsche Bank

Nevertheless, the end result is that we see an overall slowdown in market growth next year, with the result that production growth of only 2.0 bcf/d is necessary to balance in both 2016 and 2017, down from nearly double that (3.8 bcf/d) in 2014 and 2015. Thus we would expect risks to be weighted to the downside even before considering the possibility of a weak seasonal demand this winter owing to El Niño.

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Figure 8: US natural gas supply and demand (bcf/d)

Bcf/day	2013	2014	1Q 2015	2Q 2015	3Q 2015E	4Q 2015E	2015E	1Q 2016E	2Q 2016E	3Q 2016E	4Q 2016E	2016E	2017E
CONSUMPTION													
Residential	**13.5**	**14.0**	27.5	6.9	3.7	16.3	**13.6**	25.7	7.0	3.7	16.4	**13.2**	**13.2**
Commercial	**9.0**	**9.5**	16.0	5.8	4.4	10.5	**9.2**	14.9	6.1	4.6	10.9	**9.1**	**9.1**
Industrial	**20.3**	**21.0**	22.7	20.3	20.4	23.1	**21.6**	23.6	21.1	21.1	23.1	**22.2**	**22.7**
Electric Power	**22.4**	**22.3**	23.1	24.2	30.4	21.4	**24.8**	21.9	24.2	30.5	22.2	**24.7**	**25.4**
Other	**6.5**	**6.8**	7.8	6.8	6.8	7.3	**7.2**	7.9	6.9	7.0	7.5	**7.3**	**7.4**
Lease and Plant Fuel	**4.0**	**4.3**	4.5	4.5	4.5	4.6	**4.5**	4.6	4.6	4.6	4.7	**4.6**	**4.6**
Pipeline and Distribution	**2.4**	**2.4**	3.2	2.1	2.2	2.6	**2.5**	3.2	2.2	2.2	2.7	**2.6**	**2.6**
Total Demand	**71.7**	**73.6**	97.1	63.9	65.7	78.6	**76.3**	94.0	65.4	66.8	80.1	**76.6**	**77.8**
YoY % change	**2.8%**	**2.5%**	2.1%	4.3%	6.3%	3.1%	**3.7%**	-3.1%	2.3%	1.8%	1.9%	**0.4%**	**1.6%**
DOMESTIC SUPPLY	**0.00**	**0.0**	**4.4**	**4.7**	**4.7**	**4.7**	**0.0**	**4.5**	**4.5**	**4.5**	**4.6**	**0.0**	**0.0**
Alaska	**0.9**	**0.9**	1.0	0.9	0.8	0.9	**0.9**	1.0	0.8	0.8	0.9	**0.9**	**0.9**
Gulf of Mexico	**3.6**	**3.4**	3.4	3.7	3.3	3.2	**3.4**	3.3	3.2	3.0	3.0	**3.1**	**3.2**
Other US	**65.9**	**70.4**	73.8	74.0	74.5	76.0	**74.6**	75.6	76.8	77.1	77.7	**76.8**	**78.7**
Marketed Production	**70.4**	**74.7**	78.1	78.7	78.6	80.1	**78.9**	79.8	80.8	80.9	81.6	**80.8**	**82.8**
Dry Gas Production	**66.7**	**70.4**	73.7	73.9	73.9	75.4	**74.2**	75.3	76.3	76.4	77.0	**76.2**	**78.2**
YoY % change	**1.5%**	**5.7%**	8.6%	6.6%	3.7%	2.8%	**5.4%**	2.2%	3.2%	3.3%	2.2%	**2.7%**	**2.5%**
Net Storage Withdraws	**1.5**	**-0.6**	18.4	-12.9	-9.6	2.2	**-0.5**	16.7	-11.2	-10.3	2.3	**-0.6**	**-0.1**
Other & Balance	**0.0**	**0.5**	1.1	0.5	-0.7	-0.7	**0.1**	0.4	-0.5	-0.1	-0.2	**-0.1**	**-0.1**
Total Domestic Supply	**68.2**	**70.3**	93.2	61.6	63.7	76.9	**73.8**	92.4	64.6	65.9	79.2	**75.5**	**77.9**
LNG Gross Imports	**0.3**	**0.2**	0.4	0.1	0.2	0.2	**0.2**	0.1	0.2	0.2	0.2	**0.2**	**0.2**
LNG Gross Exports	**0.0**	**0.0**	0.1	0.1	0.0	0.6	**0.2**	0.7	0.7	0.7	0.7	**0.7**	**1.5**
Pipeline Gross Imports	**7.6**	**7.2**	8.4	6.7	6.4	6.9	**7.1**	7.3	6.2	6.5	6.7	**6.7**	**6.7**
Pipeline Gross Exports	**4.3**	**4.1**	4.9	4.4	4.5	4.8	**4.6**	5.1	4.9	5.1	5.3	**5.1**	**5.4**

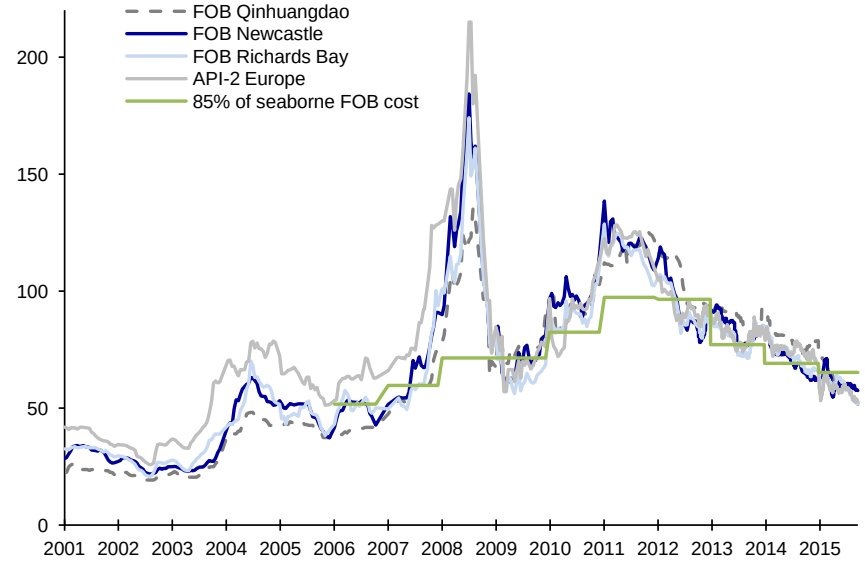
Source: US DOE/EIA, Deutsche Bank

#5 Thermal Coal

The China Threat

- We see increasing risks that continuing pressure on margins will drive cost deflation in the Chinese domestic market in the medium term and raise the likelihood of rising export volumes from China. This is a notable new downside risk for thermal coal as seaborne volumes have struggled to price into the coastal China market on an energy basis since May.
- The shift in exchange rate policy in China and associated devaluation in the spot USDCNY rate has triggered a downgrade of our medium term expectation to 6.7 for year end 2016 and 2017. This provides a tailwind for Chinese producers in terms of a contraction in USD-denominated costs.
- Additionally, Chinese trade policy is positioned to benefit the domestic coal industry at to the detriment of the traditional roster of seaborne exporters, with markdowns in export duty and the increase in import duty.
- We expect the downward trend in the Qinhuangdao (QHD) 5500kcal benchmark price to pressure Chinese costs lower through 2017. Our 2016 and 2017 QHD assumptions at CNY360/t and CNY350/t inform our expectation that seaborne benchmarks will trade lower towards USD52/t (Newcastle) and USD49/t (Richards Bay) in H2-16.
- Moreover, there is a rising likelihood that the Chinese coal market may increasingly aim to export its surplus into the international market owing to excess investment and overcapacity.
- Given that India has largely supplanted the role of China in regards to demand for South African coal, the Richards Bay benchmark may be less strongly affected by the above. Progress by Coal India towards its ambitious 2020 goal and rail capacity expansions will likely be of greater consequence for South African FOB prices.

Figure 1: Seaborne thermal coal benchmarks and cash costs (USD/t)



Source: McCloskey, AME, Wood Mackenzie, Deutsche Bank

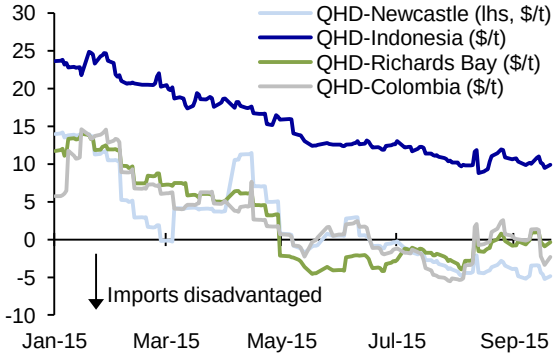
China and the export threat

Since 2013, the slowing pace of demand growth has brought prices lower, leading a cycle of cost discipline among thermal coal producers which this year will have gained further steam owing to weaker producer-currency exchange rates and lower oil prices, Figure 1. We see further exchange rate depreciation benefiting Australia and China in the medium term, and lower labor costs having the potential to bring Chinese costs back towards decade-ago levels. Successive years of accumulated overinvestment in the Chinese coal industry also mean that overcapacity may result in rising export volumes from a giant market which produced 47% (3,870mt) of the world's coal by volume in 2014.

Chinese coal exports including anthracite have yet to rise from the current historically low level of 5mtpa, and are in fact trending lower by 22% in the 8 months to August. However, the government has shown a willingness to adjust trade policy in order to support the domestic coal industry. In our view, there is a strong possibility that the government could take further steps to enable Chinese coal to compete in the international market, following from this year's January reduction in the export duty from 10% to 3%, and the October 2014 move to impose a coal import tariff of 6%. Further moves could include reducing or waiving the 17% value-added tax further helping to boost the attractiveness of Chinese coal as an export commodity. We note that China's coal exports averaged 60mtpa between 2000 and 2009. Please see *Darker days ahead for China's coal industry?* for an in-depth exploration of these issues.

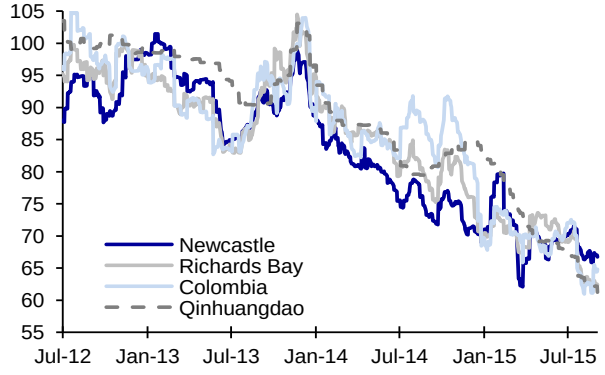
We have not built in to the model any aggressive assumption of higher exports from China owing to uncertainty around the timing and volume, which we expect will have much to do with government decisions around adjustments to taxation designed to support the domestic coal industry.

Figure 2: Energy and tax-adjusted landed China coal price differential to QHD (USD/t)



Source: Bloomberg Finance LP, Reuters, Deutsche Bank

Figure 3: Thermal coal landed price into China net of VAT (USD/t)



Source: Bloomberg Finance LP, Deutsche Bank

Pricing in the implication of lower QHD

Australian and South African coal delivered into China, measured on an energy and tax-adjusted basis, have struggled to price into the Chinese market since May of this year, Figure 2, while Indonesia's advantage has been significantly eroded. Since that time, the Qinhuangdao (QHD) benchmark has increasingly been leading international prices lower, in contrast to the 2012-2014 period when QHD was generally at a premium, Figure 3. The implication of the QHD 5500 kcal/kg benchmark trading lower to CNY360/t in 2016 and CNY350/t in 2017 (versus the 21 September price of CNY383/t) implies downside of USD-3.9/t for Newcastle in 2016 and a further USD-1.7/t in 2017 relative to the current front month. Therefore we lower our Newcastle price deck to USD53/t in 2016 and USD52/t in 2017.

Further downside risks from CNY depreciation

Yet the risks relative to the revised price deck is still likely to the downside. If we also price in the impact of our expectation of USDCNY gradually reaching 6.7 by 2016 year-end, this means that Newcastle could well trade another USD3/t lower by 2016 year-end to USD50/t, and to USD48.5/t by the end of 2017.

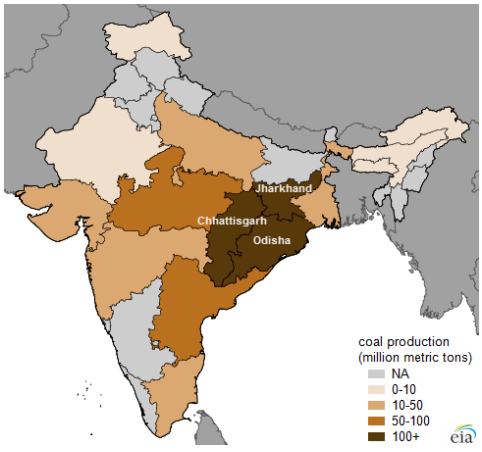
Figure 4: Regional weighted average marginal cost assumptions (USD/t)

	2013	2014	2015	2016	2017
Australia	74.0	65.4	57.8	50.4	48.0
Russia	76.6	66.7	55.8	59.0	61.9
Indonesia	56.9	55.7	57.3	59.6	60.8
South Africa	55.7	53.7	55.8	61.9	60.8
Colombia	51.7	51.9	53.3	55.1	56.4
China coastal		69.3	67.8	63.7	63.7
China inland		46.9	44.4	43.1	43.1

Source: Wood Mackenzie, Deutsche Bank

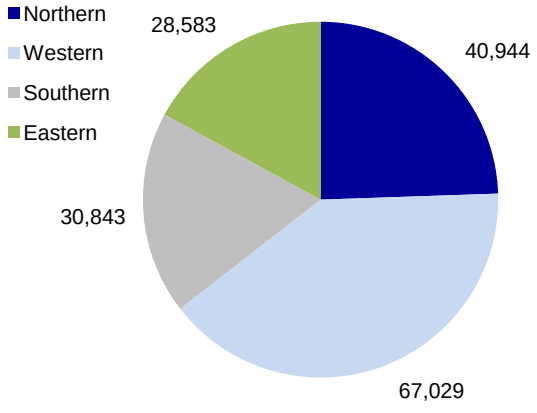
For modeling purposes we conservatively assume that half of the coal displaced by ultra-high voltage transmission lines (details in *How will China UHV boom affect materials demand?*) will be subtracted from import demand, although it is entirely possible that a greater impact could result because of the very tight price relationship between domestic and imported coal, and the fact that Qinhuangdao has appeared to lead international benchmarks lower since May. We expect the impact of lower Chinese demand may be felt more strongly in Indonesia owing to a less accommodative currency forecast relative to Australia, where we expect a sharply weakening currency to more substantially insulate producers from margin pressure, Figure 4.

Figure 5: India raw coal production by region (mt)



Source: US EIA, Deutsche Bank

Figure 6: India coal-fired power capacity by region (MW)



Source: Central Electricity Authority, Deutsche Bank

The challenge for Indian domestic coal

For South Africa, clearly no risks remain vis-à-vis China, at least until Chinese exports rise, as India has largely picked up the slack in Chinese demand. Indian imports of South African coal are on track to rise by another 19% or 6mt this year. However, the extent of India's sustained demand growth will be influenced by the success of Coal India in reaching its ambitious production goals through 2020, as well as by progress in improving domestic railway throughput from coal-producing regions to consuming regions, particularly those in the West.

The three Eastern coal-producing states of Jharkand, Chhattisgarh and Odisha were responsible for 63% of India's raw coal production in the 2013-14 fiscal year, Figure 5. However, power generation capacity, which consumes 75% of India's domestic raw coal production, and 83% of lignite production, is more evenly dispersed, creating a transportation challenge. The Western region possesses the largest share of coal-fired capacity, Figure 6 (data as of July 2015).

Thus, domestic coal supply to generation capacity away from the Eastern coal-producing regions is supplemented by imports for logistical reasons (in addition to possible quality considerations). The ports of Mundra (including the special economic zone), Kandla and Dahej in the western state of Gujarat took in 42.2mt in the 2013-14 fiscal year. Other key ports include New Mangalore in the western state of Karnataka (6.2mt), Tuticorin, Ennore and Chennai in the southern state of Tamil Nadu (17.4mt), and Visakhapatnam and Gangavaram in the eastern state of Andhra Pradesh (9.1mt). Together these nine ports accounted for 74.9mt or 57% of total thermal coal imports in the 2013-14 fiscal year.

From the production side, Coal India's target for the 2019-20 fiscal year stands at 925mt, which would represent a 13.4% compound annual growth rate from the 2014-15 fiscal year, while the achieved growth rate since 2008 has been only 3.9%. The reallocation of improperly assigned coal blocks is the first hurdle to establishing a more transparent licensing process which will encourage private and foreign participation in the coal industry. Beyond this, the application of foreign expertise and technology to Coal India's underground mines is expected to provide a boost to production. Finally, an easing of the process for acquiring environmental approvals for land access, which has proved a major obstacle in the past, will be a further requirement.

South African coal may still be able to rely on India

If we were to contrast the prospects for South African coal versus Indonesian coal, the risks for lower demand for South African coal are less clear, owing to more uncertainties around the extent to which Coal India could reach its longer term goals and domestic rail capacity will allow that coal to efficiently reach all parts of the country. Thus while we note that risks to our Newcastle forecast are weighted to the downside, we expect that Richards Bay may well be more resilient over the forecast horizon, with upside for the FOB spread which currently trades USD-5.7/t, to USD-3.0/t in our forecast deck.

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Figure 7: Seaborne thermal coal supply and demand (million tonnes)

Including Anthracite, Bituminous, Sub-bituminous, and Lignite

	2010	2011	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
Indonesian exports	298	353	384	424	408	384	361	353	346	339	333
growth	*27%*	*18%*	*9%*	*10%*	*-4%*	*-6%*	*-6%*	*-2%*	*-2%*	*-2%*	*-2%*
Australian exports	142	148	171	188	201	204	210	219	224	223	232
growth	*2%*	*4%*	*16%*	*10%*	*7%*	*2%*	*3%*	*4%*	*3%*	*-1%*	*4%*
Russia exports	75	86	103	110	117	114	114	114	115	115	117
growth	*-3%*	*15%*	*20%*	*7%*	*6%*	*-3%*	*0%*	*0%*	*1%*	*1%*	*2%*
South African exports	71	69	76	71	76	77	78	80	82	83	84
growth	*5%*	*0%*	*6%*	*-5%*	*7%*	*2%*	*2%*	*3%*	*2%*	*1%*	*1%*
Colombian exports	69	76	79	74	75	82	84	86	88	90	92
growth	*9%*	*10%*	*4%*	*-7%*	*2%*	*10%*	*2%*	*2%*	*2%*	*2%*	*2%*
US exports excl. Canada & Mexico	15	30	46	42	30	40	40	40	40	40	40
China exports	18	11	8	6	5	4	10	10	10	10	10
Other exports	127	131	135	139	143	139	135	135	135	135	135
Total seaborne thermal supply (Mt)	**815**	**905**	**1002**	**1054**	**1056**	**1043**	**1032**	**1037**	**1040**	**1035**	**1043**
growth	*10%*	*11%*	*11%*	*5%*	*0%*	*-1%*	*-1%*	*1%*	*0%*	*-1%*	*1%*
Japanese imports	131	126	139	141	143	146	148	150	152	154	156
growth	*12%*	*-4%*	*10%*	*2%*	*2%*	*2%*	*1%*	*1%*	*1%*	*1%*	*1%*
Korea & Taiwan imports	163	174	170	172	175	178	182	185	188	191	195
growth	*11%*	*6%*	*-2%*	*1%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*
European imports	187	209	223	220	213	211	201	197	179	160	164
growth	*-5%*	*12%*	*7%*	*-1%*	*-3%*	*-1%*	*-5%*	*-2%*	*-9%*	*-10%*	*3%*
China imports	137	178	235	252	229	155	121	84	48	48	48
growth	*40%*	*29%*	*32%*	*7%*	*-9%*	*-32%*	*-22%*	*-31%*	*-43%*	*0%*	*0%*
India imports	75	92	119	139	172	175	185	195	210	226	243
growth	*25%*	*22%*	*30%*	*16%*	*24%*	*2%*	*6%*	*6%*	*8%*	*8%*	*8%*
Other imports	131	144	150	155	157	159	161	163	165	167	169
Total seaborne thermal demand (Mt)	**825**	**922**	**1036**	**1078**	**1089**	**1024**	**997**	**974**	**941**	**946**	**975**
growth	*11%*	*12%*	*12%*	*4%*	*1%*	*-6%*	*-3%*	*-2%*	*-3%*	*1%*	*3%*
Notional market balance	**-10**	**-17**	**-34**	**-24**	**-33**	**20**	**35**	**64**	**99**	**89**	**68**
Contract thermal coal (JFY)	**91**	**122**	**119**	**100**	**85**	**71**	**64**	**54**	**54**		
API 4 (FOB Richard's Bay)	**91**	**116**	**93**	**81**	**72**	**58**	**50**	**49**	**49**		
Newcastle FOB	**99**	**121**	**94**	**85**	**71**	**60**	**53**	**52**	**52**		

Source: McCloskey, AME, BP, CEIC, Deutsche Bank

#6 Precious Metals

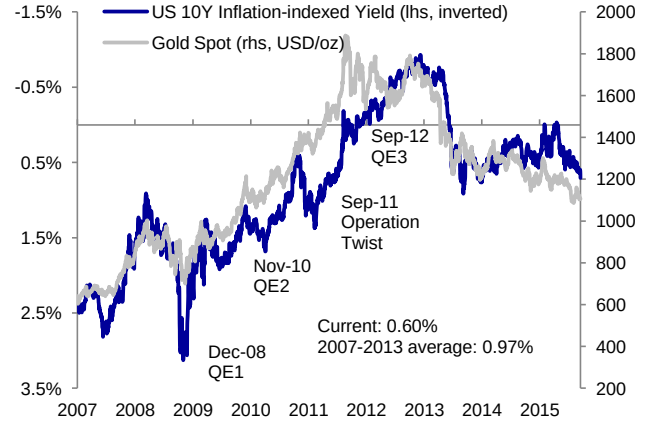
Liftoff Deferred

- Although market expectations on 16 Sep of a Fed hike were only 32%, this did not prevent gold from trading higher as a result of the hold, while the notably weak reaction from equity markets suggests that the potential for a higher equity risk premium may be the most likely source of upside risks for gold in the very near term.
- Equity market vulnerability could also be associated with further doubts over the likely schedule for higher real rates, doubts which have been growing since the mid September delay in US policy normalization and lower Fed dot plot. Despite Fed signaling, the market expectation of a December hike has now fallen to only 43% as of 25 Sep.
- However, given that US data is supportive of near-neutral monetary policy rather than the current extremely accommodative stance, our economists believe that starting the normalization process is now long overdue. Consequently the medium-term risk for gold remains largely to the downside, in our view.
- As a result of recent weakness in silver, its valuation relative to gold is near the low end of the range (17th percentile since 1971) suggesting that some re-pricing is likely over the next year as economic activity accelerates.

Gold richly valued in real terms

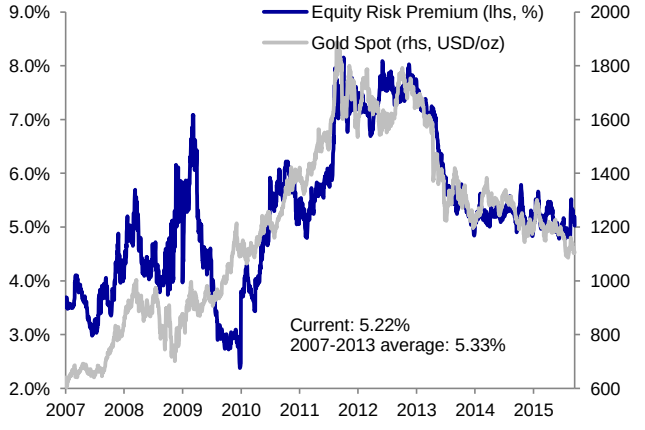
Notably, gold now stands as one of only four commodities out of a list of 20 which are still richly valued in real terms versus the historical range beginning from 2000 (the others being lead, palladium and cocoa). In our estimation, the medium term fundamentals will remain negative for gold as long as US economic data supports a gradual normalization of monetary policy, with the resulting effect that real interest rates move gradually higher. In fact, our economists believe that a start to normalization is now long overdue, with attendant risks for policy falling behind the curve in the event of rising inflation, and the need for a more aggressive tightening cycle down the road. While this threat appears remote for the time being, we believe that the negative impact to inflation from lower oil prices is now largely behind us, with year-over-year effects in 2016 being much smaller than 2015 based on our oil forecast deck.

Figure 1: Gold and US real yield



Source: Bloomberg Finance LP, Deutsche Bank

Figure 2: Gold and the equity risk premium



Source: Bloomberg Finance LP, Deutsche Bank

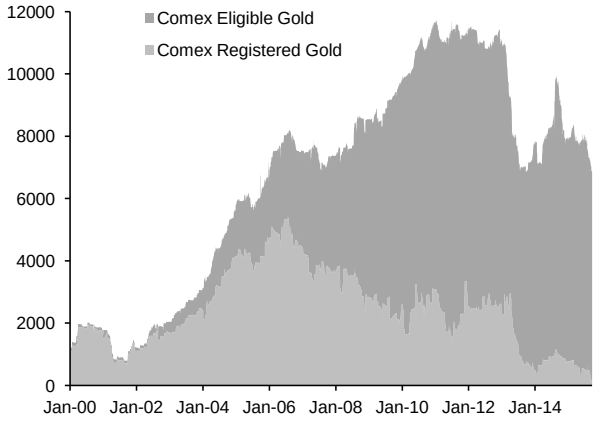
In the short term, we see upside risks to gold emanating from demonstrably fragile investor sentiment for risk assets, and equally importantly, the willingness on the part of the Federal Reserve to incorporate weakness and financial volatility in emerging markets as an input to the timing of policy decisions.

However, realised volatility in gold has in fact been rather subdued since January when the dip in US 10Y real yields to 0% helped to trigger gold's move to peak at USD1300/oz.

Figure 3: World central bank gold holdings

Source: Bloomberg Finance LP, Deutsche Bank

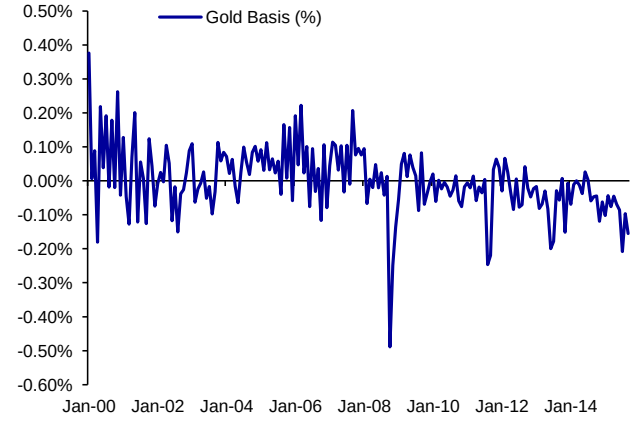
Figure 4: Comex gold inventory



Source: Bloomberg Finance LP, Deutsche Bank

We view the US dollar as having substantially less importance for gold and as a weaker influence compared to real rates and the equity risk premium. Therefore, although we expect the US dollar to continue to appreciate through the end of 2016 with EURUSD reaching 0.90 and USDJPY reaching 130, a resumption of dollar strength may be only mildly negative for the gold price.

Figure 5: Monthly gold basis (spot to front month)



Source: Bloomberg Finance LP, Deutsche Bank

Figure 6: Gold/silver ratio

Source: Bloomberg Finance LP, Deutsche Bank

Central bank and ETF holdings

World central bank gold holdings have continued their move higher since March 2009, although this occurred most recently owing almost entirely to an accumulation of Chinese holdings in June of 21.4 mm troy oz, out of a global accumulation of 23.3 mm troy oz. Data after June is likely to show a reduction

in Chinese reserve holdings of gold, however, as they rebalance to adjust for sales of USD-denominated reserve assets. We also see total ETF holdings on a downward trend, although this measure has leveled off since the beginning of August.

Comex registered gold stocks have attracted attention of late owing to its steady decline since late 2014, which has been associated with a steady deterioration in the gold basis, or the carry return from spot to front month, from positive to negative territory. Registered gold stocks are those that can be delivered against futures. However, some proportion of the eligible gold inventory could be converted to registered gold stocks through what we understand to be a simple administrative process, if backwardation in the gold curve intensifies.

Beneficial backdrop for silver

For silver, we would expect that its relative valuation to gold would have scope to improve in an environment of modestly higher global growth. Since 1971, years in which global growth has been at 2.5% or below (based on World Bank statistics) typically results in a depreciation of silver relative to gold, while growth above 2.5% is very slightly beneficial for silver. Given that silver's relative valuation is at what could be considered undervaluation from a long-term perspective, Figure 6, we expect a gradual rise in prices over a 12-month horizon.

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#7 Platinum Group Metals

Platinum: Dieselgate fallout

- In our last long-term outlook for **Platinum**, we concluded that demand growth rates are likely to slow due to amongst other factors the rising market share of battery-powered vehicles, and the decline in diesel powered market share in Europe. Simply, the rising cost of diesel emissions abatement would meet the falling cost of battery vehicles. We have factored in a 5% decline in diesel market share in Europe by the end of the decade. There are a number of permutations as to how the Dieselgate scandal will play out, and a lot depends on how VW and the other European OEMs handle the fallout, and how wedded they are to diesel powertrains. The technology exists to reduce NOx emissions to Euro 6 standards under real world driving conditions, and if more broadly applied could still enable diesel to be part of the solution in reducing CO2 emissions. The PR hurdle is however significant. The risk to platinum demand (and pricing) is that diesel's market share declines faster than our expectations.
- We think the platinum price will be heavily influenced by the marginal cost over the next few years, but at current levels, c.50% of the industry is loss-making or close to break-even. We think this is overdone. However, there has been little in the way of meaningful supply curtailments, with a paltry 200koz of closures. Political pressures to maintain employment and tight balance sheets limit producer ability to curtail production. Furthermore, a weakening Rand is bailing many mines out. It is unlikely that there will be any meaningful mine closures, in the near future, which means that supply will adjust very slowly through capital starvation. The catalyst for a price recovery remains the potential for strike action in 2016, as the next wave of wage negotiations kick in. We expect this to drive a modest recovery in pricing in 2016.
- The precipitous drop in **Palladium** prices (-32% between the end of May to the end of August) was driven by investor liquidation in response to weak Chinese vehicles sales. We think that Chinese Auto sales will remain strong over the medium term given the low penetration versus many other countries, which makes palladium a structural preference over the medium term. We think gasoline engines will capture some of the market share that diesel engines lose in Europe. Gasoline engines do not have a similar NOx problem to diesel. The move to smaller engine displacement in order to beat CO2 emissions also favours gasoline, as diesel in small vehicles is simply too expensive. This is certainly supportive for palladium demand and for sentiment.
- The fallout from the Dieselgate scandal will hit **Rhodium** the hardest of all in our view. The market remains well supplied, and needed a strong demand pull to draw down stockpiles. This demand pull was expected to come from Euro 6 emissions legislation, with Rhodium playing an important role in meeting these emission standards. Some test findings have suggested that a Lean NOx trap is not that effective at treating NOx emissions under real world driving conditions in diesels. It may simply be a question of increasing the loadings, but there is still uncertainty and at this stage the No PGM solution of Selective Catalytic Reduction seems more effective. The near-term demand drivers are therefore more muted. In the absence of supply curtailments, Rhodium could languish below USD1,000/oz for a number of years.

Diesel is dead! Long live Diesel

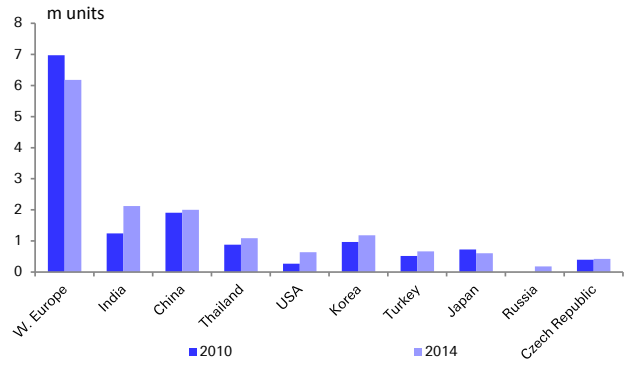
Platinum caught on the wrong side of the VW fallout

There are a number of ways the fallout from the VW-gate scandal can play out for the platinum and broader PGM markets. Very few of the scenarios are however positive for demand in our view, and it does depend on how VW and the other European Auto OEM producers choose to deal with the fallout from the scandal. The most likely outcome is that diesel engines will lose market share to gasoline, hybrid and plug-in electric vehicles over the course of the decade. We already have this built into our base case PGM demand forecasts, but the loss of diesel market share may happen quicker than we had anticipated. Furthermore those diesel models that retain their market, are more likely to use the SCR (Selective Catalytic Reduction) technological route (which is a low/zero PGM solution) to achieve the tougher emissions standards. This would be negative for both platinum and rhodium, but positive for palladium which is used in gasoline engines. Given the additional focus on emissions and in particular the discrepancy between test bench emissions and real world driving emissions, there may be a near term boost for PGM demand. Auto OEM's are likely to increase the safety margin in meeting emission standards by upping the loadings for vehicles which currently being produced or are under development. However this would reduce margins through an additional cost and simply accelerate the development of alternative technologies. A wide scale VW recall in Europe as well the US may also mean that autocatalysts with higher PGM loadings are retrofitted to achieve emission standards without impacting vehicle performance and fuel efficiency. However VW have given no indication that this will be the route they pursue.

Why diesel in the first place?

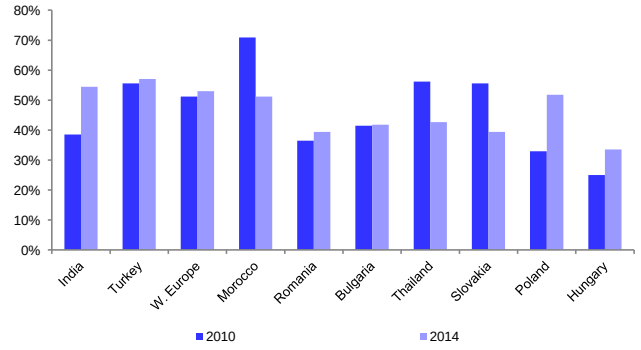
Diesel is cheaper to produce (less refined) compared to gasoline, and in the absence of differential taxation to normalize prices, should mean lower operating costs. This is the motivation for buying diesel cars in India for instance where the market share of diesels is c.45%. Furthermore, diesel engines tend to be 15-20% more fuel efficient compared to gasoline engines, a further reason to own a diesel car in an emerging market country. The higher fuel efficiency also means lower CO2 emissions which will become a more important consideration in the US and Europe as CO2 emission standards became mandatory toward the end of the decade. This is also one of the reasons why there is such a strong market share for diesels in Europe. The last reason is the driving experience of a diesel. They produce prodigious torque compared to gasoline engines of a similar power, giving the driver a feeling of acceleration at lower speeds, and are perceived as being more durable and reliable. The downside with a diesel engine is that they are more expensive to produce, typically Euro1,500–2,000 for a medium sized saloon car, and they produce much higher levels of NOx emissions compared to a gasoline car which is difficult to treat. In terms of market share India, Turkey, Western Europe and Poland have the largest diesel market share +50%. In absolute vehicle numbers however, Western Europe is by far and away the most important. India, China, Thailand and South Korea all have more than 1 million diesel vehicles sale per annum (2014).

Figure 1: Diesel passenger vehicle sales per country



Source: LMC Automotive

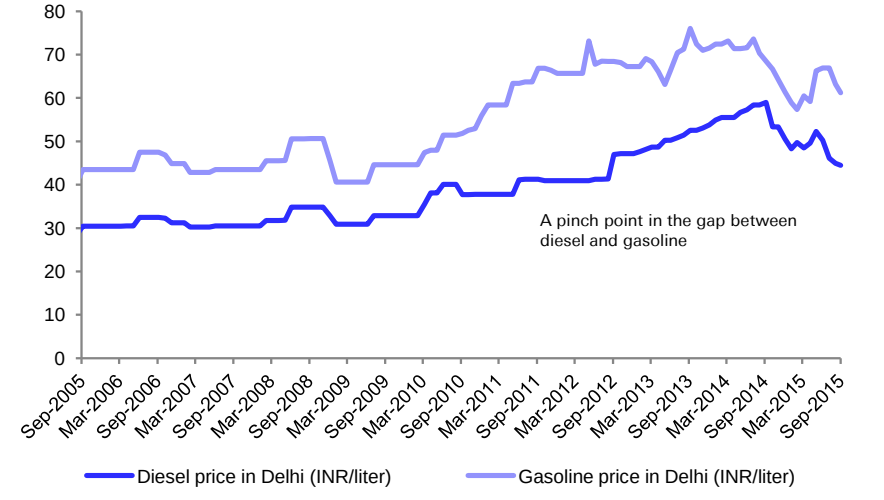
Figure 2: Diesel passenger vehicle sales by market share



Source: LMC Automotive

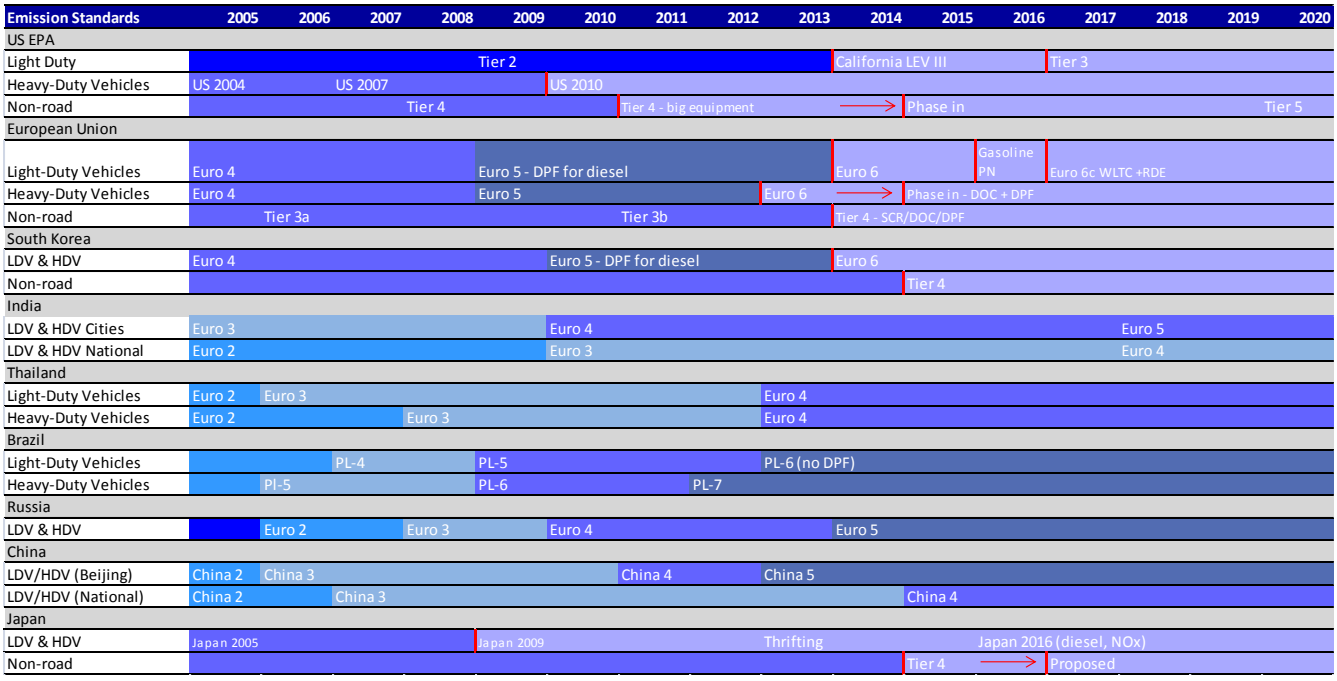
The decline in absolute numbers in Western Europe is a reflection of the general market and if anything, diesel has regained some of its lost market share which occurred during the global financial crisis. Given the less stringent emission standards in India, China and Thailand as outlined in chart 4, the main threat to diesel engines is in Western Europe. In India, the threat of increasing diesel prices, closing the gap on gasoline prices as also abated somewhat, especially in the lower oil price environment. However the threat that diesel subsidies are reduced more quickly compared to gasoline at some point in the future still remains

Figure 3: The differential between diesel and gasoline price in India



Source: Deutsche Bank, Bloomberg Finance LP

Figure 4: Global Automotive emission standards



Source: Deutsche Bank, ICCT, Delphi Automotive

Dealing with Euro 6, and CO2 emission legislation

The latest Euro 6 emission legislation targeted a further sharp reduction (66%) of NOx emissions (from 0.18g/km to 0.08g/km) from diesel engines. The NOx level in the US is 2x lower at 0.04g/km. Gasoline engines are relatively unaffected because they emit much lower levels of NOx at only 0.06g/km.

Figure 5: Diesel emission limits (mg/km over the NEDC cycle)

Pollutant	CO	NOx	PM	THC+NOx	PN (#/km over NEDC cycle)
Euro 5a	500	180	5	230	
Euro 5b/b+	500	180	4.5	230	6.00E+11
Euro6b/6c	500	80	4.5	170	6.00E+11

Source: Deutsche Bank, NECD = New European Driving Cycle

After treatment NOX control for Euro 6 light-duty vehicles is based primarily on two technologies: lean NOX traps (LNTs) and selective catalytic reduction (SCR). These technologies can be applied in combination with exhaust gas recirculation (EGR, which has been applied since the adoption of Euro 2 in the 1990s) or with in-cylinder control strategies (e.g., fuel injection delay and other combustion improvements that reduce the need for after treatment systems).

LNTs which uses mainly platinum and possible some rhodium, currently used in light-duty diesel vehicles in the US and Europe, have shown good durability and NO_x reduction performance during chassis dynamometer testing, in which they match the performance levels of SCR systems. The advantages of an LNT compared with an SCR system are that it is generally more economical for engines with displacements of less than 2.0 litres. LNTs are also likely more acceptable to customers because they do not require periodic refilling with urea, although LNT operation has a small impact on fuel consumption). The advantages of SCR are that it is generally more economical for engine above 2.0 litres and it can provide better fuel economy and CO_2 emissions through engine tuning for low PM (particulates) and high engine-out NO_x emissions. In summary then:

- A lean NOx trap is a PGM rich solution and costs US$320-520 per vehicle. The disadvantage is its limited is storage capacity.
- A Selective Catalytic Reduction or SCR is a low or zero PGM solution and costs US$400-500/vehicle. The disadvantage is the need of an urea tank which needs to be refilled and the unit is not as effective at cold temperatures.
- An exhaust gas recirculation or EGR costs US$140-160/vehicle but has the disadvantage of being a tradeoff between NOx performance and fuel economy. This technology is typically used in conjunction with an after exhaust treatment solution.

As a consequence of these additional requirements, diesel engines are becoming more expensive. However, our European Auto team thinks that this is not the end of diesel engines as due to their ability to assist in meeting CO2 emissions. Average CO2 emissions in Europe were 124g/km in 2014 with a target to reach 95g/km in '20/21. Every gram missed translates into a fine up to €95/vehicle/gram missed. Most European OEM's believe that diesel engines are crucial to achieve CO2 emissions standards.

The challenge of Real Driving Emissions (RDE) standards

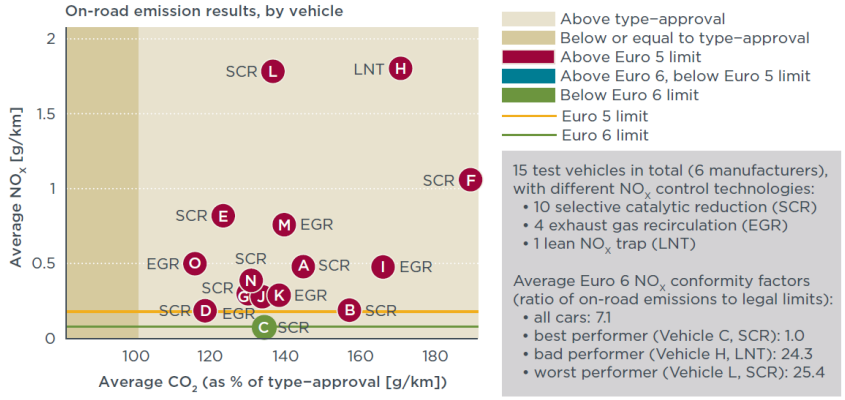
Vehicle emissions are typically tested in laboratories equipped with a chassis dynamometer. During chassis dynamometer testing, the vehicle under test remains stationary on a set of rollers that simulate driving resistance, and its emissions are collected and analyzed as it is driven according to a standard time/velocity profile known as the driving cycle. Measuring emissions under controlled conditions in a laboratory increases the repeatability and the comparability of results, which makes this an excellent approach for vehicle type-approval tests. However, it is also an artificial way of measuring emissions, and its results may differ from the actual on-road emissions because it eliminates several factors that influence emissions (e.g., road gradient, hard accelerations, use of air conditioning, and traffic or weather conditions).

The introduction of PEMS (Portable Emission Measurement System) testing in 2017 will be an additional challenge to maintaining compliance. A White Paper issued by The International Council on Clean Transportation in October 2014, found that modern diesel passenger cars have low on-road emissions of carbon monoxide (CO) and total hydrocarbons (THC), but an unsatisfactory real-world emission profile of nitrogen oxides (NOx). Their main finding was that the average, on-road emission levels of NOX were estimated at 7 times the certified emission limit for Euro 6 vehicles. There were, however, some remarkable differences among the performance of all the vehicles tested, with a few vehicles performing substantially better than the others. This supports the notion that the technologies for "real-world clean" diesels (i.e., vehicles whose average emission levels lie below Euro 6 emission limits under real-world driving) already exist.

High NOX emissions were observed across vehicles, regions (US and EU), manufacturers, and after treatment technologies. They were heavily present not just in the more demanding driving situations (e.g., uphill driving, instances of high acceleration*velocity), but also during the situations that would in principle be most favorable to achieve low NOX emissions. This points to the application of NOX control strategies that are optimized for the current type-approval test procedures (on the chassis dynamometer laboratory, using a standard test cycle), but are not robust enough to yield acceptable on-road performance. This engineering approach, albeit legal in the current regulatory context, entails a risk for manufacturers that are heavily invested in diesel technology. One of the vehicles which performed particularly poorly was fitted with a Lean NOx trap. An article which appeared in the Financial Times on

September 25 also quoted Auto OEM's as saying that SCR was vital to meeting US emission standards. Our view is that LNT technology is on the back foot and is likely to lose market share to SCR technology, all of which is a negative for PGM demand.

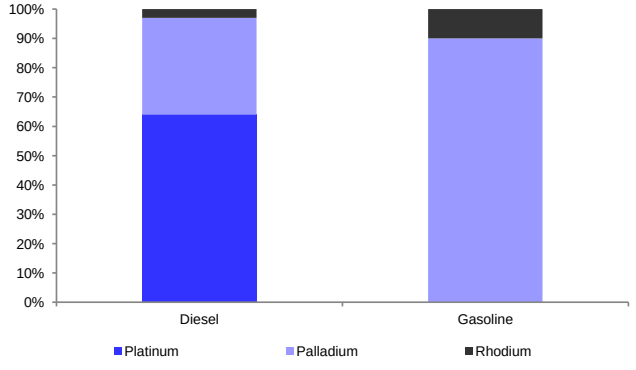
Figure 6: Overview of on-road NOx and CO2 emission results for a group of test vehicles



Source: ICCT

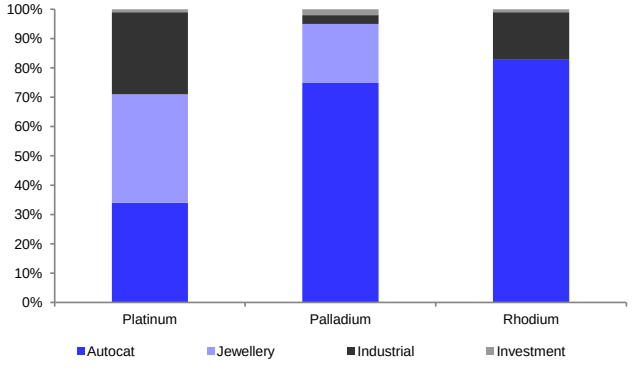
Platinum and rhodium has lost market share in global Autcats to palladium over the past 10 years. Platinum comprised 47% of the PGM's in an auto catalyst 10 years ago, versus 27% today. In contrast, palladium comprised 45% 10 years ago versus 68% today. The loss of diesel market share in favour of gasoline is a negative for both platinum and rhodium, whilst being a positive for palladium. Our previous estimate was that only 40% of vehicles which were Euro 6 compliant used LNT technology (the other 60% a combination of SCR and EGR), however given the view that LNT technology may not be as effective at treating emissions as SCR, this percentage may reduce which is a negative for both platinum and rhodium demand. Rhodium's exposure to the Autocat sector makes it the most vulnerable to VW fallout in our view.

Figure 7: Average PGM composition in diesel and gasoline power trains



Source: Deutsche Bank

Figure 8: Autocat composition of the main PGM's



Source: Deutsche Bank

Taking a Batter(y)ing

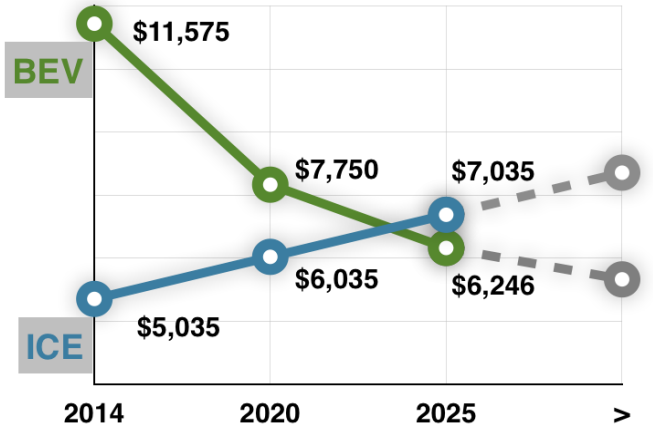
Technologies that improve the efficiency of conventional engines should experience extraordinary growth over the next 5 years. But the marginal cost of improving conventional internal combustion will increase as the cost of electrification continues to decline. Our Global Auto team estimates that various forms of electric vehicles will reach cost parity with conventional diesel power-trains within the next 5 years, and parity with conventional gasoline power-trains by the early 2020's. This, the team believes, will drive an inflection in demand for Electric Vehicles (EV's), resulting in a more meaningful market share.

Figure 9: Average Cost of IC (Internal Combustion) Vehicle

		2014
Average IC Powertrain	**$**	**5,035**
Engine	$	2,555
Transmission	$	1,825
Fuel System	$	360
Exhaust	$	295
Other Components	**$**	**9,455**
Climate/engine cooling	$	715
Axles, Driveshafts, Braking, Steering & Other	$	1,640
Body & Structural	$	2,375
Suspension	$	480
Interior	$	1,285
Audio/telematics	$	335
Electronics & Electrical	$	1,825
Passenger restraints	$	350
Wheels/Tires	$	305
Body glass	$	145

Source: Deutsche Bank, Supplier Estimates

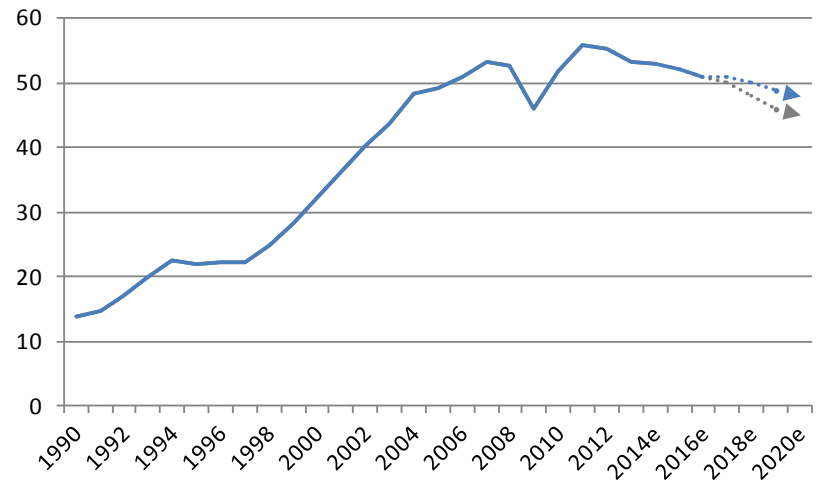
Figure 10: Comparison of Cost Trajectories of IC and Electric Power-trains



Source: Deutsche Bank, Argonne National Labs, Supplier Estimates, Industry Experts

The Diesel penetration rate in Europe has increased significantly over the past 20 years to slightly more than 50%. Depending on the speed and the final outcome of regulatory changes, we believe that this penetration rate could drop by some 500-1000bp until the end of this decade. Our base case in platinum is 500bps. As such the European Diesel volume will at best stagnate, but most likely be faced with volume shrinkage towards the end of this decade. After 20 years of expansion we see this as a significant shift, impacting the strategy of all internal combustion geared suppliers.

Figure 11: European Diesel penetration



Source: Deutsche Bank, LMC Automotive

Given our expectation of the trends, we outline our forecasts below:

Figure 12: Electric and Fuel Cell Market Share

Global vehicle market share	2014	2020	2025	2030
HEV	2.40%	6.80%	8%	9%
PHEV	0.19%	1.40%	3.50%	6%
BEV	0.25%	0.80%	2.20%	4.10%
Subtotal	**2.84%**	**9.00%**	**13.70%**	**19.10%**
Fuel cell	0.05%	0.20%	0.50%	1.00%
Diesel	20.40%	19%	18.30%	17.90%
Gasoline (incl. Stop/Start)	76.70%	71.80%	67.5%	62.0%

Source: Deutsche Bank, Continental, LMC Automotive, IHS

The rise of EV's is a threat to PGM demand, but given the market share as outlined by Figure 12, the key question is whether Autocat PGM demand will decline over the long term. The success of fuel cell technology as an alternative to electric vehicles will also be key in offsetting platinum demand destruction by electric vehicles. Our conclusion is that **gross** Autocat demand is still likely to **increase**, with the forecast rise in vehicles sales, offsetting the change in vehicle sales mix. We forecast an increase of 1.5Moz in gross Autocat platinum demand by 2030.

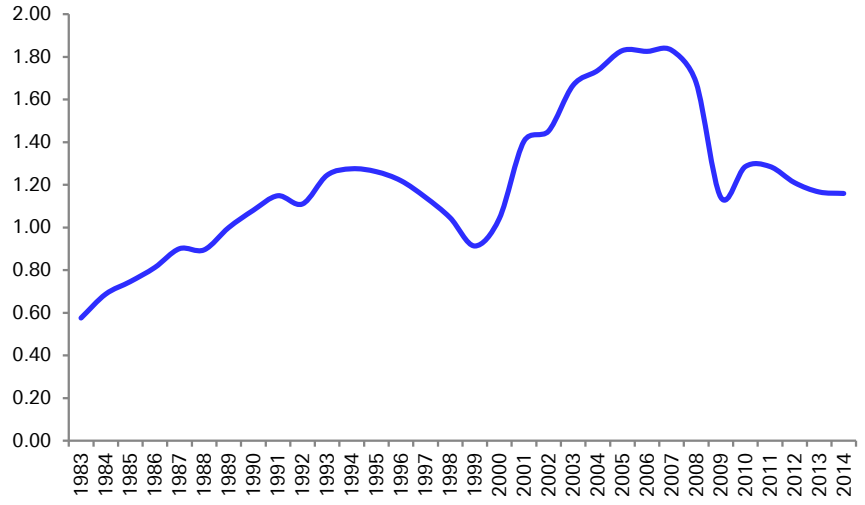
There are a number of opposing drivers for each of the PGM's, and we have stress-tested each of the metals under three scenarios, a base case, a bear case and a bull case. We have used LMC Automotive for our global vehicle sales forecasts, who estimate a CAGR of 2.6% between now and 2030. This trend is a positive driver for PGM demand. The rise in electrified vehicles is a negative for PGM demand, with pure battery vehicles using no PGM's. Hybrid vehicles can be both gasoline and diesel, although these would mainly be for the European market. Non-plug in hybrids, such as the Prius where the engine and battery work in parallel will use catalyst systems pretty much identical to an internal combustion engine model. Plug-in hybrids which have a larger battery pack and can be recharged from the grid in theory may be able to use

a smaller engine (for the same sized vehicle) and so a smaller catalyst. At the moment auto companies have not optimised loadings for hybrids and will tend to use existing catalysts. As greater investment is made in the technology we think that loadings will come down, and factor this trend in our estimates.

In aggregate we still estimate that PGM loadings in diesel and gasoline passenger vehicles will **decrease** modestly on a global basis. Our base case is that emission legislation especially in China and many other emerging market regions such as India, will play catch up. This should offset thrifting and the move to smaller vehicles (and therefore lower PGM loadings) in mature regions. In our base case, we assume that platinum loadings in diesel vehicles and heavy duty diesels (HDD's) decrease by 2 - 4% every 5 years. We also assume that Fuel cell loadings will decline from the current 30 grams per vehicle down to 10 grams per vehicle by the end of 2030. We estimate platinum loadings were c.1.11g/vehicle globally in 2014, and that loadings have doubled over a period of 30 years, through two rounds of thrifting and substitution. We estimate average vehicle loadings will fall modestly over the next fifteen years to 1.07g/ vehicle.

We outline the platinum loadings globally since 1983.

Figure 13: Estimated platinum loadings per vehicle (globally) – g/vehicle



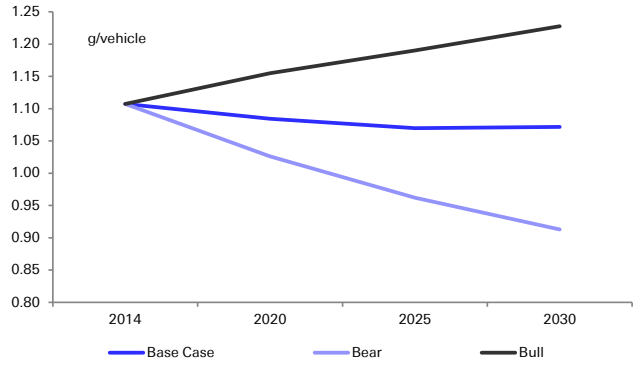
Source: Deutsche Bank, JMAT, SFA Oxford, LMC Automotive

We contrast the loadings and absolute demand in ounces under the three different scenarios. Our Bear scenario assumes that thrifting, substitution (to palladium), and the move to smaller power trains leads to falling average loading per vehicle. We also assume that fuel cell technology makes very limited market share gains. A more rapid adoption of electric vehicles at the expense of diesel would also fall into our Bear scenario. Our Bull scenario assumes that loadings increase in the diesel and heavy duty diesel sectors due to the increasing pressure increasing "real world" emissions standards. We also assume that fuel-cells reach 1.5% market share by the end of 2030, which is a plausible scenario if many major cities opt for fuel cells in their public transport network.

In contrasting the three scenarios, our base case sees modestly declining overall loadings, our bull case increasing loadings, whilst our bear case sees declining loadings. We do however reiterate the point that in all three

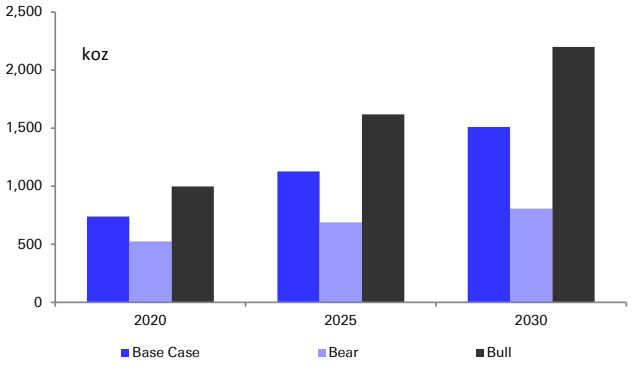
scenarios, we would expect gross platinum demand to grow. Most of the additional demand comes in the period up until the end of this decade, after which the demand growth slows. This is due to a combination of lower vehicle sales growth and Electric vehicles gaining market share. Our bear case calls for additional demand of 800koz of gross demand by 2030, whilst our bull case calls for c.2.2Moz by 2030.

Figure 14: Platinum loading trajectory under three scenarios



Source: Deutsche Bank

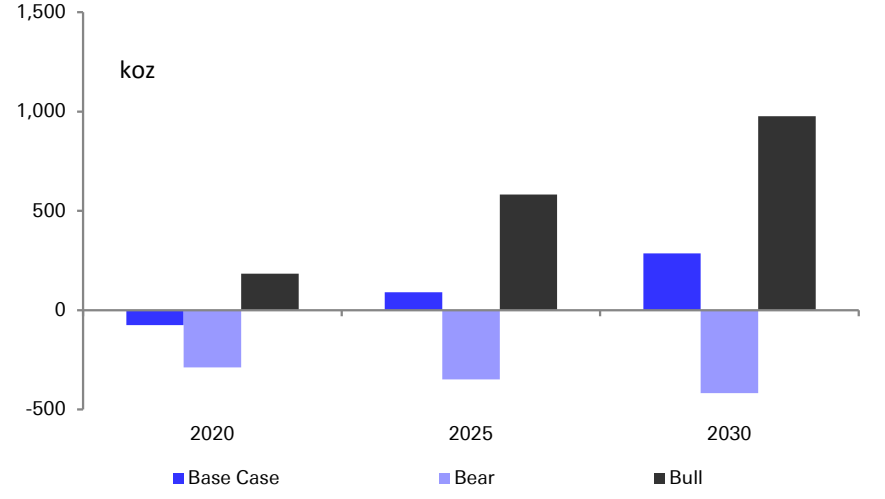
Figure 15: Additional gross platinum Autocat demand



Source: Deutsche Bank

In estimating the net Autocat demand requirements which also accounts for the effect of recycling, we have used the same three scenarios. In our base case scenario, we estimate that **the Autocat industry will be a net supplier** to the market up until 2020, whilst the additional new ounces required by 2025 will be negligible. By 2030E, the additional requirement will be 300koz, equivalent to a large platinum mine, or a two mid-sized mines. Under our bear case scenario, the Autocat industry could add an additional 400koz of metal to the market. It is only in the bull case that an additional 1Moz of platinum will be required by 2030, which is equivalent to six new mid-sized mines.

Figure 16: Net Autocat platinum demand under three scenarios

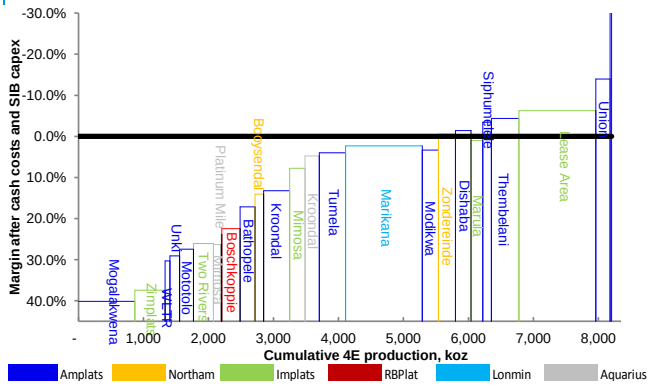


Source: Deutsche Bank

SA producer health monitor: Prices eating into the cost curve

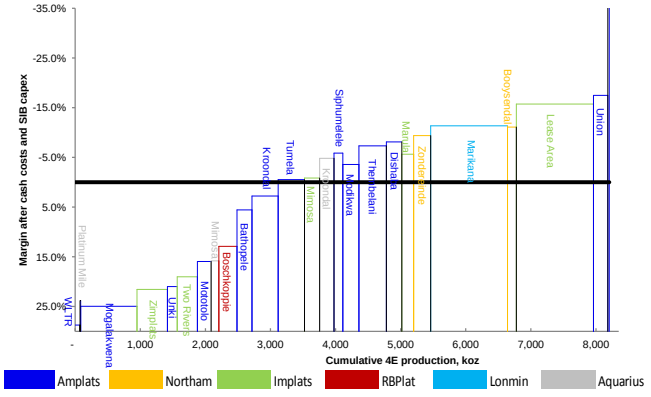
We estimate that over 50% of the industry is making a negative cash margin at the current Rand basket price of R11,400/ 4PGE, when taking stay in business capex into account. Whilst this situation is unsustainable, there have been very few announcements of near-term rationalization. The weakening Rand has however continues to be a tailwind for the SA producers.

Figure 17: Southern African producer cash cost margins



Source: Deutsche Bank, Company reports

Figure 18: Southern African producer cash +SIB capex margins



Source: Deutsche Bank, Company reports

Southern African gross refined platinum supply is set to increase by c.300koz, a meaningful amount, in 2016. This is despite the cost-out and capex-savings plans announced by the industry, which we believe is not likely to meaningfully shrink the current production base; but will rather delay longer-dated growth and replacement ounces. Production growth is expected from the Impala Lease Area (about 150koz as 20- and 16-shaft ramp-up); PTMs Western Bushveld JV Maseve project (due to begin in 4Q15 and produce around 70koz in 2016); steady-state production from Northam's Booysendal (North) mine (due to reach steady-state of phase 1 in 4Q15, and produce c.90koz of platinum in CY16 vs. 75koz in CY15E) and 70koz from Zimplats as the mine recovers from a ground-collapse and metal-in-concentrate is released from inventory.

Production closures announced to date are insufficient to offset new production or meaningfully impact the market, in our view. Impala has announced the closure of sections of older production, but this amounts to only 145koz in total over five years (i.e. an average of less than 30kozpa) and has reduced the longer-term profile by just c.15kozpa by 2020. Lonmin also intends to reduce production by c.100kozpa, but only by 2017 as it will continue to mine out high-cost shafts over a two-year period.

Recent corporate developments do not suggest near-term production curtailments are likely: Impala has shored-up its balance sheet to complete 16- and 20-shaft with an equity -raise. The agreement reached whereby Amplats will sell Rustenburg to Sibanye suggests that these assets will receive renewed attention and higher capex in order to produce more than was likely under Amplats, in our view.

The producers continue to act in a manner which could be argued to be logical from an individual perspective (maintain or push production higher for cost economies of scale), but when taken collectively are harmful to the industry as they result in higher production of value destructive ounces, as we view the market as well-supplied. The risk of a calamitous event is increasing, in our view, as it appears the market is more likely to enforce supply discipline

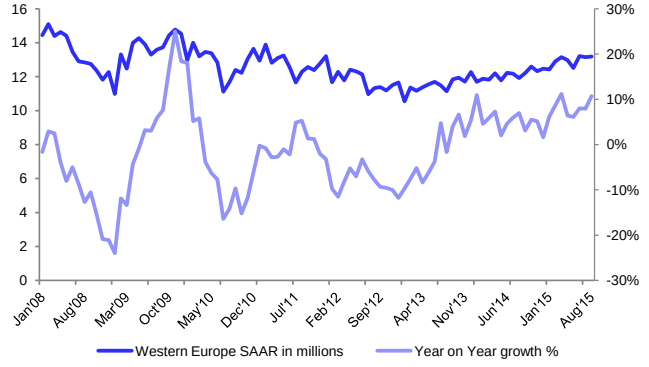
through pricing than the producers are through the required consolidation and restructuring. We highlight Lonmin's maturing debt facilities in 1H16; and 2016 Amplats, Implats and Lonmin wage negotiations as potential trigger points for the producers to come under even higher levels of financial pressure.

Strong European vehicle sales has not translated into strong platinum demand

The positive momentum in the European car market continued in August, which suggests that the car market could return to "normal" sooner than initially expected. August is generally a low-volume month in the region (~5% of annual registrations). However, the improving trends continued with volumes up 10% in W. Europe. Q3 is up +9% so and August is the 3rd month in a row SAAR is over 13.0mn/yr. Our European Auto team has upgraded their full year estimate from 12.8mn to 13.0mn units, +8% YoY.

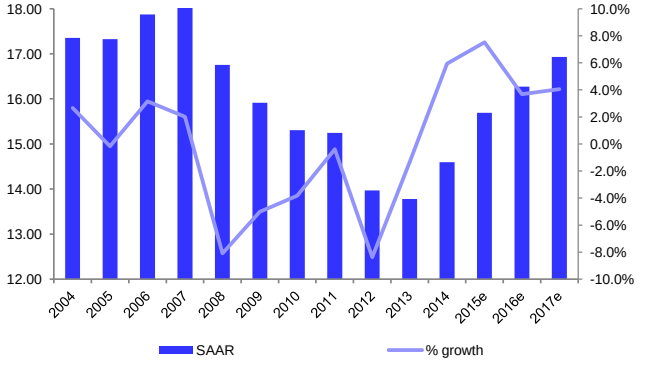
In the 5 core markets, volumes were up 10% in the month. Some markets had an extra work day that favourably impacted the monthly figures. All markets are still on an upward trend with Spain (+23% YTD) leading the way, followed by Italy (+15% YTD), France (+6% YTD), UK (+7% YTD) and Germany (+6% YTD).

Figure 19: Monthly Western European SAAR



Source: Deutsche Bank, LMC Automotive

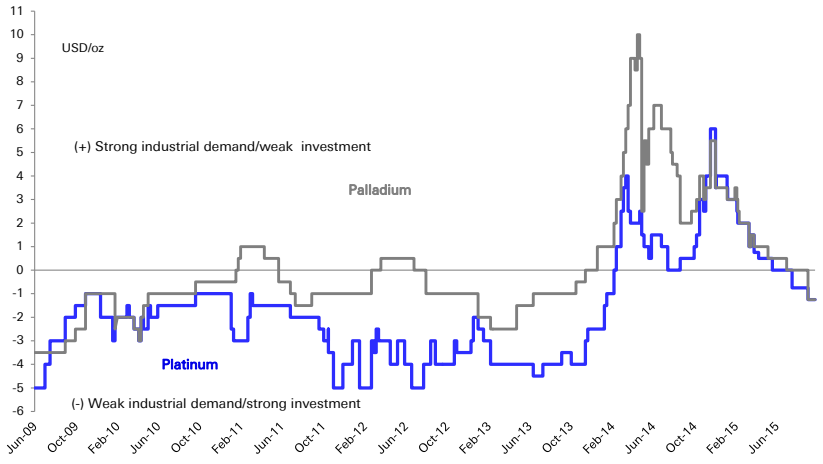
Figure 20: Total European SAAR with forecasts



Source: Deutsche Bank, LMC Automotive

The strong sales momentum has not really translated into strong platinum buying momentum from the Auto OEM's. Channel checks indicate that much of the buying for Euro 6 has been done already during previous periods of price weakness. The discount to ingot of the sponge market (a more normal situation) suggests that there is no tightness, and certainly does not give the indication of significant Auto purchases.

Figure 21: US sponge vs Zurich ingot switch



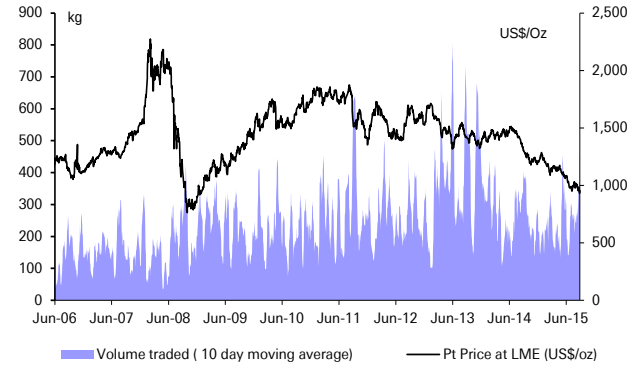
Source: Mitsubishi, Deutsche Bank

Chinese Jewellery demand will be structurally lower, but there are some positive signs for H2

The Chinese jewellery market which is normally the shock absorber in the market has lost its spring. In periods of price weakness, Chinese buying normally picks up. This has not been the case so far this year. The uncertain economic outlook and the push for less ostentatious consumption by the Chinese government have impacted Chinese jewellery demand over the first 8 months of the year. As with many of the Industrial metals we think this slowdown is a combination of cyclical factors, but also has a structural element, driven by the unfavourable demographics. Chinese wedding registrations are down 11% year to date. Furthermore, the marketing of platinum jewellery in lower tier cities will take a lot more effort. The marketing effort in lower tier cities will be commensurately higher than in the tier 1 and 2 cities. We do expect a pickup in jewellery buying in the second half of 2015.

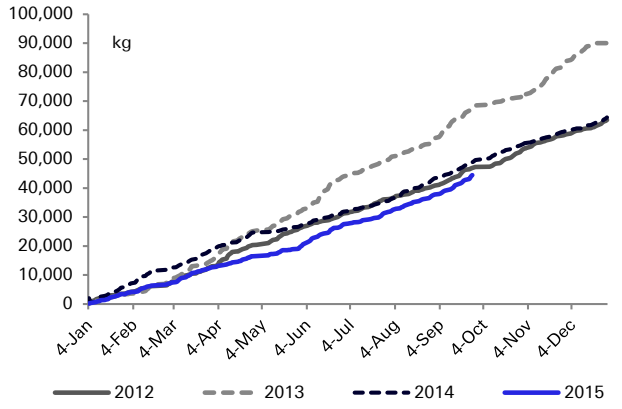
Chinese imports and trading on the Shanghai Gold exchange remains fairly muted. As a broad indicator of Chinese jewellery demand, we look at the China trade stats, and trading on the SGE. Cumulative trading volumes are down 14.0% y-o-y on the SGE. Imports have however recovered over the past few months, are now up 5% year on year, suggesting that Chinese buyers are now being tempted by the low prices. Chinese retail jewellery sales of all types have begun to pick up and are up 17.4% year on year for August.

Figure 22: Platinum traded on the SGE (10-day moving average)



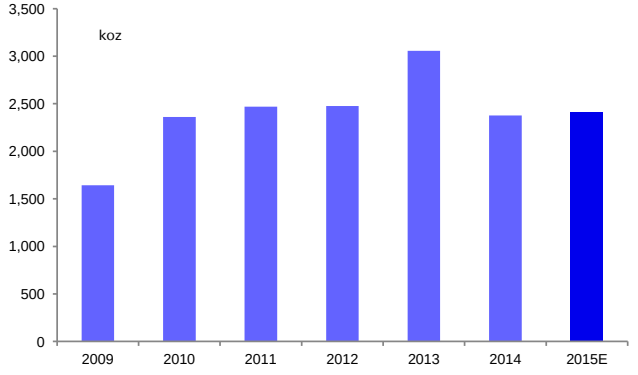
Source: SGE, Thomson Financial datastream, Deutsche Bank

Figure 23: Cumulative trading volumes on the SGE



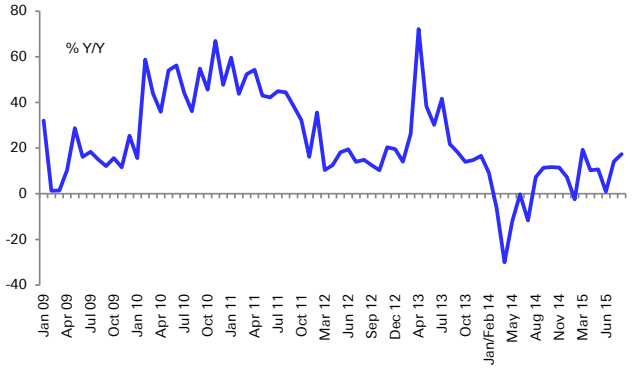
Source: SGE, Thomson Financial datastream, Deutsche Bank

Figure 24: Platinum imports into China



Source: Deutsche Bank, NBS

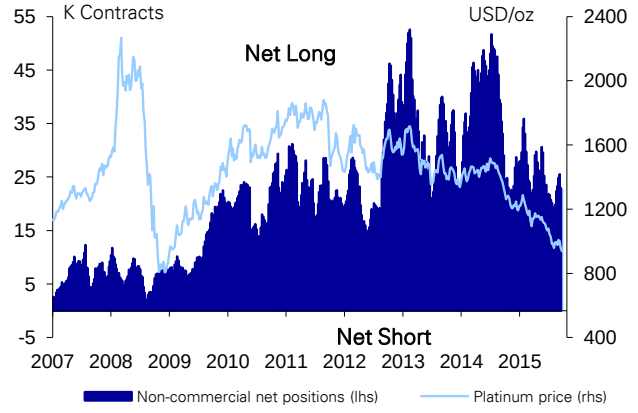
Figure 25: China retail jewellery sales – all types



Source: Deutsche Bank, Bloomberg Finance LP

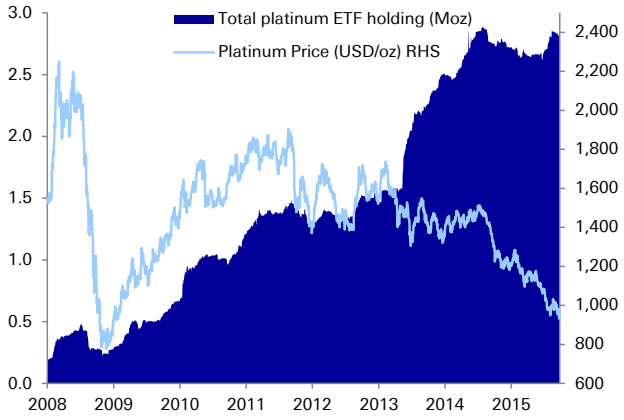
Net long positions in platinum staged a modest recovery at the end of August, but have subsequently begun to decline in September. The absolute level still remains low relative to the peaks in 2013 and 2014, but is still well above the average level pre the global financial crisis. Platinum ETF holdings started to increase significantly during August, with total ETF holdings up c.200koz. There were large inflows into the South African domiciled ETF's offset by outflows from the US and European ETFs. The South African buying is in our view driven by portfolio hedging in our view; both a hedge against a declining Rand and platinum equity values.

Figure 26: Non commercial net positions on the Nymex - platinum



Source: CFTC, Reuters, Deutsche Bank

Figure 27: Total platinum ETF holdings



Source: Bloomberg Finance LP, Deutsche Bank

Figure 28: Platinum supply – demand balance

Platinum		2010	2011	2012	2013	2014	2015F	2016F	2017F	2018F	2019F	2020F
South African supply	Koz	4,635	4,855	4,205	4,353	3,091	4,121	4,120	4,275	4,319	4,373	4,427
North American supply	Koz	200	350	310	340	395	360	350	345	350	350	350
Russian production	Koz	825	835	800	740	740	760	760	760	760	760	760
Russian stockdraw	Koz	0	0	0	0	0	0	0	0	0	0	0
Russian sales	Koz	825	835	800	740	740	760	760	760	760	760	760
Other*	Koz	1,475	1,680	1,605	1,792	1,880	2,022	2,186	2,322	2,456	2,587	2,726
Total supply	**Koz**	**7,135**	**7,720**	**6,920**	**7,225**	**6,106**	**7,263**	**7,416**	**7,702**	**7,885**	**8,070**	**8,263**
Supply growth	*%*	*4.1*	*8.2*	*-10.4*	*4.4*	*-15.5*	*18.9*	*2.1*	*3.9*	*2.4*	*2.3*	*2.4*
Total demand	**Koz**	**7,160**	**7,270**	**7,090**	**7,680**	**7,271**	**7,387**	**7,654**	**7,810**	**7,769**	**7,902**	**8,098**
Demand growth	*%*	*15.2*	*1.5*	*-2.5*	*8.3*	*-5.3*	*1.6*	*3.6*	*2.0*	*-0.5*	*1.7*	*2.5*
Autocatalyst & Off-Road	Koz	3,075	3,185	3,190	3,180	3,245	3,424	3,565	3,680	3,801	3,883	3,972
Chemical	Koz	440	470	505	585	585	615	606	611	615	620	626
Electrical	Koz	220	220	180	170	185	184	190	195	200	205	209
Glass	Koz	385	555	160	190	115	145	235	195	195	195	195
Investment	Koz	655	460	455	830	245	75	85	95	-95	-85	-75
Jewellery	Koz	1,685	1,665	1,920	2,080	2,215	2,233	2,281	2,312	2,309	2,323	2,391
Petroleum	Koz	170	210	180	170	155	170	165	186	182	183	184
Other	Koz	300	275	265	235	280	290	270	270	290	300	310
Stationary fuel cells		0	0	0	0	0	0	0	0	0	0	0
Market balance	**Koz**	**-25**	**450**	**-170**	**-455**	**-1,164**	**-124**	**-238**	**-108**	**116**	**168**	**165**
Annual average price	**US$/oz**	**1612**	**1721**	**1,397**	**1,487**	**1,386**	**1,126**	**1,198**	**1,290**	**1,423**	**1,501**	**1,571**

Source: Deutsche Bank, SFA Oxford, Johnson Matthey

Palladium: Making a comeback

…and possibly a winner in the Dieselgate fallout

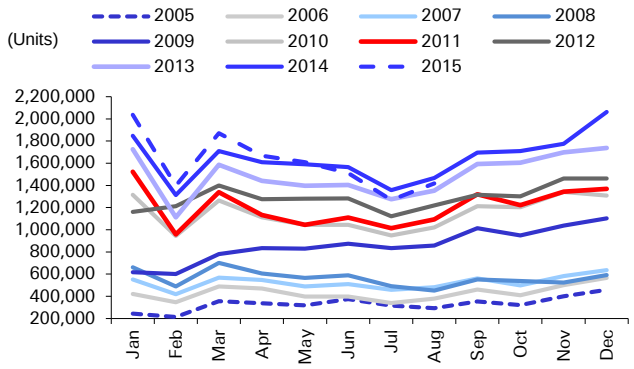
The precipitous drop in palladium prices (-32% between the end of May to the end of August) was driven by investor liquidation in response to weak Chinese vehicles sales. The key question as with most metals is whether the slowdown is a short term phenomenon or the start of a structural slowdown. We think that Chinese Auto sales will remain strong over the medium term given the low penetration versus other developing countries and many developed countries, which makes palladium a structural preference over the medium term.

We think gasoline engines will capture some of the market share that diesel engines lose in Europe. Gasoline engines do not have a similar NOx problem to diesel. The move to smaller engine displacement in order to beat CO2 emissions also favours gasoline, as diesel in small vehicles is simply too expensive. This is certainly supportive for palladium demand and for sentiment.

The entrenched rural-to-urban migration trend and solid income growth, has produced a vast new middle class with a strong appetite for new cars. However, changing the economic composition in a country and curtailing debt growth, while simultaneously maintaining strong and stable growth is not straightforward. It is perhaps not surprising that some volatility would emerge. Furthermore, other attempts to curtail unsustainable features, such as dangerous urban air pollution often attributed to vehicle emissions, led to numerous vehicle ownership restriction schemes at the city level (mainly in the larger and more prosperous cities). Enormous surges in demand have taken place, and continue to take place in some locations, in advance of restrictions – and such surges are inevitably followed by the period of harsh payback we now see. The sharp decline in the equity market has hampered sentiment in the near-term. Importantly however, geographical performance within China has varied in interesting ways. Smaller cities, often away from the richer Eastern coastal regions, have continued to see 10-20% year-on-year growth rates in 2015, in contrast to restriction-induced contractions in some big cities. More reassuringly, these smaller cities, which are many in number, account for the large majority of the vehicle market.

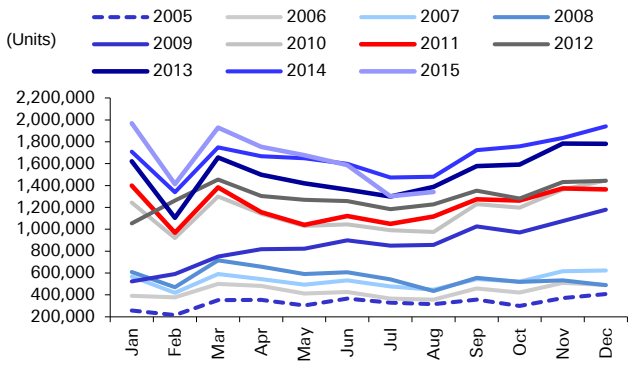
Cumulative year to date Chinese vehicles sales have slowed down to +2.6% by August, with the last three months down in year on year comparisons. Chinese passenger vehicle production is has also slowed down and is up by 2.4% year to date. For the remainder of the year, our China Auto team still expects a mild wholesale recovery on 1) stable housing demand growth to encourage auto demand, 2) retreating inventory for a better demand-supply balance and 3) more new model launches, including SUVs, to drive sales. The slowdown is however significant in the context of global demand, as the Chinese Auto sector comprises 22% of global demand. Chinese palladium imports, seemingly a reflection of weaker Auto demand is down 33% year to date.

Figure 29: Chinese PV sales – annual run rate



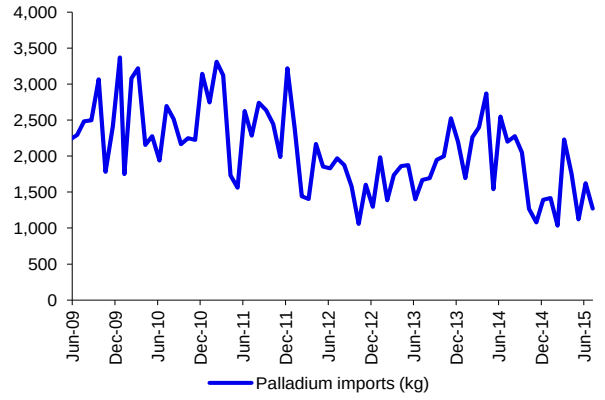
Source: CAAM, Deutsche Bank

Figure 30: Chinese PV production – annual run rate



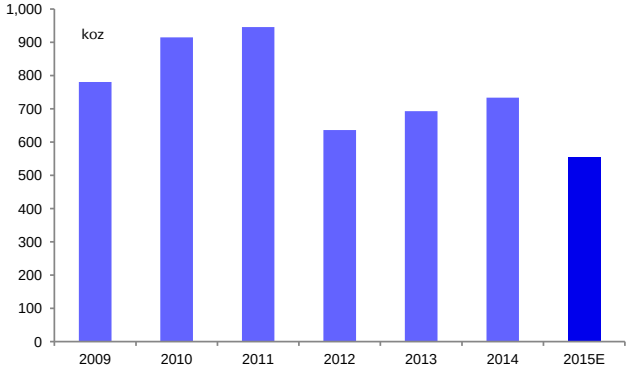
Source: CAAM, Deutsche Bank

Figure 31: Chinese palladium imports - monthly



Source: Deutsche Bank, NBS

Figure 32: Chinese palladium imports – full year estimates



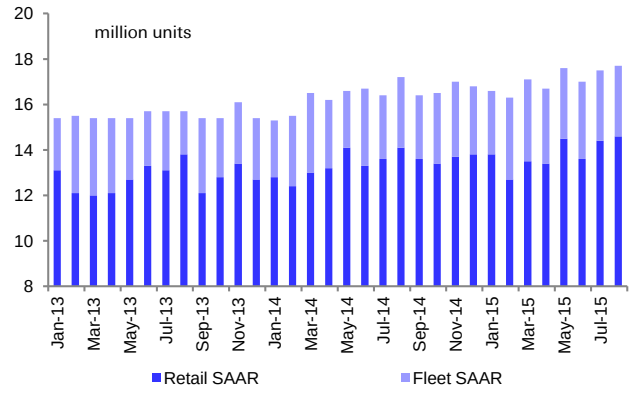
Source: Deutsche Bank, NBS

North American demand remains solid, having broadly recovered from the sharp downturn in 2009. Some threats are present in the form of long-term loans in the US, but risks appear broadly balanced. While we do not expect the US market to grow rapidly in the future, continued population growth and household formation should require some market growth in order to support a slowly rising fleet of vehicles in use.

Based on our US Auto team's mid-month channel checks they estimate that the U.S. SAAR is tracking at 17.5MM so far in September (absolute units +7.9% YOY, adjusted for one additional selling day). The YTD SAAR stands at 17.1MM. If the SAAR were to remain at 17.5MM through year end U.S. sales would finish the year at ~17.3MM units. Some of this is likely attributable to a third month of elevated incentives (up $300 yoy with ATPs up just $125 yoy. As a percent of ATPs, incentives were up 81bps to 10.6% vs. 9.8% last year. Prior to this development, incentives had not been in the double digits (% of ATP) since 2010. This is primarily being driven by ever higher incentives on small and midsize cars, increasing $571 and $945 yoy, respectively. While the team believe that favorable mix has been sufficient to offset the earnings impact of higher incentives, they nonetheless believe this may be an indication that new car prices have reached a near term peak.

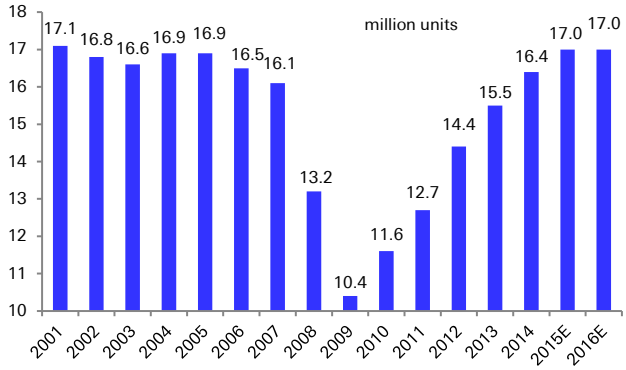
The net long positions on the NYMEX remain roughly at the Nov 12 levels. The drop in net longs has been 8.5k contracts since Jan 2015, representing 850 koz. At the same time ETF holdings remain sticky, with a small net outflows in September of 140koz since the middle of August. We highlight our estimate of liquid stocks including ETF holdings, to demonstrate the ample liquidity.

Figure 33: US passenger vehicle SAAR



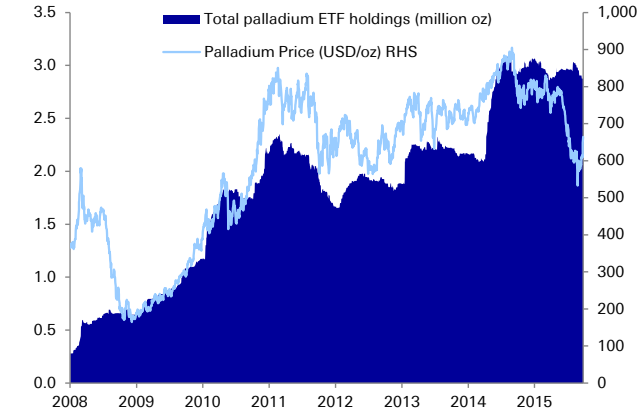
Source: Deutsche Bank, Wards

Figure 34: Non commercial net positions on the Nymex - palladium



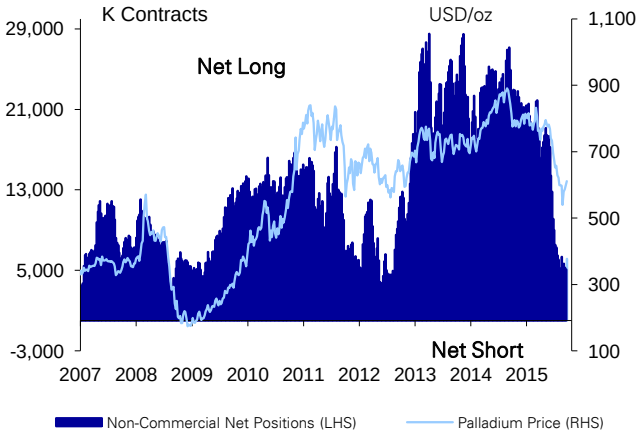
Source: Bloomberg Finance LP, Deutsche Bank

Figure 35: Total palladium ETF holdings



Source: Bloomberg Finance LP, Deutsche Bank

Figure 36: Non commercial net positions on the Nymex - palladium



Source: Bloomberg Finance LP, Deutsche Bank, CFTC

Figure 37: Palladium supply – demand balance

Palladium		2010	2011	2012	2013	2014	2015F	2016F	2017F	2018F	2019F	2020F
South African supply	koz	2,640	2,576	2,251	2,376	1,845	2,323	2,404	2,521	2,515	2,531	2,554
North American supply	koz	590	900	895	928	1,055	1,038	1,015	1,008	1,001	994	988
Zimbabwe	koz	220	265	265	331	315	334	352	348	348	349	349
Russian production	koz	2,720	2,705	2,630	2,650	2,690	2,690	2,690	2,690	2,690	2,690	2,690
Russian stockdraw	koz	1,000	775	260	250	0	0	0	0	0	0	0
Russian sales	koz	3,720	3,480	2,890	2,900	2,690	2,690	2,690	2,690	2,690	2,690	2,690
Other mine	koz	185	155	300	200	455	455	455	455	455	455	455
Secondary Supply		1,315	1,695	1,585	1,685	1,805	1,930	2,068	2,219	2,346	2,487	2,700
Total supply	**koz**	**8,670**	**9,071**	**8,186**	**8,420**	**8,165**	**8,771**	**8,984**	**9,241**	**9,355**	**9,508**	**9,736**
Supply growth	*%*	*7.5*	*4.6*	*-9.8*	*2.9*	*-3.0*	*7.4*	*2.4*	*2.9*	*1.2*	*1.6*	*2.4*
Total demand	**koz**	**9,295**	**7,930**	**9,480**	**9,521**	**9,950**	**9,688**	**9,785**	**9,920**	**10,029**	**10,183**	**10,322**
Demand growth	*%*	*25.9*	*-14.7*	*19.5*	*0.4*	*4.5*	*-2.6*	*1.0*	*1.4*	*1.1*	*1.5*	*1.4*
Autocatalyst	koz	5,680	6,215	6,835	7,241	7,490	7,758	7,964	8,200	8,398	8,641	8,869
Dental	koz	595	540	530	460	425	420	405	390	378	365	350
Electronics	koz	970	895	760	690	660	615	573	531	491	452	414
Chemical	koz	370	440	530	510	490	481	463	458	454	450	448
Jewellery	koz	495	295	255	245	205	203	167	125	89	52	16
Investment	koz	1,095	-565	470	275	600	130	128	126	124	122	120
Other	koz	90	110	100	100	80	80	85	90	95	100	105
Market balance	**koz**	-625	1,141	-1,294	-1,101	-1,785	-917	-801	-680	-674	-675	-586
Annual average price	**US$/oz**	**525**	**733**	**644**	**726**	**803**	**735**	**814**	**850**	**925**	**1,021**	**1,084**
Market balance without investment demand	**koz**	**470**	**576**	**-824**	**-826**	**-1,185**	**-787**	**-673**	**-554**	**-550**	**-553**	**-465**

Source: Deutsche Bank, SFA Oxford, Johnson Matthey

Rhodium: Cheap may no longer be enough

Losing out to No PGM technological solutions in war against NOx

Rhodium remains the worst performing precious metal, down 39% year to date. The fallout from the Dieselgate scandal will hit Rhodium the hardest in our view. The market remains well supplied, and needed a strong demand pull to draw down stockpiles. This demand pull was expected to come from Euro 6 emissions legislation, with Rhodium playing an important role in meeting these emission standards through the application of a Lean NOx Trap in diesel vehicles below 2 litres. Some test findings have suggested that a Lean NOx trap is not that effective at treating NOx emissions under real world driving conditions in diesels. It may simply be a question of increasing the loadings, but there is still uncertainty and at this stage the No PGM solution of Selective Catalytic Reduction seems more effective.

At this stage, there is no question on NOx emissions in gasoline engines, so we expect to see continued use of Rhodium (in conjunction with palladium) in a gasoline autocatalyst. The focus on real world driving emissions may result slightly higher loadings in gasoline engines. The combination of growth in vehicle sales in developing markets over the medium term and tightening emission legislation should support the use of Rhodium over the medium term. However it is only in the more stringent legislation; Euro 5 and beyond that NOx becomes the focus. It may be a few years before many emerging market countries such as China enforce tight NOx emission standards. The near-term demand drivers are therefore more muted. In the absence of supply curtailments, Rhodium could languish below USD1,000/oz for a number of years.

Figure 38: Rhodium supply – demand balance

Rhodium		2010	2011	2012	2013	2014	2015F	2016F	2017F	2018F	2019F	2020F
Total supply	**Koz**	**975**	**1,043**	**1,001**	**1,003**	**860**	**1,012**	**1,050**	**1,092**	**1,109**	**1,111**	**1,116**
Supply growth	%	1.9	7.0	-4.0	0.3	-14.3	17.6	3.8	3.9	1.5	0.3	0.4
South African supply	koz	632	641	599	590	425	554	589	616	599	618	620
North American supply	koz	10	23	35	35	40	45	45	45	45	45	45
Zimbabwe	koz	19	29	30	31	35	34	23	22	40	22	22
Other	koz	3	3	10	10	10	10	11	11	12	12	13
Russian sales	koz	70	70	75	70	75	74	73	73	73	73	73
Secondary	koz	241	277	252	267	275	295	310	325	340	342	344
Total demand	**Koz**	**887**	**908**	**958**	**1,044**	**1,015**	**1,056**	**1,052**	**1,081**	**1,124**	**1,170**	**1,218**
Demand growth	%	23.9	2.4	5.5	9.0	-2.8	4.0	-0.4	2.8	4.0	4.1	4.2
Autocat	koz	727	715	782	819	855	880	894	916	952	989	1029
Chemical	koz	67	72	80	85	85	90	70	75	80	86	92
Electrical	koz	4	5	5	5	5	6	5	4	3	3	2
Glass	koz	68	78	25	35	15	25	27	29	31	33	35
Investment	koz	0	0	36	60	10	10	10	10	10	10	10
Other	koz	21	38	30	40	45	45	46	47	48	49	50
Market balance	**Koz**	**88**	**135**	**43**	**-41**	**-155**	**-44**	**-1**	**11**	**-15**	**-58**	**-103**
Annual average price (USD/oz,	**US$/oz**	**2,442**	**1,990**	**1,274**	**1,067**	**1,172**	**989**	**1,150**	**1,320**	**1,540**	**1,855**	**2,068**

Source: Deutsche Bank, Johnson Matthey, SFA Oxford

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#8 Industrial Metals

Still adjusting to the structural slowdown in demand

- The latest tranche of Industrial focused data out of China only points to a tentative stabilization in our view. The second half recovery has proved elusive and has now morphed into a Q4 recovery. The current slowdown in China is part cyclical and part structural. The challenge is estimating in what proportion. The longer we have an easing in monetary and fiscal policy without a convincing improvement in the more industrial focused indicators, the more the slowdown is structural. Our own China real activity index (a simple average between electricity output, cement and steel production and rail traffic) weakened once more, with only electricity output showing any signs of an improvement.
- Chinese metal demand growth will slow dramatically over the next five years. In copper for instance, we forecasts the CAGR over the next five years to be 3% as opposed to 7.5% over the past five years. This translates into global copper demand growth slowing from 4.5% to 2.4% over the next five years. In most cases the supply side still has to adjust to the slower growth environment. This will result in surplus markets for the next two years, or in markets where we still forecast deficits, a much slower drawdown of inventories. The outlook remains challenging.
- All of the industrial metals are trading below or at their marginal cost of production, with the exception of copper which is below its all-in sustaining cost, but still trades above the marginal C1 cost. We continue to forecast further cost deflation through a combination of weaker producer currencies, management cost cutting and lower commodity price linked costs. Copper, zinc, lead, and iron ore would all be at or only slightly below the forecasts marginal costs for 2016E. This suggests weak cost curve support for these metals, and for iron ore where we think supply cuts are needed, we think a period of lower prices is likely. Nickel, platinum and Met coal are the markets which are under the most margin pressure in our view.
- We think that aluminium has the most challenged fundamentals and is therefore our least preferred commodity. Improving competitiveness from the Chinese producers and the "stickiness" of the country's high cost supply means that much needed supply cuts are unlikely. After the sharp price correction palladium is our most preferred commodity with decent medium-term fundamentals. We think the bulk commodities are ahead of the game in terms of supply cuts, but both markets need further rationalization. These will only come after a period of lower prices. We see further downside risks in copper with the metal having limited cost curve support. We still think the fundamentals for zinc look decent, and the current price represents an attractive entry point.

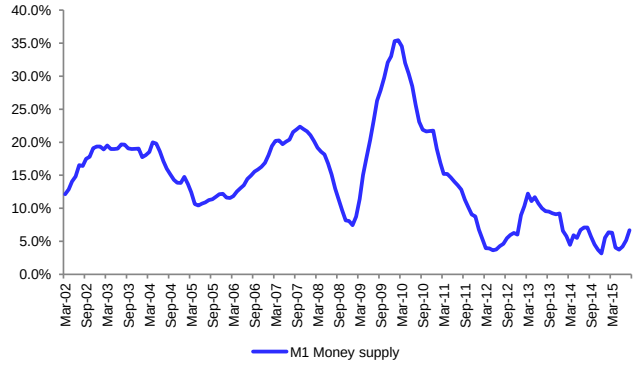
The broader indicators point to a tentative stabilization, but the H2 recovery is proving elusive

Although our China activity index, M1 money supply and Chinese IP show some signs of stabilization, we think the recovery in China may be slightly tenuous. At this stage there is no indication of a nascent recovery around the corner, certainly not for the metals. The military parade shutdowns in and around Beijing may skew the September data, so it may only be in the October data that we any sense of a recovery. Given the improving property sales, property prices, easing monetary conditions and fiscal easing, we continue to expect an improvement in demand in the last quarter of the year.

The activity data in August remained weak in our view. On the positive side, M1 money supply and electricity production rose by 2.8% and 6.7% respectively, a month on month improvement. However, the other three components of our China Real activity index, Cement output, Steel output and Rail traffic all registered declines month on month, with rail traffic being particularly weak. The current level of the index is barely higher than during the global financial crisis. IP growth edged up to 6.1%yoy in August 2015 up from 6.0% in July.

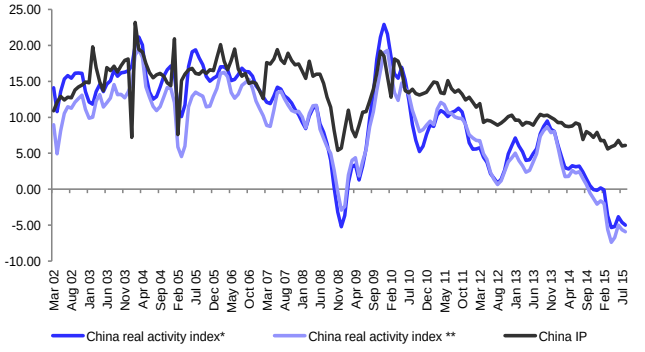
From a materials perspective, FAI growth continued to decline. Real estate investment was 4.75, the same level as during the global financial crisis, with manufacturing at 8.9%. Construction FAI was barely positive, with only infrastructure FAI remaining reasonably robust at 17.1% growth.

Figure 1:: China M1 money supply growth



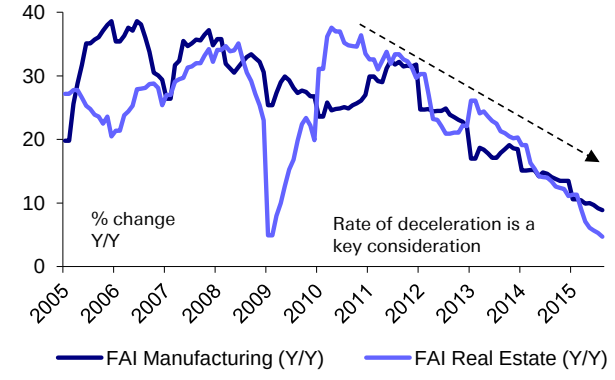
Source: Deutsche Bank, Bloomberg Finance LP

Figure 2: China real activity index



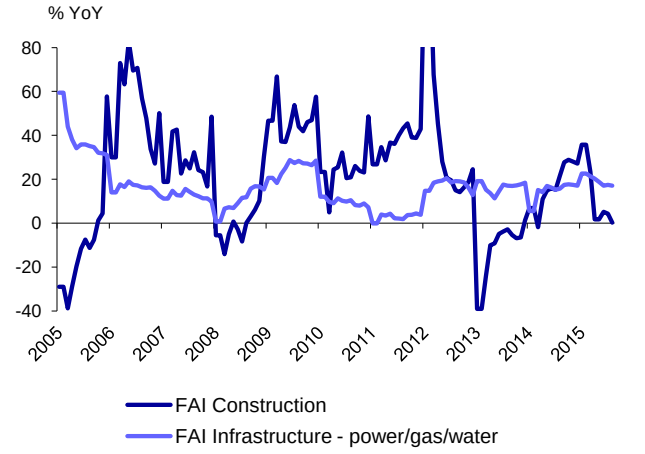
*Source: Deutsche Bank, Bloomberg Finance LP, *simple average of 3MMA growth rates in rail traffic, electricity output, steel output and cement output, **excludes steel output*

Figure 3: FAI Manufacturing and Real Estate



Source: Deutsche Bank, WIND, CEIC

Figure 4: FAI infrastructure and Construction



Source: Deutsche Bank, WIND, CEIC

The preliminary Caixin China manufacturing purchasing managers' index (PMI) fell to a six-and-a-half-year low of 47.0 in September, below the 47.5 forecast in a Reuters poll. This compares with a final reading of 47.3 in August, the lowest since March 2009. The closely-watched gauge of nationwide manufacturing activity focuses on smaller and medium-sized companies, filling a niche that is not covered by the official PMI data.

Perhaps more concerning to us is that much is being made of the Chinese economy in transition, with gross capital formation giving way to consumption and the liberalization of the State dominated manufacturing industries. In the short term however, this transition has proved challenging. There should be a liberalization of the economy with a transition from inefficient SOE's to more efficient private companies. But in the short term, the focus will be spending by the SOE's to hit target growth rates which may crowd out the smaller companies in China. Our view is that the weakness in the Flash PMI may be a reflection of this.

Perhaps more concerning is that much is being made of the Chinese economy in transition. Manufacturing to consumption etc. In the short term however, this transition has proved challenging. There should be a liberalization of the economy with a transition from inefficient SOE's to more efficient private companies. But in the short term, the focus will be spending by the SOE's to hit target growth rates which may crowd out the smaller companies in China. I think the weakness in the Flash PMI may be a reflection of this. The PMI heat map is also concerning with Production, New orders and New Export orders down, and inventory up.

Figure 5: China Caixin Flash PMI heatmap

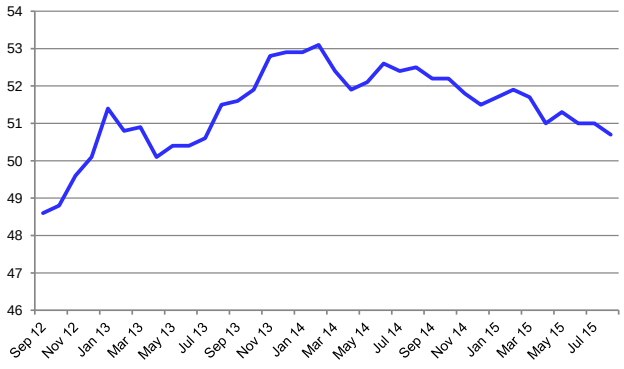
China Caixin PMI	Jul-15	Aug-15	Sep-15
Headline	47.8	47.3	47.0
Production	47.1	46.4	45.7
New Order	47.2	46.6	46.0
New Export Order	46.9	46.6	45.8
Backlog	50.8	51.1	50.2
Inventory	49.9	50.8	52.8
Purchases	48.7	48.4	48.6
Output prices	45.4	45.1	45.0
Input prices	44.9	45.2	44.3
Raw Material Inventory	47.0	45.4	46.5
Employment	47.2	46.7	46.5
Delivery Time	49.4	50.0	49.0

Legend
Above 50 & higher than prior mth
Above 50 but lower than prior mth
Below 50 but higher than prior mth
Below 50 & lower than prior mth

Source: Deutsche Bank

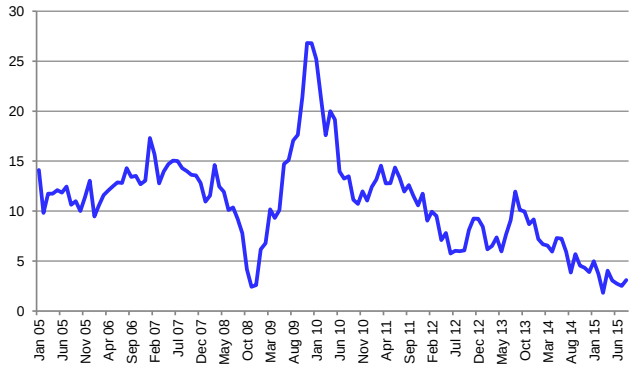
The JPM Global manufacturing PMI continued to weaken, and is now at a multi year low. The Chinese Li Ke Qiang index improved modestly in August but remains scarcely above the level of the global financial crisis.

Figure 6: Global Manufacturing PMI



Source: Deutsche Bank, Bloomberg Finance LP

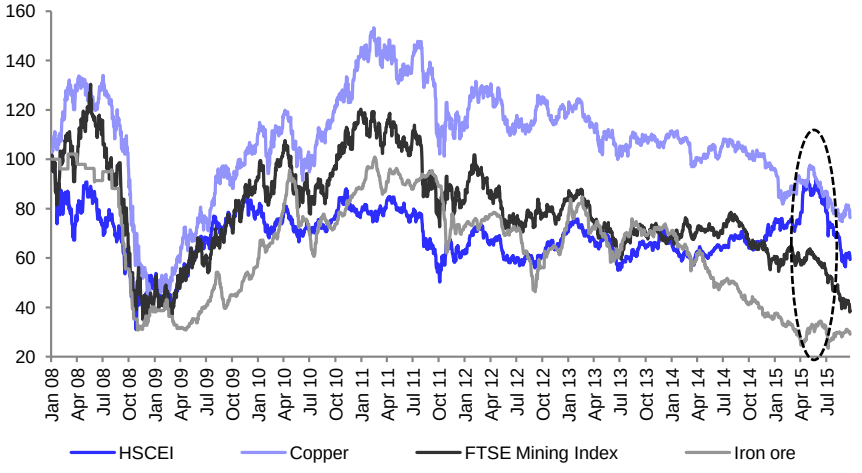
Figure 7: LI Ke Qiang index



Source: Deutsche Bank, Bloomberg Finance LP, Weighted average of annual growth rates in O/S bank loans (40%), electricity production (40%), rail freight volume (20%)

The sharp correction in the Chinese equity market has been "blamed" for the sell-off in the metals. There is clearly a sentiment impact, but the rationale being used is that many ordinary Chinese people bought into the stock market rally, and with the sharp correction have lost the ability to spend on auto's, property and consumer durables. Whilst we remain slightly skeptical of this explanation, we do think that the stock market rally did provide a sentiment lift to the metals as seen in copper and iron ore. The subsequent sell-off in the metals is not nearly as extreme as the Chinese equity market correction.

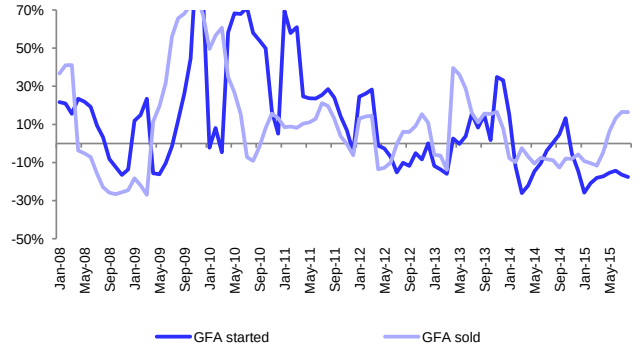
Figure 8: Influence of the Chinese stock market on metals



Source: Deutsche Bank, Bloomberg Finance LP

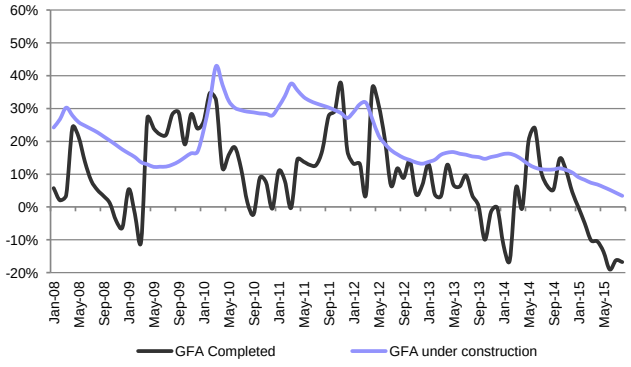
The combined picture from the four property indicators certainly does not suggest an imminent improvement in metals demand from this sector. There is positive momentum in the Gross Floor Area (GFA) sold, but at this stage there is little to suggest that this is translating into positive construction trends. The momentum in GFA started remains negative, as does GFA under construction. GFA completed may have tentatively found a floor but the indicator is still firmly in negative territory.

Figure 9: Gross floor area started and sold - % increase YoY 3 MMA



Source: Deutsche Bank, Wind

Figure 10:: Gross floor area completed and under construction - % increase YoY 3 MMA

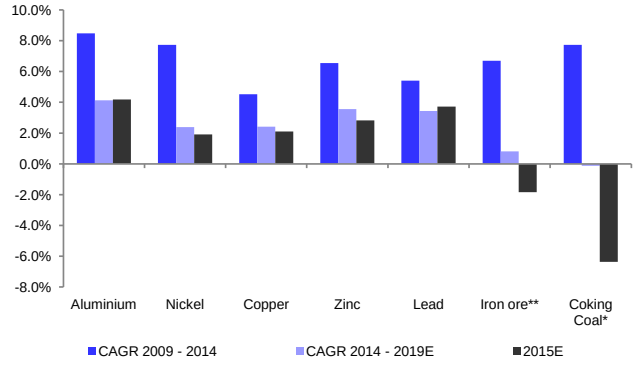


Source: Deutsche Bank, Wind

A structural shift in demand

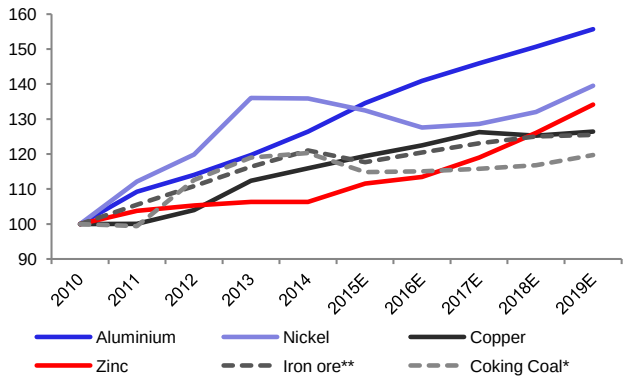
Although we think that some of the current weakness in Chinese metal demand is cyclical due to the property market, a fair proportion of the slowdown is structural. We forecast Chinese metal demand growth rates to move much closer to that of a Developed World economy. In copper for instance, we forecasts the CAGR over the next five years to be 3% as opposed to 7.5% over the past five years. This translates into global copper demand growth slowing from 4.5% to 2.4% over the next five years. We forecast refined copper demand to be slightly lower than the CAGR for the five years at 2.1%. Although demand growth has been slowing modestly since 2012, the sharp slowdown is being experienced in 2015. As highlighted on the chart below, we expect the lowest demand growth rates for iron ore and metallurgical coal, as both are linked to steel output, which we think is close to peak consumption in China.

Figure 11:: 2015 marks the slowdown in metal demand growth



Source: Deutsche Bank, Wood Mackenzie, ** Global market, * Seaborne market

Figure 12: Supply momentum in the metals

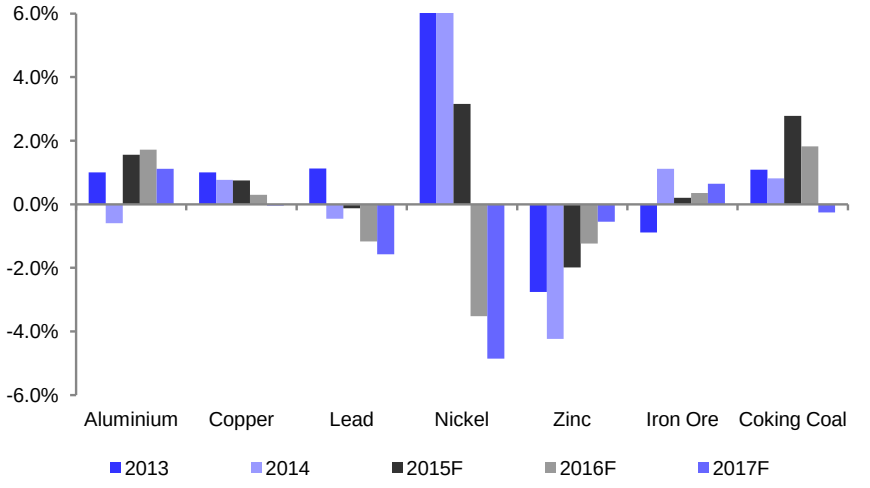


Source: Deutsche Bank

The supply side has started to adjust to a world of lower growth rates, but still has a way to go in many commodities before the markets are balanced once more. We discuss the supply side dynamics in more detail in each of the individual sections. The bulk commodities have started to adjust to the lower demand, which is unsurprising given the weak pricing and weak steel demand outlook. In iron ore, we expect further cuts from the domestic Chinese producers, non-traditional suppliers and some of the mid tier producers in

Australia and Brazil. In coking coal, we expect further cuts from the US and Canadian producers. However for these cuts to occur, we think there needs to be a period of weaker pricing to force the final capitulation. In the base metals, there is a bit more differentiation on the supply side. Although aluminium has the best demand outlook, it also has a supply side which is the least likely to curtail production as a result of Chinese overcapacity and the propensity for high cost Chinese producers to be more nimble and opportunistic during periods of price strength. Copper is the most difficult metal to bring to market, but the project momentum still has two more years to run. Glencore's curtailments may spark other producers to follow suit, and this is the market which has shown the highest propensity to shut loss-making production. After a decent uplift in 2015E, the zinc market should see much slower supply growth. Our increases post 2017E relies on funding and successful execution by a number of junior producers, and Chinese domestic production continuing to grow at c.6% per annum. Both of these assumptions are at risk if prices remain below USD2,000/t for any length of time. Many of the loss-making producers in the Nickel market have hoped for the Chinese nickel pig iron producers to fold as ore supplies dry up. Weak demand and Philippine ore stymied this hope. Given the high level of inventory, we think closures will accelerate over the course of the next six months.

Figure 13: Surplus / deficits as a percentage of the market



Source: Deutsche Bank, Wood Mackenzie

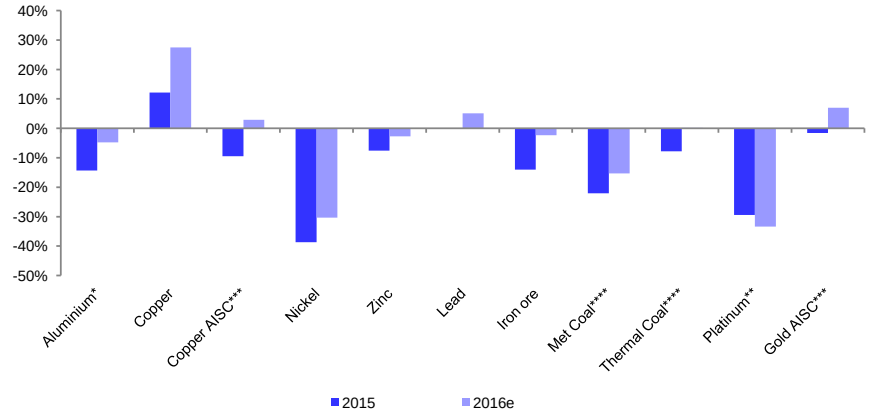
We continue to forecast surplus markets in aluminium and iron ore for the next two years to 2017E. We forecast the copper and coking coal market to be in a surplus for next year before moving to a balance in 2017F. We forecast the lead, nickel and zinc to be in a deficit for the next two years, although we expect zinc deficits to diminish over the next two years.

Finding cost curve support

We continue to think there is value in using cost curves as a gauge of overall industry profitability. The caveat of course is that cost curves are dynamic and do shift around with currencies and oil prices. There is likely to be further deflation in our view simply that the rate will not be as acute as over the past year in our view. The ability for producers to take out more costs is now more limited in our view. Nickel, aluminium, iron ore, metallurgical coal and platinum are all trading well below (double digit percentages) their respective marginal costs (90th percentile). We do forecast that the iron ore and aluminium producers will take out further costs, and looking forward to 2016E, we forecast a much smaller portion of the industry underwater. Despite lower

costs in both nickel and Met coal, we do not think that these will be sufficient and both these markets are in need of supply cuts. Due to South African inflation, platinum costs are likely to increase, depending on the trajectory of the Rand, but here too the industry is in dire need of supply cuts. Copper, lead and zinc have the least cost curve support in our view, as these metals are roughly at their marginal cost.

Figure 14:: Comparing the spot price to marginal costs

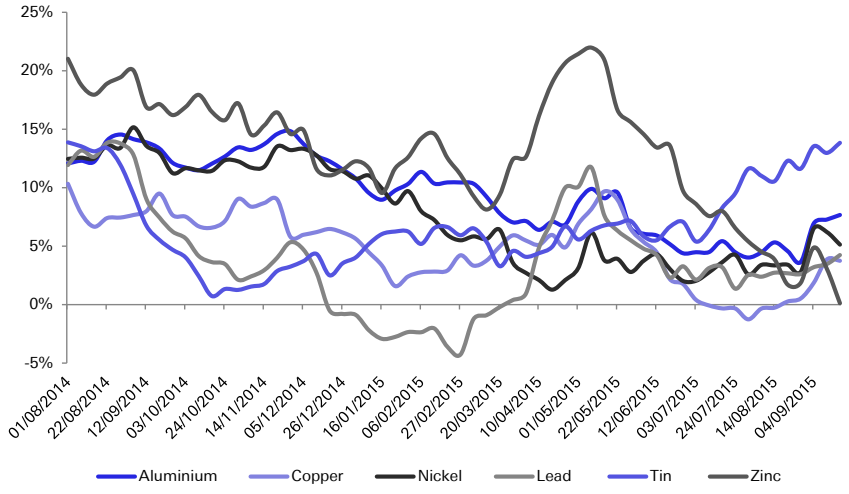


*Source: Deutsche Bank, Company reports, Wood Mackenzie, Bloomberg Finance LP, *includes US Mid West premium, **at spot palladium, rhodium and Rand prices, ***includes indirect costs and sustaining capex, ****seaborne market only*

Investor positioning – taking a divergent view

Investors in the base metals continue to take a cautious view on the complex as a whole, but as the Northern hemisphere returned from their holidays, there seems to be a greater willingness to take a more differentiated view on specific metals. Zinc is now the least preferred metal with a strong build up of short positions in September as inventories in New Orleans began to rise, after being the most preferred in the Spring. Given the relatively firmer fundamentals we think the metal could be prone to a short squeeze. Tin remains the most preferred metal, with the expectation of tighter supplies from Indonesia. Copper is no longer in a net short position, and aluminium seems to be attracting a bit more long interest after the fall below USD1,500/t. The conviction in Nickel remains low, with the recent build up of longs slowly unwinding again.

Figure 15: Net positions of the Money Managers expressed as a percentage of open interest



Source: Deutsche Bank, LME

Commodity Heat map

We have devised a commodity heatmap in order to give a more visual sense of how the commodities compared against each other. We have looked at five qualitative measures: whether a market is ina a surplus or deficit over the next 12 months; inventory levels; where the current price is versus marginal costs; whether supply cuts are needed to balance the market and how likely these cuts are. Aluminium is the least preferred metal with the most red sectors, whilst palladium is the most preferred metal with the most green sectors. All the other commodities have a mix of green, red and amber sectors. The copper market remains in a small surplus even post the Glencore cuts has very little cost support in our view, hence we think there are downside risks to price. The iron ore and Met coal markets are also in surplus, but here the supply response has been more widespread. We think a period of lower prices are required to squeeze out the last remaining tonnes of high cost supply in each market.

Figure 16:: Metals Heat Map

	Annual balance 2016E	Inventory levels	Price versus marginal cost	Supply cuts required	Likelihood of supply cuts
Aluminium	Surplus	High	Below	Yes	Low
Copper	Surplus	Average	At	No	Medium
Lead	Deficit	Average	At	No	Low
Nickel	Deficit	High	Below	Yes	Medium
Zinc	Deficit	Average	At	No	Low
Iron Ore	Surplus	Average	Below	Yes	High
Coking Coal	Surplus	Average	Below	Yes	High
Platinum	Balanced	High	Below	Yes	Medium
Palladium	Deficit	High	Below	No	Medium

Source: Deutsche Bank

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Copper: A helpful cut, but we need more

- Glencore became the third copper major to announce mine closures in the face of weak prices. The company announced the suspension of production at Katanga (DRC) and Mopani (Zambia) for 18 months, resulting in a reduction of c.400kt of copper cathode from the market Glencore's announcement brings the tally of closures to c.380 – 400kt over the past month with c.35ktpa from Grupo Mexico and c.70kt from Freeport. Post these supply side adjustments, we now forecast a surplus of 160kt in 2015e, and a roughly balanced market in 2016e and 2017e. The supply side will compensate for these losses with potentially firmer prices leading to better scrap supply, although we have left our forecasts unchanged.
- Prior to Glencore's announcement, we had expected a price recovery in Q4 driven by further Chinese monetary easing; improving property sales leading to restocking; the acceleration of grid spending after a slow start to the year and the unwinding of short positions. We expect the rally to be modest and of short duration (3–6 months) as new mined supply overwhelms the market in 2016/17e, especially in light of structurally weaker Chinese demand. We think the Glencore closures provide a "weak" price support. Definitive signs of improving demand have so far proved elusive, and without these, or indeed further supply cuts, we expect further price weakness. Any rally may be a good opportunity to establish fresh shorts.
- Chinese copper demand growth has slowed by an average of 500bps in two of the previous five year periods. The next five years will be no different in our view, confirmed by our bottom up China demand analysis. But as China accounts for nearly half of global refined copper consumption, the impact on the global balance is significant. Total Chinese copper demand grew at a CAGR of 7.5% in the period 2010 – 2014. We estimate the CAGR between 2014 to 2020E to be lower at 3%, with slowing demand growth across all sectors. However the most meaningful demand slowdown is likely to come from the two largest demand segments; Construction and Electrical Network infrastructure. A top down comparison of consumption per capita with that the US and Japan during their commodity intensive growth phases confirms that our forecast of China's trajectory is very much "in line" despite the big difference in absolute tonnages.

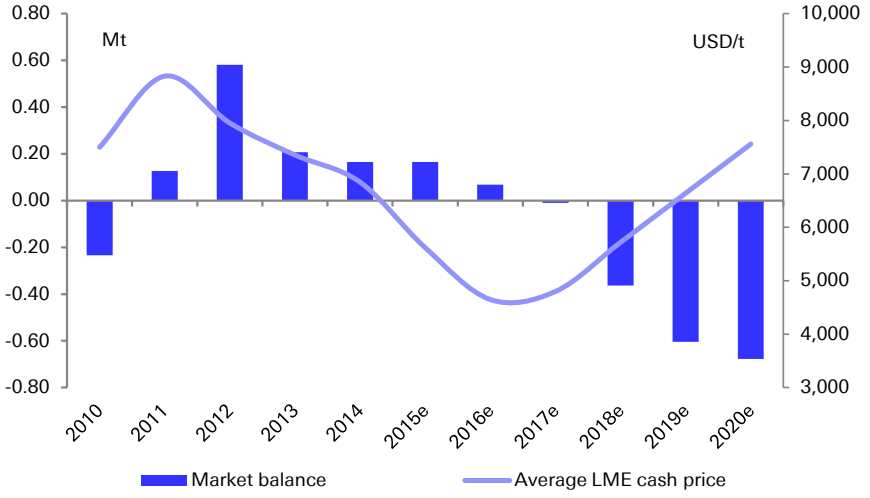
380 - 400kt of annual mined production shuttered

Glencore became the third copper major to announce mine closures in the face of weak prices. The company announced the suspension of production at Katanga (DRC) and Mopani (Zambia) for 18 months up until the completion of the expansionary and upgrade projects. This includes the whole ore leach at Katanga and the new shafts and concentrator at Mopani. A suspension of operations will remove c.400kt of copper cathode from the market according to the company, although we estimate this amounts to 280 – 300kt of annual capacity based on our production forecasts. There may be another c.100kt of production at risk, because the closure of the Mopani smelter which also treats third party copper concentrate. We have assumed that this concentrate finds a new home, but given that some of the supplier are also high cost producers, this may be the catalyst for further closures. Glencore's announcement brings the tally of closures to c.380 – 400kt over the past month with c.35ktpa from Grupo Mexico and c.70kt from Freeport.

Post these supply side adjustments, we now forecast a surplus of 160kt in 2015e, and a roughly balanced market in 2016e and 2017e. The supply side

will compensate for these losses with potentially firmer prices leading to better scrap supply, although we have left our forecasts unchanged. However, we have reduced our disruption allowance by between 100 – 150ktpa over the next few years.

Figure 17:: Copper supply – demand balance



Source: Deutsche Bank, Wood Mackenzie

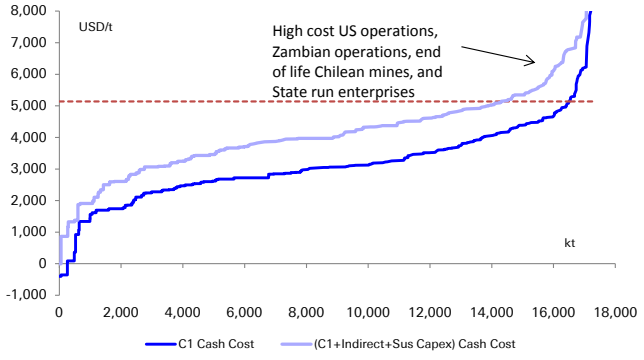
Why the pre-emptive strike in copper?

We would argue that the copper market is well ahead of many of its base metal peers in announcing cuts. The current price means that only c.5% of production is underwater, whilst we estimate c.40% of aluminium and 55% of nickel is underwater. There are some "copper specific" reasons for the early move. The cuts have been centred on the US and Central Africa. The US remains the fourth largest copper producer globally, but due to the strong USD, has lost an important competitive advantage versus its peers. Central Africa has a power shortage and less flexible labour conditions. Given that the region is also mature and needs continual capital to rejuvenate ore bodies, the remains a region where further cuts are likely. Both Glencore and Freeport have come under pressure from their balance sheets with concerns about gearing levels, especially under spot commodity prices.

There are also specific impediments as to why we have not seen more cuts in aluminium, nickel, iron ore and coal for instance. In aluminium, the increasing competitiveness of the Xinjiang region in China due to lower and stranded coal sources, combined with newer, more efficient technology and economies of scale continues to outweigh the small and rather sporadic cuts announced elsewhere. In nickel, the many of the smaller producers are fighting for survival and continue to hope for a price recovery as the Indonesian ore ban weighs on Chinese NPI production. So far the cuts in NPI output have proved elusive. In iron ore, it is also a case of survival with many of the smaller producers simply hanging on. At least here, some of the higher cost Chinese producers and non traditional suppliers have shut. In copper we think that a further c. 700kt of output remains vulnerable to closure. These include the ex Anglo's (and now Audley Capital) Mantos Blancos and El Soldado operations, although these would likely see some radical restructuring under the new ownership in order to stay cashflow positive. Antofagasta's Michilla mine, which is due for closure

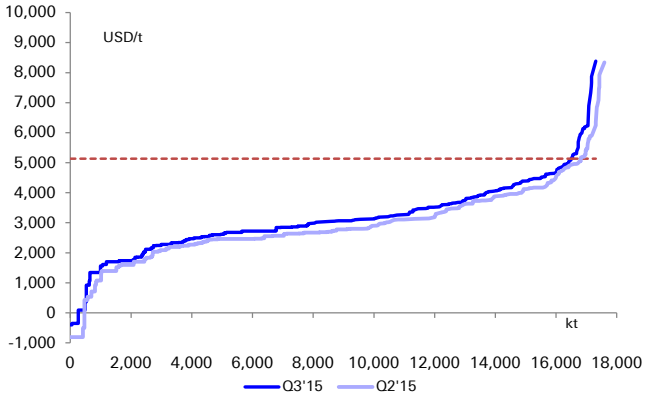
at the end of this year; Vedanta's Konkola and Nchanga operations; Teck's Quebrada Blanca mine, and some of KGHM's US operations. Although some of Codelco's and Kazakhmys' (not Kaz Minerals) operations are cash negative, we would expect these operations to stay operational, given the State ownership. We note however that the latest copper cost curve shows a slight increase in costs versus Q2. This is a surprising outcome in our view, but given the latest bout of oil price weakness and producer currency weakness, we would expect the Q4 curve to show a continuation of cost deflation.

Figure 18:: Copper cost curve Q3'15



Source: Deutsche Bank. Wood Mackenzie

Figure 19: Contrasting the copper curve Q3'15 versus Q2



Source: Deutsche Bank, Wood Mackenzie

Will these closures be enough to support the price?

Even prior to the Glencore announcement, we had expected a price recovery in Q4, driven by further Chinese monetary easing, improving property sales leading to some restocking, the acceleration of grid spending after a very slow start to the year and some short covering. We had however expected the rally to be fairly modest and of a short duration as new mined supply overwhelms the market into 2016e and 2017e, especially in light of structurally weaker Chinese demand. Against this expectation, a balanced market is a good outcome. However, we think the Glencore closures provide a weak price support at best. The market needs to see improving demand signals which so far have proved elusive and further cuts to definitively underpin the price. In particular, the Chinese Power sector investment needs to see a bit of a spending splurge in the last quarter. We estimate that power investment accounts for c.27% of Chinese copper demand. So far this year power grid investment is down 1%, due to a weak Q1 as anti corruption investigates into the State Grid (SGCC) led to a deferral of spending. Grid spending recovered in Q2, rising 5% year-on-year, however the latest channel checks still suggest that wire rod (the intermediate product for (power cables) production still remains low.

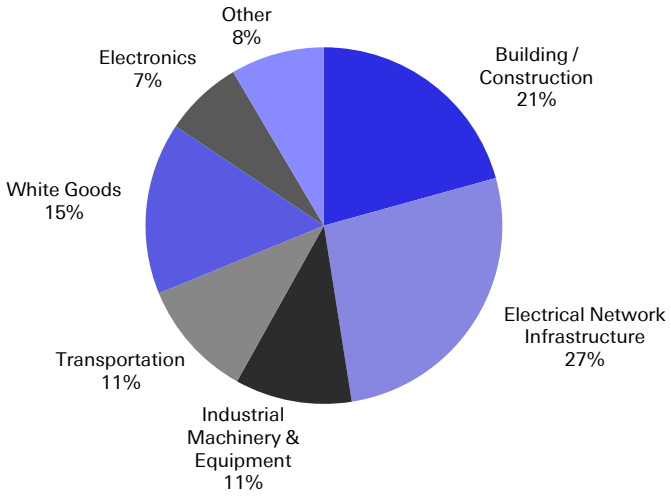
Figuring out Chinese copper demand – bottom up

The correlation between Chinese copper demand growth and Chinese GDP is not particularly meaningful on a year to year basis, and as such is not particularly useful in forecasting demand on an annual basis. Given the wide range of end-uses for copper, a divide and conquer approach poses its challenges in forecasting an absolute number too, but the approach is useful in trying to determine the underlying drivers. We have updated our bottom-up China supply demand to try to capture these underlying demand drivers. Although there seems to be little distinction between consumer demand and

infrastructure demand at the moment, currently all have disappointed on the downside, we think that over the medium term the growth rates will diverge.

We estimate that Chinese copper demand comprises the following broad categories: Building and construction (21%), Electrical infrastructure (27%), Industrial Machinery and Equipment (11%), Transportation (11%), White Goods (15%), Electronics (7%) and other (8%).

Figure 20: The composition of Chinese copper demand in 2014



Source: Deutsche Bank, Wood Mackenzie, Antaike

Consumer demand applications comprises c.40% of Chinese copper demand

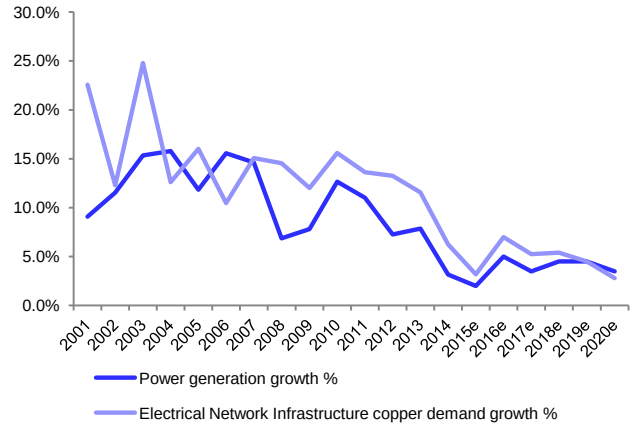
Electrical infrastructure: modest substitution from aluminium

The long-term driver of investment in electrical infrastructure is power consumption growth, which in turn is driven by population growth, urbanization and the evolution of the manufacturing industry. Population growth is slowing, and is no longer a driver of power consumption in our view. Urbanization should remain a driver, but will no longer be as strong a driver as it was over the past 15 years. However, providing power to rural areas, and the rising intensity of usage as the average GDP per capita increases, will remain a positive driver. The rate of build out of heavy industries which form the baseload of power consumption is also likely to slow, which points to slowing growth in industrial power consumption. However, there are offsetting factors which means that although power consumption may slow, the impact on copper consumption may not slow to the same degree. As an example, we point our forecast slow down in aluminium output which may seem a negative on the face of it, but given that most of the new capacity is being constructed with captive power, the copper consumption per installed power capacity is far lower given the limited transmission and distribution requirements. The slowdown will therefore have a more limited impact on copper consumption. Furthermore the focus on future power generation from renewable such as wind, solar and nuclear, means that generating units are smaller and more distributed which in turn means the transmission and distribution requirements tend to be higher.

Chinese copper consumption has tracked power generation fairly well as shown in Figure 21, although copper demand growth since 2008, has outstripped power generation growth, suggesting that investments in power transmission and distribution have outstripped investments in power

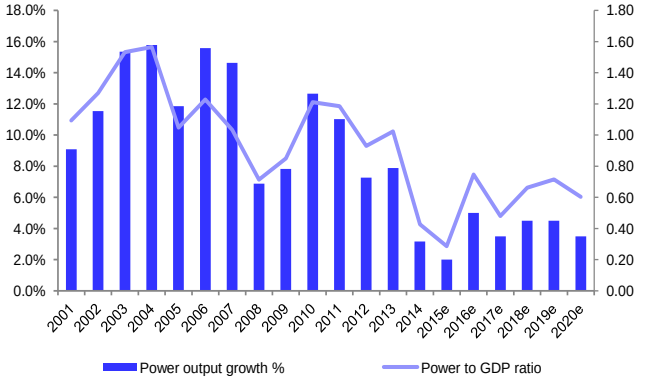
generation investment. An alternative explanation of course is that there has been a higher power generation growth, but simply that some of the "captive" power has not necessarily been captured in official statistics. Although there may be some shorter term variations, we do forecast copper demand from the electrical network infrastructure to track power generation growth more closely and in some years may actually be below.

Figure 21: China's copper consumption growth versus power generation growth



Source: Deutsche Bank, CEIC, WIND

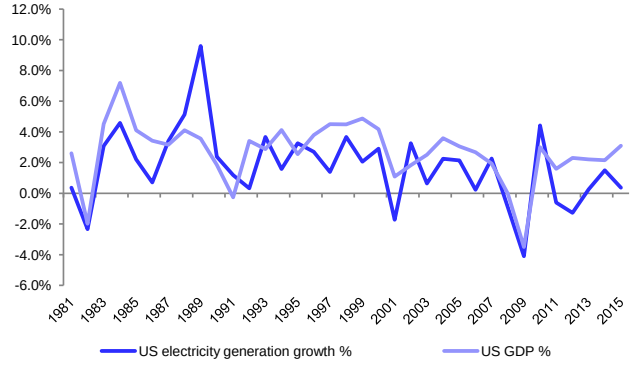
Figure 22: Chinese power output growth versus GDP



Source: Deutsche Bank, Bloomberg Finance LP, WIND

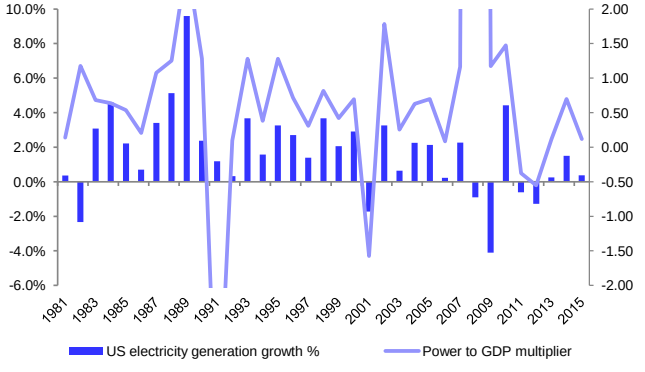
We have contrasted US power consumption versus GDP with that of China's as a template of the likely trajectory of Chinese power generation growth. The average US power generation to GDP multiplier is 0.65 since 1980, with the average multiplier from 1992 to 2007 at 0.57. We think this provides a reasonable guide as to where Chinese power consumption is likely to stabilize over the next five years.

Figure 23: US electricity production versus GDP



Source: Deutsche Bank, Bloomberg Finance LP, EIA

Figure 24: An average multiplier of 0.65 for the US

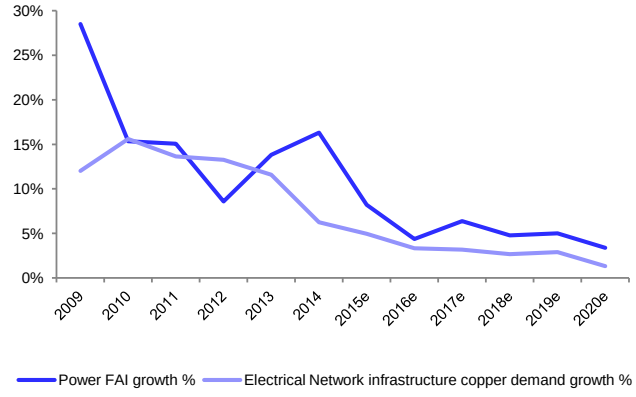


Source: Deutsche Bank, Bloomberg Finance LP, EIA

There is a fair long-term correlation between copper consumption from the electrical network and Power FAI and State Grid spend, although there are divergences in some individual years. The State Grid spend has tended to be counter cyclical to the rest of the Chinese economy with an increase in spend in 2009 during the global financial crisis, and a contraction in 2010 as the global economy recovered. We expect 2015E to be another strong year for

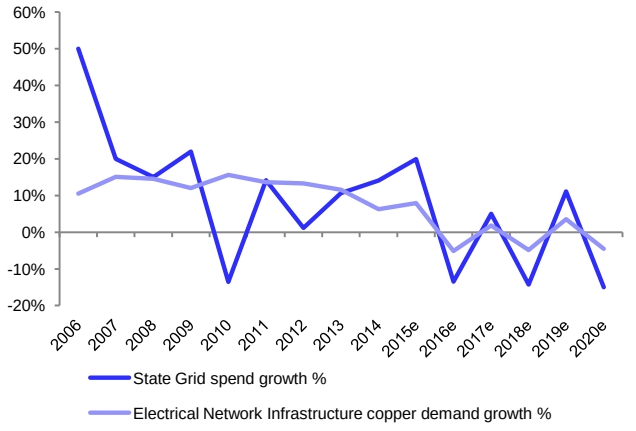
State Grid spend, with the budget of RMB420bn being augmented by an additional spend on the rural grid. Grid construction has fallen behind expectations, with only 39% (or 164bn RMB) of the planned grid investment achieved in the first half of 2015. We expect that the grid investment will accelerate in the second half of the year. Meanwhile, in addition to the completed spend on the rural grid in the first half, NDRC and NEA announced a new investment of RMB92.6bn to upgrade/reconstruct the rural grid. The new rural grid investment represents an additional 20% on top of the existing 420bn RMB investment plan and means that this new plan could result in an increase in the demand for copper. We have included an additional 10% onto the announced budget for 2015E.

Figure 25: Network infrastructure copper demand versus Chinese Power FAI



Source: Deutsche Bank, WIND, CEIC

Figure 26: Network infrastructure copper demand versus State Grid spend



Source: Deutsche Bank, WIND, CEIC, SGCC

Declining intensity of copper use due to aluminium substitution

Given the price differential between copper and aluminium, with the ratio at 3.22x, we continue to see substitution in favour of aluminium. As a general rule, copper is twice as effective as aluminium in conducting electricity and heat, so when the price ratio reaches 3x, as it has been for the past few years, this encourages substitution. The rate of adoption in China of aluminium alloy cables has been quite slow, given the bad reputation previous generations of aluminium substitutes have earned. Over time however, we expect the more modern aluminium alternatives such as the 8000 series alloys to overcome public skepticism.

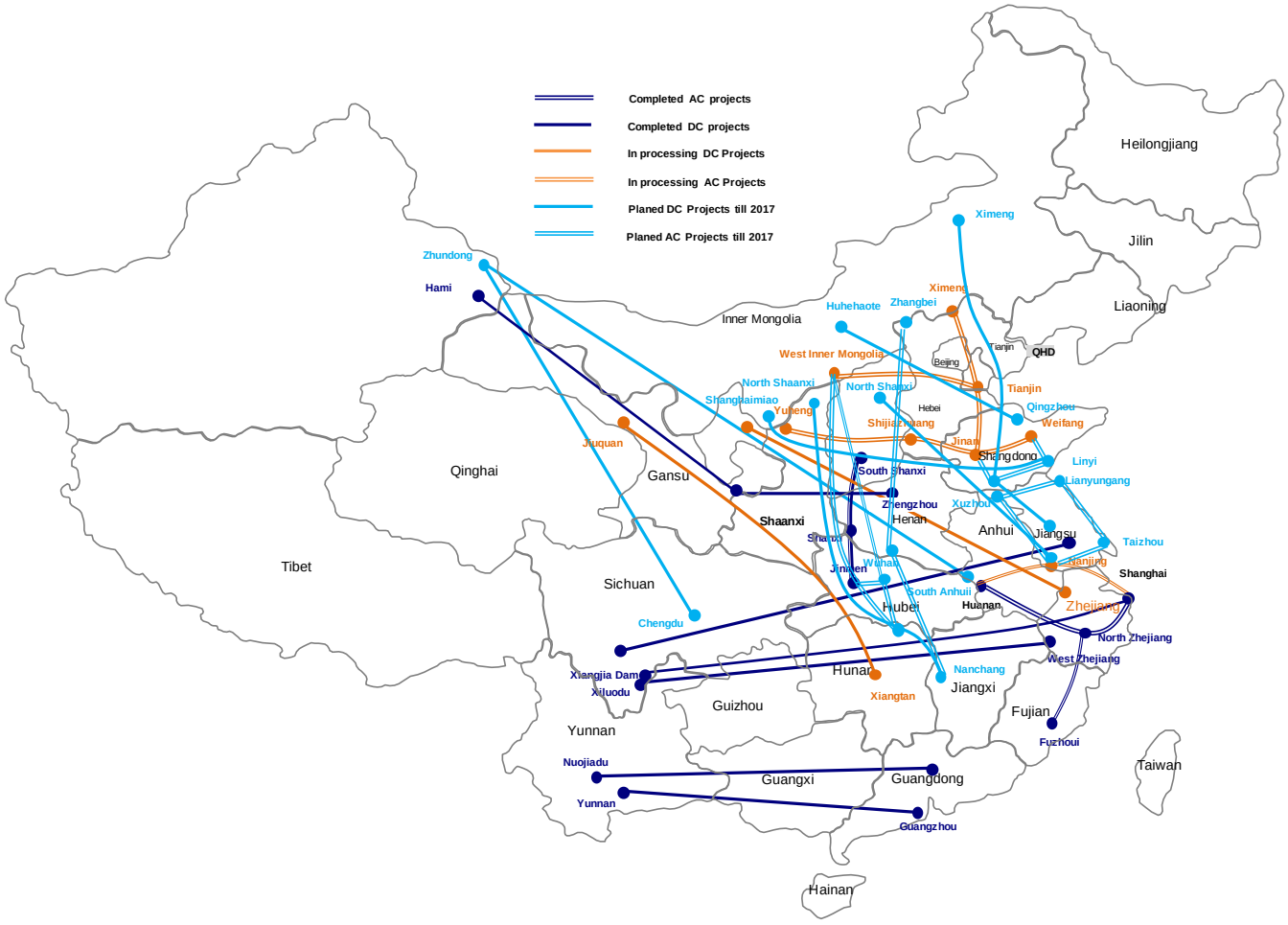
Copper intensity versus power grid investment is likely to decline over the next few years

The most direct measure of using direct proxy to assess copper demand in electrical network infrastructure is the State Grid spend / budget. However, it depends where this spend is focused; either on transmission (from the power plant to the substations) which is less copper intensive, or on distribution (from the substation to the end users) which is more copper intensive.

In order for China to tap its energy resources in Western China and to mitigate the power deficit and pollution issues in Eastern China, the country has been increasingly focused on UHV (ultra high voltage) transmission lines, which transmit power over long distances. Investment in UHV projects is set to grow from RMB25.1bn in 2014 to potentially RMB165.5bn in 2016, based on our research on plans of the State Grid Corporation of China (SGCC). The

cumulative length of UHV lines completed will increase from 8,995km as of end-2014 to 32,476km by end 2017, with a 53% CAGR. The State Grid Corporation of China (SGCC) plans to begin construction on another 11 UHV projects over the remainder of 2015. Figure 27 illustrates the Chinese government's plan by 2017. Although we think the government's plans for UHV transmission are somewhat ambitious and we would not be surprised if there were some delays on the projects, there is no doubt, that the focus and hence the main thrust of the budget allocation will be UHV projects.

Figure 27: China UHV project landscape by the end of 2017



Source: Deutsche Bank, Company data

Transmission lines in UHV projects (and in normal transmission lines) are made of ACSR (aluminium conductor steel reinforced), so other than more of the medium term budget allocation on aluminium cables, there is no direct impact on copper consumption. However, the copper intensity of high voltage transformers, is slightly lower than the copper intensity of low voltage transformers which is the only direct impact.

Based on the UHV project investments and their construction period, we believe UHV spending in 2015 will reach c.RMB88bn, more than tripling the 2014 level. If we strip out the aluminium-intensive UHV projects investments, the non-UHV grid spending should be only ~RMB333bn in 2015, representing a decline of ~8% YoY on the 2014 level (Figure 28).

If we only strip out the transmission line-related spending (transmission lines and towers, which contain little/no copper) of UHV projects, instead of total UHV investments, there will be no YoY growth in 2015 for the remaining investments into the power grid system (details shown in Figure 28). This is a key reason why we think copper demand growth in the electrical network sector will be lower than investment growth in the State Grid.

Figure 28: Chinese State Power Grid's grid spending (UHV vs. non-UHV)

(RMB bn, except %)	2009	2010	2011	2012	2013	2014	2015E
Total grid investments* **– a**	305.9	264.4	301.9	305.4	337.9	385.5	420.2
YoY		*-14%*	*14%*	*1%*	*11%*	*14%*	*9%*
UHV investments – **b**	10.0	11.7	10.3	25.6	39.2	23.0	87.5
YoY		*17%*	*-12%*	*148%*	*53%*	*-41%*	*281%*
Non UHV investments – **(a-b)**	295.9	252.7	291.6	279.8	298.7	362.5	332.7
YoY		*-14.6%*	*15.4%*	*-4.0%*	*6.8%*	*21.4%*	*-8.2%*
UHV inv.– transmission line/tower **– c**	4.9	5.7	5.3	13.7	20.8	13.4	49.4
YoY		*16%*	*-7%*	*158%*	*52%*	*-36%*	*269%*
Total inv. excl. UHV transmission line – **(a-c)**	301.0	258.7	296.6	291.7	317.1	372.1	370.8
YoY		*-14%*	*15%*	*-2%*	*9%*	*17%*	*0%*

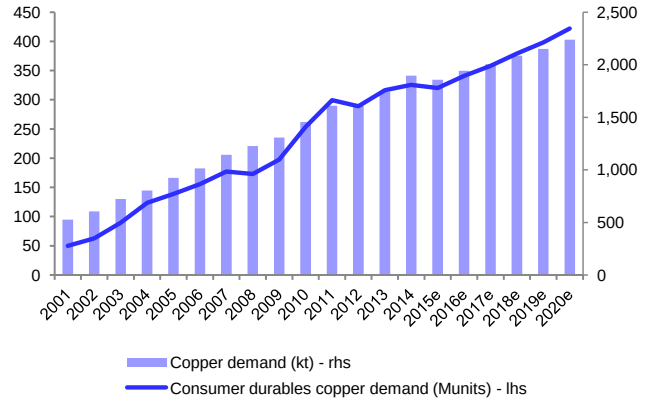
*Source: Deutsche Bank estimates, Company data, *Pre the additional investment into the Rural Grid.*

We forecast an additional copper requirement of 650kt by 2020E, or a CAGR of 3.1% from 2014.

Consumer Goods: Copper demand impacted by thrifting and substitution

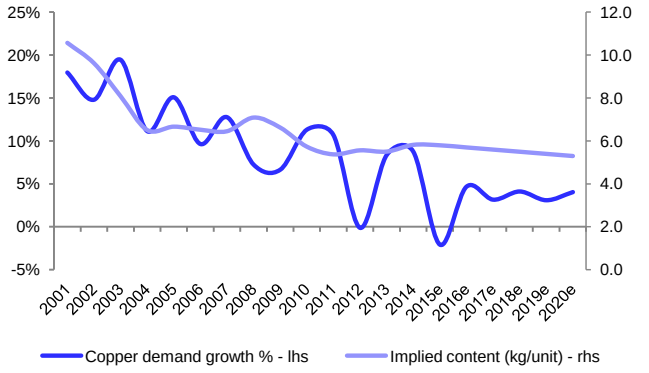
The key drivers of demand in this broad category are White Goods and Consumer Electronics. We model copper demand in consumer goods by applying a falling copper content per appliance, and for the sake of simplicity we consider the total of fridges, air conditioners and washing machines to be the total of our white goods category. We assume that output of white goods in China falls slightly (2%) in 2015E due to the high inventories, before growing at a steady 5 – 6% pace over the rest of the decade. In practice, output has tended to increase rapidly for a period before "taking a breather" for a year or so. The potential upside in demand growth is any government subsidy programmes to stimulate demand over a short period of time. We do however expect the continual thrifting of copper through using thinner materials and potentially substitution to alternative materials such as aluminium to reduce the average copper content per appliance over time.

Figure 29: Rising consumer durable demand



Source: Deutsche Bank, Wood Mackenzie, Antaike, WIND

Figure 30: …but falling copper content per appliance

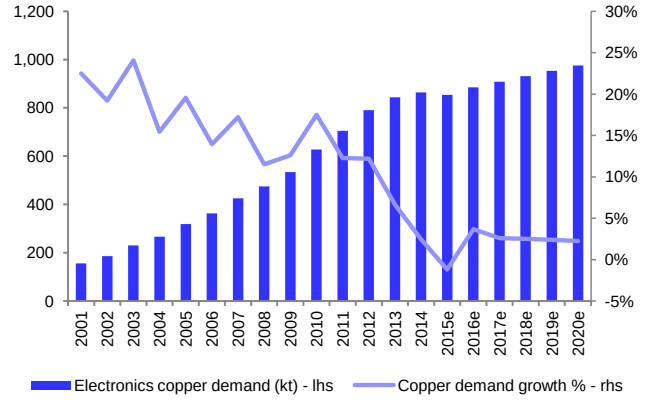


Source: Deutsche Bank, Wood Mackenzie, Antaike, WIND

We forecast an additional copper requirement of 340kt by 2020E, or a CAGR of 2.8% from 2014.

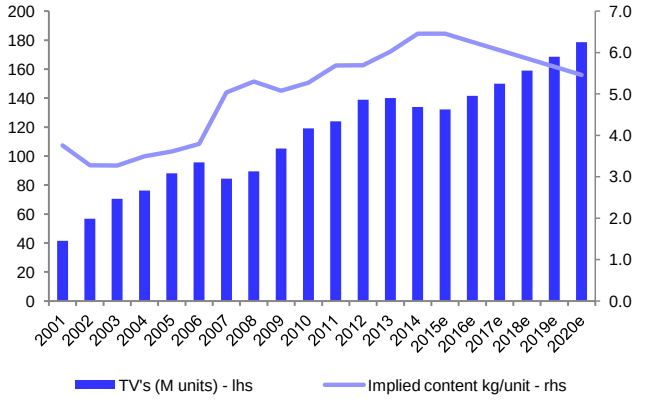
We model a similar trend in copper consumption from consumer electronics. We forecast TV output to stall slightly in 2015E, before picking up and growing at a rate of c. 5 – 6% per annum. Using TV output as a proxy for the broader electronics sector, we also assume falling copper content per unit over the next few years. We forecast an additional copper requirement of 116kt by 2020E, or a CAGR of 2.1% from 2014.

Figure 31: Electronics cooper demand modeled off



Source: Deutsche Bank, WIND, Wood Mackenzie, Antaike

Figure 32: …rising TV output, but falling content



Source: Deutsche Bank, WIND, Wood Mackenzie, Antaike

We outline our complete China supply demand model in Figure 33 below. We point out that we forecast refined copper demand growth to outstrip the underlying copper demand growth over the next three years, with the tightness in scrap availability to remain due to the price weakness and volatility. We do however expect this to be temporary with more direct use scrap being available from domestic sources towards the end of the decade.

Figure 33:: China Copper demand model

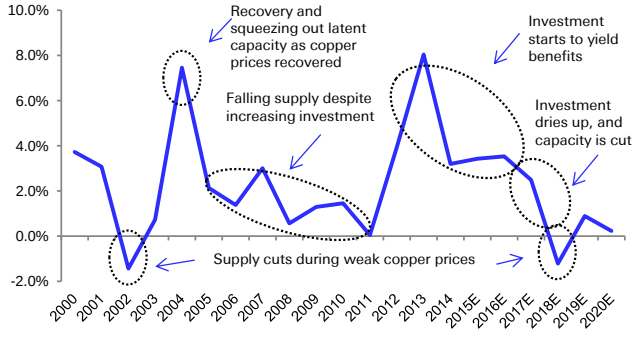
kt	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
Construction	500	607	748	889	982	1,156	1,296	1,487	1,737	1,929	2,079	2,245	2,343	2,432	2,516	2,477	2,563	2,613	2,557	2,617	2,644
% ch YoY		21.3%	23.3%	18.9%	10.4%	17.8%	12.1%	14.8%	16.8%	11.0%	7.8%	8.0%	4.4%	3.8%	3.4%	-1.6%	3.5%	2.0%	-2.2%	2.4%	1.0%
Electrical Network Infra	505	619	695	867	976	1,132	1,251	1,439	1,649	1,847	2,135	2,426	2,748	3,066	3,257	3,419	3,533	3,645	3,743	3,851	3,902
% ch YoY		22.6%	12.3%	24.8%	12.6%	16.0%	10.5%	15.1%	14.6%	12.0%	15.6%	13.6%	13.3%	11.6%	6.2%	5.0%	3.3%	3.2%	2.7%	2.9%	1.3%
Industrial Machinery & Equip	241	291	340	417	493	597	680	788	846	890	991	1,087	1,118	1,210	1,288	1,337	1,403	1,480	1,558	1,637	1,714
% ch YoY		20.6%	16.9%	22.7%	18.1%	21.2%	13.9%	15.9%	7.3%	5.3%	11.3%	9.7%	2.9%	8.2%	6.5%	3.8%	4.9%	5.5%	5.3%	5.0%	4.8%
Transportation	143	178	208	265	318	395	484	584	641	765	929	1,017	1,076	1,187	1,300	1,362	1,421	1,518	1,611	1,710	1,815
% ch YoY		24.5%	16.5%	27.5%	20.1%	24.1%	22.6%	20.6%	9.7%	19.4%	21.5%	9.4%	5.8%	10.4%	9.5%	4.7%	4.4%	6.8%	6.1%	6.1%	6.1%
White Goods	447	527	605	723	804	925	1,014	1,143	1,226	1,307	1,455	1,611	1,609	1,743	1,895	1,856	1,943	2,004	2,086	2,151	2,238
% ch YoY		18.0%	14.8%	19.4%	11.1%	15.1%	9.6%	12.8%	7.2%	6.6%	11.3%	10.7%	-0.1%	8.3%	8.8%	-2.1%	4.7%	3.2%	4.1%	3.1%	4.0%
Electronics	127	156	186	231	266	319	363	425	474	534	628	705	790	843	864	854	884	908	933	957	980
% ch YoY		22.5%	19.2%	24.1%	15.4%	19.6%	13.9%	17.2%	11.5%	12.6%	17.5%	12.3%	12.2%	6.7%	2.5%	-1.1%	3.4%	2.8%	2.7%	2.6%	2.5%
Other	270	312	371	454	529	614	673	780	725	700	877	976	966	1,056	1,032	1,012	1,032	1,073	1,116	1,161	1,207
% ch YoY		15.4%	18.8%	22.4%	16.6%	16.0%	9.6%	15.9%	-7.0%	-3.5%	25.4%	11.3%	-1.0%	9.3%	-2.2%	-2%	2%	4%	4%	4%	4%
Refined copper	**1,850**	**2,230**	**2,425**	**2,992**	**3,565**	**3,745**	**3,854**	**4,620**	**5,230**	**6,500**	**7,204**	**7,815**	**8,204**	**9,165**	**9,836**	**10,068**	**10,553**	**10,973**	**11,222**	**11,570**	**11,849**
% ch YoY		**20.5%**	**8.7%**	**23.4%**	**19.2%**	**5.0%**	**2.9%**	**19.9%**	**13.2%**	**24.3%**	**10.8%**	**8.5%**	**5.0%**	**11.7%**	**7.3%**	**2.4%**	**4.8%**	**4.0%**	**2.3%**	**3.1%**	**2.4%**
Direct use scrap	385	461	728	854	802	1,393	1,907	2,027	2,067	1,472	1,891	2,251	2,446	2,360	2,316	2,247	2,225	2,269	2,382	2,513	2,652
% ch YoY		20%	58%	17%	-6%	74%	37%	6%	2%	-29%	28%	19%	9%	-4%	-2%	-3%	-1%	2%	5%	6%	6%
Total copper demand	2,235	2,691	3,153	3,846	4,367	5,138	5,761	6,647	7,297	7,972	9,095	10,066	10,650	11,525	12,153	12,315	12,778	13,242	13,604	14,083	14,500
% ch YoY		20.4%	17.2%	22.0%	13.6%	17.6%	12.1%	15.4%	9.8%	9.2%	14.1%	10.7%	5.8%	8.2%	5.4%	1.3%	3.8%	3.6%	2.7%	3.5%	3.0%

Source: Deutsche Bank

Supply side flux - Disruptions running on track

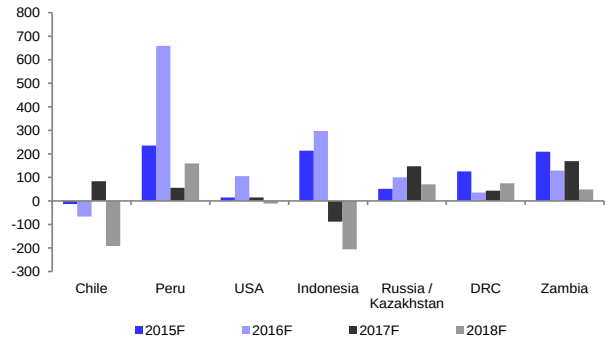
Despite fairly conservative production forecasts, a common theme through the course of 2015 has been the high level of supply disruptions in the market, and the "undershoot" of the established mines. Whether this is due to the normal operating challenges or the subtle shift in the operating modes to focus on margins as opposed to revenue remains to be seen. Post the recent set of reporting results and guidance; we have adjusted our mine supply forecasts down by 300 – 400 ktpa over the next few years. We still forecast a fair mined supply growth of 3.4% for 2015E, and a slightly bigger increase of 3.6% in 2016E, before tapering down to 2.5% in 2017E. Post 2017E, we forecast negligible growth as very little capex is currently being deployed. The capex that is being deployed is barely able to offset the grade decline in our view. We also foresee modest supply curtailments given the weak pricing environment.

Figure 34: Copper mined supply growth



Source: Deutsche Bank, Wood Mackenzie

Figure 35: Mined supply by region



Source: Deutsche Bank, Wood Mackenzie

The regions contributing consistently to the growth in mined copper supply over the next three years are Peru, the DRC, Zambia and Russia / Kazakhstan. We would highlight the social and water challenges in Peru which have the ability to delay and postpone projects for an extended period. Likewise power shortages in Zambia and the DRC have the ability to delay and disrupt the new projects. Given the likely power rationing in Zambia, First Quantum had already announced the diversion of power away from their Sentinel project in favour of the Kansanshi operation, with the likely impact on the ramp-up of Sentinel.

The power crisis in Zambia threatens to be a long-term problem for mining companies. The country relies on hydropower for virtually all of its electricity generation, more than 90% of which is produced by just three major dams - Kafue Gorge, Kariba and Victoria Falls. The Kariba generation facility has capacity to provide as much as 1,080 MW, nearly half of Zambia's normal power production. Water levels at the reservoir had dropped to 40% by July 19, half of where they were 12 months earlier. The situation is expected to normalize only in November when seasonal rains may begin replenishing water levels and when a new 300 MW coal -fired thermal power plant is due to come on stream. In the meantime, mining companies will have the option of buying emergency imported power at a higher cost. Given that many of the Zambian mines are high cost, this may not always be a viable option.

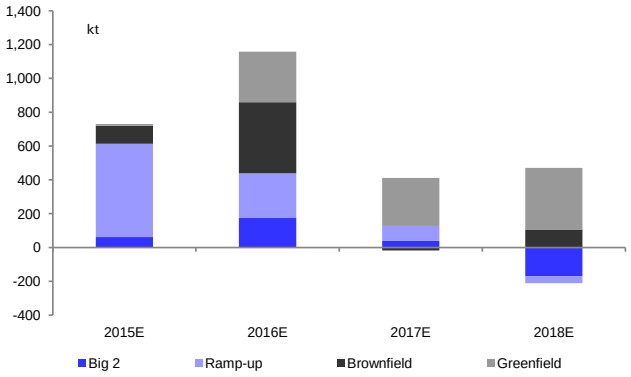
We highlight the copper projects in the table below, noting the nature of the new supply. The majority of new supply comes from brownfield and greenfield projects over the next three years, suggesting higher than normal risks to ramp-up

Figure 36:: Mined supply additions

kt	2015E	2016E	2017E	2018E	Cumulative
Grasberg	78	335	-75	-200	138
Escondida	-16	-160	114	29	-33
Big 2	**62**	**175**	**39**	**-171**	**105**
Sentinel	45	115	70	0	230
Toromocho	90	50	-10	0	130
Sierra Gorda	87	13	14	3	118
MMH	28	10	10	-23	25
Caserones	81	50	0	-5	126
Constancia	112	18	5	-15	120
Morenci	108	7	0	0	115
Ramp-up	**551**	**263**	**89**	**-40**	**863**
Cerro Verde	13	283	-100	68	264
Buenavista	105	138	19	0	262
Toquepala	-11	0	62	38	89
Brownfield	**106**	**421**	**-19**	**106**	**614**
Las Bambas	0	150	130	70	350
Cobre Panama			0	200	200
Boschekul / Aktogay	0	51	128	65	245
Antucoya	10	72	5	0	87
Bystrinskoe				30	30
Jabal Sayid	0	26	20	0	46
Greenfield	**10**	**299**	**283**	**365**	**958**

Source: Deutsche Bank, Wood Mackenzie

Figure 37: …but with increasing risks

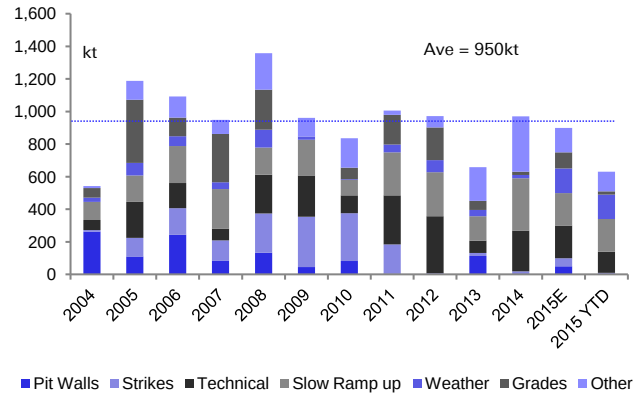


Source: Deutsche Bank

The impact of power shortages in Zambia, together with the slower ramp up of projects such as Caserones, Sierra Gorda, Sentinel, Antucoya and the Buenavista expansion have all contributed to the mounting disruptions over July. This adds to the host of weather related disruptions in Chile earlier in the year and the mill failure at Olympic Dam. Moreover, with industrial relations in Chile remaining challenging, output from Ok Tedi threatened by low rainfall, potential price related supply cuts from Freeport, it seems likely that further significant disruptions are likely to emerge as the year proceeds.

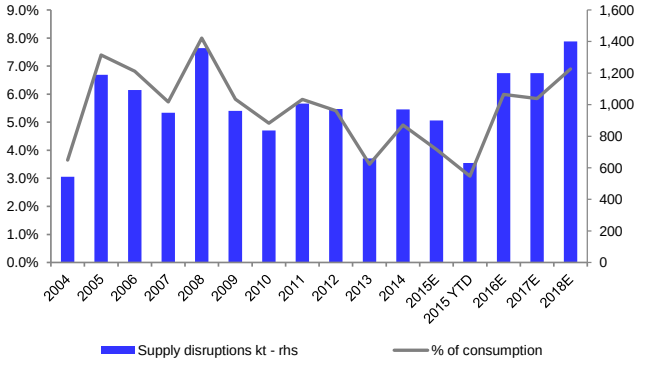
We estimate the supply disruptions so far this year amount to 630kt. In contrasts, Wood Mackenzie estimate the disruptions at 810kt, or 4.0% of their initial estimates. The absolute level of estimated disruption depends on the starting point, hence the difference in estimates. We continue to factor in a further 500kt of disruptions for the rest of the year. However, given the regional distribution of new supply and the nature of the new supply, we have increased our supply disruption estimates for 2016 – 2018E to 1.2Mt, and 1.4Mt in 2018, when we expect further price related shuts.

Figure 38: Copper supply disruptions by type



Source: Deutsche Bank

Figure 39: Copper supply disruptions as a % of consumption

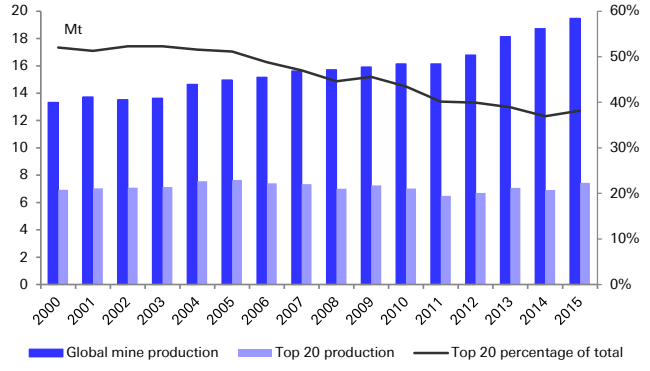


Source: Deutsche Bank

Why copper is different – it is a challenge to bring on new capacity

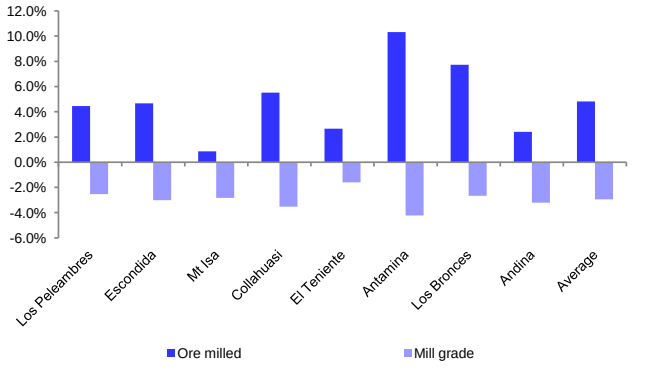
We contrast the difference in the evolution of the top 20 copper mines versus the top 20 aluminium smelters to demonstrate the technological evolution in aluminium smelting versus copper mining. The top 20 mines in copper are forecast to produce c.7% more in 2015 than in 2000, but their share of global production has fallen from 52% to 32%, as new capacity has been added. However, the average mine size has actually fallen from 75kt to 66kt. The industrial logic that as global demand grows, bigger production units should be built, simply does not work in copper. Furthermore, depletion is a pressing factor in copper with our sample of mines having an average grade decline of 3% per annum. The only reason for the additional output is investment in additional milling capacity of c.5% per annum. Simply put, the industry cannot offset depletion by building one large mine.

Figure 40: Top 20 copper mines 2000 - 2015



Source: Deutsche Bank, Wood Mackenzie

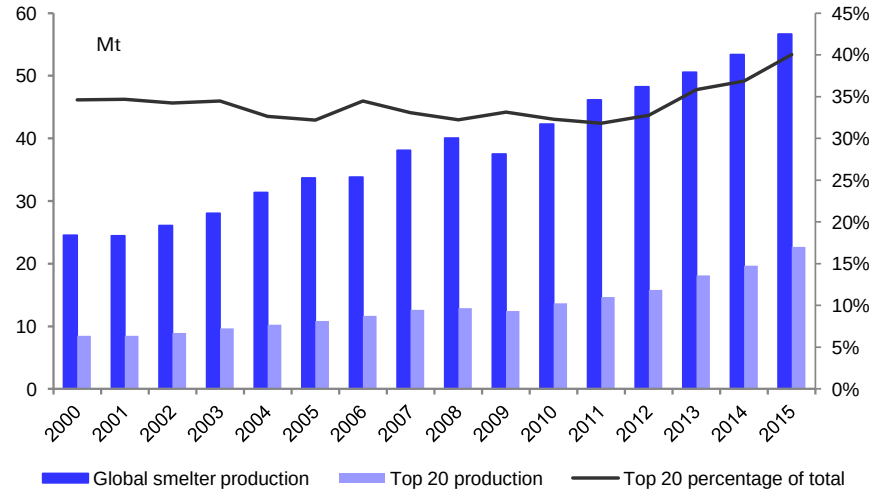
Figure 41:: Top mines: grades versus milled throughput



Source: Deutsche Bank, Wood Mackenzie

In contrast, the top 20 aluminium smelters now produce 167% more than they did in 2000, with their market share growing from 35% to 40%. The average aluminium smelter output has increased from 146kt to 370kt, with a number of mega smelters (+1.0Mt) being built and completed in China. Economies of scale are clearly being applied to aluminium smelting.

Figure 42: Top 20 aluminium smelters 2000 - 2015



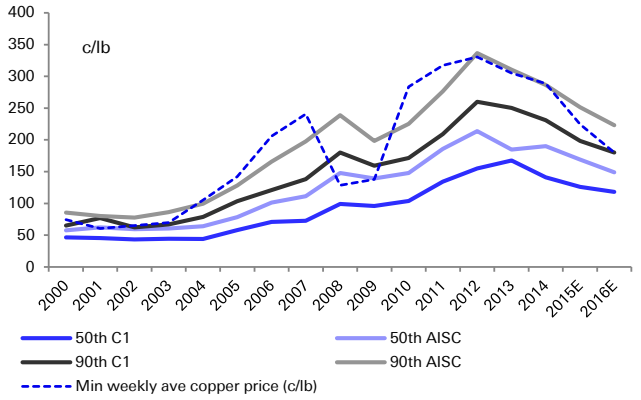
Source: Deutsche Bank, Wood Mackenzie

Deflating cost curve support.

Our thesis on copper was that in a well supplied market of small surpluses, the price would be supported at the 90th percentile of the all-in-sustaining cost curve. This was indeed the case from 2012 to 2014. However, this is not the case in 2015 so far, where the weekly average copper price has fallen through this support level as shown in Figure 43.

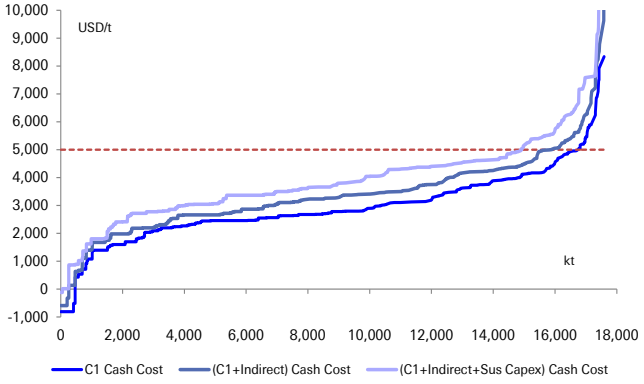
The copper industry has also been subject to deflation, due to a combination of weaker producer currencies, lower energy prices, a change in mode of operation and lower price related contract costs. Costs peaked in 2012, with the all-in-sustaining cash cost of the 90th percentile at 336 c/lb. Based on estimates at current spot oil prices and producer currencies, the 90th percentile of the all in cash cost curve has fallen by 25% to 252c/lb. The 50th percentile has only fallen by 20% highlighting the "flattening" of the curve in this deflationary environment. Part of the reason is that producers lower down the cost curve have more metal by-product credits which have also seen sharp price declines. We continue to see cost deflation in the industry with a further 10 – 15% cost decline, through a combination of mine plan redesign, management cost cutting efforts and weakening producer currencies. However, given our view of structurally slower Chinese demand growth, we think the 90th percentile of the cost curve is no longer likely to be the support level. The next level of support is likely to be the 90th percentile excluding capex, which is 180c/lb or USD3,970/t. During the global financial crisis, prices fell to the 50th percentile of the all-in sustaining cost, which we estimate will be around 150c/lb or USD3,285/t.

Figure 43: The evolution of the copper cost curve



Source: Deutsche Bank, Wood Mackenzie

Figure 44: The different ways of measuring costs



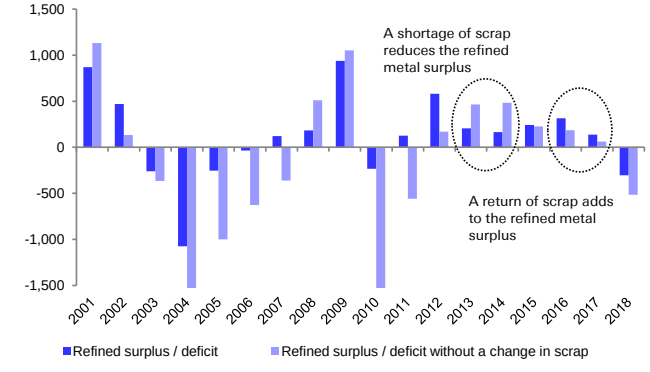
Source: Deutsche Bank, Wood Mackenzie

At current spot prices we estimate that only 5% of producers are loss making at the C1 cash cost level, whilst 15% are losing cash at the all-in sustaining cash cost level. We contrast that with Nickel, where 55% of producers are loss making at the C1 cash cost level.

Scrap is likely to remain a modest but temporary buffer

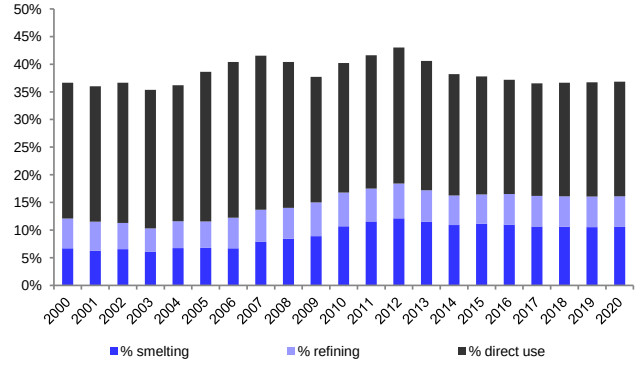
Direct use scrap accounts for c.20 – 25% of global copper demand and acts as a buffer in times of rising and falling prices. In periods of falling prices, scrap tends to be withheld from the market as highlighted by Figure 45 in 2013 and 2014. We are forecasting limited impact from scrap on the refined copper market over the next three years, but our bias is that scrap availability will tend to improve. This view is based on channel checks with European industry participants such as Aurubis. However, given the sharp decline in prices year to date, and our view that there are downside risks to prices in 2016 and 2017E, scrap could revert back to a 2013/14 type scenario. However given that China is likely to start generating more meaningful amounts of domestic scrap, we think that the "buffer" effect will only be temporary, and over the medium term, we expect Chinese scrap consumption to increase significantly.

Figure 45: Refined copper surplus / (deficit) highlighting the impact of scraps



Source: Deutsche Bank, Wood Mackenzie

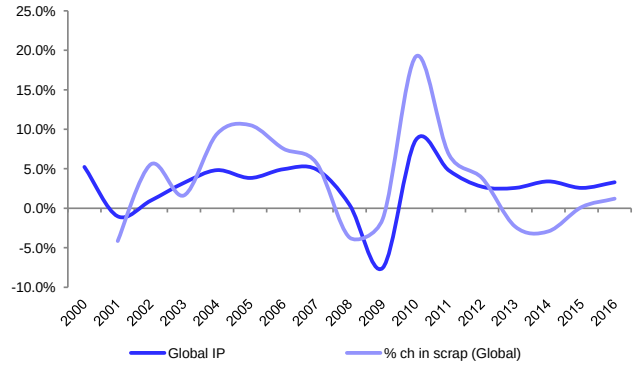
Figure 46: Copper scrap accounts for 35 – 40% of global demand



Source: Deutsche Bank, Wood Mackenzie

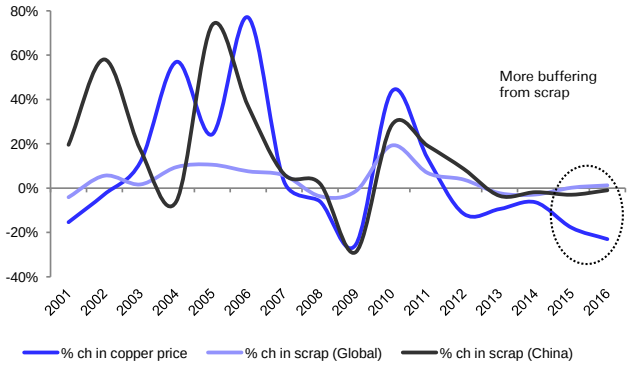
Scrap availability is influenced by both price, or more correctly price momentum and the expectation of future prices, but also by global IP. Simply, the more industrial activity, the more scrap is generated. We note that Chinese scrap consumption is more sensitive to prices than the global market. However, China is a net importer of scrap, specifically from the US, hence availability has also an issue during the mid 2000's.

Figure 47: Scrap availability influenced by Global IP



Source: Deutsche Bank, Wood Mackenzie

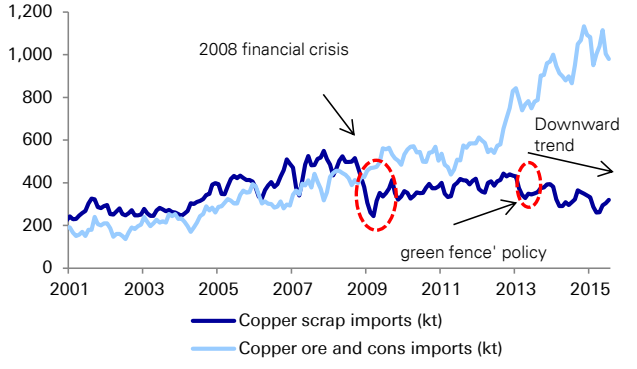
Figure 48: Scrap availability influenced by price



Source: Deutsche Bank, Wood Mackenzie

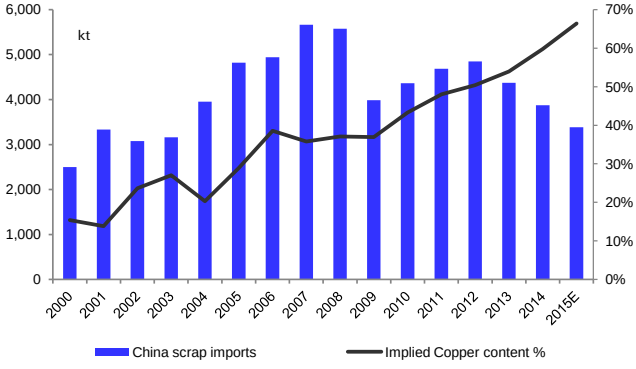
Scrap availability was certainly an issue post the global crisis, and once again in 2013 when the monitoring of scrap imports by China became far more stringent. The restrictions imposed on the quality of scrap and the tighter scrutiny of VAT rebates on scrap has meant that Chinese buyers are becoming much more selective on the quality of scrap they are willing to purchase. Figure 50 shows this trend, with the implied scrap (simply calculated as a Direct scrap consumption divided by the scrap imports) content rising close to 70% in 2015E. Channel checks have also confirmed the trend of Chinese consumers being more selective. China is also starting to consume more of its own domestically generated scrap.

Figure 49: Contrasting scrap and concentrate imports (6MMA)



Source: Deutsche Bank, NBS

Figure 50: Implied copper content of Chinese scrap imports



Source: Deutsche Bank, NBS, Wood Mackenzie

Figure 51: Deutsche Bank Copper demand – supply balance

		2010	2011	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
Chile production	Mt	5.48	5.30	5.53	5.87	5.92	5.91	5.84	5.92	5.73	5.89	5.89
Production Growth		*0.4%*	*-3.2%*	*4.3%*	*6.3%*	*0.8%*	*-0.2%*	*-1.1%*	*1.4%*	*-3.2%*	*2.7%*	*0.0%*
Chile share of global production		*34%*	*33%*	*33%*	*32%*	*32%*	*30%*	*28%*	*28%*	*27%*	*28%*	*28%*
Peru production	Mt	1.20	1.20	1.26	1.34	1.34	1.57	2.23	2.29	2.45	2.57	2.52
Production Growth	%	*-1.8%*	*-0.1%*	*5.0%*	*5.8%*	*0.2%*	*17.6%*	*41.9%*	*2.5%*	*7.0%*	*5.1%*	*-2.0%*
USA production	Mt	1.13	1.12	1.17	1.27	1.40	1.42	1.46	1.47	1.51	1.49	1.49
Production Growth	%	*-5.6%*	*-0.8%*	*4.0%*	*9.1%*	*10.1%*	*1.1%*	*2.8%*	*1.1%*	*2.7%*	*-1.3%*	*-0.1%*
China production	Mt	1.26	1.38	1.54	1.61	1.70	1.73	1.67	1.68	1.68	1.71	1.75
Production Growth	%	*19.4%*	*10.0%*	*11.3%*	*4.1%*	*5.7%*	*2.2%*	*-3.7%*	*0.8%*	*-0.4%*	*2.2%*	*2.0%*
Africa production	Mt	1.31	1.40	1.54	1.92	2.14	2.39	2.26	2.62	2.79	2.80	2.79
Production Growth	%	*12.8%*	*6.9%*	*9.9%*	*24.6%*	*11.4%*	*11.6%*	*-5.4%*	*16.0%*	*6.6%*	*0.3%*	*-0.3%*
Global Mine Production	**Mt**	**16.14**	**16.15**	**16.79**	**18.14**	**18.72**	**19.28**	**19.78**	**20.38**	**20.22**	**20.41**	**20.64**
World Mined Production Growth	%	*1.5%*	*0.0%*	*3.9%*	*8.0%*	*3.2%*	*3.0%*	*2.6%*	*3.0%*	*-0.8%*	*0.9%*	*1.1%*
Copper smelting capacity	Mt	17.62	18.09	18.87	19.75	20.45	22.64	23.01	22.84	23.07	23.06	23.14
Utilisation		*73%*	*70%*	*70%*	*73%*	*73%*	*67%*	*68%*	*71%*	*70%*	*72%*	*75%*
Anode production	Mt	14.74	15.40	15.63	16.33	17.32	17.75	18.33	18.81	18.86	19.36	19.95
Production Growth		*4.0%*	*4.5%*	*1.5%*	*4.5%*	*6.1%*	*2.5%*	*3.3%*	*2.6%*	*0.3%*	*2.6%*	*3.0%*
Total scrap consumption	Mt	4.20	4.53	4.78	4.63	4.50	4.62	4.77	4.78	4.85	4.94	5.04
Consumption Growth	%	*24.9%*	*7.7%*	*5.6%*	*-3.2%*	*-2.7%*	*2.6%*	*3.4%*	*0.2%*	*1.3%*	*1.8%*	*2.1%*
Total SxEw Production	Mt	3.3	3.4	3.6	3.7	3.9	4.1	4.1	4.1	4.0	3.7	3.4
Global Copper Supply	**Mt**	**18.94**	**19.74**	**20.15**	**20.81**	**21.79**	**22.25**	**22.96**	**23.53**	**23.52**	**23.76**	**24.12**
Global Supply Growth	%	*3.7%*	*4.2%*	*2.1%*	*3.3%*	*4.7%*	*2.1%*	*3.2%*	*2.5%*	*0.0%*	*1.0%*	*1.5%*
Chinese Consumption (real)	Mt	7.20	7.82	8.20	9.16	9.84	10.07	10.55	10.97	11.22	11.57	11.85
Consumption Growth	%	*10.8%*	*8.5%*	*5.0%*	*11.7%*	*7.3%*	*2.4%*	*4.8%*	*4.0%*	*2.3%*	*3.1%*	*2.4%*
Western Europe	Mt	3.39	3.20	2.93	2.90	3.01	3.16	3.23	3.28	3.27	3.25	3.25
growth	%	*11.5%*	*-5.5%*	*-8.4%*	*-1.2%*	*4.0%*	*4.9%*	*2.2%*	*1.6%*	*-0.4%*	*-0.5%*	*-0.3%*
USA	Mt	2.19	2.20	2.23	2.25	2.31	2.38	2.42	2.40	2.36	2.36	2.37
growth	%	*6.4%*	*0.5%*	*1.4%*	*0.7%*	*2.8%*	*3.2%*	*1.5%*	*-0.5%*	*-2.0%*	*0.2%*	*0.3%*
Japan	Mt	1.06	1.01	1.00	1.00	1.04	1.05	1.05	1.03	1.00	0.99	0.97
growth	%	*21.1%*	*-4.4%*	*-1.8%*	*0.1%*	*4.5%*	*0.5%*	*0.3%*	*-2.4%*	*-2.0%*	*-1.9%*	*-1.7%*
Big 3 mature economies	Mt	6.64	6.42	6.16	6.14	6.36	6.59	6.70	6.71	6.63	6.60	6.58
Consumption Growth	%	*11.2%*	*-3.3%*	*-4.0%*	*-0.3%*	*3.6%*	*3.6%*	*1.7%*	*0.2%*	*-1.2%*	*-0.5%*	*-0.3%*
Other mature economies	Mt	1.57	1.37	1.21	1.23	1.22	1.18	1.21	1.25	1.24	1.22	1.20
growth	%	*4.6%*	*-12.8%*	*-11.4%*	*1.7%*	*-1.0%*	*-3.3%*	*3.1%*	*3.4%*	*-1.1%*	*-1.5%*	*-1.7%*
Other developing economies	Mt	1.35	1.36	1.33	1.33	1.41	1.44	1.51	1.56	1.64	1.71	1.78
growth	%	*10.0%*	*0.7%*	*-1.8%*	*-0.4%*	*6.4%*	*2.3%*	*4.5%*	*3.6%*	*5.0%*	*4.2%*	*4.5%*
Brazil/India/Russia Consumption	Mt	1.43	1.63	1.57	1.58	1.55	1.51	1.57	1.63	1.69	1.76	1.83
Consumption Growth	%	*12.0%*	*13.9%*	*-3.2%*	*0.4%*	*-2.1%*	*-2.7%*	*4.1%*	*4.0%*	*3.8%*	*4.2%*	*4.0%*
Other	Mt	1.00	1.03	1.09	1.16	1.25	1.30	1.35	1.41	1.46	1.50	1.55
Consumption Growth	%	*14.8%*	*3.8%*	*5.3%*	*6.7%*	*7.6%*	*3.7%*	*4.3%*	*3.9%*	*3.6%*	*3.3%*	*3.3%*
Global Consumption	**Mt**	**19.18**	**19.61**	**19.57**	**20.60**	**21.63**	**22.08**	**22.89**	**23.54**	**23.88**	**24.37**	**24.80**
Global Consumption Growth	%	*10.6%*	*2.3%*	*-0.2%*	*5.3%*	*5.0%*	*2.1%*	*3.7%*	*2.8%*	*1.5%*	*2.0%*	*1.8%*
Market balance	**Mt**	**-0.23**	**0.13**	**0.58**	**0.21**	**0.17**	**0.16**	**0.07**	**-0.01**	**-0.36**	**-0.60**	**-0.68**
Average LME cash price	USD/t	**7,498**	**8,829**	**7,953**	**7,354**	**6,846**	**5,620**	**4,650**	**4,800**	**5,719**	**6,639**	**7,558**
Average LME cash price	USc/lb	**340**	**401**	**361**	**334**	**311**	**255**	**211**	**218**	**260**	**301**	**343**

Source: Deutsche Bank, wood Mackenzie

Nickel: The window of opportunity is closing

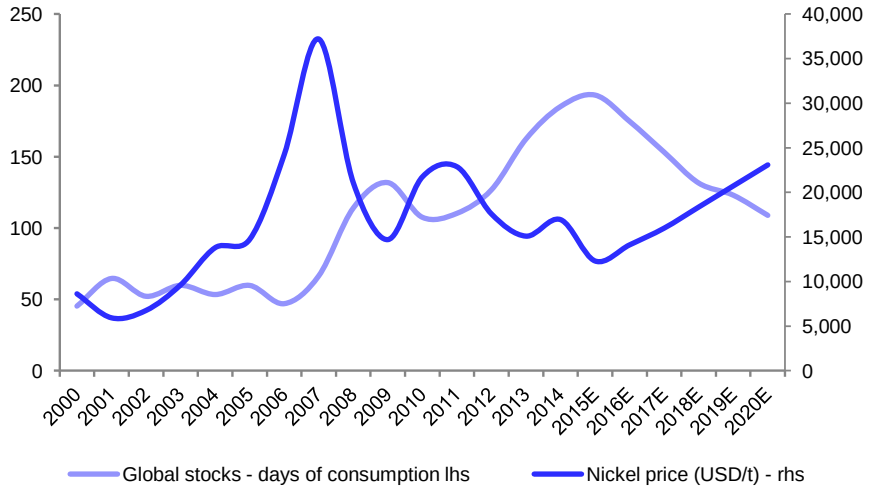
- Stainless steel demand has disappointed on the downside in all regions expect for Europe. However, even in Europe where demand has been robust, production has disappointed due to the inventory accumulation pre the imposition of import duties on Chinese and Taiwanese duties. We have cut our full year stainless melt growth to +1.3% or 43Mt, which still implies a modest 1.3% decline half on half, but this is still higher (+3.7%) on the weak H2'14. We expect the improvement (year on year) to be driven by a recovery in European output against the backdrop of a very weak Q4 last year. The stainless steel industry is in the midst of a de-stocking cycle due to the weak nickel price and "uncomfortable" levels in many regions after the big restock last year. This is exacerbating weak demand. In our view we only need a small improvement in the demand outlook, especially in China to drive a restocking rally.
- Although the Chinese NPI industry is struggling with poor profitability, it has managed the potential shortage in high grade Indonesian ore very well. A combination of stockpiling ahead of the ban, increasing medium grade Philippine imports and the selective blending of low grade ore to extend the life of the scarce high grade stockpiles, has meant that NPI output has surprised to the upside. The combination of weaker stainless steel output, and higher than expected China NPI output has meant that we now forecast a surplus of c.60kt in 2015E. We have also cut our forecast deficits by 15 – 20kt in 2016E and 2017E.
- We conservatively estimate that half of the nickel industry is loss-making at the current spot price. The key question is how long the loss-making operations in the industry are able or indeed willing to continue. Up to now, it has been a case of hoping that the Chinese NPI producers will run of ore. They have proved their resilience and we think closures outside of China are now just as likely as closures inside of China. However, the Chinese NPI closures are now likely to be driven by profitability and cash flow as opposed to a shortage of ore. Many of the high cost operations outside of China have had valid reasons for remaining open, ranging from being in an extended ramp-up mode to political interest. The longer the price stays at USD10,000/t the more likely these reasons will dissipate in our view.

The window of opportunity is closing …but something has to give.

The bull case on nickel was always based on a two to three year window of opportunity. The thesis was that due to the lack of quality ore from Indonesia, Chinese NPI production would fall low enough, for long enough to draw down the ample inventories before the Indonesian smelting industry had built up a critical mass to balance the market once more. Whilst there may be some delays in the ramp-up of Indonesian smelters, the latest news reports suggest that progress is being made. However a combination of weak demand, better than expected Philippine ore output (and better grades), and a resilient Chinese NPI sector has meant that inventories of nickel in all forms have not been drawn down anywhere near as quickly as previously expected. If anything, the period of price strength in 2014, has flushed out a large quantity of "hidden" stocks which the market is now aware of. We think the window of opportunity for fundamental market tightness has all but closed, which in our view means that sustained periods of prices above USD20,000/t is increasingly unlikely. Global nickel stocks are in our view unlikely to fall close to the 100 days which is the level at which we expect to see price tightness. The probability of stocks falling below 50 days, the level at which prices are likely to spike above USD30,000/t is extremely low in our view.

The drawdown of inventories is too slow for fundamental tightness to emerge.

Figure 52: Nickel: global stocks in days of consumption

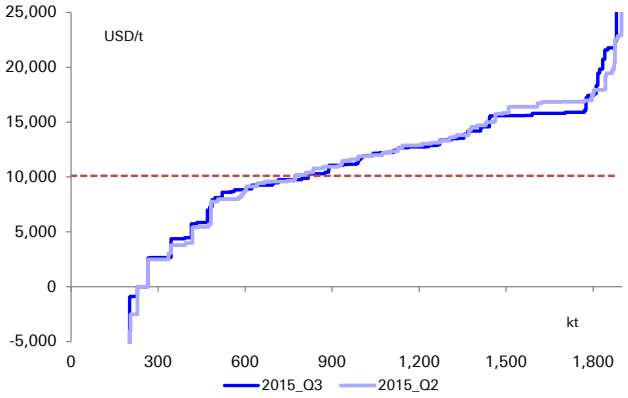


Source: Deutsche Bank, Wood Mackenzie

The current price level of USD10,000/t is unsustainable in our view. At this level, about 50% of the industry is loss-making, and this includes most of the Chinese NPI producers. Historically many of the producers have held on, hoping that demand and prices would come to their rescue. We think this is unlikely in the short-term, and curtailments will be required to see any meaningful price improvement. The low nickel price environment has so far prevented any stainless steel restocking, and in our assessment the stainless steel industry is still in destocking mode. Curtailments will be the catalyst for a recovery in prices, but we think producers may try to hold on for another quarter. Should the momentum in curtailments gather momentum, we expect a nickel price driven restocking rally and improving investor positioning to lead to a 2016 recovery. The recovery is likely to be short-lived and will peter out in H2'16.

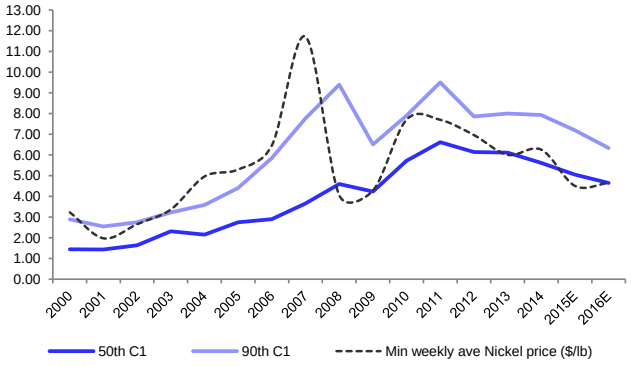
Over the past three years the mininmum weekly nickel price has hugged the 50th percentile of the cost curve. The overshoot in 2014 was due to the Indonesian ore ban, and the undershoot this year has arguably been to the high visible inventories and investor fatigue. We would expect next year to be an overshoot year but assume that the minimum weekly nickel price coincides with the 50th percentile of USD4.60/lb or USD11,400/t.

Figure 53: Comparing the Q2 to the Q3 cost curve



Source: Deutsche Bank, Wood Mackenzie

Figure 54: Minimum weekly nickel price on the cost curve since 2000



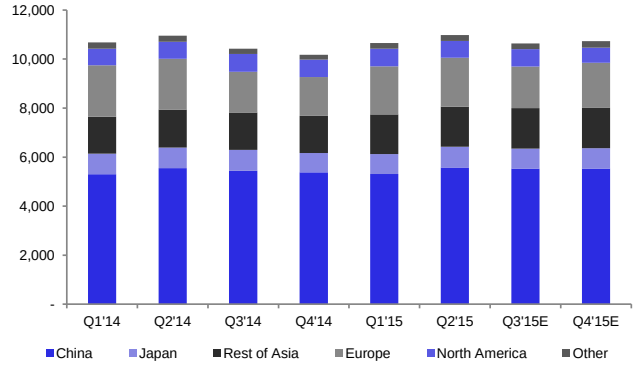
Source: Deutsche Bank, Wood Mackenzie

Looking for a demand recovery in Stainless steel demand

Stainless steel demand has disappointed on the downside in all regions expect for Europe. However, even in Europe where demand has been robust, production has disappointed due to the inventory accumulation pre the imposition of import duties on Chinese and Taiwanese duties. CRU estimates suggest that global stainless steel output is flat year on year for the first six months. We have cut our full year stainless melt growth to +1.3% or 43Mt, which still implies a modest 1.3% decline half on half, but this is still higher (+3.7%) on the weak H2'14. The second half decline in output is in line with the "normal" seasonal patterns. We expect the improvement (year on year) to be driven by a recovery in European output against the backdrop of a very weak Q4 last year. The stainless steel industry is in the midst of a de-stocking cycle due to the weak nickel price and "uncomfortable" levels in many regions after the big restock last year. This is exacerbating weak demand. In our view we only need a small improvement in the demand outlook, especially in China to drive a restocking rally.

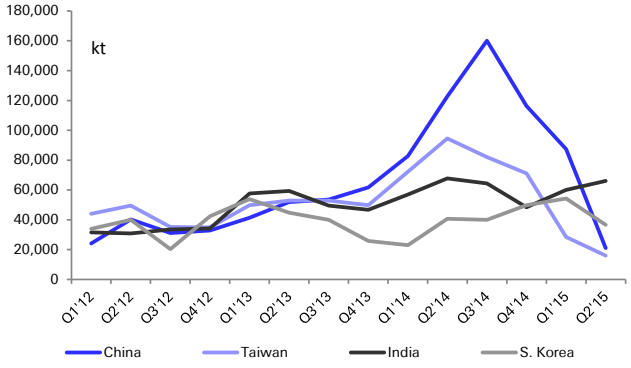
Chinese stainless steel output is essentially flat year on year, with domestic producers continuing to struggle with weak domestic demand and a near cessation of exports to Europe. Channel checks suggest that many mills are considering extended maintenance breaks in Q3. Our output forecast for the full year remains flat for 2015. Despite this weak demand environment, stainless steel capacity is still rising. Fujian Yonjin recently started trial production of cold rolled stainless steel at its 500,000 t/y mill, while Baosteel Desheng and Beihai Chengde's cold rolled mills are also scheduled to ramp-up in Q3. Chinese melted production in Q2 rose by 5% q/q to 5.58Mt according to CRU. We think some of the new capacity ramp-up will continue to force shuts amongst the smaller players.

Figure 55: Global stainless steel melt: H2 is likely to be down on H1, but better than H2'14



Source: Deutsche Bank, Wood Mackenzie, CRU

Figure 56: EU stainless steel coil imports from Asia



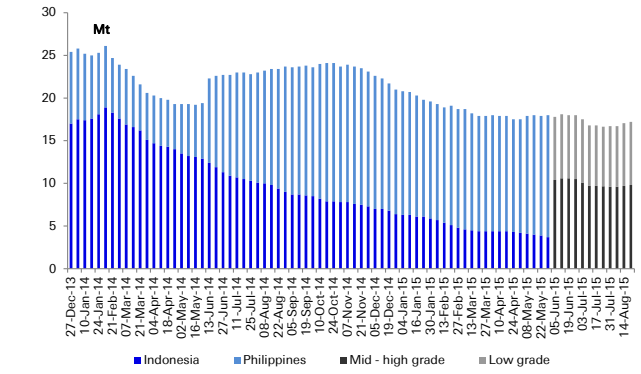
Source: Deutsche Bank, Wood Mackenzie

European mills, however, are getting some relief from the imposition of anti-dumping duties on imports of cold-rolled stainless steel from China and Taiwan. Total coil imports into the EU28 are down sharply, but shipments from other countries such as South Korea, and India have increased recently, but those are too low to fully offset the decline in Chinese and Taiwanese imports. European melted production edged up on a q/q basis in Q2 2015, but on a year-to-date basis, output remains lower than last year, despite the decline in imported material.

China has managed the ore ban very well

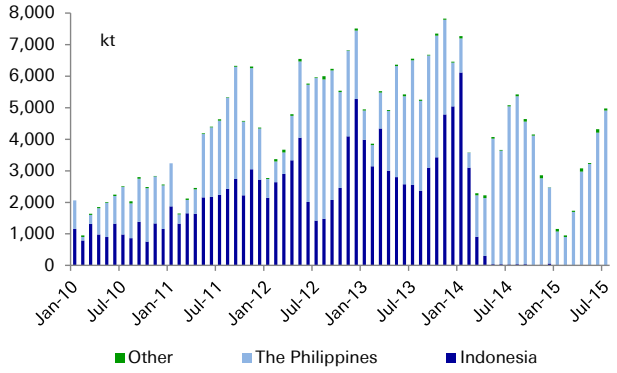
All credit to the ingenuity of the Chinese NPI industry. Although the industry is struggling with poor profitability, it has managed the potential shortage in high grade Indonesian ore very well. A combination of stockpiling ahead of the ban, increasing medium grade Philippine imports and the selective blending of low grade ore to extend the life of the scarce high grade stockpiles, has meant that NPI output has surprised on the upside. The Philippine laterite producers stepped up exports significantly in 2014, partly due to many of the medium grade deposits being "pre-stripped" due to the prior sale of low grade laterite as iron ore. The current iron ore price is unlikely to incentivize the pre stripping of the medium grade deposits. The current depressed ore prices are also unlikely to "pay" for the pre strip capex to open up more of these deposits. We think that Philippine output may increase slightly this year, but will start to ease lower as of next year in the absence of much higher nickel (and ore) prices. July's Philippine ore imports were down 2% year on year, but the total shipments are up 10% year to date. Q3 is however the strongest quarter for Philippine ore exports and we note that port stockpiles (both low grade and medium grade) have been fairly stable. Philippine producers have not had everything their own way though. The Zambales mines remain suspended, after being shut for environmental infringements. Weak demand and prices have led to weak shipments by some producers, with TVI Pacific noting that it had completed just one China bound saprolite shipment. Chinese laterite port stocks have remained at 17Mt, with only a modest drawdown of the medium grade stocks.

Figure 57: China laterite ore ports stocks remain relatively flat.



Source: Deutsche Bank, Royal Nickel

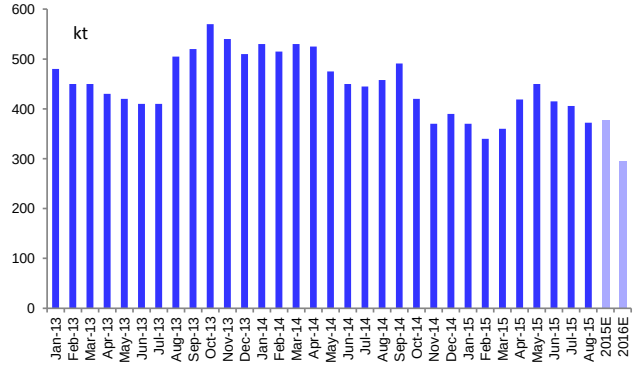
Figure 58: Philippine ore imports remain robust



Source: Deutsche Bank, NBS

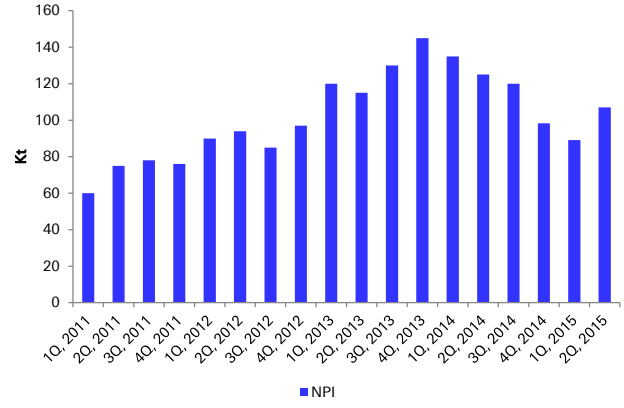
Although Chinese NPI had been declining over the past two quarters, Q2'15 bucked this trend with saw a quarter on quarter increase of 20%. August output has however continued to slide, down 8% month on months.

Figure 59: China NPI output – monthly declining once more



Source: Deutsche Bank, SMM

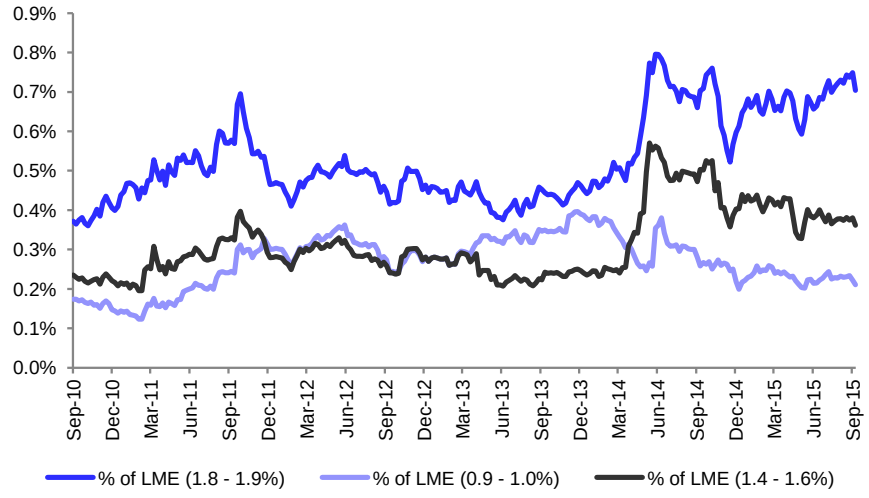
Figure 60: China NPI output – Q2 was a strong quarter



Source: Deutsche Bank, SMM, CRU

The weak demand and weak nickel price is reflected in weak ore prices, especially in the medium and low grades. The re-rating of high and medium grade ores post the Indonesian ore ban is clearly visible in the high and medium grades. However, post the initial rally at the beginning of 2014, medium grades have de-rated from 0.56% to 0.36% of the LME nickel price. We note the opposite trend in high grade ores form the end of 2014. This would suggest that high grade ore is being depleted, but would suggest that medium grade ore is more plentiful.

Figure 61: Nickel ore prices as a percentage of the LME nickel price

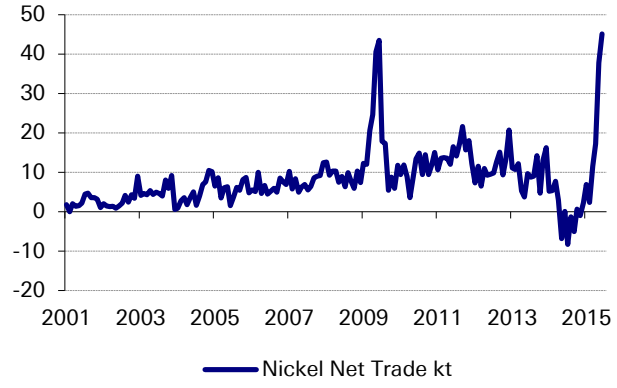


Source: Deutsche Bank, Bloomberg Finance LP

Chinese nickel restocking and off exchange inventories will dampen the price recovery.

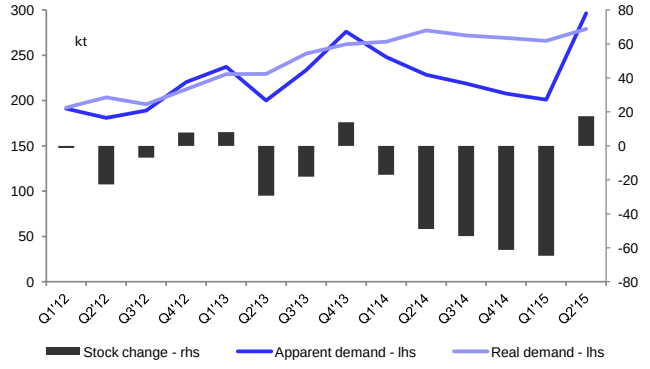
China has been destocking nickel for the past four quarters. This has come to an end in Q2'15, but not because of a sudden pick-up in demand in our view. We think there has been some improvement in the availability of credit and good old fashioned bargain hunting. This is part of China's "ore ban" strategy and good old fashioned bargain hunting in our view. We highlight the recent increase in Chinese imports of refined nickel and our assessment of apparent demand versus real demand. We estimate apparent demand as Domestic production of nickel and NPI less net imports.

Figure 62: Chinese refined nickel imports



Source: Deutsche Bank, NBS

Figure 63: Chinese apparent versus real nickel demand

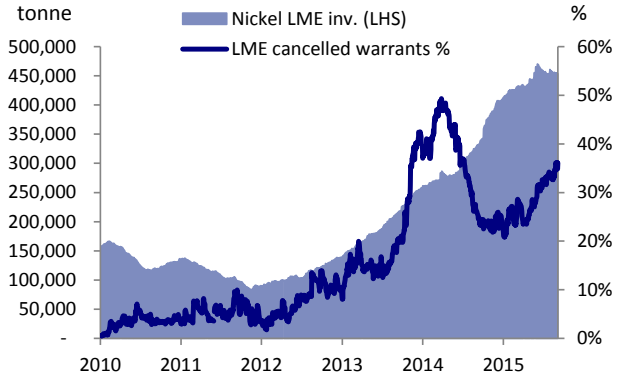


Source: Deutsche Bank, NBS,CRU, Wood Mackenzie

Whilst the end of Chinese destocking is positive for the nickel market, there has not been a significant decrease in LME stocks or indeed an increase in SHFE stocks. SHFE stocks have increased by c.10kt over the past few months. This means that off exchange stocks (we no longer refer to them as hidden, because the market is now well aware of them) are simply being transferred

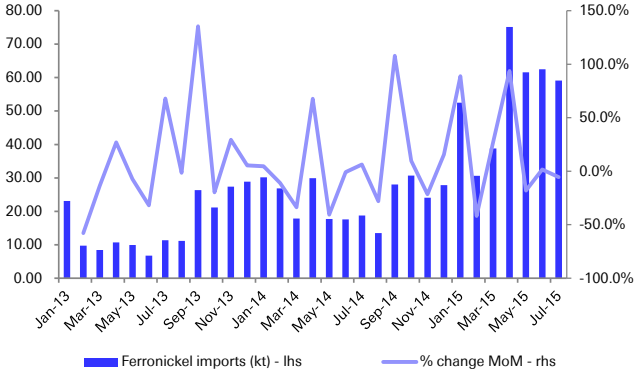
from one location to another without being consumed. Our conclusion is that consumers will feel less pressured to chase nickel rallies quite so intensely with the knowledge that the market is well supplied. This will limit both the duration and amplitude of price rallies, until there is a concerted drawdown in LME stocks.

Figure 64: LME stocks stabilizing at 450kt



Source: Deutsche Bank, Bloomberg Finance LP

Figure 65: Chinese Ferronickel imports



Source: Deutsche Bank, NBS

Figure 66: Deutsche Bank Nickel supply –demand balance

		2010	2011	2012	2013	2014	2015E	2016E	2017E	2018E	2019E	2020E
Australia mine production	kt	180.9	191.2	237.3	232.6	202.9	182.2	185.4	159.7	172.6	152.1	151.5
Production growth		*2.7%*	*5.7%*	*24.1%*	*-2.0%*	*-12.8%*	*-10.2%*	*1.8%*	*-13.9%*	*8.1%*	*-11.9%*	*-0.4%*
New Caledonia mine production	kt	130	129	138	152	186	177	188	206	214	236	241
Production growth		*40.0%*	*-0.5%*	*7.1%*	*10.2%*	*22.1%*	*-4.9%*	*6.2%*	*9.6%*	*4.0%*	*9.8%*	*2.3%*
Canada mine production	kt	154.7	215.3	200.3	222.5	223.4	235.4	232.8	231.5	226.6	226.6	223.3
Production growth		*18.7%*	*39.1%*	*-6.9%*	*11.1%*	*0.4%*	*5.4%*	*-1.1%*	*-0.5%*	*-2.1%*	*0.0%*	*-1.4%*
Russia mine production	kt	278.8	274.3	259.8	242.8	238.6	230.6	232.3	216.5	220.6	218.8	219.3
Production growth		*2.7%*	*-1.6%*	*-5.3%*	*-6.5%*	*-1.7%*	*-3.4%*	*0.8%*	*-6.8%*	*1.9%*	*-0.8%*	*0.2%*
Brazil mine production	kt	55.0	95.4	125.6	94.9	116.4	91.7	107.2	114.2	114.2	111.7	109.2
Production growth		*24.7%*	*73.4%*	*31.7%*	*-24.5%*	*22.7%*	*-21.2%*	*16.9%*	*6.5%*	*0.0%*	*-2.2%*	*-2.2%*
Indonesia mine production	kt	285.8	546.3	631.3	825.4	173.7	135.9	148.1	164.4	185.6	205.6	245.6
Production growth		*41.3%*	*91.2%*	*15.5%*	*30.7%*	*-78.9%*	*-21.8%*	*9.0%*	*11.0%*	*12.8%*	*10.8%*	*19.5%*
Philippines mine production	kt	175.1	205.9	220.0	236.0	417.1	466.8	470.4	411.4	405.6	405.6	363.6
Production growth		*23.7%*	*17.6%*	*6.8%*	*7.3%*	*76.7%*	*11.9%*	*0.8%*	*-12.5%*	*-1.4%*	*0.0%*	*-10.4%*
Estimated Ni in Ore - for Ni Pig Iron	kt	356.0	651.9	750.0	944.8	451.8	453.8	469.2	425.6	427.6	447.6	445.6
Production growth		*41.1%*	*83.1%*	*15.0%*	*26.0%*	*-52.2%*	*0.4%*	*3.4%*	*-9.3%*	*0.5%*	*4.7%*	*-0.4%*
World mine production - base case	**kt**	**1,641**	**2,051**	**2,237**	**2,437**	**2,046**	**2,075**	**2,151**	**2,121**	**2,143**	**2,152**	**2,138**
World mine production growth rate		*15.6%*	*25.0%*	*9.1%*	*8.9%*	*-16.0%*	*1.4%*	*3.7%*	*-1.4%*	*1.0%*	*0.4%*	*-0.7%*
Possible projects					**0**	**0**	**6**	**35**	**149**	**218**	**349**	**373**
Disruption allowance						**0**	**-83**	**-97**	**-106**	**-107**	**-108**	**-107**
Total world mine production	**kt**	**1,641**	**2,051**	**2,237**	**2,437**	**2,046**	**1,998**	**2,089**	**2,164**	**2,284**	**2,424**	**2,434**
Total Smelter output	**kt**	**1,504**	**1,677**	**1,802**	**2,016**	**1,986**	**1,899**	**1,935**	**1,977**	**2,097**	**2,208**	**2,278**
Implied smelter recovery	%	*92%*	*82%*	*81%*	*83%*	*97%*	*95%*	*93%*	*91%*	*92%*	*91%*	*94%*
Total refinery capacity	**kt**	**2,152**	**2,544**	**2,849**	**3,021**	**3,097**	**3,073**	**3,104**	**2,973**	**2,973**	**2,973**	**2,918**
Implied utilisation	%	*68.1%*	*64.6%*	*61.6%*	*66.0%*	*64.3%*	*63.2%*	*60.2%*	*63.4%*	*65.1%*	*68.8%*	*70.4%*
Base case refinery output	**kt**	**1,465**	**1,643**	**1,756**	**1,993**	**1,990**	**1,941**	**1,852**	**1,794**	**1,762**	**1,840**	**1,834**
Possible projects						*0*	*0*	*17*	*90*	*172*	*204*	*220*
Total refined availability / Output	**kt**	**1,465**	**1,643**	**1,756**	**1,993**	**1,990**	**1,941**	**1,869**	**1,884**	**1,934**	**2,044**	**2,054**
World refined availability growth rate		*9.2%*	*12.1%*	*6.9%*	*13.5%*	*-0.2%*	*-2.5%*	*-3.7%*	*0.8%*	*2.6%*	*5.7%*	*0.5%*
Implied Refinery recovery from mined ou	%	*89.3%*	*80.1%*	*78.5%*	*81.8%*	*97.3%*	*97.1%*	*89.5%*	*87.1%*	*84.7%*	*84.3%*	*84.4%*
Global stainless production	mt	33.0	34.6	36.0	40.1	42.4	43.0	44.5	46.3	47.9	49.6	51.3
Growth		*26.0%*	*4.6%*	*4.2%*	*11.3%*	*6.0%*	*1.3%*	*3.5%*	*4.0%*	*3.5%*	*3.5%*	*3.5%*
Austenitic stainless demand	mt	23.9	25.2	26.8	30.2	32.0	31.8	32.7	34.0	35.5	36.7	38.0
Austenitic ratio		*72.4%*	*73.1%*	*73.5%*	*75.4%*	*75.5%*	*74.0%*	*73.5%*	*73.5%*	*74.0%*	*74.0%*	*74.0%*
Total nickel demand for stainless	kt	1,716	1,797	1,843	2,007	2,118	2,097	2,148	2,225	2,310	2,381	2,455
Nickel content		*7.2%*	*7.1%*	*6.9%*	*6.6%*	*6.6%*	*6.6%*	*6.6%*	*6.5%*	*6.5%*	*6.5%*	*6.5%*
Nickel scrap consumption	kt	743	740	757	813	869	824	838	890	935	976	1,019
Scrap ratio		*43.3%*	*41.2%*	*41.1%*	*40.5%*	*41.0%*	*39.3%*	*39.0%*	*40.0%*	*40.5%*	*41.0%*	*41.5%*
Primary Nickel in Stainless	kt	973	1056	1086	1194	1249	1273	1310	1335	1374	1405	1436
Primary Nickel in Non-Stainless	kt	513	541	576	585	596	608	627	645	658	671	685
Total world nickel consumption	**kt**	**1,486**	**1,598**	**1,662**	**1,779**	**1,846**	**1,881**	**1,937**	**1,981**	**2,033**	**2,076**	**2,121**
World nickel consumption growth	%	*16.9%*	*7.5%*	*4.0%*	*7.1%*	*3.7%*	*1.9%*	*3.0%*	*2.2%*	*2.6%*	*2.2%*	*2.1%*
Adjustments												
Balance	**kt**	**-21.3**	**44.9**	**94.5**	**214.1**	**144.6**	**59.5**	**-68.2**	**-96.1**	**-98.6**	**-32.5**	**-67.1**
Reported stocks	kt	136.9	90.5	139.9	261.6	407.0	466.5	398.2	302.1	203.5	171.0	103.9
Stock to consumption ratio	w ks	4.79	2.95	4.38	7.65	11.47	12.89	10.69	7.93	5.21	4.28	2.55

Source: Wood Mackenzie, Deutsche Bank

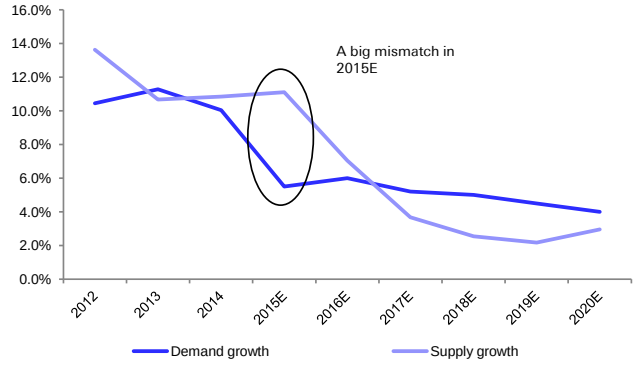
Aluminium: In need of further Chinese cuts

- Aluminium has not been immune to weak Chinese demand, and as a result we have downgraded our global demand forecast by 70bps for 2015 and 2016E. Demand growth of 4.2% in 2015E is still decent but the rate of growth is a lot slower than the average growth of 7% over the prior four years. The momentum in Chinese capacity growth has meant a well oversupplied market for 2015E of c.900kt. We forecast the rate of demand growth and supply growth to converge in 2016E, but given the starting point is one of a surplus, we continue to see a surplus market for the remainder of 2015, 2016 and 2017. Under this environment, a strong price recovery is unlikely.
- The current price of USD1,580/t or USD1,730/t when premiums are also considered, is toward the bottom end of the trading range, with c.30% of the industry loss-making. However, this does not necessarily guarantee closures as the barriers to exit in aluminium remain high. In the world ex China, a combination of long-term raw material and power contracts, hedging at higher prices and the expectation of further cost declines may delay closures. Furthermore, there is the simple fact that closures in 2013 only paved the way for increased Chinese exports in 2014/15. The high cost Chinese producers are doing the domestic industry no favours either, but may hang for longer than expected as local government "subsidize" production to meet employment and growth targets. A slowdown in Chinese production; the point at which curtailments exceed new capacity additions would be a positive signal for the market.

Chinese supply growth weighs heavily on the aluminium market

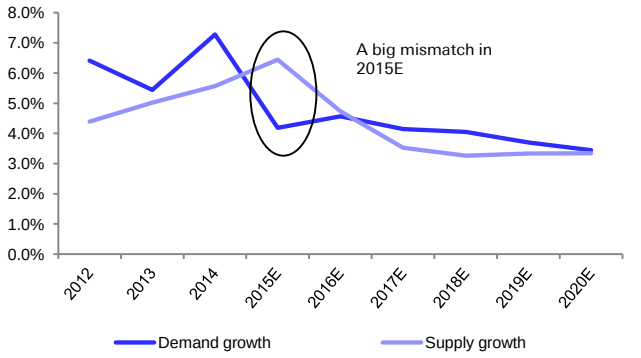
Aluminium demand remains relatively healthy when viewed over the long term. Our forecast of 4.2% for 2015E is still above the long-term trend of 3.9%. However aluminium is no different to the other base metals in that the rate of demand growth has slowed quite sharply in 2015E. In this context 4% aluminium demand growth is no different to 2% copper demand growth. The difference in aluminium however is that Chinese supply has continued at the same rate of 10% plus. Over the past few years, Chinese supply growth has matched or slightly exceeded demand growth, but the "gap" in 2015E is extreme. We forecast Chinese supply growth to continue to outpace demand growth in 2017E, but by a lower margin before falling below demand growth as supply additions slow. On a global basis, this means that global supply growth outpaces demand growth by 220bps in 2015E, before being more in line in 2016E. This is only by virtue of slow capacity additions in the rest of the world.

Figure 67: Chinese aluminium supply additions versus forecast demand growth



Source: Deutsche Bank, Wood Mackenzie

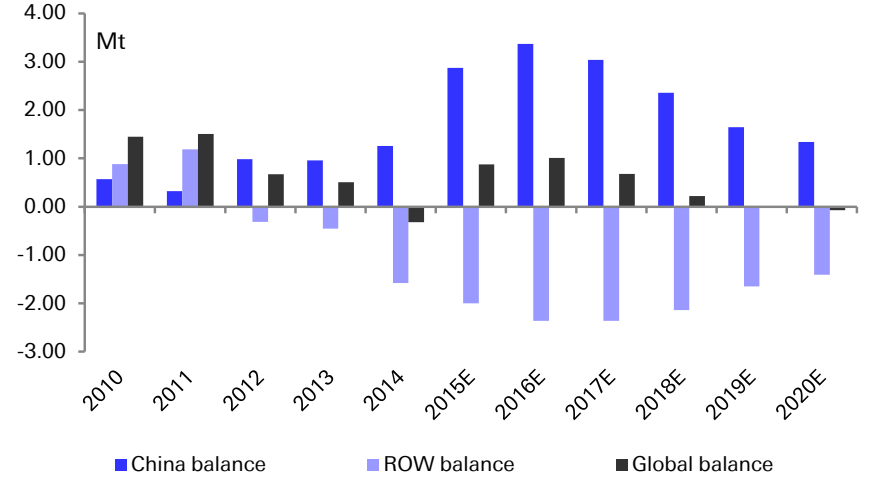
Figure 68: Global aluminium supply additions versus forecast demand growth



Source: Deutsche Bank, Wood Mackenzie

Our forecast of higher demand growth versus supply growth from 2017 onwards is still not enough to result in a deficit because the starting point is a significant surplus of c. 900kt in 2015E. Despite our forecast of lower demand growth, and higher supply in China the shape of the aluminium market is however unchanged. We still forecasts a deficit in the world ex China and a surplus in China. The net balance is however a bigger surplus, certainly for the next three years.

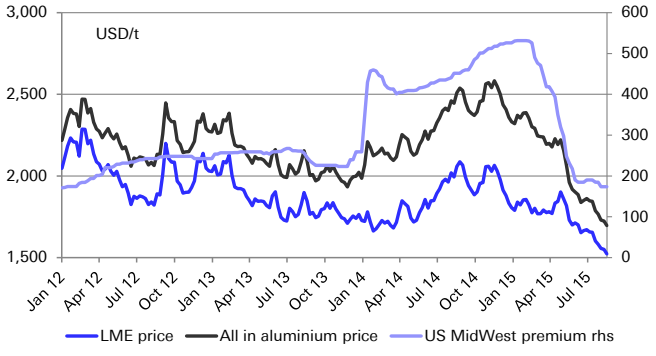
Figure 69: Aluminium supply – demand balance: China versus the world ex China



Source: Deutsche Bank, Wood Mackenzie

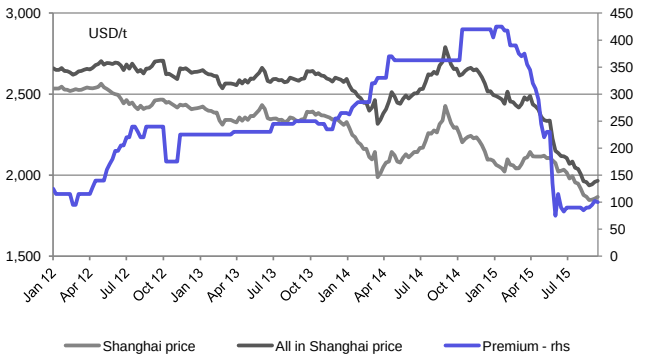
The deficit market seen in 2014, now looks like an anomaly. Given our forecast of sustained surpluses over the next three years we forecast aluminium prices below USD1,700/t for the next three years, with periods of prices below USD1,600/t. We think the current LME aluminium price is towards the bottom end of the trading range and slightly overdone on the down side. Over the past three weeks, the Shanghai price has started to show some signs of strengthening. We expect a modest recovery in Chinese demand toward the end of the year which should support the price, thereby reducing the arbitrage for exports, ultimately supporting the LME price.

Figure 70: All-in aluminium price ex China



Source: Deutsche Bank, Bloomberg Finance LP

Figure 71: Chinese domestic aluminium price



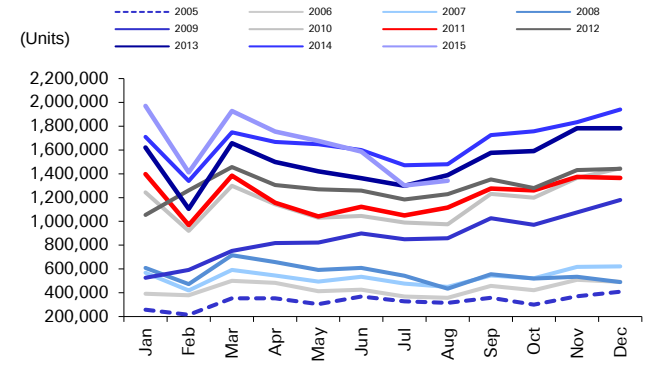
Source: Deutsche Bank, Bloomberg Finance LP

Downgrading demand forecasts due to weaker than expected demand from China.

We have downgraded our global demand forecasts for 2015E from 7% to 5.5% due to weaker Auto demand and slower than expected infrastructure build. We expect a slightly slower recovery in the residential property sector, hence the downgrade of Chinese demand from 7% to 6%. The other adjustments to global demand have been minor, and the net result is a global demand downgrade of 4.9% to 4.2% in 2015E, and 4.6% from 5.1% in 2016E.

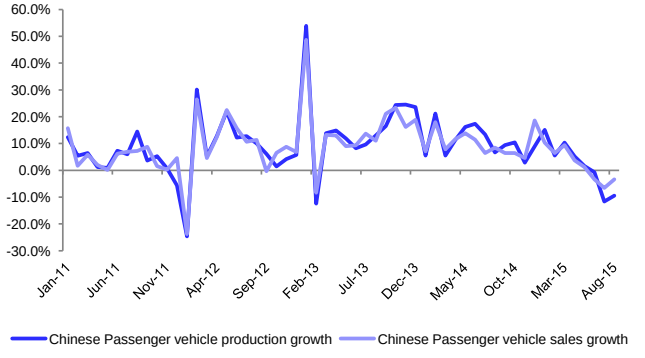
Chinese auto production has slowed due to rising inventory and slowing auto sales in Q3'15. The July and August year on year production of passenger vehicles was down 12% and 9% respectively. Cumulative Passenger vehicle (PV) production is however marginally up by 2.4% year to date for the first eight months. The Chinese government has announced restrictions for new PV registration in developed cities and hence the next growth in PV will come from tier-2 or 3 cities. This growth is likely to come from lower end vehicles which are by nature less aluminium intensive.

Figure 72: Chinese Auto production run rate for 2015



Source: Deutsche Bank, CAAM

Figure 73: Chinese Auto production falls more than sales due to high inventories



Source: Deutsche Bank, CAAM

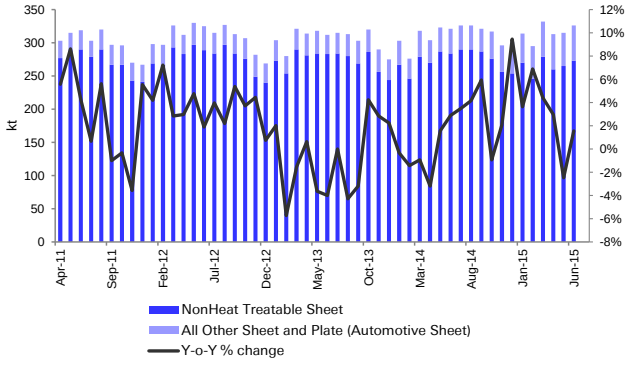
The outlook for construction sector has continued to deteriorate since Q2'14 and remains a drag on Aluminium demand. Despite the interest rate cuts and quantitative easing steps taken by the Chinese government, the property and construction market is seeing modest growth. Real estate investment grew at

3.5% year to date for the first eight months, the slowest growth since 2009. The inventory levels of unsold houses are still high despite a positive momentum in growth of house sales (7.2% year to date). The sales have to increase for many more months before we expect any meaningful demand read through for the Aluminium market.

A bright spot for demand has been the Chinese government investment in high speed trains through CRC (China Railway Corporation). Of the budget about 150Bn RMB will be used to procure 351 high speed trains and as of H1'15 only 20% of this budget was used. Domestically designed trains will slowly replace the existing ones and will play an important role in the demand of Aluminium as about 80% of rolling stock body contains Aluminium.

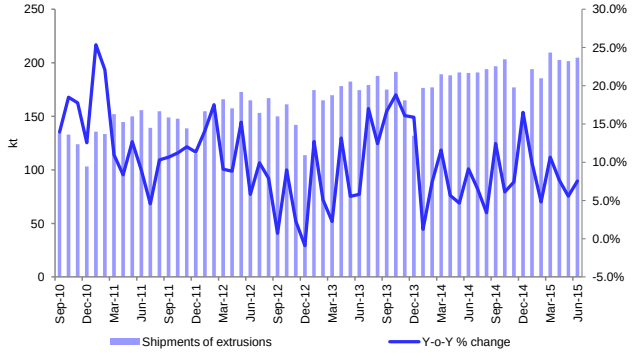
North American demand for Aluminium products continued to grow at a robust rate as there was keen interest in flat rolled products from the automobile industry. Auto sheet production is forecasted to be above 350kt based on the ramp ups in new capacity by Alcoa and Novelis. Extrusion shipments in June increased by 7.7% year on year and c.9% year to date as demand from housing sector improved. US Residential construction grew by 8% in May year on year and this positive momentum is forecasted to continue for the rest of the year. Limited inventory of houses and strong sales is quite positive for Aluminium demand in near and medium term.

Figure 74: North American FRP shipments



Source: Wood Mackenzie, Aluminum Association

Figure 75: North American extrusion shipments



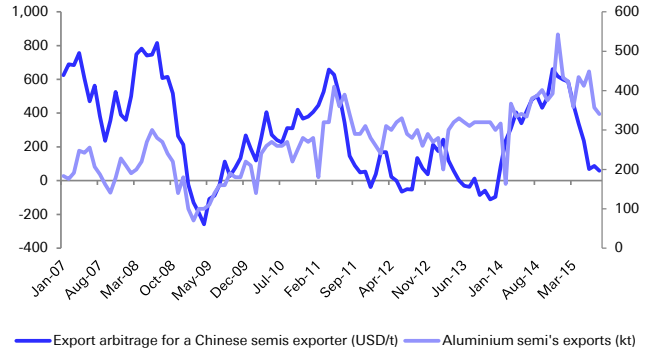
Source: Wood Mackenzie, Aluminum Association

Japanese aluminium demand has been slightly better than our expectations with housing starts were the highest since December 2013. We expect this to support demand for aluminium extrusions over the next few months. Japan's construction sector has been showing modest signs of recovery since March when housing starts edged up by 0.4% year-on-year following a year of decline. Shipments of extrusions, though down by 5% year-on-year, jumped by 18% month-on-month to 66.1kt as higher housing starts translate to increased demand for aluminium windows, doors and exteriors.

Chinese exports fell in August, but the arbitrage is opening up once more.

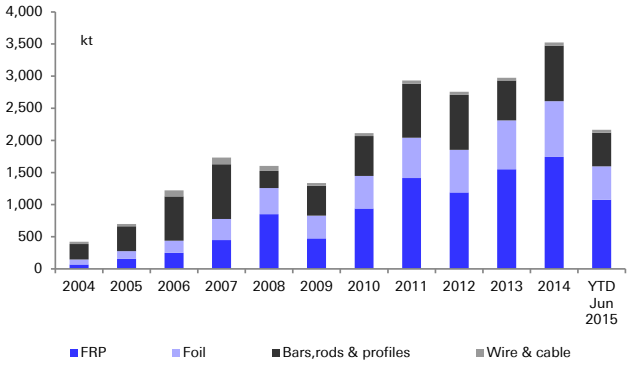
Chinese exports of semi-fabricated products are down c.5% month on month, and down 12% year on year, which is unsurprising given the fall in the arbitrage for exporting semi fabricated products. The arbitrage had fallen to c.USD50 – 60/t over August, although we note that the arbitrage has ticked up slightly over September to USD150/t. In our view this may not be enough to see significant increases towards the end of the year, and with our expectation of improving Chinese prices, the arbitrage opportunity may close again.

Figure 76: Chinese semi exports versus the export arbitrage



Source: Deutsche Bank, Bloomberg Finance LP

Figure 77: Chinese Semi's exports by type



Source: Wood Mackenzie

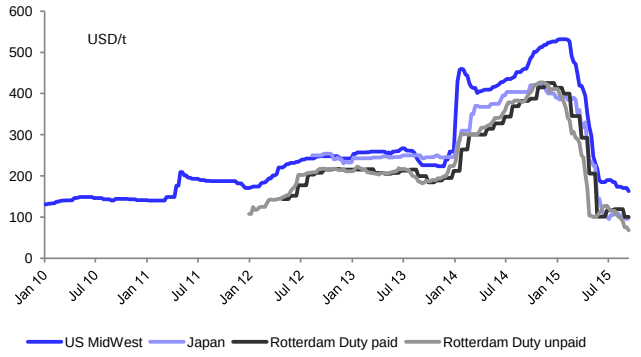
Premiums resume the fall as spreads tighten

Global premiums have staretd to soften once again after a brief period of stability. We attribute this fall to weak sentiment, inventory overhang and the recent tightness in the 3-month LME spreads. In Europe, duty-unpaid premia have fallen to USD68/t, down USD55/t from the middle of June. With the physical market in Europe remaining well supplied while the balance of negotiating power stays on the side of buyers as sellers are becoming more aggressive ahead of the potential October-November backwardation.

The cash to three month spread is down to USD9/t from the average of USD40/t in May to July. The spread continues to tighten suggesting a period of backwardation may follow. The 3 month to 15 month spread has however remain constant, which may prompt more longer dated financing deals, although the longer dated deals tend to carry more premium risk and are thus less popular. The CME premium contract may help to solve the dilemma.

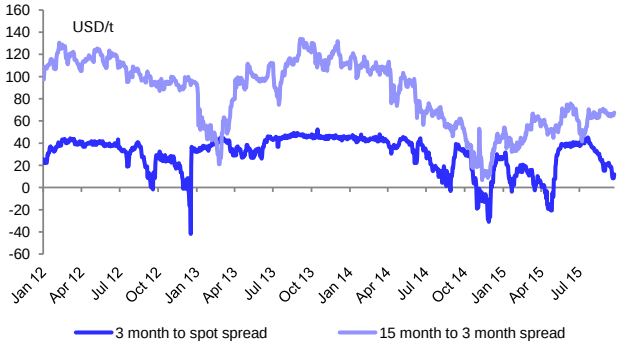
In the US, Midwest premia continued to fall as strong domestic demand and relatively poor orders elsewhere encourage more primary producers to reroute exports into the US. Besides ample supply of metal from the Middle East and Russia, imports of flat rolled products including remelt quality coil continues to arrive from China although at a decreasing rate given that the fall in premia has lowered the export incentive for Chinese mills. A new development in the US market is the sharp fall in trucking costs. Higher US trucking costs had previously been a key factor behind Midwest premia being above those in Europe. Moderate economic growth combined with lower seasonal shipping demand, expanding truck capacity and lower fuel surcharges led to a sequential 24% drop in the cost of freight during July according to the DAT Trucking Index. The dip in spot truck rates is expected to be more structural and long-lasting which should put further pressure on the freight component of Midwest premia and lower the US premia in line to those in Europe.

Figure 78: Western aluminium premiums



Source: Deutsche Bank, Bloomberg Finance LP

Figure 79: Aluminium time spreads



Source: Deutsche Bank, Bloomberg Finance LP

We have cut our US MidWest premium forecasts by c.US20 – 30/t and outline our updated forecasts in the table below:

Figure 80: US MidWest premium forecasts

	USD/t	c/lb
2014	**447**	**20.3**
Q1'15	503	22.8
Q2'15	280	12.7
Q3'15	170	7.7
Q4'15	150	6.8
Avg 2015	**276**	**12.5**
Q1'16	140	6.4
Q2'16	150	6.8
Q3'16	140	6.4
Q4'16	130	5.9
Avg 2016	**140**	**6.4**
2017	140	6.4
2018	130	5.9
2019	130	5.9
2020	150	6.8

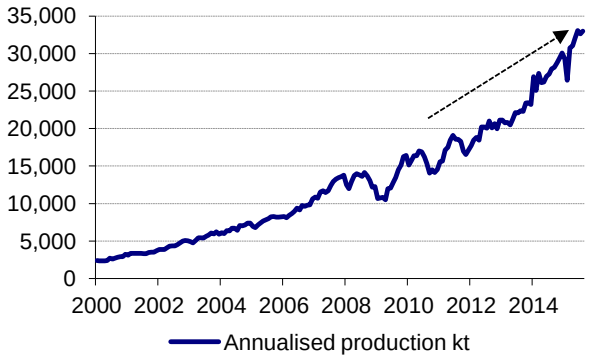
Source: Deutsche Bank, Bloomberg Finance LP

Very few signs of much needed supply cuts

Despite the sharp fall in both prices and premia over the past months, we have seen very few signs of supply cuts. Century Aluminum announced in early August that it taken one 51ktpa potline at its 255kt/a Hawesville smelter offline and indicated there could be other direct cuts at its US smelters. The company also expects some output loss through the attrition process, failing to reline cells as they fail on a normal basis, as a cost saving measure. Vedanta Aluminium halted the ramp-up of its 325kt/a Korba expansion after activating roughly 25% of the new cells. We expect the company to continue the ramp up of the 625ktpa Jharsuguda smelter expansion, simply slower than expected. RUSAL have indicated that they may curtail capacity by 200ktpa but ultimately we expect flat output from the company. Alcoa is reviewing its primary smelting portfolio and could look to rationalize c.500ktpa. We expect both of these announcements to be firmed up by the end of the year given the weak price environment.

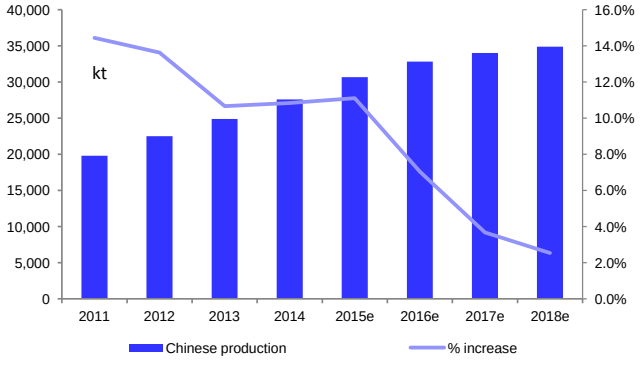
Chinese aluminium output is showing no signs of real restraint. According to channel checks, c.1.5Mtpa of capacity has been shut so far in 2015. China Power Investment (CPI) announced the closure of 550ktpa capacity at three smelters by the end of July. The targeted smelters are Tiantai Aluminium (30ktpa), Qingtongxia Aluminium (270ktpa) and Huanghe Xinye Aluminium (250ktpa). Other announced closures include: Xinheng's shutdown of its 500ktpa Yellow River Qinghai smelter, which started the year at 350ktpa rate before cutting 200ktpa in Q1. Chalco plans to close 200ktpa capacity at its Fushun Aluminium smelter in Liaoning and Dongxing is closing 100ktpa in Longxi County. Chinese authorities have indicated that additional cuts will lift the total curtailment to 2.4Mtpa by the end of 2015. So far there has been no indication of these curtailments in production data. New capacity additions have outstripped curtailments and China is on track to add a further 3.6Mtpa. This implies a net capacity addition of 1.2Mtpa, which is lower than our forecast increase in Chinese smelting output of 2.1Mtpa. August's production was up 1% month on month, propelling output up 16% year to date. If annualize the current run rate, this would suggest a full year output closer to 31Mt versus our forecast of 30.6Mt. We have allowed for a slowdown in output growth in H2.

Figure 81: Chinese aluminium production



Source: NBS, Deutsche Bank

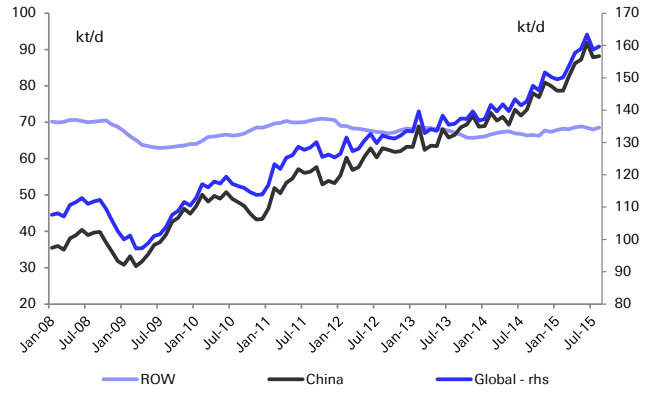
Figure 82:Chinese production forecasts



Source: Deutsche Bank, Wood Mackenzie

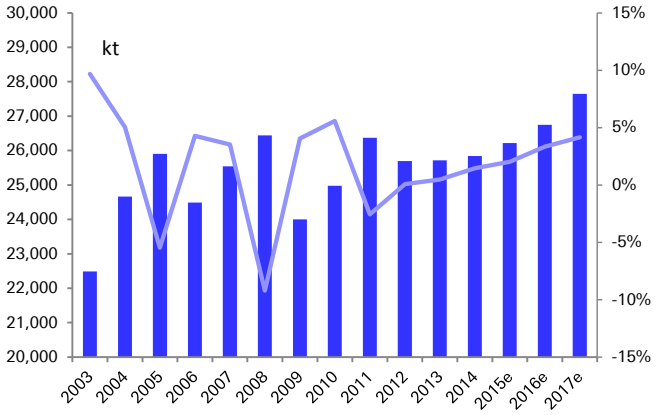
The latest IAI data indicates that global aluminium output is up 0.6% month on month and 12% year on year, driven mainly by Chinese expansions. The ROW production came in at 2,126kt (68.58kt/day), a growth of 0.9% month on month and 3.4% year on year. Increased output from India and indeed Asia ex China up 28% year on year, Western Europe (+6%) and the GCC (+2%) offset declines in Africa, North America and South America. We forecast a 1.5% increase in output from the rest of the world with increases from India, and the Middle East offsetting closures in the rest of the World. This is lower than the growth rate closer to 4% we had forecast previously.

Figure 83: Global aluminium output



Source: Deutsche Bank, IAI

Figure 84:Aluminium production in the world ex China

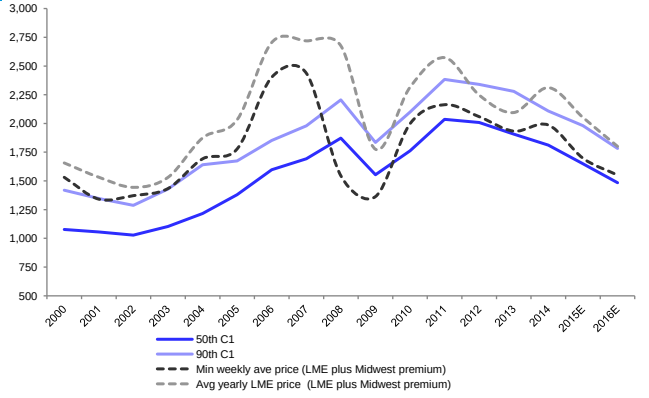


Source: Deutsche Bank, Wood Mackenzie

Gauging cost curve support

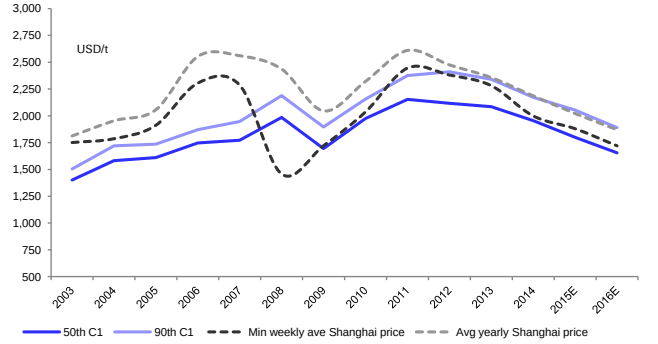
Although cost curves have proved to be less useful in the short term, especially when costs have moved so rapidly, we find the trends over a longer period very informative. As with most of the other metals, costs have been falling over the past few years. Cost deflation started a year earlier because in many instances the price of inputs is linked to the aluminium price. The average price (all in price including premiums) has tracked the 90th percentile whilst the minimum weekly average price has tracked the 50th percentile on the global cost curve. The cutbacks in the world ex China and the subsequent rally in global premiums led to the bump in the all-in price. Given our view of further cost deflation in 2016, combined with a stable premium of c. USD150/t, this would imply an average LME price of USD1,650/t for 2016E and a minimum price of USD1,400/t. The minimum average weekly Shanghai price has also started to track closer to the 50th percentile of the China cost curve. The 2014 bump in Chinese prices was absent which was one of the key reasons for the increase in Chinese exports.

Figure 85: Global cost curve – evolution of the 50th and 90th percentiles



Source: Deutsche Bank, Wood Mackenzie, Bloomberg Finance LP

Figure 86: China cost curve – evolution of the 50th and 90th percentiles

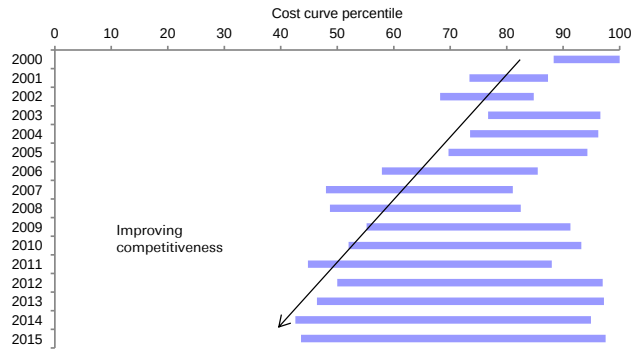


Source: Deutsche Bank, Wood Mackenzie, Bloomberg Finance LP

In Figure 87 below we highlight the spread of Chinese smelters across the cost curve, marking the bottom and the top. As more integrated power has been utilized and better technology has been installed, the Chinese industry has become more competitive, with the most efficient smelters now in the second

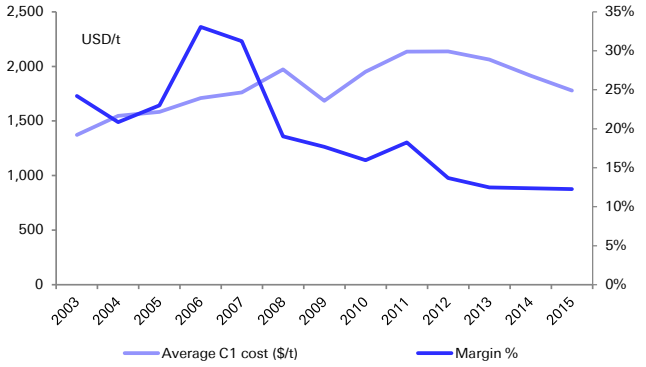
quartile of the cost curve. China has however continued to occupy the top decile of the cost curve too, with higher cost smelters acting either as swing producers, shutting and restarting far quicker than non Chinese smelters. Furthermore local governments keen to meet growth targets have often subsidized power and cut taxes during periods of weak pricing. Whilst this may help individual local governments, this swing production has not helped the overall Chinese industry. The average margin has continued to decline, falling to 12% in 2015.

Figure 87: Chinese smelters on the cost curve: spread lowest to highest



Source: Deutsche Bank, Wood Mackenzie

Figure 88: Average Chinese smelter margin over time



Source: Deutsche Bank, Wood Mackenzie

We estimate that c.30% of the aluminium industry is loss-making, but there are some good reasons why this situation may continue for some time. The logical place for cuts is China, but as we have mentioned the cuts are often temporary and with the assistance of local governments may stay open longer than anticipated. In the industry outside of China, there may be a reluctance to cut capacity to the same extent as July 2013 (c.2Mtpa over a period of 12-months) because all they have to show for it is higher exports from China. In many instances, there has been producer hedging by the high cost smelters, often with the expectation of management to further reduce costs and improve efficiencies. In many instances, producers have long-term alumina or power contracts structured on a take or pay basis. The aluminium industry has high barriers to exit, and a decision to shut is not taken lightly.

Figure 89: Deutsche Bank Aluminium supply –demand balance

		2010	2011	2012	2013	2014	2015E	2016E	2017E	2018E	2019E	2020E
Primary Aluminium												
Chinese Production	Mt	17.3	19.8	22.5	24.9	27.6	30.7	32.8	34.0	34.9	35.7	36.7
growth	%	*28%*	*14%*	*14%*	*11%*	*11%*	*11%*	*7%*	*4%*	*3%*	*2%*	*3%*
Russia Production	Mt	3.9	4.0	4.0	3.7	3.5	3.5	3.6	3.7	4.3	4.7	4.9
growth	%	*4%*	*1%*	*1%*	*-7%*	*-7%*	*2%*	*3%*	*1%*	*17%*	*8%*	*5%*
Middle East Production	Mt	3.1	3.9	4.0	4.3	5.2	5.5	5.5	5.6	5.7	5.7	5.7
growth	%	*25%*	*26%*	*5%*	*6%*	*21%*	*5%*	*1%*	*1%*	*2%*	*1%*	*0%*
Europe & N. American Production	Mt	8.5	9.0	8.5	8.5	8.2	8.3	8.4	8.6	8.7	8.9	9.0
growth	%	*0%*	*6%*	*-6%*	*1%*	*-4%*	*1%*	*2%*	*2%*	*1%*	*2%*	*1%*
Global Production	**Mt**	**42.3**	**46.2**	**48.2**	**50.6**	**53.4**	**56.9**	**59.6**	**61.7**	**63.7**	**65.8**	**68.0**
growth	%	*12.7%*	*9.2%*	*4.4%*	*5.0%*	*5.6%*	*6.4%*	*4.7%*	*3.5%*	*3.3%*	*3.3%*	*3.3%*
check		*42.3*	*46.2*	*48.2*	*50.6*	*53.4*	*57.3*	*61.2*	*63.1*	*63.3*	*65.8*	*66.6*
Global Capacity	Mt	50.3	53.1	55.7	59.8	64.9	69.2	71.0	72.5	74.5	75.7	76.4
utilisation rate	%	*84%*	*87%*	*87%*	*85%*	*82%*	*82%*	*84%*	*85%*	*86%*	*87%*	*89%*
Primary Aluminium Consumption												
China Consumption	Mt	16.7	19.5	21.5	23.9	26.3	27.8	29.5	31.0	32.5	34.0	35.4
growth	%	*18.1%*	*16.4%*	*10.4%*	*11.3%*	*10.0%*	*5.5%*	*6.0%*	*5.2%*	*5.0%*	*4.5%*	*4.0%*
China net imports (exports)	Mt	-0.4	-0.5	0.0	-0.3	-0.8	-2.9	-3.4	-3.0	-2.4	-1.6	-1.3
Developing economies (ex China)	Mt	10.4	11.2	11.4	11.7	12.3	12.7	13.2	13.8	14.4	15.0	15.7
growth	%	*11%*	*8%*	*2%*	*2%*	*6%*	*3%*	*4%*	*4%*	*5%*	*4%*	*5%*
North America	Mt	5.3	5.4	5.9	5.9	6.2	6.5	6.8	7.0	7.2	7.5	7.6
growth	%	9.8%	2.9%	8.8%	0.2%	5.2%	4.5%	3.8%	3.5%	3.2%	3.0%	2.0%
EU 15	Mt	7.9	8.3	8.4	8.5	8.8	9.0	9.2	9.4	9.7	9.9	10.1
growth	%	*11%*	*5%*	*1%*	*1%*	*3%*	*2%*	*2%*	*2%*	*2%*	*2%*	*2%*
OECD Consumption	Mt	13.7	14.0	14.6	14.5	15.1	15.5	15.9	16.2	16.5	16.8	17.0
growth	Mt	*12%*	*2%*	*4%*	*-1%*	*4%*	*3%*	*2%*	*2%*	*2%*	*2%*	*1%*
Global Consumption	**Mt**	**40.8**	**44.7**	**47.5**	**50.1**	**53.8**	**56.0**	**58.6**	**61.0**	**63.5**	**65.8**	**68.1**
check		*40.8*	*44.7*	*47.5*	*50.1*	*53.8*	*56.2*	*58.6*	*61.0*	*63.0*	*65.1*	*67.4*
growth	%	*14.1%*	*9.4%*	*6.4%*	*5.4%*	*7.3%*	*4.2%*	*4.6%*	*4.1%*	*4.1%*	*3.7%*	*3.4%*
Production adjustments	*Mt*				*0*	*0*	*0*	*-660*	*-598*	*-1,018*	*-552*	*102*
Market balance	**Mt**	**1.45**	**1.51**	**0.67**	**0.50**	**-0.32**	**0.87**	**1.01**	**0.68**	**0.22**	**0.00**	**-0.07**
Avg. LME cash price	**$/t**	**2,191**	**2,423**	**2,052**	**1,889**	**1,893**	**1,705**	**1,613**	**1,680**	**1,800**	**2,038**	**2,276**
Avg. LME cash price	**c/lb.**	**99**	**110**	**93**	**86**	**86**	**77**	**73**	**76**	**82**	**92**	**103**

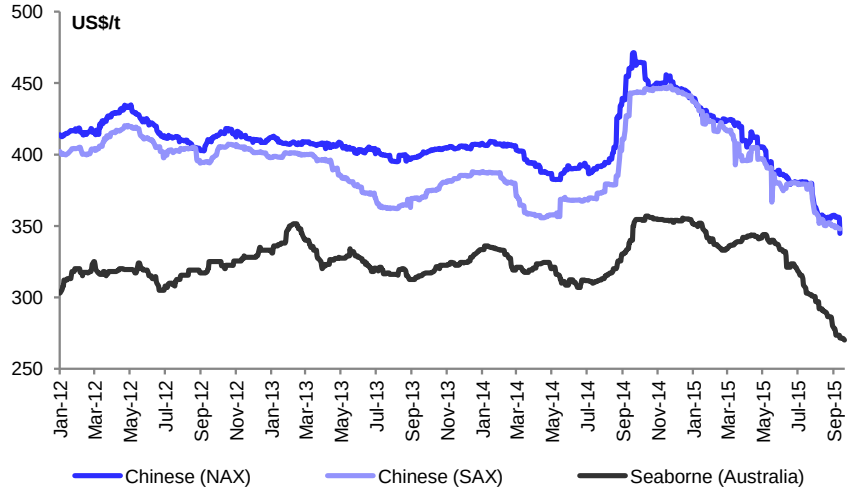
Source: Wood Mackenzie, Deutsche Bank

Alumina:- Fundamentals strong despite price decline

The alumina price has suffered together with the aluminium in 2015 but not due to Chinese exports but because of an oversupply in the Atlantic region and a slowdown in Chinese imports following a 21% YoY increase in Chinese domestic alumina production. This increase in domestic production has been fueled by capacity additions in the central and northern parts of China, predominately in Shanxi, Henan and Shandong provinces which have been fed by new bauxite supply from Malaysia and Australia. The availability of cheaper lower grade ore from Malaysia has meant that China has not needed to import as much alumina as in prior years. Chinese alumina imports are down 23% YoY however have rebounded recently with the sell-off in the seaborne alumina price.

As a result of an oversupplied Chinese domestic market, the seaborne alumina price has fallen from US$350/t to US$270/t since October 2014 following the lead of the domestic Chinese alumina price which has fallen from a peak of US$471/t in October 2014 to US$345/t as at 25 September. The price of alumina in Northern China is priced differently to that in Southern China. CM Group splits the two regions by publishing a northern (NAX) and southern (SAX) alumina price index which we have shown in Figure 90. Market liquidity is higher in the North.

Figure 90: Chinese (US$/t) and Australian (US$/t FOB) alumina price

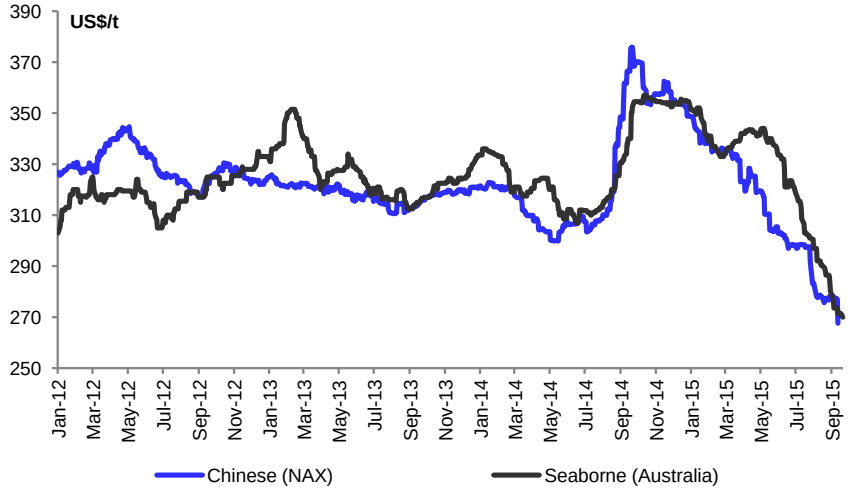


Source: Deutsche Bank, Bloomberg, CM Group, Platts

Interestingly, the Australian seaborne price (Platts) is now trading at a discount to the Chinese alumina price after adjusting for the 17% VAT, freight and quality differential. This arbitrage has resulted in a rebound in Chinese alumina imports (see Figure 91) in July and August indicating that the seaborne price may have found a support level.

The spot alumina price is now below the theoretical support of US$280-290/t level determined by several of the major global alumina producers based on when a significant amount of Chinese production that relies on imported bauxite starts to generate cash losses.

Figure 91: Australian alumina a slight premium over the Chinese NAX price

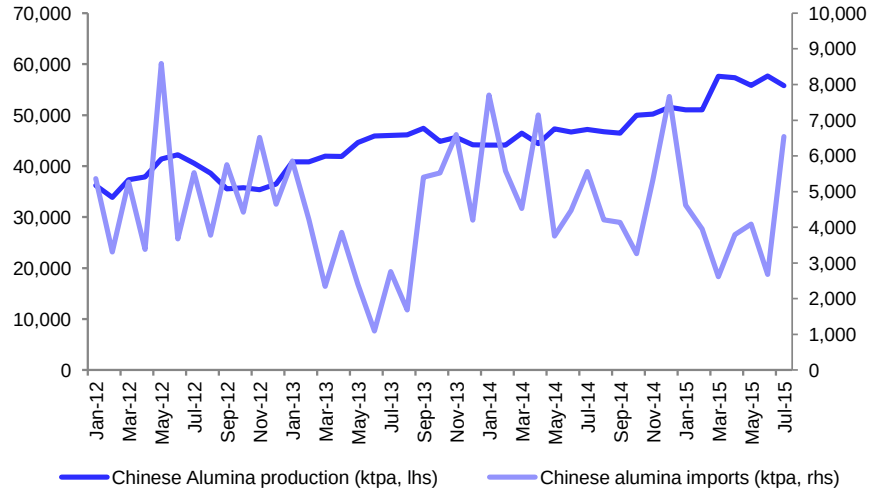


Source: Deutsche Bank, Bloomberg, CM Group, Platts

The key question now is has the seaborne price found a floor and are the strong fundamentals still intact. We believe so. Based on our analysis of the higher cost Chinese refineries we calculate that over 10% or c. 6Mtpa of China's c. 57Mtpa of alumina production is currently running at cash losses. This excludes any integration benefits with aluminium smelting such as in Shandong. Despite this, we are not aware of any capacity cuts in China. We have even heard of a price war between Xinfa and Jinjiang Group in Northern China with both companies competing for market share.

We also think there is some production outside of China operating at a loss including several refineries in India and the Atlantic. It is therefore likely that further curtailments will be announced in addition to Alcoa's recent decision to close its 2.2Mtpa Paranam refinery in Suriname. Though this refinery was only operating at a rate of just 0.8Mtpa.

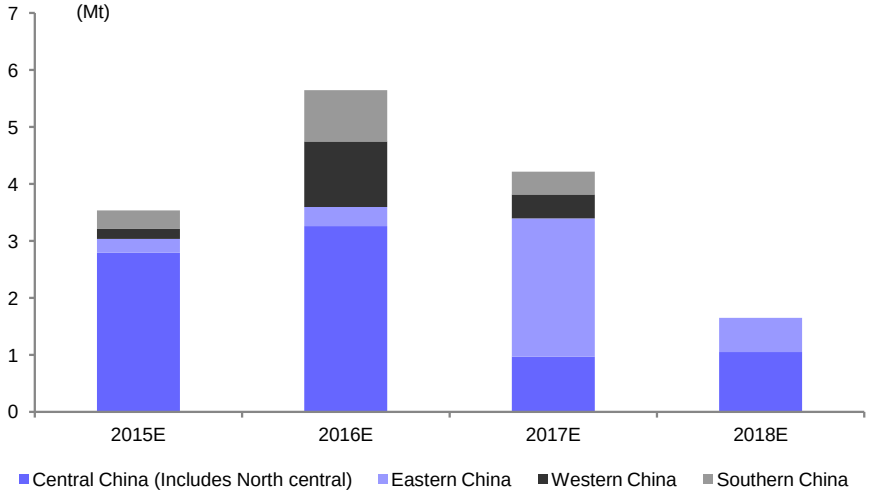
Figure 92: Chinese domestic alumina production and alumina imports



Source: Deutsche Bank, Chinese NBS data

Based on our outlook for Chinese aluminium demand we expect Chinese alumina production to increase by 9% in 2015 to 57Mt and 7% in 2016 to 61Mt. The majority of this new capacity will be supplied by seaborne bauxite rather than domestic Chinese bauxite production in our view. An example is Chalco and Shenhua's recent announcement to study a new 4Mtpa refinery on the coast in Hebei. If approved, first production from the new refinery is likely in 2018. The refinery would likely consume up to 10Mtpa of seaborne bauxite (ratio of 2.6-2.7:1) through Huanghua Port and the alumina produced will likely be sold to central and western China, such as Inner Mongolia and Xinjiang. We have also heard that Hongqiao plans to expand one of their Shandong refineries by 2Mtpa.

Figure 93: Chinese alumina production growth (by region)



Source: Deutsche Bank, Wood Mackenzie

Turning to the alumina price outlook, with the current arbitrage between Australian and Chinese alumina prices and the fact that some Chinese production appears to be running at a loss we expect the seaborne alumina price to stabilise at current levels. The global cost curve is moving lower with the drop in currencies and energy prices however the seaborne bauxite price remains around US$60/t and should strengthen over the next few years due to a lack of new supply until Rio Tinto's South of Embley project commences production in 2018 or 2019.

With the majority of new Chinese alumina production set to consume imported bauxite due to the declining quality of domestic bauxite (AS ratios are dropping) and the fact that most larger deposits are located in Shanxi and in the South (Guangxi and Guizhou) then we think there is limited scope for the Chinese to lower their refining costs other than through economies of scale. As a result we forecast the seaborne alumina price to increase moderately to US$315/t in 2016 and then increase to our revised long run real price of US$330/t by 2021.

Figure 94: Revised alumina price forecasts (US$/t FOB Australia)

	Spot	2014A	1Q15A	2Q15A	3Q15F	4Q15F	2015F	2016F	2017F	2018F	2019F	2020F	LT (nom)	LT (real)
Alumina Index (US$/t)	275	327	340	325	286	290	310	315	335	350	370	390	394	330
% Change		0%	0%	0%	-9%	-8%	-4%	-3%	-1%	0%	-3%	-3%	-8%	-8%

Source: Deutsche Bank, Platts

We have tested both for a theoretical floor and ceiling for the seaborne alumina price based on our view that China will continue to add cheap low capital intensity refining capacity. We believe that the long run alumina price should be set at least by the cash flow break-even of Chinese marginal cost refineries located in Shandong province. Based on a long run bauxite price of US$50/t (CIF) we calculate that a seaborne alumina price US$290-300/t is required to keep these refineries cash flow positive (see Figure 94). However a price of US$340-350/t is required to generate a 10% IRR for a new Shandong refinery assuming capital intensity of US$800/t. Therefore we think higher prices are required to incentivise new capacity additions in China beyond 2020. This analysis assumes the current RMB/USD exchange rate. We have used the rough average of these two numbers to derive our new long run alumina price of US$330/t FOB Australia.

Furthermore, we expect the long-term alumina price floor to be set by lower cost integrated alumina production in Guangxi and Guizhou provinces which have access to better quality domestic bauxite. Our analysis shows that these refineries start generating cash losses at around US$260/t.

Figure 95: Price and cost analysis of a Chinese alumina refinery in Shandong

Assumption/parameter	Unit	Cash flow positive	10% IRR	Comments
Chinese alumina price (NAX)	US$/t (CFR)	375	480	
VAT adjustment	US$/t	-64	-82	17%
Freight	US$/t	-15	-15	Panamax from Australia to China
Equivalent FOB Australia price	**US$/t (FOB Aus)**	**296**	**383**	
Costs				
Bauxite	US$/t (CFR)	50	50	
VAT adjustment	US$/t	9	9	17%
Bauxite conversion rate	Bauxite to Alumina	2.7	2.7	
Bauxite	**US$/t China**	**158**	**158**	
Transport (port charges and rail from Chinese port)	US$/t	20	20	Port and rail
Caustic soda price	US$/kg	280	280	
Caustic Soda consumption rate	kg/t of Alumina	175	175	
Total Caustic Soda cost	US$/t	49	49	
Limestone/lime and soda ash	US$/t	10	10	
Caustic / Lime / Limestone / Ash	US$/t	59	59	
Total Energy	US$/t	77	77	
Labour	US$/t	7	7	
Other costs	US$/t	30	30	
Operating unit costs	**US$/t**	**-324**	**-324**	
EBITDA	US$m	102	312	
Depreciation	US$m	-55	-55	
Interest (5.5%)	US$m	-72	-72	
Corporate Tax (25%)	US$m	0	-46	
Sustaining capex	US$m	-30	-30	
Growth capex	US$m	0	-1,600	Based on US$800/t
FCF	**US$m**	**0**	**164 (pre-growth capex)**	

Source: Deutsche Bank, CM Group, Wood Mackenzie

Figure 96: Deutsche Bank Alumina supply –demand balance

		2010	2011	2012	2013	2014	2015E	2016E	2017E	2018E	2019E	2020E
Alumina												
China alumina production	Mt	31.0	39.2	43.0	47.2	51.4	57.3	61.0	65.0	62.6	62.2	62.8
growth	%	*30%*	*26%*	*10%*	*10%*	*9%*	*11%*	*6%*	*7%*	*-4%*	*-1%*	*1%*
Oceana alumina production	Mt	20.1	19.6	21.6	21.8	20.8	20.4	21.1	21.3	21.4	21.4	21.4
growth	%	*-1%*	*-2%*	*10%*	*1%*	*-5%*	*-2%*	*4%*	*1%*	*0%*	*0%*	*0%*
LatAm	Mt	13.6	15.0	14.2	13.6	13.6	13.3	12.8	13.0	14.4	15.3	15.6
growth	%	*3%*	*10%*	*-5%*	*-5%*	*1%*	*-2%*	*-4%*	*1%*	*11%*	*6%*	*2%*
North America	Mt	5.3	5.7	6.1	6.8	6.6	6.5	6.6	6.8	7.1	7.1	7.1
growth	%	*25%*	*7%*	*6%*	*12%*	*-3%*	*-1%*	*0%*	*4%*	*4%*	*0%*	*0%*
India	Mt	3.6	3.9	3.8	3.7	4.9	5.5	6.1	6.8	7.3	7.7	8.0
growth	%	*-2%*	*8%*	*-3%*	*-1%*	*33%*	*12%*	*9%*	*12%*	*7%*	*6%*	*4%*
Europe	Mt	8.2	8.6	8.1	8.3	8.3	8.5	8.8	8.9	8.9	9.0	9.0
growth	%	*23%*	*5%*	*-6%*	*3%*	*0%*	*2%*	*4%*	*1%*	*1%*	*1%*	*1%*
Russia	Mt	2.9	2.8	2.7	2.7	2.6	2.6	2.7	2.9	3.1	3.1	3.1
growth	%	*2%*	*-1%*	*-4%*	*-2%*	*-3%*	*1%*	*4%*	*8%*	*6%*	*0%*	*0%*
Other Regions & projects	Mt	3.5	3.4	3.2	3.3	3.2	4.2	5.7	4.9	8.1	13.3	16.2
growth	%	*6%*	*-3%*	*-5%*	*1%*	*-1%*	*31%*	*35%*	*-14%*	*65%*	*63%*	*22%*
Global alumina production	**Mt**	**88.2**	**98.2**	**102.6**	**107.3**	**111.5**	**118.4**	**124.8**	**129.6**	**132.9**	**139.1**	**143.3**
growth	%	*13%*	*11%*	*4%*	*5%*	*4%*	*6%*	*5%*	*4%*	*0%*	*1%*	*1%*
Global alumina consumption (total)	**Mt**	**89.2**	**97.0**	**100.7**	**105.8**	**111.4**	**118.4**	**124.3**	**128.8**	**133.1**	**137.4**	**141.8**
growth	%	*15%*	*9%*	*4%*	*5%*	*5%*	*6%*	*5%*	*4%*	*3%*	*3%*	*3%*
Alumina used for industrial applications	Mt	6.0	6.5	6.5	6.9	7.0	7.5	8.2	8.6	8.9	9.1	9.2
growth	%	*26%*	*8%*	*0%*	*6%*	*3%*	*6%*	*9%*	*5%*	*4%*	*1%*	*1%*
Smelter grade alumina (SGA) consumptio	Mt	83.2	90.5	94.3	98.9	104.3	110.9	116.2	120.3	124.2	128.3	132.6
growth	%	*14%*	*9%*	*4%*	*5%*	*5%*	*6%*	*5%*	*4%*	*3%*	*3%*	*3%*
Ratio to Al production		*1.97*	*1.96*	*1.96*	*1.95*	*1.95*	*1.95*	*1.95*	*1.95*	*1.95*	*1.95*	*1.95*
Alumina market balance	**Mt**	**-0.97**	**1.24**	**1.89**	**1.44**	**0.11**	**-0.01**	**0.44**	**0.76**	**-0.27**	**1.69**	**1.55**
Avg spot alumina price	$/t	333	374	318	329	327	312	315	335	350	370	386

Source: Wood Mackenzie, Deutsche Bank

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Zinc: The Spectre of Hidden Inventory

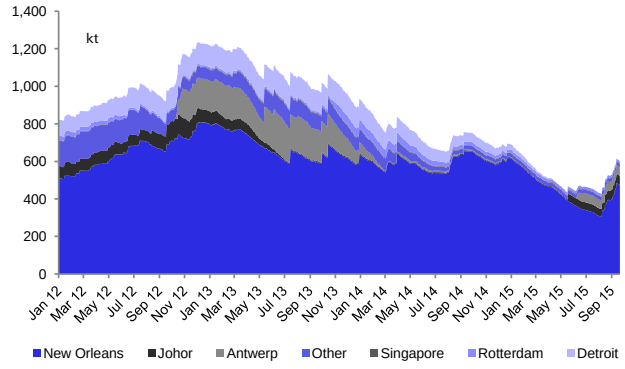
- Hidden inventory which made its way onto the LME post the Qingdao scandal was the undoing of Nickel last year. The c.170kt inflow of metal into the New Orleans warehouses has raised a similar fear in Zinc. In Nickel the flood of metal was due to creditors demand more secure collateral in the form of an LME warrant. In Zinc it may simply be a case of market participants wanting to reduce working capital for the sake of short term liquidity, or reducing balance sheet risk. The key difference however is that the zinc market has been in a deficit for the past few years whilst the nickel market was in a significant surplus. We think this means that the scale of "hidden" inventory is likely to be lower in zinc. Nevertheless, Zinc is now trading roughly in line with sister metal.
- Given the less than inspiring Chinese macro indicators, and the slowing zinc specific demand indicators, we have cut our Chinese demand forecasts by 0.5% over the next three years. These were low to start with. We still estimate that the zinc market will be in a modest deficit for the next few years. However this forecast relies on relatively robust Chinese mined supply growth (above the trend of the last few years), which has not been the case so far in 2015E. It also relies on some degree of success by the industry to bring on new supply. Any bouts of price weakness will make this a challenge for some of the junior miners. As a result, we think risks are skewed to the upside and we forecast zinc prices to rise in 2016 and 2017E, by an average of 10% per annum.

Blame it on NOLA.

The zinc price is down 24% YTD, with prices falling by almost 20% since the end of Q2'15. As with the other base metals, the price drop was driven by the strengthening USD, heightening concerns over the health of the Chinese economy, all compounded by the devaluation of Yuan. The catalyst for the recent USD150/t drop was however the sharp rise in inventories in the New Orleans LME warehouses (NOLA for short). The sharp and sudden inflow of metal is in an odd location, given that US demand indicators (Auto sales remain relatively robust) and one would expect more inflows into the Johor due to its proximity to China. The concern in the zinc market is that there are significant stockpiles of hidden inventory, which are now being dumped onto the LME, as financial institutions, consumers and producers face balance sheet scrutiny. Whilst this concern is not totally without foundation as demonstrated by the nickel market last year, we would point out that the nickel market has been in a surplus for a number of years, whilst the zinc market has been in a deficit for a number of years.

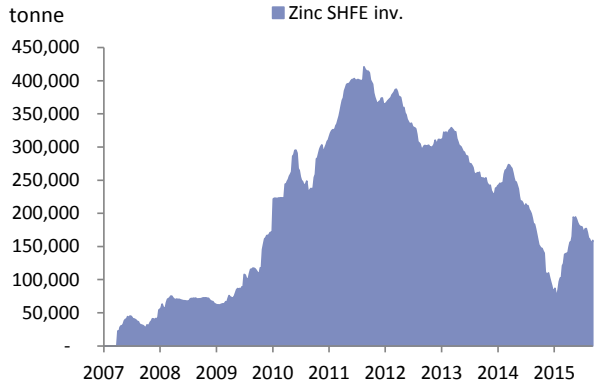
Overall exchange stocks increased significantly over the past month, with LME inventory up 40% or 173kt since the middle of August. Most of the accumulation has been in New Orleans, with modest inflows in Johor and Antwerp. The recent inflow into New Orleans is more sustained compared to previous inflows over the past two years.

Figure 97: LME zinc inventories by location



Source: Deutsche Bank, Bloomberg Finance LP

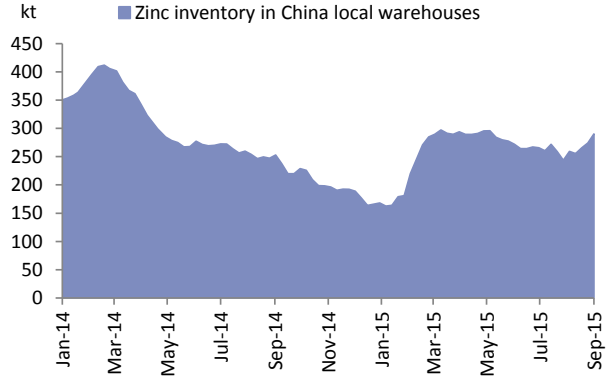
Figure 98: Zinc inventories on the SHFE



Source: Deutsche Bank, Bloomberg Finance LP

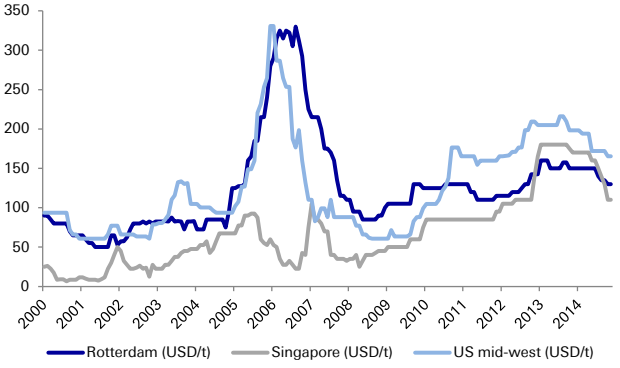
Although SHFE inventories by 11% Q-o-Q to 159kt in September, total warehouse inventories have also started to climb, suggesting demand has started to soften in China. European premiums have continued to soften, but US and Asian premiums have stabilized. We would point out that general trend has been down since the middle of last year.

Figure 99: Total zinc inventory in Chinese warehouses



Source: SMM, Deutsche Bank

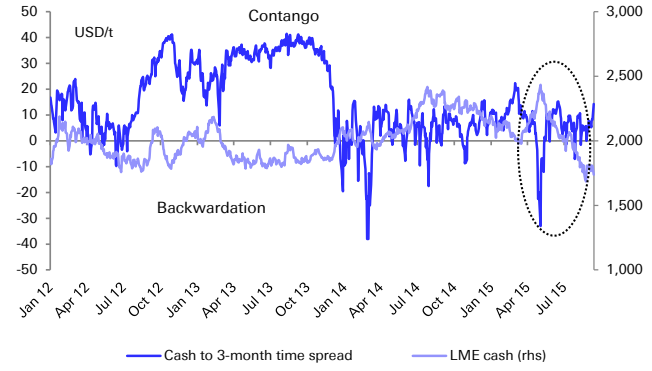
Figure 100: Global zinc premiums – falling modestly



Source: Wood Mackenzie, Deutsche Bank

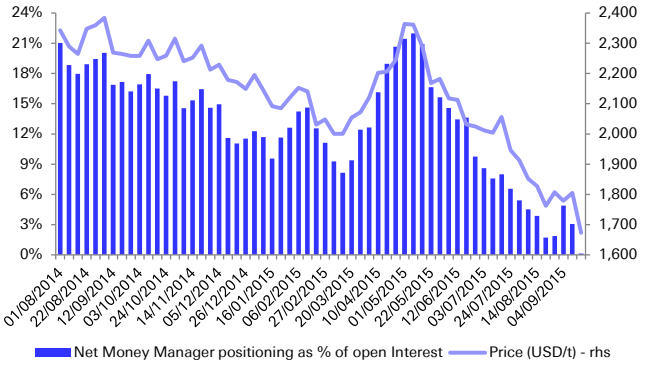
Investor positioning is a reflection of the waning enthusiasm for zinc. The net money manager positioning on the LME decreased substantially from a peak of 22% of the open interest at the beginning of May to 0% by the end of September. The latest build up of short positions is in our view an expectation of further liquidation of inventories by producers which may be struggling with liquidity.

Figure 101: Cash to 3-month time spreads



Source: Bloomberg Finance LP, Deutsche Bank

Figure 102: Net Money positioning as a % of open interest



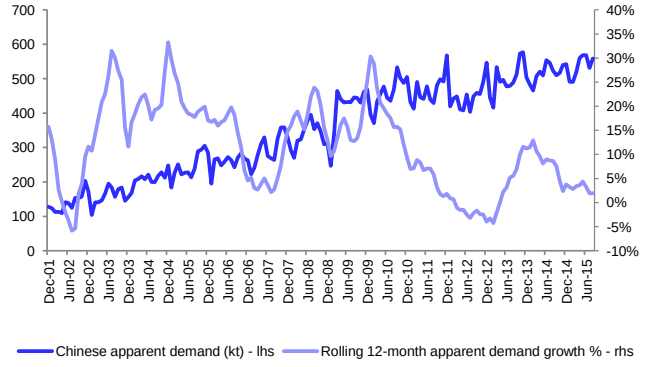
Source: Bloomberg Finance LP, LME, Deutsche Bank

Downgrading demand as Auto's and consumer durables disappoint

Although galvanized sheet production has recovered post Chinese year, the recovery has been modest with August production down c.7% year on year, while year to date the production is up c.5.4%. production has declined quite sharply over the past two months. Consumer durables are up c.10% year to date for the first eight months of year, versus and increase of 18% last year, and have also declined over the past two months. Channel checks suggest that inventory levels are high, and may limit further production growth over the remainder of the year. Chinese passenger vehicles sales are slowing. The year-to-date growth is marginally up at 2.6% and it falls short of our recently revised 4 – 5% growth range. Aug sales were down 3 4% year on year

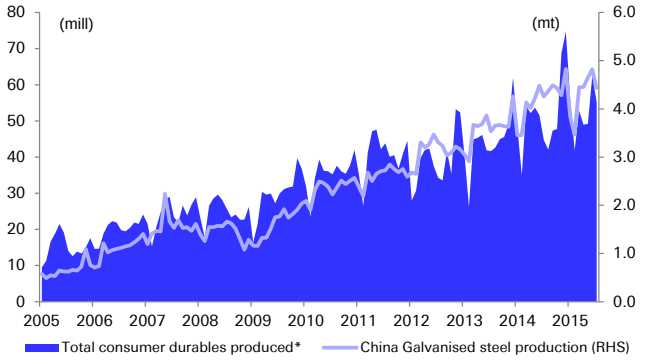
We note that apparent zinc demand (Refined zinc production plus net imports) has modestly lagged galvanised sheet production growth, and is only up 4.3%, which is below our revised 4.0% demand growth number. A significant driver of zinc demand in China remains the construction sector, accounting for 50% of zinc demand. Within the construction component of demand, infrastructure is at least half of that. Infrastructure project starts have been sluggish this year, partly attributable to the on-going anti-corruption campaign and the lack of revenues at the local government level due to poor land sale auctions. Although Residential construction remains weak as the fall in Real Estate fixed asset investment indicates, property sales have started to improve, especially in the tier 1 and tier 2 cities. Nevertheless, given the slowing apparent 12 month rolling apparent demand growth (1.9% in August), we have trimmed our demand forecast by 0.5%. Although we expect

Figure 103: Chinese apparent demand – rolling 12 month YoY



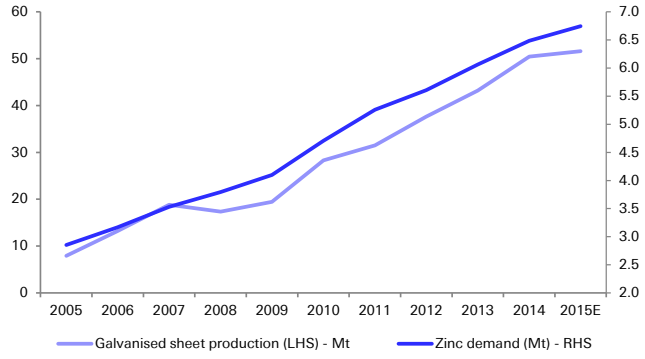
Source: Deutsche Bank, NBS

Figure 104: China consumer durable* sales vs galvanized steel production



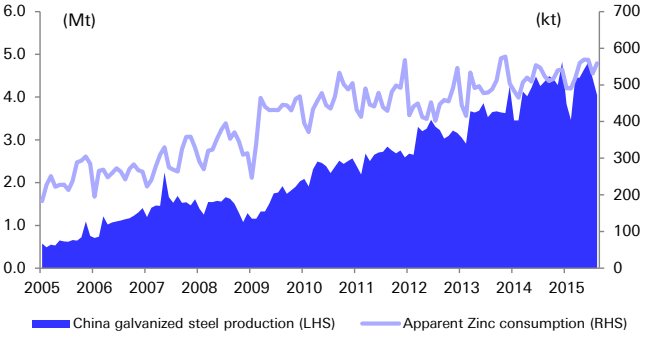
*Source: Bloomberg Finance LP, NBS, Deutsche Bank, *Washing machines, oven, Air conditioners and Refrigerators*

Figure 105: Domestic galvanized sheet production versus Chinese zinc demand



Source: CEIC, Deutsche Bank, Bloomberg Finance LP

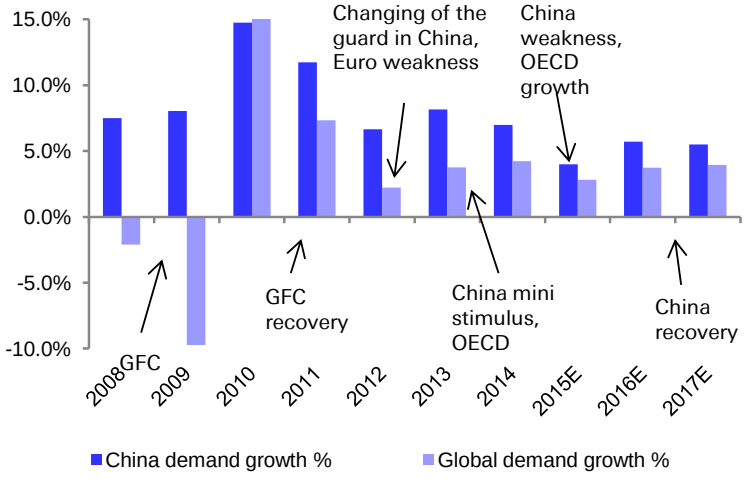
Figure 106: Chinese galvanized steel production versus apparent* zinc consumption



*Source: Bloomberg Finance LP, NBS, Deutsche Bank, *Apparent zinc consumption = refined production plus net imports*

We outline our revised zinc demand growth expectations in the chart below:

Figure 107: Zinc demand growth: China will continue to drive global growth

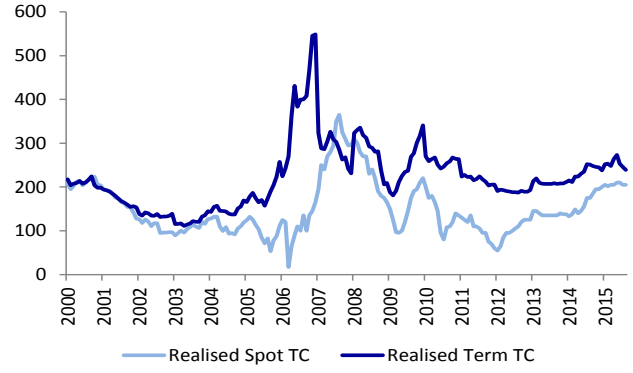


Source: Deutsche Bank, Wood Mackenzie

Strong Chinese production from imported concentrates

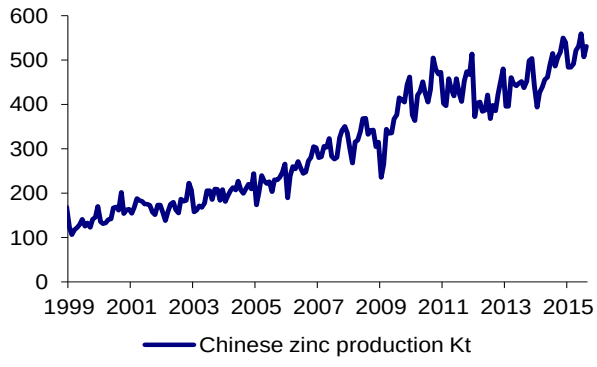
Chinese refined zinc production is up 12% year to date, which is well ahead of the 8% increase in 2014, and our 10% forecast for 2015E. August production was up 9% year on year. Spot TC's are up by USD72/t since the beginning of the 2014, to USD205/t. The improving smelter profitability will ultimately spur on latent capacity restarts and improving utilization. Our global refined metal output estimate growth rate for 2015E is 5.4%, marginally ahead of our mined output forecast growth of 5.2%.

Figure 108: Zinc TC's (USD/t of conc.)



Source: Wood Mackenzie, Deutsche Bank

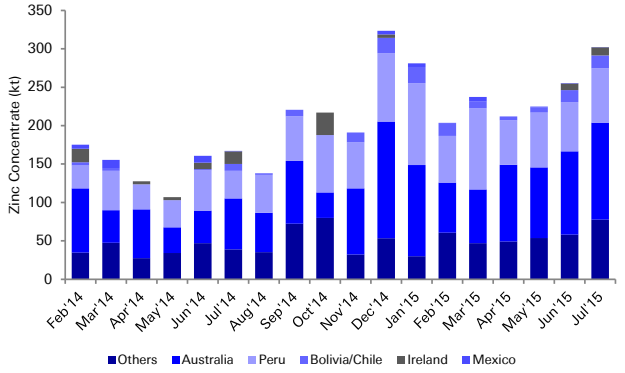
Figure 109: Chinese refined zinc production



Source: NBS, Deutsche Bank

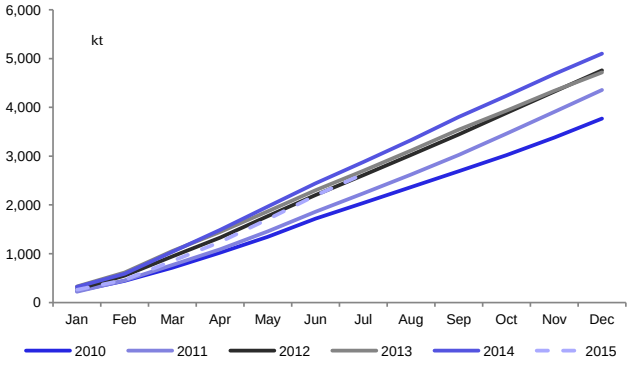
China's concentrate imports of 302kt gross weight in July were up 81% year on year. The year to date total is 1717kt which is up 92% year on year. This indicates the good availability of concentrate in Australia and Peru, again highlighting the fact that zinc market is not "tight" in 2015. Minor countries like Indonesia and Morocco also improved their exports to China in July. Imports from Ireland improved to 11kt in July, but far from October 2014 levels of 29kt, thereby indicating weak production at the Tara and the Lisheen mines. Chinese mined supply has had a slow start to the year, and although the vagaries of reporting notwithstanding, the year to date output is down c.13%. This is perhaps a further reason for the increase in zinc concentrate imports.

Figure 110: Chinese zinc concentrate imports by destination



Source: Deutsche Bank, Wood Mackenzie

Figure 111: Chinese mined zinc output

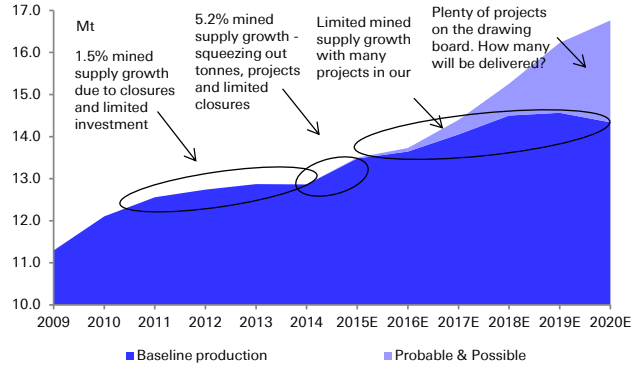


Source: Wood Mackenzie, Deutsche Bank

Cutting into the cost curve for the first time this year

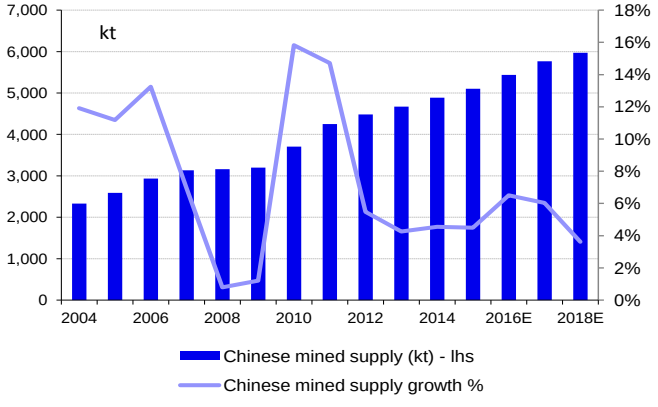
The zinc market does have some unique characteristics in contrast to copper. Given the higher grade and smaller scale of individual mines, the approval and construction time tends to be much shorter, 4 – 5 years versus 8 – 10 in copper. The capex intensity is also much lower and therefore the barriers to entry are also much lower. As a result the supply base is more fragmented and in the hands of junior producers. This is perhaps the reason why the looming deficit always seems to be two years out; supply can respond quickly enough to meet the deficit. However, the closure of two big mines (Century and Lisheen) this year will impact supply growth next year. Given that much of the supply is in the hands of junior miners, a protracted bout of price weakness may delay the response. We forecast a modest increase in mined supply next year of 1.7% before a recovery to 4.9% in 2017E. We would however point out that the mined supply growth in 2017E is dependent on the ramp-up of projects which are either in construction or still have to be built. Our forecast also assumes a relatively strong mined supply growth from China of 4 – 6% for 2015 – 2018E, which given the YTD performance looks optimistic.

Figure 112: Zinc mined supply growth



Source: Deutsche Bank, Wood Mackenzie

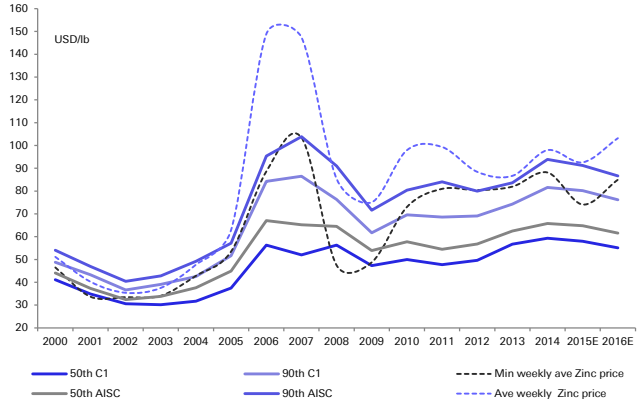
Figure 113: Chinese Zinc mined supply growth



Source: Deutsche Bank, Wood Mackenzie

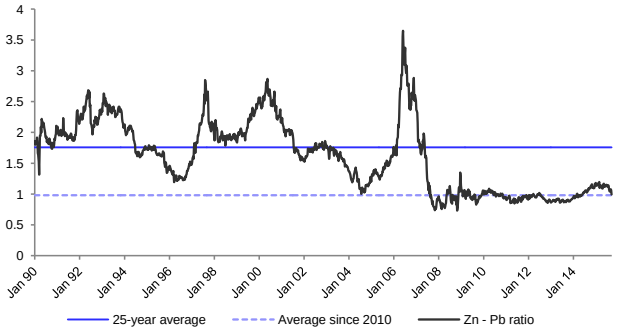
The second difference between zinc and copper is that cash costs for zinc have been a lot flatter than copper, not rising much in the 2010 – 2012 period, but also not falling by much subsequently. We expect some cost deflation in 2016e, but far less than in copper. The average weekly zinc price has tended to track above the marginal cost (90th percentile of the all in sustaining cost) whilst the minimum weekly zinc price has also tracked at the marginal cost. The anomaly has been 2015E, where the minimum weekly average has fallen below the 90 th percentile in the past month. We forecast 2016 to be closer to 2011, with the average price well above the cost curve and the minimum price at the 90 the percentile of the all in sustaining cost.

Figure 114: Evolution of the zinc cost curve since 2000



Source: Deutsche Bank, Wood Mackenzie

Figure 115: Zinc – Lead ratio



Source: Deutsche Bank, Bloomberg Finance LP

Figure 116: Global zinc supply & demand model

		2010	2011	2012	2013	2014	2015E	2016E	2017E	2018E	2019E	2020E
China mine production	Mt	3.7	4.2	4.5	4.7	4.9	5.1	5.4	5.8	6.0	6.1	6.1
China mine production growth	%	*16%*	*15%*	*5.5%*	*4.3%*	*4.5%*	*4.5%*	*6.5%*	*6.0%*	*3.6%*	*1.4%*	*0.8%*
Australia mine production	Mt	1.5	1.5	1.5	1.5	1.5	1.6	1.3	1.2	1.4	1.3	1.2
Australia mine production growth	%	*13%*	*0%*	*0%*	*0%*	*2%*	*8%*	*-23%*	*-3%*	*11%*	*-2%*	*-7%*
Peru mine production	Mt	1.4	1.2	1.2	1.2	1.2	1.4	1.5	1.4	1.4	1.4	1.4
Peru mine production growth	%	*-2%*	*-15%*	*0%*	*5%*	*-3%*	*15%*	*6%*	*-4%*	*2%*	*0%*	*-2%*
North America mine production	Mt	1.9	2.0	2.0	1.8	1.8	1.9	2.0	2.1	2.0	2.0	2.0
North America mine production growth	%	*1%*	*5%*	*0%*	*-9%*	*0%*	*6%*	*7%*	*3%*	*-2%*	*0%*	*-4%*
India mine production grow th	Mt	0.7	0.7	0.7	0.8	0.7	0.8	0.7	0.9	1.0	1.0	0.9
India mine production growth	%	*4.6%*	*3.5%*	*-1.7%*	*13.0%*	*-13.5%*	*6.9%*	*-6.0%*	*22.1%*	*8.3%*	*2.1%*	*-4.4%*
European mine production	Mt	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
European mine production growth	%	*3.3%*	*0.9%*	*1.2%*	*-3.0%*	*2.4%*	*0.7%*	*-1.4%*	*-3.1%*	*3.3%*	*-5.9%*	*0.6%*
World Mine Production	**Mt**	**12.10**	**12.56**	**12.74**	**12.87**	**12.86**	**13.50**	**13.73**	**14.40**	**15.26**	**16.23**	**16.76**
World Mine Production Growth	%	*7%*	*3.7%*	*1.4%*	*1.0%*	*-0.1%*	*5.0%*	*1.7%*	*4.9%*	*6.0%*	*6.4%*	*3.3%*
Concentrate for smelting	Mt	12.10	12.56	12.74	12.87	12.86	13.50	13.73	14.40	15.26	16.23	16.76
Secondary & other zinc	Mt	0.9	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.3	1.3	1.4
Losses	Mt	0.7	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.6	0.7
Total Refined output	**Mt**	**12.71**	**12.97**	**12.45**	**12.94**	**13.28**	**13.98**	**14.61**	**15.29**	**15.98**	**16.92**	**17.47**
World refined availability growth	%	*14%*	*2.0%*	*-4.0%*	*3.9%*	*2.6%*	*5.2%*	*4.5%*	*4.7%*	*4.5%*	*5.9%*	*3.3%*
China Refined Consumption	Mt	4.7	5.3	5.6	6.1	6.5	6.7	7.1	7.5	7.9	8.3	8.6
Consumption growth	%	*14.8%*	*11.7%*	*6.6%*	*8.2%*	*7.0%*	*4.0%*	*5.7%*	*5.5%*	*5%*	*5%*	*4%*
US Refined Consumption	Mt	1.2	1.3	1.4	1.4	1.5	1.5	1.6	1.6	1.6	1.7	1.7
Consumption growth	%	*6%*	*5.9%*	*6.2%*	*0.1%*	*5.3%*	*2.8%*	*2.5%*	*2.0%*	*2%*	*2%*	*2%*
Europe Refined Consumption	Mt	1.9	1.9	1.8	1.7	1.8	1.8	1.8	1.9	1.9	1.9	1.9
Consumption growth	%	*20.5%*	*3.1%*	*-7.9%*	*-0.9%*	*2.8%*	*1.2%*	*1.3%*	*1.8%*	*1%*	*1%*	*1%*
Brazil/India/Russia Refined Consumption	%	1.0	1.1	1.1	1.1	1.1	1.1	1.2	1.2	1.3	1.4	1.5
Consumption growth		*15.9%*	*7.8%*	*4.3%*	*2.0%*	*-2.7%*	*1.7%*	*5.0%*	*6.4%*	*6%*	*5%*	*5%*
World Refined Consumption	**Mt**	**11.69**	**12.55**	**12.83**	**13.31**	**13.87**	**14.26**	**14.80**	**15.38**	**15.96**	**16.52**	**17.05**
World Refined Consumption Growth	%	*15.7%*	*7.3%*	*2.2%*	*3.8%*	*4.2%*	*2.8%*	*3.7%*	*3.9%*	*3.8%*	*3.5%*	*3.2%*
Market balance	**Mt**	**1.02**	**0.42**	**-0.38**	**-0.37**	**-0.59**	**-0.28**	**-0.18**	**-0.08**	**0.02**	**0.41**	**0.43**
Exchange stocks	Mt	3.48	3.90	3.52	3.15	2.57	2.28	2.10	2.02	2.04	2.44	2.87
Reported-stock-to-consumption ratio	Wks	15.5	16.1	14.3	12.3	9.6	8.3	7.4	6.8	6.6	7.7	8.7
Annual average LME cash prices	**USD/t**	**2,158**	**2,212**	**1,965**	**1,940**	**2,164**	**2,021**	**2,275**	**2,450**	**2,700**	**2,779**	**2,857**
Annual average LME cash prices	**USc/lb**	**98**	**100**	**89**	**88**	**98**	**92**	**103**	**111**	**123**	**126**	**130**

Source: Deutsche Bank, Wood Mackenzie

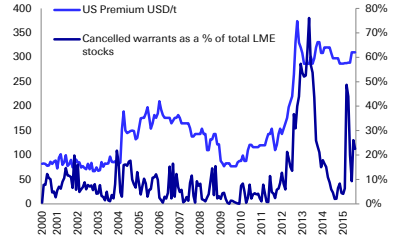
Lead: Resilient and Steadfast

- Given that lead is the heaviest of the base metals, it is apt that the metal has been the most resilient in the face of the price rout seen in the metals. Lead is the best performing base metal in the complex, only down 9% year to date. We would describe the fundamentals as solid, but certainly not spectacular, with modest deficits (100 – 200kt) over the next two to three years. Given the relatively low inventories, we forecast prices to recover from their current lows. However, we think it is unlikely that the price will remain sustainably above USD2,000/t.
- Lead also fell as a result of the negative Chinese sentiment during the stock market rout. Lead prices bottomed at USD1,640/t at the end of August, levels seen last in 2009. Although US and European vehicle sales remain strong, Chinese sales have slowed down weighing on battery demand. The slowdown of Chinese battery demand in conjunction with the maturing e bike market and a slow-down in base station construction by telecom operators has continued to weigh on demand. Slowing mine production from China, Europe and Australia will however more than offset this slowing demand.

The cancelled warrants ease lower once more, but stocks keep falling

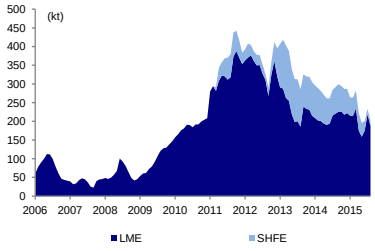
Inventory levels were volatile throughout Q3'15 and ended marginally down quarter on quarter at 168kt. Cancelled warrants as a percentage of LME inventory increased from 9% at the start of July to 25% by end of August and subsequently fell to 13% in September. SHFE stocks continue to fall and are now below 14kt, which is at all time low. US premiums have been steady throughout the year at decent levels, signaling decent regional demand.

Figure 117: US premiums vs cancelled warrants



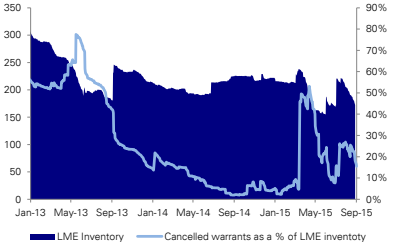
Source: Deutsche Bank, Bloomberg Finance LP, Wood Mackenzie

Figure 118: Lead exchange inventory



Source: Deutsche Bank, Bloomberg Finance LP

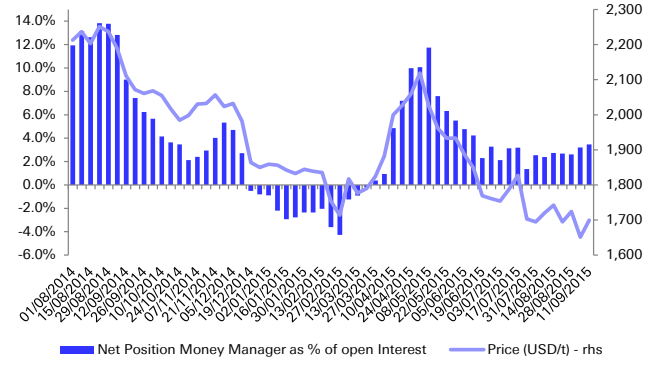
Figure 119: LME Inventory vs LME cancelled warrant as % of inventory



Source: Deutsche Bank, Bloomberg Finance LP

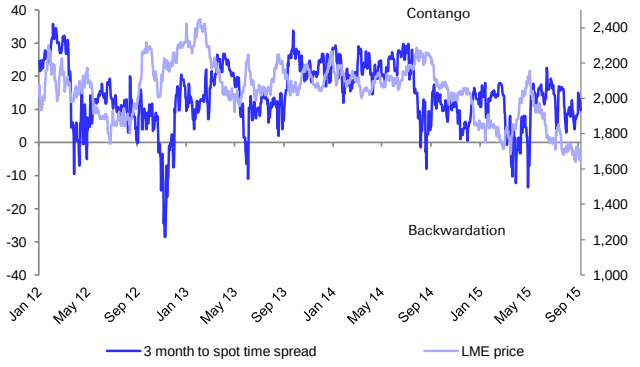
Positioning in the influential money manager category on the LME was relatively flat throughout Q3'15; around (3-4%). Prices moved down by only 3% Q-o-Q on concerns of Chinese economy, while other base metals fell by a bigger margin. Lead is still the best performer year to date with prices down by only 8% in a overall tough period for commodities. The market has moved back into a customary contango position, after the brief periods of backwardation.

Figure 120: Net Money manager positions - % of open interest



Source: Deutsche Bank, LME

Figure 121: Lead near-term time spreads

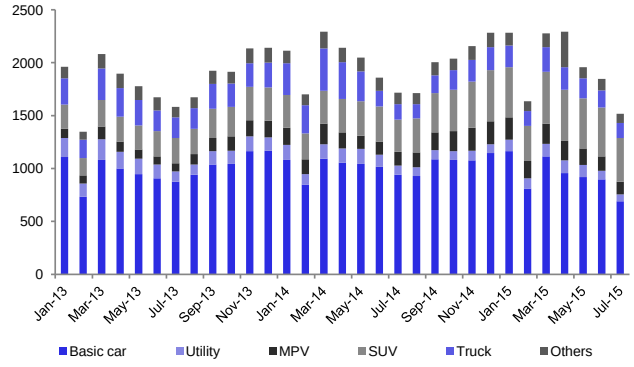


Source: Deutsche Bank, Bloomberg Finance LP

We remain positive on the medium term outlook for lead as we forecast modest growth (1%) in Chinese mine production in 2015. Chinese refined lead production has fallen by 5% year to date as on July 2015. Tougher pollution control standards set by the Chinese government on both primary and secondary production will lead to supply tightness in refined Lead metal. However the falling Chinese passenger vehicle and e bike sales offset the fall in supply and place the lead market in a small deficit in 2015.

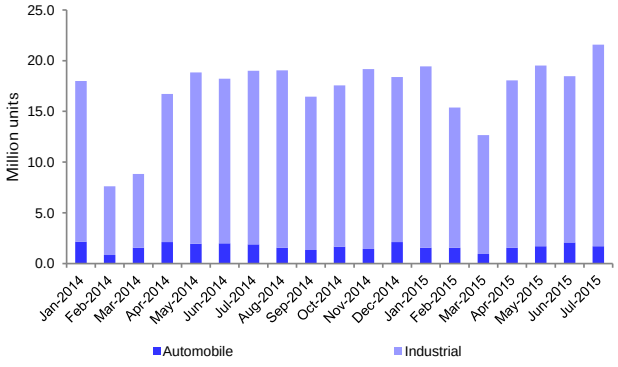
Chinese passenger vehicles sales have dropped in Q3 with July/August sales down 6.6% and 3.4% y-o-y respectively. Cumulative passenger vehicle sales year to date have slowed down to 2.6%, the lowest since 2009. The sale of commercial vehicles continued to suffer with July/August sales down 10% and 1% y-o-y respectively. Along with slowing Auto sales, the Chinese battery sector continues to struggle with excess capacity and tough competition which has impacted margins. This over capacity translates to exports and after a sluggish restart after the Chinese New Year, Industrial battery exports in July increased by 16% y-o-y to 19.9m units. At the same time automobile batteries export fell by 10% y-o-y to 1.7m highlighting the falling cyclical demand in replacement batteries. Demand from mobile telephone networks segment continued to slowdown with19.7M new mobile base stations installed in July. Installation was down 48% month on month and the cumulative growth for first seven months was down 30% year to date at 153.4M units. The fall in Chinese PV sales has resulted in build up of SLI battery inventories and production has slowed down. July production was down c.9% month on month to 17.2MkVAh, while down c.12% year to date for the first seven months.

Figure 122: Slowing Chinese PV sales take its toll on SLI battery production (thousand units)



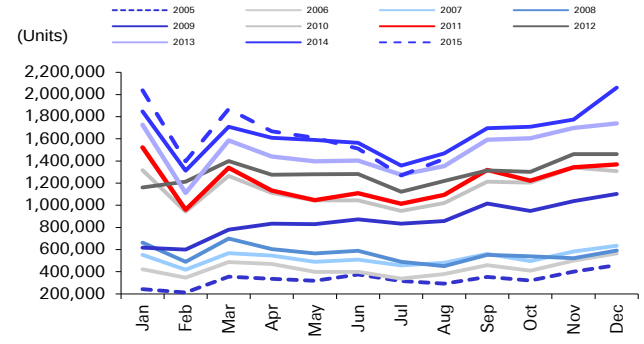
Source: Deutsche Bank, Wood Mackenzie

Figure 123: Chinese battery exports have recovered



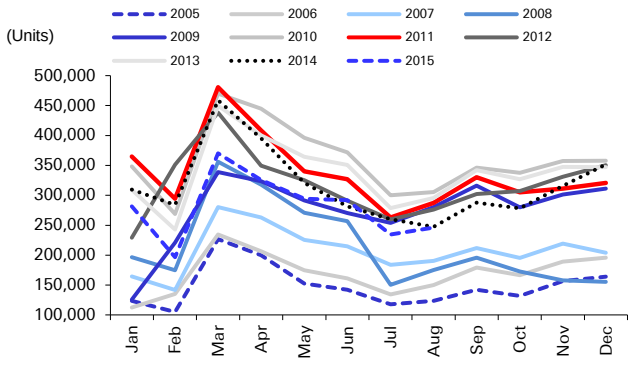
Source: Deutsche Bank, Wood Mackenzie

Figure 124: Passenger Vehicles sales in China



Source :Wood Mackenzie Deutsche Bank

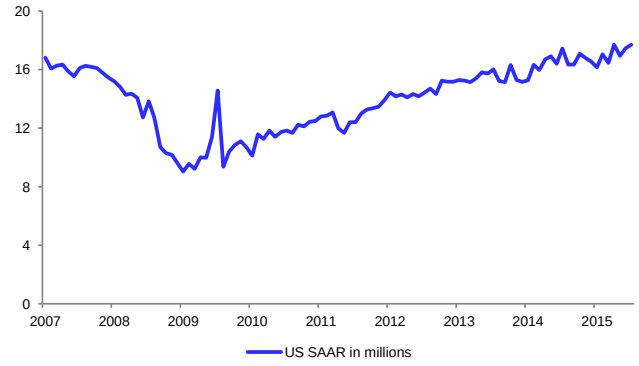
Figure 125: Commercial Vehicles sales in China



Source: Wood Mackenzie Deutsche Bank k

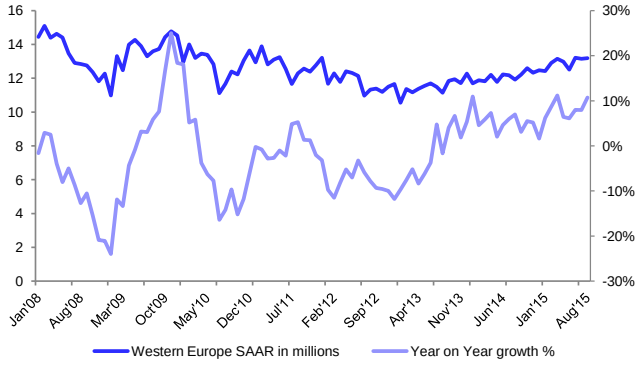
The US car sales and SUV sales remain robust thanks to the lower gasoline prices, which in turn is good for the battery and lead demand. Passenger vehicles sales increased up by c.7% / 3% in July/August y-o-y. Western European automobile sales have been robust in Q3'15 with July and August sales up year on year by c.8% and11% respectively. Western European SAAR for August stood at 13.2MM. Start-Stop vehicles (SSVs) constitute less than 10% of new vehicles at present are bound to increase significantly by 2020. This will impact the traditional SLI automobile battery sales and also impact the recycling rate of batteries as SSVs batteries have a longer life. Johnson Controls Inc. has two plants in China and have commissioned another plant which is supposed to start production by 2018 at 6M units per annum.

Figure 126: US auto sales



Source: Deutsche Bank, Bloomberg Finance LP

Figure 127: Western European auto sales

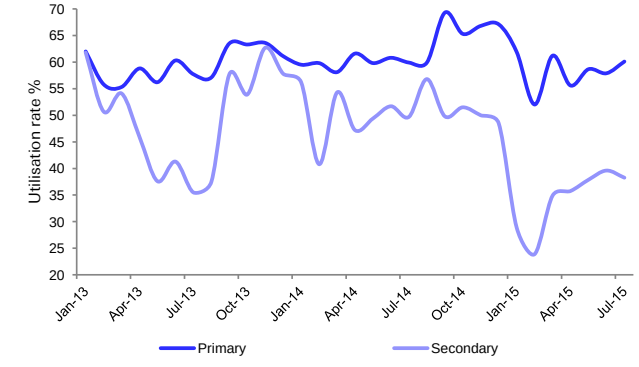


Source: Bloomberg Finance LP, Deutsche Bank

The Chinese primary and secondary utilization levels remain lower than that of 2014 The Chinese secondary smelting industry has been squeezed to unsustainable levels, due to high scrap prices and a maturing e-bike market. E-bikes are the major market for secondary lead and the utilization rate in Jul'15 was 38%, c.13% below Jul'14. In contrast there has been am improvement in primary smelter utilization due to a combination of improving TC's and the positive arbitrage between the SHFE and the LME.

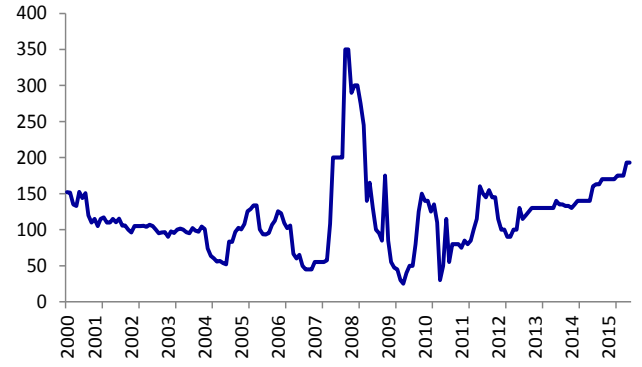
The positive arbitrage between SHFE and LME widened to above USD100/t in August from around USD40/t in June. This translates to about USD250/t from Spot TC and arbitrage for concentrates. This favorable arbitrage leads to an increase in concentrate imports and July figures increased by 27kwmt from June to 131kwmt. The spot TCs have increased in July and have remained stable in August at USD190-195/t, suggesting a continued tightening in concentrate supply.

Figure 128: Chinese Primary vs Secondary Smelter utilization rate



Source: Deutsche Bank, National Statistic Bureau

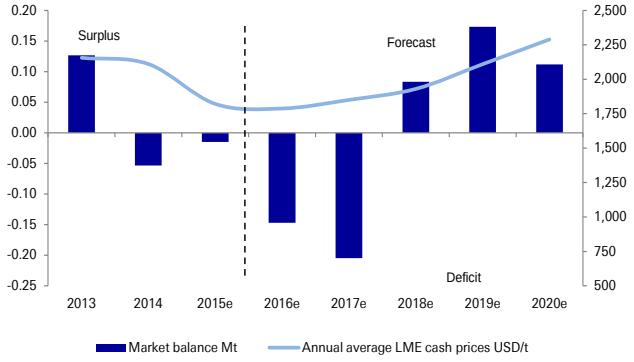
Figure 129: Lead TCs (USD/t)



Source: Deutsche Bank, Wood Mackenzie

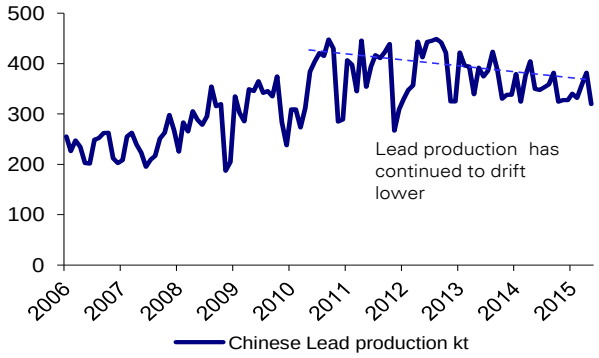
We forecast mined production to be up by 2% at 5.53Mt in 2015 and 5.67Mt in 2016. Our forecast for total refined production is 12.19Mt, a growth of 4% y-o-y outstripping mined supply growth as scrap availability improves and secondary capacity increases meaningfully, predicated on improving prices. This assumption will however be dependent on an improvement of scrap to LME spreads. We forecast global consumption to grow by 3.7% to 12.2Mt, leaving the market in a slight deficit for a second year in a row. 2015 - 2017 is a period of low mined growth. The key event is the closure of Century in late 2015 which leads to a 13% drop in Australian output.

Figure 130: Global lead market balance



Source: Deutsche Bank, Wood Mackenzie

Figure 131: Chinese lead production



Source: Deutsche Bank, NBS

Figure 132: Global Lead supply & demand model

		2011	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
China mine production	Mt	2.3	2.5	2.8	3.0	3.0	3.0	3.0	3.0	3.0	3.0
China mine production growth	%	*28%*	*7%*	*14%*	*5%*	*1%*	*0%*	*0%*	*0%*	*0%*	*0%*
Australia mine production	Mt	0.6	0.6	0.7	0.7	0.7	0.6	0.6	0.6	0.6	0.6
Australia mine production growth	%	*-11%*	*-1%*	*15%*	*3%*	*-2%*	*-13%*	*7%*	*-1%*	*6%*	*-4%*
Peru mine production	Mt	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Peru mine production growth	%	*-11%*	*7%*	*9%*	*7%*	*10%*	*1%*	*-3%*	*0%*	*-4%*	*0%*
North America mine production	Mt	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.6	0.6
North America mine production growth	%	*3%*	*2%*	*-2%*	*2%*	*13%*	*0%*	*1%*	*0%*	*-1%*	*-4%*
World Mine Production	**Mt**	**4.49**	**4.72**	**5.22**	**5.40**	**5.53**	**5.60**	**5.73**	**6.17**	**6.52**	**6.80**
World Mine Production Growth	%	*12%*	*5%*	*11%*	*3%*	*2%*	*1%*	*2%*	*8%*	*6%*	*4%*
Losses	Mt	0.29	0.30	0.32	0.33	0.36	0.35	0.36	0.38	0.40	0.42
Scrap	Mt	1.0	0.8	0.7	0.8	1.0	0.9	0.9	1.0	1.0	1.1
Production at Primary Refineries	Mt	5.0	5.1	5.5	5.7	6.1	6.1	6.3	6.8	7.1	7.3
Secondary refined prodcution	Mt	5.4	5.7	5.9	6.0	6.1	6.3	6.5	6.7	6.9	7.0
Total Refined Availability	**Mt**	**10.43**	**10.85**	**11.41**	**11.71**	**12.19**	**12.45**	**12.79**	**13.46**	**13.95**	**14.30**
World refined availability growth	%	*8%*	*4%*	*5%*	*3%*	*4%*	*2%*	*3%*	*5%*	*4%*	*3%*
China Refined Consumption	Mt	4.2	4.7	5.1	5.4	5.7	5.9	6.2	6.5	6.7	7.0
Consumption growth	%	*6%*	*12%*	*8%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*	*5%*
NAFTA (US, Canada, Mexico)	Mt	1.7	1.8	1.7	1.7	1.8	1.8	1.8	1.8	1.8	1.8
Consumption growth	%	*3%*	*1%*	*-3%*	*3%*	*1%*	*1%*	*1%*	*1%*	*1%*	*1%*
Japan	Mt	*19%*	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Consumption growth	%	*-2%*	*9%*	*1%*	*2%*	*2%*	*-2%*	*-2%*	*-2%*	*-2%*	*-2%*
EU (15)	Mt	*131%*	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3	1.3
Consumption growth	%	*3%*	*-3%*	*1%*	*1%*	*2%*	*1%*	*0%*	*-1%*	*-1%*	*-1%*
Brazil/India/Russia Refined Consumption	Mt	0.9	1.0	1.1	1.2	1.3	1.3	1.4	1.5	1.6	1.6
Consumption growth	%	*5%*	*12%*	*8%*	*7%*	*6%*	*6%*	*6%*	*5%*	*5%*	*5%*
World Refined Consumption	**Mt**	**10.14**	**10.77**	**11.29**	**11.76**	**12.20**	**12.60**	**13.00**	**13.38**	**13.77**	**14.18**
World Refined Consumption Growth	%	*5%*	*6%*	*5%*	*4%*	*4%*	*3%*	*3%*	*3%*	*3%*	*3%*
Market balance	**Mt**	**0.29**	**0.08**	**0.13**	**-0.05**	**-0.01**	**-0.15**	**-0.20**	**0.08**	**0.17**	**0.11**
Exchange stocks	Mt	1.33	1.46	1.59	1.54	1.52	1.37	1.17	1.25	1.43	1.54
Reported-stock-to-consumption ratio	Wks	6.8	7.1	7.3	6.8	6.5	5.7	4.7	4.9	5.4	5.6
Annual average LME cash prices	**USD/t**	**2,391**	**2,074**	**2,156**	**2,111**	**1,821**	**1,788**	**1,850**	**1,930**	**2,110**	**2,290**
Annual average LME cash prices	**USc/lb**	**108.5**	**94.1**	**97.8**	**95.8**	**82.6**	**81.1**	**83.9**	**87.6**	**95.7**	**103.9**

Source: Deutsche Bank, Wood Mackenzie

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#9 Steel-Making Materials

Steel: - Downgrading Chinese steel demand

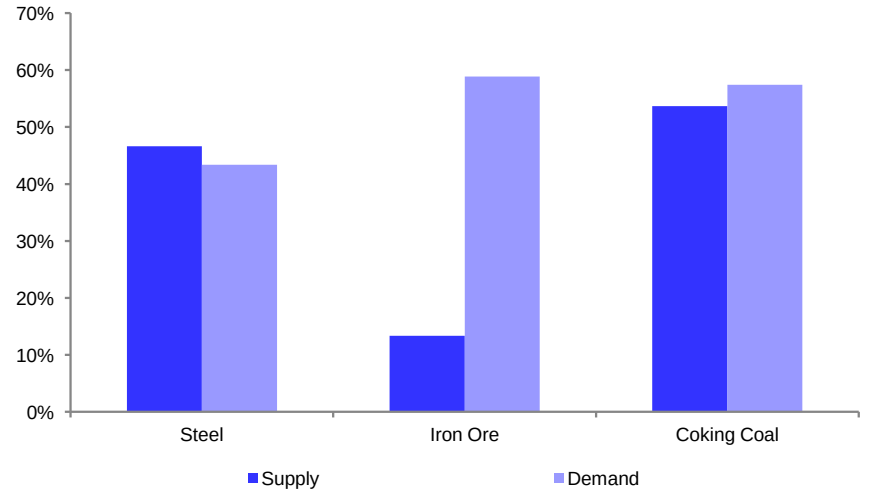
- We continue to think the residential construction sector will be the catalyst to spark a recovery in the Chinese steel sector. However, we expect the recovery to be more muted that previously forecast. Our revised forecast for 2016E underlying demand is now +0.8% versus +2.5% previously. There are four reasons for our forecast downgrade; 1) The lag between a recovery in property sales and steel production is proving to be longer than in previous cycles, with lower tier city inventory levels higher than in previous cycles. 2) The combination of a fiscal crunch (less revenue at the government's disposal due to a collapse in land sales) and corruption investigations into many of the State Owned Entities (SOE's) has resulted in more muted infrastructure spend. 3) A weak property market has had a far greater secondary impact on the rest of demand components, especially consumer durables such as home appliances and goods, and 4) lastly reduced global trade is likely to have an impact on other steel consuming sectors such as shipping and containers
- Stable Chinese port inventories and steel mill inventories indicate that the market is currently in balance. This "balance" is temporary in our view and is only due to declining domestic output and lower exports from many of the non-traditional exporting countries as low prices force out many of the high cost producers. Despite these cuts, we estimate that a further supply cut of c.60 – 70Mt in the mid-tier producers from Australia and Brazil will required in a low steel demand growth environment to balance the market. This will only happen at lower prices, and we see a minimum six month period of sub USD50/t prices to force these closures.
- Despite the weak price environment, there have been very little in the way of supply cuts. Both Teck Resources and Peabody tried to do their bit, with Teck idling some of their Canadian mines over the summer and Peabody idling some of their Australian mines. This was not enough and the Q4 settlement is down another USD4/t to USD89/t. Supply-side adjustments continue to play catch up, and have proved to be insufficient to offset weak Chinese steel demand, a more efficient domestic production base, rising Chinese steel cannibalizing Asian demand and coke exports, weakening producer currencies including the RMB most recently. Over 30% of the seaborne market is loss- making on our forward-looking cost curve, so we do expect further cuts which will ultimately stabilize the price. This is unlikely before end 2016, in our view

A muted rebound in Chinese steel for 2016E

The weak Chinese domestic steel market has sent waves across both the **Iron ore and Coking Coal** markets. Not only has weak domestic steel demand led to imports being either down year on year in the case of coking coal or flat in the case of iron ore, but increasing Chinese exports of steel and coke have displaced production around the world. As an example, increasing steel exports have displaced domestic output in the US, and increasing coke exports to Japan have displaced coking coal imports. These imports are due to two reasons; excess Chinese capacity is being exported, but in many instances Chinese raw material production has become far more competitive, and is now more willing to compete against the more traditional suppliers in order to retain and win market share. We would, however, argue the Iron ore supply side has adapted far quicker to these challenges than the coking coal market. But it does boil down to China's disadvantaged position in iron ore versus coking coal, which, in our view, makes the structure of the iron ore market more attractive versus coking coal.

Chinese steel and coking coal markets are roughly balanced.

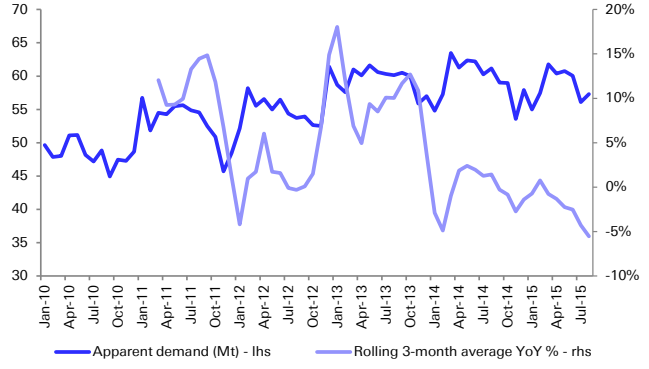
Figure 1: Chinese demand and supply as a percentage of global output (2015E)



Source: Deutsche Bank, Wood Mackenzie

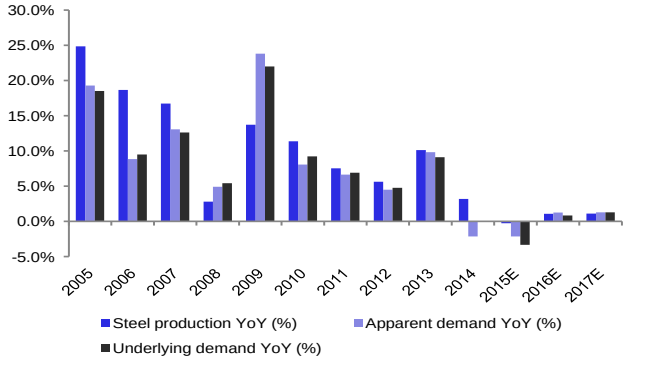
We estimate that apparent steel demand in China is down 2.9% year to date, which equates closely with our revised estimate for the full-year of -2.1% and underlying demand down -3.3%. An increase in exports means that production is roughly flat year on year. We continue to think that the residential construction sector will be the catalyst to spark a recovery in the Chinese steel sector. However, we expect the recovery to be more muted that previously forecast. Our revised forecast for 2016E underlying demand is now +0.8% versus +2.5% previously. We forecast the recovery to extend through to 2017E, with underlying demand up 1.3%.

Figure 2: Chinese apparent steel demand - monthly



Source: Deutsche Bank, NBS, Bloomberg Finance LP

Figure 3: Chinese steel demand and production



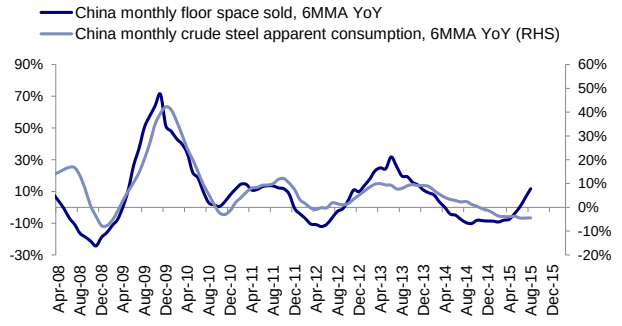
Source: Deutsche Bank, NBS, Wind

Four reasons to downgrade Chinese steel forecasts

There are four reasons for our downgrade:

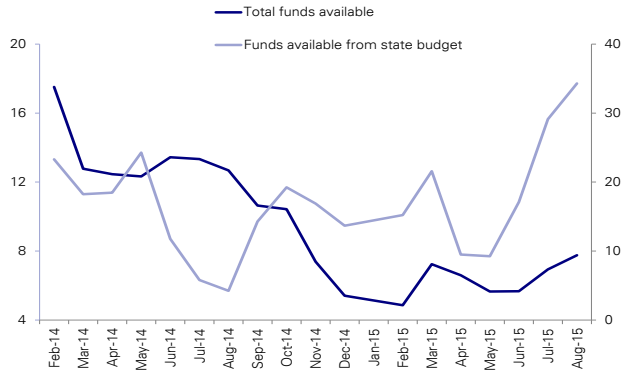
- The lag between a recovery in property sales and steel production is proving to be longer than in previous cycles. Although property inventory levels (month of supply) have trended towards more normal levels, this is more of a tier 1 and tier 2 city phenomenon. The inventory data on the lower tier cities is less reliable but channel checks suggest that these remain high. Tier 3 and lower tier cities remain c.65% of sales in terms of volumes (square metres sold). This means that from a steel market perspective, the sales momentum is not in the right place. Our China Property team does expect inventory levels to fall in Tier 3 and lower tier cities, but perhaps not as quickly as in the tier 1 and tier 2 cities.
- The acceleration of infrastructure build has often been used as a means to offset weakness in other parts of the economy. The combination of a fiscal crunch (less revenue at the government's disposal due to a collapse in land sales) and corruption investigations into many of the State Owned Entities (SOE's) responsible for much of the infrastructure spend, has meant that the economic shock absorber has not softened the blow as much as expected. We think some of the slowdown is structural however. There is simply less to build.
- A weak property market has had a far greater secondary impact on the rest of demand components, especially consumer durables such as home appliances and goods. This effect is at least in part a sentiment impact.
- Lastly the slowdown in global trade, and lower exports has impacted sectors such as shipbuilding, containers and machinery. Non-financial Chinese A-listed company capex as a proxy for real manufacturing FAI continues to decline, which highlights the current weakness in both domestic demand and global trade.

Figure 4: China floor space sold versus crude steel consumption



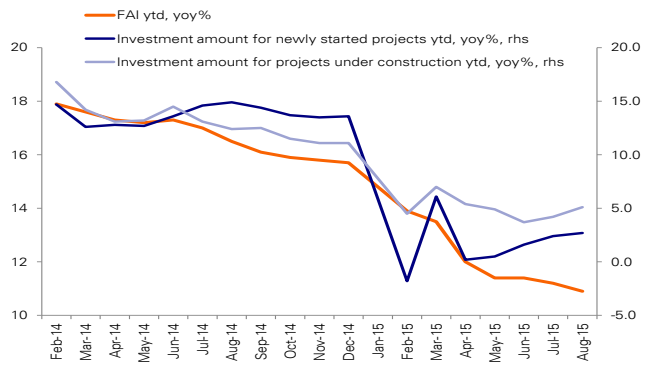
Source: Deutsche Bank, NBS, WIND

Figure 5: Funds available for investment, 3mma, yoy%



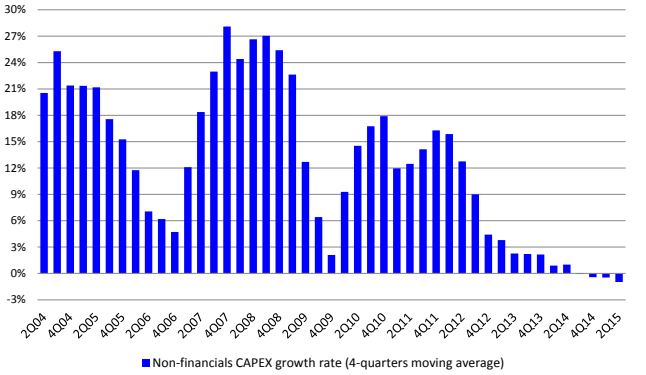
Source: Deutsche Bank, WIND

Figure 6: Fixed asset investment



Source: Deutsche Bank, WIND

Figure 7: China non-financials sector capex growth rate YoY



Source: Deutsche Bank, NBS, WIND

The land market has generally been on a softening trend in 2015 YTD. Following a brief rebound in June (albeit land sales volume was still down 10% on the average monthly volume registered in 2014), land sales volume weakened again in July with volume down by 22% YoY and -22% MoM. In August, land sales volume further deteriorated with a decline of 27% YoY and -13% MoM. Overall, residential land sales volume in 300 major cities have seen a marked decline of 38% YoY. In our view, the weak land sales statistics are in-line with the falling appetite for new land acquisitions in 2H15 among the key listed developers; these developers have generally not increased new land acquisitions and new starts despite a much improved liquidity environment. Hence, we believe FAI growth from the property sector is likely to remain lackluster.

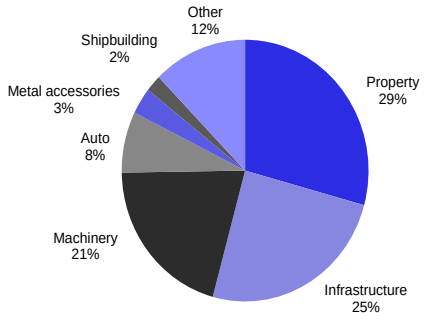
Figure 8: China Property: Residential land sales – 8M14 vs. 8M15

	Residential Land Sales (RMBbn)			Residential GFA Sold (msqm)			Residential Floor Price (RMB psm)			% of Price Sold over Launched (ppt)		
	8M14	8M15	YoY	8M14	8M15	YoY	8M14	8M15	YoY	8M14	8M15	YoY
Beijing	93.2	54.4	-42%	6.6	3.8	-43%	14,149	14,381	2%	34%	42%	8%
Shanghai	59.3	62.5	5%	7.1	6.5	-9%	8,351	9,688	16%	42%	26%	-16%
Guangzhou	37.2	31.2	-16%	4.4	4.2	-5%	8,378	7,368	-12%	13%	8%	-5%
Shenzhen	-	0.9	-	-	0.2	-		4,590	-	0%	0%	0%
Tianjin	50.5	28.3	-44%	9.9	5.5	-44%	5,094	5,120	1%	7%	6%	-1%
Chongqing	58.3	46.4	-20%	38.2	31.6	-17%	1,525	1,468	-4%	6%	6%	0%
Chengdu	31.9	18.5	-42%	15.1	10.3	-32%	2,109	1,798	-15%	18%	14%	-4%
Hangzhou	38.2	22.1	-42%	6.5	3.6	-45%	5,893	6,182	5%	4%	10%	6%
Nanjing	31.8	39.0	23%	8.2	6.3	-23%	3,883	6,176	59%	11%	21%	10%
Suzhou	32.8	34.7	6%	11.2	8.3	-26%	2,918	4,202	44%	12%	22%	10%
Dalian	8.2	4.0	-51%	4.3	2.7	-36%	1,923	1,469	-24%	6%	2%	-4%
Shenyang	11.7	2.9	-75%	5.1	2.1	-59%	2,309	1,394	-40%	2%	3%	1%
Qingdao	16.7	13.0	-22%	13.3	6.1	-54%	1,251	2,131	70%	5%	6%	2%
Xian	17.3	8.7	-50%	14.8	7.6	-49%	1,170	1,146	-2%	0%	2%	1%
Changsha	15.7	3.3	-79%	9.2	3.3	-64%	1,713	1,007	-41%	9%	1%	-7%
Wuhan	25.5	35.4	39%	13.1	9.3	-29%	1,950	3,803	95%	6%	16%	10%
300 Cities	**1,017**	**744**	**-27%**	**560**	**346**	**-38%**	**1,816**	**2,152**	**18%**	**13%**	**15%**	**3%**
Tier-1 Cities	**190**	**149**	**-21%**	**18**	**15**	**-19%**	**10,463**	**10,161**	**-3%**	**22%**	**19%**	**-3%**
Key Tier-2 Cities	**339**	**256**	**-24%**	**149**	**97**	**-35%**	**2,274**	**2,651**	**17%**	**7%**	**9%**	**2%**

Source: Soufun, Deutsche Bank

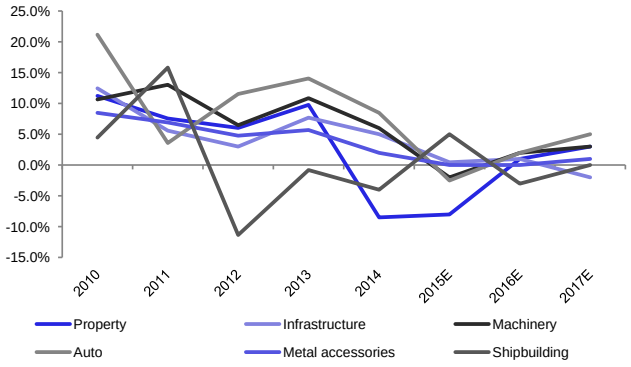
We think the recovery in property sales will eventually lead a recovery in residential construction and steel. We also expect a modest pick-up in infrastructure as the corruption investigations subside. The recovery in property should have a positive effect on some of the other sectors. We outline our expectations for steel growth rates in the charts below:

Figure 9: Chinese steel demand by sector (2015E)



Source: Deutsche Bank, CISA

Figure 10: Chinese steel demand growth rates



Source: Deutsche Bank

Global steel output has disappointed in 2015

Chinese steel production is roughly flat according to the NBS stats or down 3% according to the World Steel Association figures. Nevertheless, the weakness in China's output has dragged down global steel output to -2.1%. The regions outside of China have also been weak, with the only regions registering a positive production output are Europe, up 0.4%, and the Middle East up 3.2%. Despite a reasonable growth rates in North America, production in the region is down c.7% mainly as a result of imports. Although we think there will be a rise in trade cases and anti-dumping duties imposed on Chinese steel, we have trimmed our Japanese and South East Asian production output as well, a direct result on more Chinese imports into these regions.

Figure 11: Monthly global crude steel production output Y/Y

Source: Deutsche Bank, World Steel Association

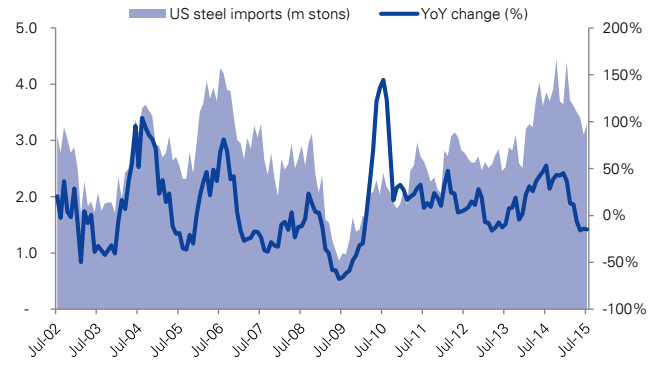
Figure 12: China and Global ex-China steel production output Y/Y

Source: Deutsche Bank, World Steel Association

China's daily crude steel output continued to fall in early September although the steel industry outlook remained gloomy amid rising inventory, weak demand and record-low prices. Member mills of the China Iron & Steel Assn (CISA) produced crude steel at an average rate of 1.7 million tpd during the first ten days of September, down 1.4% from the last eleven days of August, according to estimates from the industry body reported on Friday September 18. CISA member mills, which are mainly medium-sized and large steelmakers, account for roughly 80% of the country's total steel output.

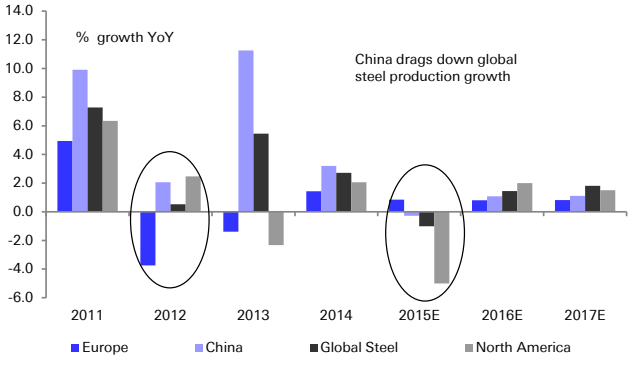
Steel production levels were expected to be lower during the first few days of September, due to emission control measures imposed by Beijing ahead of a military parade in the capital. Despite this, mills have still struggled to sell material during what is traditionally a peak season for the sector, supporting claims that the country's steel industry is slowing down.

Figure 13: US steel imports have only just started to fall



Source: Deutsche Bank

Figure 14: Global steel output growth year on year



Source: Deutsche Bank, World Steel Association

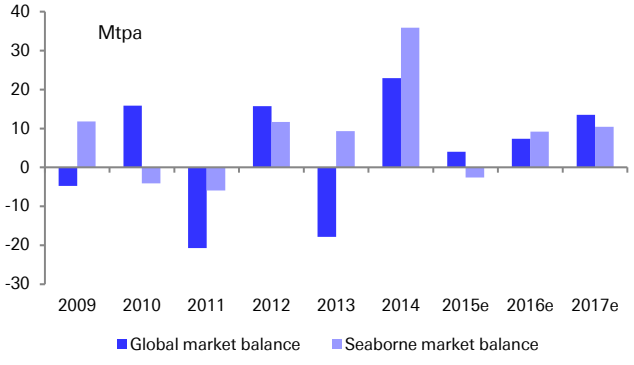
Iron Ore: - Is +USD55/t iron ore sustainable? Not yet!

Despite weak Chinese steel production and prices, iron ore prices have remained relatively robust. Stable Chinese port inventories and steel mill inventories indicate the market is currently in balance. This "balance" is temporary, in our view, and is only due to declining domestic output and lower exports from many of the non-traditional exporting countries as low prices force out many of the high cost producers. Our lower steel output forecast simply means that less ore is needed. We forecast iron ore demand growth of 1.7% and 1.9% in 2016E and 2017E. This means that more mid-tier output in Australia and Brazil will need to shut to accommodate new supply from the low cost producers. This will only happen at lower prices, and we see a minimum six-month period of sub USD50/t prices to force these closures. Assuming we see some of the cuts, we still estimate the iron ore market will be in a surplus of c.10Mtpa in both 2016E and 2017E. This would imply only modest increases in Chinese port stocks, and would result in more stable prices, in our view.

Figure 15: Iron ore price 62% delivered to China

Source: Deutsche Bank, Bloomberg Finance LP

Figure 16: Iron ore market balance (Global and seaborne)



Source: Deutsche Bank, Wood Mackenzie

More cuts are required to make way for Roy Hill

In light of our lower demand growth expectations, we have reviewed our supply demand balance in order to assess the extent of the oversupply over the next three years. We forecast an additional iron ore demand of c.70Mt over the next four years, with 2015E being negative. The additional tonnage from the large Brazilian and Australian producers as well as select large projects over the next four years is forecast to be c.330Mt. The excess supply would amount to c.265Mt before cuts. Chinese domestic production is forecast to decline by c.140Mt to an equilibrium level of 200Mt. We forecast the non-traditional suppliers to decline by c.110Mt over the four year period to 2018E.

Indian production is expected to recover to the tune of 50Mt, matching steel output. After several months of speculation and numerous false starts caused by bureaucratic delays to the issuance of licenses, iron ore mining has finally restarted in the state of Goa. The ban was officially lifted last year but it has taken many months of wrangling to obtain the necessary environmental approvals in order to recommence mining. Vedanta Resources is the first mover, having already restarted operations at its largest asset, the 3 Mtpa Codli mine. The company aims to resume mining at its other Goan iron ore

assets over the next few months. Vedanta has been allocated 5.5 Mt of Goa's 20 Mt export quota. Given the challenges that Indian shippers now face competing in the seaborne iron ore market, we do not forecast significant volumes from India. Competition and cost pressures have intensified and the iron ore majors are now supplying sinter fines to China at a breakeven price close to $40/t CFR, a level at which Goan producers of low-grade fines will find impossible to match given their smaller scale, lower grade and unaccommodating tax system. Not surprisingly, Indian iron ore miners are lobbying hard for a reduction in taxes and royalties in order to improve their competitiveness. Export taxes for low-grade ore (<58% Fe) have already been cut from 30% to 10% but combined duties, royalties, sales taxes and contributions to local/regional development funds remain high by international standards, making exports prohibitively expensive in the current market.

This still leaves c.65 – 70Mt of excess supply, which needs to come from the higher cost mid-tier producers in Australia and Brazil. In our supply-demand model, we assume at least half of the mid-tier supply is cut, which is why we do not have large surpluses.

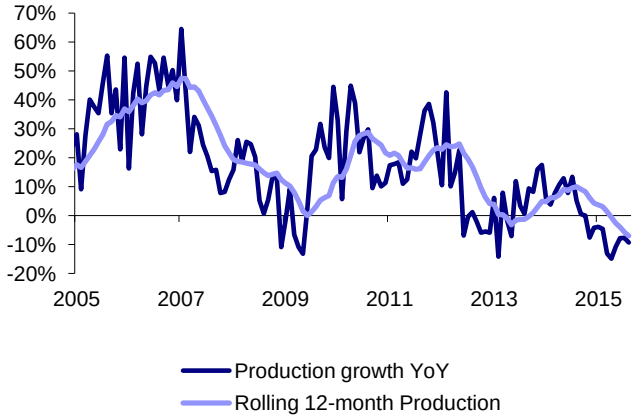
Figure 17: Cataloguing the required cuts

Mt	2015E	2016E	2017E	2018E	Cumulative	Comments	Risk
Demand growth	-37.9	33.7	38.7	33.4	67.9	So far easing measures have not led to any meaningful uptick in the "old" economy demand	-ve
Vale	16.0	14.1	**49.4**	15.5	95.1	Project plans on track	Neutral
Rio	**43.8**	28.4	14.5	6.0	92.7	Project plans on track	Neutral
BHPB	18.0	19.4	9.6	3.8	50.7	Project plans on track	Neutral
FMG	4.0	9.4	3.8	0.0	17.2	Cash constraints may limit the ability to squeeze out the final tonnage	+ve
Minas Rio (Anglo)	11.2	12.1	1.2	0.0	24.5	Project plans on track	Neutral
Roy Hill (Hancock)	5.0	**20.0**	**27.0**	0.0	52.0	The ramp-up could be quicker than anticiapted	-ve
Big project supply growth	97.9	103.4	105.4	25.3	332.1		
Excess supply	135.8	69.7	66.7	-8.0	**264.2**		
China domestic	-68.0	-40.0	-30.0	0.0	-138.0	Sticky supply and cost cuts could see the equilibrium output higher than expected	-ve
India	7.7	8.7	18.4	13.1	47.8	Indian mining output has historically disappointed due to permitting delays	+ve
Non-traditional producers	-65.8	-22.9	-13.8	-5.1	-107.5	Favourable currencies such as the Rouble have provided a significant tailwind	-ve
Excess supply	9.7	15.4	41.3	-0.1	**66.4**		

Source: Deutsche Bank

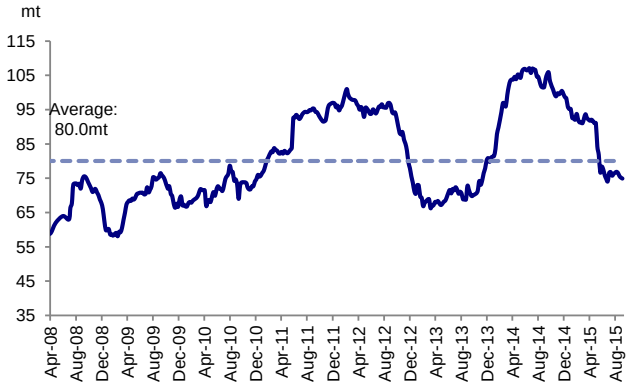
In order to assess how supply curtailments are shaping up against our full-year forecasts, we have compiled a mid-tier producer "monitor" in conjunction with the customary Chinese production and import stats. Chinese production is down 9% year to date, which implies a full-year grade-adjusted output of c.300Mt, 30Mt above our 270Mt forecast. Chinese iron ore output is proving to be stickier than anticipated.

Figure 18: Chinese domestic iron ore production – year on year comparison



Source: Deutsche Bank, NBS

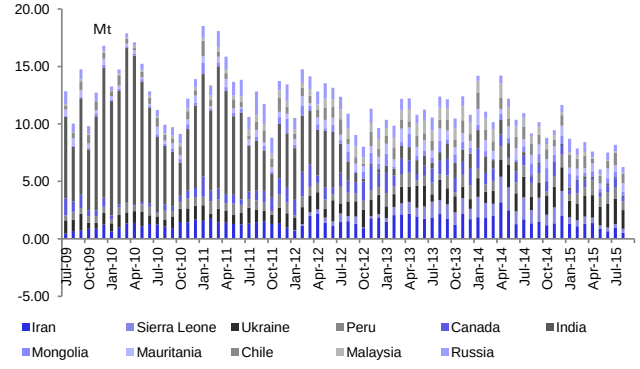
Figure 19: China iron ore port stocks remain relatively stable



Source: Deutsche Bank, Antaike

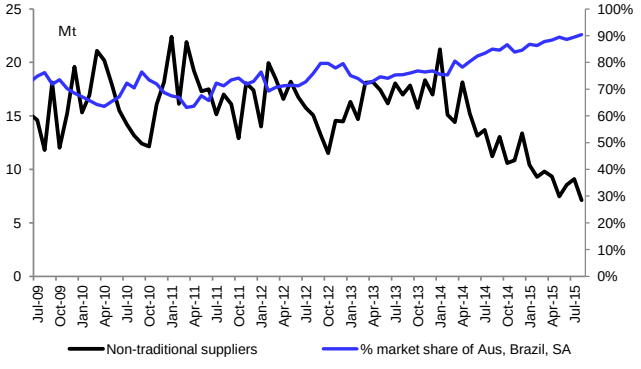
Exports of iron ore from the non-traditional suppliers, which we classify as everything except Brazil, Australia and South Africa have also fallen by 42% year to date, which implies a full-year cut of 80Mt, which is 15Mt ahead of our forecast cut of 65Mt. We have, however, started to see some year-on-year increases from countries such as Russia, Ukraine and Peru, taking advantage of weak currencies. These may pose some downside risks to our full-year forecasts.

Figure 20: Chinese imports of iron ore from the non-traditional countries – making a small comeback



Source: Deutsche Bank, Bloomberg Finance LP

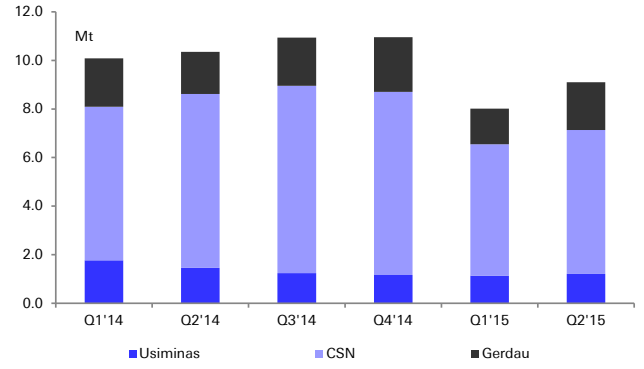
Figure 21: Chinese iron ore imports – the market share of Aus, Brazil and SA continues to grow1



Source: Deutsche Bank, Bloomberg Finance LP

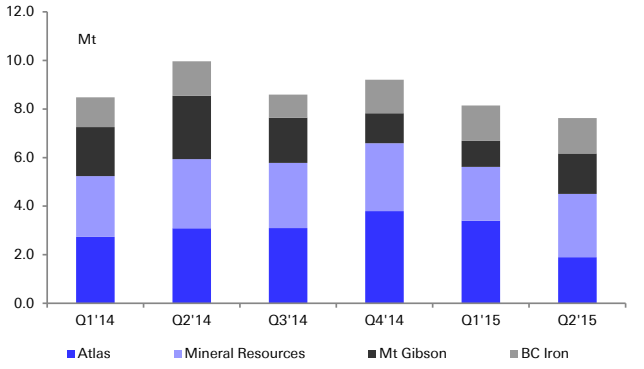
Our sample of mid-tier Brazilian iron ore producers (Usiminas, CSN and Gerdau) have decreased shipments by 16% year to date, whilst our Australian producers (Atlas, Minerals Resources, Mt. Gibson and BC Iron) have decreased shipments by 14%. The mid-tier producers are proving to be more resilient than our expectations.

Figure 22: Brazilian mid-tier iron ore shipments - quarterly



Source: Deutsche Bank, Company reports

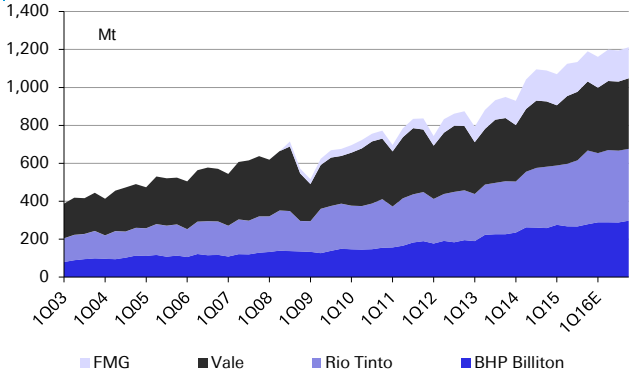
Figure 23: Australian mid-tier iron ore shipments - quarterly



Source: Deutsche Bank, Company reports

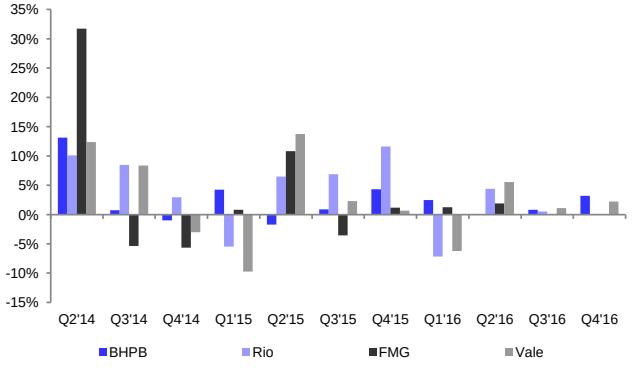
The four major iron ore producers had a strong Q2, which is also the quarter which sees the strongest momentum. We expect Rio's momentum to continue in Q3 and Q4 despite trimming their full-year guidance. The volume momentum is however not nearly as strong in 2016E, although we expect Roy hill to being ramping up in earnest from Q2'16 onwards, which will continue the supply momentum from Australia.

Figure 24: Volume increases from the big four - tonnages



Source: Deutsche Bank, Company reports

Figure 25: Volume increases from the big four - % change

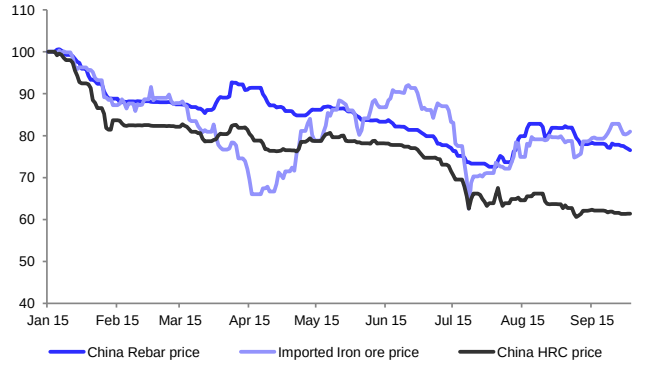


Source: Deutsche Bank, Company reports

A divergence between steel and iron ore prices is squeezing Chinese profitability

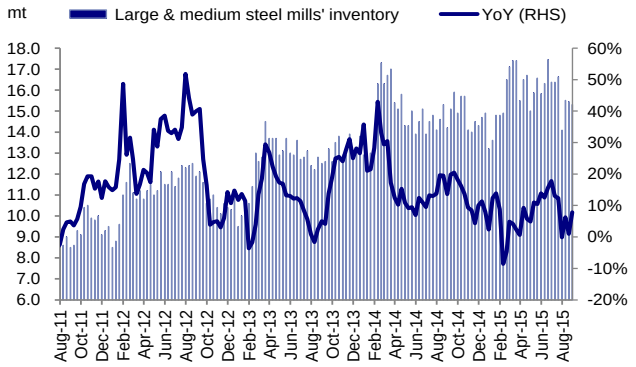
Whilst iron ore prices have declined by c.20% year to date, Chinese rebar prices have fallen further by 24% and HRC prices have fallen even further by nearly 40%. Domestic steel mill margins are being squeezed, and output has remained relatively firm despite this squeeze. However, we note the inventories at the large and medium steel mills have declined from peak levels at the beginning of the year. Part of the motivation to remain producing is to cover fixed costs and retain market share.

Figure 26: Chinese steel prices versus the underlying iron ore price



Source: Deutsche Bank, Bloomberg Finance LP

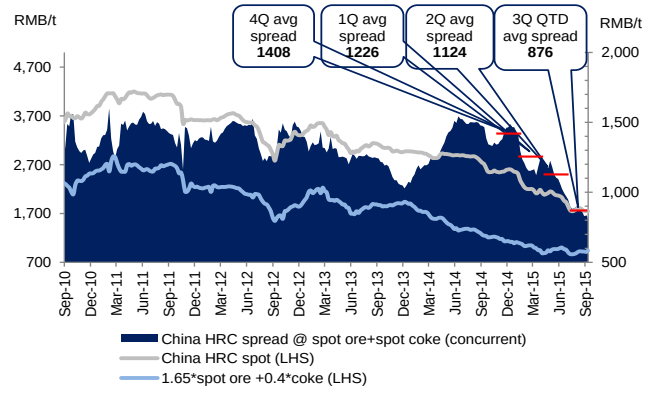
Figure 27: Large and medium Chinese steel mills – inventory levels



Source: Deutsche Bank, CISA

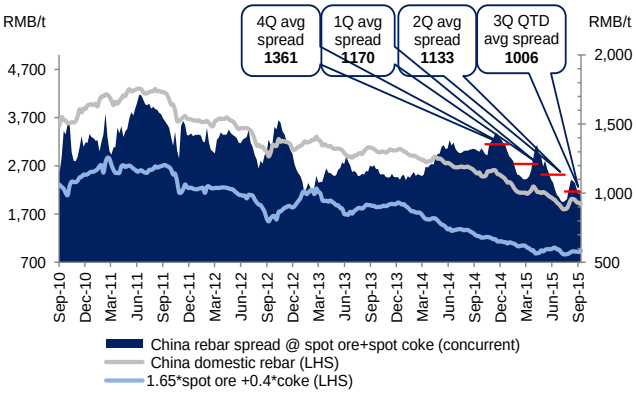
Many of the Chinese steel companies continue to report losses, and ultimately we think this situation is unsustainable. In the absence of a demand pick-up and tougher export conditions, there are downside risks to our Chinese steel forecasts. Spot prices of seaborne hot rolled coil in Asia slumped to another record low (as of the 18th of September) as Chinese offers led the decline amid a lack of buying interest. Channel checks suggest that prices may stabilize next week, not because of any demand recovery, but as trading is expected to wind down ahead of the week-long National Day holiday in China. However many traders think that prices are overdone on the downside due to short-selling according to the Steel Business Briefing.

Figure 28: China HRC – raw material spread



Source: Deutsche Bank, Bloomberg Finance LP

Figure 29: China Rebar – raw material spread



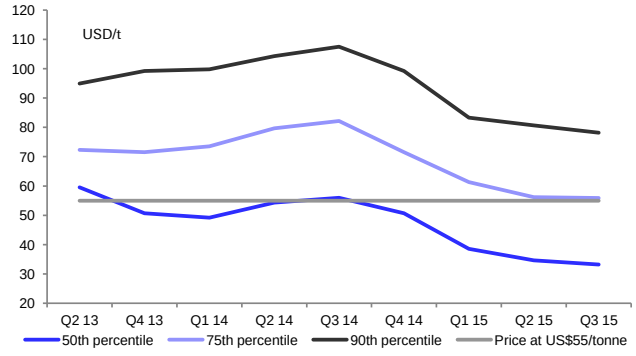
Source: Deutsche Bank, Bloomberg Finance LP

Cost continue to ease lower

Q3'15 has seen Brazilian producers reap the benefits of cost-cutting measures and low freight rates as the country assumes the enviable position of cheapest delivered seaborne iron ore to China. Compared to Q2, Brazilian total cash costs (FOB vessel) dropped by 5% and delivered costs to China fell by 15% to an average of US$32/dmt 62% Fe equivalent. Brazil's significant reduction in CFR costs can be mostly attributed to lower shipping rates with some assistance from a weaker Brazilian Real exchange rate.

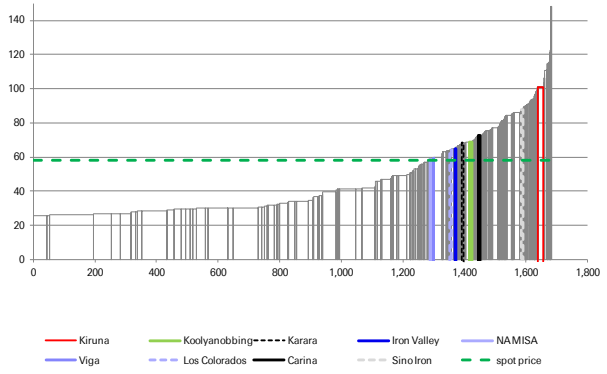
Freight rates from Western Australia to China have not been as volatile as rates from Brazil in 2015. As such we have seen little change in Australia's total cash cost and CFR delivered costs this quarter. Meanwhile, the average Chinese total cash cost reduced by 6.5% aided by the exit of more high-cost producers and ongoing. Given our expectation of further weakness in producer currencies, we expect cost declines of c.10 – 15%. This would imply that current iron prices would intersect the 85th percentile of the cost curve. In our view this is not deep enough into the cost curve to ensure price stabilization or indeed a recovery. We highlight the mid-tier producers that are in the "danger zone" of the cost curve in the chart below.

Figure 30: Costs continue to fall across the cost curve



Source: Wood Mackenzie

Figure 31: Iron ore cost curve 62% delivered to North China with high cost mid-tier operations highlighted



Source: Deutsche Bank, Wood Mackenzie

Figure 32: Deutsche Bank Iron Ore supply – demand model

Supply		2009	2010	2011	2012	2013	2014	2015e	2016e	2017e	2018e	2019e	2020e
Brazil	Mt	301	360	378	372	373	389	427	449	493	517	521	519
growth	%	*-9%*	*19%*	*5%*	*-2%*	*0%*	*4%*	*10%*	*5%*	*10%*	*5%*	*1%*	*0%*
Australia	Mt	393	433	477	529	622	749	794	873	922	926	917	910
growth	%	*14%*	*10%*	*10%*	*11%*	*18%*	*21%*	*6%*	*10%*	*6%*	*0%*	*-1%*	*-1%*
South Africa	Mt	55	58	58	61	68	74	71	71	71	71	69	69
growth	%	*17%*	*4%*	*0%*	*6%*	*11%*	*8%*	*-4%*	*1%*	*0%*	*0%*	*-3%*	*0%*
India	Mt	206	200	181	135	120	114	110	114	118	121	124	130
growth	%	*8%*	*-3%*	*-10%*	*-25%*	*-11%*	*-5%*	*-3%*	*3%*	*4%*	*2%*	*3%*	*5%*
China	Mt	242	348	362	325	402	338	270	230	200	200	200	200
growth	%	*-20%*	*44%*	*4%*	*-10%*	*24%*	*-16%*	*-20%*	*-15%*	*-13%*	*0%*	*0%*	*0%*
CIS incl. Russia	Mt	172	199	208	206	209	204	195	191	185	182	185	189
growth	%	*-6%*	*16%*	*4%*	*-1%*	*1%*	*-2%*	*-4%*	*-2%*	*-3%*	*-2%*	*2%*	*2%*
North America	Mt	71	100	112	116	125	116	100	98	94	93	92	91
growth	%	*-30%*	*41%*	*12%*	*3%*	*8%*	*-7%*	*-14%*	*-2%*	*-4%*	*-1%*	*-1%*	*-1%*
West Africa	Mt	20	23	23	26	31	32	28	24	23	23	23	22
growth	%	*-9%*	*14%*	*1%*	*11%*	*19%*	*3%*	*-13%*	*-15%*	*-3%*	*0%*	*-1%*	*-2%*
Other regions	Mt	21	-4	13	133	48	61	26	18	5	13	21	11
Total iron ore supply	**Mt**	**1,481**	**1,717**	**1,812**	**1,902**	**1,997**	**2,077**	**2,020**	**2,067**	**2,112**	**2,146**	**2,153**	**2,142**
growth	%	*-3.8%*	*15.9%*	*5.5%*	*5.0%*	*5.0%*	*4.0%*	*-2.7%*	*2.3%*	*2.2%*	*1.6%*	*0.3%*	*-0.5%*
Demand		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015e**	**2016e**	**2017e**	**2018e**	**2019e**	**2020e**
Global steel production (crude steel)	Mt	1,235	1,430	1,534	1,543	1,627	1,671	1,654	1,678	1,708	1,735	1,761	1,767
Global Hot Metal production	Mt	1,005	1,125	1,204	1,245	1,320	1,341	1,310	1,332	1,355	1,377	1,390	1,384
growth	%	2.0%	11.9%	7.0%	3.4%	6.0%	1.6%	-2.3%	1.6%	1.8%	1.6%	0.9%	-0.4%
% Non scrap production	%	81%	79%	78%	81%	81%	80%	79%	79%	79%	79%	79%	78%
European crude steel production	Mt	168	206	217	209	206	209	210	212	214	215	216	217
European Hot metal production	Mt	103	106	104	105	106	106	106	106	107	107	108	108
growth	%	16%	3%	-2%	1%	1%	0%	0%	0%	1%	1%	0%	0%
% Non scrap production	%	61%	51%	48%	50%	52%	51%	50%	50%	50%	50%	50%	50%
Japan crude steel production	Mt	88	110	108	107	111	111	108	108	108	108	108	107
Japan hot metal production	Mt	67	82	81	81	84	84	82	82	82	82	82	81
growth	%	-22.3%	22.9%	-1.5%	0.5%	3.0%	0.0%	-2.8%	0.4%	0.0%	-0.2%	-0.2%	-0.2%
% Non scrap production	%	77%	75%	75%	76%	76%	76%	76%	76%	76%	76%	76%	76%
India crude steel production	Mt	64	69	74	78	81	86	92	98	105	114	120	127
India hot metal production	Mt	60	63	66	68	69	75	79	85	91	98	104	110
growth	%	3.0%	4.5%	4.2%	3.7%	1.6%	7.9%	6.0%	7.0%	7.5%	8.0%	5.6%	5.6%
% Non scrap production	%	95%	91%	89%	88%	85%	86%	86%	86%	86%	86%	86%	86%
China steel prodution (crude steel)	Mt	577	639	702	717	797	823	820	829	839	844	852	842
China steel production (iron ore)	**Mt**	**553**	**613**	**672**	**709**	**777**	**786**	**771**	**780**	**788**	**793**	**792**	**775**
growth	%	15.6%	10.8%	9.7%	5.4%	9.6%	1.2%	-1.9%	1.1%	1.1%	0.6%	-0.1%	-2.3%
% Non scrap production	%	*96%*	*96%*	*96%*	*99%*	*97%*	*96%*	*94%*	*94%*	*94%*	*94%*	*93%*	*92%*
Iron Ore													
China	Mt	831	923	1024	1077	1195	1211	1187	1199	1212	1219	1218	1190
growth	%	*15%*	*11%*	*11%*	*5%*	*11%*	*1%*	*-2%*	*1%*	*1%*	*1%*	*0%*	*-2%*
Japan	Mt	102	125	124	124	127	127	126	127	127	126	125	125
growth	%	*-22%*	*23%*	*-1%*	*0%*	*3%*	*-1%*	*-1%*	*1%*	*0%*	*0%*	*-1%*	*0%*
S. Korea & Taiwan & other	Mt	65	81	95	92	95	108	104	109	115	119	122	124
growth	%	*-13%*	*25%*	*18%*	*-4%*	*3%*	*14%*	*-4%*	*5%*	*6%*	*4%*	*2%*	*2%*
Europe	Mt	119	153	153	149	153	157	156	156	157	158	159	159
growth	%	*-30%*	*29%*	*0%*	*-3%*	*3%*	*3%*	*-1%*	*0%*	*1%*	*1%*	*0%*	*0%*
India	Mt	92	97	100	104	105	113	120	128	138	149	158	167
growth	%	*3%*	*5%*	*4%*	*3%*	*1%*	*8%*	*6%*	*7%*	*8%*	*8%*	*6%*	*6%*
Brazil	Mt	35	43	46	45	44	45	44	45	46	48	49	50
growth	%	*-28%*	*22%*	*7%*	*-3%*	*-3%*	*3%*	*-3%*	*2%*	*3%*	*3%*	*3%*	*3%*
CIS	Mt	125	135	138	141	141	137	132	128	132	136	139	142
growth	%	*-11%*	*7%*	*3%*	*2%*	*0%*	*-3%*	*-4%*	*-3%*	*3%*	*3%*	*3%*	*2%*
Total iron ore demand	**Mt**	**1,486**	**1,701**	**1,832**	**1,887**	**2,015**	**2,054**	**2,016**	**2,050**	**2,089**	**2,122**	**2,139**	**2,130**
growth	%	*-2.9%*	*14.4%*	*7.7%*	*3.0%*	*6.8%*	*1.9%*	*-1.8%*	*1.7%*	*1.9%*	*1.6%*	*0.8%*	*-0.5%*
Implied scrap ratio	%	*25%*	*26%*	*25%*	*24%*	*23%*	*23%*	*24%*	*24%*	*24%*	*24%*	*24%*	*25%*
Disruption allowance	*Mt*								*10*	*10*	*10*	*10*	*10*
Notional market balance	**Mt**	**-5**	**16**	**-21**	**16**	**-18**	**23**	**4**	**7**	**13**	**14**	**4**	**3**
China imported fines (62% CFR)	**USD/t**	**79.8**	**146.6**	**167.0**	**123.8**	**130.0**	**97.0**	**56.5**	**48.5**	**56.0**	**61.7**	**67.4**	**73.1**

Source: Deutsche Bank, Wood Mackenzie

Coking Coal: Grinding lower with no immediate end in sight

Despite the Q3 benchmark Low Vol Hard Coking Coal contract settlement of USD93/t, there were very little in the way of supply cuts. Both Teck Resources and Peabody tried to do their bit, with Teck idling some of their Canadian mines over the summer and Peabody idling some of their Australian mines. We estimate the net reduction is c.3 – 4Mtpa across all grades for 2015E. This was not enough and the Q4 settlement is another USD4/t down from the Q3 level. Anglo American settled its Q4 2015 Low Vol HCC contract price at US$89/t for its German Creek brand. This is now a familiar trend in the market; supply side adjustments continue to play catch up, and have proved to be insufficient to offset weak Chinese steel demand, a more efficient domestic production base, rising Chinese steel cannibalizing Asian demand and coke exports, weakening producer currencies including the RMB most recently. We outline the recent contract settlements in the table below.

Figure 33: Quarterly and monthly prices for range of metallurgical coal products delivered to Asia

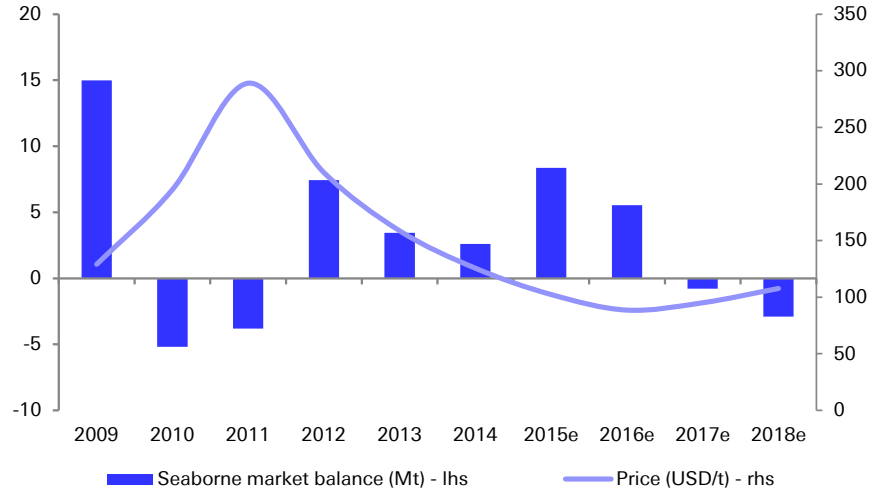
Coal type	Brand	Supplier	Q1 2015 Price (US$/t FOB)	Q2 2015 Price (US$/t FOB)	Q3 2015 Price (US$/t FOB)	Q4 2015 Price (US$/t FOB)	Difference Q4 vs Q3 2015 (US$/t FOB)	Buyer destination
Australian Benchmark coals								
LV HCC	German Creek	Anglo American	117.0	109.5	93.0	89.0	-4.0	Japan
ULV PCI	Coppabella	Peabody Energy	99.0	92.5	73.0	71.0	-2.0	Japan/SK
SSCC	Hunter Valley Type	Glencore Plc. and Rio Tinto	86.0	81.0	74.0	70.0	-4.0	Japan
Other coals								
MV HCC	Moranbah North	Anglo American	116.5	109.5	93.0	89.0	-4.0	Japan
MV HCC*	Lake Vermont-type	Jellinbah Resources	102.0	95.5	85.5	81.5	-4.0	Japan
Weak Coking*	Moura Soft	Anglo American	90.9	85.4	72.5	69.4	-3.1	Japan
ULV PCI	Foxleigh	Anglo American	99.0	92.5	73.0	71.0	-2.0	Japan
MV PCI	Capricorn	Anglo American	88.0	84.0	66.0	64.0	-2.0	Japan
International coals								
US MV HCC		Alpha Natural Resources	104.5	100.0	84.0	78.0	-6.0	India
Monthly contract			February	May	July	September		
LV HCC	Peak Downs	BHP Mitsubishi Alliance	115.0	99.0	90.6	87.3	-3.3	India
MV HCC	Goonyella	BHP Mitsubishi Alliance	114.0	97.0	87.9	84.0	-4.0	India
HV HCC	Gregory	BHP Mitsubishi Alliance	100.0	89.0	83.3	75.6	-7.7	India

*Source: Wood Mackenzie, *estimates*

Other than even lower prices it is difficult to see what breaks the downward spiral. We do forecast an improvement in Chinese steel demand (just not as much as previously), and as a result a modest 1% increase in Coking coal seaborne demand in 2016E. However, this is simply not enough to drive any fundamental tightness in the market, without meaningful supply cuts, which

includes slowing production growth from China. As a result, we see prices grinding lower to a low of USD85/t in Q2'16, before recovering in H2'16, after cuts from smaller suppliers gain momentum.

Figure 34: Metallurgical seaborne coal supply – demand balance



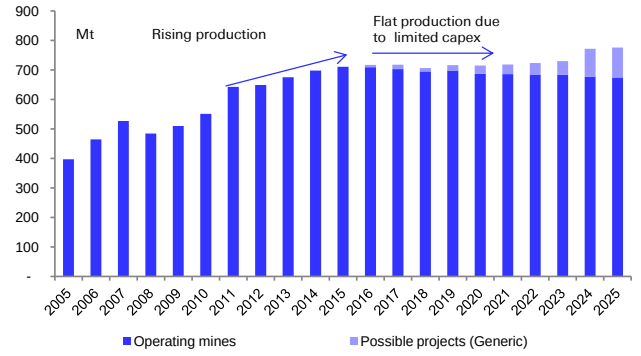
Source: Deutsche Bank, Wood Mackenzie, McCloskey's

Improving Chinese efficiency and rising exports will continue to pressure the seaborne market

Total marketable Met coal production in China for 2015 is expected to reach c.711Mt, a modest 1.8% increase over 2014. We estimate that half of the total metallurgical production to be hard coking coal. The provinces with the largest metallurgical production volumes in 2015 are Shanxi (334 Mt), Henan (42 Mt) and Guizhou (37 Mt). Metallurgical production from Shanxi alone in 2015 will constitute 47% of total Chinese marketable coking coal production.

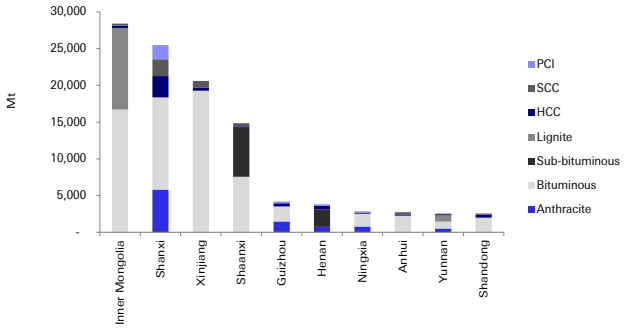
Metallurgical coal production from existing operations and known expansions is expected to peak at 711 Mtpa. However, we estimate China could construct an additional 193 Mtpa of metallurgical coal capacity if required, with Shanxi and Xinjiang accounting for majority of this upside capacity. Shanxi holds 46% of China's metallurgical coal reserves. Other traditional metallurgical coal producing provinces such as Henan, Heilongjiang, Hebei and Shandong will see limited growth in production due to their mature deposits. Guizhou and Yunnan have abundant metallurgical resources although converting them into marketable reserves is hampered by difficult geological conditions, indicating that Shanxi will continue to dominate China's metallurgical coal production.

Figure 35: Chinese Metallurgical production



Source: Deutsche Bank, Wood Mackenzie

Figure 36: Marketable reserves by province



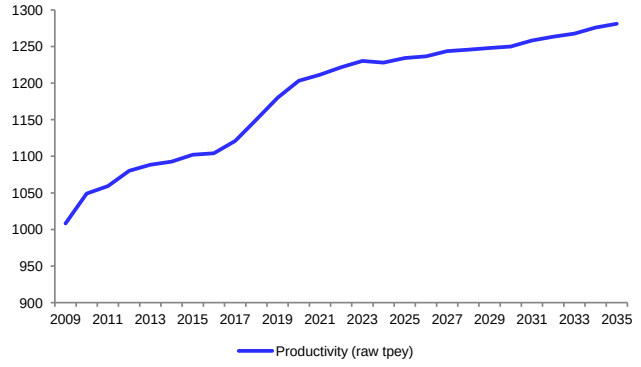
Source: Wood Mackenzie

There was a period post 2009, when rail infrastructure was a bottleneck to delivering coal from production region to the steel producing regions. This is no longer the case. Total operational rail network, under the authority of the government, spans more than 80,000 kms. It is by far the largest rail network globally. There are also thousands of kilometres of rail network under the authority of local governments or mining companies. Approximately 60% of China's total coal production is transported by rail. With the heavy investment in transport network over the past five years, we expect the rail capacity for coal to increase significantly with the completion of several green-field and expansion projects. China's National Development and Reform Commission aims to increase coal rail transport capacity to 3 Btpa by 2015.

The weighted average productivity in Chinese coal mines has increased 5% over the past five years owing to faster production ramp up and technology upgrade. As production will be increasingly sourced from low strip ratio, non-gassy coal mines with lower mining difficulties in Inner Mongolia and Xinjiang province, we expect productivity on a raw coal basis to continue to increase.

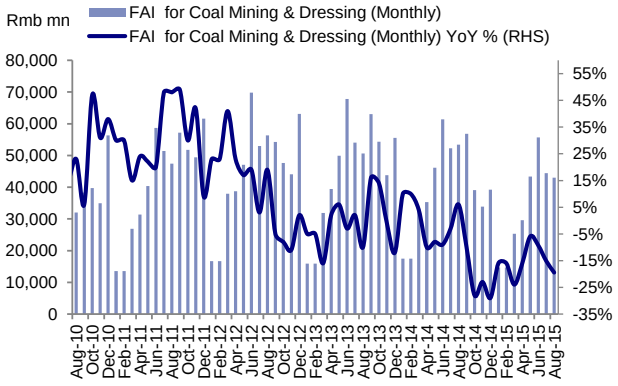
Capital spending for coal expansion projects in China peaked in 2010 at CNY284 billion after the Chinese government announced the CNY 4 trillion stimulus package in November 2008. Since mid 2012, coal price weakness and the lingering global economic headwinds have forced many coal companies to cutback capital spending and/or defer projects. China coal FAI reduced 9.5% YoY in 2014. The emerging target of Chinese government on curbing oversupply amid price and demand weakness was underscored by Shanxi's recent decision to stop approval of new projects by 2020. We expect less than half of the future possible capacity will be realized, meaning that annual capital expenditure over the next 15 years will be much lower than the past 5 years. It is the reduction in capex which we think will ultimately slow the rate of Chinese output and lead to a resumption in imports.

Figure 37: Weighted average productivity improvements in the Chinese coal industry



Source: Wood Mackenzie

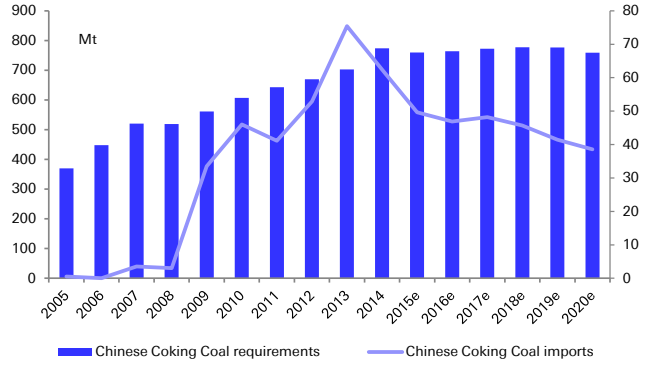
Figure 38: Capex to the Coal industry (monthly)



Source: Deutsche Bank, CEIC

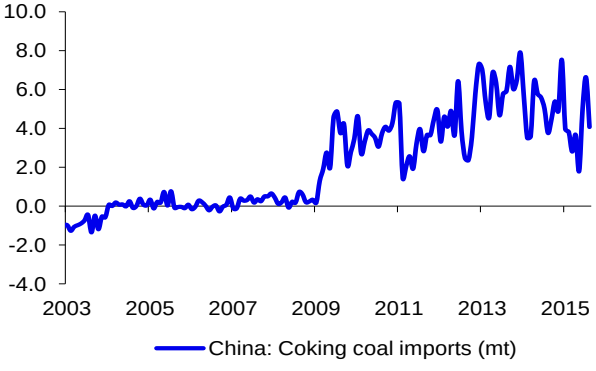
We continue to factor in modest growth in Chinese coking coal production of 1% over the next few years, as efficiency gains result in extra tonnes from the larger producers at the expense of the smaller less efficient producers. We also forecast flat demand growth for coking coal out of China over the next few years. As a result, we do not expect a recovery in Coking coal exports, with imports ranging from 40 – 50Mt over the next few years. The annual run rate for 2015 is 48Mt (DBe at 50Mt). The relatively low level of imports is surprising given the favourable arbitrage of imported coal over domestic coal. These periods of strong imports are of fairly short duration however. Australian coking coal continues to be subject to 3% import tariffs. After the signing of the Australia-China Free Trade Agreement (ChAFTA) in June 2015, both parties are in discussion to ratify the agreement. We expect this process to complete by end of the year and tariffs on coking coal imports will end latest by 1 January 2016. We not expect this change to influence the exports significantly. We also do not expect Chinese Coking coal exports to go to zero, as the shift of blast furnace capacity to Southern China (Guangdong) from Shandong favours imported coals over domestic brands, simply due to logistics contrainsts.

Figure 39: Forecasting Chinese coking coal imports



Source: Deutsche Bank, Wood Mackenzie

Figure 40: Monthly Coking coal imports - China

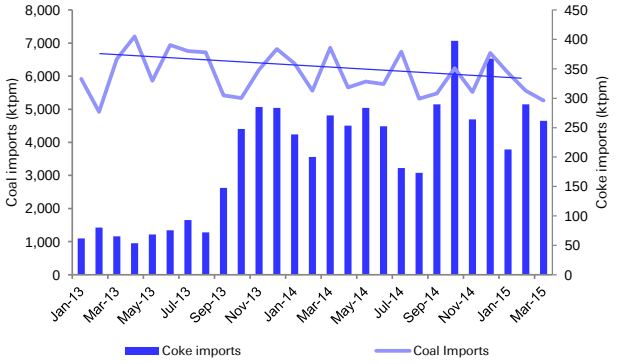


Source: Deutsche Bank, NBS

The strong increase in steel and coke exports continues to displace seaborne Coking coal demand. In the absence of trade cases in steel, which we think may continue to gain momentum, Chinese steel exports are likely to stay

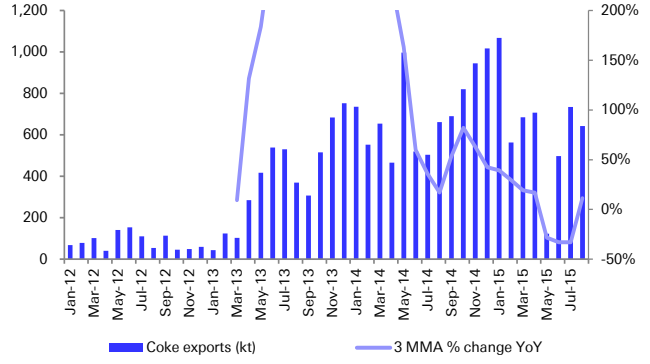
relatively robust. Similarly unless there is a change in export taxes on coke, we think it is unlikely that exports will decline meaningfully. Coke exports have recovered in August after a few weak months.

Figure 41: Japanese coke and coal imports 2013 - 2015



Source: Deutsche Bank, Wood Mackenzie

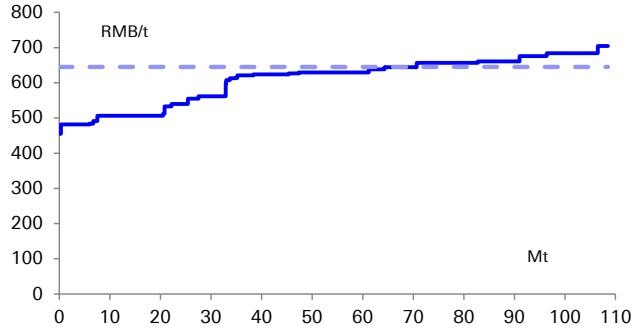
Figure 42: Chinese Coke exports - monthly



Source: Deutsche Bank, NBS

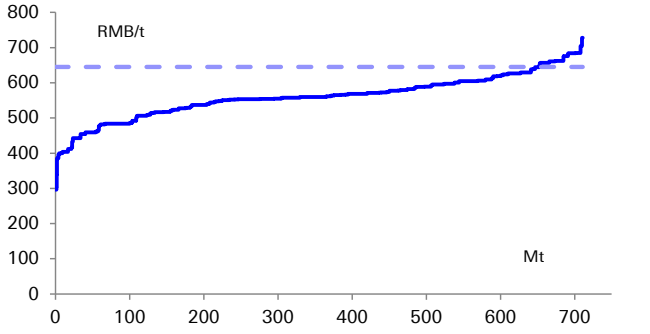
The Chinese Coking coal industry has become far more profitable after a number of years of consolidation. Some of the coastal producer are by no means comfortable, and we estimate that 35% of the coastal production is loss making at the current Liulin No 4 spot price of RMB645/t, without making any quality adjustments for some of the lower quality producers. These adjustments may bring the loss-making percentage closer to 45%. If we include the inland producers which are lower cost but incur rail costs to deliver to the coast, we estimate that only 10% of the supply is loss-making. The absolute tonnage is only 60Mt which is small in relation to the Chinese market, but significant when compared to the seaborne market of 310- 320Mt.

Figure 43: China coastal coking coal cost curve



Source: Deutsche Bank, Wood Mackenzie

Figure 44: China total coking coal cost curve



Source: Deutsche Bank, Wood Mackenzie

Australian capacity continues to push out US supply

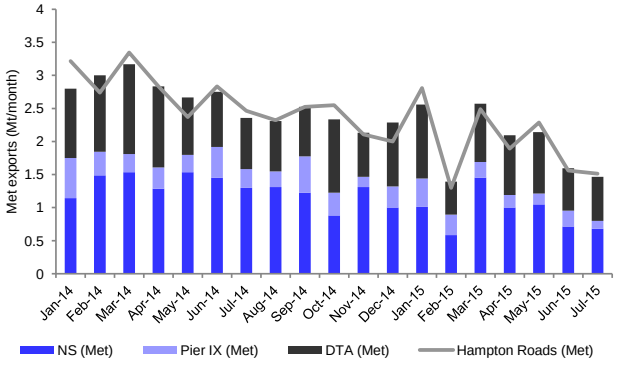
The high-cost US producers are bearing the brunt of the low-price environment. On 3 August, Alpha Natural Resources became the latest US coal miner to seek Chapter 11 bankruptcy protection following on from Walter Energy and Patriot Coal in May. All three producers entered the downturn with balance sheets that were too leveraged. Restructuring will likely keep some capacity open, but production and operating margins are expected to suffer in

the near future. Given the waning demand from China, Queensland exports operating at all time highs, and continued depreciation of non-US currencies, prices have not been able to keep many US producers coking coal volumes competitive, and we expect further production cuts.

US East Coast shipments of metallurgical coal at Hampton Roads are finally starting to fall considerably, after holding their own through May 2015, above 2 Mt per month. Exports fell precipitously through June and were barely above 1.5 Mt in July. The anomalously low February shipments were due to cold winter weather and damaged loading facilities at Hampton Roads. Wood Mackenzie estimate that buyers in Europe, who had not already switched tonnes to Australian shipments in a competitive freight market, and had been paying a premium for high-fluidity, low-ash US coals, will now begin to roll off some of these purchases. We forecast total US metallurgical coal exports in the 39 Mt range for the year, down 21% from 2014.

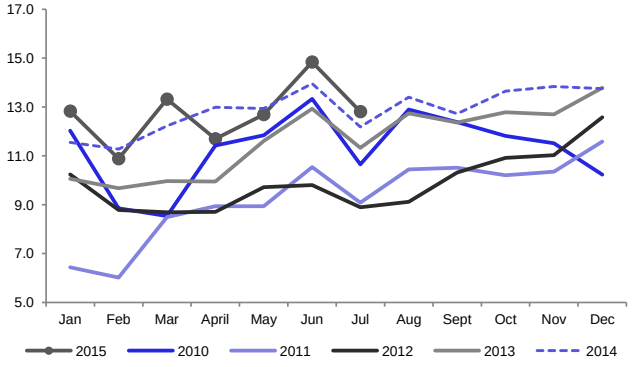
Queensland metallurgical coal exports dipped from their all-time high of 14.8 Mt in June 2015, falling to 12.8 Mt. However, that level is still above the prior five year July figures – July typically falling after the end-of-financial-year rush. Australia continues to compete well in the trade, but the China slowdown has had an impact, with annual exports likely to be slightly lower this year than last. On an annualised basis first half exports have totaled 180 Mt, down from last year's 185Mt, after a strong second half. We forecast a full-year export level of 180Mt.

Figure 45: US East Coast metallurgical coal shipments



Source: Deutsche Bank, Wood Mackenzie

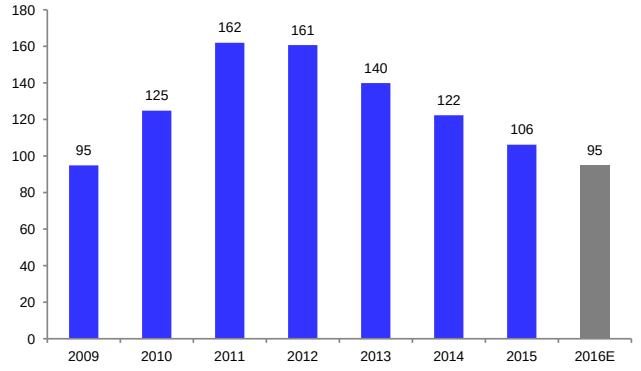
Figure 46: Queensland port Coking coal exports (Mt)



Source: Deutsche Bank, Wood Mackenzie

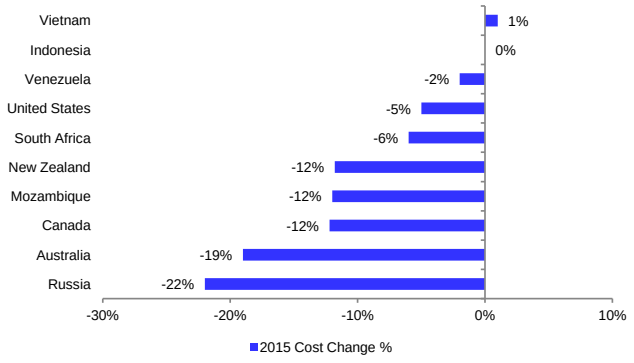
The Coking coal market has been at the vanguard of cost cutting, partly because the mining method lends itself to adding costs in good times to chase the marginal tonnes. The corollary of course is that these costs can be removed very quickly in periods of weak pricing. More recently, the relatively higher proportion of oil price exposure in the cost base, combined with an exposure to the AUD, RUB and CAD of the production base has led to costs continuing to fall. We estimate the marginal cost fell by 34% since the peak in 2011/12. We forecast a further 11% fall in the marginal cost closer to USD93/t. We highlight the regions which have been most successful at taking out costs being Canada, Australia and Russia.

Figure 47: Progression of the marginal cost in Coking coal



Source: Deutsche Bank, Wood Mackenzie

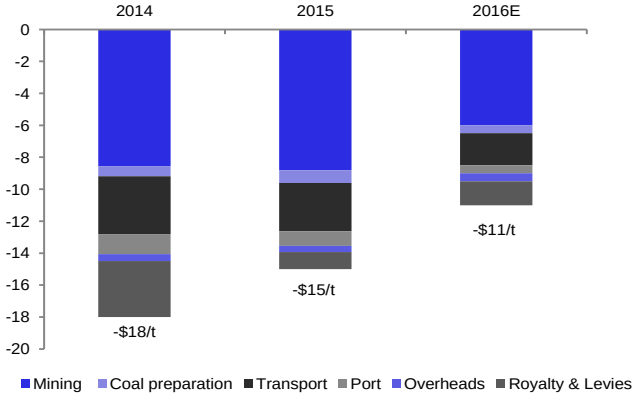
Figure 48: Incremental cash cost change by region 2015 versus 2014



Source: Deutsche Bank, Wood Mackenzie

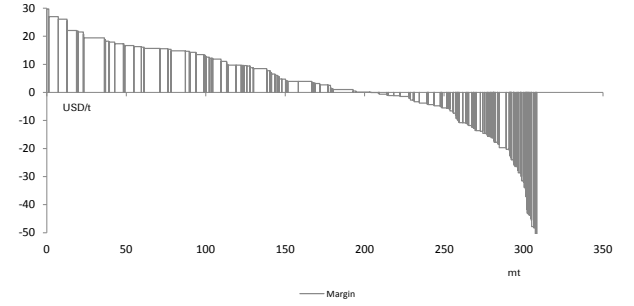
In the absence of the lower energy price and exchange rate tailwinds, we think it will be more challenging for the miners to continue at the same pace of cost cutting as in 2014 and 2015. We forecast cost out of USD11/t in 2016, with some help from weaker currencies, and lower royalties from lower prices. At the current spot price of USD81/t, we estimate that c.35% of the seaborne market is loss making, based on our forecast 2016E cost curve. Unless we have underestimated the ability of the industry to cut costs more aggressively, this is unsustainable in the medium term.

Figure 49: The rate of cost cutting is slowing in coking coal but remains significant



Source: Deutsche Bank, Wood Mackenzie

Figure 50: Seaborne coking coal margin curve (2016E)



Source: Deutsche Bank, Wood Mackenzie

Lowering our incentive price to USD127/t

In light of weaker producer currencies, lower oil prices and falling capex, we have reviewed our long-term coking coal assumption. We have used a mixed methodology to set our long-term price, comprising partly a marginal cost and partly an incentive price methodology to reflect the ample latent capacity and low utilization in the industry. This is in contrast to our approach to base metals, which is solely based on an incentive price methodology. The challenge in trying to determine the incentive price for future coking coal projects is the dearth of new projects being assessed. In many cases we have looked at existing and completed projects, but assessed them under a lower

capex assumption. In most cases we have assumed that the project could be built 25% cheaper due to lower contractor margins and weaker producer currencies. As with our approach to base metals, we have solved for a price which achieves a 15% IRR across a range of projects, mainly in Australia Mozambique and Canada. Our average incentive price for new projects is USD157/t ranging from USD114/t to USD225/t.

Figure 51: Estimating the Coking Coal incentive price

Project	Production (Mt)	Incentive price (USD/t)
Daunia*	5	143
Caval Ridge*	6.5	198
Grosvenor 2	4.5	145
Moranbah South	4.2	148
Belvedere	6.5	140
Vickery	3.8	114
Appin 9*	3.5	127
Sukunka	4	144
Roman	2.2	138.5
Makhado	5.3	144
IndoMet*	5	151
Revuboe	5	193
Zambeze	12.5	225

*Source: Deutsche Bank, * completed projects reassessed under lower capex assumptions*

Our second approach is to assess the price at which a number of shuttered operations will re-open. In this case we have assumed a price which is higher than the operating cost and the sustaining capex. The average price required is USD136/t. The third approach is to assess where the marginal cost will move to over time. In our assessment the marginal cost producer will be around USD88 – 90/t, with some of the coastal production being lower at around USD75/t. The average of these three methods is USD127/t.

Figure 52: Estimating the long-term Coking coal price

Method	LT price (USD/t)
Marginal cost	89
Restarts	136
Global projects (brownfield and greenfield)	157
Average	127

Source: Deutsche Bank

Figure 53: Deutsche Bank Coking coal supply-demand model

		2009	2010	2011	2012	2013	2014	2015e	2016e	2017e	2018e
Australian exports	Mt	134	158	134	144	169	185	180	182	184	179
growth	%	*-2%*	*18%*	*-16%*	*8%*	*17%*	*9%*	*-2%*	*1%*	*1%*	*-3%*
Canadian exports	Mt	22	27	28	31	34	30	27	26	25	25
growth	%	*-18%*	*23%*	*2%*	*11%*	*12%*	*-11%*	*-11%*	*-4%*	*-4%*	*0%*
US exports	Mt	33	48	59	59	54	49	39	33	31	30
growth	%	*-7%*	*45%*	*24%*	*0%*	*-8%*	*-10%*	*-21%*	*-15%*	*-6%*	*-3%*
China exports	Mt	4	5	8	7	6	1	1	1	1	1
growth	%	*-59%*	*39%*	*45%*	*-17%*	*-8%*	*-90%*	*71%*	*2%*	*2%*	*2%*
Other supply	Mt	43	30	39	63	56	59	62	68	70	79
Disruption allowance			0	0	0	0	0	0	0	0	0
Global traded coking coal supply	**Mt**	**236**	**269**	**267**	**303**	**320**	**323**	**309**	**309**	**311**	**314**
growth	%	*1%*	*14%*	*-1%*	*13%*	*6%*	*1%*	*-5%*	*0%*	*1%*	*1%*
Japanese imports	Mt	66	77	69	62	59	61	59	59	59	59
growth	%	*9%*	*17%*	*-11%*	*-9%*	*-6%*	*4%*	*-3%*	*0%*	*0%*	*0%*
Korea & Taiwan imports	Mt	25	34	38	40	44	44	40	41	42	43
growth	%	*-23%*	*36%*	*13%*	*5%*	*11%*	*0%*	*-9%*	*2%*	*1%*	*2%*
European imports	Mt	46	52	53	49	52	52	53	53	53	54
growth	%	*-30%*	*14%*	*2%*	*-7%*	*5%*	*1%*	*2%*	*0%*	*1%*	*0%*
China imports	Mt	34	47	45	53	75	62	50	47	48	46
growth	%	*912%*	*37%*	*-5%*	*18%*	*43%*	*-17%*	*-20%*	*-6%*	*3%*	*-5%*
India imports	Mt	31	34	34	36	41	44	46	49	53	57
growth	%	*17%*	*11%*	*-1%*	*7%*	*13%*	*6%*	*6%*	*7%*	*8%*	*8%*
Brazil imports	Mt	11	14	13	15	16	16	15	16	16	17
growth	%	*-32%*	*20%*	*-4%*	*14%*	*9%*	*-3%*	*-3%*	*2%*	*3%*	*3%*
Other imports / inventory adjustment	Mt	12	20	24	31	20	32	29	31	32	34
Global traded coking coal demand	**Mt**	**221**	**274**	**271**	**295**	**316**	**321**	**300**	**304**	**312**	**317**
growth	%	*-4%*	*24%*	*-1%*	*9%*	*7%*	*1%*	*-6%*	*1%*	*3%*	*2%*
Notional market balance	**Mt**	**15**	**-5**	**-4**	**7**	**3**	**3**	**8**	**6**	**-1**	**-3**
Contract Hard Coking Coal	**USD/t**	**129**	**195**	**289**	**210**	**159**	**126**	**102**	**89**	**95**	**108**

Source: Deutsche Bank, Wood Mackenzie

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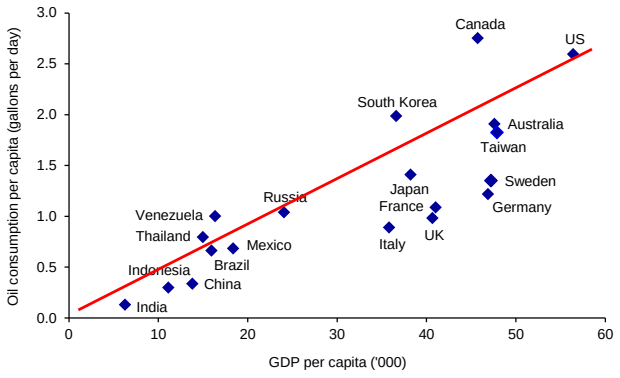
Commodities Chartbook

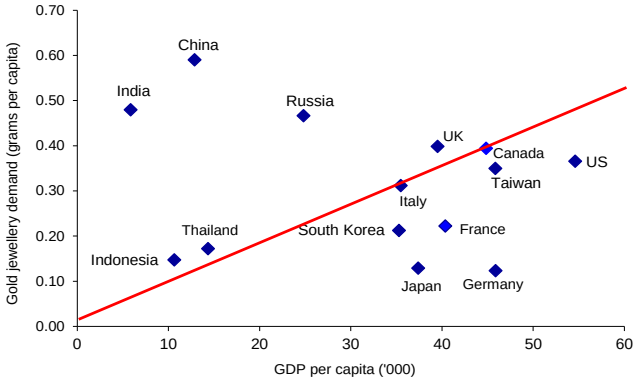
Commodity consumption around the world relative to per capita income

Figure 1: Oil consumption intensity



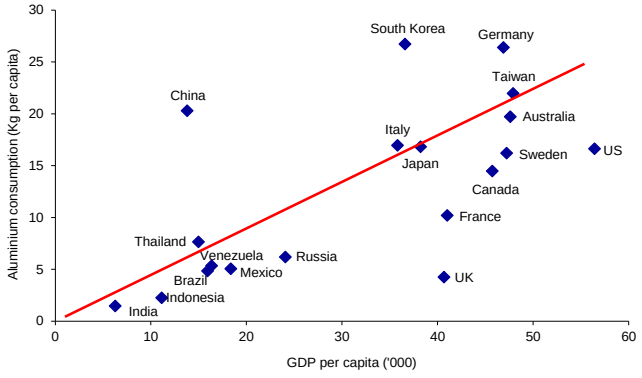
Source: DB Global Markets Research, IMF, IEA (2015)

Figure 2: Gold consumption intensity



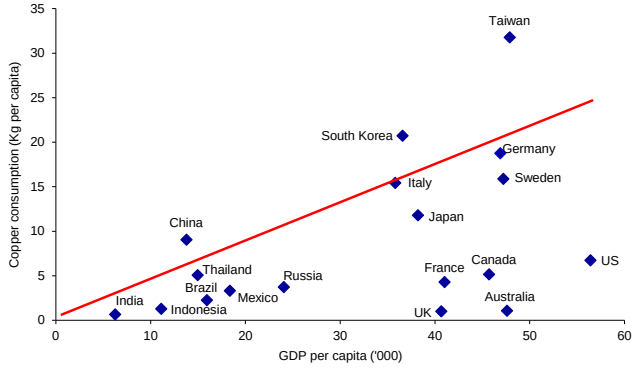
Source: DB Global Markets Research, IMF, World Gold Council (2014)

Figure 3: Aluminium consumption intensity



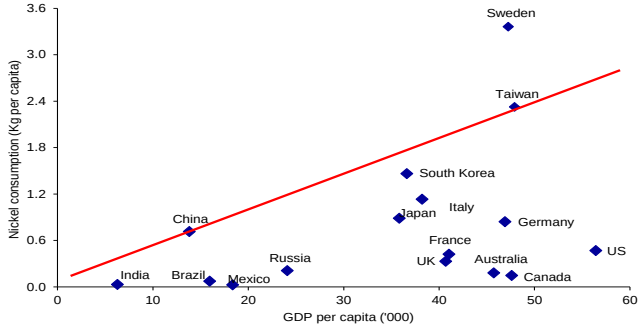
Source: DB Global Markets Research, IMF, Brook Hunt (2015)

Figure 4: Copper consumption intensity



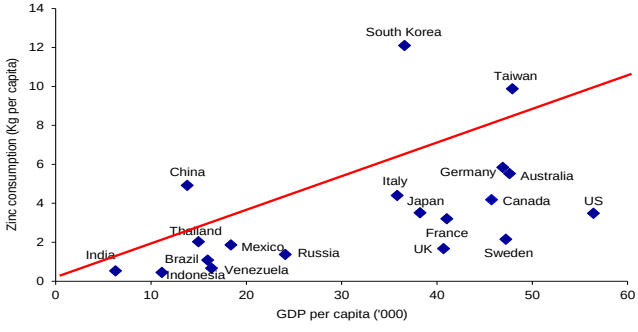
Source: DB Global Markets Research, IMF, Brook Hunt (2015)

Figure 5: Nickel consumption intensity



Source: DB Global Markets Research, IMF, Brook Hunt (2015)

Figure 6: Zinc consumption intensity

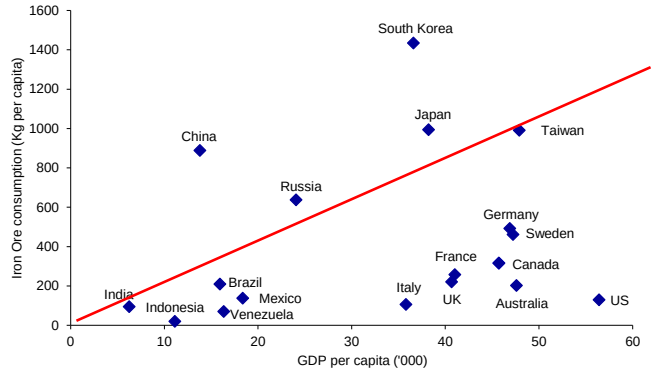


Source: DB Global Markets Research, IMF, Brook Hunt (2015)

Commodities Chartbook

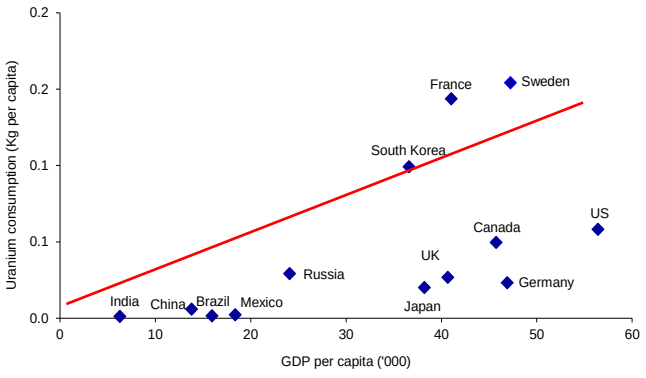
Commodity consumption around the world relative to per capita income

Figure 7: Iron ore consumption intensity



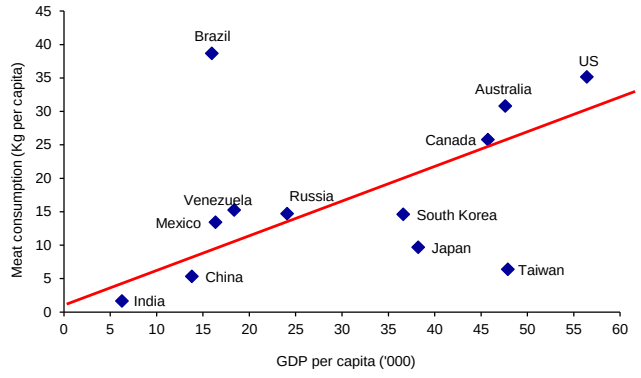
Source: DB Global Markets Research, IMF, BH (2014)

Figure 8: Uranium consumption intensity



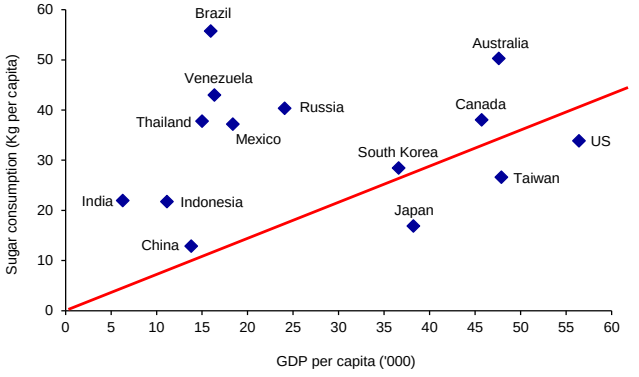
Source: DB Global Markets Research, IMF, WNA (2015)

Figure 9: Meat consumption intensity



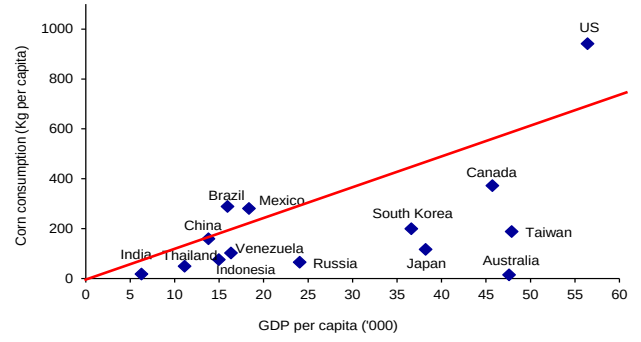
Source: DB Global Markets Research, IMF, USDA (2015)

Figure 10: Sugar consumption intensity



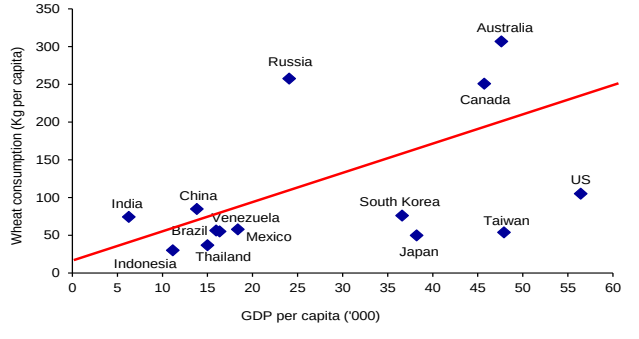
Source: DB Global Markets Research, IMF, USDA (2015)

Figure 11: Corn consumption intensity



Source: DB Global Markets Research, IMF, USDA (2015)

Figure 12: Wheat consumption intensity

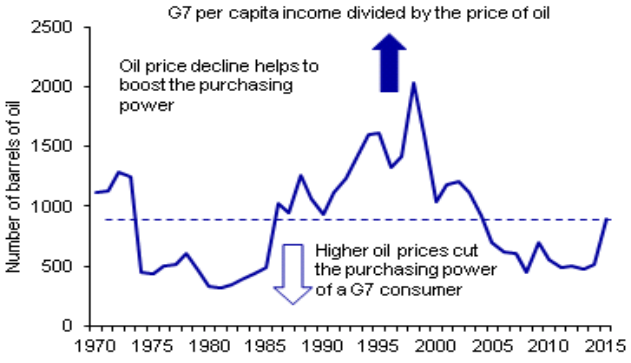


Source: DB Global Markets Research, IMF, USDA (2015)

Commodities Chartbook

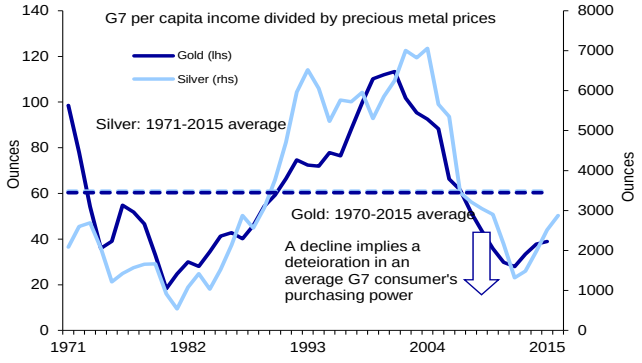
Commodities relative to G7 per capita income

Figure 1: Crude oil prices relative to per capita income



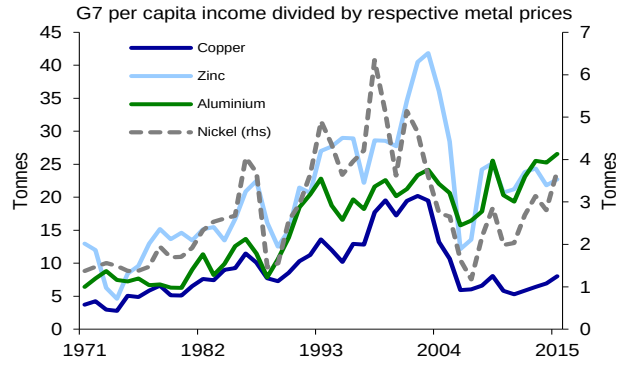
Source: DB Global Markets Research, IMF

Figure 2: Gold & silver prices relative to per capita income



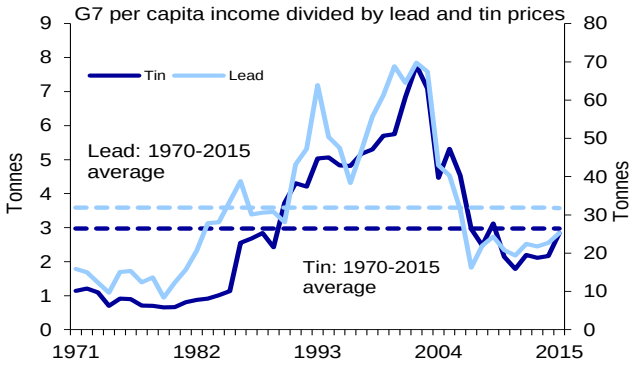
Source: DB Global Markets Research, IMF

Figure 3: Industrial metal prices relative to per capita income



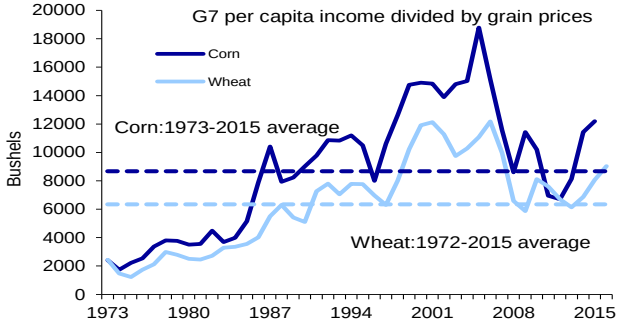
Source: DB Global Markets Research, IMF

Figure 4: Lead & tin prices relative to per capita income



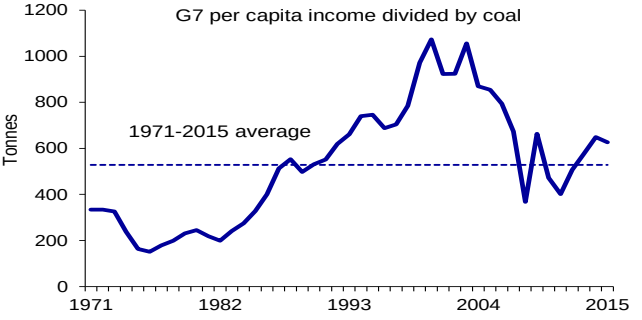
Source: DB Global Markets Research, IMF

Figure 5: Grain prices relative to per capita income



Source: DB Global Markets Research, IMF

Figure 6: Coal prices relative to per capita income

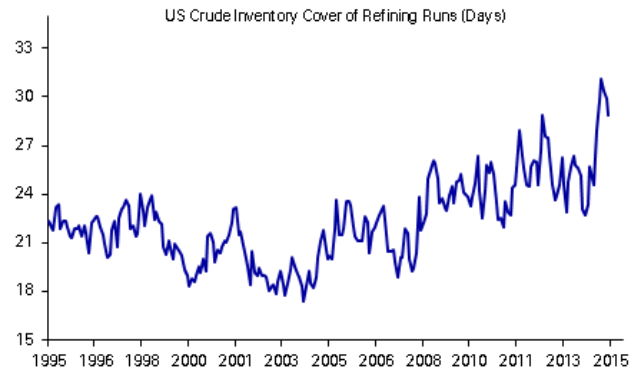


Source: DB Global Markets Research, IMF

Commodities Chartbook

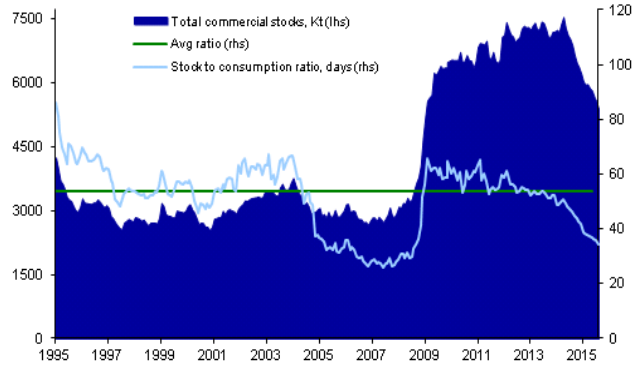
Commodity inventory-to-use ratios

Figure 1: US oil inventory-to-use ratio



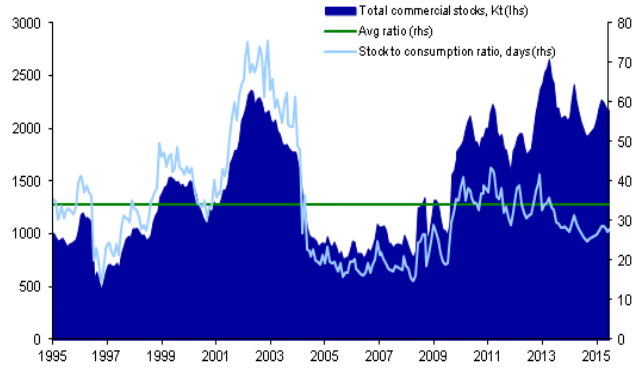
Source: IEA

Figure 2: Aluminium stock-to-consumption ratio



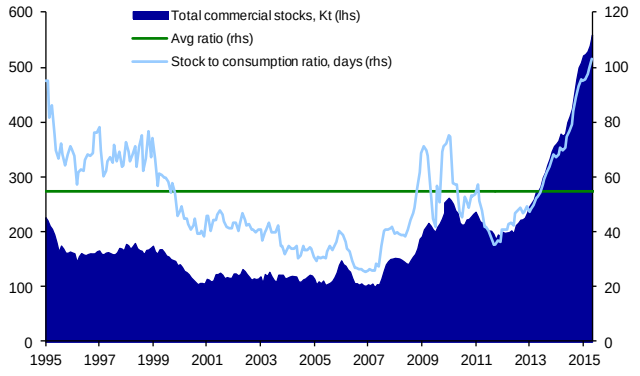
Source: Reuters, WBMS

Figure 3: Copper stock-to-consumption ratio



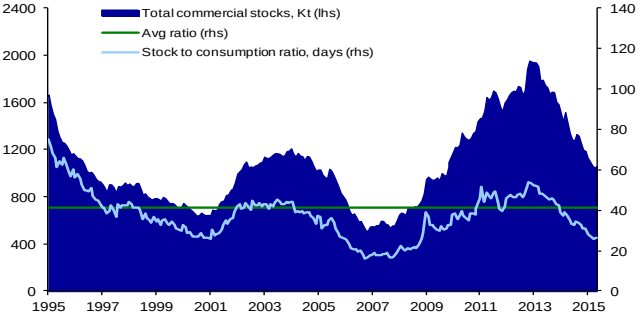
Source: Reuters, ICSG, WBMS

Figure 4: Nickel stock-to-consumption ratio



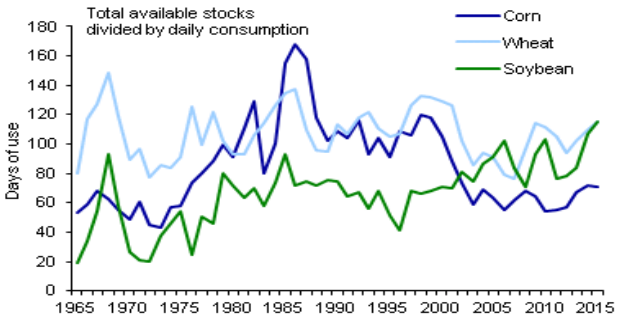
Source: Reuters, INSG, WBMS

Figure 5: Zinc stock-to-consumption ratio



Source: Reuters, ILZSG

Figure 6: Corn, soybeans & wheat stock-to-consumption ratio

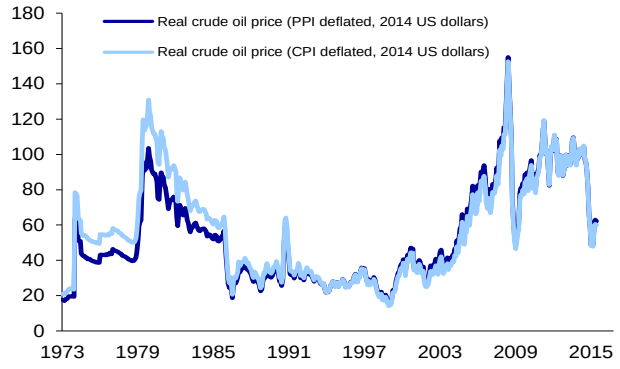


Source: USDA, Deutsche Bank

Commodities Chartbook

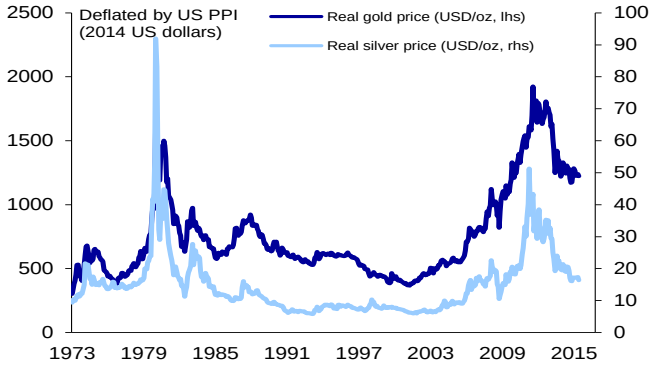
Commodities prices in real terms

Figure 1: Crude oil prices in real terms



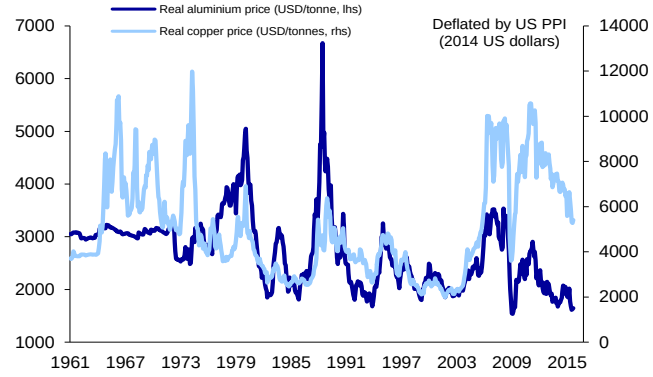
Source: IMF, Bloomberg Finance LP

Figure 2: Precious metal prices in real terms



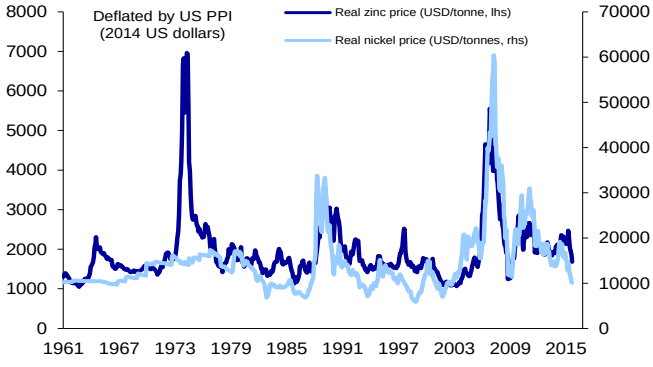
Source: IMF, Bloomberg Finance LP

Figure 3: Aluminium & copper prices in real terms



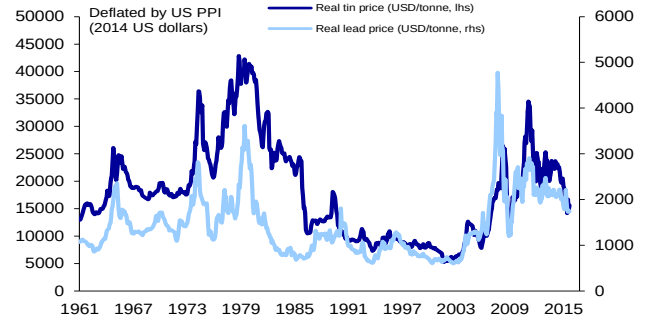
Source: IMF, Bloomberg Finance LP

Figure 4: Nickel & zinc prices in real terms



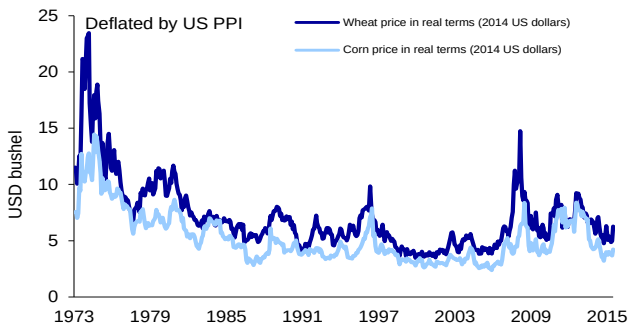
Source: IMF, Bloomberg Finance LP

Figure 5: Lead & tin prices in real terms



Source: IMF, Bloomberg Finance LP

Figure 6: Corn & wheat prices in real terms

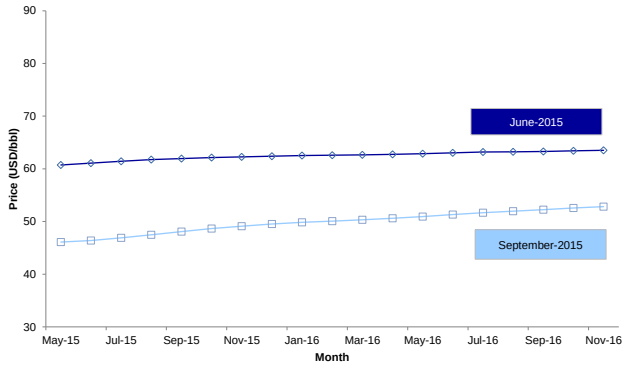


Source: IMF, Bloomberg Finance LP

Commodities Chartbook

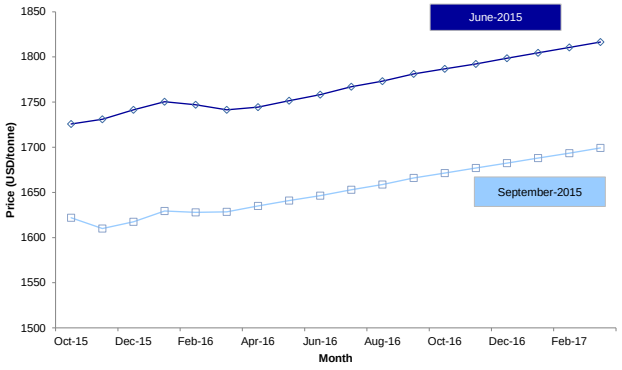
Commodity Forward Curves

Figure 1: WTI crude oil forward curve



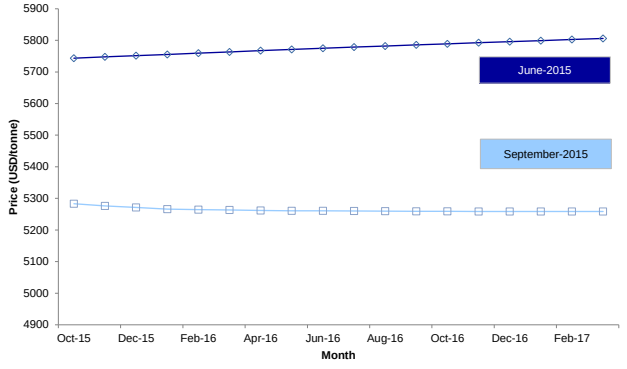
Source: DB Global Markets Research

Figure 2: Aluminium forward curve



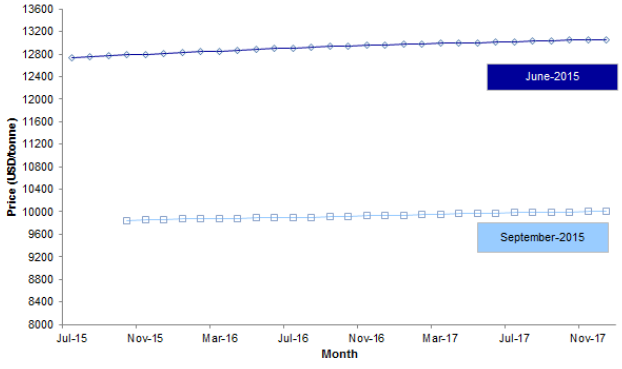
Source: DB Global Markets Research

Figure 3: Copper forward curve



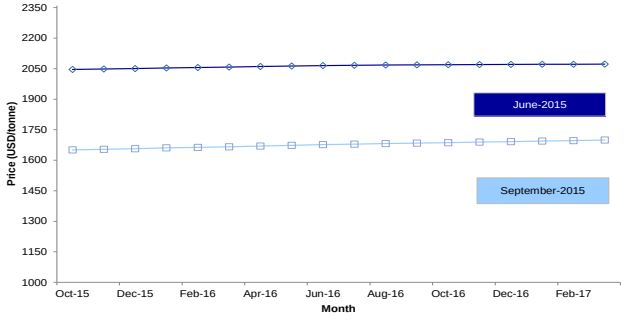
Source: DB Global Markets Research

Figure 4: Nickel forward curve



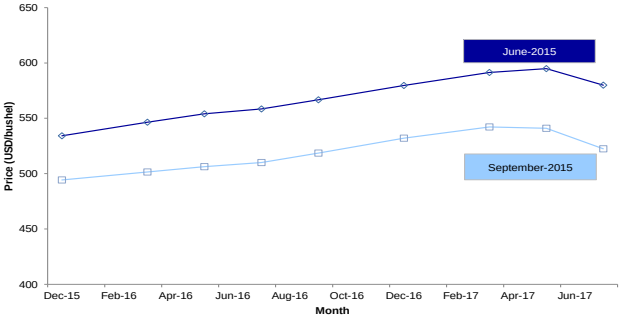
Source: DB Global Markets Research

Figure 5: Zinc forward curve



Source: DB Global Markets Research

Figure 6: Wheat forward curve

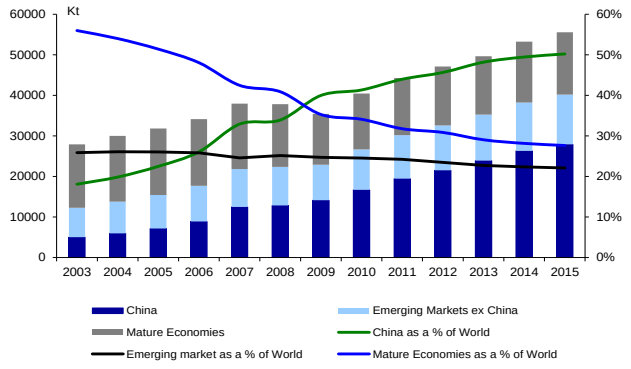


Source: DB Global Markets Research

Commodities Chartbook

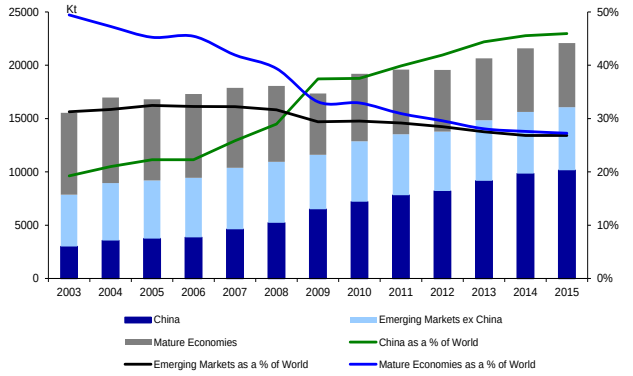
BRIC & OECD commodity demand

Figure 1: Aluminium demand



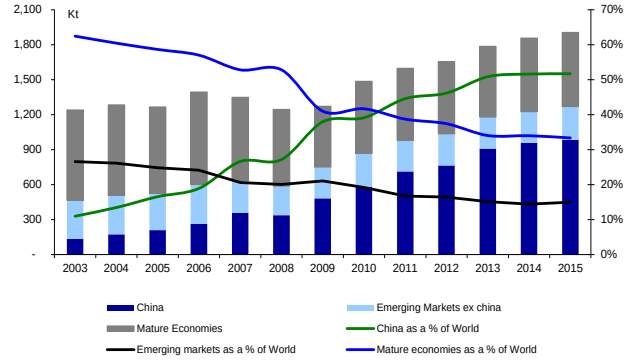
Source: DB Global Markets Research, Brook Hunt

Figure 2: Copper demand



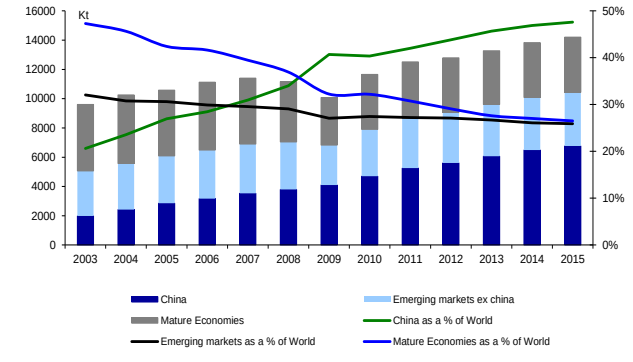
Source: DB Global Markets Research, Brook Hunt

Figure 3: Nickel demand



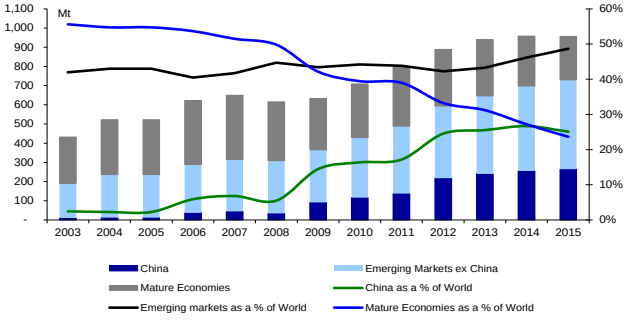
Source: DB Global Markets Research, Brook Hunt

Figure 4: Zinc demand



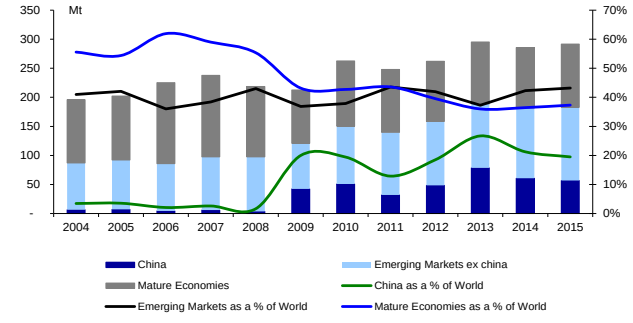
Source: DB Global Markets Research, Brook Hunt

Figure 5: Thermal coal demand



Source: DB Global Markets Research, Brook Hunt

Figure 6: Metallurgical coal demand



Source: DB Global Markets Research, Brook Hunt

Commodity Price Forecasts

Energy Commodities Price Forecasts

USD	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	Q1 16	Q2 16	Q3 16	Q4 16	2016	2017	2018
WTI (bbl)	93.01	48.6	58.0	46.6	48.0	50.3	50.0	50.0	54.0	54.0	52.0	58.0	65.0
% Change from previous forecast	*0.0%*	*0.0%*	*0.3%*	*-15.2%*	*-16.5%*	*-8.1%*					*-20.0%*	*-17.1%*	
Brent (bbl)	99.54	55.1	63.5	51.7	53.0	55.8	55.0	55.0	59.0	59.0	57.0	63.0	70.0
% Change from previous forecast	*0.0%*	*0.0%*	*-0.3%*	*-13.9%*	*-15.2%*	*-7.5%*					*-18.6%*	*-16.0%*	
US Natural Gas (mmBtu)	4.25	2.87	2.73	2.78	2.90	2.82	3.05	3.25	3.30	3.40	3.25	3.75	4.25
% Change from previous forecast	*0.0%*	*0.0%*	*0.7%*	*2.9%*	*0.0%*	*0.9%*					*-7.1%*	*-11.8%*	
Thermal Coal - Japanese Guide Price (JFY)	85.25	82.00	67.80	67.80	67.80	71.35	67.80	63.00	63.00	63.00	64.20	54.00	54.00
% Change from previous forecast	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*					*0.3%*	*-10.0%*	*-42.8%*
API4 (Richard's Bay) FOB (t)	71.89	61.70	61.21	55.64	52.00	57.64	51.00	51.00	49.00	49.00	50.00	49.00	49.00
% Change from previous forecast	*0.0%*	*4.7%*	*1.8%*	*-10.3%*	*-16.1%*	*-5.1%*					*-16.7%*	*-14.0%*	*-44.4%*
Newcastle FOB (t)	71.39	64.92	59.33	59.38	56.00	59.90	54.00	54.00	52.00	52.00	53.00	52.00	52.00
% Change from previous forecast	*0.4%*	*12.0%*	*3.4%*	*0.6%*	*-5.1%*	*2.7%*					*-7.0%*	*-5.5%*	*-42.9%*
Uranium (U3O8) (lb) [term]	49	55	49	52	55	53	55	58	58	58	57	59	62
% Change from previous forecast	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*					*-1.3%*	*-2.4%*	*-1.7%*

Source: Deutsche Bank

Precious Metals Price Forecasts

USD/oz	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	Q1 16	Q2 16	Q3 16	Q4 16	2016	2017	2018
Gold	1267	1219	1194	1125	1125	1166	1115	1100	1100	1085	1100	1100	1150
% Change from previous forecast	*0.0%*	*0.0%*	*-0.1%*	*-2.2%*	*0.0%*	*-0.6%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*
Silver	19	17	16	15	15	16	16	16	17	17	16	17	18
% Change from previous forecast	*0.0%*	*0.0%*	*0.2%*	*-12.0%*	*-9.4%*	*-5.4%*	*-7.2%*	*-5.7%*	*-3.4%*	*-1.3%*	*-4.4%*	*0.0%*	*0.0%*
Platinum	1386	1194	1129	1000	980	1076	1050	1200	1250	1240	1185	1290	1350
% Change from previous forecast	*0.0%*	*0.0%*	*-0.1%*	*-9.1%*	*-16.9%*	*-6.5%*	*-4.5%*	*0.0%*	*0.0%*	*0.0%*	*-1.0%*	*0.0%*	*-5.1%*
Palladium	803	786	759	615	630	698	700	820	835	720	769	820	850
% Change from previous forecast	*0.0%*	*0.0%*	*1.2%*	*-14.6%*	*-19.2%*	*-8.1%*	*-12.5%*	*0.0%*	*0.0%*	*-10.0%*	*-5.5%*	*-3.5%*	*-8.1%*
Rhodium	1172	1182	1074	850	850	989	900	1150	1150	1000	1050	1200	1350
% Change from previous forecast	*0.0%*	*0.0%*	*-1.4%*	*-22.7%*	*-22.7%*	*-11.5%*	*-18.2%*	*0.0%*	*0.0%*	*-16.7%*	*-8.7%*	*-9.1%*	*-12.3%*

Source: Deutsche Bank

Industrial Metals Price Forecasts

Cash price	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	Q1 16	Q2 16	Q3 16	Q4 16	2016	2017	2018
Aluminium													
USc/lb	85.9	81.7	80.2	72.6	74.9	77.3	73.5	72.6	71.7	74.9	73.2	76.2	81.7
USD/t	1893	1801	1767	1600	1650	1705	1620	1600	1580	1650	1613	1680	1800
% Change from previous forecast	*0.0%*	*0.0%*	*0.4%*	*-7.0%*	*-8.3%*	*-3.7%*	*-12.4%*	*-12.1%*	*-16.8%*	*-15.4%*	*-14.2%*	*-11.6%*	*-10.0%*
Copper													
USc/lb	310.6	264.8	274.3	231.4	249.5	255.0	226.9	217.8	204.2	195.1	211.0	217.8	259.5
USD/t	6846	5837	6045	5100	5500	5620	5000	4800	4500	4300	4650	4800	5719
% Change from previous forecast	*0.0%*	*0.0%*	*-0.9%*	*-17.7%*	*-12.7%*	*-8.0%*	*-10.7%*	*-12.7%*	*-25.0%*	*-31.7%*	*-20.5%*	*-14.3%*	*-9.5%*
Lead													
USc/lb	95.8	82.1	87.9	78.3	82.1	82.6	80.8	81.7	79.4	82.6	81.1	83.9	87.6
USD/t	2111	1810	1938	1725	1810	1821	1780	1800	1750	1820	1788	1850	1930
% Change from previous forecast	*0.0%*	*0.0%*	*-1.1%*	*-9.2%*	*-8.6%*	*-4.8%*	*-13.2%*	*-14.3%*	*-18.6%*	*-17.3%*	*-15.9%*	*-17.3%*	*-17.9%*
Nickel													
USc/lb	769.3	652.4	591.7	483.2	508.2	558.9	589.8	703.3	657.9	612.5	640.9	726.0	833.2
USD/t	16955	14380	13041	10650	11200	12318	13000	15500	14500	13500	14125	16000	18364
% Change from previous forecast	*0.0%*	*0.0%*	*-1.2%*	*-21.1%*	*-34.1%*	*-15.2%*	*-18.8%*	*-13.9%*	*-23.7%*	*-32.5%*	*-22.6%*	*-27.3%*	*-19.7%*
Tin													
USc/lb	993.6	832.9	706.4	689.7	726.0	738.7	748.6	748.6	748.6	748.6	748.6	807.6	863.8
USD/t	21899	18357	15569	15200	16000	16282	16500	16500	16500	16500	16500	17800	19037
% Change from previous forecast	*0.0%*	*0.0%*	*-1.5%*	*-7.9%*	*-5.9%*	*-3.7%*	*-8.3%*	*-8.3%*	*-8.3%*	*-8.3%*	*-8.3%*	*-6.0%*	*-4.2%*
Zinc													
USc/lb	98.2	94.3	99.2	84.8	88.5	91.7	99.8	102.1	104.4	106.6	103.2	111.2	122.5
USD/t	2164	2079	2187	1870	1950	2021	2200	2250	2300	2350	2275	2450	2700
% Change from previous forecast	*0.0%*	*0.0%*	*-0.1%*	*-12.6%*	*-15.2%*	*-7.2%*	*-8.3%*	*-8.2%*	*-8.0%*	*-7.8%*	*-8.1%*	*-5.8%*	*-3.6%*

Source: Deutsche Bank

Minor Metals Price Forecasts

USD	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	2016	2017	2018
Molybdenum (lb)	11.66	8.69	7.68	7.90	5.90	7.54	6.13	7.00	7.50
% Change from previous forecast	*0.0%*	*-0.7%*	*-1.5%*	*0.0%*	*-26.3%*	*-7.0%*	*-27.9%*	*-22.2%*	*-25.0%*

Source: Deutsche Bank

Bulk Commodities Price Forecasts

USD	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	Q1 16	Q2 16	Q3 16	Q4 16	2016	2017	2018
Iron Ore Spot Landed Fines Price in China CIF (t)	97.04	62.48	58.47	55.00	50.00	56.49	50.00	45.00	45.00	54.00	48.50	56.00	61.70
% Change from previous forecast	*0.0%*	*0.0%*	*0.8%*	*10.0%*	*4.2%*	*3.4%*	*-3.8%*	*-10.0%*	*-25.0%*	*-14.3%*	*-13.8%*	*-9.7%*	*-6.8%*
Hard Coking Coal JFY (t)	125.50	117.00	110.00	93.00	89.00	102.25	87.00	85.00	90.00	92.00	88.50	95.00	107.63
% Change from previous forecast	*0.0%*	*0.0%*	*0.5%*	*0.0%*	*-7.3%*	*-1.6%*	*-13.0%*	*-19.0%*	*-10.0%*	*-16.4%*	*-14.7%*	*-20.0%*	*-19.6%*
Low-volatile PCI JFY (t)	104.25	99.00	93.00	73.00	71.00	84.00	70.00	68.00	76.50	78.20	73.18	80.75	91.48
% Change from previous forecast	*0.0%*	*0.0%*	*0.0%*	*-7.7%*	*-13.0%*	*-4.7%*	*-17.6%*	*-23.8%*	*-10.0%*	*-16.4%*	*-17.0%*	*-20.0%*	*-19.6%*

Source: Deutsche Bank

Key Economic Forecasts

	GDP growth (% yoy)			CPI inflation (% yoy)			Current Account (% of GDP)			Fiscal Balance (% of GDP)		
Advanced economies	2014	2015F	2016F	2014	2015F	2016F	2014	2015F	2016F	2014	2015F	2016F
US	2.4	2.6	3.0	1.6	0.4	2.3	-2.6	-3.0	-3.6	-2.8	-2.7	-2.4
Japan	-0.1	0.6	1.1	2.7	0.8	0.8	0.5	3.4	3.3	-5.9	-5.3	-4.5
Euro area	0.9	1.4	1.6	0.4	0.3	1.4	2.1	3.0	2.3	-2.4	-2.1	-1.8
Germany	1.6	1.7	1.7	0.8	0.5	1.8	7.4	8.3	8.2	0.7	0.7	0.5
France	0.2	1.2	1.6	0.6	0.3	1.1	-0.9	-0.5	-1.0	-4.0	-3.8	-3.6
Italy	-0.4	0.7	1.5	0.2	0.2	1.2	1.9	2.5	2.9	-3.0	-2.8	-2.2
Spain	1.4	3.2	2.8	-0.2	-0.3	1.5	0.8	1.3	1.1	-5.8	-4.6	-3.6
Netherlands	1.0	1.9	1.4	0.3	0.2	1.3	10.6	11.1	11.1	-2.3	-2.0	-1.9
Belgium	1.1	1.3	1.6	0.5	0.6	1.6	1.6	2.0	1.5	-3.2	-2.7	-2.5
Austria	0.5	0.5	1.4	1.5	1.0	1.8	0.8	1.1	1.5	-2.4	-2.0	-1.9
Finland	-0.4	0.2	0.9	1.2	0.1	1.4	-0.9	-1.0	-0.8	-3.2	-3.1	-2.8
Greece	0.7	-3.0	-1.4	-1.4	-1.4	1.0	-2.3	1.5	1.2	-3.5	-3.4	-2.7
Portugal	0.9	1.6	1.7	-0.2	0.7	1.4	0.6	0.9	1.0	-4.5	-3.1	-2.6
Ireland	5.2	3.7	3.5	0.3	0.3	1.8	3.6	5.0	4.5	-4.1	-2.4	-2.0
United Kingdom	3.0	2.5	2.3	1.5	0.5	1.6	-3.2	-4.5	-3.0	-4.3	-3.8	-2.5
Denmark	1.1	1.8	2.0	0.6	0.6	1.4	6.3	6.0	6.0	-1.0	-1.5	-2.0
Norway	2.3	1.5	1.9	2.0	2.0	2.2	9.4	7.5	7.0	9.1	7.5	7.5
Sweden	2.4	2.4	2.6	-0.2	0.3	1.5	6.8	6.5	6.0	-1.9	-1.0	-0.5
Switzerland	1.9	0.8	1.2	0.0	-1.0	-0.3	7.0	7.0	6.5	0.2	0.0	-0.5
Canada	2.4	1.8	2.7	1.9	1.4	2.0	-2.2	-2.6	-1.2	-0.8	0.0	0.3
Australia	2.7	2.2	2.6	2.5	1.7	2.5	-3.0	-4.1	-3.5	-2.8	-2.4	-2.2
New Zealand	3.3	2.2	1.9	1.2	0.3	1.9	-3.3	-4.7	-5.3	-0.7	-0.1	0.2
EEMEA	2.4	1.0	1.9	6.0	8.8	6.6	1.9	-0.6	-0.6	-2.1	-5.7	-4.3
Czech Republic	2.0	4.2	3.0	0.4	0.6	2.1	0.6	0.3	0.0	-1.9	-1.8	-1.6
Egypt	2.2	4.2	4.0	10.1	11.0	10.0	-0.8	-3.9	-3.3	-12.8	-11.7	-10.5
Hungary	3.6	2.7	2.4	-0.2	0.4	2.7	4.0	3.1	3.3	-2.6	-2.7	-2.4
Israel	2.6	2.8	3.2	0.5	-0.6	0.8	4.3	4.1	4.7	-2.7	-3.4	-3.2
Kazakhstan	4.3	1.5	2.0	6.7	6.1	10.7	2.2	-1.9	0.8	1.9	-2.0	-0.7
Nigeria	6.2	3.9	5.0	8.1	10.0	10.0	1.2	-2.5	-1.8	-1.9	-2.8	-2.4
Poland	3.4	3.4	3.5	0.0	-0.7	1.4	-1.4	-1.7	-1.8	-3.2	-2.9	-2.7
Romania	2.9	3.7	3.0	1.1	-0.7	0.1	-0.4	-0.5	-0.9	-1.5	-1.7	-2.5
Russia	0.6	-3.8	-1.2	7.8	15.6	8.8	3.1	5.8	5.0	-0.5	-3.4	-1.9
Saudi Arabia	3.5	3.2	1.4	2.7	2.2	2.5	10.9	-5.4	-4.7	-2.0	-19.7	-13.2
South Africa	1.5	1.5	2.1	6.1	4.9	5.9	-5.4	-4.7	-4.8	-3.5	-3.3	-2.5
Turkey	2.9	3.0	3.0	8.9	7.6	7.8	-5.8	-5.5	-6.1	-1.3	-1.6	-2.3
Ukraine	-6.9	-10.1	1.5	12.1	47.9	16.3	-3.5	-2.5	-2.0	-4.6	-4.5	-3.0
United Arab Emirates	4.6	2.7	2.8	2.3	3.6	2.1	13.7	2.1	3.0	5.0	-4.7	-2.9
Asia (ex-Japan)	6.4	6.2	6.1	3.4	2.6	3.3	2.4	2.6	2.3	-2.2	-3.1	-2.7
China	7.3	7.0	6.7	2.0	1.7	2.7	3.1	3.4	3.3	-2.1	-3.7	-3.0
Hong Kong	2.5	2.5	3.0	4.4	3.0	3.8	1.9	2.4	2.6	3.6	2.4	2.3
India	7.1	7.5	7.5	6.7	4.8	5.1	-1.4	-1.5	-1.9	-4.0	-3.9	-3.8
Indonesia	5.0	4.5	4.5	6.4	6.5	4.7	-2.9	-2.0	-1.6	-2.2	-1.7	-1.7
Korea	3.3	2.4	2.9	1.3	0.8	1.8	6.3	7.5	6.9	0.6	-0.3	-0.1
Malaysia	6.0	4.6	4.2	3.1	2.2	3.0	4.3	2.2	2.1	-3.4	-3.2	-3.0
Philippines	6.1	6.0	6.5	4.2	1.5	3.1	4.4	3.8	3.5	-0.6	-2.2	-2.4
Singapore	2.9	2.5	3.0	1.0	-0.4	1.2	18.9	19.6	18.2	6.9	6.8	6.6
Sri Lanka	4.5	4.0	5.0	3.3	1.4	4.5	-2.6	-1.6	-1.3	-5.7	-6.0	-5.5
Taiwan	3.8	1.5	2.6	1.2	-0.4	1.5	12.3	14.7	12.3	-0.8	-1.6	-1.6
Thailand	0.9	2.5	3.0	1.9	-0.8	1.1	3.4	3.7	2.5	-2.8	-2.5	-2.0
Vietnam	6.0	6.5	6.5	4.1	1.1	5.0	5.9	-1.5	-2.9	-5.8	-5.5	-5.3
Latin America	0.8	-0.6	0.7	12.5	15.3	17.8	-2.7	-3.2	-2.7	-5.3	-6.2	-5.5
Argentina	-1.5	0.3	0.1	38.6	28.1	32.1	-1.7	-2.3	-1.8	-6.2	-8.2	-5.8
Brazil	0.1	-2.8	-0.9	6.3	8.8	7.4	-4.4	-4.0	-3.0	-6.2	-7.0	-6.8
Chile	1.8	2.1	2.8	4.4	4.6	3.1	-1.2	-0.4	-0.8	-1.6	-2.1	-2.3
Colombia	4.6	3.0	3.2	2.9	4.6	3.8	-5.2	-5.8	-4.2	-2.3	-3.0	-3.6
Mexico	2.1	2.1	3.0	4.0	2.8	3.1	-2.3	-2.5	-2.7	-4.2	-3.8	-3.3
Peru	2.4	3.3	4.5	3.4	3.5	3.3	-4.0	-4.7	-4.7	0.7	-1.0	-0.5
Venezuela	-3.4	-9.7	-7.6	62.0	120.0	175.0	6.8	-0.4	-1.1	-13.0	-19.5	-15.8
G7	1.7	2.0	2.3	1.5	0.5	1.8						
Advanced economies	1.7	1.9	2.2	1.3	0.5	1.8						
EM economies	4.6	4.0	4.4	5.4	5.8	6.0						
Global	3.4	3.1	3.5	3.6	3.5	4.2						

Source: Deutsche Bank Research, National statistical authorities

Correlation Matrix

	CL	LCO	XB	HO	LGO	NG	MAL	MCU	MPB	MNI	MZN	TSIPI062	GC	PL	SI	PA	W	C	S	DBLCI	DBLCI-MR	GSCI-TR	EUR	GBP	NOK	CAD	AUD	JPY	ED	SHCOMP Index	SPX	iBOX
Light Crude		0.93	0.83	0.90	0.64	0.21	0.53	0.52	0.41	0.50	0.37	0.49	0.05	0.37	0.31	0.36	0.01	0.14	0.31	0.90	0.96	0.96	-0.21	-0.16	-0.04	-0.05	0.09	0.38	-0.27	0.38	0.37	-0.27
Brent	0.93		0.89	0.96	0.70	0.11	0.49	0.48	0.39	0.53	0.38	0.45	0.03	0.42	0.32	0.43	-0.03	0.16	0.29	0.88	0.93	0.95	-0.28	-0.23	-0.01	-0.03	0.07	0.41	-0.22	0.48	0.46	-0.20
Unleaded Petrol	0.83	0.89		0.89	0.61	0.03	0.37	0.41	0.35	0.45	0.30	0.43	0.08	0.32	0.36	0.41	-0.07	0.06	0.18	0.76	0.82	0.85	-0.20	-0.20	-0.10	-0.10	0.09	0.31	-0.22	0.44	0.28	-0.14
Heating Oil	0.90	0.96	0.89		0.71	0.16	0.44	0.45	0.35	0.51	0.37	0.41	0.05	0.41	0.33	0.47	-0.00	0.14	0.30	0.87	0.92	0.94	-0.23	-0.24	-0.05	-0.06	0.08	0.37	-0.15	0.51	0.41	-0.16
Gas Oil	0.64	0.70	0.61	0.71		0.24	0.62	0.50	0.55	0.54	0.53	0.41	0.09	0.38	0.41	0.48	0.05	0.21	0.39	0.70	0.69	0.75	-0.20	-0.14	-0.18	-0.15	0.21	0.40	-0.15	0.46	0.27	-0.18
Natural Gas	0.21	0.11	0.03	0.16	0.24		0.42	0.26	0.34	0.18	0.24	0.11	0.10	0.12	0.11	0.14	-0.02	0.03	0.08	0.24	0.20	0.25	0.26	0.26	-0.25	-0.08	0.17	0.13	0.03	0.11	0.15	-0.02
LME Al	0.53	0.49	0.37	0.44	0.62	0.42		0.75	0.72	0.57	0.75	0.31	0.15	0.46	0.48	0.36	-0.14	0.10	0.29	0.54	0.52	0.58	-0.04	0.09	-0.21	-0.09	0.24	0.38	-0.11	0.18	0.24	-0.21
LME Cu	0.52	0.48	0.41	0.45	0.50	0.26	0.75		0.69	0.70	0.71	0.31	0.12	0.40	0.54	0.37	0.04	0.19	0.41	0.56	0.53	0.60	-0.02	0.06	-0.18	-0.01	0.17	0.35	-0.17	0.12	0.27	-0.37
LME Lead	0.41	0.39	0.35	0.35	0.55	0.34	0.72	0.69		0.59	0.78	0.20	0.23	0.34	0.50	0.39	-0.01	0.14	0.32	0.45	0.43	0.49	-0.13	-0.07	-0.02	-0.09	0.26	0.37	-0.23	0.21	0.17	-0.22
LME Nickel	0.50	0.53	0.45	0.51	0.54	0.18	0.57	0.70	0.59		0.65	0.44	0.06	0.40	0.52	0.44	0.09	0.29	0.43	0.56	0.55	0.60	-0.32	-0.17	0.05	0.01	0.11	0.45	-0.25	0.37	0.40	-0.22
LME Zinc	0.37	0.38	0.30	0.37	0.53	0.24	0.75	0.71	0.78	0.65		0.23	0.25	0.43	0.58	0.51	-0.04	0.12	0.33	0.44	0.41	0.47	-0.16	-0.09	0.00	-0.08	0.15	0.34	-0.14	0.23	0.23	-0.22
Iron Ore	0.49	0.45	0.43	0.41	0.41	0.11	0.31	0.31	0.20	0.44	0.23	1.00	-0.10	0.17	0.22	0.10	-0.11	-0.17	0.17	0.37	0.39	0.45	-0.04	0.13	-0.21	-0.34	0.27	0.37	-0.12	0.40	0.20	-0.11
Comex Gold Future	0.05	0.03	0.08	0.05	0.09	0.10	0.15	0.12	0.23	0.06	0.25	-0.10		0.60	0.66	0.41	0.18	-0.04	-0.08	0.17	0.09	0.06	0.33	0.06	-0.10	-0.20	0.09	-0.16	0.18	-0.03	-0.21	-0.07
NYMEX Platinum	0.37	0.42	0.32	0.41	0.38	0.12	0.46	0.40	0.34	0.40	0.43	0.17	0.60		0.71	0.65	0.01	0.06	0.13	0.43	0.41	0.43	0.08	-0.02	-0.14	-0.19	0.16	0.29	-0.07	0.28	0.37	-0.01
Comex Silver	0.31	0.32	0.36	0.33	0.41	0.11	0.48	0.54	0.50	0.52	0.58	0.22	0.66	0.71		0.56	0.10	0.04	0.28	0.40	0.36	0.38	0.08	0.06	-0.15	-0.27	0.17	0.29	0.01	0.36	0.11	-0.19
NYMEX Palladium	0.36	0.43	0.41	0.47	0.48	0.14	0.36	0.37	0.39	0.44	0.51	0.10	0.41	0.65	0.56	1.00	0.12	0.16	0.16	0.45	0.42	0.45	-0.12	-0.25	-0.11	-0.06	0.13	0.36	-0.17	0.36	0.36	0.01
Wheat CBOT	0.01	-0.03	-0.07	-0.00	0.05	-0.02	-0.14	0.04	-0.01	0.09	-0.04	-0.11	0.18	0.01	0.10	0.12		0.72	0.54	0.33	0.18	0.11	0.09	0.08	-0.08	0.07	0.02	-0.05	-0.13	0.17	-0.02	-0.24
Corn	0.14	0.16	0.06	0.14	0.21	0.03	0.10	0.19	0.14	0.29	0.12	-0.17	-0.04	0.06	0.04	0.16	0.72		0.69	0.47	0.35	0.29	-0.07	0.02	-0.07	0.18	0.04	0.09	-0.25	0.25	0.20	-0.21
Soy beans	0.31	0.29	0.18	0.30	0.39	0.08	0.29	0.41	0.32	0.43	0.33	0.17	-0.08	0.13	0.28	0.16	0.54	0.69		0.53	0.45	0.44	-0.05	0.04	-0.11	0.03	0.08	0.20	-0.23	0.37	0.17	-0.24
DBLCI	0.90	0.88	0.76	0.87	0.70	0.24	0.54	0.56	0.45	0.56	0.44	0.37	0.17	0.43	0.40	0.45	0.33	0.47	0.53		0.98	0.96	-0.16	-0.13	-0.10	-0.02	0.11	0.36	-0.19	0.48	0.36	-0.27
DBLCI-MR	0.96	0.93	0.82	0.92	0.69	0.20	0.52	0.53	0.43	0.55	0.41	0.39	0.09	0.41	0.36	0.42	0.18	0.35	0.45	0.98		0.98	-0.22	-0.17	-0.05	-0.02	0.08	0.39	-0.23	0.47	0.40	-0.27
GSCI-TR	0.96	0.95	0.85	0.94	0.75	0.25	0.58	0.60	0.49	0.60	0.47	0.45	0.06	0.43	0.38	0.45	0.11	0.29	0.44	0.96	0.98		-0.22	-0.16	-0.08	-0.04	0.12	0.42	-0.23	0.48	0.43	-0.25
EUR	-0.21	-0.28	-0.20	-0.23	-0.20	0.26	-0.04	-0.02	-0.13	-0.32	-0.16	-0.04	0.33	0.08	0.08	-0.12	0.09	-0.07	-0.05	-0.16	-0.22	-0.22		0.48	-0.58	-0.27	0.25	-0.47	0.18	-0.20	-0.40	-0.19
GBP	-0.16	-0.23	-0.20	-0.24	-0.14	0.26	0.09	0.06	-0.07	-0.17	-0.09	0.13	0.06	-0.02	0.06	-0.25	0.08	0.02	0.04	-0.13	-0.17	-0.16	0.48		-0.54	-0.38	0.44	0.01	0.09	-0.06	-0.10	-0.11
NOK	-0.04	-0.01	-0.10	-0.05	-0.18	-0.25	-0.21	-0.18	-0.02	0.05	0.00	-0.21	-0.10	-0.14	-0.15	-0.11	-0.08	-0.07	-0.11	-0.10	-0.05	-0.08	-0.58	-0.54		0.45	-0.53	-0.01	-0.02	-0.06	0.14	0.20
CAD	-0.05	-0.03	-0.10	-0.06	-0.15	-0.08	-0.09	-0.01	-0.09	0.01	-0.08	-0.34	-0.20	-0.19	-0.27	-0.06	0.07	0.18	0.03	-0.02	-0.02	-0.04	-0.27	-0.38	0.45		-0.57	0.08	-0.03	-0.14	0.16	-0.02
AUD	0.09	0.07	0.09	0.08	0.21	0.17	0.24	0.17	0.26	0.11	0.15	0.27	0.09	0.16	0.17	0.13	0.02	0.04	0.08	0.11	0.08	0.12	0.25	0.44	-0.53	-0.57		0.05	-0.12	0.23	0.04	-0.03
JPY	0.38	0.41	0.31	0.37	0.40	0.13	0.38	0.35	0.37	0.45	0.34	0.37	-0.16	0.29	0.29	0.36	-0.05	0.09	0.20	0.36	0.39	0.42	-0.47	0.01	-0.01	0.08	0.05		-0.08	0.40	0.55	0.03
ED	-0.27	-0.22	-0.22	-0.15	-0.15	0.03	-0.11	-0.17	-0.23	-0.25	-0.14	-0.12	0.18	-0.07	0.01	-0.17	-0.13	-0.25	-0.23	-0.19	-0.23	-0.23	0.18	0.09	-0.02	-0.03	-0.12	-0.08		-0.04	-0.25	0.36
SHCOMP Index	0.38	0.48	0.44	0.51	0.46	0.11	0.18	0.12	0.21	0.37	0.23	0.40	-0.03	0.28	0.36	0.36	0.17	0.25	0.37	0.48	0.47	0.48	-0.20	-0.06	-0.06	-0.14	0.23	0.40	-0.04	1.00		0.21
SPX	0.37	0.46	0.28	0.41	0.27	0.15	0.24	0.27	0.17	0.40	0.23	0.20	-0.21	0.37	0.11	0.36	-0.02	0.20	0.17	0.36	0.40	0.43	-0.40	-0.10	0.14	0.16	0.04	0.55	-0.25	0.40	1.00	
iBOXX Euro Corp All	-0.27	-0.20	-0.14	-0.16	-0.18	-0.02	-0.21	-0.37	-0.22	-0.22	-0.22	-0.11	-0.07	-0.01	-0.19	0.01	-0.24	-0.21	-0.24	-0.27	-0.27	-0.25	-0.19	-0.11	0.20	-0.02	-0.03	0.03	0.36	0.21	0.10	1.00

Source: Deutsche Bank

Appendix 1

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