Deutsche Bank
Markets Research

Global	Commodities		Date

Date
16 December 2014

Grant Sporre

Research Analyst
(+44) 20 754-58170
grant.sporre@db.com

Michael Lewis

Strategist
(+44) 20 754-52166
michael.lewis@db.com

Michael Hsueh

Strategist
(+44) 20 754-78015
michael.hsueh@db.com

Jayati Mukherjee

Strategist
(+91) 22 6181-2036
jayati.mukherjee@db.com

Commodities Outlook 2015

#1 Benchmark indices & a third year of under-performance: Following powerful price corrections, investors may be tempted to re-establish long exposures. However, US dollar strength should sustain the under-performance of commodity benchmark returns relative to equities.

#2 Living with lower oil prices: We believe Brent oil prices below USD60/barrel would, over time, inflict damage on US oil supply prospects. A more powerful and sustained slump in oil prices towards USD40/bbl would, in our view, be only likely to occur in a much weaker global growth environment.

#3 Natural gas supply growth: With 2015 supply growth likely to exceed the level needed to balance the market, we expect this year's storage deficit to be eliminated by the end of Q1-15. Building surpluses over the balance of the year are likely to weigh on prices particularly in the summer.

#4 The Fed & gold: Lower oil prices will inflict more damage on the S&P500 than the US real economy and encourage an expansion in central bank balance sheets outside of the US. These may provide pockets of support for gold, but, US financial forces will eventually overwhelm and drive gold prices lower.

#5 The curse of over-valuation: Palladium has taken on the mantle of the world's most richly priced commodity. While lower oil prices and a falling US unemployment rate should propel US auto sales higher, palladium fundamentals have to remain robust to justify our bullish price forecasts.

#6 Copper's exposure to the property slowdown in China: Unlike energy, agricultural and bulk commodities, where prices are back to levels last seen in 2009, industrial metal have been more resilient. However, the copper market is moving into surplus and the lagged effects of the weaker Chinese property market will hit copper demand, as a result copper is our preferred short.

#7 Bulk commodities & the US dollar: Depreciating currencies have given bulk producers some breathing space to tolerate further price declines. This may delay the necessary production cuts, which will mean prices drift lower.
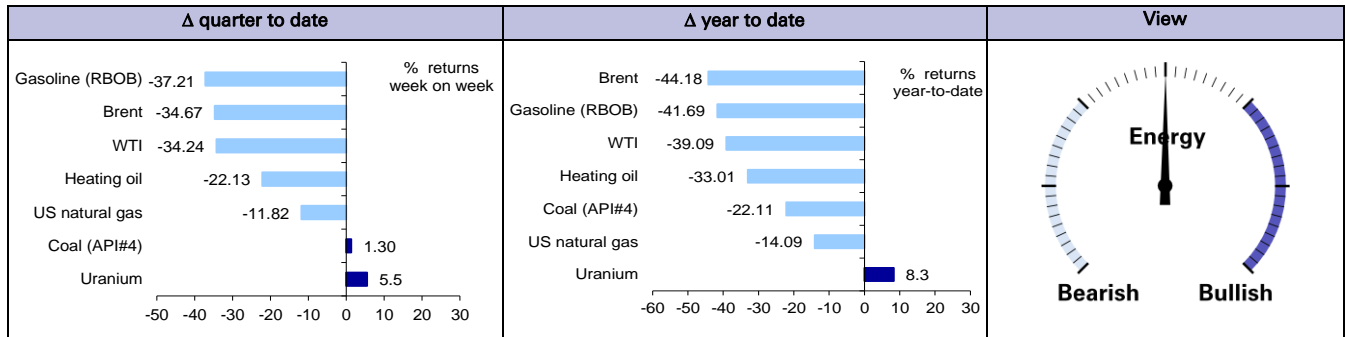
Crude Oil & The Line In The Sand

Commodity Performance

Energy

Δ quarter to date	Δ year to date	View

Δ quarter to date — % returns week on week

Commodity	Value
Gasoline (RBOB)	-37.21
Brent	-34.67
WTI	-34.24
Heating oil	-22.13
US natural gas	-11.82
Coal (API#4)	1.30
Uranium	5.5

Δ year to date — % returns year-to-date

Commodity	Value
Brent	-44.18
Gasoline (RBOB)	-41.69
WTI	-39.09
Heating oil	-33.01
Coal (API#4)	-22.11
US natural gas	-14.09
Uranium	8.3

View: Energy — Bearish / Bullish (gauge near neutral)

Precious Metals

Δ quarter to date	Δ year to date	View

Δ quarter to date — % returns week on week

Commodity	Value
Platinum	-5.35
Silver	0.53
Gold	1.24
Palladium	5.45

Δ year to date — % returns year-to-date

Commodity	Value
Silver	-12.13
Platinum	-10.24
Gold	1.55
Palladium	13.67

View: Precious Metals — Bearish / Bullish (gauge slightly bullish)

Industrial Metals

Δ quarter to date	Δ year to date	View

Δ quarter to date — % returns week on week

Commodity	Value
Lead	-5.00
Zinc	-4.24
Copper	-2.65
Aluminium	-1.28
Tin	0.44
Nickel	2.24

Δ year to date — % returns year-to-date

Commodity	Value
Copper	-11.82
Lead	-10.09
Tin	-8.72
Zinc	6.62
Aluminium	7.49
Nickel	19.96

View: Industrial Metals — Bearish / Bullish (gauge near neutral)

Agriculture

Δ quarter to date	Δ year to date	View

Δ quarter to date — % returns week on week

Commodity	Value
Sugar	-2.13
Lumber	0.99
Soybeans	14.13
Corn	21.59
Wheat	27.73

Δ year to date — % returns year-to-date

Commodity	Value
Soybeans	-20.59
Sugar	-7.68
Corn	-7.58
Lumber	-6.64
Wheat	0.83

View: Agriculture — Bearish / Bullish (gauge near neutral)
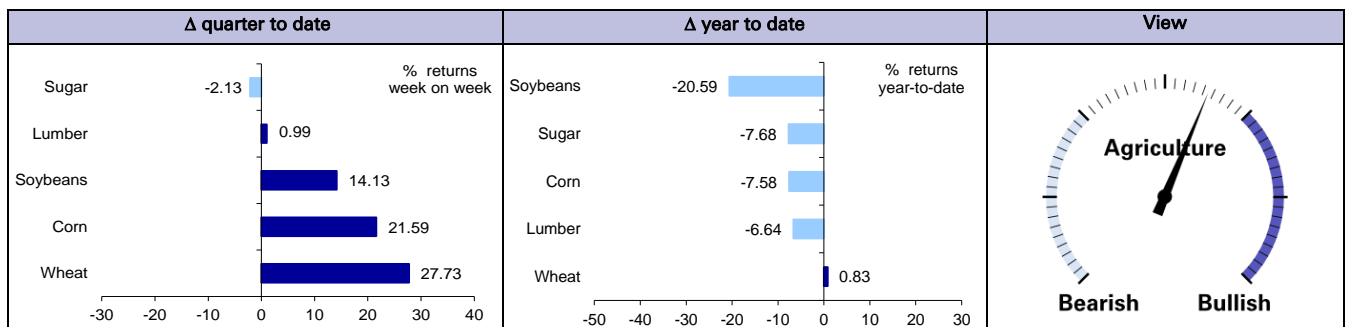
Sources: Deutsche Bank, Bloomberg Finance LP (Prices as of close of business Friday December 12, 2013)

#1 Executive Summary

Crude Oil & A Line In The Sand

- Powerful price corrections are pushing many commodity prices to levels last seen in 2009. We attempt to identify the drivers of price recoveries which will be slow to non-existent in energy and bulk commodities, achievable in parts of the industrial metals complex and agriculture, but, be prone to disappoint in precious metals and specifically gold.

- To bring the collapse in the crude oil price in line with previous slumps in the oil price would require Bent oil prices reaching USD58/bbl. While lower oil prices outside of a recession are typically a welcome development given their positive implications for economic activity, there are concerns that the collapse in oil prices is moving into territory that could prove problematic for certain sectors of the US and global economy.

- We estimate that if Brent crude oil prices fall below USD60/bbl on a sustained basis it would imply significant default risk across energy names in the US High Yield sector. We would also expect these price levels, if sustained into the first half of next year, would trigger additional downgrades to our medium term US oil supply growth projections.

- However, assessing the point at which US tight oil plays become unprofitable is fraught with difficulties. Indeed the relentless decline in iron ore prices over the past year demonstrates how challenging deploying cost curve analysis can be in attempting to identify the price floor of a particular commodity.

- Despite the collapse in crude oil prices, refining margins continue to suffer globally. We believe refineries will increase run rates as cracking margins remain in positive territory on a global basis. In turn this will lead to a glut in oil products, thus weakening margins further.

- The implications of a lower oil price are cascading into our precious metals outlook since we expect it will deliver more upside momentum to the US dollar as the Fed focuses on the growth benefits of lower oil prices while the ECB responds to the deflationary implications. We view palladium fundamentals as a potential beneficiary from lower oil prices since further declines in the US unemployment rate would tend to encourage a further recovery in auto sales.

- The slowdown in Chinese GDP growth into next year will sustain risks to the industrial metals and bulk commodity sectors. However, we would cite copper as the most vulnerable not only given its greater exposure to the Chinese property sector but also, unlike many bulk commodities, copper prices have been relatively resilient during the broad based correction in commodity prices that has occurred this year. We view fundamentals as strongest in aluminum, zinc and nickel.

- In bulk commodities, depreciating currencies have given the producers some breathing space to tolerate further price declines. This may delay the necessary production cuts, and as a result prices are likely to drift even lower.
- Earlier this quarter agricultural markets had moved into cheap and oversold territory. Despite strong harvests, inventory-to-consumption ratios remain low in the grains market and we view these markets as prone to the upside in the event of any supply disruptions.

Michael Lewis (44) 20 7545 2166
michael.lewis@db.com

#2 Commodity Indices

Benchmark Under-Performance Continues

- Benchmark commodity index returns are down in excess of 10% so far this year. As a result, commodities are on course to be the worst performing asset class for a third consecutive year.

- After the collapse in precious metal and agricultural returns last year, energy has become the primary source of weakness in index returns in 2014.

- While there is risk that oil prices will overshoot to the downside, we believe the prospect of a turnaround in energy returns are distant given that weak physical oil market fundamentals are set to persist for at least the first six months of next year.

- Even from a valuation perspective, the DBLCI-Mean Reversion Enhanced continues to build an underweight allocation to energy suggesting the sector has not yet moved into territory that can be viewed as cheap.

- Our bullish US dollar view would also indicate an ongoing challenging environment for commodity returns not least since rising US dollar environments typically imply the under-performance of commodity returns relative to equities.

- The other main directional calls of the DBLCI-MRE are its increasing overweight allocation to silver and corn. Indeed the index is holding its largest overweight exposure to silver on record. This would seem to make sense given silver was the worst performing precious metal during 2014 and tends to outperform relative to gold in environments where US growth surprises to the upside.

- The gains in agricultural returns during the fourth quarter have been insufficient to reverse the heavy losses earlier in the year. From a sector perspective, we view large parts of the complex as trading cheap.

- However, this year has seen a broad based rebuilding in inventories across large parts of the agricultural complex and consequently we would view price recoveries as likely to be contingent on adverse supply shocks, most probably triggered by adverse weather.

- The only source of positive returns in 2014 was in the livestock sector. However, history reveals that the incidence of positive returns in the sector is rare and consequently we are skeptical of these gains persisting into next year.

- Among the risk factor strategies, momentum has been the strongest performer with returns up 10% since the end of last year. These gains have been accrued entirely during the fourth quarter in response to the strong directional moves across commodity markets and specifically energy markets.

- Given the volatility risk associated with a turn in US Fed policy, which we expect to occur in the middle of next year, we would expect strong directional markets are likely to persist next year and this would tend to work in favour of momentum strategies continuing to perform strongly.
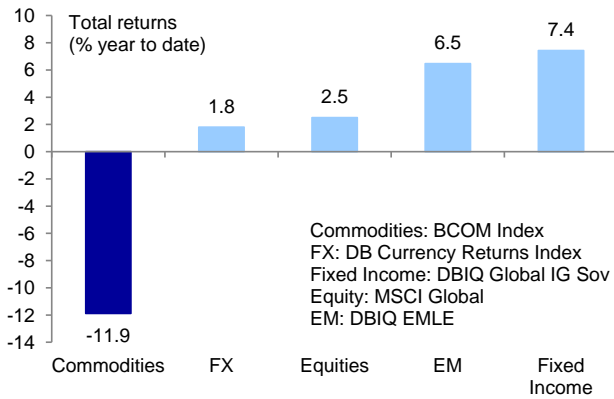
Figure 1: Excess returns in 2014

(USD terms)	Δ MTD	Δ QTD	Δ YTD	Sharpe
DBLCI-OY Balanced	-2.06	-9.39	-16.83	-1.74
DBLCI-OY Diversified	-4.33	-15.80	-22.89	-1.99
DB Booster	-1.66	-6.75	-12.38	-1.39
DBLCI-Mean Reversion	-2.42	-6.49	-15.71	-1.42
DBLCI-MR Enhanced	-0.67	-5.33	-10.13	-1.01
DBLCI-MR Plus	0.00	0.00	-2.85	-1.24
DBLCI Backwardation Long	-2.09	-12.03	-18.35	-1.71
Risk factors				
DB Commodity Curve Alpha Lite	1.04	0.57	-4.66	-0.71
DBLCI Backwardation Alpha	2.69	11.84	10.31	1.44
DBLCI Momentum Alpha	-0.43	-2.20	-1.35	-1.04
SPGSCI sector performance				
Energy	-11.66	-32.78	-38.48	-1.97
Industrial	-0.49	-2.05	-3.68	-0.16
Precious	4.60	0.70	-0.42	-0.13
Agriculture	2.00	11.51	-8.47	-0.69
Livestock	-4.33	-4.61	14.65	1.19
Performance of other benchmark indices				
SPGSCI	-7.53	-22.56	-28.35	-1.98
BCOM	-1.93	-6.67	-11.91	-1.21

Sources: Deutsche Bank, Bloomberg Finance LP
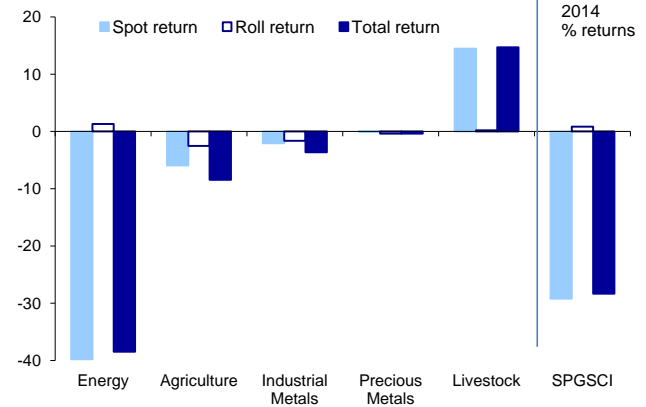*(Figures are cob December 12, 2014. Sharpe ratios are calculated on a YoY basis)*

Figure 2: 2014 asset class performance

Total returns
(% year to date)

Commodities: BCOM Index
FX: DB Currency Returns Index
Fixed Income: DBIQ Global IG Sov
Equity: MSCI Global
EM: DBIQ EMLE

-11.9   1.8   2.5   6.5   7.4

Commodities   FX   Equities   EM   Fixed Income

Source: Bloomberg Finance LP 12 December 2014)

Figure 3: Commodity returns by sector and type

2014
% returns

Spot return   Roll return   Total return

Energy   Agriculture   Industrial Metals   Precious Metals   Livestock   SPGSCI

Source: Bloomberg Finance LP, Deutsche Bank (12 December 2014)

For the third consecutive year, commodities have been the worst performing asset class with benchmark returns down in excess of 10% since the end of 2013. With the exception of livestock, all commodity sectors posted negative return this year with losses concentrated in the energy sector. Looking into next year, we would view the US dollar as the main contagion risk to commodities given our bullish outlook and the US dollar's strong negative correlation to most commodities.

Indeed work published by DB's Asset Allocation team reveals the sensitivities of various commodities to the US dollar as well as global growth. Their findings tend to suggest that in an environment where global growth will continue to accelerate, then industrial metals are likely to outperform relative to precious metals and crude oil. Moreover, from a benchmark returns perspective, a rising US dollar environment would also tend to sustain the underperformance of commodities relative to equities which has been a feature of asset class returns since the end of 2011, Figure 5. In this environment, we expect commodities will struggle to attract capital inflows and consequently will mean physical fundamentals such as supply, demand and inventory will dictate the directional moves in commodity prices.

Figure 4: Winners & losers according to global growth and the US dollar

US dollar
Global growth

Gold   Silver   Lead   Oil   Copper   Aluminium   Zinc   Nickel
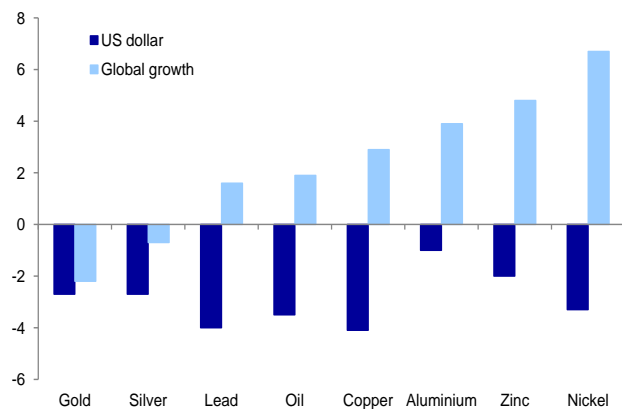
Sources: Deutsche Bank

Figure 5: Commodities tend to underperform equities in a rising US dollar environment

USD TWI (lhs)

S&P500/SPGSCI ratio (rhs)

1992   1996   2000   2004   2008   2012
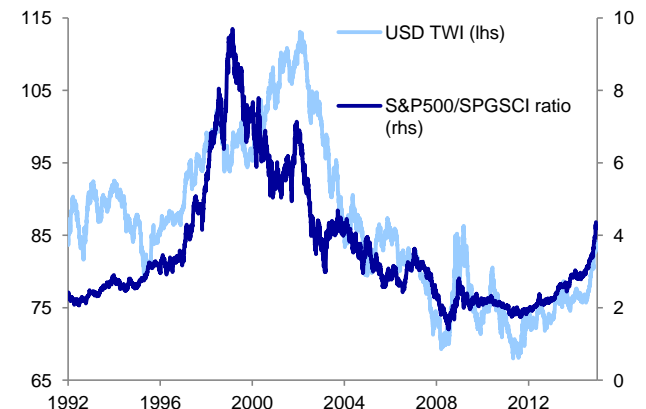
Source: Deutsche Bank

Figure 6: 2014 commodity index scorecard
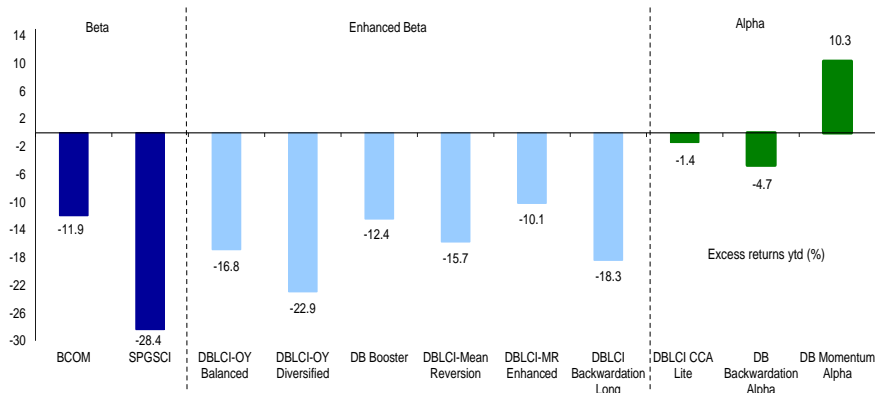
Source: Deutsche Bank

While long only and enhanced beta strategies have all struggled this year, carry, value and momentum strategies have been the relative outperformers. Indeed excess returns on the DB Momentum index have risen by 10% since the end of last year with the majority of these gains occurring in the fourth quarter of this year. Among the enhanced beta indices, the DBLCI-MRE has been the relative outperformer with returns down 10% compared to losses in excess of 28% for the SPGSCI.

The DBLCI-MRE has benefited from its aggressive underweight allocation to the energy sector. In fact the DBLCI-MRE index has continued to build an aggressive underweight allocation to energy throughout December, implying the sector has not yet moved into territory that can be viewed as cheap. In contrast, the index is building small overweight exposures to precious metals and agriculture and specifically silver and corn. Our fundamental analysis for commodity markets would tend to support these directional calls given positive growth shocks in the US should benefit silver, low inventory to consumption ratios in corn provide upside price risks in the event of adverse supply shocks and weak fundamentals in the oil market suggesting price recoveries in oil will be difficult to achieve.

Figure 7: Sector allocations of the DBLCI-MRE relative to its base weights
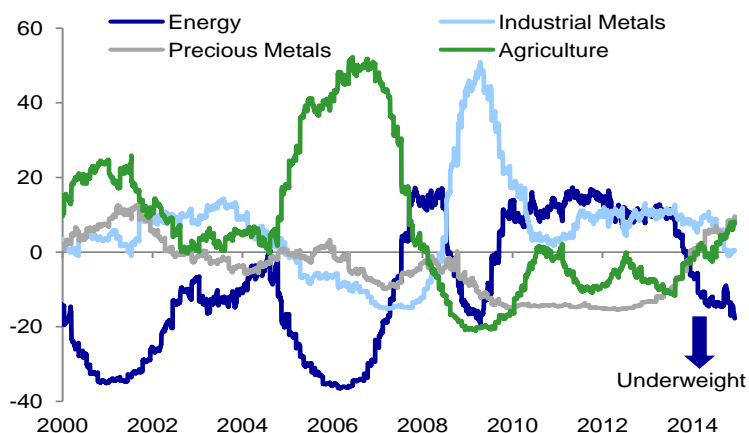
Source: Deutsche Bank

Michael Lewis, (44) 20 754 52166
michael.lewis@db.com

#3 Global Macro

Living With Lower Oil Prices

- On the assumption that OPEC keeps production at current levels, we believe the fundamentals of the oil market will remain weak for at least the next six months. Indeed compared to previous slumps in the oil price, Brent oil prices would need to fall to USD58/barrel to be on a par with historical averages in magnitude terms.

- In the unlikely event of price rallies, for example linked to a cold Northern hemisphere winter or Chinese SPR buying, we believe these would be based on very shaky foundations given what remains a very over-supplied market.

- We believe a more powerful decline in oil prices perhaps as low as USD40 would only be likely to occur under a scenario where global growth is significantly weaker. On our estimates global GDP growth is forecast to rise to 3.6% next year.

- We expect the falling oil price will expose the increase divergence among global central banks. In Europe, CPI readings will move into negative territory and push the ECB into public QE. In contrast, the boost to US growth via lower energy costs will ensure that lift off in the Fed Funds rate will commence around the middle of next year.

- Commodity markets will therefore need to fear a further strengthening in the US dollar with precious metals and energy markets exhibiting the strongest negative correlation to the US dollar.

- We are therefore maintaining our bearish outlook for gold. In terms of silver, after its recent under-performance we expect upside price risks given the building momentum in the US economy. Historically positive growth shocks in the US have pushed the gold to silver price ratio lower.

- Iron ore has led the charge lower in commodity prices this year. While this weakness has spread to other markets such as corn and crude oil, industrial metals and specifically copper have been more resilient. However, ongoing downside risks to the Chinese property sector threaten to expose copper to a more violent correction to the downside next year.

- Given a weak fundamental picture across energy markets, we would view agriculture as posing the main risk to an upside inflation shock next year. Indeed from a valuation and positioning perspective the sector may have moved into cheap and oversold territory earlier this year and in certain instances is under-pricing event risk. However, in the absence of supply shocks inventory levels are sufficiently high to limit price rallies.

Tipping points in the crude oil market

Historically powerful downward corrections in the oil price have been triggered by a worldwide recession and a subsequent collapse in global oil demand. This time round, the primary driver is supply since although global oil demand growth has disappointed this year, it has remained positive and, on our forecasts, is set to accelerate into 2015.

In this type of global growth environment, where global GDP growth is set to reach 3.6% next year, we would expect any action by OPEC to cut production would have a high chance of stabilising oil prices. Outside of recessionary environments, quota reductions by the cartel have increased oil prices by an average of 8.5% in the three months after the quota reduction, Figure 4.

Figure 1: The world's top 10 oil producers
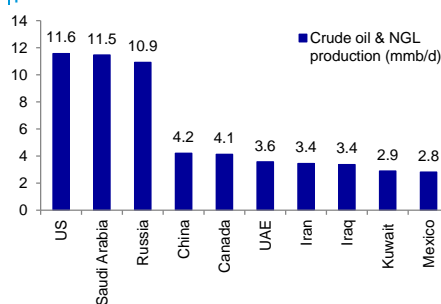
Source: Deutsche Bank, IEA

Figure 2: Estimating the steady state for crude oil prices

|	
Real terms (PPI)	USD53
Relative to income	USD53
Real terms (CPI)	USD54
Relative to copper	USD55
High Yield credit default*	**USD60**
As a share of world GDP	USD70
US tight oil incentive price	USD72
Relative to gold	USD80
Relative to the S&P500	USD80
Versus the USD	USD80
GCC budget breakeven	USD89
Average	**USD68**

* Estimates are Brent with the exception of HY credit default, which is WTI. We assume existing WTI-Brent spread to calculate the average figure
Source: Deutsche Bank (Commodities Weekly October 17, 2014)
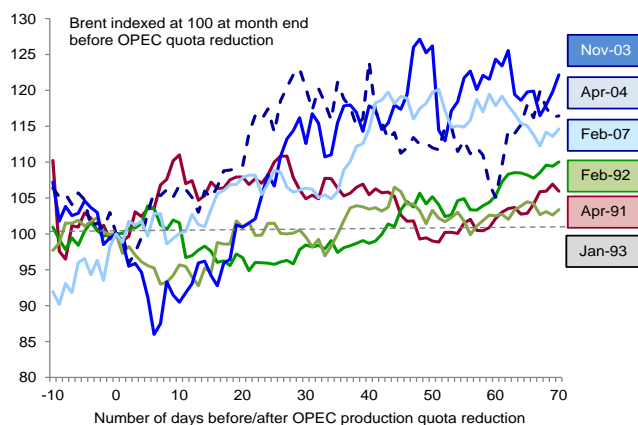
Figure 3: OPEC production allocation reductions since 1984
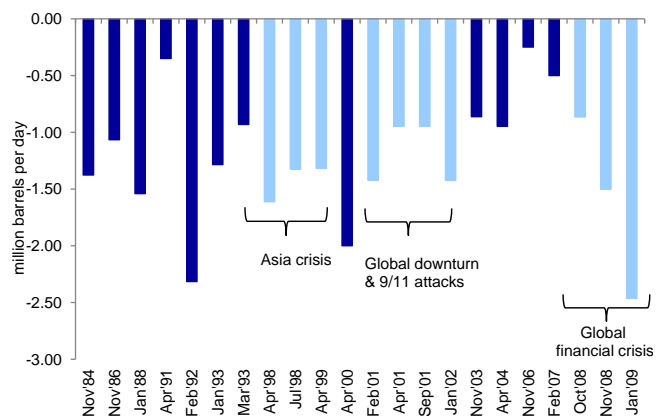
Sources: Deutsche Bank, OPEC

Figure 4: The performance of crude oil following an OPEC quota reduction in non-recessionary environments

Sources: Deutsche Bank, Bloomberg Finance LP

However, on our assumptions OPEC will keep production levels unchanged until their next meeting in June. This will mean the weakness in physical oil market fundamentals in the first six months of next year will be on par with events in 1998 when oil prices collapsed to USD10/barrel. It may therefore be informative to examine previous price corrections in the oil market to assess the extent to which the current decline in prices can be considered normal or if further downside is probable. We find that if we compare the slump in oil prices today with previous corrections, then Brent oil prices would need to fall to USD58/barrel to be on a par with historical averages in magnitude terms.

With little fundamental support aside from possible a cold winter and/or Chinese SPR buying, we expect oil prices will continue to trend lower to the point at which either OPEC brings forward production cuts or production projections for non-OPEC oil producers are scaled back significantly. We believe production cuts or oil supply growth targets need to be cut by around 1.5mm/b to restore order to oil markets.

From an US oil sector incentive pricing basis we stated that at USD65 (WTI) or below it would start to affect our US tight oil production growth assumptions albeit with a lag. In addition, DB's Credit Strategy team cited USD60 (WTI) as the level below which it would trigger widespread default risk for energy names across the US High Yield sector. As a result, and in the absence of downgrades to our global GDP growth assumptions, we believe we are rapidly approaching the level at which, if sustained into the first half of next year, will trigger long term supply adjustments that eventually help to stabilise prices.

Tracking energy sector distress in a low oil price environment
The decline in energy costs represents a significant tax cut for major consuming nations such as the US. However, it poses significant risks to parts of the oil producing community. Indeed the US economy has benefited significantly from the energy development and the surge in capex investment, for example, railroads, drilling equipment, cement, steel and electricity. Even financials have benefited from USD550bn in energy bonds/loans that have been brought to the US market in the last four years by energy producers.

Figure 5: Commodity bear markets compared

Commodity	Start	End	Duration (months)	Drawdo (%)
Crude oil	Nov-85	Jul-86	8	-56
	Oct-92	Dec-93	14	-37
	Jan-97	Dec-98	23	-58
	Nov-00	Jan-02	14	-48
US natural gas	Oct-97	Aug-98	10	-52
	Apr-01	Jan-02	10	-61
	Jun-11	Apr-12	10	-61
Aluminium	Aug-88	Feb-90	18	-45
	Aug-95	Mar-99	43	-38
Copper	Aug-92	Oct-93	14	-37
	Aug-95	Feb-99	43	-54
Average for oil			**15**	**-50**
Average for all			**19**	**-50**
Current episode				
Oil	Jun-14	Dec-14	6	-45
Aluminium	Apr-11	Dec-14	44	-28
Copper	Jul-11	Dec-14	41	-32

Source: Deutsche Bank Credit Research, Outlook 2015

DB's High Yield Credit team show that within their IG and HY indices, cumulative capital expenditures among energy companies since January 2010 have totaled USD4.7 trillion, with USD1.15 trillion coming in the last four quarters alone. They estimate that WTI crude oil prices below USD55 for just a few months would increase materially the chances of a broad sector restructuring. Since energy names dominate the US High Yield sector, this scenario would have repercussions for the timing of overall HY default cycle. With the prospect of Fed tightening added to the mix this would prove a particularly toxic combination.

Outside of the US, we believe Venezuela and Brazil are worth watching closely. Of the group, we would cite Venezuela as the most deeply distressed with a high probability of debt restructuring by its national oil producer, PPDVSA. Indeed like other the major oil exporters to the US, such as Mexico and Saudi Arabia, Venezuela have seen their export volumes to the US fall steadily over the past few years. Moreover from a budgetary position, Venezuela has one of the highest budget breakevens of any oil producing country. While the devaluation of the Venezuelan bolivar will help to boost the local currency value of oil revenues, we still expect the breakeven price will still be in excess of USD115/bbl next year.

In Russia, the decline in the oil price has been offset by the collapse in the rouble. As a result, we do not expect Russian companies will reduce capex in rouble terms. Moreover for any new greenfield projects the Russian government is providing a tax inventive mechanism which guarantees that projects receive a 16.3% IRR. As a result, we are not making any significant adjustments to Russian production levels which we expect will fall by around 250kbd by the end of the decade. More problematic may be the high cost ultra-deep water projects off West Africa and specifically Angola as well as Brazil. Figure 7 identifies the key countries in terms of supply growth over the next five years before the recent correction in oil prices.

China growth & the threat to copper

Across the four broad sectors, the prices of many commodities are falling back to levels last seen in 2009. However, industrial metals have proved to be increasingly resilient to this weaker trend. This might reflect the fact that although the sector displays a negative correlation to the US dollar, it is significantly more sensitive to global growth. Given the strength in US equity markets, which have tended to be a good proxy for global growth expectations, this might help to explain the relative out-performance of industrial metals relative to the energy, agricultural and bulk commodity sectors. However, this may be difficult to sustain in the event of ongoing downgrades to the Chinese growth outlook.

Of particular concern is the exposure of industrial metals to a further deterioration in the Chinese property sector. Of the group we would cite copper not only as the last man standing in the broad based commodity correction this year, but, also the most exposed to the China downturn and specifically the lagged effects of the property market slowdown on copper demand. Given tightening fundamentals in nickel, aluminium and zinc, we view copper as our most preferred short amongst the industrial metals. Lower energy costs alongside weaker producer currencies will also tend to lower the marginal cost support level, which we now estimate at USD5,800/tonne.

Figure 6: US petroleum & petroleum product imports by country
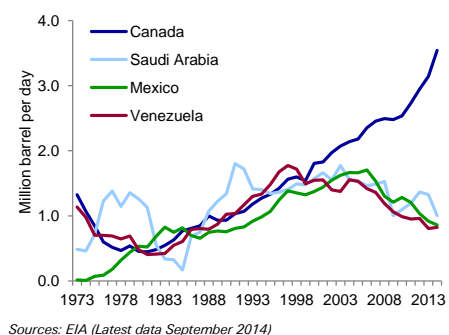
Sources: EIA (Latest data September 2014)

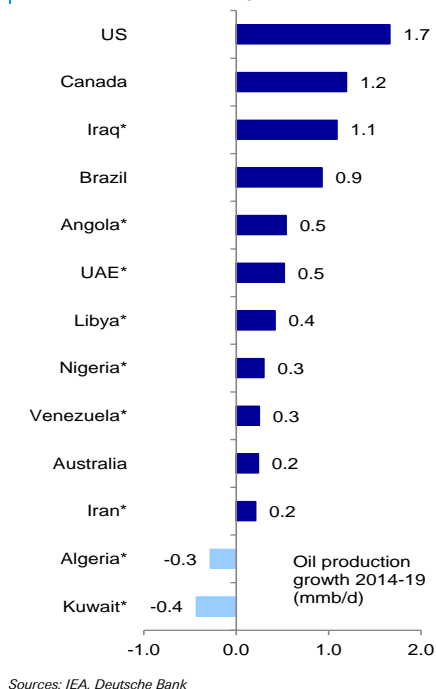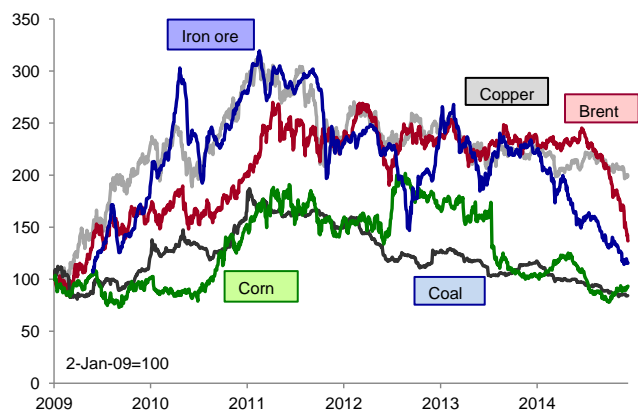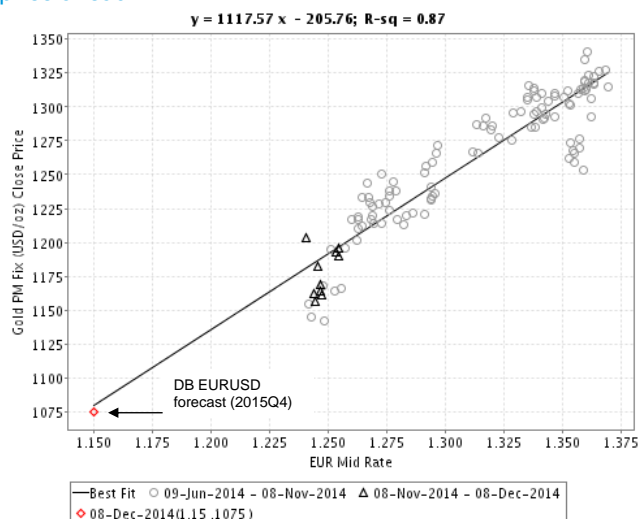Figure 7: Oil supply growth assumptions by country 2014-2019 before the recent oil price correction

Sources: IEA, Deutsche Bank

Figure 8: Copper at risk of succumbing to broad based commodity price weakness

Figure 9: Our bullish US dollar targets imply a lower gold price ahead

y = 1117.57 x - 205.76; R-sq = 0.87

Divergent central bank policies & the implications for precious metals

We expect the collapse in oil prices will exaggerate the growing divergence between central bank policies in the US versus the rest of the world. We see the Fed focusing on the growth benefits from lower oil prices, but, the ECB contending with an increasing fear of deflationary forces taking hold, which will be addressed by public QE. We expect this divergence will accelerate the path of US dollar strength which on our forecasts will see EURUSD falling to 1.15 by the end of next year and approaching parity during 2016.

While some may consider the expansion in central bank balance sheets most notably in Europe and China as beneficial to the gold price, we expect US financial markets will be the ultimate driver of where gold prices are heading next year. As a result, a rise in US long term real interest rates, a stronger US dollar and further advances in the S&P500 will re-exert downward forces on the gold price. However, we are cogniscent of the fact that lower oil prices will have negative implications for the US equity market given the importance of the energy sector from a market capitalization perspective. While the negative implications of lower oil prices on the S&P500 might introduce pockets of support for gold we expect the overall trend in gold will be lower. Indeed fair value estimates for gold seems to cluster around USD950/oz highlighting that at current levels gold prices cannot be considered cheap.

The curse of overvaluation & the risks to palladium

We believe valuing commodities in real terms provides a clue as to event risk in commodity markets. Over recent years we have seen that when physical fundamentals turn and begin to be at odds with a commodity's valuation then this can trigger a powerful adjustment in the price, forward curve and volatility of a particular commodity.

For example, in 2012 gold was the most richly priced commodity in the world when measured in real terms. As interest rates, exchange rates and equity markets slowly moved against gold, this premium in the gold price became increasingly difficult to justify and like many other safe havens, gold prices eventually collapsed in 2013.
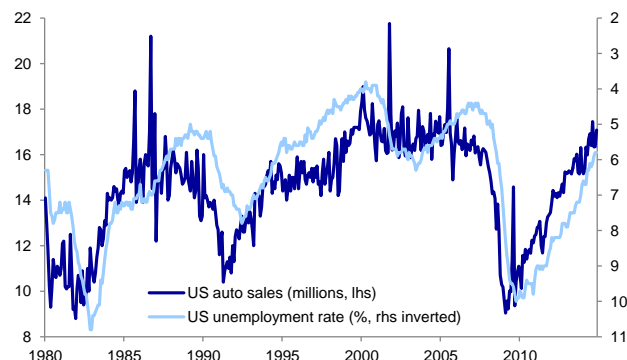
Figure 10: Valuing commodities in real terms
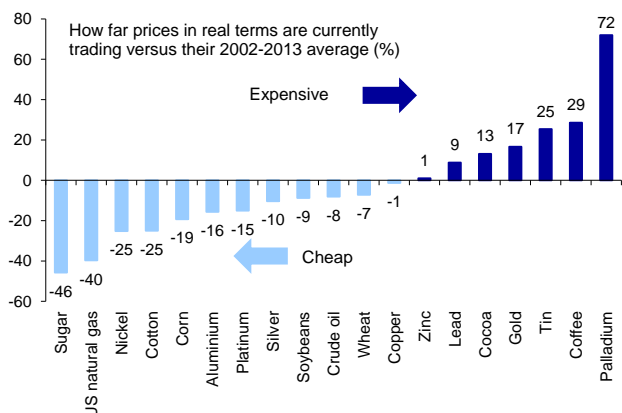
Source: Deutsche Bank Credit Strategy Research (end November 2014)

Figure 11: US auto sales are closely tied to labour market trends

Source: Bloomberg Finance LP, Deutsche Bank

As gold prices adjusted, crude oil then took on the mantle of the world's most richly priced commodity and by June 2014 crude oil could be considered the most overbought and overvalued commodity in the world. In some sense this was justified by increasing supply disruptions or sanctions across major oil production countries as well as heightened geopolitical risk surrounding Iraq. However, as fundamentals turned during the summer, this exposed crude oil prices to a sizeable downward adjustment.

Today palladium holds the status of the world's most richly priced commodity such that prices in real terms today are trading at a 72% premium to their long run historical average, Figure 8. This brings palladium's valuation closer to the extreme levels witnessed in 2001. This may be easier to justify in a falling price environment given the positive boost to the global auto sector lower oil prices might imply. Indeed we expect the boost to US household balance sheets from lower energy costs and signs of a more vigorous upturn in the US labour market will be positive developments for US auto sales and hence underlying palladium demand. However, palladium fundamentals need to remain robust to justify valuation levels which have become stretched.

Agricultural outlook

In contrast, many agricultural commodities are trading at levels that can be considered cheap. Not only is the DBLCI-MRE index building an overweight exposure to agriculture and specifically corn, but, prices in real terms are trading at a discount to long run historical averages. Moreover, the SPGSCI agricultural index is trading close to its lowest level in many years, Figure 10. Part of the weakness in the agricultural sector this year has been related to bumper harvests, which have prompted a significant rebuilding in global inventories.

Indeed when we measure inventory-to-consumption ratios across the complex we find these have risen substantially for soybeans indicating that in the absence of severe supply disruptions price rallies are likely to difficult to sustain in what appears to be an over-supplied market. However, in the case of grains inventory-to-consumption ratios have risen recently, but, are still at relatively low levels. We would therefore view price levels in these markets as under-pricing event risk.
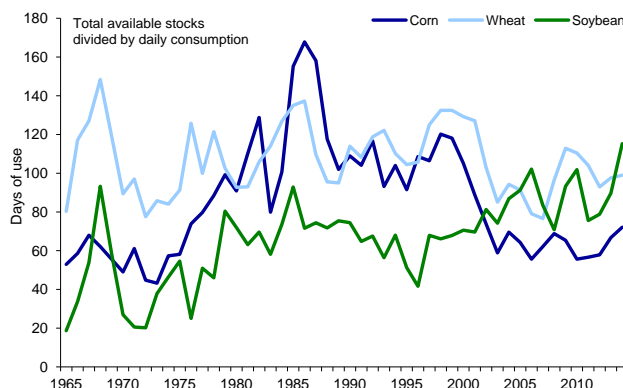
Figure 10: SPGSCI agricultural index is close to multi-decade lows

SPGSCI Agricultural index
(31-Dec-69=100)
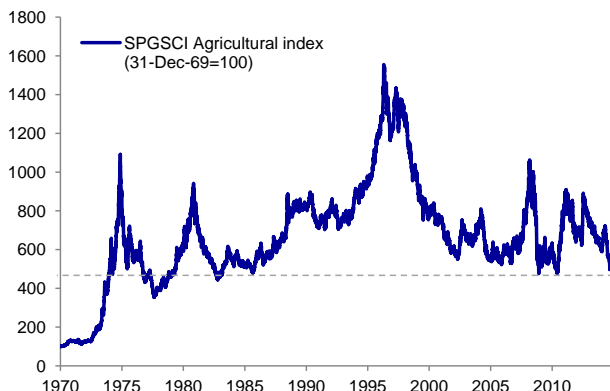
Sources: Deutsche Bank, Bloomberg Finance LP

Figure 11: Inventory to consumption ratios across parts of the agricultural complex have recovered recently

Total available stocks divided by daily consumption

Days of use

Corn — Wheat — Soybean

Sources: Deutsche Bank, USDA

Conclusion

We expect an improvement in global GDP growth next year and with it a pick-up in commodity demand growth for many markets. However, in crude oil we expect supply trends will be the ultimate driver of crude oil prices. In the event of no curtailment in OPEC or US production growth, fundamentals in the crude oil market will remain weak in the first half of next year.

We believe lower oil prices will lead to a further divergence between US and European central bank policy, which will deliver more US dollar strength and contagion risks for commodities and specifically gold. While lower oil prices and an ongoing improvement in the US labour market will provide a boost to the auto sector, palladium fundamentals need to remain tight to justify the current rich levels of valuation. We are optimistic since we expect inventory drawdown in this market.

In China, the deterioration in the property sector poses ongoing risks to copper demand particularly since unlike other commodities copper has been relatively resilient to the broad based correction that has occurred across the energy, agricultural and bulk commodity sectors over the past year.

Michael Lewis, (44) 20 754 52166
michael.lewis@db.com

#4 Energy Overview

Energy Prices Converge

- Extreme oil price weakness this year reflects not just rapid non-OPEC supply growth, but, OPEC's reluctance to play its customary role of withholding supply from the global market in times of oversupply. This has consequently thrown the oil market into disarray.

- We view the USD65-70/bbl range for WTI as a key level at which US producers begin to constrain capital expenditures for future production growth. However, even with revised oil supply expectations these still imply a surplus market in the first half of next year that, in the absence of OPEC action, will sustain oil price weakness.

- Indeed, on current trends the extent of the mismatch between global oil supply and demand in the first half of next year will be the largest since 1998 when crude oil prices fell by almost 30%.

- As a result, we expect oil prices will remain weak throughout next year. We expect prospects for a price recovery will be based on whether price weakness triggers OPEC to cut production and/or more substantial downgrades to non-OPEC supply.

- The relative prices of energy have converged with the decline in oil prices since July, reducing the spread in energy terms between the cheapest and most expensive energy commodities at USD8/mmBtu, the lowest level since 2009.

- Our forecasts suggest that this differential will near its tightest range over the next six months and widen again over the remainder of the decade as supply dynamics remain relatively loose in thermal coal and natural gas, while crude oil fundamentals are likely to tighten towards a neutral balance in 2017.

- Owing to the lagged nature of oil indexation in contract LNG pricing and the relatively high cost of LNG in comparison to pipeline gas, we see Asian electricity generation markets as the only region susceptible to possible substitution effects from low oil prices.

- By contrast to the 42% decline in crude oil since July, spot uranium has increased by 33% as the first restarts of Japanese nuclear capacity become a reality. However, the *de minimis* variable costs of nuclear energy mean that this has little effect on its comparative economic advantage in the short run.

Saudi OSP reduction hastens crude oil decline

OPEC's reluctance to play its customary role of withholding supply from the global market in times of oversupply has thrown the oil market into disarray. Not surprisingly, it has created substantial uncertainty over where prices may settle in the near term. Not only was the cartel's overall production allocation left unchanged, but there was also no commitment to tighten compliance with the 30mmb/d quota.

More recently, a further decrease to the Saudi Official Selling Prices (OSPs) for Arab Light in the month of January signals that the country continues to find it difficult to place sufficient volumes in export markets. The differential for Arab Light to Asia (versus Oman/Dubai) was increased to a discount of -USD2.0/bbl (the largest since at least 2007), while the premium for Arab Light to Europe was reduced to USD0.9/bbl (versus the Argus Sour Crude Index).
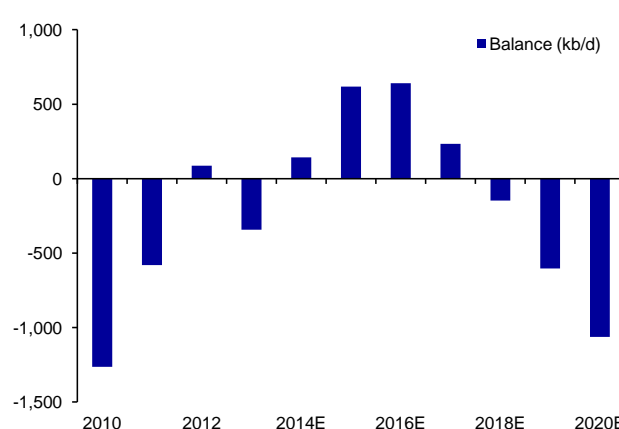
Figure 1: Saudi Official Selling Price (USD/bbl)
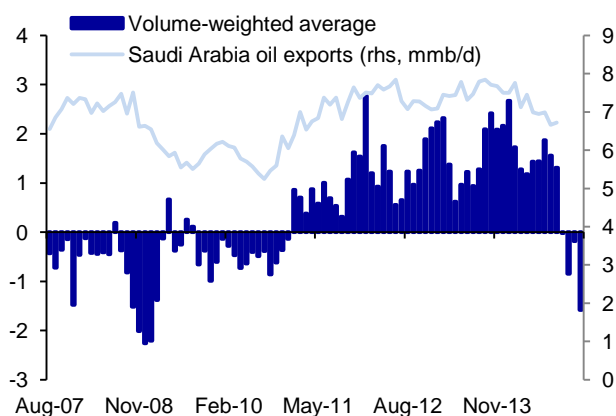
Source: Bloomberg Finance LP, JODI, Deutsche Bank

Figure 2: Global crude oil supply-demand balance

Source: IEA, Deutsche Bank

We view the USD65-70/bbl range for WTI as a key level at which US producers begin to constrain capital expenditures for future production growth. Therefore we have reduced our expectations for US production growth from 950kb/d to 750kb/d yoy in 2015 (with 2016 growth marked down from 700kb/d to 450 kb/d yoy). However, one risk to this scenario is that US producers under sustained margin pressure may find ways of reducing costs, thus shifting the cost curve lower as has been the case in natural gas production. This would imply less of a curtailment in US tight oil production growth than we are assuming and with it a longer period for oil prices to stabilise.

Crude oil oversupply persists to 2016 without OPEC action

Even with reductions to the pace of US supply growth, the bearish fundamental outlook in the first half of next year is largely unchanged in the absence of OPEC production cuts. Indeed if we assume OPEC production remains close to current levels of 30.2mmb/d, then it implies the first half of next year will see the most oversupplied oil market since the same period in 1998, when oil prices fell by 28% yoy. It also suggests that if OPEC production persists at 30.2 mmb/d, oversupply in 2016 would be equally severe at roughly 600kb/d averaged over the year.

We expect this fundamental backdrop will sustain the pressure on OPEC to cut production either at their next meeting in June 2015 or before. We expect OPEC will eventually cut production by around 1.5mmbd and their action will eventually help to tighten oil market fundamentals. History suggests that when OPEC takes action, outside recessionary environments, it succeeds in stabilizing prices and it action typically raises crude oil prices by an average of 8.5% within three months of the quota reduction.

Other event risks that could help tighten oil market fundamentals would be a cold winter, aggressive SPR builds in China or supply disruptions in Libya, Iraq or elsewhere in the Middle East or beyond. However, given the oversupplied nature of the oil market heading into next year we believe positive demand/negative supply shocks will need to be of a significant magnitude to materially tighten oil market fundamentals. For example, armed incursions in Libya have led to supply losses of as much as 280 kb/d in November. However, this will be insufficient to affect oil market fundamentals significantly.

Crude oil remains expensive in energy terms

The relative prices of energy as measured through thermal coal, natural gas and crude oil have converged significantly since July. By comparing the prices of these commodities in energy terms, we can see that the spread between the cheapest and most expensive fuels has halved from USD16/mmBtu at the start of the year to only USD8/mmBtu currently. This is the lowest level observed since the more dramatic fall in oil prices in 2009.

Yet the compression in prices indicates that any short-term substitution effects may be limited with the possible exception of Asian power markets, and hence that upside for crude oil or oil products demand may be modest. When compared on the basis of electricity generating cost, crude oil and fuel oil remain the most expensive fuel for power generation after accounting for plant efficiency.

Figure 3: Energy commodity prices in energy terms	Figure 4: Electricity generation cost by fuel ($/MWh)
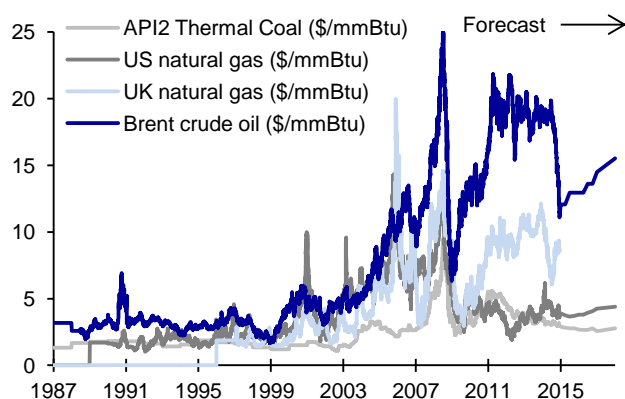
Source: Bloomberg Finance LP, BP Statistical Review, Deutsche Bank
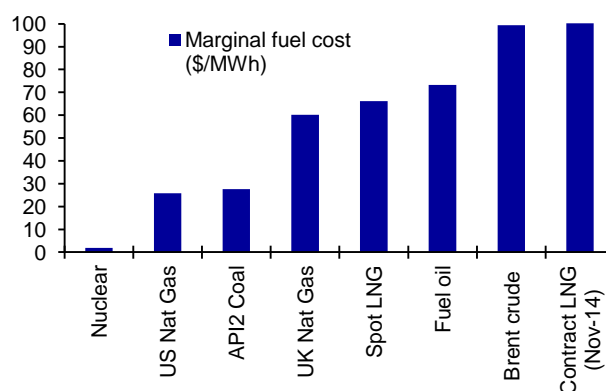
Source: Bloomberg Finance LP, Reuters, Deutsche Bank

Since spot LNG has declined to USD9.5/mmBtu on 5 December according to Reuters' weekly assessment, this means that it still prices below fuel oil for power generation.

Contract LNG is the exception

The only exception to this is contract LNG, which in fact represents the majority of LNG imported into Asian countries. The average delivered price of all LNG into Japan in November was USD14.4/mmBtu, translating into an electricity generation cost of USD100/MWh, roughly equal to crude oil. Thus there is an economic incentive to burn fuel oil instead of LNG, with the capacity of oil fired generation as a limiting factor. We would expect similar economics to be in effect in other Asian markets with both LNG and oil-fired capacity such as South Korea, Taiwan, and China, thus adding to total Asian demand. However, this economic incentive is likely to be decrease somewhat as lower oil prices work their way into the lagged contract formula for LNG. Over the next several months we would expect contract LNG to fall to roughly USD12/mmBtu, meaning an electricity generation cost of USD84/MWh, still above fuel oil but below crude oil.

Apart from Asia, crude oil and fuel oil retains its position as the most expensive fuel for power generation although this differential has closed considerably with regard to European natural gas, which is now only 9% lower than fuel oil in electricity terms. This includes the effect of the relatively higher thermal efficiency of combined-cycle natural gas power plants, at 49% (or higher for new build) relative to 37-38% for coal and oil-fired power plants. US natural gas and thermal coal remain well below the cost of oil and roughly 1/3 the electricity cost of fuel oil.

Finally, the cost of nuclear power in electricity terms remains by far the cheapest despite the 33% increase in spot uranium price since July. This reflects the very low proportion of costs represented by uranium concentrate, conversion and enrichment, and the relatively high proportion of costs represented by capital costs which represent 83% of the levelised cost of energy (LCOE) generated by nuclear plants, versus 56% for coal-fired generation and only 25% for natural gas combined cycle.

Energy commodity spread to widen again

On our estimates the spread amongst energy commodities in equivalent energy terms is set to widen once more as oil markets embark on an extended period of reestablishing balance. We expect this process to take two years from now to 2017, during which world oil demand growth exceeds our revised (lower) estimate of non-OPEC supply growth. Over the years 2015 and 2016, we expect that a modeled oversupply of 600-700 kb/d would weigh upon the market in the event of no OPEC quota change. This would entail downside risk to our price projections, which incorporate the likelihood of OPEC reduction at some point, given that the modest slowing of US production growth is so far insufficient to balance the market on its own.

Michael Hsueh, (44) 20 754 78015
michael.hsueh@db.com

Figure 5: Global oil supply & demand

Unit: Million bbl/day	2006	2007	2008	2009	2010	2011	2012	2013	2014E	2015E	2016E	2017E	ANNUAL AVERAGE RATE '00-05	'05-10	'10-15
CONSUMPTION															
OECD Americas	25.7	25.9	24.6	23.7	24.2	24.0	23.6	24.1	24.0	24.1	24.1	24.0	1.2%	-1.3%	0.0%
USA	20.7	20.7	19.5	18.8	19.2	18.9	18.5	19.0	19.0	19.1	19.0	19.0	1.1%	-1.6%	-0.1%
OECD Europe	15.7	15.5	15.5	14.7	14.7	14.3	13.8	13.6	13.5	13.4	13.3	13.2	0.6%	-1.4%	-1.9%
Germany	2.6	2.4	2.5	2.4	2.5	2.4	2.4	2.4	2.4	2.4	2.4	2.4	-1.1%	-1.2%	-0.7%
OECD Asia-Pacific	8.7	8.6	8.3	7.9	8.1	8.2	8.5	8.3	8.2	8.1	8.1	8.1	-0.1%	-1.7%	0.1%
Japan	5.2	5.0	4.8	4.4	4.4	4.4	4.7	4.5	4.3	4.2	4.2	4.1	-0.7%	-3.5%	-0.9%
TOTAL OECD	50.2	50.1	48.4	46.3	47.0	46.4	45.9	46.1	45.7	45.6	45.5	45.3	0.8%	-1.4%	-0.6%
FSU	4.1	4.1	4.2	4.0	4.2	4.5	4.6	4.7	4.8	4.8	4.9	5.0	0.6%	1.6%	2.9%
Europe	0.7	0.7	0.7	0.7	0.7	0.7	0.6	0.7	0.7	0.7	0.7	0.7	4.2%	-0.8%	0.0%
China	7.2	7.6	7.8	7.9	9.0	9.4	9.8	10.1	10.4	10.8	11.3	11.8	7.8%	5.9%	3.7%
Other Asia	9.2	9.8	9.6	10.2	10.9	11.2	11.6	11.9	12.1	12.4	12.6	12.9	2.9%	4.0%	2.6%
Latin America	5.2	5.3	5.7	5.7	6.1	6.2	6.4	6.6	6.8	6.9	7.0	7.1	1.2%	3.8%	2.6%
Middle East	6.1	6.4	6.9	7.2	7.3	7.5	7.7	7.9	8.1	8.3	8.5	8.8	4.5%	4.4%	2.6%
Africa	2.9	3.1	3.3	3.5	3.6	3.6	3.8	3.8	3.9	4.1	4.2	4.4	3.5%	4.3%	2.4%
TOTAL NON-OECD	35.4	37.1	38.1	39.3	41.7	43.1	44.6	45.7	46.8	47.9	49.3	50.6	3.6%	4.1%	2.8%
GLOBAL OIL DEMAND	**85.6**	**87.1**	**86.5**	**85.6**	**88.7**	**89.5**	**90.5**	**91.8**	**92.4**	**93.6**	**94.8**	**96.0**	1.8%	1.0%	1.1%
SUPPLY															
OECD Americas	13.9	13.8	13.3	13.6	14.1	14.6	15.8	17.1	18.6	19.5	20.2	21.0	-0.4%	0.2%	6.8%
USA	7.0	7.0	6.9	7.4	7.7	8.1	9.1	10.2	11.7	12.4	12.9	13.5	-2.4%	1.8%	9.9%
Mexico	3.7	3.5	3.2	3.0	3.0	2.9	2.9	2.9	2.8	2.6	2.7	2.7	1.8%	-4.7%	-2.3%
Canada	3.2	3.3	3.2	3.2	3.3	3.5	3.7	4.0	4.1	4.3	4.5	4.7	2.2%	1.8%	5.3%
OECD Europe	5.3	5.0	4.7	4.5	4.2	3.8	3.5	3.3	3.3	3.1	3.0	2.8	-3.5%	-6.1%	-5.6%
North Sea	4.8	4.6	4.3	4.1	3.8	3.4	3.1	2.9	2.9	2.7	2.5	2.3	-3.9%	-6.4%	-6.4%
Other OECD	0.6	0.6	0.6	0.6	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3	-7.6%	2.0%	-9.2%
TOTAL OECD	19.8	19.4	18.7	18.8	18.9	18.9	19.8	20.9	22.4	23.0	23.5	24.2	-1.6%	-1.3%	4.1%
FSU	12.3	12.8	12.8	13.3	13.6	13.6	13.7	13.9	13.9	13.8	13.9	13.9	8.2%	2.7%	0.4%
Non-OECD Europe	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-3.3%	-1.9%	-1.0%
China	3.7	3.7	3.8	3.8	4.1	4.1	4.2	4.2	4.2	4.2	4.3	4.3	2.2%	2.3%	0.7%
Other Asia	3.8	3.7	3.7	3.7	3.7	3.7	3.6	3.5	3.4	3.5	3.5	3.4	0.1%	-0.5%	-1.3%
Latin America	3.6	3.6	3.7	3.9	4.1	4.2	4.2	4.2	4.4	4.6	4.8	5.0	1.9%	3.5%	2.4%
Middle East	1.7	1.7	1.7	1.7	1.8	1.7	1.5	1.4	1.3	1.3	1.3	1.2	-3.3%	-1.0%	-6.2%
Africa	2.5	2.6	2.6	2.5	2.5	2.5	2.2	2.3	2.3	2.3	2.4	2.4	4.4%	0.5%	-1.8%
TOTAL NON-OECD SUPPLY	27.8	28.2	28.4	29.0	29.9	29.9	29.5	29.5	29.6	29.9	30.3	30.3	3.8%	1.9%	0.0%
PROCESSING GAINS	2.0	2.0	2.0	2.0	2.1	2.1	2.1	2.2	2.2	2.2	2.2	2.3	1.3%	1.2%	1.3%
GLOBAL BIOFUELS	0.8	1.0	1.4	1.6	1.8	1.9	1.9	2.0	2.1	2.2	2.3	2.4	17.3%	23.9%	3.9%
TOTAL NON-OPEC SUPPLY	**50.4**	**50.7**	**50.5**	**51.4**	**52.7**	**52.8**	**53.3**	**54.6**	**56.4**	**57.3**	**58.4**	**59.2**	1.4%	1.1%	1.7%
*TOTAL SUPPLY	85.5	85.6	86.7	85.6	87.3	88.6	90.8	91.3					1.9%	0.6%	
OECD STOCK CHANGE	0.25	-0.24	0.32	0.01	0.06	-0.28	0.19	-0.19							
Industry	0.22	-0.31	0.32	-0.10	0.07	-0.20	0.16	-0.22							
Government	0.03	0.07	0.01	0.11	-0.01	-0.08	0.03	0.03							
OPEC NGLS	4.2	4.3	4.5	5.1	5.5	5.9	6.2	6.3	6.4	6.7	6.8	6.8	7.0%	5.7%	4.1%
**Other & Balance	-0.36	-1.32	-0.12	0.03	-1.44	-0.66	0.05	-0.22	0.21	0.66	0.66	0.26			
OPEC CRUDE OIL	30.9	30.7	31.6	29.1	29.2	29.9	31.3	30.5					2.0%	-1.0%	
***IEA's Call on OPEC Crude	31.0	32.2	31.4	29.1	30.6	30.8	31.1	30.9	29.6						
***DB's Call on OPEC Crude									29.6	**29.5**	**29.6**	**30.0**			

*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

#5 Crude Oil Markets In The US

Awaiting A Lifting of Crude Oil Export Restrictions

- Discussions around the relaxation of US restrictions on crude oil exports are building steam. Two bills have been introduced this year to repeal export limitations, and a panel hearing on the topic was conducted in the House of Representatives on 11 December. A study conducted by the DOE found that increased exports of US crude oil could ultimately result in lower domestic gasoline prices.

- We believe the rationale supporting a loosening of export restrictions is strong. Although the WTI-Brent spread has remained relatively tight at -USD5/bbl since July, further production growth over 2015-2020 will put the spread at risk of widening once again.

- Wider WTI-Brent spreads could further imperil the investment returns on new drilling programs, especially in the absence of decisive action from OPEC to tighten supply discipline in the next year. Allowing crude exports would enable US producers to achieve higher selling prices and sustain higher levels of production growth.

- Light oil imports of API gravity 35 and greater have already been scaled back substantially to 0.5 mmb/d. This leaves little room for further accommodation of domestic crude oil and condensate production growth forecast at 750 kb/d in 2015 and 450 kb/d in 2016.

- Refinery inputs can be adjusted to take a heavier proportion of light oil, which has already been in evidence since 2007. However, this has its limits as refinery capacity designed to handle heavy oil will suffer a loss in efficiency or require expensive investment to adapt to light oil.

- The next step to a loosening of export restrictions could come either in the form of a BIS ruling or government decision allowing exports of all types of condensate (rather than only minimally processed condensate) or through signs of support for legislation already introduced by lawmakers this year.

Background

The restrictions on crude oil exports currently in force are governed by Export Administration Regulations (EAR) controlled by the Bureau of Industry and Security (BIS), an agency of the US Department of Commerce. These regulations specify the conditions under which crude oil can be exported, which are in fact numerous. . Applications to export crude oil will generally be approved for the following categories:

(i) Exports from Alaska's Cook Inlet

(ii) Exports to Canada for consumption or use

(iii) Exports in connection with refining or exchange of SPR oil

(iv) Exports of heavy California crude up to 25 kb/d

(v) Exports consistent with international agreements and federal statutes

(vi) Exports of foreign-origin crude oil

Other applications to the BIS to export crude oil will be approved if consistent with the national interest and the 1975 Energy Policy and Conservation Act (EPCA). The EPCA and the 1979 Export Administration Act provide the legislative authority for export restrictions, while the EAR spells out the specific

conditions of those restrictions. The BIS will generally approve applications to export crude oil where the export is part of an overall transaction

(i)   That will result directly in the importation of an equal or greater quantity

(ii) That will take place only under contracts which can be terminated if US petroleum supplies are compromised

(iii) And in which the crude oil cannot be reasonably marketed in the US

or where the export is part of a temporary arrangement or exchange.

Private-letter rulings clarify definition of crude oil

Private-letter rulings (PLRs) were issued by the BIS in response to inquiries from two companies (Pioneer Natural Resources and Enterprise Product Partners) in June 2014 for further clarity as to what does and does not qualify as crude oil. A third company, Peaker Energy Group, was issued a similar PLR much earlier in September 2013. Finally, BHP Billiton announced in November that it would begin exporting processed condensate with an API gravity of 52 beginning in January without explicit permission in the form of a PLR from the BIS as it has established to its satisfaction that its condensate is eligible for export as a refined product.

Hydrocarbons not fitting the definition of crude oil are not subject to export restrictions of any kind. The definition of crude oil according to the Export Administration Regulations (EAR) specifies that the hydrocarbons are considered crude oil when they are in liquid form both when below ground and above ground at atmospheric pressure, and when they have not been processed through a distillation tower.

The PLRs to Pioneer and Enterprise stated that lease condensate no longer qualifies as crude oil once it has been processed through a stabiliser. A condensate stabiliser separates lighter components such as methane, ethane, propane and butane from pentanes and heavier hydrocarbons. Condensate production has been estimated at 650 kb/d by the EIA but receives a USD10-12/bbl discount relative to WTI. By exporting this volume, producers can achieve much better prices at Brent minus, potentially resulting in improvement of USD15/bbl, according to Pioneer. Also important to the ruling is the fact that a stabiliser at several million dollars is much less expensive than a condensate splitter or refinery at several hundred million dollars. A 50 kb/d splitter is estimated to cost USD175-200 million according to Platts, while a condensate stabiliser of similar capacity is considerably less expensive, likely less than a tenth of the cost.

Therefore the rulings on minimally processed condensate already allow a material exception to export restrictions even for companies not directly addressed by private-letter rulings, and will enable further export growth as lease condensate production rises from quickly-growing shale plays including the Eagle Ford and Permian regions.

Two legislative bills introduced

This year there have been two bills introduced to repeal limitations on crude oil exports. These are the Crude Oil Export Act (H.R.4286 and S.2170) introduced in April as part of the much larger American Energy Renaissance Act of 2014, and H.R. 5814 introduced in December by Representative Joe Barton ("To adapt to changing crude oil market conditions"). Although support for the bills

is regarded as still insufficient to garner enough votes to pass, but the EIA study dating from October 2014 gave a boost to its supporters. The study found that Brent crude oil prices are more closely related to US domestic gasoline prices. By allowing US producers to achieve the best possible selling prices and raising supplies to the international market, an elimination of export restrictions could well lead to lower domestic gasoline prices.

Figure 1: Definition of crude oil according to BIS EAR

"Crude oil" is defined as a mixture of hydrocarbons that existed in liquid phase in underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities and which has not been processed through a crude oil distillation tower. Included are reconstituted crude petroleum, and lease condensate and liquid hydrocarbons produced from tar sands, gilsonite, and oil shale. Drip gases are also included, but topped crude oil, residual oil, and other finished and unfinished oils are excluded.

Source: Bureau of Industry and Security

Figure 2: US import of crude oil by API gravity

Light (>= 35 API)
Heavy (< 35 API)
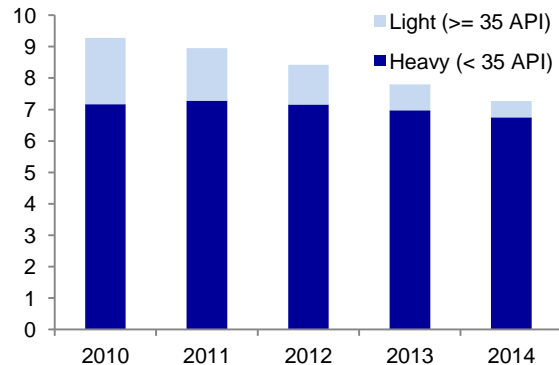
Sources: US EIA, Deutsche Bank

In our view, the pressure to loosen export restrictions will only grow in coming years as US crude oil production grows further. Continued growth also entails some risk that the WTI-Brent spread may widen once again if pipeline infrastructure fails to keep pace. Of additional concern would be any increased discount of regional crude prices to WTI owing to transportation bottlenecks, to the extent that this could reduce investment in oil production.

Crude oil imports of light oil when defined as API 35 degrees and lighter, have declined to 526 kb/d in the first 9 months of the year as compared to 2.1 mb/d in 2010. This introduces tension in the system as US refineries are configured to process a heavier crude slate, particularly in the Gulf Coast (*Opening A Release Valve,* 14 Nov 2014).

Figure 3: US crude oil spreads to Brent

WTI-Brent ($/bbl)
LLS-Brent ($/bbl)
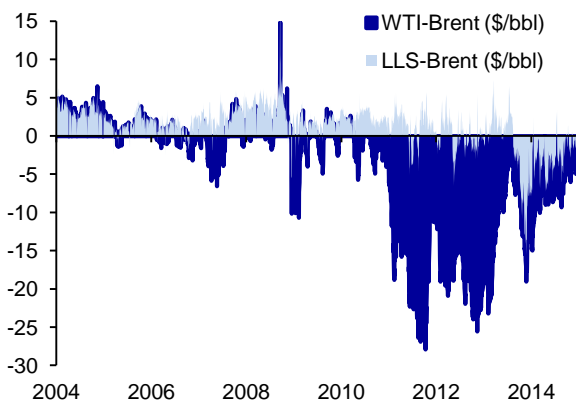
Source: Bloomberg Finance LP, Deutsche Bank

Figure 4: US refinery crude oil input quality

Adjusting for tight oil

Increasing complexity

Sulfur content (lhs, %)
API gravity (rhs, Degrees)
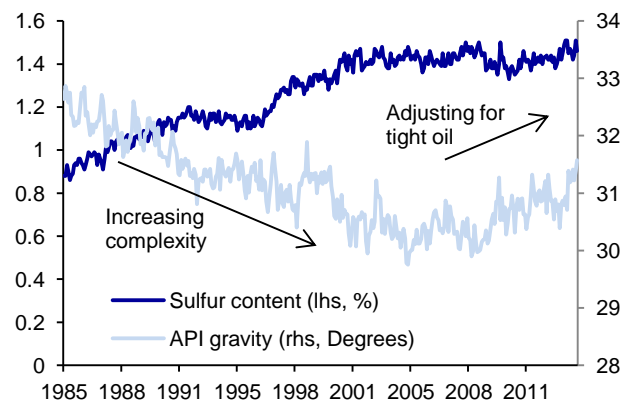
Sources: US EIA, Deutsche Bank

If exports of light oil cannot be reduced much further, then US refineries may offer increasingly lower prices for light oil to reflect its unsuitability. This would result in wider spreads versus Brent, and would lower the incentive for production growth.   While it is possible that refineries could invest in equipment to accommodate increasingly lighter crude slate, they may reasonably require some reassurance that export restrictions will remain in place indefinitely. It seems more likely that increased volumes of domestically-produced light oil would lead to increased support for legislative action, or at least further BIS exceptions to the current definition of crude oil.

Michael Hsueh, (44) 20 754 78015
michael.hsueh@db.com

#6 Global Refining Margins Outlook

Overcapacity & Product Weakness To Weigh On Margins

LLS cracking margins in the US Gulf Coast fell north of $5/bbl in the past month. These margins, which looked fairly strong throughout the current year have plummeted recently despite the fall in the crude prices and stand at the bottom end of the 5 year range. Diesel and Mogas contribution to the margins have decreased the most during this period followed by jet and naphtha. We see a positive contribution from fuel oil. As a result, the margins for heavier grades like Mars and Maya do not show as big a fall as lighter grades; nevertheless they also look very weak.

The arbitrage for Mexican Maya crude vs Mars looks open at the moment. This implies that Gulf Coast refiners now prefer to run Maya than Mars because of greater economic profitability. Meanwhile the arbitrage for EU crudes like Forties and West African grades like Bonny Light looks closed currently after being open in the recent past. We believe that stronger freight is one of the contributing factors for this arb being closed. This suggests that the US is in need of importing heavier grades of crude and has a cost advantage in terms

of light sweet crudes. We believe this will be further supported since the price differential between the light and heavy grades of crude have collapsed in the recent past (Figure 4) and with the oversupply of light sweet crude oil globally we expect this differential to remain depressed in the short term. Meanwhile, if EU crudes fall further it might open the arbitrages between these regions and put further pressure on US crudes. Meanwhile, a lift in the export ban might provide a support to the downside of US crude.

Margins for Northwest Europe (NWE) also show a downward trend in the past month with cracking margins falling more than the marginal hydroskimming. The reason behind this is due to the downfall of Mogas. Mogas contribution to margins has declined sharply followed by Diesel and Jet. We observe a positive contribution from fuel oil and LPG. The arbitrage for Urals against Forties has been open since the start of December. Meanwhile the arbitrage for West African crudes like Bonny Light has been open to Europe since Q1-14. We believe that gasoline spreads will further impact margins negatively as we head into seasonally poor winter demand coupled with seasonal specification changes which makes gasoline cheaper to produce due to the use of inexpensive butane to meet the winter RVP specifications. Furthermore the fact that refineries have come out of maintenance will add additional downward pressure on gasoline. The region will also face downward pressure from rising volumes of products exports as new capacities come online in Asia and Middle East.

Meanwhile in the Med, we also see margins declining on the back of poor diesel and gasoline pricing. Contributions to margins from Naphtha, LPG and Fuel Oil show an increase in the past month. Asian, European and West African crude arbitrages to the Med look closed currently against Urals whereas the arbitrages for grades like CPC and Saharan Blend remain open. We believe that the decline in European product demand, overhang of obsolete refining capacity and rising environmental costs will continue to weigh on Med market.

Figure 1: Brent Curve Structure
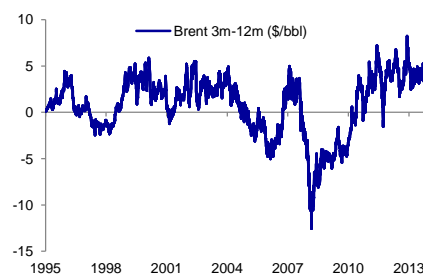
Source: Bloomberg Finance LP, Deutsche Bank

Figure 2: WTI Curve Structure
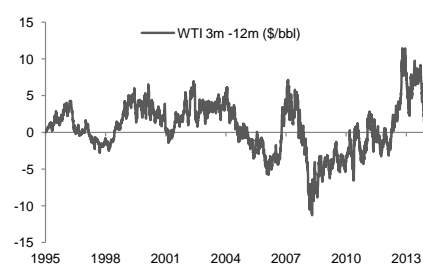
Source: Bloomberg Finance LP, Deutsche Bank

Figure 3: LLS Vs Brent Prices ($/bbl)
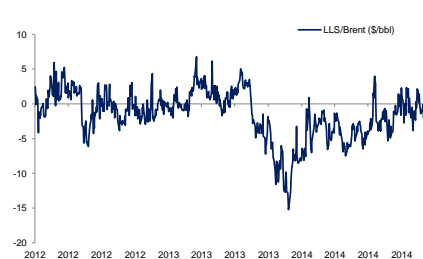
Source: Platts, Deutsche Bank

Figure 4: Light Heavy Crude Price Differential ($/bbl)
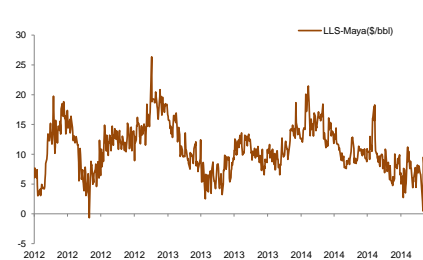
Source: Platts, Deutsche Bank

In Asia, cracking margins fell by more than $1/bbl in the past month. We observe decreased contributions from Gasoline, Diesel and Jet, and increased contributions from Fuel Oil and Naphtha. According to our model, cracking margins in Asia look strong at the moment and are at the higher end of the 5 year range. Margins for light-sweet grades like Murban have been impressively strong as its price differential to Dubai narrows. We believe that margins in Asia were advantaged compared to the other regions as product pricing remained relatively healthier and the spread between Brent-Dubai became wider in November.

All crude arbitrages to Asia look closed at the moment against Middle Eastern crudes. We believe the key reason for these arbs being shut is the cut in OSPs by Saudi Arabia to the Asian market coupled with recent high freight rates. The Brent-Dubai price differential is at a 4 month wide which will additionally help the arbs to remain shut. We believe that prompt strong margins and high refinery run rates will put downward pressure on margins for Q1-15 until March 2015 when Asia heads into maintenance. Moreover, the new capacity coming online in Middle East in 2015 is likely to put additional pressure on margins.

Figure 5: USGC cracking margins for LLS ($/bbl)
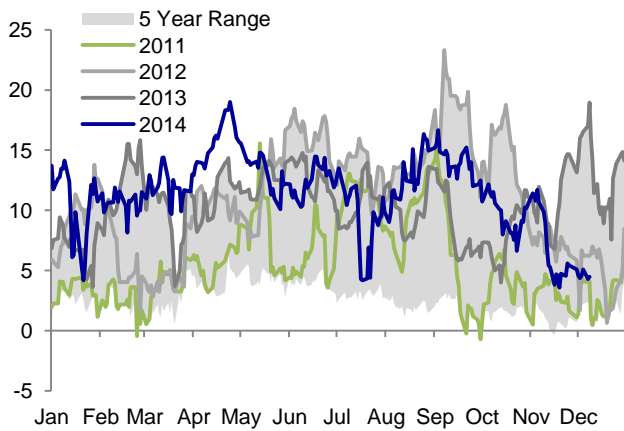
Source: Platts,HComet, Deutsche Bank

Figure 6: USGC refining margin premium ($/bbl)
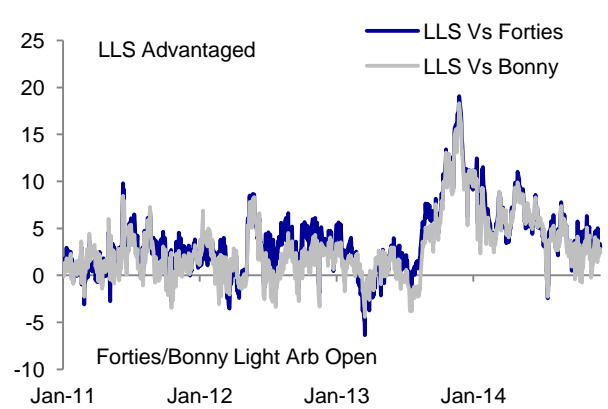
Source: Platts, HComet, Deutsche Bank

Figure 7: NWE hydroskimming margins for Forties ($/bbl)
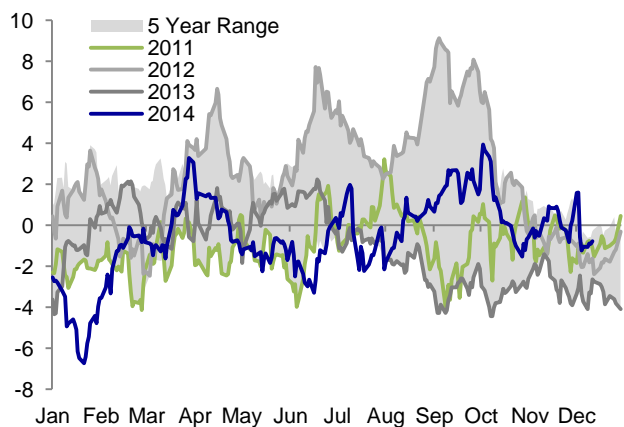
Source: Platts,HComet, Deutsche Bank

Figure 8: NWE refining margin premium ($/bbl)
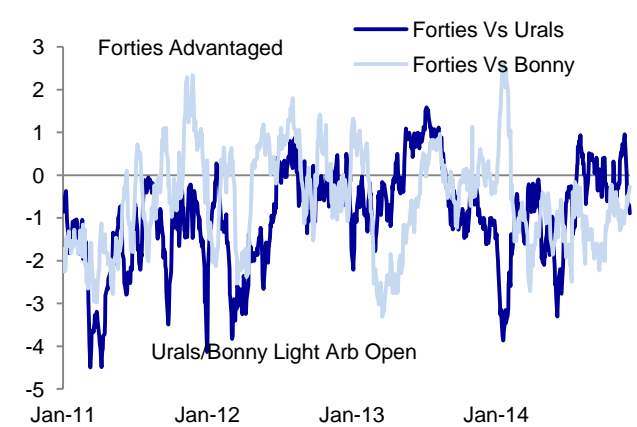
Source: Platts,HComet, Deutsche Bank

Figure 9: Med hydroskimming margins for Urals ($/bbl)
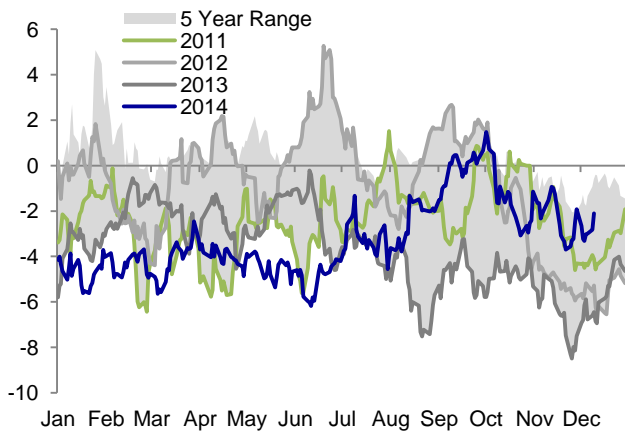
Source: Platts,HComet, Deutsche Bank

Figure 10: Med refining margin premium ($/bbl)
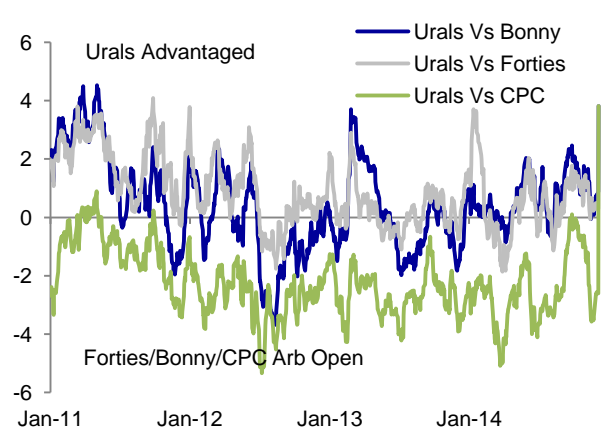
Source: Platts,HComet, Deutsche Bank

Figure 11: Singapore hydroskimming margins for Dubai ($/bbl)
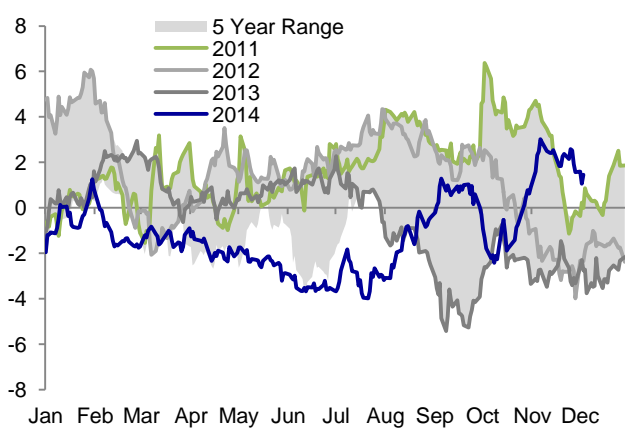
Source: Platts,HComet, Deutsche Bank

Figure 12: Singapore refining margin premium ($/bbl)
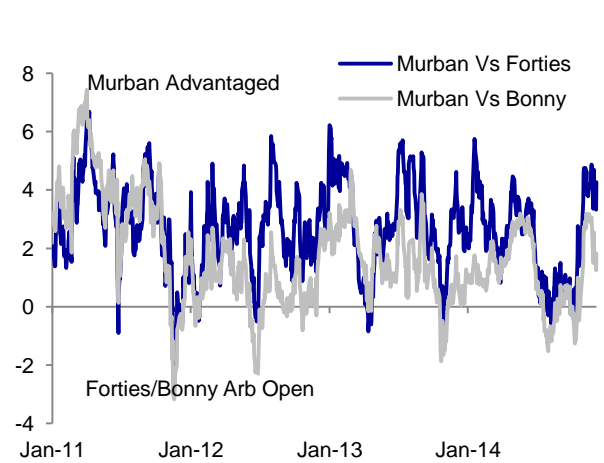
Source: Platts,HComet, Deutsche Bank

Overcapacity and product weakness to weigh down on refining margins

In the last decade the global refining industry has changed its demographics with a shift in demand from OECD to non OECD countries. With the advent of US tight oil the US has emerged as an exporter of products reversing its long-held position as an importer. This has resulted in a supply glut for products globally. Moving on, between now and 2020 we expect approximately 7.65 million bbls of complex refining capacity to come online of which approximately 3.4 mbpd is to be added in Asia and 2.5 mbpd in Middle East alone. This will create additional surplus adding to the already existing glut and pressure refinery utilization rates, which will ultimately be reflected in weaker refinery margins globally in the long run.. We believe in the coming months the refineries will show an increase in run rates as cracking margins continue to remain in positive territory on a global basis which will lead to a product glut, thus weakening margins further. We do not expect this to change unless crude weakens further globally and refineries cut back on runs.

Figure 13: Global refinery capacity expansions by region (2014-2020) (mmb/d)
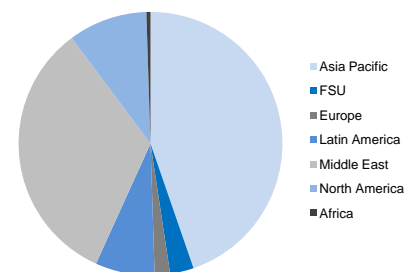
Source: Woodmackenzie, BP Statistical Review,Deutsche Bank

Jayati Mukherjee, (91) 22 6181 2036
jayati.mukherjee@db.com
Michael Hsueh, (44) 20 754 78015
michael.hsueh@db.com

#7 US Natural Gas & Thermal Coal

Production Cost Declines Promise Weaker Pricing

- Production cost declines in thermal coal and US natural gas mean that oversupplied conditions in these markets in 2015 will likely lead to further downside.

- In thermal coal, lower costs have been achieved through reductions in workforce, renegotiating mining contracts, cutting fuel expenses, reducing strip ratios and postponing sustaining capex. We expect weakness in producer currencies and crude oil to translate into further cost declines, although this could be offset by a partial rebound in other costs.

- Limited deviations from the longer term trend in supply growth matched against new signs of demand weakness suggest that oversupplied conditions are likely to continue and that declines in dollar-denominated costs may be a guide to future price developments. We lower our 2015 price forecast for Newcastle FOB to USD60/t and Richards Bay FOB to USD63/t.

- Production curtailments remain limited, despite the Glencore shutdown of Australian production for 3 weeks in December (-4mt). Furthermore, any idled mines will be available for restart in the event of improved market conditions, limiting the potential upside.

- In US natural gas, estimated development breakeven costs (excluding finding costs) have declined by roughly USD0.60/mmBtu in the last year owing to well cost reductions, more extensive use of pad drilling, and increased numbers of wells per pad. Production growth has recovered sharply from freeze-offs in November to average +4.3 bcf/d yoy.

- While we expect this growth to slow to only 2.0 bcf/d yoy in 2015, we believe the market would be balanced at only 1.3 bcf/d yoy growth. Therefore we expect storage normalization versus the 10-year average by the end of March, and building surpluses over the remainder of the year prior to Winter 15-16. Consequently we lower our 2015 Henry Hub price forecast to USD3.75/mmBtu.

Overview
Production cost declines have characterized both the global thermal coal and US natural gas markets in the past year, with further USD cost declines likely in thermal coal. We expect oversupplied markets to persist over a multi-year period in thermal coal, and over the whole of 2015 in natural gas. Consequently, lower costs of production translate into a lower likelihood of supply curtailments and greater potential downside.

Oversupplied conditions persist in thermal coal
Limited deviations from the longer term trend in supply growth matched against new signs of demand weakness suggest that oversupplied conditions are likely to continue and that declines in dollar-denominated costs may be a guide to future price developments.

It is increasingly difficult to rationalise even a stabilisation of prices at the current level given the strong efforts by the Chinese government to support domestic pricing. This has been promulgated on three fronts: (i) reductions in domestic production, (ii) various quality thresholds for both domestic production and imports, and (iii) import quotas individually assigned to major state-owned utilities.
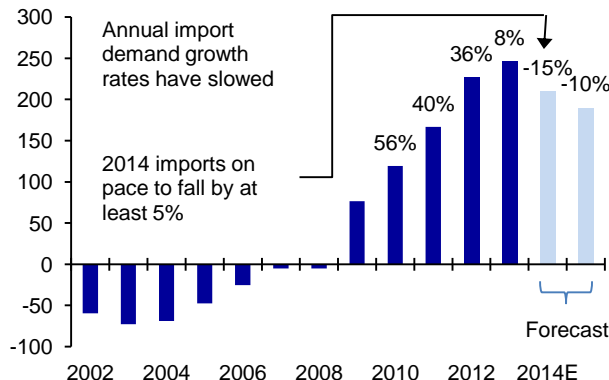
Figure 1: Seaborne export thermal coal cash costs
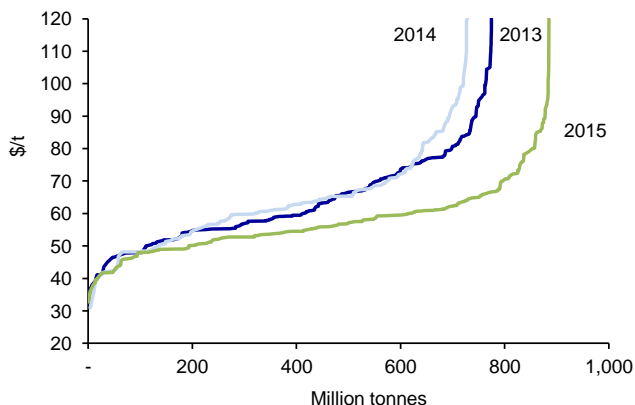
Source: Wood Mackenzie, Deutsche Bank

Figure 2: Chinese thermal coal net import growth (%)

Source: McCloskey Coal Report, Deutsche Bank

The strongest engine of thermal coal demand growth has now gone into recession (Chinese net imports falling in 2014). As a result we have seen the Qinhuangdao price disconnecting from Newcastle FOB as the landed price discount becomes irrelevant, and the FOB spread (RB-NEWC) having remained firmly in positive territory for virtually all of 2014. This reflects the relative weakness in the Pacific Basin as a result of the first decline in Chinese thermal coal flows since trade turned to a net import in 2009, and signals that Chinese demand will be less of a support for the market in 2015 than it has been in the past 5 years.

We would expect that Chinese demand for Richards Bay FOB would decline first, as the spread is least positive for this region, and that demand for Newcastle FOB should be comparatively resilient. Australian coal will continue to be at a disadvantage to Indonesian coal, however, and this difference will have been exaggerated by the re-imposition of a 6% import duty on thermal coal since 15 October, which was removed in 2007.

Figure 3: FOB spread (Richards Bay – Newcastle, USD/t)
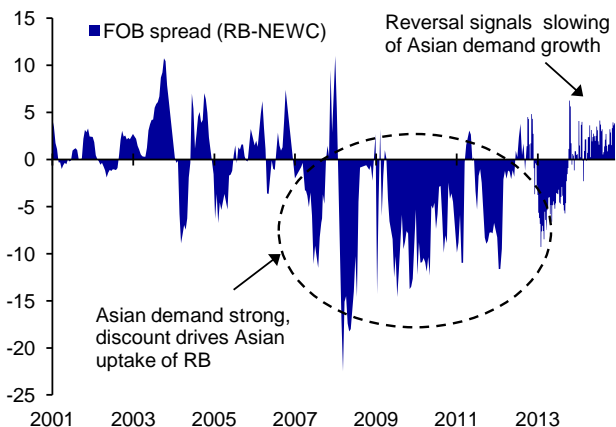
Source: Bloomberg Finance LP, Deutsche Bank

Figure 4: Implied freight and physical freight (USD/t)
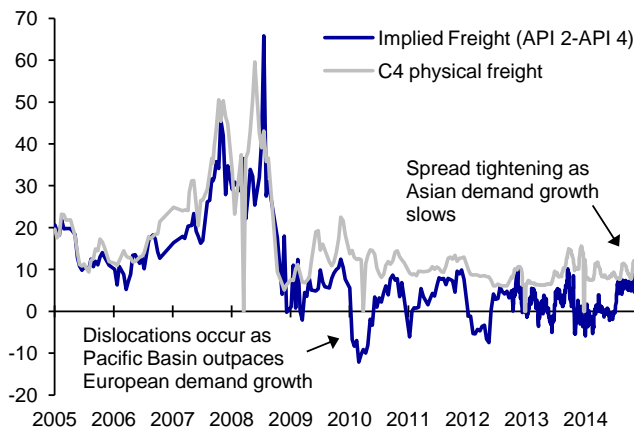
Source: Bloomberg Finance LP, Deutsche Bank

The negotiation of the China-Australia Free Trade Agreement (ChAFTA) will remove this import duty over a period of two years beginning after the agreement comes into force, which will likely come at some point in mid- to

late-2015. For the Atlantic Basin, the same dynamic suggests that the spread between implied and physical freight may remain tighter as prices for Richards Bay FOB become more closely related to European demand.

Concerns for Chinese import demand growth

It now seems probable that the Chinese government restrictions on thermal coal will be extended in some form or another in 2015 and beyond. Quality thresholds for both imported coal and domestically-produced coal will take effect on 1 January 2015, despite the fact that most large-scale coal-fired power plants are already equipped with flue-gas desulphurisation and electrostatic precipitators for the removal of sulphur and ash emissions. These thresholds are the most restrictive for coal imported into the three key regions of Beijing-Tianjin-Hebei, Pearl River Delta and Yangtze River Delta.

Our analysis shows that the thresholds will have the greatest effect on lignite produced domestically in Eastern Inner Mongolia (owing to the specific energy requirement) and on lignite produced in Yunnan (owing to the ash requirement). Comparatively smaller volumes of imports from Australia would be affected by the ash restriction, and Indonesian coal by the specific energy restriction (*China Import Ban Takes Shape,* 22 Sep 2014).

In September 2014, the government also assigned import cuts in absolute quantities for each major state-owned utility. The key driver for tighter policy is the persistent concern around air pollution as well as longer-term signals that regional cap and trade programs may eventually be expanded into a nationwide cap in the longer term (2030 or earlier, according to a deal agreed with the US in November).

Figure 5: China coal capacity (million tonnes)	Figure 6: Divergence in Qinhuangdao and benchmarks
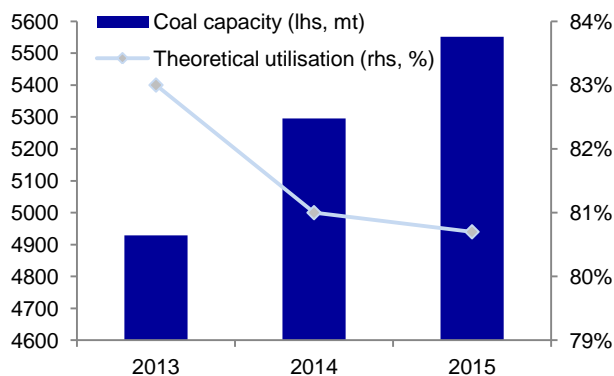
Source: Deutsche Bank Asia Metals & Mining Research
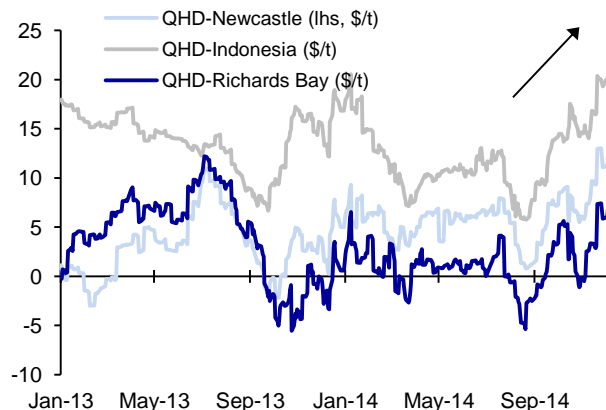
Source: Bloomberg Finance LP, Deutsche Bank

A second concern, apart from government regulation, is that investment in Chinese coal production capacity has not slowed to the same degree as production growth, partly as a result of the government-mandated reduction in domestic production of 150mt in 2014. DB China Metals & Mining Research estimates that domestic production of coal will have risen by 477mt in 2015 compared with 2013, while the capacity for coal production will have risen by 622mt, implying a decrease in utilisation in the coal industry. This may be aided by subsidies offered by provincial administrations to coal producers under economic stress which have risen two years in a row, according to the Financial Times.

As increases in domestic coal consumption are more likely to be satisfied by domestic production rather than imports, we lower our assumptions for Chinese net thermal coal imports from 210mt in 2014 to 190mt in 2015.

Indian market reforms

There is some likelihood of upside revision to Indian imports in the longer term owing to government initiative to boost economic growth through a combination of export-oriented manufacturing, heavy infrastructure building and urbanisation. This will necessarily be more materials and energy intensive. However, our macro research analysts indicate that an export-driven growth model is unlikely to succeed at a time of stagnation in global trade and manufacturing overcapacity. In addition, it will take time to recover from the loss of momentum in recent years and to overcome a number of longstanding internal challenges relating to land, labor and energy reforms and bad loans. We note that these internal challenges may also throw into question the rate at which the government will be able to grow domestic production by Coal India, which is another goal of the reforms. For the time being we leave our assumed trajectory of Indian import growth unchanged pending more concrete signs of implementation of the new growth plan.

Market can be balanced without further Indonesian growth

From the supply side we see very few signs of financial stress leading to mine closures, as producers have made progress in reducing costs. Incipient signs of supply restraint from Indonesia have been attributed to difficulty in registering for newly required export licenses. However, 2014 production estimates from key mining companies continue to show increases from 2013. Moreover, a recent report from McCloskey claims that government measures to constrain illegal mining have been less effective than assumed because companies have been underreporting production, and that overall production will grow by 50mt in 2014.

Into 2015, however, we believe conditions will become more difficult for Indonesian miners owing to increased margin pressure based on our revised price forecast for Newcastle FOB at USD60/t. In addition, there are reports that the government may impose a requirement for miners to pay royalties on exported coal in advance, thereby raising cash constraints on production growth. We expect that Indonesian exports may reach a plateau in a USD60/t environment, and that the market can remain well supplied in such a scenario.

Figure 7: End of period currency assumptions					
	2013	2014	2015	2016	2017
AUDUSD	0.89	0.90	0.78	0.68	0.60
USDRUB	32.73	50.00	47.52	47.32	46.04
USDIDR	12270	12200	12250	12750	13000
USDZAR	10.49	11.00	11.00	10.50	11.14

Source: Deutsche Bank

USD strength pushes cost curves lower

More concerning is the impact of dollar strength on cost curves, particularly in the case of the two countries with the highest marginal costs, Australia and Russia. We estimate that Australian marginal costs will decline by a further $21/t at the 85th percentile and $17/t at the weighted average by 2017 in comparison to 2014. Clearly the sharp devaluation of the ruble will also have downside consequences for costs in 2015, as 75% of Russian production costs are ruble-denominated. By contrast, we expect relatively less weakness in the Indonesian rupiah and stability in the South African rand through the end of 2017.

Figure 8: Weighted-average energy-adjusted thermal coal cash costs ($/t)					
	2013	2014	2015	2016	2017
Australia	74.0	75.3	57.8	52.8	48.0
Russia	76.6	61.6	55.8	59.0	61.9
Indonesia	56.9	62.6	57.3	59.6	60.8
South Africa	55.7	45.6	55.8	61.9	60.8
Colombia	51.7	52.6	53.3	55.1	56.4

Source: Wood Mackenzie, Deutsche Bank

As a result, we see a substantial flattening in weighted-average cash costs across regions in 2015, as Australia and Russia are no longer the standout high-cost producers. We expect weighted average cash costs in 2015 to lie within a tight range near USD57/t and rising modestly in the two years to 2017. With further depreciation in the Australian dollar beyond 2015 this makes Australian coal the lowest cost region, resulting in Indonesia and South Africa and Russia as the regions most likely to suffer from margin pressure in the longer term.

The risk for the upside is likely that reductions in sustaining capital expenditures for mining equipment and postponement of overburden removal will gradually lead to cost re-inflation. We would look for larger volumes of production placed on care and maintenance to balance the market over the next three years as prices remain at USD60/t and below.

Natural gas supply growth raises oversupply concern

An extremely cold winter in 2013-14 ended with storage gas at the lowest level in both percentage terms and absolute terms since 2003. As in 2003, this was followed by a very strong injection season with 2,770 bcf (59% of working gas capacity) added, as compared with 2,491 bcf (61%) in 2003 when measured from the end of March to the first week in November. This was facilitated by the strongest production growth rate (+3.1 bcf/d) of the last nine years apart from 2011. Of particular note is that production growth accelerated into the end of the year, despite the weakest pricing also occurring in Q4-14.

Figure 9: Dry gas production growth and Henry Hub
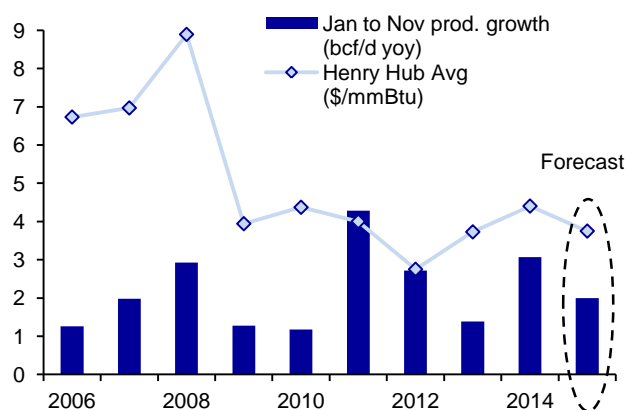
Source: Bloomberg Finance LP, Bentek Energy, DB Oil & Gas E&P Equity Research

Figure 10: Dry gas production (bcf/day)
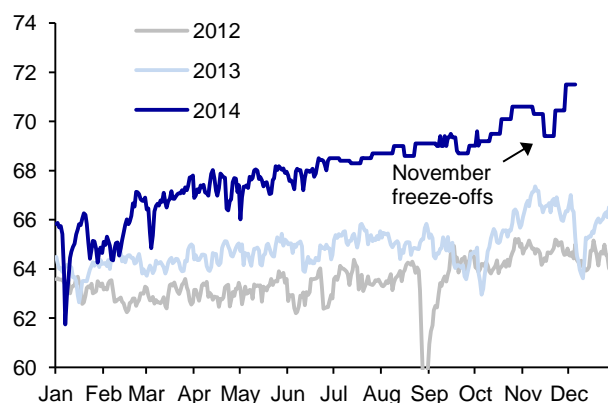
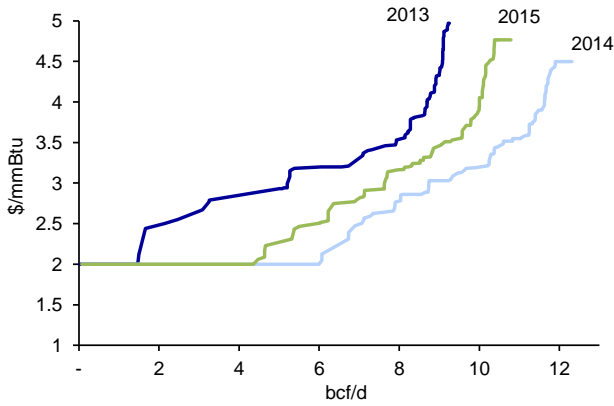Source: Bentek Energy, Deutsche Bank

Continued strength in production growth poses the greatest risk for pricing in 2015 and we lower our price forecast to USD3.75/mmBtu on expectations that supply will exceed requirements in a normal-weather scenario. A shift towards lower costs has been facilitated by tighter well spacing and longer laterals, while we do not expect reduced drilling for tight oil to detract substantially
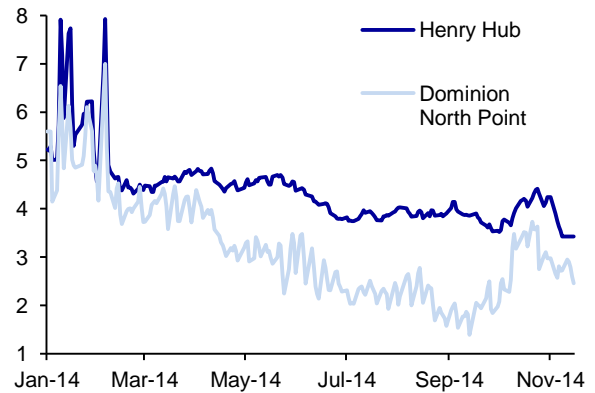
from associated gas production growth. We expect these costs to remain lower in 2015 versus 2013. However, a continued backlog of takeaway capacity in Northeast Pennsylvania may hold back growth below what it otherwise could be, owing to negative basis relative to Henry Hub.

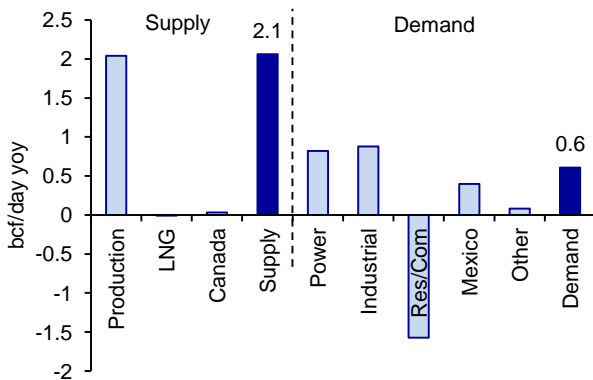| Figure 11: New drilled gas supply breakeven	Figure 12: Dominion North Point (USD/mmBtu)
Source: Wood Mackenzie, Deutsche Bank	Source: Bloomberg Finance LP, Deutsche Bank

On a year-on-year comparison we expect lower demand from normalised winter weather to be offset by growth in power utility generation demand and industrial demand. Winter-to-date weather has been quite close to average in cumulative HDDs, with generally mild weather being offset by a pronounced cold spike over 12-21 November. This cold spell also triggered freeze-offs but a return to mild weather resulted in a quick resumption in production to the highest average of the year at 71.5 bcf/d in the week ending 5 December.

Figure 13: Natural gas supply & demand (yoy change)	Figure 14: Storage as % of working gas capacity
Source: US DOE/EIA, Deutsche Bank	Source: US DOE/EIA, Deutsche Bank
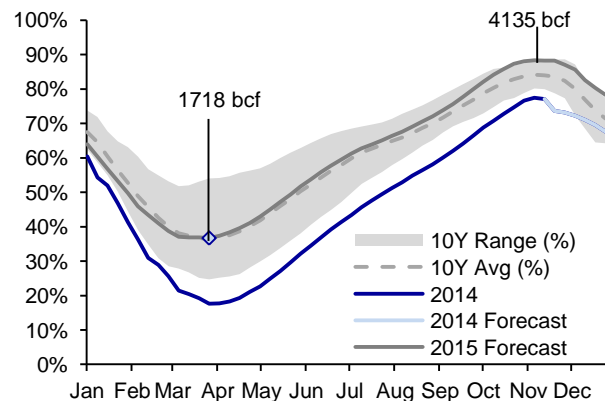
Overall we expect that the market could be balanced and restore normal storage levels by mid-year if production growth averages 1.3 bcf/d yoy in 2015. Consequently, our forecast of 2.0 bcf/d yoy growth implies normal storage achieved by the end of Q1, and building surpluses relative to the 10Y average (measured by the percentage of working gas capacity) over the balance of the

year. Therefore we lower our 2015 forecast for Henry Hub to USD3.75/mmBtu with downside risks over the summer in the event of more aggressive production growth.

Michael Hsueh, (44) 20 754 78015
michael.hsueh@db.com

Figure 15: Seaborne thermal coal supply and demand (million tonnes)

Including Anthracite, Bituminous, Sub-bituminous, and Lignite

	2010	2011	2012	2013	2014e	2015e	2016e	2017e	2018e	2019e	2020e
Indonesian exports	298	353	384	424	420	420	420	426	432	435	438
growth	*27%*	*18%*	*9%*	*10%*	*-1%*	*0%*	*0%*	*1%*	*1%*	*1%*	*1%*
Australian exports	142	148	171	188	202	214	224	232	239	235	243
growth	*2%*	*4%*	*16%*	*10%*	*8%*	*6%*	*5%*	*3%*	*3%*	*-2%*	*3%*
Russia exports	75	86	104	110	106	106	108	110	113	115	117
growth	*-3%*	*15%*	*21%*	*6%*	*-4%*	*0%*	*2%*	*2%*	*2%*	*2%*	*2%*
South African exports	71	69	76	71	75	77	78	80	82	83	84
growth	*5%*	*0%*	*6%*	*-5%*	*5%*	*2%*	*2%*	*3%*	*2%*	*1%*	*1%*
Colombian exports	69	76	79	74	77	82	84	86	88	90	92
growth	*9%*	*10%*	*4%*	*-7%*	*5%*	*6%*	*2%*	*2%*	*2%*	*2%*	*2%*
US exports excl. Canada & Mexico	15	30	46	41	40	40	40	40	40	40	40
China exports	18	11	8	6	5	5	5	5	5	5	5
Other exports	127	131	135	139	143	139	135	135	135	135	135
Total seaborne thermal supply (Mt)	**815**	**905**	**1003**	**1053**	**1068**	**1083**	**1094**	**1114**	**1134**	**1137**	**1153**
growth	*10%*	*11%*	*11%*	*5%*	*1%*	*1%*	*1%*	*2%*	*2%*	*0%*	*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	215	195	185	185	185	185	185
growth	*40%*	*29%*	*32%*	*7%*	*-15%*	*-9%*	*-5%*	*0%*	*0%*	*0%*	*0%*
India imports	75	92	119	139	156	163	172	182	196	211	228
growth	*25%*	*22%*	*30%*	*16%*	*12%*	*5%*	*6%*	*6%*	*8%*	*8%*	*8%*
Other imports	131	144	150	155	157	159	161	163	166	168	170
Total seaborne thermal demand (Mt)	**825**	**922**	**1036**	**1079**	**1060**	**1053**	**1049**	**1063**	**1066**	**1070**	**1098**
growth	*11%*	*12%*	*12%*	*4%*	*-2%*	*-1%*	*0%*	*1%*	*0%*	*0%*	*3%*
Notional market balance	**-10**	**-17**	**-33**	**-25**	**9**	**30**	**45**	**52**	**68**	**68**	**55**

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

Figure 16: US natural gas supply and demand (bcf/day)

Bcf/day	2013	1Q 2014	2Q 2014	3Q 2014	4Q 2014E	2014E	1Q 2015E	2Q 2015E	3Q 2015E	4Q 2015E	2015E	2016E	2017E
CONSUMPTION													
Residential	**13.6**	28.8	7.4	3.6	15.8	**13.9**	24.9	7.2	3.7	15.8	**12.9**	**12.9**	**13.0**
Commercial	**9.0**	16.5	6.2	4.7	10.3	**9.4**	14.4	6.0	4.6	10.3	**8.8**	**8.8**	**8.8**
Industrial	**20.4**	23.0	20.0	19.8	22.4	**21.3**	23.8	21.0	20.8	23.1	**22.2**	**23.1**	**24.1**
Electric Power	**22.3**	19.7	21.0	26.8	19.7	**21.8**	19.9	21.8	28.3	20.5	**22.6**	**23.3**	**24.0**
Other	**6.0**	6.8	5.9	6.0	6.3	**6.2**	6.8	6.1	6.1	6.3	**6.3**	**6.4**	**6.4**
Lease and Plant Fuel	**3.9**	4.0	4.1	4.1	4.1	**4.1**	4.2	4.2	4.2	4.2	**4.2**	**4.2**	**4.2**
Pipeline and Distribution	**2.0**	2.7	1.7	1.7	2.1	**2.1**	2.5	1.8	1.8	2.1	**2.1**	**2.1**	**2.1**
Total Demand	**71.4**	94.7	60.4	60.8	74.4	**72.6**	89.8	62.1	63.3	76.0	**72.8**	**74.5**	**76.3**
YoY % change	**2.3%**	7.4%	1.3%	0.0%	-3.3%	**1.7%**	-5.2%	2.7%	4.1%	2.2%	**0.3%**	**2.3%**	**2.4%**
DOMESTIC SUPPLY													
Alaska	**0.9**	1.0	0.9	0.9	1.0	**0.9**	1.0	0.9	0.8	0.9	**0.9**	**0.9**	**0.9**
Gulf of Mexico	**3.6**	3.3	3.4	3.1	3.1	**3.2**	3.1	3.1	2.9	2.9	**3.0**	**3.1**	**3.2**
Other US	**65.7**	67.9	69.6	71.0	71.1	**69.9**	72.1	72.5	72.6	73.0	**72.6**	**74.1**	**76.2**
Marketed Production	**70.2**	72.1	74.0	75.1	75.1	**74.1**	76.2	76.5	76.3	76.9	**76.5**	**78.1**	**80.3**
Dry Gas Production	**66.5**	68.2	69.8	70.7	71.6	**70.1**	71.9	72.1	72.0	72.5	**72.1**	**74.0**	**76.2**
YoY % change	**1.2%**	4.2%	5.3%	5.9%	5.8%	**5.3%**	5.3%	3.4%	1.8%	1.3%	**2.9%**	**2.6%**	**3.1%**
Net Storage Withdraws	**1.5**	22.8	-12.7	-13.0	1.0	**-0.5**	15.6	-12.1	-10.8	1.7	**-1.4**	**-0.7**	**-0.2**
Other & Balance	**-0.233**	-0.2	0.6	-0.1	-1.0	**-0.1**	-0.9	-0.2	-0.4	-0.2	**-0.5**	**-0.5**	**-0.5**
Total Domestic Supply	**67.8**	90.8	57.7	57.6	71.6	**69.4**	86.5	59.8	60.8	73.9	**70.2**	**72.8**	**75.6**
LNG Gross Imports	**0.3**	0.2	0.2	0.2	0.2	**0.2**	0.2	0.2	0.2	0.2	**0.2**	**0.2**	**0.2**
LNG Gross Exports	**0.0**	0.0	0.0	0.0	0.0	**0.0**	0.0	0.0	0.4	0.6	**0.3**	**1.2**	**2.2**
Pipeline Gross Imports	**7.6**	8.4	6.5	7.2	7.2	**7.3**	7.8	6.9	7.4	7.4	**7.4**	**7.4**	**7.4**
Pipeline Gross Exports	**4.3**	4.7	3.9	4.2	4.5	**4.3**	4.6	4.7	4.6	4.9	**4.7**	**5.0**	**5.3**

Source: US DOE/EIA, Deutsche Bank

#8 Precious Metals

Gold To Remain Mesmerized By US Financial Market Trends

- We are maintaining our bearish outlook for gold prices heading into next year. This reflects ongoing adjustments in US interest rates, equity and currency markets all of which we expect to be negative for gold.

- Indeed we expect the start of a new Fed tightening cycle from the middle of the year will push US long term real interest rates higher and encourage further gains in the US dollar.

- If we are right and EURUSD falls to 1.15 by the end of next year then based on gold's historical correlation with the US dollar over the past six months, it would imply gold prices falling to as low as USD1,075/oz .

- In fact, work conducted by DB's Asset Allocation team which models gold relative to the US dollar, world growth, money supply and central bank gold purchases, reveals that the current fair value for gold is close to USD940/oz.

- Moreover if we value gold in real terms, relative to income, relative to physical assets and relative to the US equity market, then on average gold prices would need to fall towards USD905/oz to bring its valuation against these various indicators back towards it long run historical averages.

- This illustrates to us that despite the powerful correction in gold prices that has occurred over the past 18 months, gold can still not be considered cheap or even close to fair value.

- If we are wrong, we would view weaker US growth and a delay to Fed tightening as the most likely scenario that would rescue the gold price. However, the collapse in oil prices if sustained alongside recent signs of a more vigorous improvement in the US labour market suggest this may prove to be an unlikely event risk next year.

- More convincing could be the prospect that additional programmes of quantitative easing by other global central banks such as the ECB, BoJ and the PBoC might throw a life-line to the gold price. However, we find only a loose correlation of central bank balance sheet growth and gold price trends.

- Another source of support for the gold market is likely to be ongoing central bank gold buying. However, gold purchases by this community have slowed considerably over the past few years and since last year has been overwhelmed by the liquidation in gold ETF holdings.

- We believe the prospects for silver are more promising at least on a relative basis to gold. Silver has been the worst performing precious metal this year as the market has endured a significant reduction in speculative length. However, in an environment of upside risks to US growth we expect this will encourage the gold to silver ratio to move lower over time.

Over recent years we believe the rise and fall of gold prices has been driven by powerful adjustments in US real interest rates, the US equity risk premium and the US dollar. Indeed successive rounds of QE by the Fed, which drove US long term real interest rates lower and then into negative territory provided powerful fuel to the gold price rally. However, Fed tapering has pushed US long term real interest rates higher, introduced interest rate support for the US dollar and exposed the rich valuation of gold relative to other physical and financial assets, Figures 1 & 2.

Figure 1: US long term real interest rates & the gold price

Source: Bloomberg Finance LP

Figure 2: US equity risk premium & the gold price
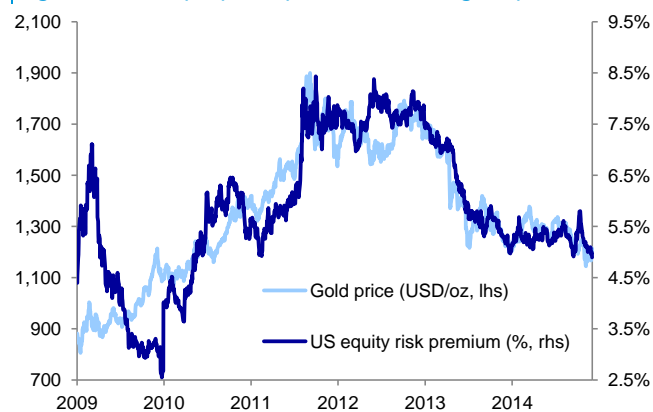
Source: Bloomberg Finance LP, Deutsche Bank

Looking into next year, and given DB's expectation that the Fed lifts the Fed Funds rate from June, we would expect this to sustain the move higher in long term real interest rates and with it the bearish backdrop for gold prices from an interest rate perspective. Only if we witnessed a fresh decline in US real interest rates, most likely triggered by downgrades to US growth, would we abandon our bearish gold price outlook. In this scenario, weaker US growth would most likely trigger a correction in the US equity market and unravel interest rate support for the US dollar.

From an equity perspective, we track the US equity risk premium given its close links to the gold price. The US ERP measures the difference between the expected rate of return on the S&P500 and a risk free interest rate. As the ERP declines so equities become a lower risk-higher return investment, a combination which is typically problematic for gold. Last year witnessed the Great Rotation from fixed income to equities and the subsequent decline in the US ERP. However, given the already significant decline in the ERP it may be prudent to assume that further declines will be harder to achieve. Indeed at 4.7%, the ERP has now fallen below its 2009-2014 average of 6.0%.

Aside from the negative implications of negative growth shocks in the US on the S&P500, our US Equity Research team highlights a potentially more realistic risk scenario next year, namely the danger of a profit recession. A profit recession is defined as two consecutive quarters when S&P EPS is down year on year at the same time real GDP growth is up. They reveal that oil price declines and surges in the US dollar are the typical causes of profit recessions and consequently an environment which could prove problematic for the S&P500 but supportive to the gold price.

From a US dollar standpoint, given our expectation that Fed and ECB policy is set to diverge significantly next year we look for EURUSD to fall to 1.15 by the end of 2015. Over the past six months we find that there has been a strong positive correlation between the gold price and EURUSD. Given our bullish US dollar targets it would imply downside risks for gold at around USD1,075/oz, Figure 3.

Figure 3: EURUSD & the gold price

y = 1117.57 x - 205.76; R-sq = 0.87
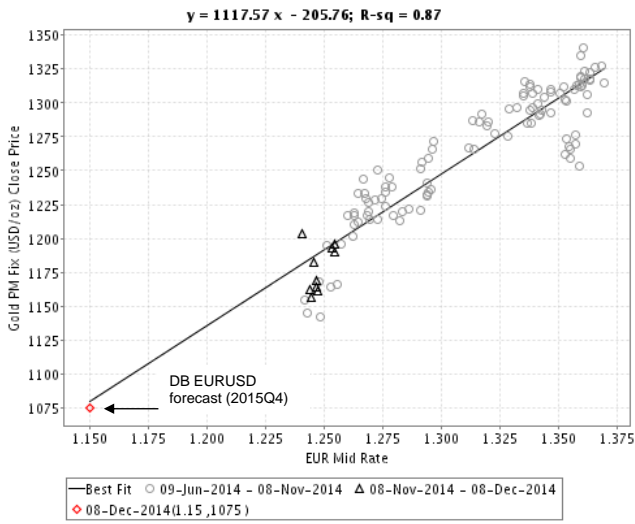
Source: Deutsche Bank

Figure 4: Annual change in global central bank and gold ETF holdings
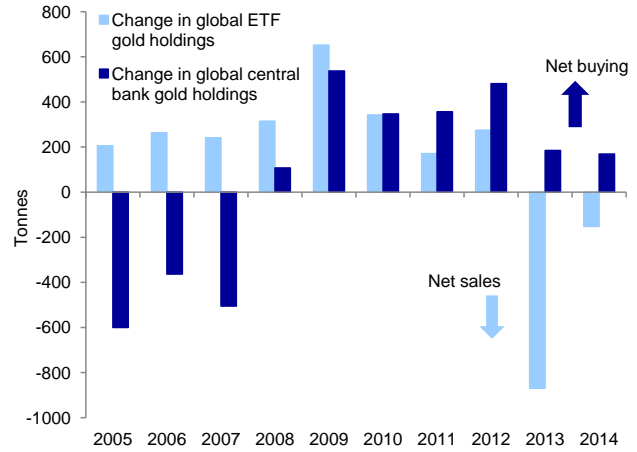
Source: Bloomberg Finance LP, Deutsche Bank

Given the adverse environment for gold from an interest rate, FX and equity perspective, it may therefore be useful to examine whether net gold buying among global central banks will continue and/or whether the liquidation in global ETF holdings has run its course. We find that in the heyday of the gold price rally between 2009 and 2012, public and private sector flows into gold were unambiguously positive, with combined inflows averaging 790 tonnes per annum, Figure 4. However, since then net purchases of gold by global central banks have slowed while there has been a significant liquidation in gold ETF holdings.

While we expect ongoing gold buying by global central banks, we would expect inflows into gold ETFs will be contingent on a decline in US long term real rates, a lower US equity market and a weaker US dollar, none of which we expect on a sustained basis over the coming year. However, one source of inflows into gold ETFs could come as a result of further rounds of QE by global central banks. Indeed outside of the US this seems a high probability event.

Figure 5: Central bank balance sheets by country
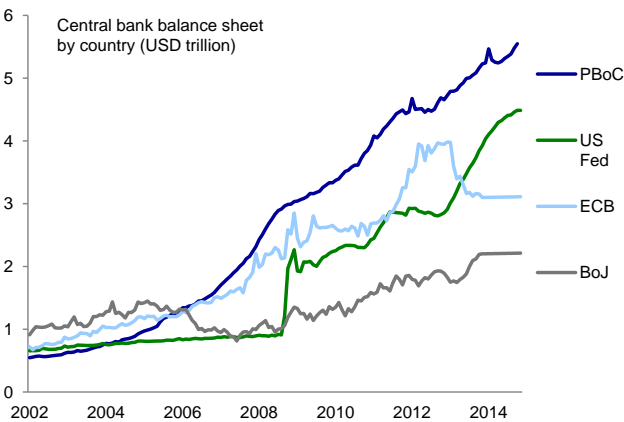
Source: Bloomberg Finance LP

Figure 6: Balance sheet growth & gold price performance
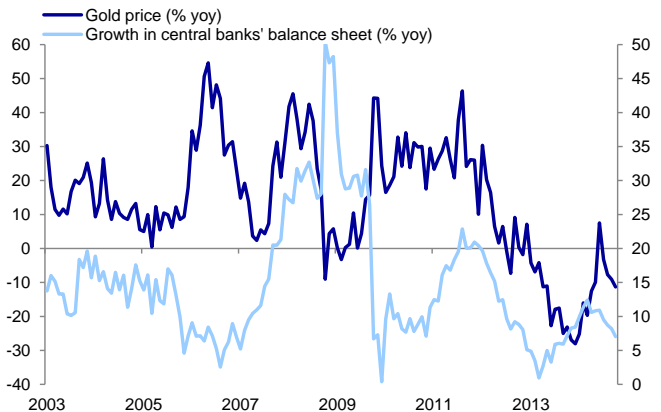
Source: Bloomberg Finance LP, Deutsche Bank

Figure 7: Gold prices are trading rich relative to fair value

Fitted (Log real gold price) = 15.5
-2.7*(Log USDTWI)
-2.2*(World output gap)
+ 0.06*(CB buying)
+ 0.34*(Log M2)

R-Squared = 91%
Sample: Jan 1993 to Feb 2013
All coeff. significant at 1% level

Gold price
Fitted gold price
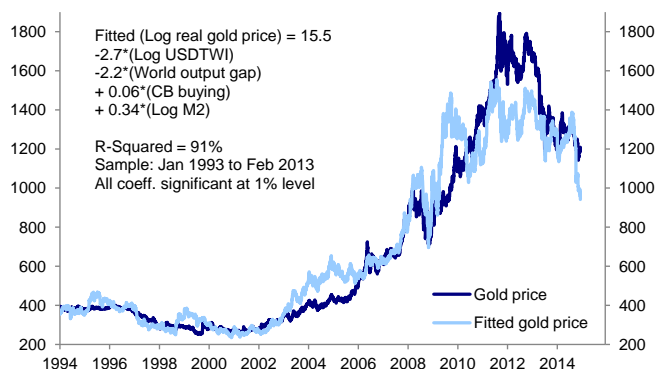
Source: Deutsche Bank

Figure 8: The level of the gold price that represents fair value across a number of indictors

In real terms (PPI)	725
In real terms (CPI)	770
Relative to per capita income	800
Relative to the S&P500	900
Versus copper	1050
Versus crude oil	1165
Average	**906**

Source: Deutsche Bank

While there has been a clear link between successive rounds of QE by the Fed on financial markets and specifically the gold price, it is not clear, in our mind, whether similar action by the other major central banks, in the absence of the Fed, will have such a powerful effect on the gold price. To assess the sensitivity of gold prices to central bank balance sheets we aggregated data for the US, China, Japan and the Euro area. One would expect periods of rapid central bank balance sheet expansion would coincide with gold price appreciation and vice versa.

While we find a loose positive correlation the results are less than convincing, Figure 6. We would therefore view public QE by the ECB as unlikely to have a material effect in boosting the gold price particularly it is accompanied by a strengthening US dollar. A more bullish scenario for gold would be if central bank balance sheet expansion coincided with a correction in the S&P500 perhaps linked to the profit recession risks outlined earlier. However, we would view any upside in gold would be most likely linked to the knock-on effects of a lower S&P500 on the market's expectations towards Fed tightening.

Estimating fair value for gold

At current levels, gold prices can still not be considered cheap or even close to fair value, in our view. According to work conducted by DB's Asset Allocation team which models gold prices relative to the US dollar, world growth, money supply and central bank gold purchases, reveals that the current fair value for gold is close to USD940/oz. Moreover when measured ersus a variety of indicators we find that gold priecs would need to fall towards USD900/oz to bring gold's valuation back towards historical averages, Figure 8.

Conclusion

Heading into next year the analyst community expects gold prices to average approximately USD1,225/oz. Unlike oil price forecasts, analysts have a relatively good track record in terms of predicting gold prices. Indeed since 2001 the analyst community has tended to underestimate the strength in gold prices by an average of 7%. Forecasting errors increased during the 2011-12 overshooting period but have this year reverted back towards more normal levels. In comparison, the analyst forecasting error for crude oil over the same period is 20% a sign that higher volatility commodities tend to exhibit higher forecasting errors.

The track record of analyst price forecasting would suggest it would be wise not to expect a significant divergence from consensus forecasts which are clustered around USD1,200/oz. Even so the possibility that gold prices fall towards USD1,000/oz should not be viewed as extreme in our view since this would bring gold in line with historical valuations. However, we are not adopting such an aggressively bearish view towards gold despite our expectation of higher long term US real interest rates, a powerful strengthening in the US dollar and ongoing advances in the S&P500. Our more cautiously bearish approach to gold reflects considerable uncertainties to the financial and economic outlook next year.

First, the possibility that Fed tightening is delayed from our mid-year lift off date. An ongoing accommodative Fed alongside balance sheet expansion in the Euro area and China could provide strong support for gold prices. Second, DB's Equity Research team reveals that the combination of falling oil prices and a stronger US dollar threaten to deliver a profit recession in the US which is in danger of undermining the outlook for US equities. Third, we expect the trend of global central bank gold buying will continue albeit at a slower clip than recent years.

Figure 9: Tracking gold price forecasting errors among the analyst community
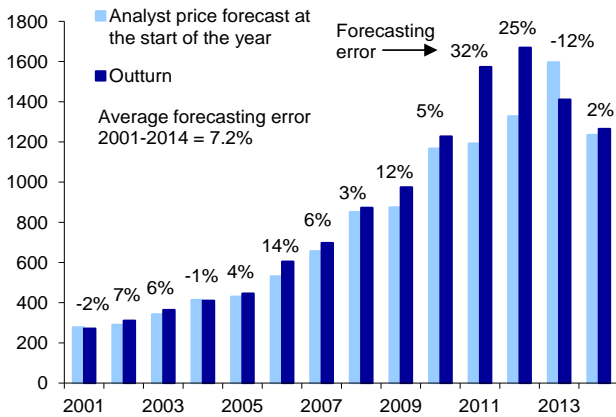
Sources: Deutsche Bank, Reuters

Figure 10: Tracking oil price forecasting errors among the analyst community
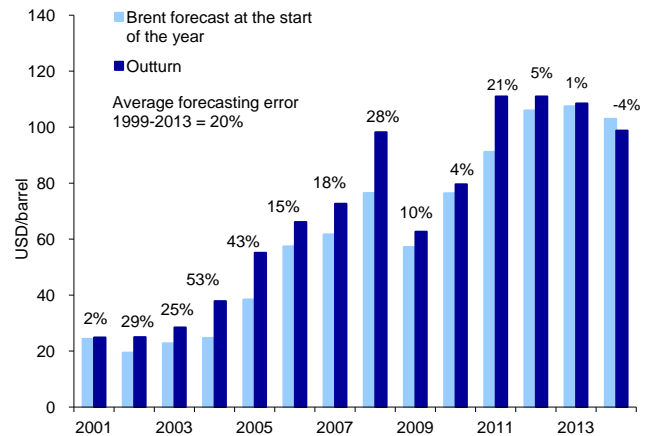
Sources: Deutsche Bank, Reuters

Michael Lewis, (44) 20 754 52166
michael.lewis@db.com

#9 Platinum Group Metals

Breaking Free From Gold

- Despite a five and half month strike which has reduced **platinum** inventories by c.1Moz, the metal has been dragged down by the double whammy of a falling gold price and a weakening South African Rand. Ample liquidity from previous surpluses means that the metal cannot be considered scarce, leading to an under-performance versus gold.

- We think that platinum can eventually re-rate versus gold, and forecast prices to recover from the current lows. But the market does need some help from the producers in cutting 200 – 400koz of unprofitable production. These cuts are unlikely in the near-term as fixed cost recovery is the current and pressing objective, leading to a strong production recovery. However, the current negative free cash flow environment is unsustainable, which will either result in a starvation of capital or a proactive closure of high cost operations. The upcoming February results season will give the market some inkling of likely producer actions.

- We forecast strong platinum demand growth of c5% in 2015E, with a continued recovery in European and Indian Auto sales, and further momentum from the implementation of Euro 6 emission legislation. The South African supply chain is still in recovery mode, resulting in a second year of deficits and a further draw down of inventory. Whilst we may start to see signs of a tighter market in the second half of the year, a further period of sustained deficits is required to draw down inventories to levels that would lead to significant price tension. In the absence of some producer cuts, the platinum market looks more balanced from 2016E onwards.

- The investment case on **palladium** remains far more compelling, with deficits of 800 – 1,000koz likely until the end of the decade, irrespective of South African producer behaviour. In our view, there is sufficient metal in inventories to supply the market until the end of the decade, but as these stocks are drawn down, we continue to forecast rising prices.

- The advent of Euro 6 and an extended period of depressed pricing has been the savior of the **rhodium** market. Improving demand from lean NOx traps to ensure Euro 6 compliance and some reverse substitution away from palladium in standard gasoline Autocats, has lead to a deficit market. Inventories remain high, but as these are drawn down, we expect prices to continue improving.

- Our preferred platinum group metal over the medium term remains Palladium, followed by Rhodium and lastly Platinum. We expect palladium to continue re-rating versus platinum, but given the current Pt: Pd ratio of 1.5 to 1, this may reverse in the near-term.

The strong dollar is a double whammy for platinum

We believe the two main questions that many investors are asking are; "Can platinum ever break free from gold's apron strings?", and secondly, "Can the Rand PGM basket outpace mining inflation?" This seems unlikely in the near-term in our view. The platinum to gold premium peaked at c.USD220/oz, in June 2014, post the five and a half month strike in South Africa. Subsequently however, platinum was sucked down by the gold vortex at the end of September, as the USD strengthened. There was a brief period where platinum traded at parity with gold, and given the metal's under-performance YTD, it is behaving almost like silver, nothing but a high beta gold. Gold has recovered from its lows, and is still up YTD, but platinum has not!

Figure 1: Precious metal performance YTD
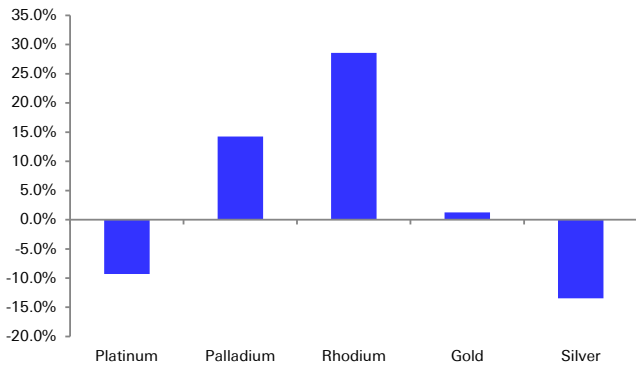
Source: Thomson Reuters Datastream, Deutsche Bank

Figure 2: Platinum – gold spread (USD/oz)
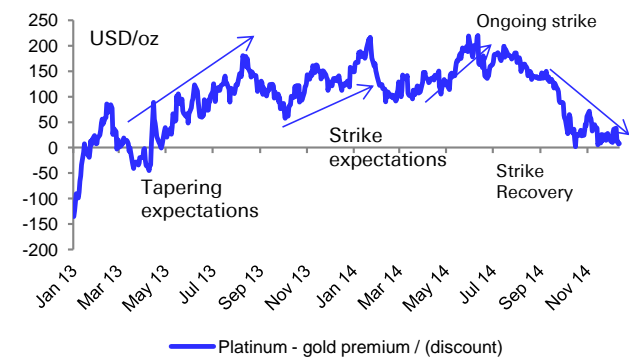
Source: Deutsche Bank, Thomson Reuters Datastream

The strong surge in the USD is a double negative for platinum. Firstly, in the absence of compelling fundamentals, the metal's value is still referenced to that of gold. But secondly, the USD induced weakness in the Rand means that although the USD basket price is back down to the lows, the Rand basket price received by the producers has recovered far more convincingly, suggesting the chance of a producer led supply cut is not imminent. However, if we take look at the upper and lower trendlines on the Rand basket price chart, we see that the increase in the Rand basket price is between 11 – 17% over two years, slightly below the platinum mining inflation rate of c. 8 – 10% p.a., or 20 – 25% over two years.

Figure 3: PGE Rand basket price versus the USD basket price
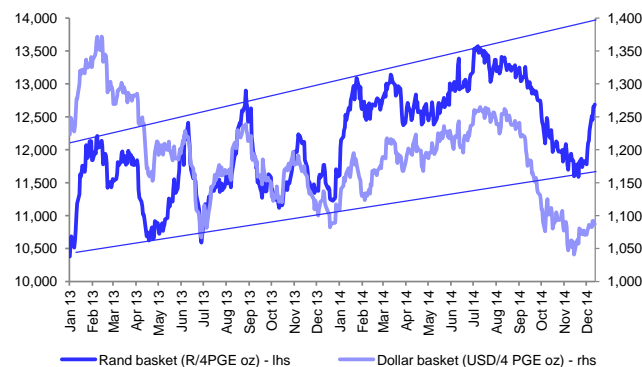
Source Thomson Reuters Datastream, Deutsche Bank

Figure 4: Platinum premium / (discount) to gold on a quarterly basis since 2000
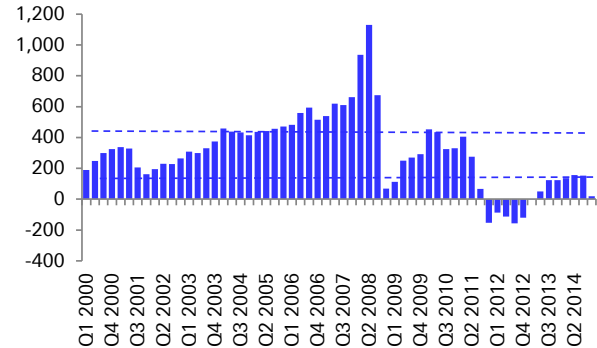
Source: Thomson Reuters Datastream, Deutsche Bank

The average quarterly platinum premium over gold since 2000, up until the global financial crisis has been USD430/oz, but the average since then has been USD140/oz. We think it unlikely that platinum will break out of the USD0 – 200/oz premium over gold in 2015E, but that the probability improves over the 2016 – 2018E time frame. However this view is dependent on a number of factors, not least the collective producer behaviour. We think, the South African producers will ultimately be forced to curtail loss-making production, either by proactive steps or by capital starvation, which will ensure a healthy market over the medium-term. We think any significant cuts are unlikely over the next twelve months, as the producers struggle to generate cashflow in order to meet fixed costs (labour for now) and protect fragile balance sheets. We look at the factors which could drive the platinum premium over gold back to the USD200 – 400/oz range:

- **Demand growth above 3% p.a. for a sustained period.** We think it is unlikely that demand growth will be sustained above 3% until the end of the decade. We estimate demand growth closer to 2%. However, growth rates over the next three years are expected to average above 3%, but simply not for long enough to create sufficient pricing tension in isolation.

- **Producer discipline.** It is unlikely that the South African producers will actively curtail production in the near-term. Generating cash is the main imperative for now. However, we think the current price environment will force cuts, either through proactive steps or by a slow starvation of capital.

- **A peak in recycling ratio's.** The sharp increase in platinum loadings at the beginning of the 2000's up until the middle of the decade is going to manifest itself in a steady increase in volumes being recycled each year until the end of the decade, with an a static recycling ratio which is likely to climb above 50% by the end of the year. These "secondary" ounces will remain a headwind for the sector and compete against primary supply.

- **A depletion of stocks.** The protracted strike in South Africa did reduce inventories, but there is still ample liquidity. On our revised estimates of liquid stocks and forecast deficits', we see liquid stocks being reduced sharply until 2016. However, inventories held in the various ETFs will remain visible and if these are included in the estimate, then there is still ample liquidity in the market. The corollary does however apply that if these inventories are tightly held, then the market will seem a lot tighter.

Modest demand growth until the end of the decade

Platinum demand growth averaged 3.5% between 1997 and 2007, driven by sharply tightening emission legislation in Europe and to a lesser extent, the US. The period 2007 to 2017 was punctuated by the global financial crisis and hence the demand growth CAGR is estimated to be 0.5%. We currently estimate the demand growth CAGR for the period 2010 (post the GFC recovery) and the end of the decade to be almost 1.5% lower the strong demand growth period, of 1997 – 2007 at 2.2%. However, we do expect the period 2013 -2016E to be a period of solid growth averaging 3.3%, and 2015 peaking at 5.3%.

The composition of the demand drivers is also very important in determining the likely price tension. The period of sharply rising prices was during the period of strongly rising Auto demand which is largely price inelastic. During the same period, jewellery demand contracted highlighting the price elasticity of this component. Industrial demand is somewhere in between, because there is the ability to substitute between metals in some industrial applications.

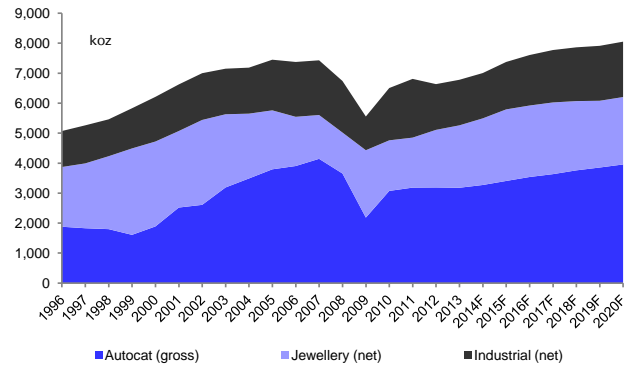*Strong growth over the next three years, but tailing off toward the end of the decade*

Figure 5: Platinum demand growth ex investment
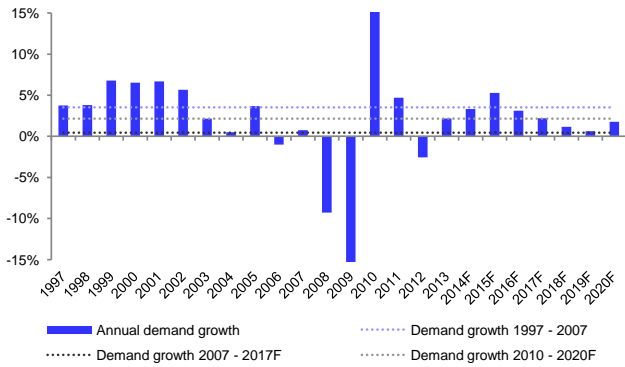
Source: JMAT SFA Oxford, Deutsche Bank

**Figure 6: Demand by broad segment**

Source: JMAT SFA Oxford, Deutsche Bank

Across the broad categories, we expect Auto demand to improve with a continued recovery in the European Auto market in 2015E, and the tentative signs of a recovery in the Indian vehicle market. Platinum demand from the Auto sector has been flat since 2010, and we expect 2014 to be the first year of improving demand. We forecast 3.2% demand growth CAGR or an additional 750koz by the end of the decade.

The main contributors to the additional 750koz of platinum demand is from the ROW segment (+260koz), of which India (50%), Turkey (50%), Thailand (35%) and South Korea (25%) have the largest diesel market share. Although the price difference in diesel and petrol is closing as diesel subsidies are removed, we expect the diesel market share in India to remain relatively robust at 45 - 50%. As emission legislation catches up, and vehicles sales improve over the next few years, we forecast India to be a key driver of platinum demand. A pro-business government and falling oil prices should drive strong vehicle sales growth over the next few years. The contribution from Europe (+200koz) will be realized over the next two years, with a combination of improving vehicle sales and the implementation of Euro VI. Our European Auto team is forecasting 2% sales growth in 2015E, and 3% in 2016E.

Figure 7: Contribution to Auto demand by segment between 2013 and 2020E
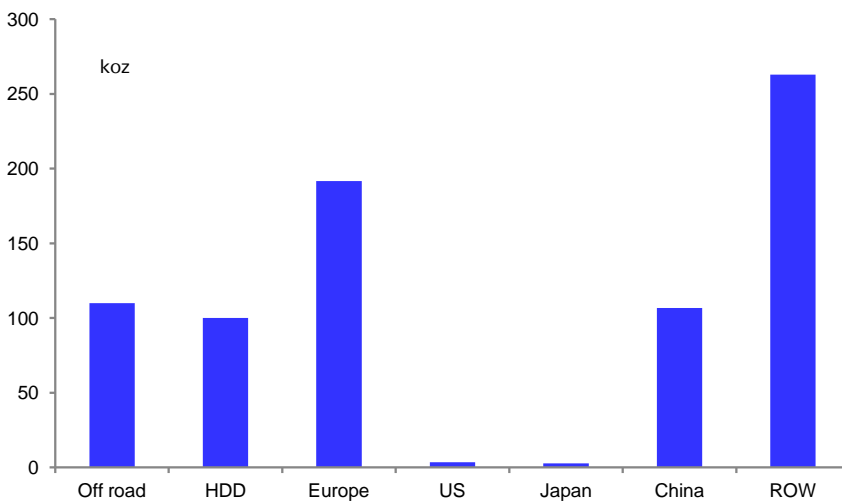
Source: SFA Oxford, Deutsche Bank

Indian growth and a recovery in Europe will drive Auto demand

Off-road applications in the US and Europe, heavy duty diesel, also in the US and Europe, and China (light duty diesel), are each expected to contribute an additional 100koz of demand, whilst the US and Japan light duty diesel are expected to be flat.

The main downside risk to demand in this segment is the bad press which diesel powertrains have had over the past few months. Recent reports in both the UK and France have suggested that diesel particulates lead to many thousands of deaths each year. The fallout has been that London may ban sub-Euro 6 diesel cars and Paris may ban diesel cars altogether. Furthermore, the difference in the cost of a diesel versus a gasoline powertrain means that diesel is continuing to lose market share in the small car segment. Balancing the downside of these recent press reports, is that a Euro 6 compliant diesel engine is as clean as an equivalent petrol engine, and the lower fuel consumption is better for CO_2 emissions.

Modest jewellery demand growth

We continue to forecast growth in the jewellery sector, particularly in China and India, although far more modest (1.1%) than in the Auto sector. The additional ounces required by the end of the decade are expected to be c.260koz on a gross basis, but recycling especially from Japan should reduce the net requirement to c. 170koz.

Figure 8: Platinum jewellery demand by region
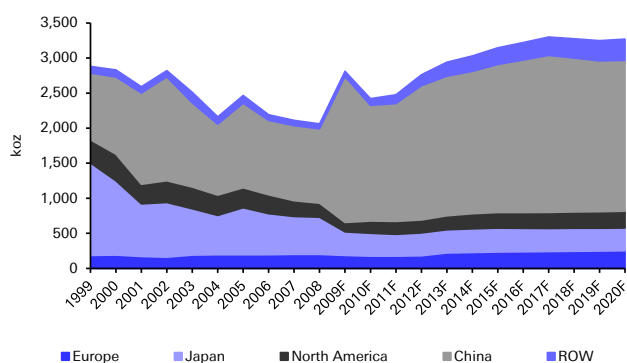
Source: JMAT SFA Oxford, Deutsche Bank

Figure 9: Additional ounces from jewellery demand
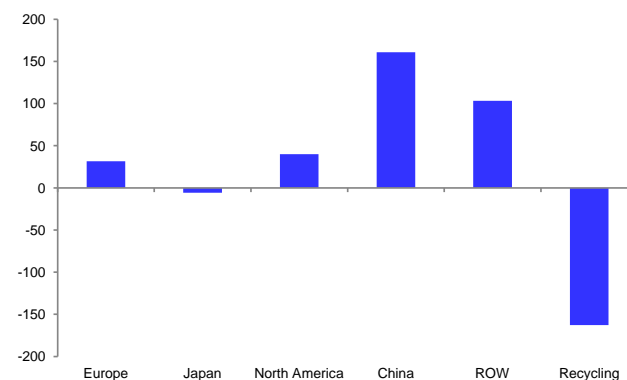
Source: JMAT SFA Oxford, Deutsche Bank

The main risks to our forecast are that China's population is aging and hence the number of marriages would arguably fall too. India is still a relatively immature market and still requires significant investments in marketing to establish the brand. Whilst early indications are positive, if a critical mass is not attained over the next few years, platinum in India could go the way of palladium in China. The withdrawal of significant marketing efforts may result in rapidly declining sales.

Trading on the SGE has been rather subdued in 2014, despite the general price weakness and sharp price falls. This has historically been a signal that Chinese jewellery demand is weak. Channel checks suggest that manufacturer stocking was still up in 2014 YTD, and that all the main retailers have continued to open new stores at a healthy rate. The main reason for the lower trading volumes on the SGE is the better availability of metal generally in China. Metal released from a large maintenance program at Chinese petroleum refineries is currently making its way into the market.

Figure 10: Platinum traded on the SGE (10-day moving average)
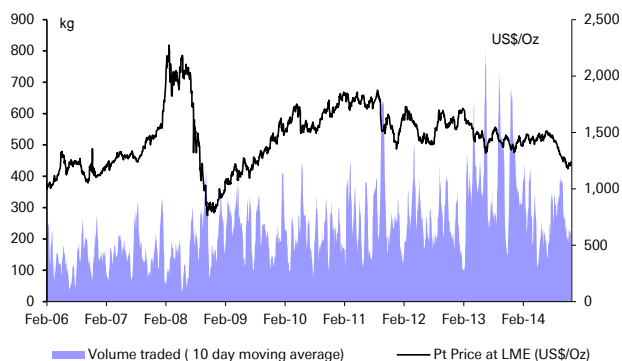
Source: SGE, Thomson Financial datastream, Deutsche Bank

Figure 11: Cumulative trading volumes on the SGE
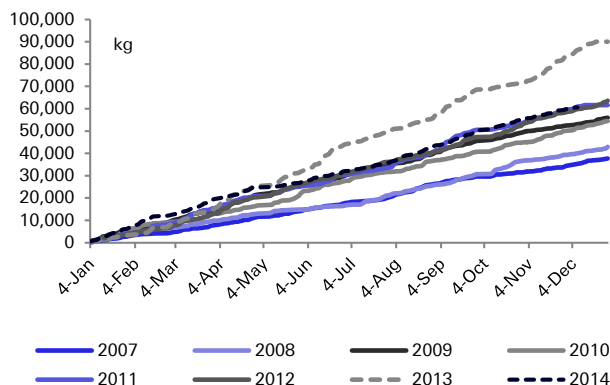
Source: SGE, Thomson Financial datastream, Deutsche Bank

Decent Industrial demand growth

We forecast Industrial demand to grow by a CAGR of 2.8% to the end of the decade, with the main drivers being Fuel cells, both transport and stationary, the Chemical industry (propylene dehydrogenation and paraxylene) and Petroleum. The main risk to the petroleum sector in the near term is the risk of closures to refineries due to over-capacity in the market. As a refinery is closed, metal is sold back to the market. An estimated 300koz of metal could come back to the market from Europe. Although we expect this capacity would be partially offset by growth in the other regions, the sudden release of metal could be disruptive over the short term.

Figure 12: Contribution to Industrial demand by segment between 2013 and 2020E
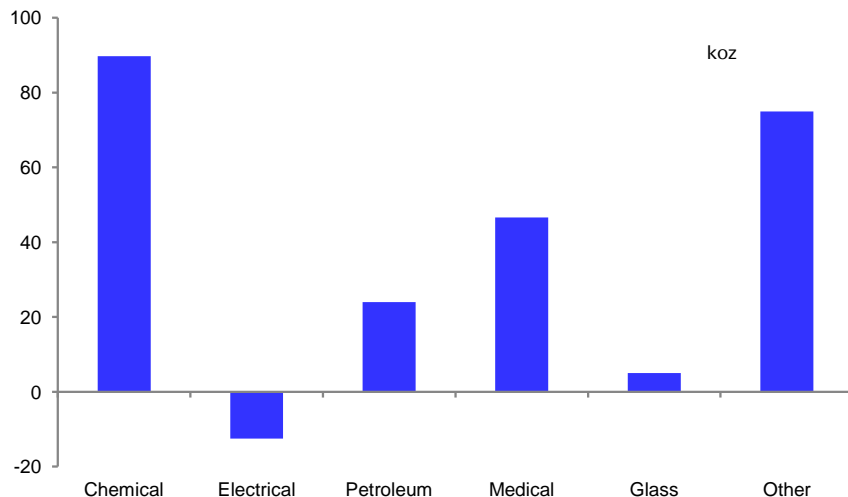
Source: SFA Oxford, Deutsche Bank

Chemical plants, oxygen sensors, and stationary fuel cells will be the main drivers of additional demand

Cutting capacity is hard to do

In our assessment of the market, the South African producers have to cut between 200 – 400koz of high cost platinum ounces in order to ensure a tight market, or at least tight enough to draw down the liquid stocks. In the short-term, this is unlikely however. Post the crippling strike, the South African producers have been trying to ramp up production to "normal" levels. The

producers are in a difficult position, with a full complement of workers, low absenteeism but sub-optimal production, which is having a detrimental impact on cashflows. There is a short-term imperative to generate cash given the weakened balance sheets. Amplats and Lonmin have been relatively successful in the ramp-up, with Impala hampered by safety stoppages. Most of the producers are undergoing strategic reviews, which we think will result in capacity rationalization, given the poor profitability of many of the UG2 areas. However the outcome and timing of these strategic reviews is still uncertain. There is however a high probability of further strike action should mass retrenchments be an outcome of the strategic reviews.

(a)   Producers are still incentivised to produce at a loss to cover fixed costs
Part of the reason prices have persisted below the total cost of production is because of inelastic (price insensitive) short-term supply. At current spot, producers are still incentivised to produce in the short-term. Figure 13 shows costs that are immediately avoidable by ceasing production (using "cash on mine costs" as a proxy). Figure 14 also shows "total cash costs and capex" and average revenue. There is a significant portion of industry production where revenue exceeds short-term costs but not total costs.

Figure 13: Industry short term and long term cost-curves
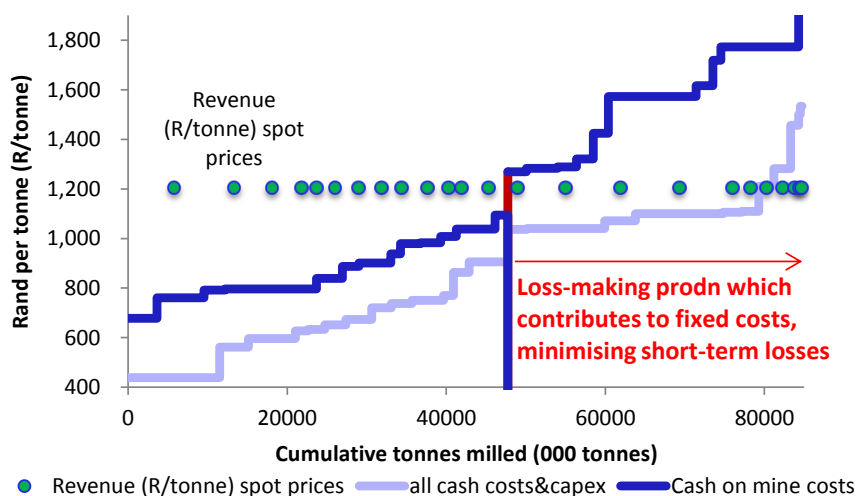
Source: Deutsche Bank, Company Data, DataStream

The rational short term decision, faced with the above cost curve, is to continue to produce to minimise losses. However, we do view PGM prices as "low" relative to the total cost of production. Current PGM prices are below estimated total cash costs and capex for 2015, below where producers can earn a "normal" profit and, it follows, below incentive price. If these spot prices were expected to persist, we would expect a supply reaction. If production is curtailed in the short-term, fixed costs are merely spread over fewer ounces and it is unlikely to be a cash-positive decision until fixed costs can be reduced proportionately (the long-term).

Cost curves (excluding tax, interest and other non-operational items) for "cash costs plus all capex" and "cash costs plus SIB capex" are shown in Figure 14 and Figure 15 respectively, along with revenue "dots".

Figure 14: 2015e: cash costs plus all capex, and revenue by company under current spot (dots)
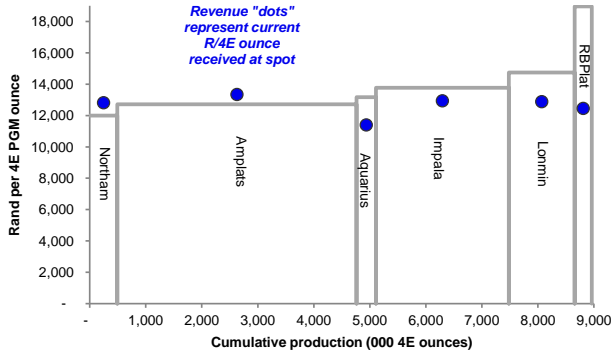
Source: Deutsche Bank, Company Data, DataStream

Figure 15: 2015e: cash costs + SIB capex, and revenue by company under current spot (dots)
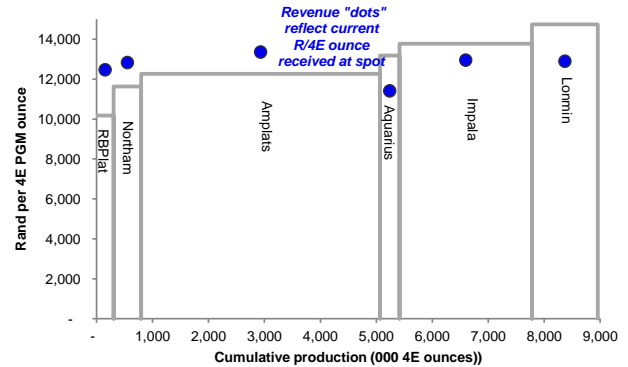
Source: Deutsche Bank, Company Data, DataStream

We estimate the South African PGM industry is generating negative free cashflow under the current spot pricing environment in 2015. This is unsustainable and will compel the producers to act in our view. The process will either be a slow degradation of the asset base by a starvation of capital, or it will be through a more proactive curtailment of production.

Our free cash flow forecasts under spot prices (for financial years), are shown below. When running spot-prices through our models, we also make assumptions around the levels of capex spent by the producers, given balance sheet constraints. The supply constraint is more likely to come via capital constraint than active closures.

Figure 16: Free cash flow under spot prices for financial years
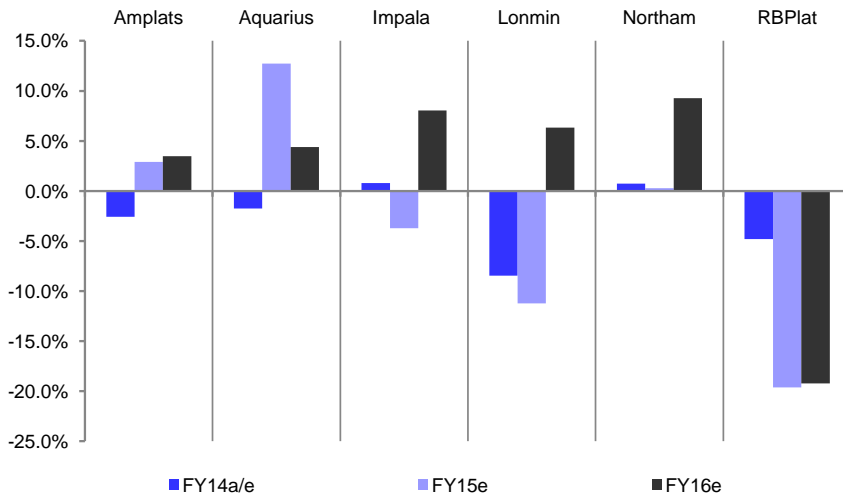
Source: Deutsche Bank, Company Data, DataStream

The individual producers' positions under spot

We believe Amplats can sustain positive free cash flow without thrifting on capex plans. Aquarius has a large cash injection in FY15e as it receives US$27m (pre-tax) on the sale of prospecting rights, which allows it to re-invest at Mimosa, which we believes allows the company to remain FCF-positive into FY16e.

Impala turns FCF-positive in FY16e under spot, in our view, however this is at the expense of further capex spend on the 17-shaft project and the Afplats/Leeuwkop project. This could impair its future production profile. 17-shaft is expected to produce 180kozpa at steady-state and to begin production in 2020. If other shafts at the Lease Area (such as 20-shaft which may be targeted for optimization from 1.7Mtpa to 1.9Mtpa) cannot pick-up the slack of any further delays, the target of 850kozpa at the Lease Area will not be achievable under this scenario. There is also a possibility of shaft closures or production cuts from specific levels should spot persist, which could be announced at the February 2015 interim results as part of the outcome of the company's strategic review, although this is not our base-case scenario.

Lonmin are aiming to spend what the company can afford on its new, large K4 shaft. Although formally targeted for ramp-up in 2017 to replace shafts at Marikana running out (the Eastern declines and Newman), Lonmin has stated that it will begin moving excess labour from other shafts to K4 in 2015, if possible. The FY16e positive cash flow forecasts assumes K4 is deferred, putting Lonmin's 750kozpa production profile at risk. Lonmin would also be likely to close its high-cost Hossy shaft (currently 100ktpm) should spot-prices persist for another 12-months or so, unless operational management were able to produce significant cost-savings.

Northam are well positioned to generate positive cash flow in FY16, however the accumulating preference shares of R6.6bn will have introduced significant non-cash interest charges and a huge liability into its capital structure. The prefs become due in 10 years time (about R22bn falls due in 10 years time - relative to the current market cap of about R14bn, if we assume static interest rates and no pre-payments). This would significantly hamstring the company's balance sheet and make further investment extremely difficult, in our view.

RBPlat heads into peak capex on its Styldrift project in the next two years and should be focused on this project's delivery during this time.

Thus, at current spot prices, we think that projects (17-shaft, Leeuwkop and K4 specifically) are starved of capex, which could impair Lonmin and Impala's ability to reach current targeted levels of production. Northam could find itself unable to spend more than bare capex at spot, given its preference share liability. All of the producers are focusing on cost-reductions in the current price environment. This can hamper flexibility and lead to production disruptions as a result of under-investment, in our view, the longer it persists.

We outline our forecasts for the recovery in South African PGM production, post the strikes. Our forecasts include an allowance for 100 – 300koz of curtailments and 200koz of disruption in platinum as a result of our expectation of supplier cuts. In platinum, the new "normal" is around the 4Moz level, but we only forecast South African supply to get there by 2017F. However, from a market balance perspective, this should be an equilibrium level. We do not expect the market to be able to accept more mined supply as the supply of recycled ounces increases toward the end of the decade. We expect a similar profile in palladium, where production will recover to c.2.3Moz by 2016F, gradually increasing to c.2.6Moz by the end of the decade.
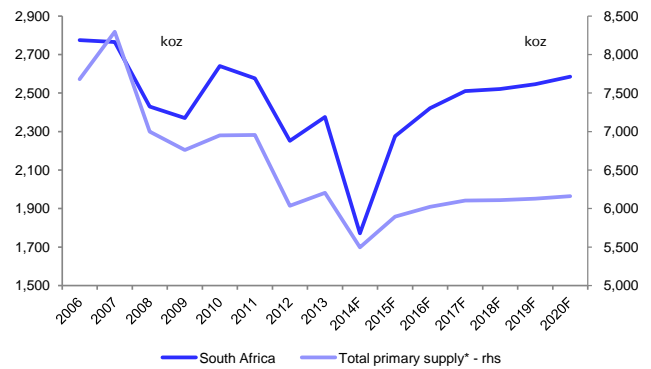
Figure 17: Primary platinum supply
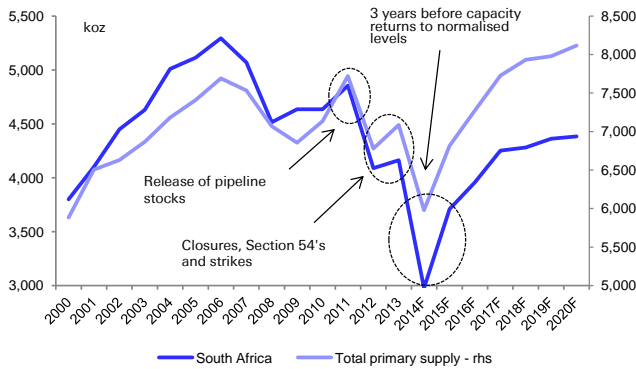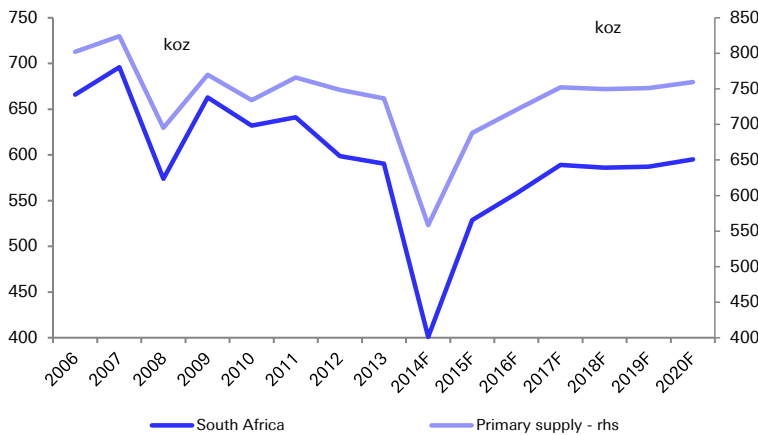

Source: Deutsche Bank

Figure 18: Primary palladium supply

Source: Deutsche Bank, *includes Russian stockpile sales

In Rhodium, we forecast the new "normal" South African output to be around 580 – 600koz, with a return to the 560 – 570koz level in 2016F.

Figure 19 Rhodium supply recovery post the South African strikes
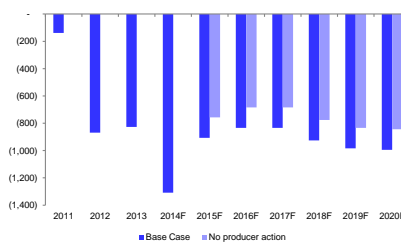

Source: Deutsche Bank

As the platinum and rhodium markets are the most finely balanced, and therefore the impact will be the most pronounced should the producers not cut some excess capacity out of the market. There would be very little impact on the palladium market however. We outline our estimates of surpluses and deficits in the absence of any producer discipline.

Figure 20: Platinum S&D model
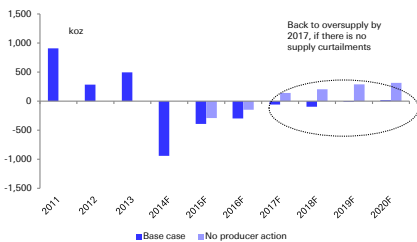
Source: SFA Oxford, Deutsche Bank

Figure 21: Palladium S&D model

Source: SFA Oxford, Deutsche Bank

Figure 22: Rhodium S&D model
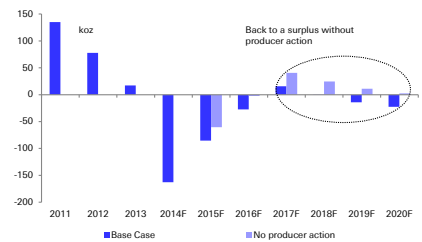
Source: SFA Oxford, Deutsche Bank

Strong recycling growth from 2015E onwards

We forecast strong Autocat recycling volumes from 2015E onwards. There was a big step up in Autocat consumption in 2001, and again in 2003 due to the tightening of emission legislation. If we assume that the average car life is 12- 14 years, then the market is due for significant additional volumes of recycled platinum from the Auto sector. We estimate an additional 910koz of platinum from 2013 until the end of the decade. The sharp increase in loadings 12 – 14 years ago should result in a steadily increasing static recycling ratio from 39% in 2013 to 55% by the end of the decade. This implies that over half of the Autocat demand will be supplied by recycled material. We expect the dynamic recycling ratio (-12Y) to be constant at just under, or at 50% for the next five years. A risk factor for 2015 is that the price volatility at the end of 2014 may have resulted in recycled metal being held back and only making its way into the market in 2015. This would be a repeat of the pattern in 2009 and 2012.

Figure 23: Additional Autocat recycling volumes
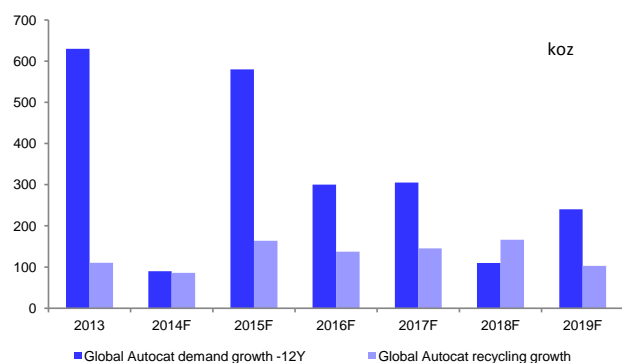
Source: SGE, Thomson Financial datastream, Deutsche Bank

Figure 24: Static and dynamic recycling ratios
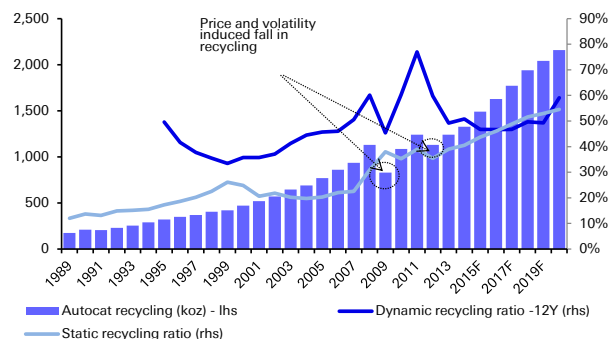
Source: SGE, Thomson Financial datastream, Deutsche Bank

Will the real stock level please stand up?

The main reason PGM prices have not been higher post the protracted strike at the beginning of the year has been due to ample above ground stocks and liquidity in the market. We have once again reviewed our above ground stock data, focusing on both short-term liquid stocks and long-term stocks. We define liquid stocks as producer, consumer, investor and ETF holdings, and exclude closed loop working inventory in our estimates. Long-term stocks include closed loop working inventory, which will only come to market if there is a technology change, or there are facility closures as in a petroleum refinery. We estimate that there are currently 2.1Moz of liquid platinum stocks excluding ETF holdings, 6.9Moz of liquid palladium stocks, and 275koz of liquid rhodium stocks. In platinum, we estimate that these stocks will be drawn down to low levels by 2017E, but would point out that including ETF holdings, which we assume to be "sticky", overall liquid stocks remain relatively flat until the end of the decade. It therefore depends on the behaviour of ETF holders on whether there will be any pricing tension in the market. Days of supply remain relatively constant at 200 until the end of the decade on our forecasts. Palladium stocks start at a much higher level, but the rate of drawdown is much more rapid. We expect the tightness in the market to emerge around 2018E. On our current supply – demand forecasts, we expect the liquid stocks in Rhodium to be depleted by 2020E, which should result in a sharp increase in prices. However, the uptick in ETC holdings results in overall liquid inventories being well above the period 2006 – 2008 when Rhodium spiked to USD10,000/oz. As with platinum, it will depend on how sticky ETC
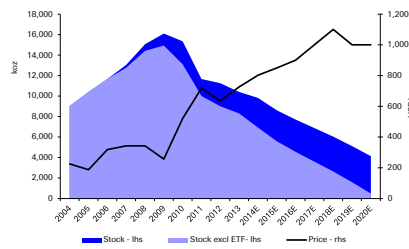
holdings are as to whether metal will be available. Long-term stocks including working inventory is much higher for each of the PGM's. The progression of these stocks highlight why our preference remains palladium and Rhodium over Platinum, with Platinum stocks staying roughly constant at 10,000koz until the end of the decade.
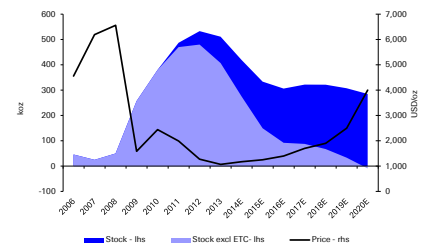
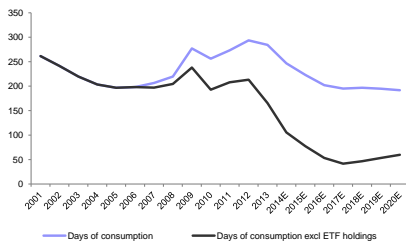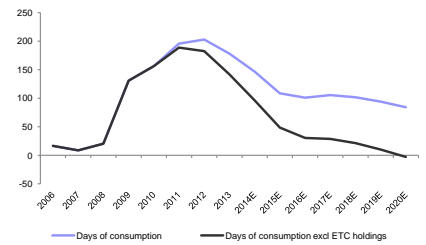| Figure 25: Platinum liquid stocks	Figure 26: Palladium liquid stocks	Figure 27: Rhodium liquid stocks
Source: SFA Oxford, Deutsche Bank	*Source: SFA Oxford, Deutsche Bank*	*Source: SFA Oxford, Deutsche Bank*
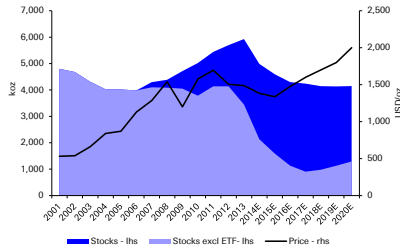
Figure 28: Platinum days of supply	Figure 29: Palladium days of supply	Figure 30: Rhodium days of supply
Source: SFA Oxford, Deutsche Bank	*Source: SFA Oxford, Deutsche Bank*	*Source: SFA Oxford, Deutsche Bank*
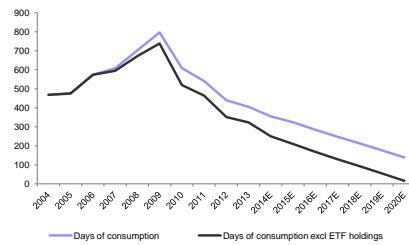
| Figure 31: Platinum Long-term stocks	Figure 32: Palladium long-term stocks	Figure 33: Rhodium long-term stocks
Source: SFA Oxford, Deutsche Bank	*Source: SFA Oxford, Deutsche Bank*	*Source: SFA Oxford, Deutsche Bank*
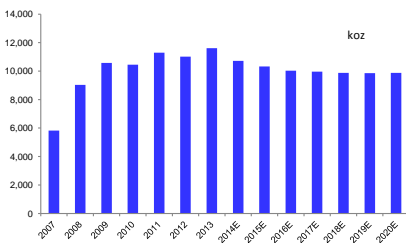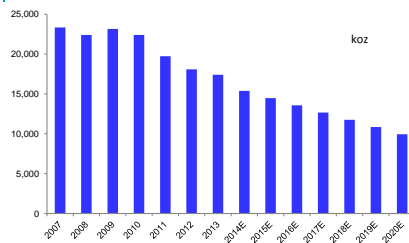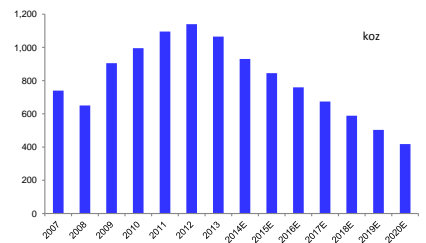
Part of the inventory balance was made up of relatively high inventory balances at the producers going into 2014, as is shown in Figure 33.

Figure 34: The three major producers had higher than normal stock going into 2014 and are still relatively well stocked
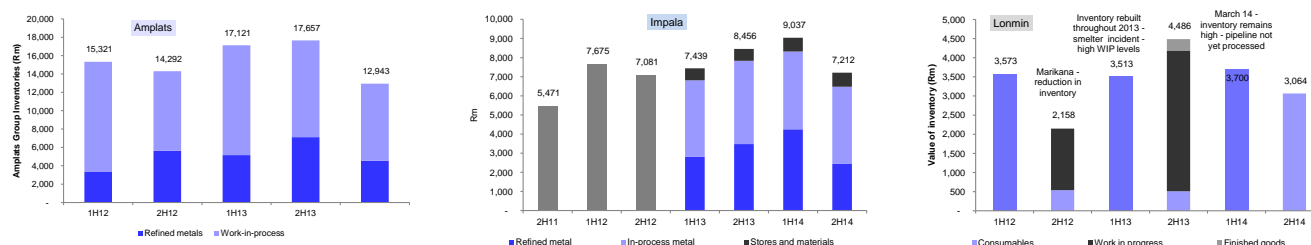

Source: Deutsche Bank, Company Data

Physical indicators give mixed signals; investors take a divergent view on platinum and palladium

On the face of it, the resurgence in platinum and palladium sponge premiums would suggest that the physical market is still tight post the recovery in South African supply. However, we have seen industrial consumers enter the market when the ingot price has seen a strong correction. We view this as more of a counter cyclical indicator. However, it does show that there is demand, but that Industrial buyers have become far more savvy in their buying behaviour, now only buying on the dips.

Figure 35: US sponge vs Zurich ingot switch (USD/oz)
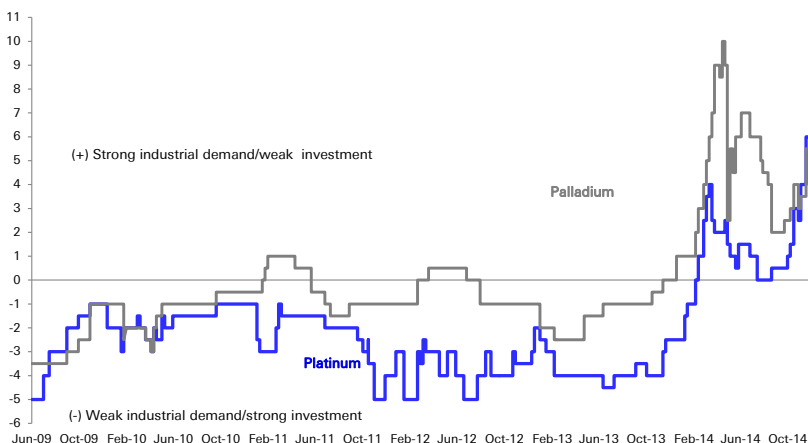

Source: Mitsubishi Corp (USA), Deutsche Bank

The tightness in both platinum and palladium sponge has increased once more with a brief rally in sponge premiums

The contrast in "non commercial" positioning on the Nymex between platinum and palladium is indicative of the sentiment towards these two metals. Net long positions in platinum have fallen sharply since mid August (down 50%), with positions close to the lows seen in 2012. The reduction in net longs has been due to a significant build up of short positions. The South African producers reporting a solid production ramp-up post the strikes and the down-draught from gold have continued to be headwinds. The net long position in palladium has also been falling, but remains at an elevated level. The net long position in platinum is at 50% of the previous peak, whilst the net long position in palladium is now at 75% of the previous peak.
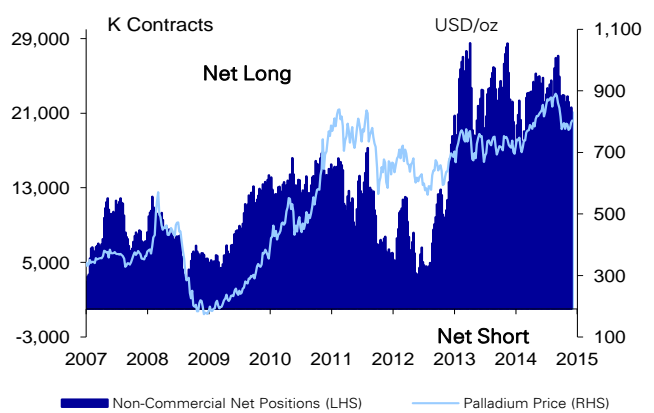
Figure 36: Non commercial net positions on the Nymex - platinum
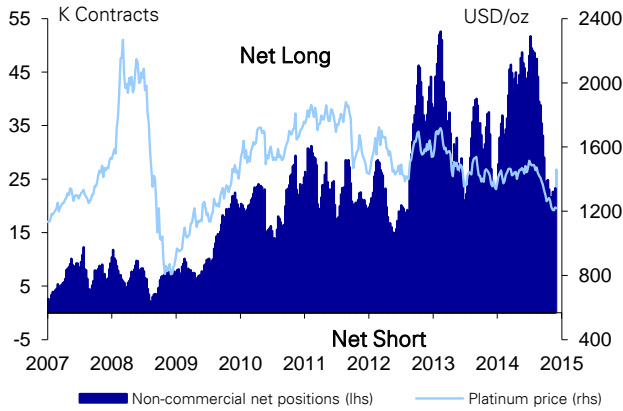
*Source: CFTC, Reuters, Deutsche Bank*

Figure 37: Non commercial net positions on the Nymex - palladium


Source: CFTC, Reuters, Deutsche Bank

The outflows from the various ETF's also highlight the investor preference for palladium over platinum, as the palladium holdings have been quite "sticky". Since the price correction in August there have been steady outflows from the platinum ETFs, whilst there have been some renewed inflows into the palladium ETF's. The combined platinum ETF holding have seen outflows of c.240koz and palladium a mere 45koz since the peak. These outflows have been widespread, with the exception of the South African ETFs, which have continued to attract metal into the ETF. Rhodium holdings in the Deutsche Bank ETC have also seen some investor fatigue, with outflows of 23koz since the peak at the end of August.

Figure 38: Total platinum ETF holdings
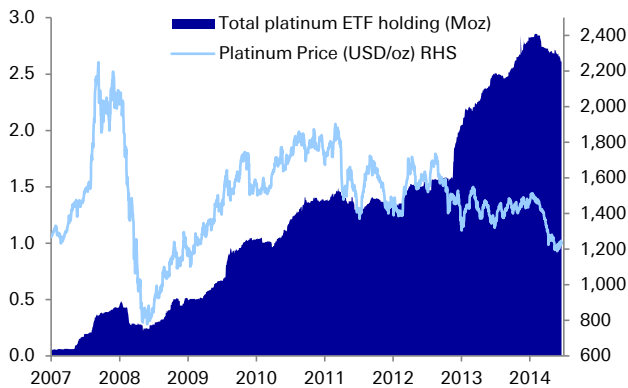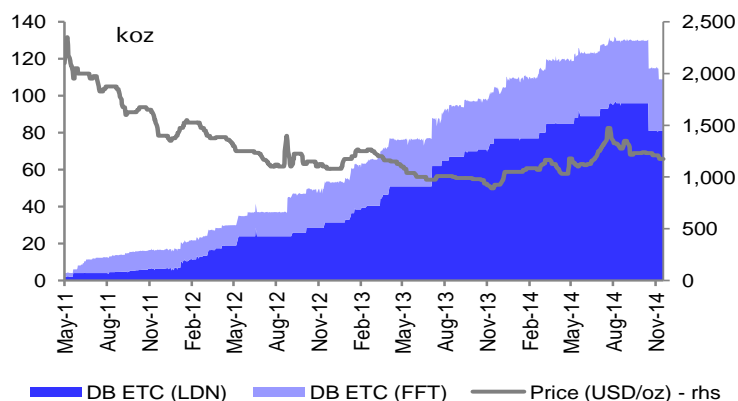

Source: Bloomberg Finance LP, Deutsche Bank

Figure 39: Total palladium ETF holdings
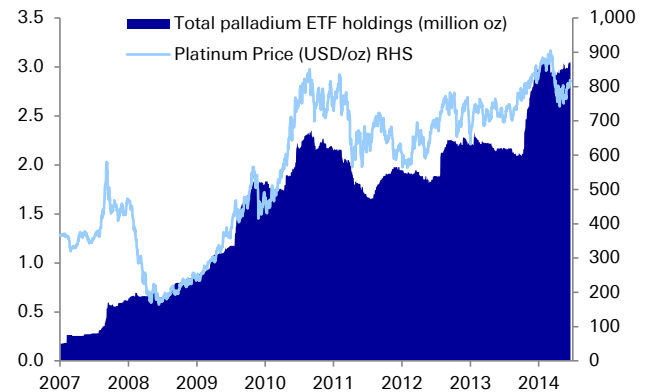
Source: Bloomberg Finance LP, Deutsche Bank

Figure 40: Deutsche Bank ETC Rhodium holdings

Source: Bloomberg Finance LP, Deutsche Bank

Figure 41: Platinum supply – demand balance

| Platinum		2010	2011	2012	2013	2014F	2015F	2016F	2017F	2018F	2019F	2020F
South African supply	Koz	4,635	4,855	4,205	4,353	2,992	3,776	3,913	4,185	4,061	4,088	4,130
North American supply	Koz	200	350	310	340	378	360	360	345	350	350	350
Russian production	Koz	825	835	800	740	760	760	760	760	760	760	760
Zimbabwe	Koz	280	340	365	402	403	402	448	448	448	448	448
Other	Koz	110	100	110	200	205	195	200	205	210	215	220
Autocat recycling	Koz	1,085	1,240	1,130	1,240	1,326	1,490	1,627	1,773	1,939	2,042	2,159
Total supply	Koz	7,135	7,720	6,920	7,276	6,064	6,983	7,308	7,715	7,768	7,903	8,066
Supply growth	%	4.1	8.2	-10.4	5.1	-16.7	15.2	4.6	5.6	0.7	1.7	2.1
Total demand	Koz	7,160	7,270	7,090	7,610	7,380	7,525	7,766	7,943	7,693	7,753	7,902
Demand growth	%	15.2	1.5	-2.5	7.3	-3.0	2.0	3.2	2.3	-3.1	0.8	1.9
Autocatalyst	Koz	3,075	3,185	3,190	3,180	3,273	3,407	3,539	3,634	3,760	3,855	3,957
Chemical	Koz	440	470	505	585	650	655	644	652	659	666	675
Electrical	Koz	220	220	180	170	175	180	180	179	175	168	158
Glass	Koz	385	555	160	190	100	155	235	195	195	195	195
Investment	Koz	655	460	455	830	375	150	160	170	-170	-160	-150
Jewellery	Koz	1,685	1,665	1,920	2,080	2,221	2,385	2,382	2,390	2,309	2,225	2,247
Medical & Biomedical	Koz	230	230	235	240	247	253	260	266	273	280	287
Petroleum	Koz	170	210	180	170	175	180	185	196	192	193	194
Other	Koz	300	275	265	165	165	160	180	260	300	330	340
Market balance	Koz	-25	450	-170	-334	-1,316	-542	-458	-228	75	150	164
Annual average price	US$/oz	1612	1721	1553	1487	1384	1338	1475	1600	1700	1800	2000
Market balance excl. investment demand		630	910	285	496	-941	-392	-298	-58	-95	-10	14

Source: Johnson Matthey, SFA oxford, Deutsche Bank

Palladium: How Will The Deficits Be Filled?

…Industrial demand destruction, recycling and inventories

In contrast to platinum, the main question that investors have, "Is how long can the market tolerate annual deficits of 800 – 1000koz?" Our view is that higher prices will lead to demand destruction in the industrial applications, especially electrical and electronic applications, as base metals take market share in these applications. Recycling of Autocat metal will increase as the cars being scrapped over the next few years through improved collection and recovery efficiencies. Ultimately however, the deficits will have to be filled from liquid stocks, which are currently still at reasonable levels. However, once these are depleted, or reach critical levels, we expect higher palladium prices to drive substitution back into platinum. However, we only expect this towards the end of the decade, should the platinum market remain in fairly balanced.

The increase in demand for palladium will be driven by Auto demand, and in particular China. This will be an increase in vehicle sales and increasing emission legislation. The recent drop in the oil price, is likely to skew demand back to the larger engine light trucks in North America, which will drive palladium demand in tandem with tighter emission legislation. The continued substitution of palladium in diesel autocats is a factor in the increasing demand in Europe.

Figure 42: Palladium Autocat demand
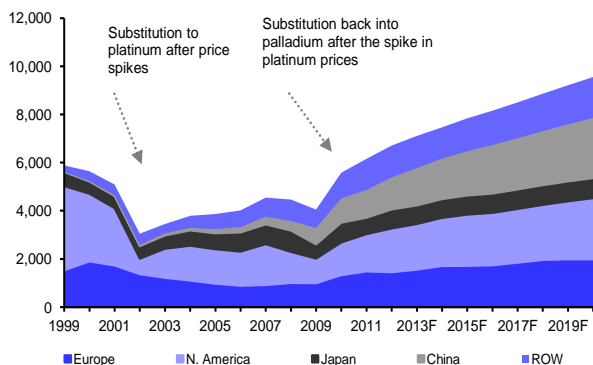
Source: JMAT, SFA Oxford, Deutsche Bank

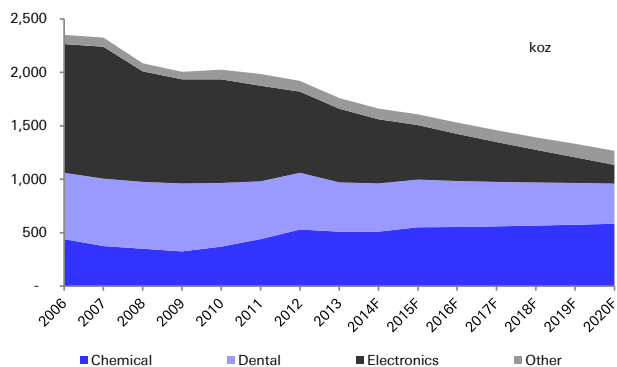Figure 43: Additional ounces by region from 2013 to 2020E
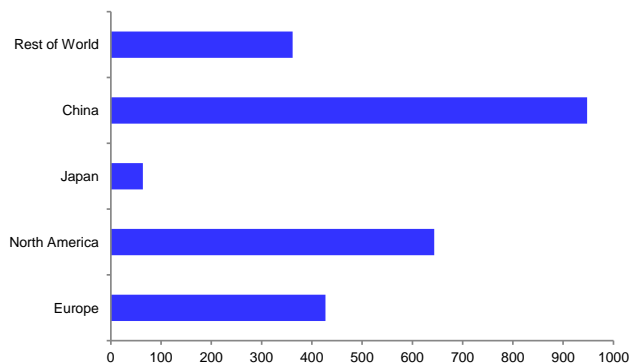
Source: JMAT, SFA Oxford, Deutsche Bank

In contrast to Autocat demand, we see Industrial demand declining over the next few years, especially in the electronics sector. It is only military grade electronics that is likely to retain palladium in the manufacturing process. We forecast a decline in Dental applications too, but recognize that there could be further demand destruction of c.350koz by the end of the decade, depending on pricing.
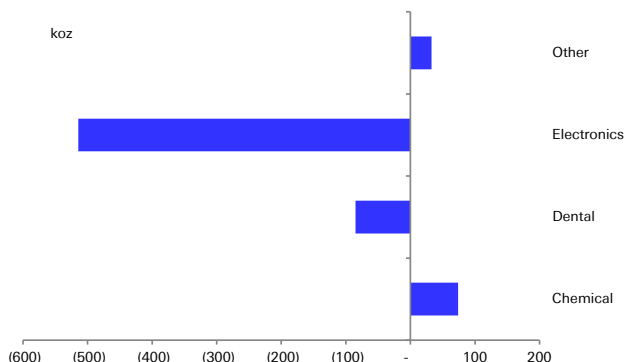
Figure 44: Palladium Industrial demand

Source: JMAT, SFA Oxford, Deutsche Bank

Figure 45: Additional / (less) ounces by application from 2013 to 2020E

Source: JMAT, SFA Oxford, Deutsche Bank

We continue to forecast recycling volumes from autocats to continue increasing, with an additional 1Moz being recycled p.a. by 2020E. However, in contrast to platinum, the loadings in palladium fell sharply in 2003, post the price spike at the beginning of the decade. This gives rise to the sharp increase in the dynamic recycling ratio from a low 30% to low 60%. All things being equal, this would suggest some downside risks to the volumes being returned. However, the static recycling ratio is still very low at 30%. This ratio will improve as collection and recovery efficiencies improve in our view.

Given our forecast of deficits until the end of the decade, liquid stocks will continually be depleted. The absolute level is high at roughly one year including ETF stocks, but these will decline to four months by the end of the decade. There is no imminent shortage of metal, but depending on the behaviour of ETF holders, the tightness may well become apparent well before the end of the decade. A near-term risk is potential the stocks held by the Russian central bank. Norilsk has already signaled its intention to buy these stocks, estimated at 2Moz. If cashflows became tight, Norilsk may use these stocks to generate cash which would be an overhang on the market. However, the weak Russian Ruble does provide Norilsk with a natural hedge should other commodities such as copper and nickel weaken significantly (not our base case), and we would expect them to behave rationally in selling these stocks to the market.

Figure 46: Palladium liquid stocks
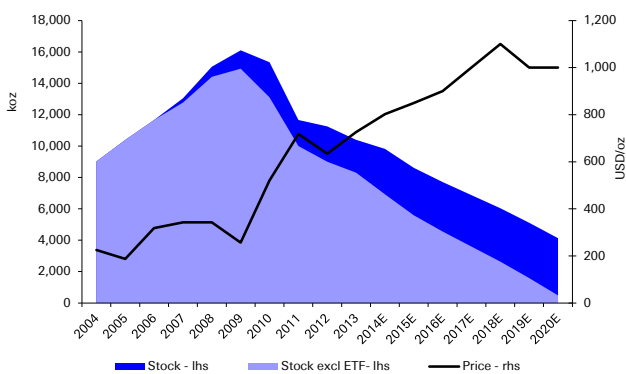
Source:SFA Oxford, Deutsche Bank

Figure 47: Palladium days of supply of liquid inventories
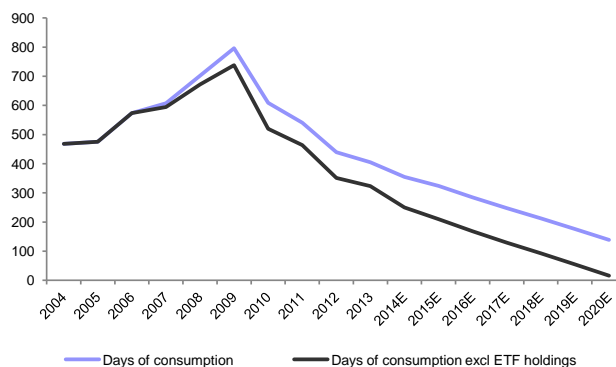

Source: SFA Oxford, Deutsche Bank

All three of the platinum group metals can be substituted for one another. Currently the substitution between platinum and palladium is all in palladium's favour. A price ratio closer to 1.2x or even parity would likely see the direction of this substitution. This would imply a price of both metals closer to USD1,200/oz, with platinum only maintaining a USD100/oz premium over gold. Given the size of the palladium stocks, we think price parity between platinum and palladium is unlikely until the end of the decade, but we certainly see the ratio continuing to narrow.

Figure 48 Palladium – Platinum ratio
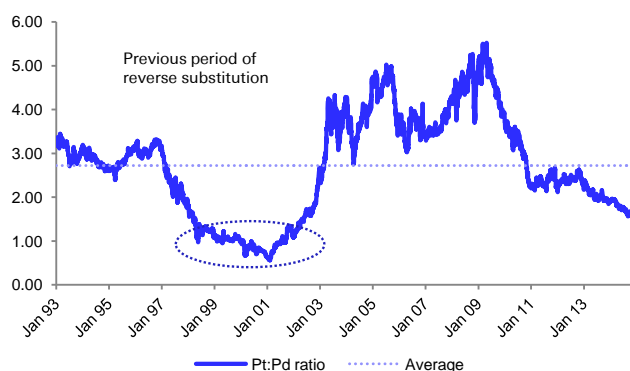
Source: Thomson Reuters Datastream, Deutsche Bank

Figure 49: Palladium supply – demand balance

| Palladium		2010	2011	2012	2013	2014F	2015F	2016F	2017F	2018F	2019F	2020F
South African supply	koz	2,640	2,576	2,251	2,376	1,771	2,276	2,421	2,511	2,521	2,546	2,585
North American supply	koz	590	900	895	928	976	969	951	944	938	931	924
Zimbabwe	koz	220	265	265	331	279	332	342	342	342	342	342
Russian production	koz	2,720	2,705	2,630	2,650	2,650	2,650	2,650	2,650	2,650	2,650	2,650
Russian stockdraw	koz	1,000	775	260	250	100	0	0	0	0	0	0
Russian sales	koz	3,720	3,480	2,890	2,900	2,750	2,650	2,650	2,650	2,650	2,650	2,650
Other mine	koz	185	155	300	200	400	400	400	400	400	400	400
Secondary Supply		1,315	1,695	1,670	1,792	1,926	2,044	2,172	2,314	2,470	2,643	2,837
Total supply	koz	8,670	9,071	8,271	8,528	8,102	8,670	8,937	9,161	9,321	9,513	9,738
Supply growth	%	7.5	4.6	-8.8	3.1	-5.0	7.0	3.1	2.5	1.7	2.1	2.4
Total demand	koz	9,195	7,870	9,350	9,379	10,111	9,707	9,899	10,121	10,371	10,619	10,853
Demand growth	%	24.5	-14.4	18.8	0.3	7.8	-4.0	2.0	2.2	2.5	2.4	2.2
Autocatalyst	koz	5,580	6,155	6,705	7,104	7,460	7,834	8,151	8,496	8,857	9,207	9,548
Dental	koz	595	540	530	460	450	445	430	415	403	390	375
Electronics	koz	970	895	760	690	601	511	441	373	306	241	176
Chemical	koz	370	440	530	510	510	551	553	560	567	575	584
Jewellery	koz	495	295	255	240	189	135	89	40	-3	-43	-82
Investment	koz	1,095	-565	470	275	800	130	128	126	124	122	120
Other	koz	90	110	100	100	100	101	106	111	117	127	133
Market balance	**koz**	**-525**	**1,201**	**-1,079**	**-852**	**-2,008**	**-1,037**	**-962**	**-960**	**-1,050**	**-1,106**	**-1,115**
Annual average price	US$/oz	525	733	644	726	803	850	900	1,000	1,100	1,000	1,000
Market balance without investment demand	koz	570	636	-609	-577	-1,208	-907	-834	-834	-926	-984	-994

Source: Johnson Matthey, SFA Oxford, Deutsche Bank

Rhodium: Clawing Back Some Market Share

Legislation and low prices continue to spur demand

When Euro 6 legislation was being introduced, there was some doubt as to the impact on Rhodium demand, despite the heavy bias towards curbing NOx emissions. The improving demand from the Autocat sector indicates that there has been a decent uptake of Rhodium, particularly in the use of lean NOx traps. We estimate that an additional demand of c.200koz will be required by the end of the decade, most of which will be supplied by recycling c.160koz, but nevertheless, the net demand is still positive.

Figure 50: Rhodium demand in Autocats
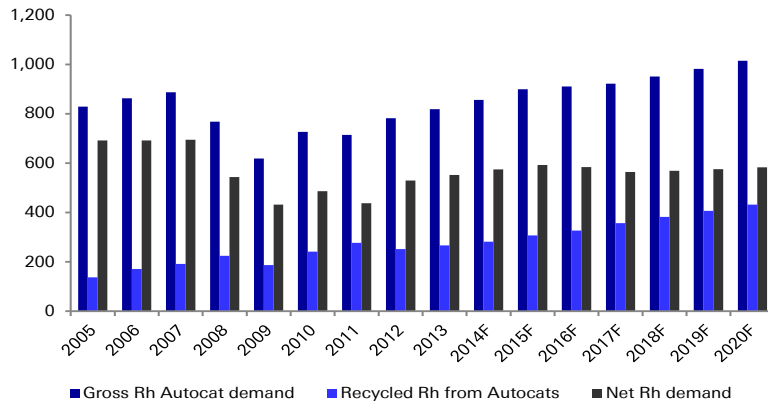
Source: JMAT, SFA Oxford, Deutsche Bank

Part of rhodium's recent demand revival is due to the near record low ratio versus palladium. The average ratio, excluding the high price period between 2004 – 2008, is 3x, versus the current ratio of 1.4x. This attractive ratio has seen the direction of substitution reverse with respect to palladium, especially in the use of three way catalysts (TWC). There is also a move to supply Rhodium by producers with a floor and a cap price. A floor price would ensure that some of the UG2 mines on the Western Limb of the bushveld remain profitable, and a cap would ensure that consumers have some protection against future price spikes.

Figure 51: Rhodium - palladium ratio
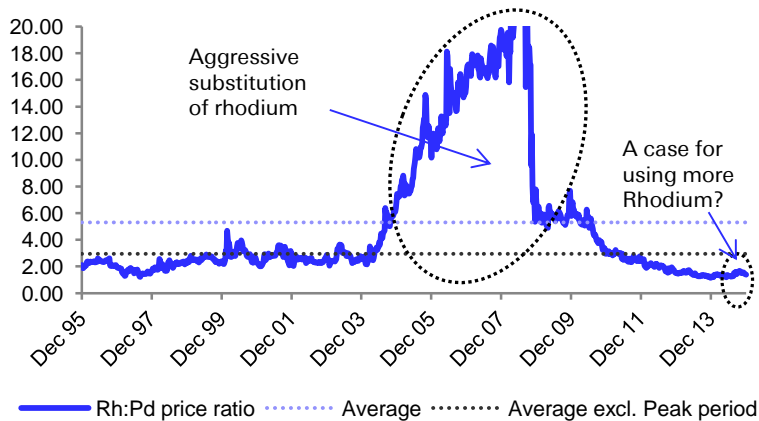
Source: Thomson Reuters Datastream, Deutsche Bank

Figure 52: Rhodium supply-demand balance

Rhodium		2010	2011	2012	2013	2014F	2015F	2016F	2017F	2018F	2019F	2020F
Total supply	Koz	975	1,043	1,001	1,003	840	995	1,048	1,109	1,132	1,158	1,192
Supply growth	%	1.9	7.0	-4.0	0.3	-16.3	18.4	5.3	5.9	2.0	2.3	2.9
South African supply	koz	632	641	599	590	401	529	558	589	586	587	595
North American supply	koz	10	23	35	35	35	40	40	40	40	40	40
Zimbabwe	koz	19	29	30	31	38	35	39	39	39	39	39
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	282	307	327	357	382	407	432
Total demand	Koz	887	908	959	1,046	1,043	1,120	1,105	1,113	1,152	1,192	1,234
Demand growth	%	23.9	2.4	5.6	9.1	-0.3	7.4	-1.4	0.8	3.5	3.5	3.5
Autocat	koz	727	715	782	819	857	900	911	922	951	983	1015
Chemical	koz	67	72	80	85	75	90	70	75	80	86	92
Electrical	koz	4	5	6	7	6	6	5	4	4	2	1
Glass	koz	68	78	25	35	25	40	43	46	49	52	56
Investment	koz	0	0	36	60	40	40	30	20	20	20	20
Other	koz	21	38	30	40	40	45	46	47	48	49	50
Market balance	**Koz**	**88**	**135**	**42**	**-43**	**-203**	**-125**	**-57**	**-4**	**-20**	**-34**	**-43**
Annual average price	US$/oz	2,442	1,990	1,274	1,067	1,172	1,250	1,400	1,700	1,900	2,500	4,000

Source: Johnson Matthey, SFA Oxford, Deutsche Bank

Grant Sporre, (44) 20 7547 3943
grant.sporre@db.com

Patrick Mann, (27) 11 775 7282
patrick.mann@db.com

#10 Industrial Metals
Extrapolating Behaviours Across Commodities

- The three commodities that are perceived as the bell-weather indicators for global economic growth, and more specifically Industrial production are arguably oil, copper and more recently iron ore. Copper and iron ore are also the most important non-Energy commodities, comprising 60% of the EBITDA of the Big Four diversified miners; BHP Billiton, Rio Tinto, Anglo American and Glencore. Ironically, these three commodities have fallen 40%, 15% and 50% YTD, which would suggest that global growth has suffered a shock. Quite the opposite in fact! Oil prices are now at a level which is likely to modestly boost the expansion of economic activity, and we forecast global economic growth to rise to a moderate 3.6% in 2015E and a bit further in 2016. The sharp price fall in these three commodities is simply down to supply growth. Although the dynamics in each commodity market has unique aspects, we think there is value in extrapolating the price behaviour in some of the markets where over capacity has been prevalent for a number of years. We look to the Aluminium and Coking Coal markets as a guide to how the iron ore price is likely to evolve.

- The sharp fall in many commodity prices to levels well below marginal costs, has left investors questioning the usefulness and validity of industry cost curves in a falling market. Whilst it's fair to say that these are most certainly backward looking, we do think there is some use in examining how cost curves have evolved in a period of falling prices. By reviewing the cost dynamics in the aluminium and coking coal markets, we think that iron ore prices are likely to stay between USD60 – 70/t for at least 18 months before the inevitable industry cuts lead to a price improvement.

Lessons learnt from Coking Coal & Aluminium
Iron ore has been one of our least preferred commodities for 2014, due to the weight of supply momentum from the large cap miners. We believe there are some parallels from both the Coking Coal and the Aluminium markets, which could serve as a useful gauge as to how far prices could fall, how long before we see a price stabilization or recovery, and what actions we need to see from the supply side to ensure a price recovery. There are obvious differences in the market structures versus iron ore, but aluminium and coking coal to a lesser extent, have successfully transitioned from a "supply momentum" commodity to a "supply curtailment" commodity.

We define three distinct phases in the evolution of prices for an over-supplied commodity. These are:

- Phase I: a rapid price decline as the market moves into a significant over supply.

- Phase II: a slow price decay, potentially followed by a period of price stabilization, as production growth slows, or producers implement supply cuts

- Phase III: price appreciation, as the supply curtailments reach a critical mass, and the market either anticipates or moves into a deficit once more.

We outline these phases for both the coking coal and aluminium markets:
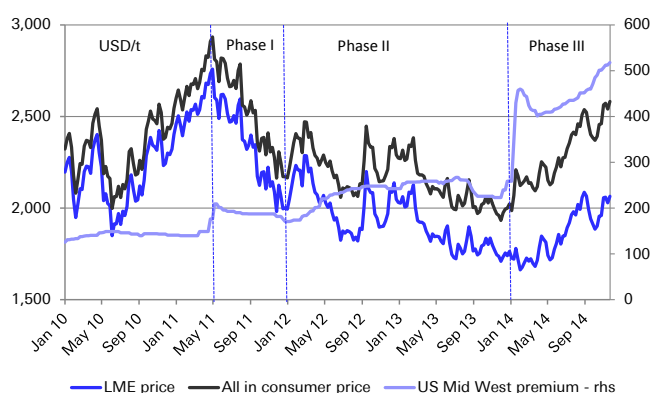
Figure 1: Coking Coal prices since April'10
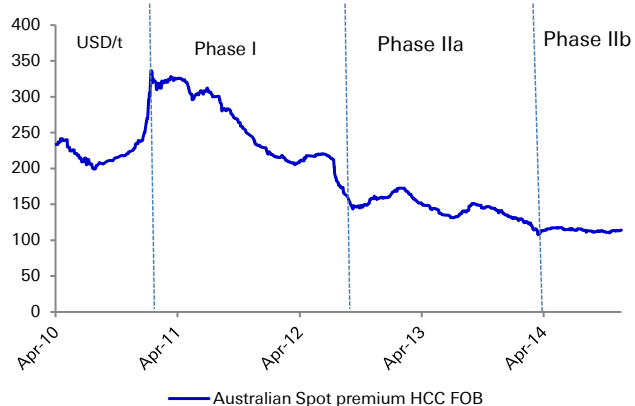
Source: Bloomberg Finance LP, Deutsche Bank

Figure 2: Aluminium (all-in) prices since Jan'10

Source: Bloomberg Finance LP, Deutsche Bank

Both the Coking Coal price and the aluminium price peaked around the same time, in April/May 2011. Since then prices have declined by an average of 55%, with aluminium prices recovering by 28% since the beginning of 2014, whilst coking coal prices have merely stabilized. The average duration of the sharp decline phase was 12 months and the average period of slow decay / price stabilization is 26 months. The decline in coking coal prices has however been much sharper and more protracted versus aluminium, and we would argue that a price recovery is by no means certain in coking coal.

Figure 3: Contrasting the price behaviour between Coking Coal and Aluminium

	Phase I	Phase II a / b	Phase III
	Sharp decline	Slow decay / Price stabilisation	Price recovery
Time (months)			
Aluminium	8	24	11
Coking Coal	16	18/9	
Average	12	26	
Price (%)			
Aluminium	-29%	-4%	28%
Coking Coal	-56%	-24%/4%	
Average	**-43%**	**-12%**	

Source: Deutsche Bank

There are two important differences between the coal and the aluminium markets. Firstly, coking coal is essentially a terminal market, whilst aluminium is an exchange traded market. This allows for the accumulation of inventories and investor participation in aluminium. Furthermore, aluminium demand has been consistently stronger than steel demand (coking coal's end market). Aluminium demand growth has averaged 6.8% pa since 2011, whilst crude steel production has grown by an average of 3.8%, with 2012 down at 0.5%. We would argue that the first difference led to a much quicker price correction in aluminium, and that the second difference led to a much quicker price recovery in aluminium. The main similarity between the two markets is that China is certainly self sufficient in both materials and has inclined to be over-supplied in the recent past. This is evident in the increasing exports of coke in the case of coking coal and semi-fabricated products in the case of aluminium.
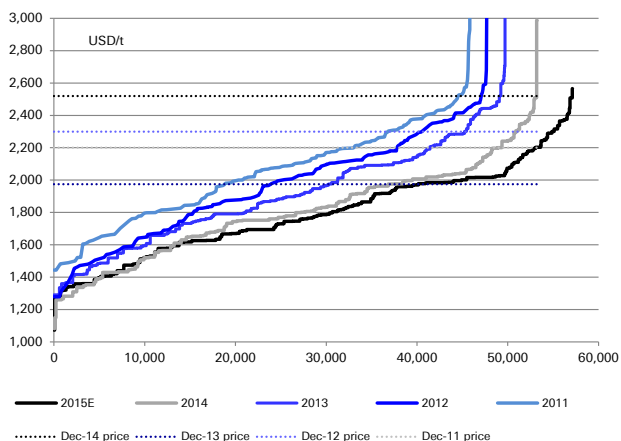
Cost curve dynamics

In both the coking coal and aluminium markets, costs have declined over the past three to four years, due to a combination of:

▪ New supply being added in the second or third quartile of the cost curve.

▪ Producers cutting out the "fat" that was built up during the high commodity price environment. Essentially the era of chasing the marginal tonne is over.

▪ Producer currencies have all declined in the face of a strengthening USD.

▪ More recently, the sharp fall in the oil price will also result in modest operating cost declines. However, this is only likely to impact late in 2015, as many producers hedge prices for a year.

The key difference between the two markets however, is that a supply shock, namely the Queensland floods of 2010 and 2011, allowed high cost swing capacity from the US to fill the gap however. In our view the sharp price fall in coking coal was caused by the tussle between the returning Australian producers forcing the swing capacity back out of the market.
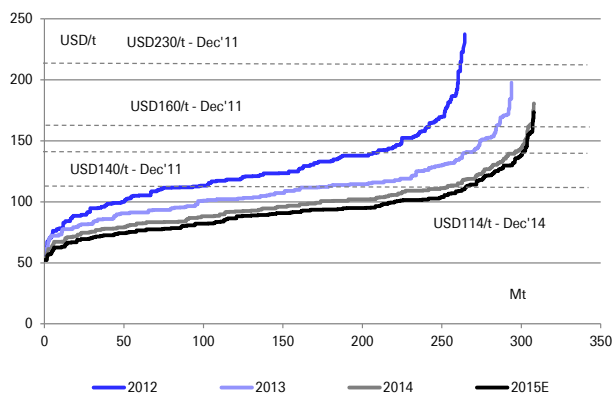
We highlight the progression of the aluminium and coking coal cost curves from 2011/12 to 2015E, which demonstrates the flattening and lowering of the respective curves. We have adjusted the 2014 coking coal cost curve for weaker currencies (RUB and AUD), and a weaker oil price. These two factors lower the cost curve by c.4 – 7% in 2015E. However, in both aluminium and coking coal, we think there is limited opportunity for management controlled costs to be cut much further.

Figure 4: Aluminium cost evolution 2011 – 2015E	Figure 5: Coking Coal cost evolution 2012 – 2015E
Source: Wood Mackenzie, Deutsche Bank	*Source: Wood Mackenzie, Deutsche Bank*

We make the following observations, based on the year end price versus the respective annual cost curves:

▪ Cost curves are backward looking, and cost management is a lot quicker in a falling commodity price environment. The year-end price (December average) would indicate that a significant percentage of production is loss making using the current year's cost curve. However, the percentage of loss making capacity is significantly reduced when viewed against a 1-year forward cost curve (e.g. The Dec'12 price versus the 2013 cost curve).

▪ Prices had to "dig" deeper into the cost curve for aluminium versus coking coal before producers were compelled to act. This is due to the higher barriers to exit in aluminium versus coking coal, given the take or pay structure of power and alumina supply contracts and the high restart costs.

- Coking Coal closure announcements amounted to c.26Mt, or 8% of the seaborne market. The closure announcements started in March 2014 and reached a critical mass in September 2014. The period of price stabilization coincided with the start of the closure announcements in April 2014. The pressure point in coking coal was when 15% of the seaborne market was loss-making. We estimate that a decrease in oil price and weaker currencies will trim this percentage to 13% in 2015E.

- Aluminium closures started in late 2011, and continued throughout 2012. There was a brief hiatus in the first half of 2013, but accelerated from August 2013. The total closures amount to c.3Mt in the market ex China, or 12% of the market ex China (6% of the global market). A price recovery at the end of 2012/ beginning of 2013 delayed the critical mass in closure announcements. The pressure point in aluminium is when over 20% of the market is loss-making. At the current prices, most of the industry is cash positive.

Figure 6: Seeking out the pressure points

Percentage of loss-making capacity	Coking Coal Current year	1 -year forward	Aluminium Current year	1 -year forward
End 2011 price		1%	20%	20%
End 2012 price	10%	3%	14%	9%
End 2013 price	10%	5%	38%	29%
End 2014 price	15%	13%	1%	0%

Source: Deutsche Bank

Read-through to iron ore

Perhaps not unsurprisingly, we think the Iron Ore market is likely to follow the Coking Coal market in its pricing dynamics. The obvious similarities are that both commodities have terminal markets and that steel production is the end use. We would argue that strong domestic Chinese production of the downstream products (steel, aluminium semi-fabricated products and coke), combined with softer demand has seen exports increase for all three commodities over the course of 2014. The key difference between iron ore and coking coal from a China perspective is that China is roughly balanced in Coking Coal, but is significantly short in iron ore. In theory this should mean that supply curtailments outside of China in iron ore would stabilize prices quicker than in coking coal.

Figure 7: Chinese exports rebased to 100 in January 2013
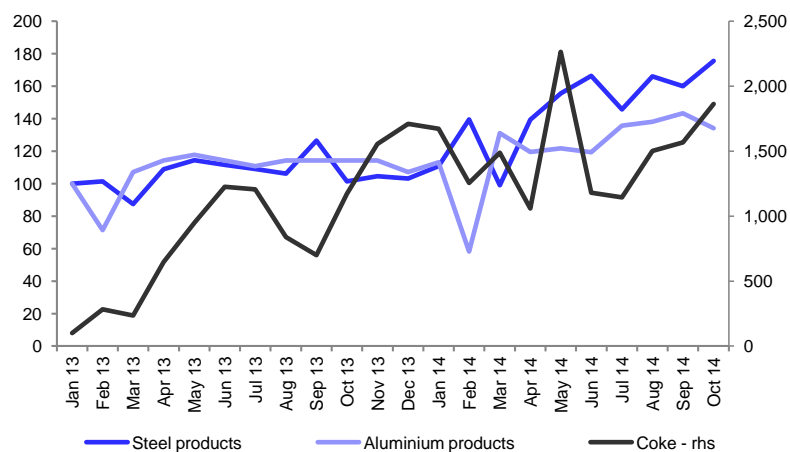
Source: Bloomberg Finance LP, Deutsche Bank

Iron ore prices peaked at roughly the same time as coking coal and aluminium in Q1'11. However, it is only in Q3'14, that significant price pressure began to emerge. Iron ore's sharp decline period started at the beginning of 2014, with the price down close to 50% YTD.

Figure 8: Spot Iron Ore prices (62% CFR to China) since April'10

Source: Bloomberg Finance LP, Deutsche Bank

A China relief valve, domestic over-supply is being exported

In our view, iron ore is close to the end of its "sharp decline" phase

The duration of the price decline is 11 months. If the iron ore market were to follow that of coking coal, this would suggest that the period of sharp price declines is nearly over (12-months and -56% for coking coal).

Figure 9: Contrasting the price behaviour between Coking Coal and Iron ore

	Phase I	Phase II a / b	Phase III
	Sharp decline	Slow decay / Price stabilisation	Price recovery
Time (months)			
Aluminium	8	24	11
Coking Coal	16	18/9	
Average	12	26	
Iron ore	*11*		
Price (%)			
Aluminium	-29%	-4%	28%
Coking Coal	-56%	-24%/4%	
Average	-43%	-12%	
Iron Ore	*-47%*		

Source: Deutsche Bank

Given that a similar percentage of the iron ore industry is loss-making, c.15% compared to Coking Coal, and the Industry has started to witness the start of enforced closures (African Minerals due to a lack of working capital), this should mark the start of a period of limited price decline and possibly even a period of stabilization. The significant acceleration of production cuts in Coking Coal at the beginning of March 2014, marked the start of a period of price stabilization.

Cutting deep into the cost curve. But is it enough?

Figure 10: Iron ore industry cost evolution 2011 – 2015E

Source: Wood Mackenzie, Deutsche Bank

If we assume that Iron Ore has seen the worst of its price decline, the next phase would be a slow decay in prices as producer's battle for survival and take out costs. There is a tailwind of weakening currencies and lower oil prices which will provide some relief for the high cost producers. In China, the Coal industry managed to make some labour savings, which we think will apply to the iron ore industry as well. There is also the possibility of further relief from lower local government taxes and royalties. However, given that China is not as influential in the market, we would expect this process to be less influential than on the Coking coal market. If we extrapolate the Coking Coal and aluminium example, there is potentially some modest downside of c.10% to the current spot iron ore price, suggesting the lows could be sub USD65/t.

Figure 11: Pricing pressure points in iron ore

Percentage loss-making	Current year	1 -year forward
End 2011 price	1%	1%
End 2012 price	1%	1%
End 2013 price	1%	1%
End 2014 price	13%	12%

Source: Deutsche Bank

Both aluminium and coking coal markets suggest that a critical mass of 6- 7% in curtailments are required to induce either price support. The level is however higher to encourage price appreciation. In the case of aluminium curtailments amounted to 12% of the market ex-China before there was any price appreciation. The implied threshold level of 6 – 7% t for the global iron ore market is c.125Mt, and c.250Mt for any meaningful price appreciation. Currently there are 43Mt of cuts announced which is still well short of the implied critical mass. However, as with Coking Coal, the large cap miners are bringing on new low cost capacity at the expense of the high cost producers.

Figure 12: Price related mine production cuts in iron ore					
Country	Company	Asset	Date	Reason/Impact	Prod'n (Mtpy)
Australia	Kimberley Metals	Ridges	Jul-14	Price related production cut	1.7
Australia	IMX Resources	Cairn Hill	Jun-14	Placed into administration - likely closure	1.6
Australia	Noble Resources	Frances Creek	Jul-14	Price related mine closure	1.5
Australia	Shree Minerals	Nelson Bay River	Jun-14	Price related mine closure	0.1
Brazil	MMX	Serra Azul	Aug-14	30 day closure - price and environmental	6
Canada	Labrador Iron Mines	Stage 1 (Schefferville)	Jul-14	Price related mine closure	1.7
Canada	Cliffs	Wabush (Scully)	Feb-14	Price/cost related mine closure	1.5
Russia	IRC	Kuranakh	Aug-14	Profit warning - possible closure.	1
Guinea	Bellzone	Forecariah	Aug-14	Lack of finance - likely closure in Q4'14.	0.5
Canada	Cliffs	Bloom Lake	Oct-14	Lack of Funding, with Phase I not feasible	7
Sierra Leone	African Minerals	Tonkolilli	Nov-14	Lack of working capital	20
				Total annualised production	**42.6**

Source: Deutsche Bank, Wood Mackenzie

Conclusion

There is some, but we would argue limited downside (c.10%) in spot iron ore prices, based on the behaviour in the coking coal and aluminium markets. Weaker producer currencies (AUD, BRL and RUB) are however a further headwind for iron ore prices, which could see the price test the low 60's. We think that this level is needed to force some of the high cost producers out of the market, or those producers with capacity spanning the cost curve to shut high cost operations e.g. FMG's Cloudbreak mine. The rate of closures or closure announcements once we reach the low 60's is likely to be quite rapid. This should induce price support by the end of 2015, with modest price appreciation in 2016.

Grant Sporre, (44) 20 7547 3943
grant.sporre@db.com

Copper: Grinding Lower

- The fundamentals of copper do not mirror that of oil. In copper, there is no technological breakthrough which has opened up vast new resources, therefore copper should not suffer the same fall in pricing as that of oil. The fallout from oil has however impacted the overall sentiment towards commodities. However, copper remains a well supplied market, and a lower oil price in combination with weaker producer currencies will lower the marginal cost support level, which we now estimate at USD5,800/t.

- We continue to forecast a surplus market in copper for 2015E and 2016E, which in our view will see prices grind lower. However, we have cut the magnitude of the surpluses in both 2014 and 2015E by 200kt over the course of the year. The big increase in mined supply growth that we had previously forecast has been eroded by the latest round of downgrades to company guidance. Although we forecasts a more substantial surplus in 2016, we think risks are skewed to the downside, given the poor industry track record in delivering growth.

Lower support levels = lower prices

The copper market remains well to over-supplied for the next two years in our view, with the jury still out on 2017. In our assessment 2017 is likely to be a balanced market. That being said, 2014 looks to be tighter than initially forecast and we have reduced our surplus for 2015, due to lower mined supply growth than previously forecast. 2013 looks to be a "10-year" anomaly where the supply side delivered on expectations. The same cannot be said for 2014, which has experienced the "normal" 5- 6% supply disruption. The magnitude of the surpluses are however within reasonable limits for the market to absorb, although our estimate of 600kt in 2016 is at the upper limit. We think the cost curve including sustaining capex) will continue to provide a support level, but will falling oil prices and weaker currencies, this support level will also fall.

Figure 1: Copper supply – demand summary
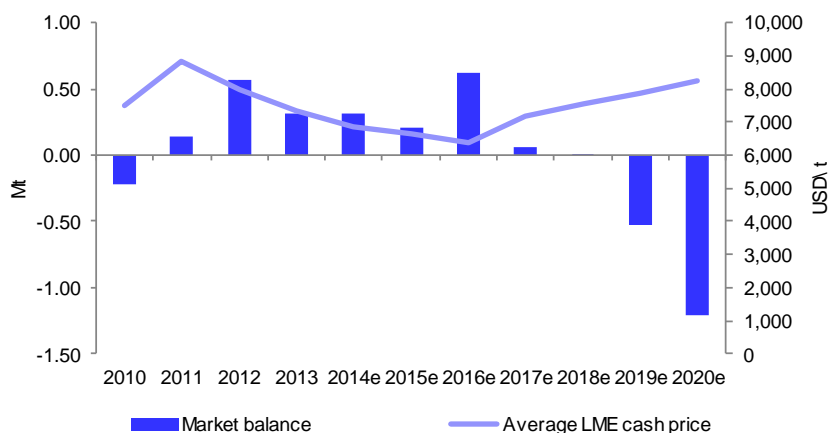
Source: Wood Mackenzie, Deutsche Bank

The key themes for copper in 2015, are:

- Will Chinese demand fall sharply due to a lag effect from the property market downturn? Our view is that global copper demand will be 1% lower in 2015E because of this effect.
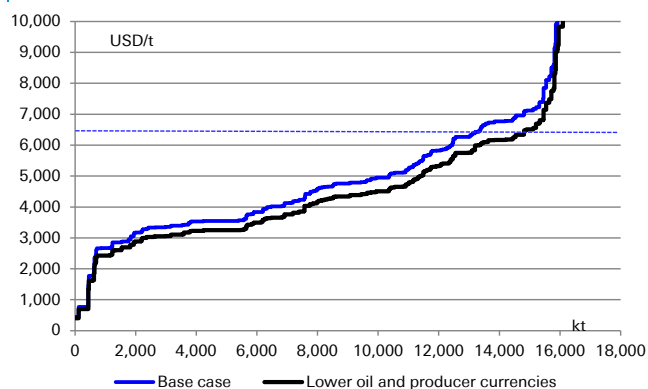
- Will mined supply growth continue to disappoint? Our view is most likely but not to the extent that will cause a deficit market.

- Who will win the tussle between those market participants "shorting" copper and the SRB, which seems to be intent on providing support?

- How dynamic is the copper cost curve? We reiterate our view that marginal costs will come down, but not nearly as much as in some of the other metals.
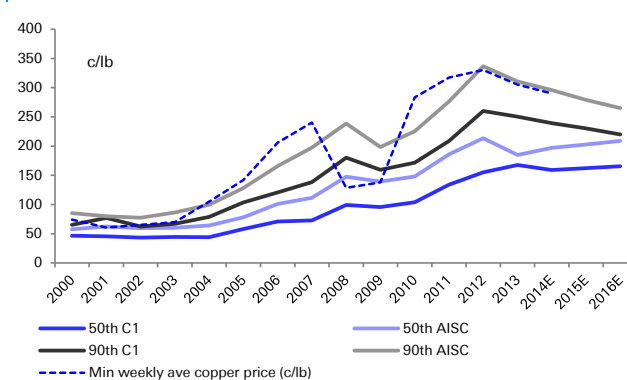
Easing support levels from oil and currencies

We maintain our view that the cyclical component of costs in the copper industry will continue to unwind over the next two years, especially for the higher cost producers. We estimate that over the very near term the cyclical deflation will outweigh the structural factors such as water scarcity, grade decline and higher stripping ratios. In coming to this conclusion, we had assumed flat energy prices, however the c.40% fall in the oil price over the past year will certainly add weight to our argument that marginal costs will fall over the next two years. We estimate that copper mining and processing costs have a c.15 - 20% exposure to the oil price from direct components such as diesel for open cut mining and stripping, and the more indirect components such as explosives, tyres and transport. A 30% fall in oil prices would result in a 5% operating cost saving. Furthermore, we estimate that most currencies will depreciate by an average of 10% against the USD, and if c.50% of costs are denominated in local currencies, then producer currency depreciation will result in a further 5% saving in operating costs. We highlight the lowering of the cost curve in the Figure 2 below. As we have witnessed with the other base metals, a falling marginal cost is likely to lead to a falling commodity price in a well supplied market.

Figure 2: Copper AISC in 2014E	Figure 3: Copper: All-in-sustaining cost progression
Source: Wood Mackenzie, Deutsche Bank	Source: Wood Mackenzie, Deutsche Bank

Copper has proven to be no different, with the minimum weekly copper price being just below the 90th percentile on the all-in-sustaining cost (including sustaining capex) curve. We continue to see the 90th percentile as providing cost support. However, we expect this level of support to decline by 6% in 2015E and 5% in 2016E. Our support level (Minimum weekly average price) is therefore USD6,100/t in 2015E, and USD5,800/t in 2016E.
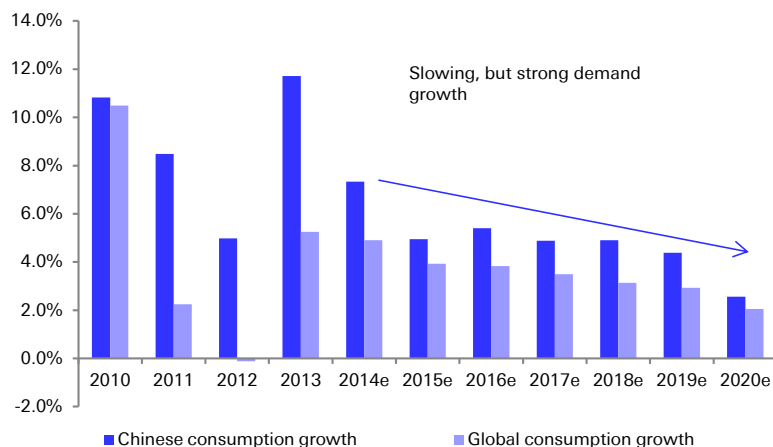
All eyes on Chinese demand

Chinese copper demand has been strong so far this year, with 2014E demand likely to be up c.7.0% YoY. The strong Chinese demand, along with a recovery in the US and a positive Europe all contributed to the above trend demand growth close to 5%. The challenge as always with China is assessing how

much of this demand is real versus apparent. SRB buying behaviour also skewed the picture for 2014. The hotly debated topic remains the impact on copper demand from the slowdown in the property market, both the first order impact and the second order impact, and whether there will be a lag effect in 2015. We certainly think so, and expect Chinese copper demand growth to fall to 4.9% in 2015E, dragging global refined copper demand growth to 3.9% for 2015E. Copper wiring tends to be installed late in the build programme in China, according to the buyers own requirements.

Demand growth is likely to be closer to trend in 2015E and 2016E

Figure 4: Refined copper consumption estimates

Source: Wood Mackenzie, Deutsche Bank

The first point of debate is how end demand is classified, with low voltage building wire being included in Construction by Wood Mackenzie but Antaike classifying all distribution applications under Power. We think that Construction accounts for c.20% of Chinese copper demand. Furthermore, the second order effect of lower property sales is also likely to be on the Home appliances category. This puts the proportion of "at- risk" demand close to 35 – 40% in our view.

Figure 5: Chinese copper demand by sector - Antaike
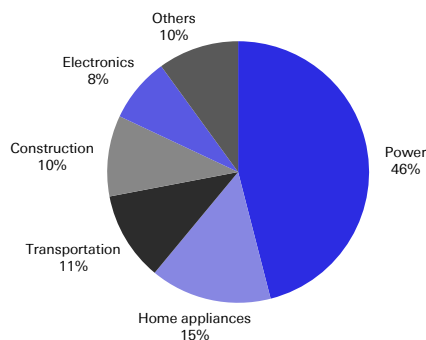
Source: SMM, Antaike, Deutsche Bank

Figure 6: Chinese copper demand by end use – Wood Mackenzie
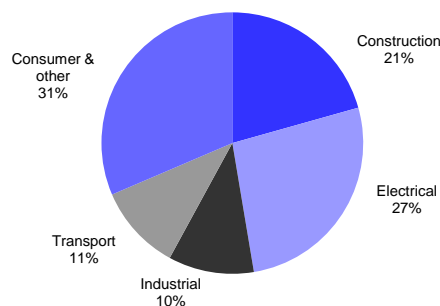

Source: Wood Mackenzie, Deutsche Bank

If we assume that the slowdown in property sales feeds through to copper demand in 2015, the key question is then whether government instigated power intensive infrastructure projects can compensate. Over the past two

months China's economic planning body, the National Development & Reform Commission (NDRC), has approved USD160bn worth of transportation projects. The latest infrastructure investment approvals were issued on November 28 and are related to three railway and one airport project. Over the past two months, the NDRC has granted approvals for no fewer than 28 rail, six airport and one port projects. Whilst there has been no specific announcement on power investment from the State Power Grid, the targeted stimulus approach from China's central government does still seem to in place. Channel checks suggest that the State Power Grid will not spend all of its allocated funds this year, and that a portion of 2014 demand from the Grid will be carried over into next year.

Chinese copper demand indicators could probably be described as mixed, with Chinese power FAI holding steady. Power cable production has been very strong however with no sign of slowing momentum. We would however caution that this measure would also encompass aluminium cables. Power "generating" equipment and transformer demand has been more erratic however, with the momentum slowing. The knock-on effect from slowing China property sales can be seen on both air conditioner and refrigerator sales, both at low levels. Our China copper inventory model suggests a continuation of destocking, which started off in June.

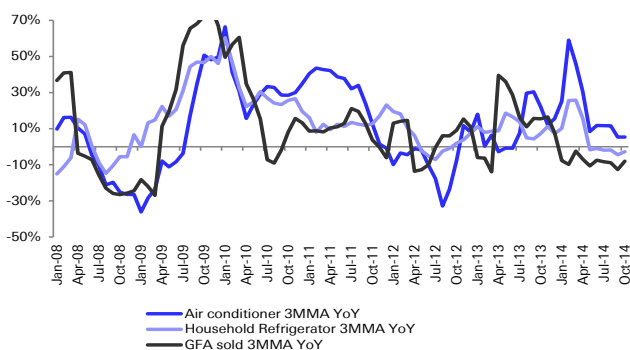Figure 7: Chinese Power FAI growth versus Power Cable production 3MMA YoY
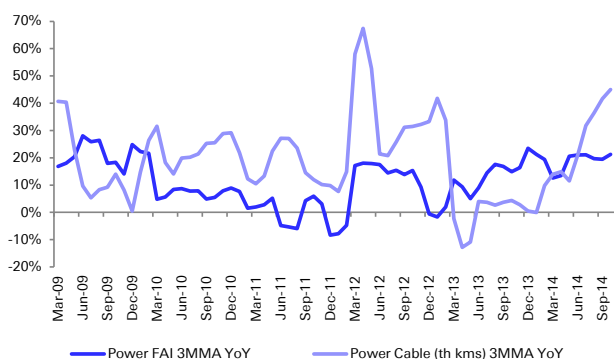
Source: Wind, Deutsche Bank

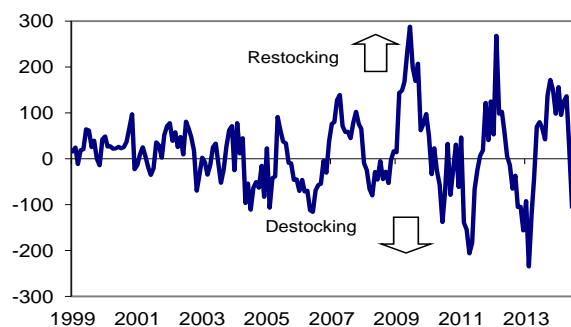Figure 8: Chinese power equipment production 3MMA YoY.
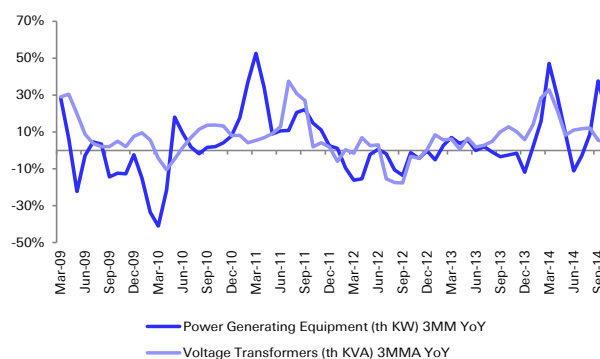
Source: Wind, Deutsche Bank

Figure 9: Chinese Home appliance sales versus Property sales (Gross Floor Area)

Source: Deutsche Bank, Wind

Figure 10: China copper inventory model

Source: Deutsche Bank, Bloomberg Finance LP, NBS

Copper: The preferred base metal short

Copper remains the least preferred long or rather the most preferred short amongst the base metals. This is perhaps unsurprising given the strong likelihood of a surplus market over the next two years, the downside risks from the Chinese property market, and the downdraft from a falling oil price. As mentioned earlier, a falling oil price will impact costs, and will pull down the marginal cost support levels, but the linkage between oil and copper in this instance has been more sentiment driven. Investor positioning on the COMEX has moved to a far more significant net short position, with current positioning not far off the record short positioning seen in November last year and March this year. On the LME, money managers have remained net long, but when expressed as percentage of open interest, copper is one of the lowest among the base metals. We note however, that the net long position fell sharply over the period when the oil price registered its big fall. We think that Copper will remain a favourite short in the base metal market over the course of 2015, with bouts of short covering leading to some volatility over the period

Figure 11: Copper Non-commercial net positions on the Comex
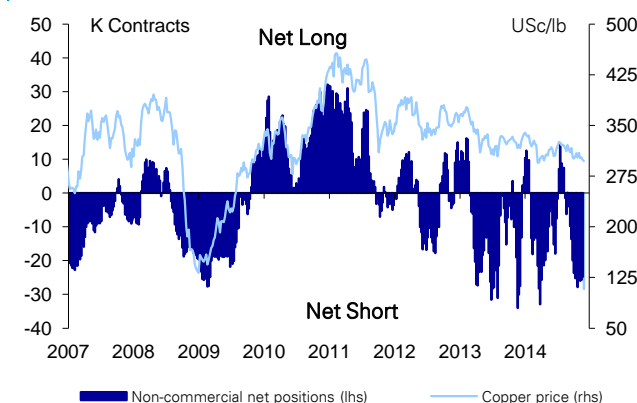
Source: Bloomberg Finance LP, CFTC, Deutsche Bank

Figure 12: Net Money Manager positions on the LME – % of open interest
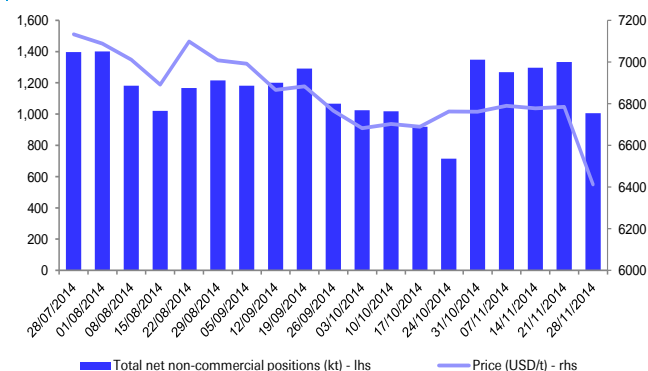
Source: LME, Bloomberg Finance LP, Deutsche Bank

However, for those market participants itching to short copper, the behaviour of the Chinese SRB (State Reserve Bureau) will remain a key risk factor. The exact amount purchased by the SRB in 2014 is keenly debated, but estimates range from 400 – 700kt. We assume 500kt. Channel checks would suggest that the SRB is looking to buy a further 200kt of metal this year, should the price fall below USD6,500/t, pushing the total purchases close to 700kt. Our forecast surplus for the next two years is 800kt, which seems to be within the SRB's capacity to absorb. All things being equal, the SRB's willingness to buy copper when prices fall, would suggest that there is an expectation of future deficits.

Mined supply disappoints – back to the familiar refrain?

2014 was supposed to be a big year for mined supply growth. At just under 2% growth, we would classify 2014 as average. The reason was of course the number of disruptions and delayed project start-ups. There were a number of high profile disruptions in the year, starting off with the tough stance taken by the Indonesian government hampering concentrate sales. Slower than expected ramp-ups of Ministro Hales, Toromocho, Caserones, Sierra Gorda and Oyu Tolgoi also added to the disruption tally. But all of these disruptions simply makes 2014 a "normal" year, with 5 – 6% or 1Mt of disruptions. Perhaps 2013 was the anomaly where a record mined supply growth was helped by a very low disruption of only 3.5% in the year. The last time, the

disruption allowance was below 4%, was in 2004, also a very strong mined supply growth year. We continue to forecast strong mined supply growth for the next two years (5% in 2015E and 6.5% in 2016E), but we have tempered our forecasts with a high disruption allowance (6% of supply in both years).

Figure 13: Copper mined supply growth
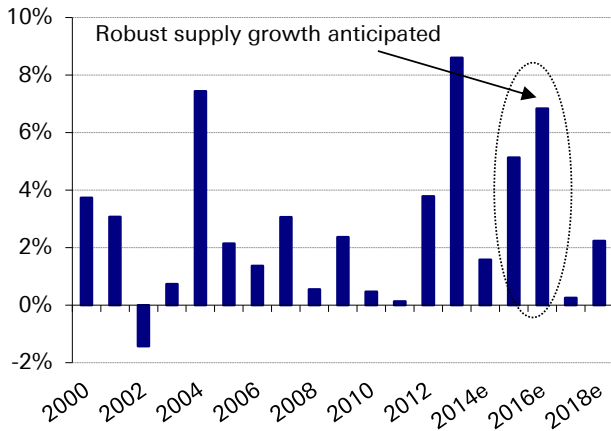
Source: Wood Mackenzie, Deutsche Bank

Figure 14: Copper mined supply disruptions
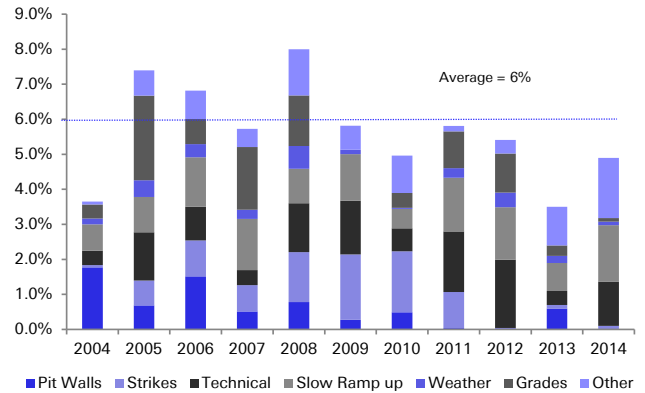
Source: Wood Mackenzie, Deutsche Bank

Given that the copper market always suffers from a high level of disruption, we need to assess whether the forecasts of robust mine output in 2015 and 2016 are realistic. We would point out that both BHP and Rio have recently guided to lower mined output for 2015 and 2016 at recent investor days. BHP's Escondida mine will see lower grades from the end of 2015, with limitations on water usage restricting the use of the third concentrator until 2017.

We factor in 160kt less production in 2016, as a result of this guidance. Rio's Bingham Canyon mine will also see c.120kt less production in 2015, as a result of remediation work to secure the mine after the 2013 pit wall slippage. The other major mine that will experience a fall in production is Grasberg in 2017E, as the operation transitions to an underground block cave. We outline a list of the major mines which are forecast to deliver significant volume or alternatively see big falls in production, along with our view of the risks on delivery. The big contributions amount to c.1.1 – 1.2Mt in 2015 and 2016E, which is similar to our disruption allowance. The main contributing region is still Latin American, especially Chile, Peru and Mexico, with an additional 1.7Mt forecast from the region.

Figure 15: Large scale mined copper additions and depletion (90kt and above in any year)				
Mine	2015E	2016E	2017E	Comments
Vedanta	-36	114	50	The Konkola complex has perennially under-delivered
Sentinel	190	25	10	Power risks in Zambia
Batu Hijau	139	-45	-18	Restart capacity
Grasberg	80	375	-250	Restart capacity, followed by grade improvements in the open pit
Antucoya SxEw	61	26	3	Modest start-up risk
Caserones	91	-10	0	Start-up has been delayed already
Escondida	40	-158	82	Grade
Sierra Gorda	90	8	69	Start-up has been delayed already
Buenavista (Cananea)	128	56	63	Start-up risk
Antamina	91	-17	0	Grade variability is difficult to forecast
Cerro Verde Mill	29	245	0	Modest start-up risk
Constancia	70	60	5	Modest start-up risk
Las Bambas	0	250	50	Start-up has been delayed already
Toromocho	100	78	-27	Arsenic grade variability
Bingham Canyon	-126	50	54	Recovery in 2016 is not guaranteed
Morenci	184	0	0	Modest start-up risk
Kaz Minerals (Aktogay and Bozshakul)	42	63	103	Modest start-up risk
Total	**1,173**	**1,120**	**193**	

Source: Deutsche Bank

We highlight the next wave of mined copper projects which are due to start up in 2017, delivering meaningful tonnages in 2018. We point out that none of the large cap producers appear on the list. In our view, First Quantum is the only company that has a proven track record of delivering projects on time and close to budget on this list, which suggests that this tranche of supply may also be delayed.

Figure 16: Copper projects due to start up in 2017, and ramp up in 2018							
Project	Company	Country	Type	Capex	2017	2018	LOM avg.
Qulong	Tibor Julong	China	Concs	n/a	10	75	180
Sicomines	Sicomines	DRC	Concs	3,000	30	70	400
Mirador	Tongling NF	Ecuador	Concs	3,000	10	55	110
El Arco	Grupo Mexico	Mexico	Concs	2,600	25	170	190
Cobre Panama	First Quantum	Panama	Concs	6,200	15	150	320
Galeno	Jiangxi Copper	Peru	Concs	2,500	25	160	200
Tia Maria	Grupo Mexico	Peru	SxEx	1,400	10	100	120

Source: SNL Metals and Mining, Deutsche Bank

Figure 17: Copper supply demand balance

		2010	2011	2012	2013	2014e	2015e	2016e	2017e	2018e	2019e	2020e
Chile production	Mt	5.47	5.30	5.52	5.86	5.79	6.21	5.91	5.94	6.10	6.07	6.00
Production Growth		*2.9%*	*-3.2%*	*4.2%*	*6.2%*	*-1.2%*	*7.2%*	*-4.9%*	*0.5%*	*2.7%*	*-0.4%*	*-1.2%*
Chile share of global production		*34%*	*33%*	*33%*	*32%*	*31%*	*30%*	*27%*	*28%*	*28%*	*28%*	*29%*
Global Mine Production	**Mt**	**16.15**	**16.18**	**16.79**	**18.23**	**18.52**	**19.47**	**20.80**	**20.89**	**21.37**	**21.54**	**21.29**
World Mined Production Growth	*%*	*0.5%*	*0.1%*	*3.8%*	*8.6%*	*1.6%*	*5.1%*	*6.8%*	*0.4%*	*2.3%*	*0.8%*	*-1.2%*
Copper smelting capacity	Mt	17.69	18.10	18.90	19.61	20.47	22.28	22.51	22.16	22.31	22.31	22.30
Utilisation		*73%*	*70%*	*70%*	*74%*	*71%*	*69%*	*74%*	*76%*	*78%*	*80%*	*81%*
Anode production	Mt	14.75	15.41	15.63	16.35	17.40	17.99	19.24	19.32	19.94	20.44	20.56
Production Growth		*26.4%*	*4.5%*	*1.4%*	*4.6%*	*6.4%*	*3.4%*	*7.0%*	*0.4%*	*3.2%*	*2.5%*	*0.6%*
Total scrap consumption	Mt	4.21	4.54	4.78	4.57	4.69	4.77	4.92	4.91	4.96	5.06	5.15
Consumption Growth	*%*	*25.0%*	*7.7%*	*5.4%*	*-4.3%*	*2.5%*	*1.7%*	*3.1%*	*-0.3%*	*1.2%*	*1.9%*	*1.8%*
Total SxEw Production	Mt	3.3	3.4	3.6	3.7	3.9	4.1	4.0	4.0	3.9	3.6	3.3
Global Copper Supply	**Mt**	**18.95**	**19.75**	**20.15**	**20.93**	**21.93**	**22.67**	**23.95**	**24.20**	**24.91**	**25.11**	**24.95**
Global Supply Growth	*%*	*3.7%*	*4.2%*	*2.0%*	*3.9%*	*4.8%*	*3.4%*	*5.7%*	*1.0%*	*2.9%*	*0.8%*	*-0.7%*
Chinese Consumption (real)	Mt	7.20	7.82	8.20	9.16	9.84	10.32	10.88	11.41	11.97	12.50	12.82
Consumption Growth	*%*	*10.8%*	*8.5%*	*5.0%*	*11.7%*	*7.3%*	*4.9%*	*5.4%*	*4.9%*	*4.9%*	*4.4%*	*2.6%*
Western Europe	Mt	3.38	3.20	2.93	2.89	2.95	3.00	2.98	2.99	2.98	2.96	2.95
growth	*%*	*11.6%*	*-5.4%*	*-8.5%*	*-1.2%*	*2.0%*	*1.5%*	*-0.5%*	*0.2%*	*-0.4%*	*-0.4%*	*-0.4%*
USA	Mt	2.19	2.20	2.23	2.23	2.31	2.40	2.47	2.52	2.51	2.51	2.50
growth	*%*	*6.4%*	*0.5%*	*1.4%*	*0.0%*	*3.5%*	*3.7%*	*3.0%*	*2.0%*	*-0.2%*	*-0.2%*	*-0.2%*
Japan	Mt	1.06	1.00	0.99	0.99	1.00	1.02	1.04	1.05	1.05	1.05	1.05
growth	*%*	*21.1%*	*-5.4%*	*-1.8%*	*0.1%*	*1.5%*	*2.0%*	*1.5%*	*1.0%*	*0.2%*	*0.2%*	*0.2%*
Big 3 mature economies	Mt	6.63	6.40	6.15	6.11	6.26	6.41	6.49	6.55	6.54	6.52	6.51
Consumption Growth	*%*	*11.2%*	*-3.4%*	*-4.0%*	*-0.5%*	*2.5%*	*2.4%*	*1.1%*	*1.0%*	*-0.2%*	*-0.2%*	*-0.2%*
Other mature economies	Mt	1.57	1.37	1.21	1.23	1.23	1.25	1.26	1.25	1.23	1.21	1.19
growth	*%*	*4.6%*	*-12.8%*	*-11.4%*	*1.7%*	*-0.4%*	*2.2%*	*0.3%*	*-0.4%*	*-1.5%*	*-1.6%*	*-1.7%*
Other developing economies	Mt	1.35	1.36	1.33	1.33	1.42	1.56	1.65	1.75	1.85	1.96	2.06
growth	*%*	*10.0%*	*0.7%*	*-1.8%*	*-0.4%*	*7.1%*	*9.7%*	*6.1%*	*5.8%*	*5.8%*	*5.7%*	*5.2%*
Brazil/India/Russia Consumption	Mt	1.42	1.63	1.60	1.61	1.61	1.58	1.64	1.71	1.78	1.85	1.93
Consumption Growth	*%*	*10.1%*	*14.1%*	*-1.8%*	*0.9%*	*-0.3%*	*-2.0%*	*4.2%*	*4.1%*	*4.2%*	*4.2%*	*3.9%*
Other	Mt	1.00	1.04	1.09	1.17	1.15	1.35	1.55	1.74	1.99	2.22	2.21
Consumption Growth	*%*	*14.6%*	*3.7%*	*5.3%*	*6.6%*	*-1.2%*	*17.5%*	*14.4%*	*12.6%*	*14.0%*	*11.8%*	*-0.4%*
Global Consumption	**Mt**	**19.17**	**19.60**	**19.58**	**20.61**	**21.62**	**22.47**	**23.33**	**24.14**	**24.90**	**25.63**	**26.16**
Market balance	**Mt**	**-0.22**	**0.14**	**0.57**	**0.32**	**0.31**	**0.20**	**0.62**	**0.06**	**0.01**	**-0.52**	**-1.21**
Average LME cash price	USD/t	**7,498**	**8,829**	**7,953**	**7,354**	**6,838**	**6,625**	**6,388**	**7,200**	**7,544**	**7,887**	**8,231**
Average LME cash price	USc/lb	**340**	**401**	**361**	**334**	**310**	**301**	**290**	**327**	**342**	**358**	**373**

Source: Deutsche Bank

Nickel: Hitting The Big 400

- Tangible signs of a deficit market in Nickel have remained elusive. LME inventories have shot above 400kt, and Chinese laterite port stocks are at the same levels as of the beginning of the year. A sizeable proportion of the rise in LME stocks is however from past surpluses and the composition of Chinese ore stocks has shifted from high grade to medium grade. However, 2014 will go down as another surplus year, and it is only likely that a deficit will emerge in the second half of 2015. Potential signposts for the emerging deficits include falling LME stocks, an acceleration in the decline of ore stocks at the Chinese Ports and a sharp fall in Chinese NPI production due to a shortage of ore.

- In our assessment, the nickel market will be in a surplus of 44kt (previously a 15kt deficit) in 2014, but move to a modest deficit of c.40kt (previously a 130kt deficit) in 2015. We have reduced our forecasts for the size of the deficit in 2015, due to higher and more sustainable ore exports from the Philippines and Chinese port stocks which will last for a further 4 – 6 months. As a result of the much smaller deficit in 2015, we have downgraded our forecast by 10% to USD19,125/t.

Still forecasting a deficit for 2015, only smaller

It's fair to say that the Nickel price performance has disappointed the bulls in the market, especially in the beginning of the fourth quarter. This is unsurprising given that there has been no sign of an impending deficit. LME inventories breached 400kt at the end of November, and have continued to rise; Philippine ore exports to China remain on course for a record year; the drawdown of nickel ore stocks in China is painfully slow, with no signs any let-up in Chinese Nickel Pig Iron (NPI) production, all exacerbated by lacklustre demand versus expectations.

We have reviewed all our assumptions for 2015, and made the following changes:

- Modestly tweaked up our demand forecasts given the strong stainless steel melt YTD. However, we continue to see lower demand growth in 2015 and 2016, as Chinese production growth is impacted by the eventual shortage of NPI, scrap ratio's increase and ferritic (non-Nickel bearing) stainless steel takes market share away from the Austenitic grades.

- Increased our assumption of mined ore volumes from the Philippines, to sustainably above 300ktpa. The country's ability to continue increasing mined volumes will be keenly watched once the current monsoon season is over at the end of March.

- Increased our refined nickel production assumptions as the ore stockpiles in China are likely to last well into Q2'15. The depletion is likely to be a good 6 – 9 months later than our expectations at the beginning of the year. The rate at which these stockpiles are consumed will another keenly watched indicator.

Figure 1: Nickel market balance with price forecasts

Ni market balance (kt)   LME Nickel (USD/t) RHS
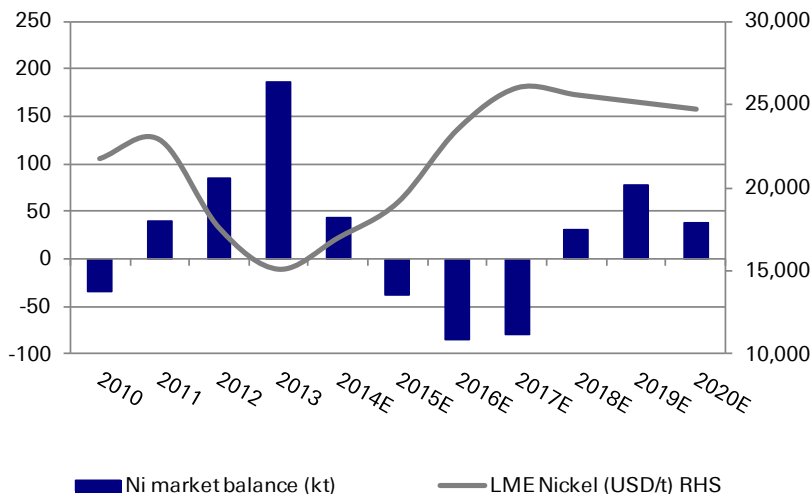
Source: Wood Mackenzie, Deutsche Bank

### Slowing demand momentum in China

Chinese stainless steel production is up 13% YTD, but the momentum has slowed since June, with October being the first month in negative territory. Channel checks suggesting that Baosteel has cut Austenitic grades seems to be borne out in the latest production figures, with the ratio of Austenitic grades also falling. The soft demand has also been evinced by domestic mills struggling to raise prices in order to achieve acceptable margins. A squeeze on favourably priced NPI and the likelihood of anti-dumping duties on Chinese stainless steel from Europe and the rest of South East Asia, is likely to pressure local mills, which have become more reliant on exports, over the past 12-months. In saying that, the utilization rate in many of the larger producers in China is close to 90%, with only Tsingshan having any idle capacity (c.900kt).

Figure 2: Chinese crude stainless steel production (monthly)

China Crude stainless steel production (kt)   % chng Y/Y
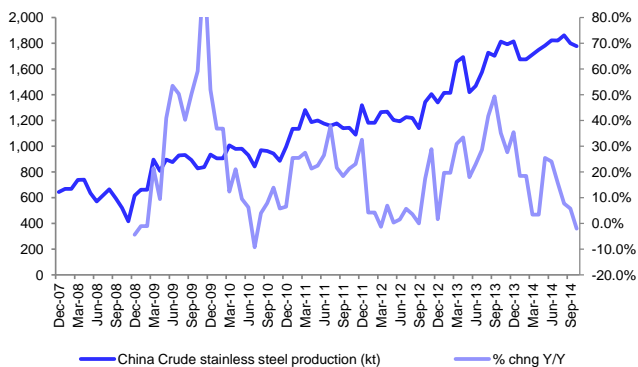
Source: Bloomberg Finance LP, Deutsche Bank

Figure 3: Chinese crude stainless steel production versus % Austenitic grades

China Crude stainless steel production (kt)   % Austenitic
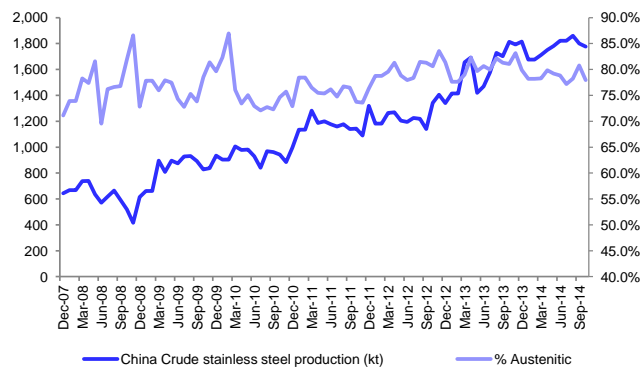
Source: Bloomberg Finance LP, Deutsche Bank

We would however point out that the weak sentiment in stainless steel sector in general is simply due to de-stocking. Restocking earlier in the year (when demand was improving and prices were rising) went too far and that now, with prices falling, there is a rush to destock. The focus in the downstream segment has been using up excess stock before the end of the year, rather than buying in new stock that may fall in value. Thus even if distributors/service centres

continue to ship good volumes of product to end user customers, the utilisation of existing stock means that their orders to the mills have probably decreased, which is forcing the mills to scale back melting rates. The recent rally in the Nickel prices will have improved sentiment somewhat and may drive a bit of a restocking rally. The destocking is evident in Chinese stainless steel inventories as well.

Figure 4: Chinese stainless steel stocks
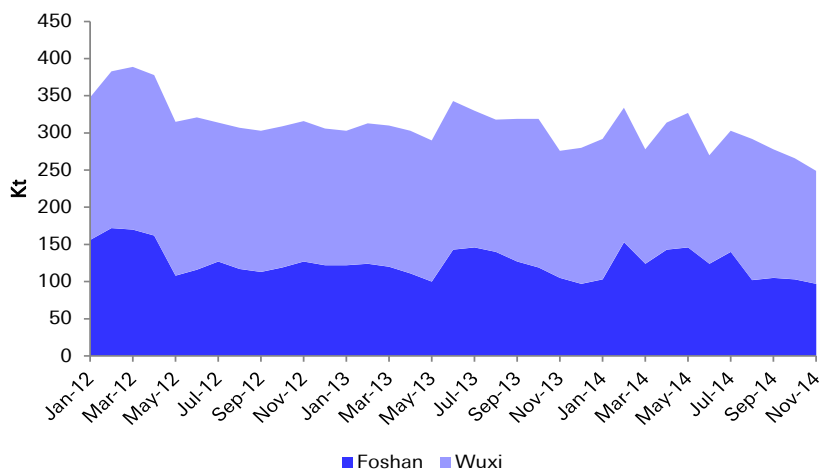
Source:, CRU

Stainless steel stocks have diminished since the end of June.

We outline our expectation both global stainless steel and nickel demand over the next three years.

Figure 5: Slowing demand in 2014 and 2015 – Global Nickel and Stainless

Source: Deutsche Bank, CRU, Wood Mackenzie
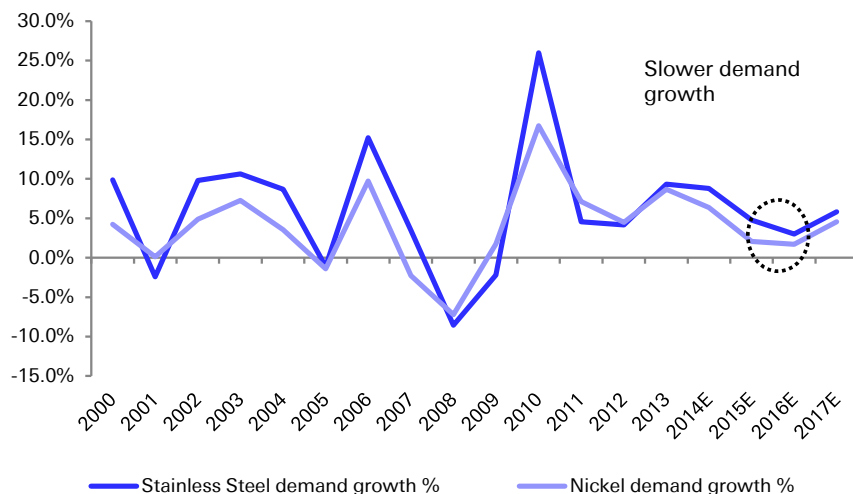
Stainless steel demand is likely to fall as nickel prices rally, with higher scrap usage and lower Austentic ratios leading to higher Nickel demand under-performing stainless.

All the hallmarks of a surplus market

The nickel market remains in a surplus with rising LME inventories and net exports of metal out of China. LME nickel inventories have risen by 150kt over the course of the year. Our estimate of the 2014 surplus is 40 – 50kt, suggesting that 100kt is a surplus accumulated in previous years, which is now simply visible.

Figure 6: LME nickel inventories
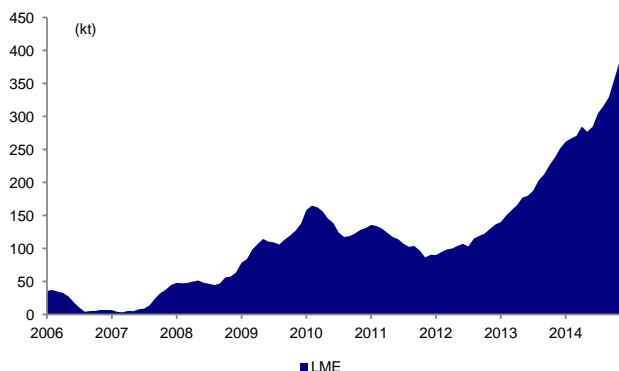
Source: Bloomberg Finance LP, Deutsche Bank

Figure 7: Chinese nickel metal net exports
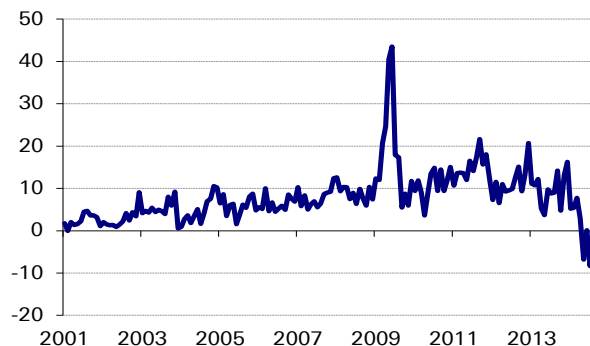
Source: NBS, Deutsche Bank

Net exports of metal out of China continued in October, making its way into the Asian LME warehouses of Johor and potentially Singapore, although much of the inflows in Singapore originate from Australia and Russia. The Qingdao investigation may have contributed to the net exports out of China, but it is in our view simply a reflection of a surplus market.

How long will Chinese ore stocks last?
The theme of previously hidden surpluses is also reflected in the Chinese port stocks of laterite (Saprolite and Limonite), both Indonesian and Philippine. There has also been an increase in the imports of Philippine ore, which has essentially kept the overall inventory at the same level prior to the ban. This has allowed Chinese NPI producers to blend medium-grade ore from the Philippines with high-grade Indonesian ore to extend the NPI production, which has been reflected in the production of Chinese NPI. Total Chinese NPI production may well be a record or certainly very close to 2013, despite the ban. Production was up 8% YoY as of the end of September. At the current run rate, Chinese NPI production would be 490kt, however we expect a small slowdown in Q4 and have penciled in 465kt.

Figure 8: Chinese nickel ore stocks by origin
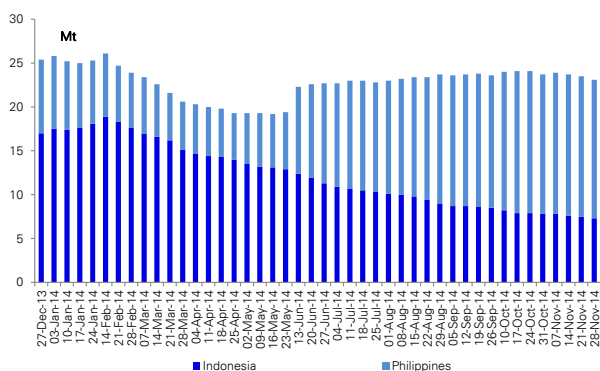
Source: Royal Nickel presentation, Deutsche Bank

Figure 9: Chinese NPI production annualized on a monthly basis
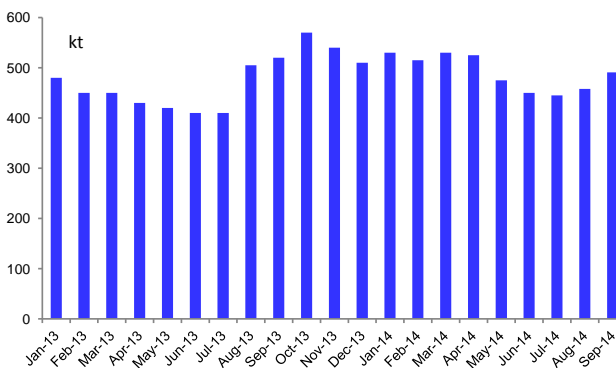
Source: Royal Nickel presentation, Deutsche Bank

The key question then, is how long the current ports stocks can maintain NPI production at the current rate. There are a number of ways to get to an estimate. If we assume that the current run rate can only be maintained by

virtue of the Indonesian stocks then, these should run out by the end of April. That being said our previous estimate was end of February 2015. We estimate that c.140kt of contained nickel stocks will be carried over into next year. As a result we have bumped up our estimates if Chinese NPI production to c.300kt for 2015E.

Figure 10: Chinese NPI production DB estimates
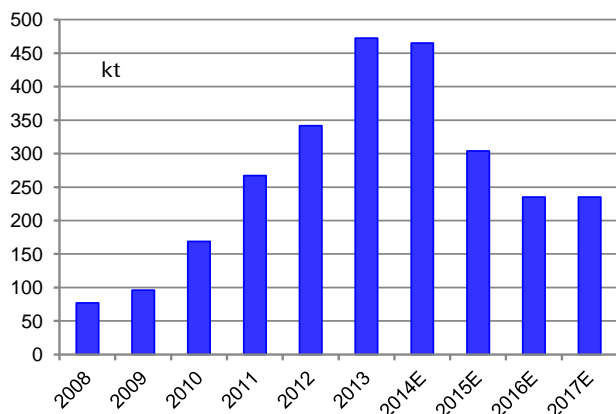
Source: Deutsche Bank

Figure 11: Chinese NPI production (quarterly) in contained Nickel terms
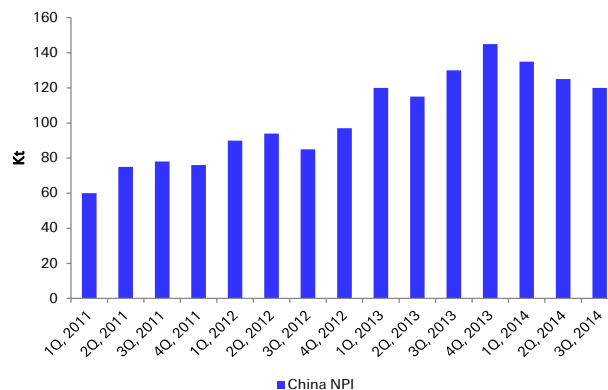
Source: CRU

The estimate of how many contained nickel tonnes is in the Chinese port stocks, depends on three very important variables; firstly the absolute ore tonnage, the grade of each type of ore, and an estimate of the proportion of low iron content Philippine ore (Saprolite). We outline our estimate in the table below of how many months, the stockpile could last. If we assume that only half of the Philippine ore is suitable for NPI (ie low iron content), then there are four months worth of stocks, at an NPI run rate of 40ktpm. If all the stocks are Saprolite, then the estimate goes up to 6 months. These estimates lead us to conclude that stocks will run out at the end of March or end May.

Figure 12: Estimating the longevity of Chinese nickel ore stocks

	Mt	Ratio Saprolite to Limonite	Moisture %	Grade %	Recovery	Contained Nickel kt
Philippine Stocks	15.8	50%	35%	1.40%	93%	66.9
Indonesian Stocks	7.3	100%	35%	1.90%	96%	86.5
Total						153.4
Months						**3.8**

Source: Deutsche Bank

Can Philippine ore exports continue to increase?

Philippine ore exports to China are up 24% YTD as of the end of October. An increase was always expected, but the magnitude has surprised on the upside. Annualising the current run rate, which is a best case scenario because exports typically tail off at the end of the year, would put Philippine imports at 38Mt. This amounts to 300kt of contained nickel at a grade of 1.4% and 35% moisture. The sustainability of these imports and indeed whether or not these can be increased remains a key question. At the same time ferronickel imports are also up, 67% YTD, which suggest that not all of the Philippine imports are suitable for NPI production.
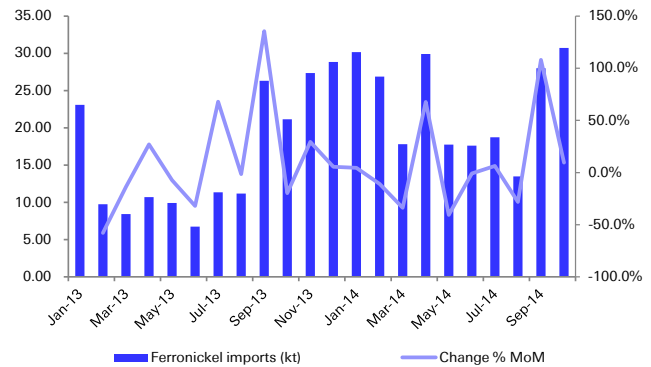
Figure 13: Chinese Nickel Ore imports
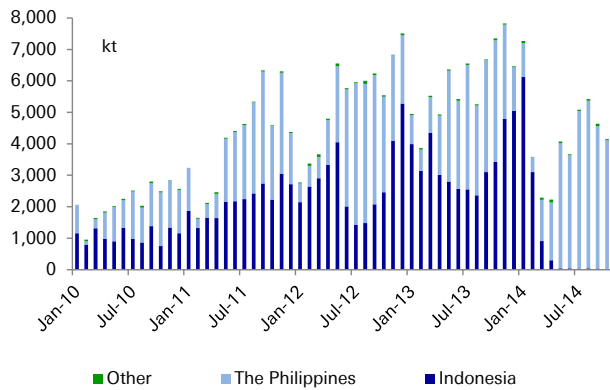
Source: Bloomberg Finance LP, Deutsche Bank

Figure 14: Chinese Ferronickel imports (kt)
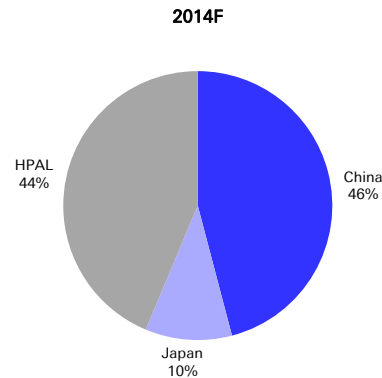

Source: NBS, Deutsche Bank

The best window into the Philippine mined ore market is through Nickel Asia. The company supplies high grade ore to Japan and China, and low grade ore to China and its partly owned High Pressure Acid Leach (HPAL) facility. Shipments of high grade Saprolite have increased by a CAGR of 17% since 2009, and have increased by 23% H1'14 versus H1'13. Shipments of low grade Limonite have increase by more; a CAGR of 23% since 2009, and 47% H1'14 versus H1'13. The main increase is however in the lower grade Limonite category, which suggests that the increase in shipments will not necessarily translate into NPI production, and that some of the Limonite is being imported by China for the iron units and not necessarily the nickel units.

Figure 15 Shipments of nickel ore from Nickel Asia (wet Mt)
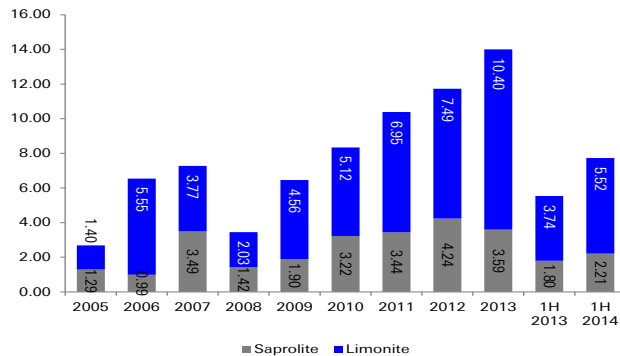
Source: NAC, Deutsche Bank

Figure 16: End destination of Nickel Asia's ore production in 2014F

Source: NAC, Deutsche Bank

The grade profile of Nickel Asia's shipments suggest that Saprolite grades are declining by 3.5 – 4% per annum, and Limonite grades by 2.5 – 3% per annum. The level of grade decline is slightly higher than copper which is c.3%. Simply put, any increase in tonnage from the Philippine will also have to account for the degradation of the ore quality, making significant growth in contained nickel units a challenge, again similar to the copper industry. Our conclusion is that Philippine shipments of **nickel units** will continue to increase, but at a slower pace. More lower grade material will be shipped but not all of it suitable for the NPI industry without being augmented with pure nickel cathode.

Nickel Asia's shipment profile also highlights the seasonality of the Philippine industry, with over 70% of exports in Q2 and Q3. The recent rally in the Nickel
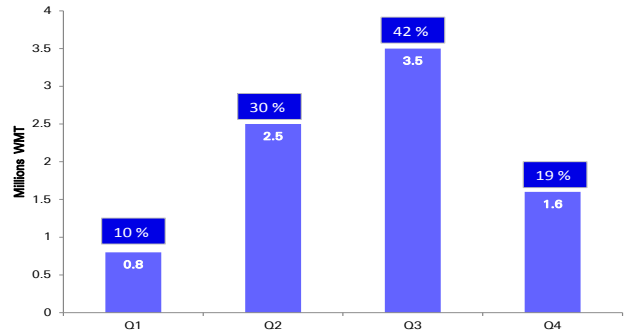
prices is partly driven by the expectation of low Philippine shipments over the next four to five months. We expect Nickel prices to demonstrate their usual strong Q1 performance, followed by a weaker Q2 as shipments from the Philippines resume.

Figure 17: NAC's product grades since 2009
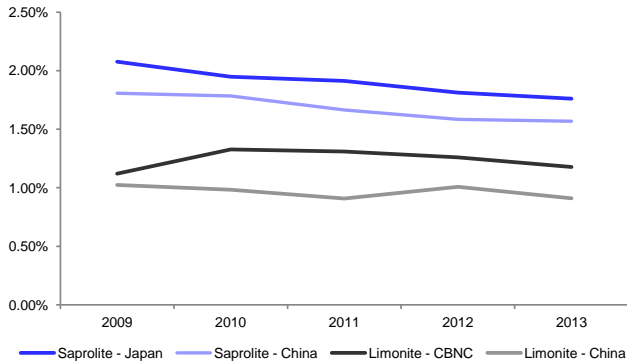
Source: NAC, Deutsche Bank

Figure 18: Shipment seasonality for NAC

Source: NAC, Deutsche Bank

Indonesian smelting capacity will come, but at a slower pace

Progress at the greenfield Indonesian smelter projects has been much slower than initially expected. The notable exception is that of Tsingshan. Tsingshan and its local partner, Bintang Delapan, in Sulawesi have indicated that commissioning started in October, and that production will commence in Q1'15. Initial capacity is expected to be 30ktpa nickel in NPI. Antam's FeNi IV construction is well underway and should be on-stream by mid-2015. The original FeNi I furnace has been completely removed and the addition of the new furnace will increase production capacity to between 27ktpa and 30ktpa nickel in FeNi. The capacity of FeNi II, III and IV were indicated as 8kt, 9kt and 9kt, respectively, with a view that FeNi III and IV could potentially achieve 11ktpa. We think that Indonesian mined output will now closely match smelting output. However, even if we assume that the all the identified probable Indonesian smelter projects come on line (highly doubtful as we outlined), a gap still remains as shown by the grey bar in the chart below:

Figure 19: Probable Indonesian smelting projects
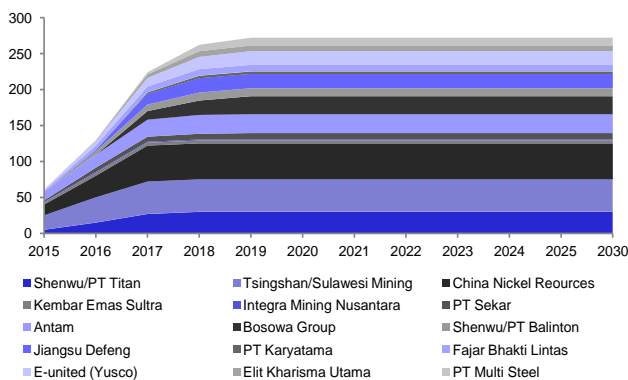
Source: Wood Mackenzie, Deutsche Bank

Figure 20: Indonesian mined and refined contained Nickel supply

Source: Wood Mackenzie, Deutsche Bank

Chinese pricing indicators – Rebounding on the back of an LME recovery.

Before the Indonesian ore ban, NPI, laterite ore and LME refined Nickel prices roughly tracked each other, although the LME price has tended to lead NPI and

Ore prices, especially on the way down. After it became apparent that the ban was permanent, ore prices led both LME and NPI prices up. The recent recovery in both NPI prices and ore prices has been led by a recovery in LME prices, although prices are still not quite at the level where they were in September. This suggests that the broad recovery may be sentiment driven as opposed to a real tightness in China.

Figure 21: LME Nickel, NPI and nickel ore prices rebased to 100
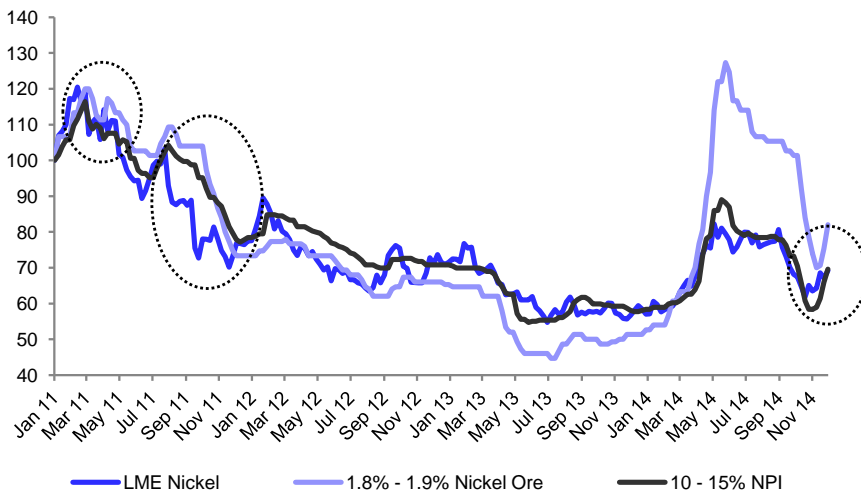
Source: Bloomberg Finance LP, Deutsche Bank

Figure 22: Global nickel supply and demand model

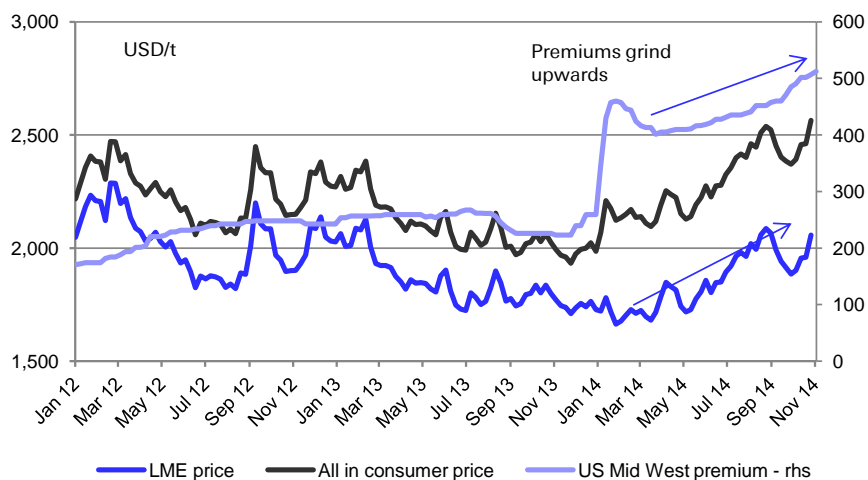|		2010	2011	2012	2013	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Australia mine production	kt	180.9	191.2	237.3	232.6	271.9	261.3	240.2	215.5	199.9	195.5	194.9
Production growth		*2.7%*	*5.7%*	*24.1%*	*-2.0%*	*16.9%*	*-3.9%*	*-8.1%*	*-10.3%*	*-7.3%*	*-2.2%*	*-0.3%*
New Caledonia mine production	kt	130	129	138	152	165.7	189.2	218.8	238.6	246.9	248.5	247.9
Production growth		*40.0%*	*-0.5%*	*7.1%*	*10.2%*	*8.7%*	*14.2%*	*15.6%*	*9.0%*	*3.5%*	*0.6%*	*-0.2%*
Canada mine production	kt	154.7	215.3	200.3	222.5	226.8	234.0	245.2	240.9	235.0	235.1	227.8
Production growth		*18.7%*	*39.1%*	*-6.9%*	*11.1%*	*1.9%*	*3.2%*	*4.8%*	*-1.8%*	*-2.5%*	*0.1%*	*-3.1%*
Russia mine production	kt	278.8	274.3	259.3	243.4	235.0	237.6	232.3	216.5	220.6	218.8	219.3
Production growth		*2.7%*	*-1.6%*	*-5.5%*	*-6.1%*	*-3.5%*	*1.1%*	*-2.2%*	*-6.8%*	*1.9%*	*-0.8%*	*0.2%*
Brazil mine production	kt	55.0	95.4	125.6	93.0	119.2	107.6	124.3	130.5	130.3	134.0	137.3
Production growth		*24.7%*	*73.4%*	*31.7%*	*-25.9%*	*28.1%*	*-9.7%*	*15.4%*	*5.0%*	*-0.2%*	*2.9%*	*2.4%*
Indonesia mine production	kt	285.8	546.3	631.3	822.2	175.1	178.9	233.0	281.9	375.6	475.6	475.6
Production growth		*44.5%*	*91.2%*	*15.5%*	*30.2%*	*-78.7%*	*2.2%*	*30.2%*	*21.0%*	*33.2%*	*26.6%*	*0.0%*
Philippines mine production	kt	175.1	205.9	220.0	236.0	306.7	324.4	339.3	314.7	314.7	314.7	314.7
Production growth		*23.7%*	*17.6%*	*6.8%*	*7.3%*	*30.0%*	*5.8%*	*4.6%*	*-7.3%*	*0.0%*	*0.0%*	*0.0%*
Estimated Ni in Ore - for Ni Pig Iron	kt	356.0	651.9	750.0	944.8	341.6	350.0	415.2	437.3	530.9	630.9	630.9
Production growth		*43.6%*	*83.1%*	*15.0%*	*26.0%*	*-63.8%*	*2.4%*	*18.6%*	*5.3%*	*21.4%*	*18.8%*	*0.0%*
World mine production - base case	**kt**	**1,648**	**2,063**	**2,259**	**2,468**	**1,846**	**1,961**	**2,126**	**2,157**	**2,214**	**2,295**	**2,279**
World mine production growth rate		*15.9%*	*25.1%*	*9.5%*	*9.3%*	*-25.2%*	*6.2%*	*8.4%*	*1.5%*	*2.6%*	*3.7%*	*-0.7%*
Possible projects					0	17	50	87	152	164	180	205
Disruption allowance					0	-59	-64	-65	-66	-69	-68
Total world mine production	**kt**	**1,648**	**2,063**	**2,259**	**2,468**	**1,864**	**1,952**	**2,149**	**2,245**	**2,461**	**2,556**	**2,565**
Total Smelter output	**kt**	**1,507**	**1,676**	**1,808**	**2,009**	**1,966**	**1,828**	**1,944**	**2,125**	**2,273**	**2,294**	**2,342**
Implied smelter recovery	%	*91%*	*81%*	*80%*	*81%*	*106%*	*94%*	*90%*	*95%*	*92%*	*90%*	*91%*
Total refinery capacity	**kt**	**2,157**	**2,549**	**2,854**	**3,022**	**3,069**	**2,792**	**2,647**	**2,592**	**2,592**	**2,592**	**2,592**
Implied utilisation	%	*67.9%*	*64.6%*	*61.8%*	*66.5%*	*64.6%*	*69.6%*	*72.9%*	*78.1%*	*84.6%*	*88.2%*	*88.6%*
Base case refinery output	**kt**	**1,465**	**1,646**	**1,764**	**2,010**	**1,980**	**1,862**	**1,770**	**1,757**	**1,880**	**1,966**	**1,975**
Possible projects						3	80	159	267	311	320	320
Total refined availability / Output	**kt**	**1,465**	**1,646**	**1,764**	**2,010**	**1,984**	**1,942**	**1,929**	**2,025**	**2,191**	**2,286**	**2,295**
World refined availability growth rate		*9.4%*	*12.4%*	*7.1%*	*14.0%*	*-1.3%*	*-2.1%*	*-0.7%*	*5.0%*	*8.2%*	*4.3%*	*0.4%*
Implied Refinery recovery from mined	%	*88.9%*	*79.8%*	*78.1%*	*81.4%*	*106.4%*	*99.5%*	*89.8%*	*90.2%*	*89.0%*	*89.4%*	*89.5%*
Global stainless production	mt	33.0	34.6	36.0	39.3	42.8	44.8	46.2	48.9	50.6	52.4	54.2
Growth		*26.0%*	*4.6%*	*4.2%*	*9.3%*	*8.8%*	*4.8%*	*3.0%*	*5.8%*	*3.5%*	*3.5%*	*3.5%*
Austenitic stainless demand	mt	23.9	25.1	26.5	29.3	31.7	33.0	33.7	35.9	37.5	38.8	40.1
Austenitic ratio		*72.4%*	*72.6%*	*73.5%*	*74.4%*	*74.0%*	*73.5%*	*73.0%*	*73.5%*	*74.0%*	*74.0%*	*74.0%*
Total nickel demand for stainless	kt	1,714	1,788	1,825	2,003	2,154	2,225	2,268	2,407	2,500	2,578	2,660
Nickel content		*7.2%*	*7.1%*	*6.9%*	*6.8%*	*6.8%*	*6.8%*	*6.7%*	*6.7%*	*6.7%*	*6.7%*	*6.6%*
Nickel scrap consumption	kt	725	718	714	755	818	868	896	963	1,012	1,057	1,104
Scrap ratio		*42.3%*	*40.2%*	*39.2%*	*37.7%*	*38.0%*	*39.0%*	*39.5%*	*40.0%*	*40.5%*	*41.0%*	*41.5%*
Primary Nickel in Stainless	kt	989	1070	1110	1248	1335	1357	1372	1444	1487	1521	1556
Primary Nickel in Non-Stainless	kt	510	536	568	575	604	622	641	660	673	687	701
Total world nickel consumption	**kt**	**1,499**	**1,606**	**1,678**	**1,823**	**1,939**	**1,979**	**2,013**	**2,105**	**2,161**	**2,208**	**2,256**
World nickel consumption growth	%	*16.7%*	*7.1%*	*4.5%*	*8.7%*	*6.4%*	*2.1%*	*1.7%*	*4.6%*	*2.7%*	*2.2%*	*2.2%*
Adjustments												
Balance	**kt**	**-33.9**	**40.4**	**85.8**	**186.6**	**44.1**	**-37.4**	**-84.0**	**-80.0**	**30.4**	**78.0**	**38.9**
Reported stocks	kt	136.9	177.2	263.0	449.6	493.7	456.4	372.3	292.3	322.8	400.8	439.7
Stock to consumption ratio	wks	4.75	5.74	8.15	12.82	13.24	11.99	9.62	7.22	7.77	9.44	10.13
Annual Average Prices	USD/t	21,745	22,888	17,591	15,102	16,990	19,125	23,500	26,000	25,572	25,144	24,716
Annual Average Prices	USD/lb	9.87	10.38	7.98	6.85	7.71	8.68	10.66	11.80	11.60	11.41	11.21

Source: Deutsche Bank, Wood Mackenzie

Aluminium: Sustainable At USD2,500/tonne

- We think the peak in regional premiums, modestly rising Chinese semis exports and continued supplier discipline will be the main points of debate over the next eighteen months. How these aspects evolve, will determine the outcome of aluminium pricing.

- Supply discipline, both in China and the world ex-China, assisted by strong demand growth has ensured a balanced market in 2014. We forecast this trend to continue, resulting in a deficit market for 2014. We forecast this trend to continue, resulting in a deficit market for 2015, which will support prices at the current level. We see modestly easing premiums offset by rising LME prices. The tighter market in 2015, should see upside to current levels, but price c.USD200 – 300/t higher will lure metal out of storage and encourage restarts, capping the upside.

The 3-month aluminium price hit a floor of USD1,677/t at the beginning of March 2014, before peaking at USD2,107/t in September 2014. The all-in aluminium price (including the regional premium) peaked at the same time at a price of USD2,538/t. The combination of robust global demand and producer discipline has provided the foundations for the recovery in aluminium prices, with the degree of global annual surpluses being significantly reduced.

Figure 1: All-in aluminium prices at a three year high.

Source: Bloomberg Finance LP, Deutsche Bank

All-in aluminium price at a near-term peak

Although we forecast aluminium demand growth to slow in 2015, we still expect demand to remain above the 5% growth level. Supplier discipline from many of the established producers in 2013 and 2014, has created the market conditions for an all-in price, which we believe is sustainable at USD2,500/t. However, we do not expect significant upside from these levels, with price rallies limited to USD300/t in our view. We believe the aluminium market will be dominated by the following themes over the next eighteen to twenty four months:

- The return to "normal" premiums? We expect premiums to peak in 2015 and to erode slowly over the course of the year, but perhaps not quite to levels considered historically normal.

- A flood of Chinese exports? We expect that Chinese aluminium exports will follow the example of steel, and increase modestly over the course of 2015. However, the threat of anti-dumping legislation and Chinese government policy combined with a tighter domestic balance, will constrain these exports to a steady stream, as opposed to a deluge.

- Major producer discipline to hold, but perhaps not so the smaller producers. We expect modest supply growth over the next few years in both China, and the world ex-China. Although many of the smelter closures have been permanent, there is idle capacity which could be restarted, capping some of the upside in pricing.

Although we consider these topics separately, they are in many aspects inter-related.

The end of peak premiums in 2015?

The steadily rising premiums to record levels have been driven by the increasing physical tightness in the aluminium market. Simply put, it's becoming harder to obtain prompt delivery metal. Our view is that this rise was, and is being caused by a confluence of factors, and not a single factor. The current "two hemisphere structure" of the industry with China accounting for roughly 50% of the market and the ROW the other 50% is also the prime reason as to why this physical tightness has manifested itself in the premium market, and not in the underlying aluminium price. The rise in physical premiums started in the US, and was evident in the Mid West premium specifically. However, other regional premiums soon followed, as an attractive arbitrage developed.

Figure 2: Aluminium premiums continue to rise

Global premiums being pulled higher by the US
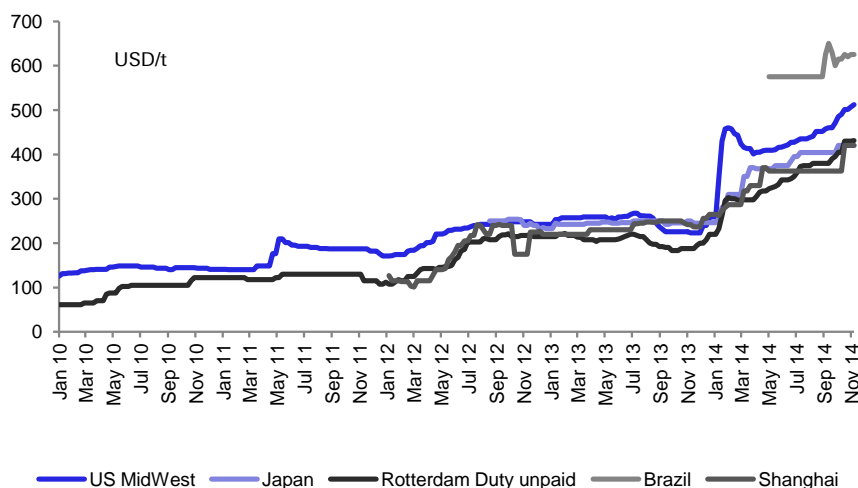
Source: Bloomberg Finance LP, Deutsche Bank

Our view on why the US was the epicentre in the rise of premiums is as follows:

- The combination of improving demand in the US and a number of concurrent smelter closures, created a significant regional deficit. The smelter closures were due to poor profitability.

- The persistent contango in the market has meant that the holding cost of physical aluminium is very low, or in some instances even a profitable enterprise. This has restricted the flow of aluminium from inventories, both on and off-exchange

- The current LME load out rules (a maximum load out of 3,000 tonnes for a warehouse location with over 900kt of metal) exacerbated the physical tightness by creating queues. This allowed warehouse companies to offer incentives in order to keep inventories locked up, in order to maximize revenue.

When considering all of the factors which have contributed to high premiums, we think the conditions in 2015 will not be as favourable as in 2013 or indeed most of 2014.

Industry profitability has improved through a combination of higher prices and lower costs. At the current all-in price of c.USD2,500/t, most of the aluminium industry is cash positive. Average industry costs have declined due to weaker producer currencies, price linked input cost reductions and general efficiency improvement measures from management teams, which has led to a flattening and lowering of the industry cost curve. The industry can now tolerate lower premiums from a profitability perspective. Given our view that both the US market and the overall market balance will be in a deficit, we think that the downside risk to the all-in price is limited and this extends to the premiums as well. We forecast US production to remain stable over the course of 2015, before accelerating in 2016 and 2017E as capacity is restarted. Due to the continuing regional market deficit, we think a collapse in premiums is unlikely however.

Improved industry profitability would suggest that the industry can tolerate lower premiums as long as the LME price does not decline at the same time.

Figure 3: Flattening aluminium cost curves

Legend: 2014, 2013, 2012, 2012 average all in price, 2013 average all in price, Spot all-in aluminium price
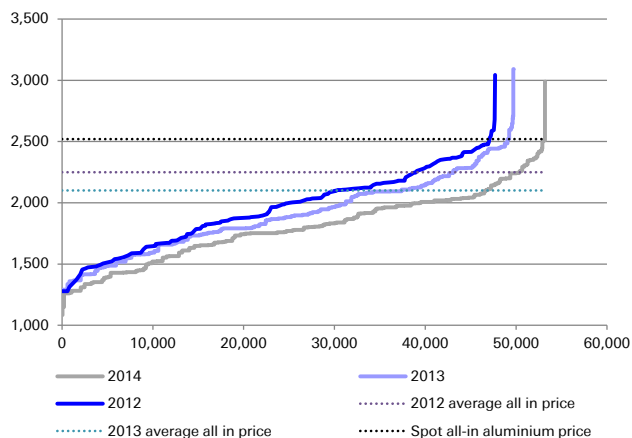
Source: Wood Mackenzie, Deutsche Bank

Figure 4: Aluminium production in the US
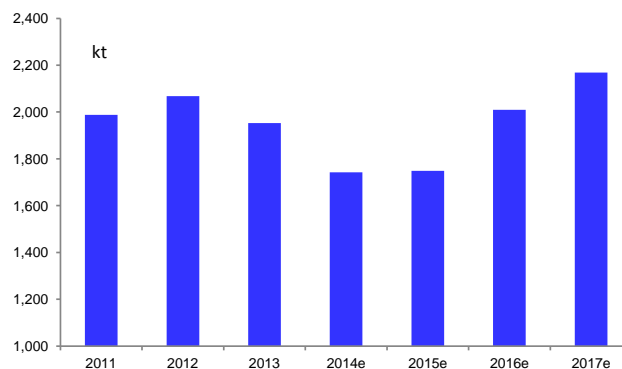
Source: Deutsche Bank

The aluminium forward curve has been in a consistent contango for most of the period since the beginning of 2012. However, since August this year, both near-term and longer-term spreads have tightened with the market currently in a near-term (3-month) backwardation. The current near-term backwardation and tightening of longer-term spreads makes the holding of physical metal more expensive. This may prompt market participants to allow financing trades to unwind, ensuring more physical metal is available in the market.

Holding the physical has become more expensive.

Figure 5: Aluminium time spreads
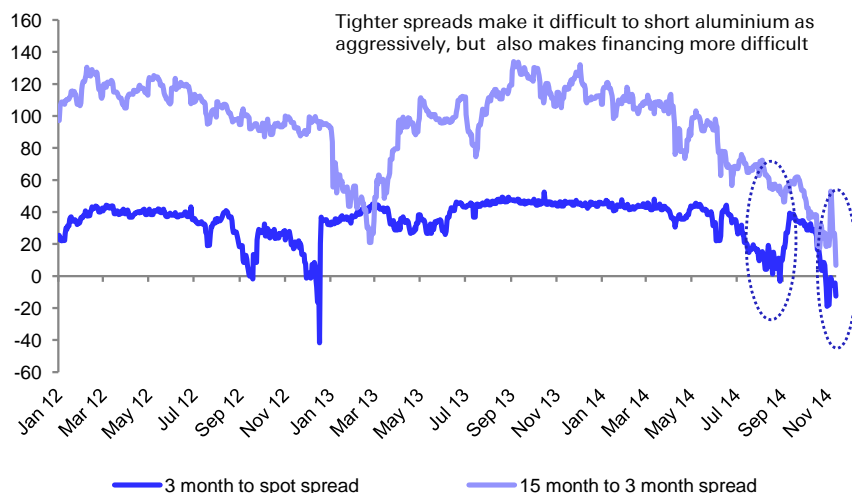
Source: Bloomberg Finance LP, Deutsche Bank

To queue or not to queue

The LME has been responsive to criticism about the building queues in some of its warehouses (Detroit and Vlissingen in the case of aluminium), and in 2010 commissioned Europe Economics to prepare an assessment on the adequacy of LME load-out rates. Based on the outcome of these findings, the LME increased minimum load-out rates from 1,500 t/day to a schedule based on absolute tonnages in the warehouse:

- <300kt = 1,500t/day

- 300kt – 600kt = 2,000t/day

- 600kt – 900kt = 2,500t/day

- >900kt = 3,000t/day

Subsequently, the LME introduced additional requirements on warehouse companies to load-out a minimum quantity of a low volume metal (500 tons) stored alongside a dominant metal. This rule was introduced so that metals such as copper, nickel, tin and lead were not trapped in a queue behind aluminium and zinc for instance.

The new proposal, (originally proposed in July 2013) is effectively a Linked Load-In / Load-Out rule and seeks to address queues specifically by focusing on off-warrant (cancelled warrant) metal, whilst still imposing minimum load-out rates based on absolute warehouse stocks. The "newly" proposed regulations will impact warehouses with queues greater than 100 days. These affected warehouses will have to load out 0.5x any new metal placed on warrant in a day up to the normal daily load-out rate plus any new metal placed on warrant over and above the normal daily minimum load-out rate, in addition to the normal minimum load-out rate. So if the normal load-out rate is 3,000/day, and the average load-in rate is 3,500t/day, the warehouse will have to load out (3,000+0.5x3,000+(3,500- 3,000)=5,000)t/d in the next quarter.

We estimate that the Detroit queue length peaked at 765 days in Sept 2014. Absolute inventories peaked in January 2014, but cancelled warrants have also increased to nearly 100% of the inventory. Subsequently, the queue length has fallen in line with falling inventories. Part of the reduction in inventories has been due to robust US demand, but also the pre-emption of the likely warehousing rule change on the LME, subsequent to the successful high court challenge. Whilst there has been a reasonable correlation between the US Mid West premium and the implied queue premium (ie the cost of drawing metal out of the Detroit warehouse), this correlation has broken down since the middle of this year. This suggests that queue length has become less of an influencing factor on premiums.

Figure 6: Inventory and cancelled warrants at Detroit	Figure 7: Implied queue premium versus the US Mid West premium
Source: Bloomberg Finance LP, Deutsche Bank	Source: Bloomberg Finance LP, LME, Deutsche Bank
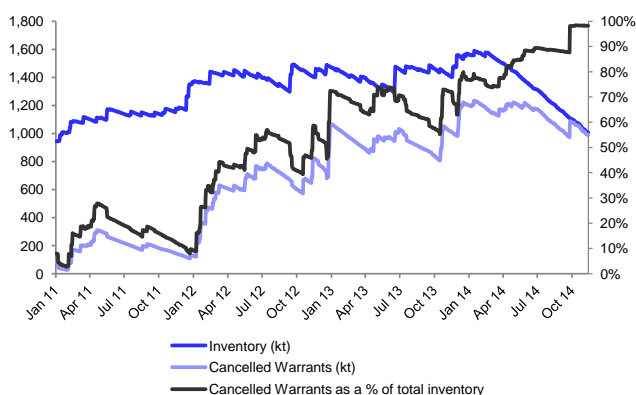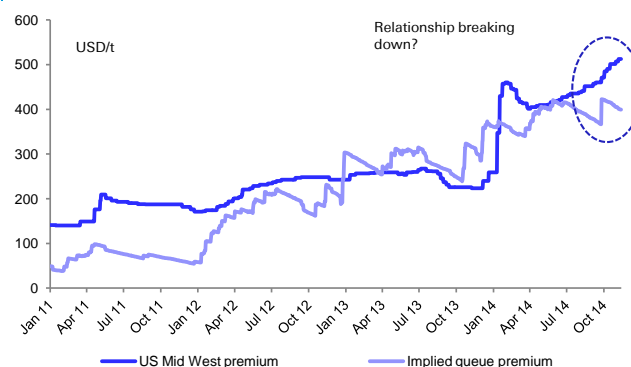
We summarise all of these factors in the matrix below, and conclude that the market conditions for high premiums are easing, but that the deficit market in the US and the world ex China will ensure that premiums remain well supported. We forecast premiums to remain around the USD500/t level until the end of 2014 and into the early part of 2015, but then to decline over the course of the year to below USD400/t.

Figure 8: A qualitative matrix assessing the conditions for increasing / decreasing premia in the US

|	2012	2013	2014	2015E
Regional deficit caused by:	Modest deficit	Deficit	Significant deficit	Significant deficit
Strong and recovering demand	Very strong	Flat	Strong	Strong
Profitability related closures	Closures begin	Closures gain momentum	Closures slow significantly	Possible restarts
Balanced by another region in surplus:	Significant surplus	Significant surplus	Significant surplus	Small surplus
Physical constraints in obtaining metal:	Yes	Significant	Significant	Easing constraints
Low holding cost due to a persistent contango	Persistent contango along the curve	Persistent contango along the curve	Spreads contract over the course of the year	Sustained backwardation?
Extended waiting times to withdraw metal from Warehouses	High levels of On warrant material	High levels of On warrant material	High levels of On warrant material	Declining queues, partly due to LME rule change, and partly due to strong demand
Impact on premiums (annual appreciation)	42%	6%	98%	????

Source: Deutsche Bank

China will remain over-supplied, but the surplus is diminishing

In 2012 and 2013, the aluminium market was characterized by a surplus in China and a deficit market in the world ex-China. The global balance however, was still in a modest surplus. Metal exports in the form of semi-fabricated products helped "balance" the market in the world ex China. We think this broad dynamic will continue over the next three to four years. However, we expect the ROW deficit to be far more significant in 2014E and 2015E, and due to the slow-down of new capacity additions in China, the China surplus is forecast to diminish. The net impact is a global aluminium market deficit for 2014 – 2016E. Post 2016E, we expect global capacity additions (both in China and the world ex-China) to accelerate once more, leading to a modestly over-supplied Chinese market, a balanced Rest-of-the-World market and a modest Global balance.

Figure 9: Aluminium supply –demand balance (China and the rest of the World)

Source: Wood Mackenzie, Deutsche Bank

A global deficit for 2014 – 2016E
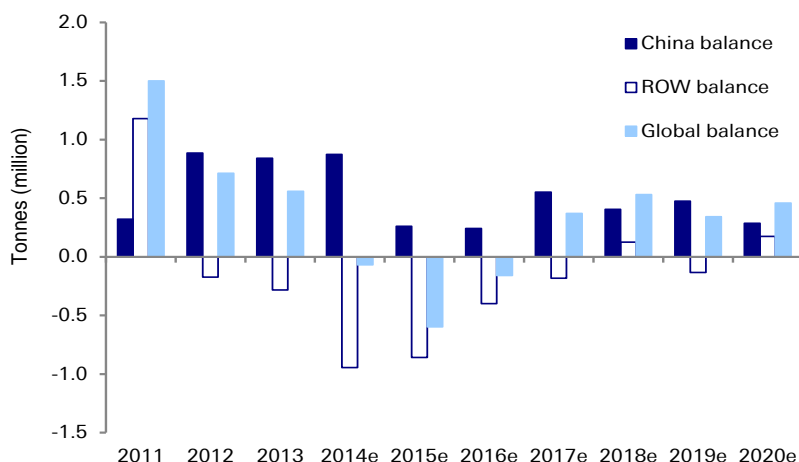
We continue to think that the Chinese market will remain roughly balanced over the longer-term, with surpluses being opportunistically exported depending on the prevailing tax regime and the arbitrage between the SHFE and LME prices. We do not think that the Chinese aluminium producers will set themselves up as an export focused industry, due to the uncertainty of "anti-dumping" measures from the rest of the world and possible tax changes imposed by the Chinese government.

We outline the arbitrage or more correctly the profit and loss of a Chinese producer, exporting either primary aluminium, which attracts an export tax of 15%, or semi-fabricated products, which attracts a 13% rebate. We include the US Mid West premium in the received price calculation for a Chinese exporter and the Shanghai CIF premium on ingots. We also assume that there is no further conversion premium arbitrage in our forecasts, and that shipping costs are negligible. Essentially, we assume that semi-fabricated products are merely exported as a relief valve for the primary aluminium market. It is clear that since the beginning of 2009, it was mostly unprofitable to export primary aluminium, whilst the opposite is the case for semi-fabricated products where it is almost always economic to export semi-fabricated products. The profitability of the trade has increased by USD500/t since the beginning of the year.

Figure10: Primary aluminium P&L for a Chinese exporter
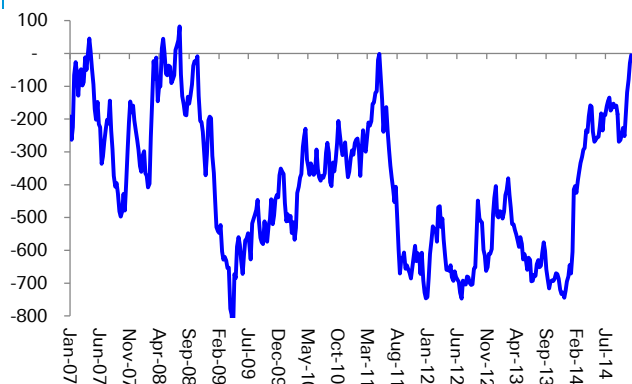
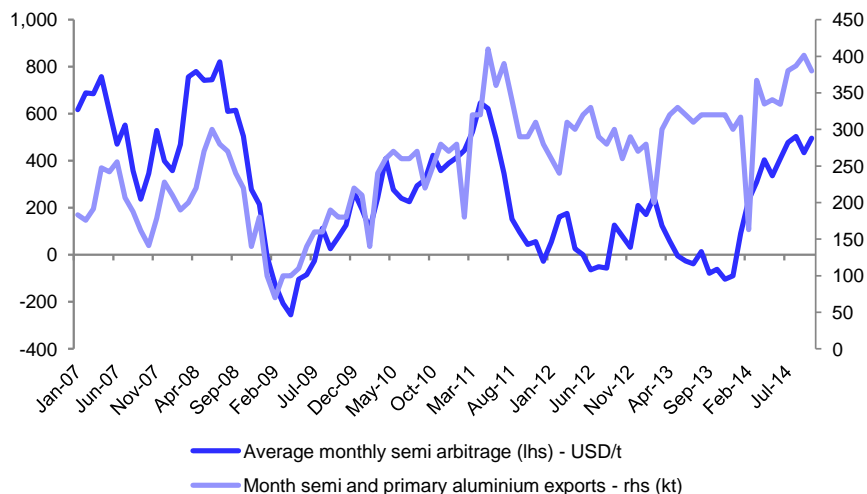*Source: Bloomberg Finance LP, Deutsche Bank*

Figure 11: Semi fabricated product P&L for a Chinese exporter
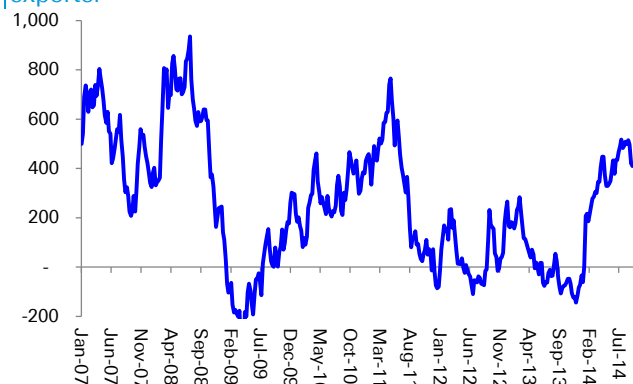
Source: Bloomberg Finance LP, Deutsche Bank

The arbitrage SHFE to LME clearly drives the behavior of Chinese exports. As the arbitrage has increased so too have the monthly China aluminium exports. We expect the level of Chinese semi-fabricated products to continue rising, albeit slowly over the course of the next eighteen months. We do not expect a deluge of exports however. Although the Rest of the World deficit is forecast to remain above 500kt, we estimate the China surplus will shrink, especially in 2015 and 2016E. Simply put, the deficit in the Rest-of-the World will continue to draw metal out of China, but the tighter domestic market will in turn constrain the flow.

Figure 12: Estimating the profit on Chinese aluminium semi exports versus the level of exports"

Average monthly semi arbitrage (lhs) - USD/t
Month semi and primary aluminium exports - rhs (kt)

Source: Bloomberg Finance LP, Deutsche Bank

This "relief valve" behaviour has already been visible in the Steel market this year, where exports have increased 43% YoY. In our discussions with Chinese steel producer's exports of steel remains largely opportunistic, with sales being conducted via traders. None of the larger steel manufacturers are actively pursuing an export strategy as yet, with a reluctance to do so being driven by the deterrent of anti—dumping measures. With Chinese steel exports rising by 42% YTD, a cavalry of tariff action may be in the offing. Many countries

including India have talked about the prospect of constraining imports through a revision of tariffs/safeguard duties. Alternatively, China may pre-empt this action by reclassifying its export rebates on boron added carbon steel, which lie at the center of global attention. Chinese steel companies have been adding boron to carbon steel to reclassify same as alloy steel to enjoy attractive tax rebates. We think this dynamic will apply to aluminium. Furthermore, should the export of primary aluminium via "semi-fabricated" products become much more significant, we would expect some action from the Chinese authorities, either lowering or removing the export rebate.

Figure 13: Chinese steel product exports (monthly)

Source: Bloomberg Finance LP, Deutsche Bank

Rising exports and a temporary "relief valve"
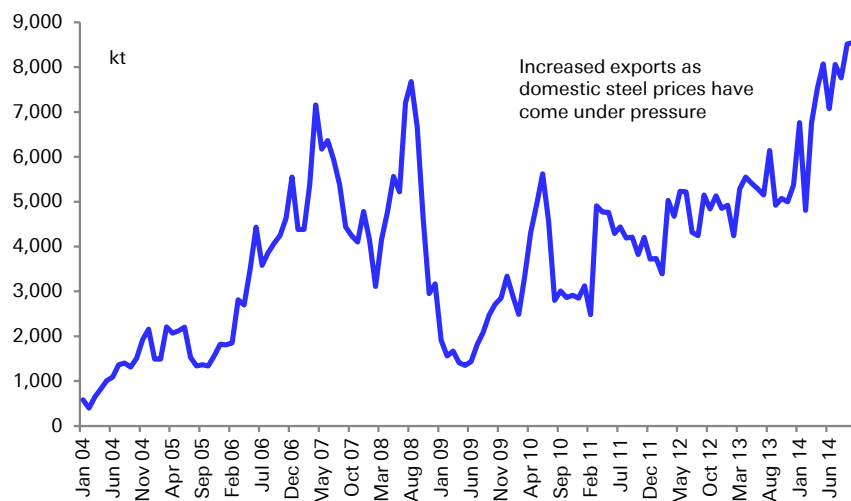
Although Chinese capacity additions will fall short of the additional demand tonnage in 2015E, we think this situation is temporary, with the combination of selected restarts (800kt on the latest estimate) and continued capacity growth in the Xinjiang province, increasing supply additions back in the range of 2 – 2.5Mtpa.

Figure 14: New Aluminium capacity in the Xinjiang province

Company	2014	2015F	2016F	2017F	2018F
Xinfa	1.35	1.35	1.9	1.9	1.9
Tianshan	1.1	1.35	1.58	1.8	1.8
East Hope	0.75	1.03	1.3	1.53	2.2
Shenhuo	0.8	0.8	0.8	0.8	0.8
Kia	0.6	0.9	1.13	1.35	1.35
Jiarun	0.34	0.68	0.9	0.9	0.9
Tianlong	0.15	0.25	0.25	0.25	0.25
Yuhong	0	0.2	0.2	0.2	0.2
Total	**5.09**	**6.56**	**8.06**	**8.73**	**9.4**
Additional capacity		**1.47**	**1.5**	**0.67**	**0.67**

Source: Company reports, Deutsche Bank

The rise of the Xinjiang province is highlighted in Figure 15, with the province contributing to over 80% of all capacity additions in 2014 and 2015E. Although, we forecast the rate of additions to slow and hence the contribution of Chinese capacity additions to decline, we think there is upside to this region, at the expense of other regions. The relatively low water consumption in a dry region, is a good way to leverage the provinces vast coal resources. The resource is effectively a "stranded" power source.

Figure 15: Xinjiang capacity additions in the context of China as a whole
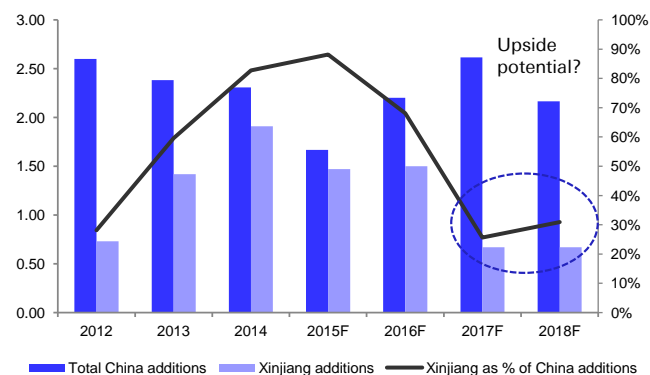
Source: Wood Mackenzie, Deutsche Bank

Figure 16: Supply matching demand in China
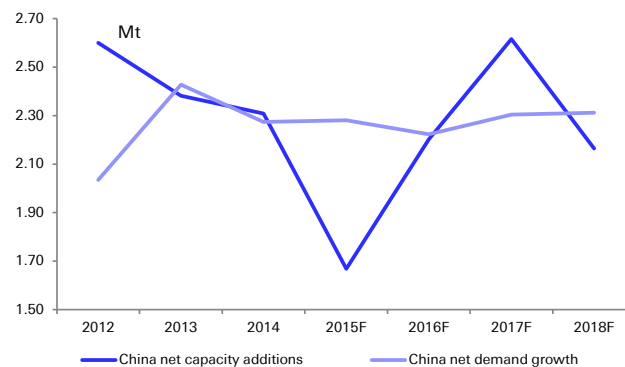
Source: Wood Mackenzie, Deutsche Bank

Producer discipline holds for now

Producer discipline, especially by the larger producers in the world ex-China has contributed significantly to the steady rise in regional premiums and the welcome recovery in the LME price. The steady recovery in producer margins is likely to encourage continued supply discipline from the larger producers such as Alcoa and RUSAL. We forecast the average industry EBITDA margin to improve from the low of c.USD200/t in 2012 to c.USD400/t in 2014E. Given our forecast of higher prices in 2015E, we expect margins to continue improving to c.USD500/t.

Figure 17: Improving producers margins (EBITDA/t)
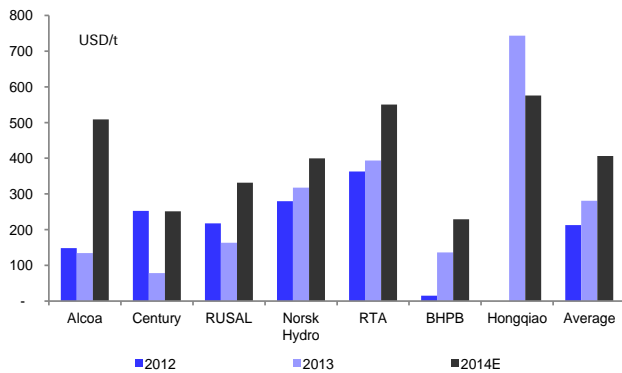
Source: Company reports, Deutsche Bank

Figure 18: …but nowhere near back to peak pre-crisis levels.
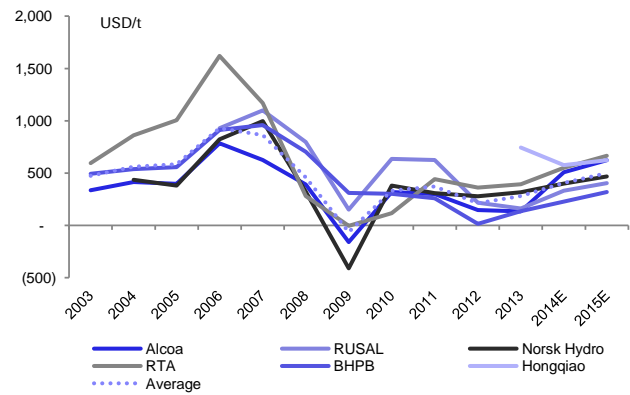
Source: Company reports, Deutsche Bank

We forecast growth in aluminium supply in the world ex-China to commence after three years of declines or flat production. New capacity in the Middle East and India will start to offset the c.3Mt of voluntary supply cuts since the end of 2011. There is some downside risk (i.e. upside risk to the ROW deficit) to the ramp-up of Indian production given the widespread coal block allocation. Many of these coal blocks had been earmarked for captive power plants in the aluminium industry. So far company commentary has suggested that capacity will continue to ramp up with the use of imported coal and the procurement of domestic coal via e-auctions.

Figure 19: Aluminium capacity additions in the ROW.
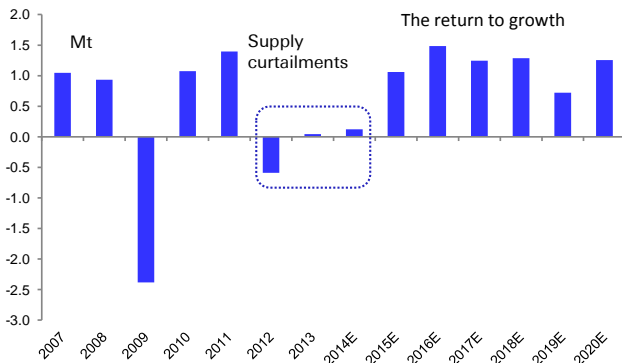
Source: Deutsche Bank, Wood Mackenzie

Figure 20: Indian and Middle East capacity growth
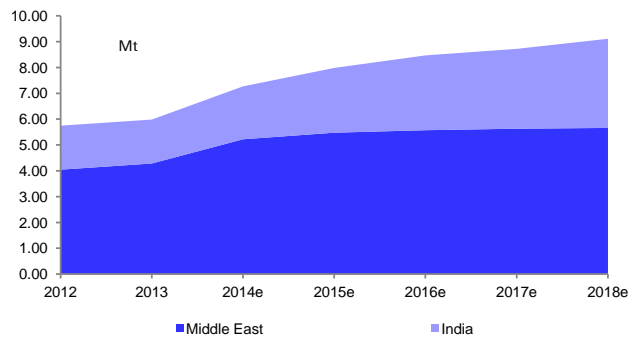
Source: Deutsche Bank, Wood Mackenzie

The aluminium industry responded very well to the weak price environment, with a total of c.3Mt in supply cuts in the World ex China. The critical masses in announcements were from August 2013, with the larger producers Alcoa and in particular UC RUSAL being at the forefront of the closures. Key regions for closures are Brazil, the USA and Russia, with some older uneconomic capacity in Europe being closed permanently. We estimate the capacity closure in the US is close to 800kt.

Figure 21: Aluminium closures in the ROW since October 2011

Country	Company	Smelter	Recent Output	Curtailment	Effective date	Comments
Netherlands	Klesch Group	Vlissingen	230	230	Dec-11	Bankruptcy - Smelter to be demolished
UK	Rio Tinto	Lynemouth	178	178	Mar-12	Permanent shutdown
Australia	Hydro	Kurri Kurri	180	60	Mar-12	
New Zealand	Rio Tinto	NZAS	355	45	May-12	Due to high spot power price
Australia	Hydro	Kurri Kurri	120	120	Jun-12	Full S/D of remaining lines by August
Spain	Alcoa	Aviles	93	30	Jun-12	
Spain	Alcoa	La Coruna	87	33	Jun-12	
Montenegro	Kombinat Alum	Podgorica	120	60	Jun-12	
USA	Ormet	Hannibal	270	90	Aug-12	
Bosnia	Aluminij	Mostar	130	17	Jul-12	High power price - Low aluminium price
Italy	Alcoa	Pt. Vesme	150	150	Nov-12	Completed Nov 2
Russia	Rusal	Multiple	0	50	Dec-12	
Canada	Alcoa	Baie Comeau	390	105	Aug-13	Soderberg potlines targeted for demolition
USA	Ormet	Hannibal	270	90	Aug-13	Total curtailed now 180kt/a
USA	Alcoa	Massena E	125	40	Sep-13	Permanent closure of 40kt/a line
Brazil	Alcoa	Pocos de Caldes	96	32	Sep-13	Temporary
Brazil	Alumar	San Luis	447	92	Sep-13	Temporary
Russia	Rusal	Russia -Multiple	0	350	Sep-13	Rusal cut 350kt/a in September
Russia	Rusal	Russia -Multiple	0	297	Oct-13	Additional cuts lifting total to 647kt/a
USA	Ormet	Hannibal	270	90	Oct-13	Permanent smelter closure announced Oct '14
Canada	Rio Tinto	Shawinigan	100	100	Nov-13	Permanent closure
Netherlands	Klesch Group	Aldel	100	100	Dec-13	Bankruptcy
USA	Alcoa	Massena E	84	84	Mar-14	Permanent closure of remaining lines
Sweden	Rusal	Granges	135	25	Mar-14	75 year old facility to be demolished
Japan	Nippon	Kambara	7	7	Mar-14	
Brazil	Alcoa	Pocos de Caldes	96	64	Apr-14	Temporary
Brazil	Alumar	San Luis	360	200	Apr-14	Temporary
So. Africa	BHP-Billiton	Bayside	100	100	Jun-14	Permanent closure
Australia	Alcoa	Pt. Henry	190	190	Aug-14	Permanent closure
Brazil	Hindalco	Ourto Preto	50	50	Dec-14	Company announced permanent closure
Total Curtailments			**3,079**			

Source: Deutsche Bank, Wood Mackenzie

We would however argue that there is an equivalent capacity of potential restarts, ie 3Mt. Although some of the closures that have been announced are permanent, there are other facilities that have latent capacity. Most of the restarts, will depend on pricing (both LME and premiums), favourable power contract terms and in some cases financing.

Figure 22: Potential capacity restarts

Country	Company	Smelter	Capacity (kt)	Possible start Date	Comments
USA	Alcoa	Rockdale	190	2017	A new operator with a new power contract
USA	Century	Ravenswood	175	2016	A new favourable power contract
USA	Glencore	Colombia Falls	170	2016	A new favourable power contract
USA	Ormet	Hannibal	180	2017	A new favourable power contract
Montenegro	Kombinat Alum	Podgorica	70	2017	Price dependent
Spain	Alcoa	Aviles	90	2017	Price dependent
Spain	Alcoa	La Coruna	90	2017	Price dependent
USA	Alcoa	Ferndale	50	2016	Price dependent
Brazil	Alcoa / BHP Billiton	Sao Luis	200	2016	Price dependent and power security
Brazil	CBA	Aluminio	110	2016	Price dependent and power security
Norway	Hydro	Soral	90	2015	Price dependent
India	NALCO	Angul	130	2015	Price dependent
NZ	RTA	Tiwai Point	40	2015	Price dependent
Tajikistan	Tajikistan	Tursunzade	370	2016	Price dependent
France	Trimet	St Jean de Maurienne	50	2014	Favourable power contract
Brazil	Alcoa	Pocos de Caldes	60	2017	Price dependent
USA	Alcoa	Wenatchee	40	2017	Price dependent
Russia	Rusal	Russia -Multiple	160	2017	Price dependent
Brazil	Vale	Valesul	90	2017	Price dependent
Australia	Alcoa	Portland	30	2017	Price dependent
Venezuela	CVG	Alcasa/Venalum	400	2017	Price dependent and Financing
Ghana	Ghana	Valco	140	2017	Price dependent and Financing
Norway	Hydro	Sunnal	50	2017	Price dependent
Sweden	Rusal	Sundsvall	20	2017	Price dependent
	Various		100	2017	Price dependent
Potential restart capacity			**3,095**		

Source: Deutsche Bank, UC RUSAL

So far, the larger producers have given no indication that they will restart capacity, preferring to focus on downstream profitability. However, we think that the biggest opportunity for restarts will lie in the US. We estimate the latent US capacity at c.750kt pa, which is roughly half our forecast demand growth for the region by the end of the decade. The combination of strong growth and the possibility of cheaper energy from rising tight gas output, could be the catalyst for restarts in the US. Producers such as Century Aluminium have shown a willingness to negotiate more favourable power contracts and with majority shareholder Glencore comfortable with running swing capacity, we think the company will continue pursuing opportunities in growing capacity. The company acquired Rio Tinto's Sebree smelter in April 2013 for USD61m, and in a replay acquired Alcoa's 50.3% stake in the Mt. Holly facility for USD68m. During February 2014, Sebree entered into a new market-based power supply contract with Kenergy and Big Rivers (similar to the agreement with Hawesville). We expect the company to renegotiate a more favourable supply contract (currently due to expire in YE15). Likewise, we expect Century to restart the Ravenswood facility after renegotiating labor and power contracts in order to have a more flexible cost structure (similar to the one used at Hawesville). Legislation passed in West Virginia allows an attempt for a new power contract at Ravenswood. Given Century's improving balance sheet and market conditions, a restart may be possible in 2015.

At an all-in-price of USD2,500/t, the restart economics for a high cost smelter (c.USD2,300/t cash cost) is marginal, generating c.6% IRR based on our assumptions. We outline our basic assumptions in the figure below:

Figure 23: The economics of restarting a high cost smelter

Parameters	Units										
Capacity	kt	170									
Start-up or purchase capex	USDm	100									
Cash cost	USD/t	2,293									
Other Costs	USD/t	1,350									
Power Cost	USD/MWhr	65									
Energy consumption	MWhr/t	14.5									
Energy cost	USD/t	943									
Fixed cost	%	35%									
Fixed cost	USDm	136									
LME price	USD/t	2,000									
Premium	USD/t	500									
Sustaining Capex	USD/t	35									
Sustaining Capex	USDm	6									
Tax rate	%	30%									
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Production	kt	102	153	170	170	170	170	170	170	170	170
Revenue	USDm	255	382.5	425	425	425	425	425	425	425	425
Cash Cost	USDm	288	364	390	390	390	390	390	390	390	390
EBITDA	USDm	-33	18	35	35	35	35	35	35	35	35
Depreciation	USDm	-10	-10	-10	-10	-10	-10	-10	-10	-10	-10
EBIT	USDm	-43	8	25	25	25	25	25	25	25	25
Tax	USDm	0	-2	-8	-8	-8	-8	-8	-8	-8	-8
Capex	USDm	-100									
Sustaining Capex	USDm	-5.95	-5.95	-5.95	-5.95	-5.95	-5.95	-5.95	-5.95	-5.95	-5.95
FCF	USDm	-139	10	22	22	22	22	22	22	22	22
IRR		**5.6%**									

Source: Deutsche Bank

However, the IRR is very sensitive to price and power costs. In the event that a smelter cannot renegotiate a better power tariff, a move up of USD100/t would increase the IRR to 19%, making the restart far more attractive. Likewise a reduction in power costs of USD5/MWhr increases the IRR by 10% to c.16%.

Based on this sensitivity analysis, we conclude that an all-in price of USD2,5000/t is a sustainable level over the next few years, with only a select number of restart opportunities being economic at this level. However, with a USD200/t rise in price, the economics look far more compelling, which suggest that any sustainable price level significantly above this level will trigger restarts.

Figure 24: Restart sensitivity to Power Costs
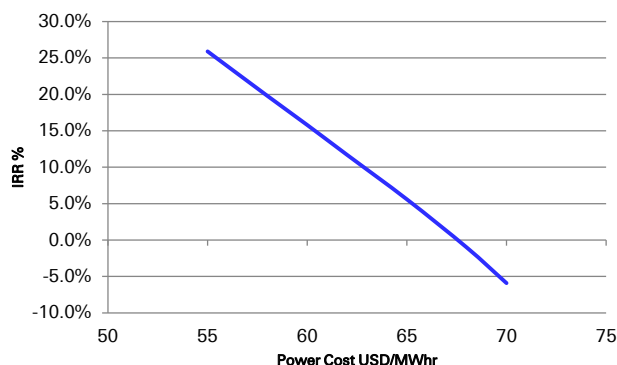
Source: Deutsche Bank

Figure 25: Restart sensitivity to Aluminium price
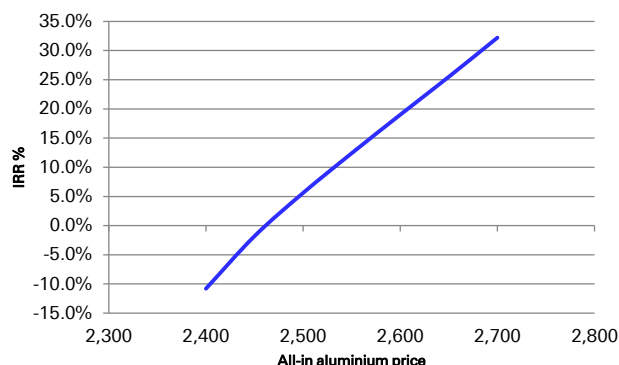
Source: Deutsche Bank

Figure 26: Deutsche Bank Aluminium supply –demand balance

		2010	2011	2012	2013	2014E	2015E	2016E	2017E	2018E	2019E	2020E
Primary Aluminium												
Chinese Production	Mt	17.3	19.8	22.4	24.8	27.1	28.8	31.0	33.6	35.7	38.1	40.4
growth	%	*28%*	*14%*	*13%*	*11%*	*9%*	*6%*	*8%*	*8%*	*6%*	*7%*	*6%*
Russia Production	Mt	3.9	4.0	4.0	3.7	3.5	3.6	3.8	3.9	4.3	4.7	4.9
growth	%	*4%*	*1%*	*1%*	*-7%*	*-7%*	*4%*	*6%*	*1%*	*11%*	*9%*	*4%*
Middle East Production	Mt	3.1	3.9	4.0	4.3	5.2	5.5	5.6	5.6	5.7	5.7	5.7
growth	%	*25%*	*26%*	*5%*	*6%*	*22%*	*5%*	*2%*	*1%*	*1%*	*0%*	*0%*
Europe & N. American Production	Mt	8.3	8.8	8.4	8.5	8.1	8.3	8.8	9.3	9.4	9.4	9.4
growth	%	*1%*	*6%*	*-5%*	*1%*	*-4%*	*2%*	*7%*	*5%*	*2%*	*0%*	*0%*
Global Production	**Mt**	**42.1**	**46.0**	**48.0**	**50.5**	**52.9**	**55.6**	**59.5**	**63.1**	**66.6**	**69.7**	**73.2**
growth	%	*13.1%*	*9.2%*	*4.4%*	*5.0%*	*4.8%*	*5.2%*	*6.9%*	*6.2%*	*5.5%*	*4.6%*	*5.0%*
check		*42.3*	*46.2*	*48.1*	*50.3*	*53.7*	*56.9*	*59.5*	*62.3*	*65.8*	*68.6*	*71.1*
Global Capacity	Mt	50.2	52.9	56.2	62.3	66.9	70.1	72.7	74.2	75.2	75.2	75.2
utilisation rate	%	*84%*	*87%*	*85%*	*81%*	*79%*	*79%*	*82%*	*85%*	*89%*	*93%*	*97%*
Primary Aluminium Consumption												
China Consumption	Mt	16.7	19.5	21.5	23.9	26.2	28.5	30.7	33.0	35.3	37.6	40.1
growth	%	*18.1%*	*16.4%*	*10.4%*	*11.3%*	*9.5%*	*8.7%*	*7.8%*	*7.5%*	*7.0%*	*6.5%*	*6.5%*
China net imports (exports)	Mt	-0.4	-0.5	0.0	-0.3	-0.4	-0.3	-0.2	-0.6	-0.4	-0.5	-0.3
Developing economies (ex China)	Mt	10.3	11.0	11.3	11.6	12.0	12.5	13.1	13.8	14.4	15.1	15.9
growth	%	*11%*	*8%*	*3%*	*2%*	*4%*	*4%*	*5%*	*5%*	*5%*	*5%*	*5%*
North America	Mt	5.3	5.4	5.9	5.9	6.1	6.4	6.8	7.0	7.3	7.5	7.6
growth	%	*9.8%*	*2.9%*	*8.8%*	*0.2%*	*3.0%*	*5.0%*	*5.2%*	*4.0%*	*3.5%*	*3.0%*	*2.0%*
EU 15	Mt	7.9	8.3	8.3	8.4	8.6	8.8	9.0	9.2	9.4	9.6	9.8
growth	%	*11%*	*6%*	*0%*	*1%*	*2%*	*3%*	*2%*	*2%*	*2%*	*2%*	*2%*
OECD Consumption	Mt	13.7	14.0	14.5	14.4	14.7	15.2	15.7	16.0	16.3	16.6	16.8
growth	Mt	*12%*	*2%*	*3%*	*-1%*	*3%*	*3%*	*3%*	*2%*	*2%*	*2%*	*1%*
Global Consumption	**Mt**	**40.7**	**44.5**	**47.3**	**49.9**	**53.0**	**56.2**	**59.5**	**62.8**	**66.1**	**69.4**	**72.8**
check		*40.7*	*44.5*	*47.3*	*49.9*	*53.4*	*57.0*	*60.7*	*64.4*	*67.8*	*71.4*	*74.9*
growth	%	*14.0%*	*9.3%*	*6.3%*	*5.5%*	*6.1%*	*6.1%*	*5.8%*	*5.6%*	*5.2%*	*5.0%*	*4.9%*
Production adjustments	Mt				0	-200	-200	-200	-200	-200	-200	-200
Market balance	**Mt**	**1.40**	**1.50**	**0.71**	**0.56**	**-0.07**	**-0.58**	**-0.01**	**0.34**	**0.50**	**0.31**	**0.43**
Avg. LME cash price	$/t	2,191	2,423	2,052	1,889	1,901	2,063	2,263	2,381	2,499	2,618	2,736
Avg. LME cash price	c/lb.	99	110	93	86	86	94	103	108	113	119	124

Source: Wood Mackenzie, Deutsche Bank

Zinc: Century – A Good Innings

- The zinc market has been in a deficit for three years, since 2012. In each of the past three years, mined zinc supply growth has been below 2%, with 2014 likely to register a meagre 1% supply growth. As a result prices have slowly begun to appreciate. We expect price to continue appreciating in 2015, but not in any meaningful way due to a mined supply response.

- The supply side in zinc is responding and we believe this response will keep zinc prices in check for 2015, with market in a modest deficit. The closure of the big Century mine (c.500ktpa) was well known, so the confirmation announcement was no surprise. However, MMG's ability to eke out c.100 – 150 ktpa more than expected, Glencore's additional 200kt, combined with the host of small supply additions from other miners, means that mined supply for 2015 is likely to be up +7% year on year. The other significant news was the approval of the first big (in the context of the zinc market) greenfield project by a major western producer. The Gamsberg project in South Africa will produce c.250ktpa, and requires a zinc price of USD2,250/t to achieve an IRR of 15%. This announcement is indicative of an industry which is now comfortable with expansions. The closure of Century means that the supply momentum does not carry through to 2016, which is when we expect a more meaningful appreciation in prices.

...but the market may have to wait until end 2015 for any significant price moves

Zinc prices have held up well, despite the general correction in the broader commodity markets. This is a reflection of the favourable supply-demand fundamentals, reinforced by the steady decline in exchange stocks. There is always going to be a debate whether stocks are simply being moved off exchange or whether this is a genuine draw-down of inventories.

Figure 1: Exchange stocks resume their decline led by the SHFE
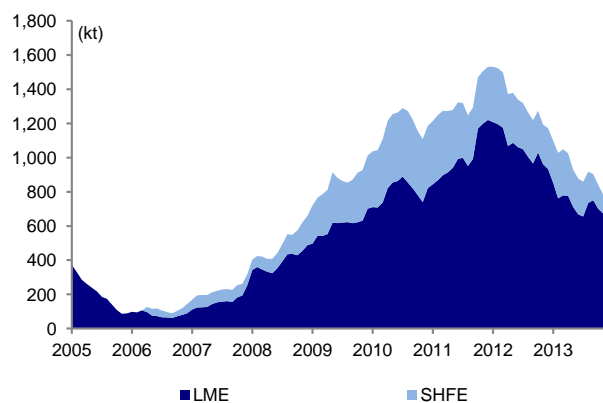
Source: Bloomberg Finance LP, Deutsche Bank

Figure 2: Global zinc premiums
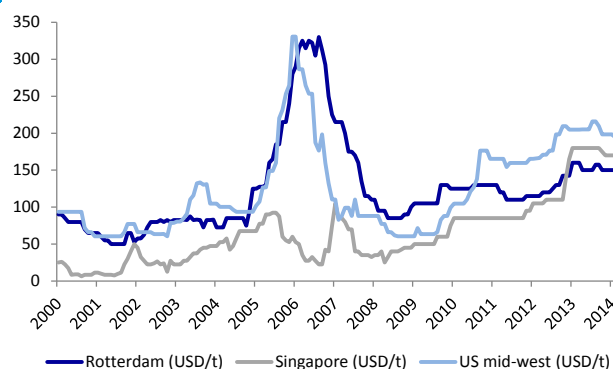
Source: Wood Mackenzie, Deutsche Bank

Although movement of stocks off exchange may have occurred at the margin, we tend to think there is a genuine draw-down of stocks. Global premiums have remained stable suggesting decent physical demand, and near-term spreads remain tight which would discourage the build-up of inventories by traders. We note that the longer dated spread (15 month to 3 month) has started to close marginally as well.

Figure 3: Cash to 3-month time spreads
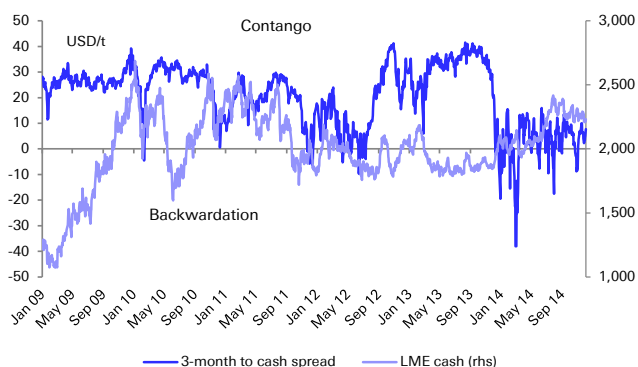
Source: Bloomberg Finance LP, Deutsche Bank

Figure 4: US zinc premiums versus the 15 – 3 month time spread
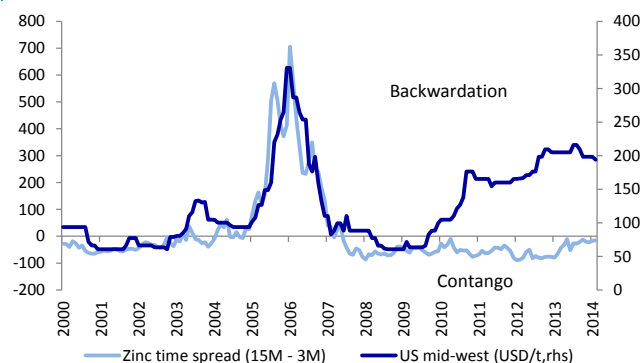
Source: Bloomberg Finance LP, Deutsche Bank

Demand to remain firm, but below 4% for the next two years.

Chinese demand indicators for zinc have been strong YTD, and we forecast zinc demand growth of 6.4% in 2014E, down from the 8.2% demand growth last year. Although the Chinese residential property sector is only 13% of end demand use in China, we expect demand growth to continue slowing over the course of 2015 (5.8%) and 2016E (5.1%), especially with the second order impact on consumer goods (lower property sales mean less appliances). Robust demand growth from elsewhere (the US and India) is enough to keep global demand at 3.7 – 3.9% over the next two years.

Figure 5: Zinc demand growth China and global
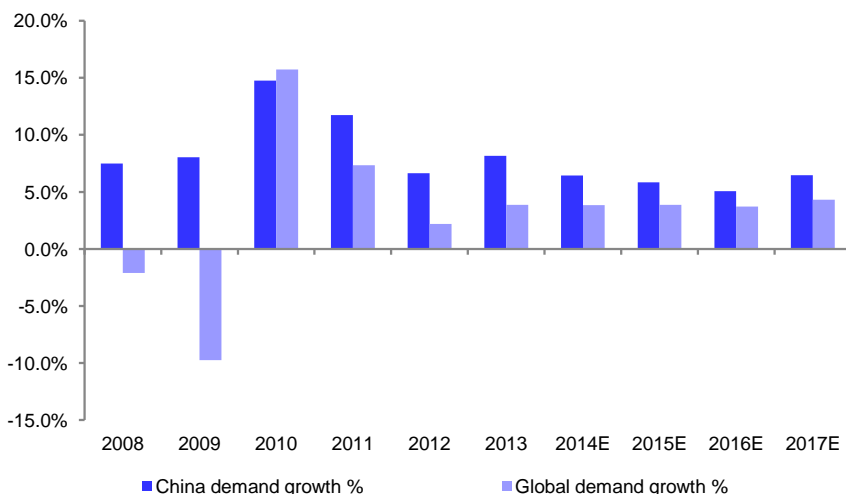
Source: Deutsche Bank

Stable global demand growth over the next two years

Chinese galvanised steel production of 4.4Mt was down 16% from September, but the YTD increase is still high at 17%. Whilst Chinese Auto sales remain up strongly at 9.5%, the recovery in sales of white goods from the lows in August, has been less than convincing. The fall in the iron ore price has meant that the margins of the integrated galvanised steel producers remains robust. However, prices of Chinese hot dipped galvanized sheet has fallen 7% since the end of June, and is now only RMB50 – 60/t above the 2009 lows. Although galvanized sheet production accounts for c.30% of Chinese zinc demand, there is a

reasonable correlation. We note that apparent zinc demand has not kept track with galvanised sheet production growth, only up 4.6%, which is below our 6.4% demand growth number. All of these factor are contributors to our view that the growth rate in Chinese zinc demand will slow over the next year and into 2016.

Figure 6: China passenger vehicle sales
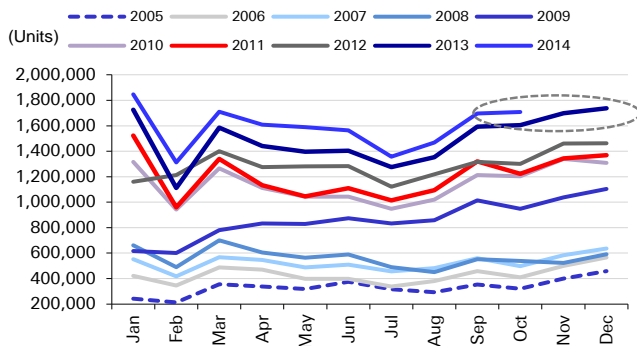
Source: Deutsche Bank, CAAM

Figure 7: China consumer durable* sales vs galvanized steel production
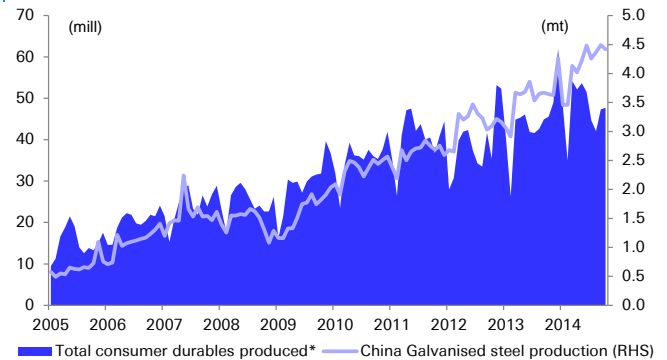
*Source: Bloomberg Finance LP, NBS, Deutsche Bank, *Washing machines, oven, Air conditioners and Refrigerators*

Figure 8: China's galvanised sheet production versus zinc demand
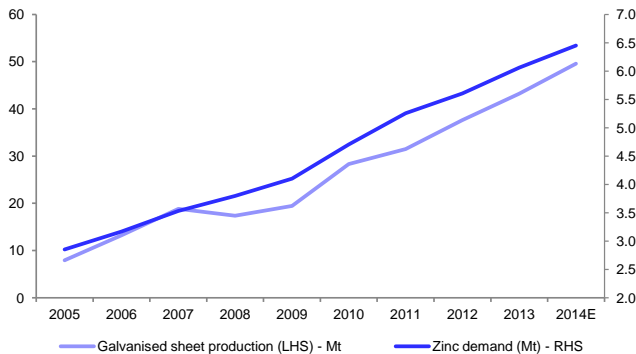
Source: CEIC, Deutsche Bank

Figure 9: Chinese galvanized steel production versus apparent* zinc consumption
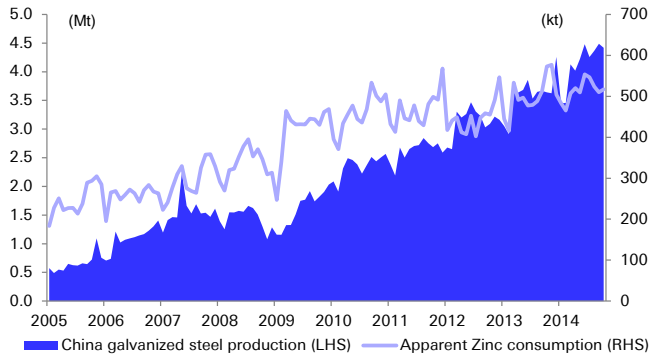
*Source: Bloomberg Finance LP, NBS, Deutsche Bank, *Apparent zinc consumption = refined production plus net imports*

Zinc supply is back in expansion mode

When categorizing the supply side dynamics, each of the four main base metals is unique. We would classify nickel as having a supply shock, aluminium as seeing supply curtailments, copper as having supply momentum, with zinc being ahead of the cycle in supply expansion mode. The restart of Teck's Pend Oreille mine and Vedanta's approval of a large scale and challenging greenfield project Gamsberg are indicators of a market back in expansion mode. Given the nature of zinc deposits, namely that they are smaller, higher grade and fairly well defined, the response time to rising and falling prices from the mining industry is relatively quick. Given the lower barriers to exit from the zinc smelting industry, this part of the market normally responds even quicker. We highlight these features of the zinc market with reference to the chart below:

Figure 10: Mined and refined zinc supply growth in response to price

Source: Wood Mackenzie,, Bloomberg Finance LP, Deutsche Bank

A big year in 2015, but no momentum into 2016.
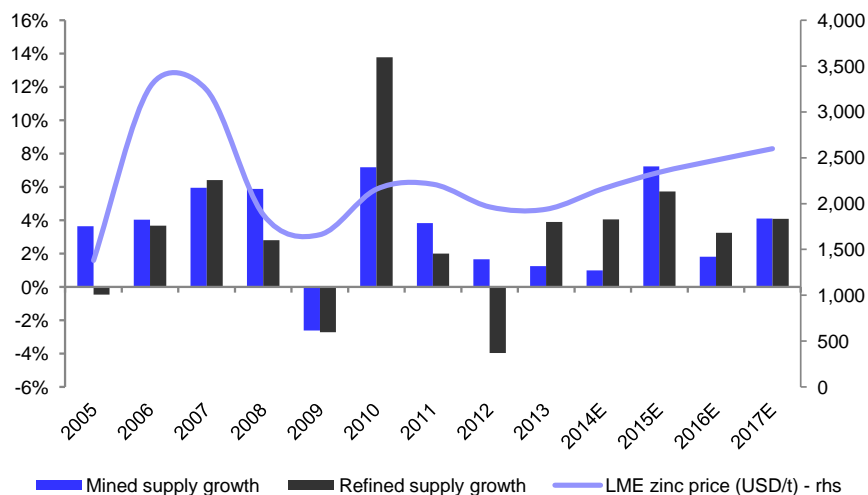
The zinc market saw strong mine supply growth in the period 2005 – 2007, in response to an improving demand outlook and high prices. The refining industry grew capacity rapidly in 2006 – 2007, but responded more quickly to the downturn in 2008, and 2009, where the mine response lagged by a year. The recovery in 2010 – 2011, again saw a sharp response from both mining and refining although once again refining was much quicker in responding to the recovery. The subsequent price weakness in 2012 and 2013, has led to three years (including 2014) of low mined supply growth. The refined supply contraction in 2012 to a certain extent anomalous, driven by Chinese environmental closures as well as profitability concerns. Since then refining supply growth has outstripped mined supply growth. A lack of sustained investment in mined capacity has led to this period of low output growth. However, we see 2015 as a year, where mined supply is likely to be robust, above 7%. Smelting capacity is likely to grow strongly as well, but will lag the mined supply response, which is good for zinc TC's. In our assessment, the zinc market will still be in a slight deficit for 2015E, which means that the strong mine supply growth can be absorbed, but that the price will struggle to break out meaningfully until the end of 2015 in our view. The risk is that refining capacity can respond better than our forecasts which would ultimately balance the market.

In trying to identify the main contributors to the strong mined supply growth, we would point to a number of small increases in a number of mines. There are very few big mine additions, making the assessment of how realistic this mined supply increase forecast is, quite challenging. The main contributors to the strong supply growth in 2015 are. Regionally, China, Australia, Peru, North America, Mexico and Russia are the main contributors, accounting for c. 1mtpa of mined zinc supply. The mined supply growth rate is significantly tempered by the closure of Century in 2016, although the recent guidance by MMG for 2015E was c.100kt higher than our forecasts. It is the closure of Century mine that makes this cycle unique, and stalls the momentum. If it were not for the end of Century, we believe the zinc price recovery may also have stalled. Our mined supply growth forecasts of 2.5% in 2016E and 4.8% in 2017E are dependent on the some of the projects in the probable and possible category being delivered.

Figure 11: Mined supply growth
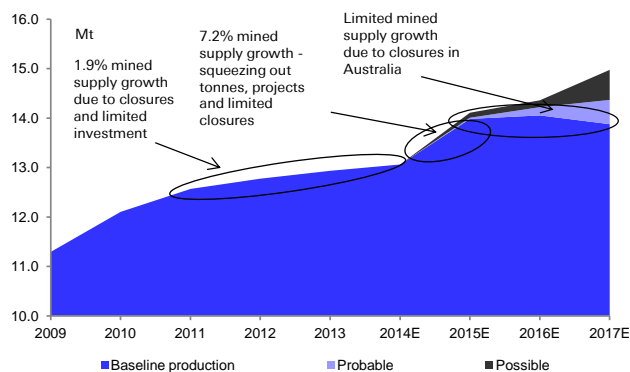
Source: Deutsche Bank, Wood Mackenzie

Figure 12: Regional supply changes in Zinc
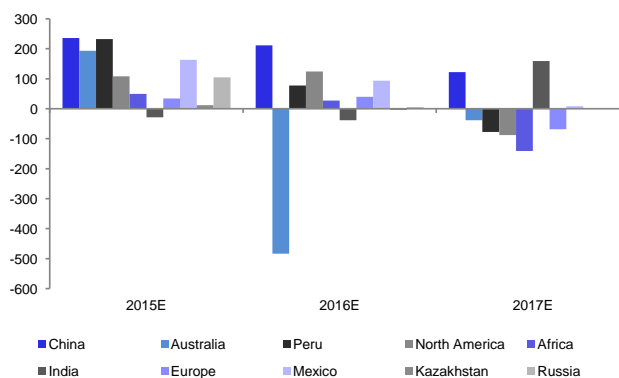
Source: Wood Mackenzie, Deutsche Bank

We highlight the projects / mines that are forecast to deliver the greatest growth, and those that are forecast to deliver the biggest declines in the table below. The key point to note is that the scale of closures is easier to identify than the growth projects. There is a reasonable probability that some of the scheduled starts may be delayed, tempering the supply response in 2015E

Figure 13: Mined and refined zinc supply growth in response to price

Growth	2015E	2016E	2017E
Bisha	30	15	40
Aguas Tenidas	39	35	0
Neves Corvo	18	0	5
China	236	212	122
Santander	24	0	0
Antamina	48	37	
Caribou	50	12	5
Colquijirca	41	0	0
Penasquito	40	27	0
Kyzyl Tashtygskoe	70	0	0
Lalor Lake	30	10	0
Tayahua	41	4	-3
McArthur River	101	9	0
Mount Isa	68	-12	
Rey del Plata	0	33	2
Total	**836**	**381**	**171**
Decline	2015E	2016E	2017E
Skorpion			-164
Pomorzany-Olkusz		-55	
Lisheen	-72	-60	
Mount Isa		-84	
Century		-460	
Antamina			-37
Total	**-72**	**-520**	**-121**

Source: Deutsche Bank, Wood Mackenzie

The NBS reported Chinese mined supply at 481kt for October, down 6% month on month. The NBS tends to over-report tonnages, with the 10-month run rate at 4.63Mt. We have penciled in 5Mt for 2014E, which is close to c.5% growth

YoY. We continue to expect modest growth in Chinese mined supply growth, but for the rate of growth to slow. We note however, that the Chinese mined supply responses can be swift in the face of high prices such as 2007 and 2010/11. Should the Chinese mined zinc industry maintain its rate of growth at c.6%, there is the potential for an additional 300kt of mined zinc supply versus our base case forecast. Given our view of improving prices, we think this is a realistic scenario given the up and coming region of Inner Mongolia.

Figure 14: Chinese mined supply growth
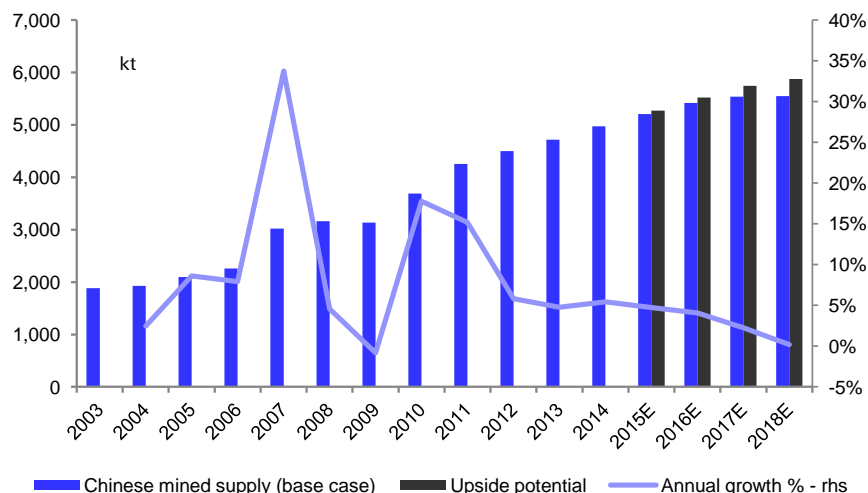
Source: Wood Mackenzie,, Bloomberg Finance LP, Deutsche Bank

The smelting industry catches up in 2014

Chinese refined zinc production is on course to deliver 6% production growth, offsetting the profitability and environmental enforcement constraints seen in 2012. We remain skeptical that a smelting bottleneck in zinc will constrain the market to the extent that a meaningful price spike will result. We note however, that spot zinc TC's have increased by USD62/t since the beginning of the year, which suggests that the profitability outlook will improve. The improving profitability will ultimately spur on latent capacity restarts and improving utilization. The improving trend in spot TC's as well as the expectation of a strong mined supply growth in 2015, will mean contract TC's are likely to rise in 2015E with some momentum into 2016E.

Figure 15: Zinc TC's (USD/t of conc.)
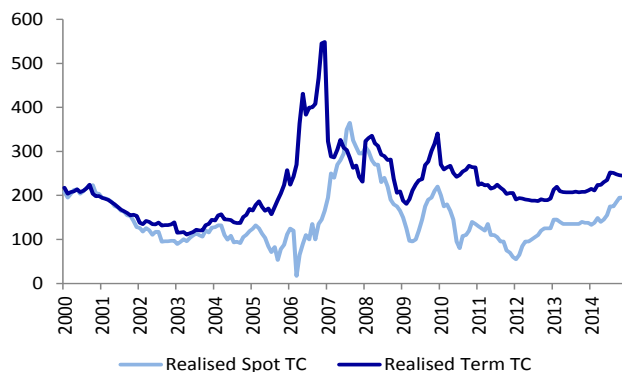
Source: Wood Mackenzie, Deutsche Bank

Figure 16: Chinese refined zinc production (run rate)
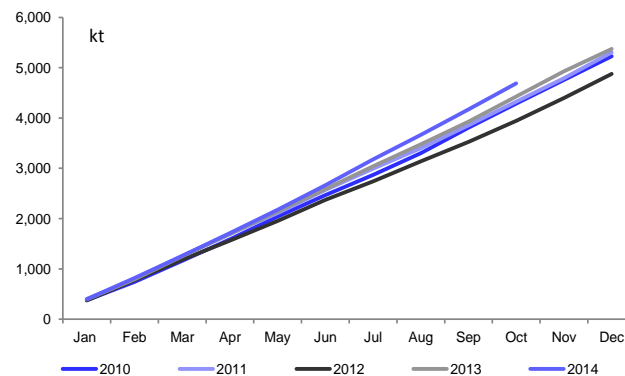
Source: NBS, Deutsche Bank

Figure 17: Global zinc supply & demand model

		2010	2011	2012	2013	2014E	2015E	2016E	2017E
China mine production	Mt	3.7	4.3	4.5	4.7	5.0	5.2	5.4	5.5
China mine production growth	*%*	*16%*	*15%*	*5.8%*	*4.8%*	*5.4%*	*4.7%*	*4.1%*	*2.3%*
Australia mine production	Mt	1.5	1.5	1.5	1.5	1.5	1.7	1.2	1.2
Australia mine production growth	*%*	*13%*	*0%*	*0%*	*0%*	*3%*	*13%*	*-28%*	*-3%*
Peru mine production	Mt	1.4	1.2	1.2	1.2	1.2	1.4	1.5	1.4
Peru mine production growth	*%*	*-2%*	*-15%*	*0%*	*5%*	*-6%*	*20%*	*6%*	*-5%*
North America mine production	Mt	1.9	2.0	2.0	1.8	1.6	1.9	2.1	2.1
North America mine production growth	*%*	*1%*	*5%*	*0%*	*-10%*	*-8%*	*16%*	*11%*	*-4%*
India mine production grow th	Mt	0.7	0.7	0.7	0.8	0.8	0.8	0.7	0.9
India mine production growth	*%*	*4.6%*	*3.5%*	*-1.7%*	*13.0%*	*-1.6%*	*-3.5%*	*-4.9%*	*21.3%*
European mine production	Mt	0.9	0.9	0.9	0.9	0.9	1.0	1.0	0.9
European mine production growth	*%*	*3.3%*	*0.9%*	*0.9%*	*-2.0%*	*3.0%*	*3.7%*	*4.2%*	*-6.9%*
World Mine Production	**Mt**	**12.10**	**12.57**	**12.77**	**12.93**	**13.06**	**14.01**	**14.36**	**14.98**
World Mine Production Growth	*%*	*7%*	*3.8%*	*1.7%*	*1.2%*	*1.0%*	*7.2%*	*2.5%*	*4.3%*
Concentrate for smelting	Mt	12.10	12.57	12.77	12.93	13.06	14.01	14.36	14.98
Secondary & other zinc	Mt	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3
Losses	Mt	0.7	0.7	0.7	0.7	0.7	0.8	0.8	0.8
Total Refined output	**Mt**	**12.71**	**12.97**	**12.45**	**12.94**	**13.47**	**14.24**	**14.80**	**15.43**
World refined availability growth	*%*	*14%*	*2.0%*	*-4.0%*	*3.9%*	*4.1%*	*5.7%*	*3.9%*	*4.3%*
China Refined Consumption	Mt	4.7	5.3	5.6	6.1	6.5	6.8	7.2	7.6
Consumption growth	*%*	*14.8%*	*11.7%*	*6.6%*	*8.2%*	*6.4%*	*5.8%*	*5.1%*	*6.5%*
US Refined Consumption	Mt	1.2	1.3	1.4	1.4	1.5	1.5	1.5	1.6
Consumption growth	*%*	*6%*	*5.9%*	*6.2%*	*0.1%*	*4.0%*	*3.5%*	*2.5%*	*2.0%*
Europe Refined Consumption	Mt	1.9	1.9	1.8	1.8	1.8	1.8	1.8	1.9
Consumption growth	*%*	*20.5%*	*3.1%*	*-7.9%*	*-0.3%*	*1.0%*	*1.2%*	*2.1%*	*1.8%*
Brazil/India/Russia Refined Consumption	*%*	1.0	1.1	1.1	1.1	1.1	1.2	1.2	1.3
Consumption growth		*15.9%*	*7.8%*	*4.3%*	*2.0%*	*0.5%*	*3.9%*	*4.6%*	*5.3%*
World Refined Consumption	**Mt**	**11.69**	**12.55**	**12.83**	**13.32**	**13.83**	**14.37**	**14.90**	**15.55**
World Refined Consumption Growth	*%*	*15.7%*	*7.3%*	*2.2%*	*3.9%*	*3.8%*	*3.9%*	*3.7%*	*4.3%*
Market balance	**Mt**	**1.02**	**0.42**	**-0.37**	**-0.38**	**-0.37**	**-0.13**	**-0.11**	**-0.12**
Exchange stocks	Mt	3.48	3.90	3.52	3.14	2.77	2.64	2.53	2.42
Reported-stock-to-consumption ratio	Wks	15.5	16.1	14.3	12.3	10.4	9.5	8.8	8.1
Annual average LME cash prices	**USD/t**	**2,158**	**2,212**	**1,965**	**1,940**	**2,162**	**2,280**	**2,475**	**2,600**
Annual average LME cash prices	**USc/lb**	**98**	**100**	**89**	**88**	**98**	**103**	**112**	**118**

Source: Deutsche Bank, Wood Mackenzie

Lead: A Slower Derating Versus Zinc

- We think that lead will register a positive performance for 2015, but will continue to under-perform zinc over the next few years. We continue to forecast slowing mined supply growth, albeit with a small pick-up in 2015, and deficits for the next three years. After a number of years of strong mined supply growth, outpacing that of zinc, this trend reverses, hence our view that the derating will slow. The lead market still has to adjust to the maturing of the Chinese E-bike sector, which will in our view continue to be a drag on demand whilst Auto penetration is still growing. On balance we think the market will be tighter in 2015 and forecast deficits between c.100 - 180kt for the next two years. We expect prices to recover from current spot levels, and average close to USD2,150/t in 2015.

Lead will continue to derate versus zinc, but at a much slower rate

Lead has been a disappointing performer over the course of 2014, down 11% YTD. The performance is especially disappointing when contrasting lead's performance versus that of zinc, with the relative performance at 18% in zinc's favour. Given that lead has limited exposure to the Chinese property sector, and good exposure to the healthy Auto sector, this under-performance is doubly perplexing. We think investors will be considering the possibility that lead will continue to de-rate versus zinc over the next few years.

Is lead's de-rating versus zinc cyclical or structural?

Figure 1: Lead – zinc price ratio

Source: Thomson Reuters Datastream, Deutsche Bank

On balance, we think the worst of the derating is over and that the pace will slow in 2015. After 2015, we think zinc will continue to derate at a slower pace until the end of the decade. There are two factors that should lead to a slower derating and one that will continue to drive the derating.

- We continue to forecast a deficit in the market over the next three years, which should drive prices higher.

- Mined supply additions have outstripped those of zinc for the past four years. We forecast this trend to reverse over the next two years, especially in 2015E, where we forecast a strong year for zinc.

- The decline of the E-bike sector in China has been a drag on the demand side of the equation. This trend is likely to continue and in the process

more recycled lead will make its way into the market. Ultimately the increase in vehicle penetration will offset the decline in E-bikes, but the transition is likely to slow the trend of an increasing intensity of demand. In aggregate, we do expect lead demand growth to be c.1 – 1.5% lower in the upcoming decade versus the past decade.

Figure 2: Lead supply – demand balance
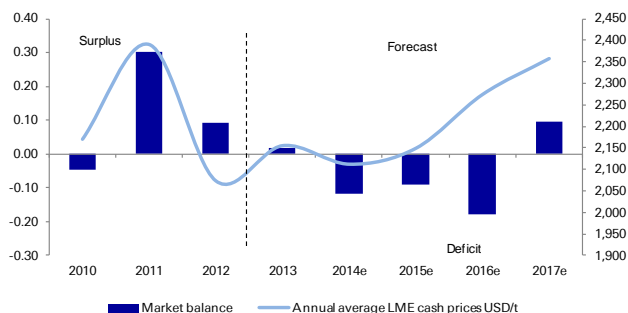
Source: Wood Mackenzie, Deutsche Bank

Figure 3: Forecasts lead – Zinc ratio's
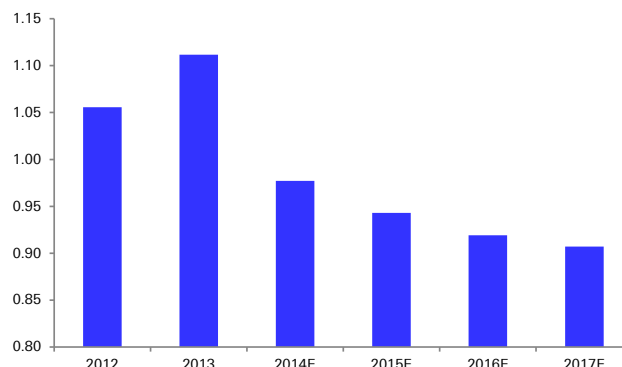
Source: Deutsche Bank

Figure 4: Lead demand growth – adjusting to lower growth
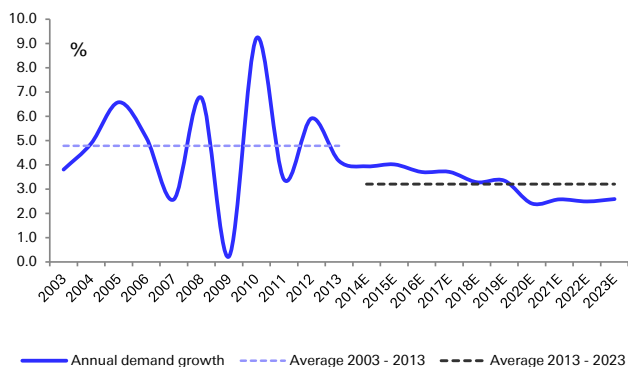
Source: Wood Mackenzie, Deutsche Bank

Figure 5: Contrasting mined lead supply growth with zinc
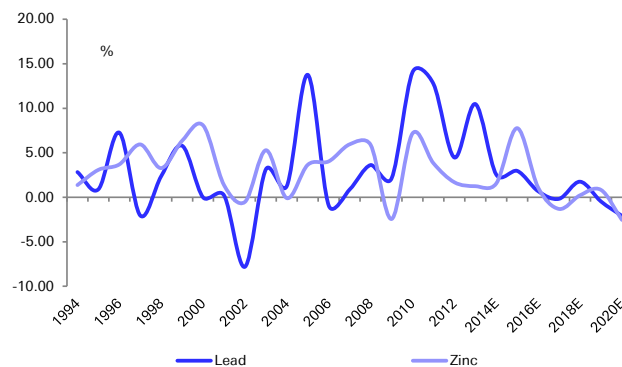
Source: Wood Mackenzie, Deutsche Bank

Mixed short-term indicators despite the recent pull back in prices

Short-term demand indicators which until October were slightly negative have turned more positive, but remain mixed in our view. LME stocks which had been building up saw a gradual decline in November, although there have been some gyrations again in December. SHFE stocks have fallen, but this also relates to withdrawals from Guangdong as this location will attract a discount from February 2015, as the SHFE tries to shift inventory closer to demand. Likewise cancelled warrants increased from almost at zero (2% of LME inventory in September to 8% in November. US premiums have however begun to ease slightly and are trading at c.USD13/t below September levels. Premiums in Europe have however been holding firm at September levels of USD20 – 50/t Rotterdam.

Figure 6: Lead inventory (days consumption) vs prices
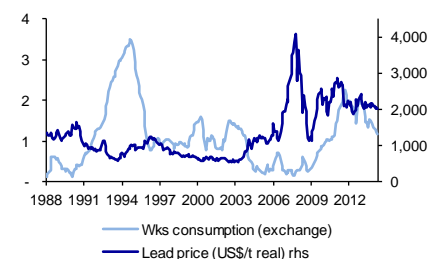
Source: Deutsche Bank, Bloomberg Finance LP

Figure 7: Lead exchange inventory
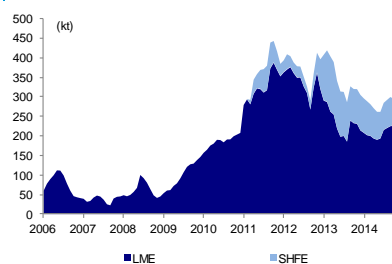
Source: Deutsche Bank, Bloomberg Finance LP

Figure 8: US lead premium vs LME cancelled warrants as % of total
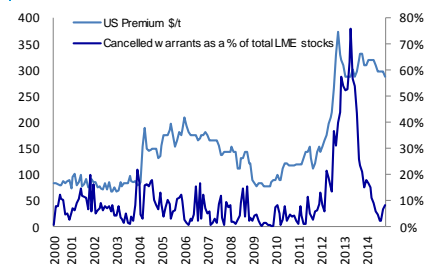
Source: Deutsche Bank, Bloomberg Finance LP

Positioning on the LME improved over the course of November, with a modest increase in net long positions, partly in response to the surprise rate cut from the PBOC. The recent fall in the oil price has weighed on all the base metals from a sentiment perspective. However, from a fundamental perspective, a fall in the oil price should be positive for lead, as lower petroleum prices will lead to more miles driven, and higher battery consumption.

Figure 9: Net money manager positions as a percentage of open interest
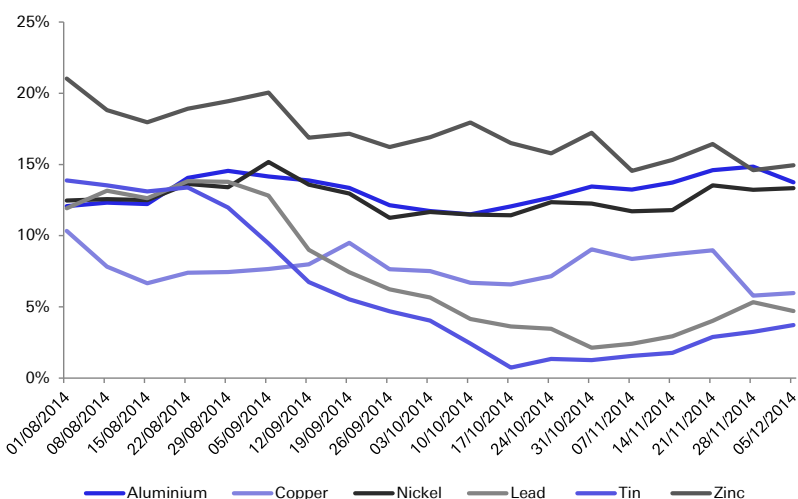
Source: LME, Deutsche Bank

Improving sentiment in November, only to be knocked by oil.

North America and China account for over 60% of global lead demand

We remain positive on the medium term outlook for the lead market, a function of limited new mine production in the world ex-China and tighter environmental scrutiny on both primary and secondary production in the Chinese refined lead industry. However, the demand has been somewhat disappointing, despite strong Auto sales figure in the US and China. The main cause for this disappointment has been the maturing E-bike sector.

The November U.S. light vehicle SAAR came in at 17.1MM in November; the second highest level since January 2006. Sales increased 9.3% yoy, adjusted for one fewer selling day. The SAAR now stands at 16.4MM YTD (16.7MM excluding the low, weather impacted, levels seen in Q1). The strong increase in Auto sales has translated to strong OE battery shipments increasing by 7.6% to 10.5M units in first three quarters of the year. In China, the October SAAR also registered a strong result of 20.51 MM, a 6.4% increase yoy. Although the rate of vehicles sales in China is slowing, the YTD growth still remains robust at 9.5%.

Despite the strong Auto sales numbers, the maturing E-bike market where sales are expected to decline, will continue to weigh on over lead demand. The transition from E-bike ownership to Auto penetration will weigh on lead demand and also see scrap supply increase in the near-term. Lithium-ion batteries, although expensive are taking market share away from the lead-acid market. The combination of strong Auto sales, falling E-bike sales will see most of the future sales aimed at the aftermarket..

Figure 10: E-bikes dominate the lead sector in China
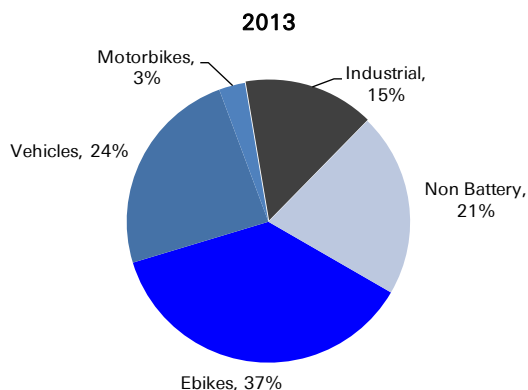
Source :Wood Mackenzie Deutsche Bank

Figure 11: The Industrial sector will overtake the E-bike sector
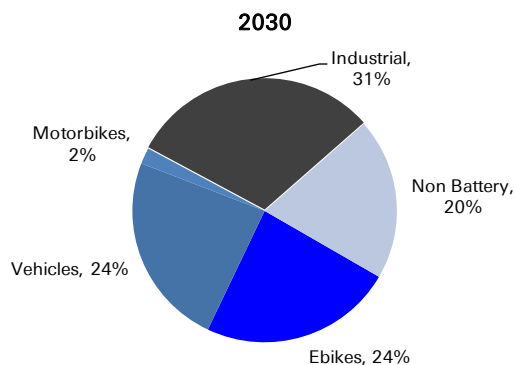
Source: Wood Mackenzie Deutsche Bank k

Figure 12: US and China auto sales
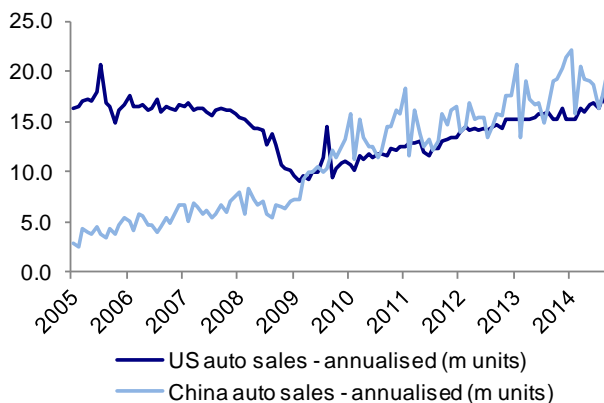
Source: Deutsche Bank, Bloomberg Finance LP

Figure 13: Indexed monthly Chinese refined lead production
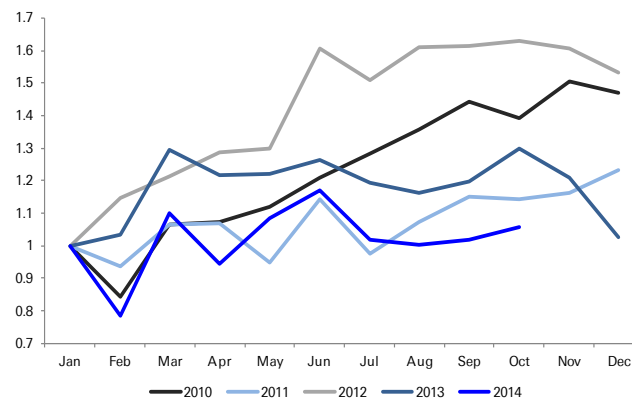
Source: NBS, Wood Mackenzie, Deutsche Bank

The weak Chinese refined production which started in October last year has continued throughout 2014. The CNIA reported lead production at 3.6Mt (2.6Mt primary and 0.9Mt secondary) for the first 10 months of the year, which is down 6% year on year. There are a number of factors for this decline including, tighter domestic mined supply, weak downstream demand and production shutdowns for environmental upgrades, especially at the secondary smelters.

Lead ore / concentrate imports have risen sharply, up 18% YTD to October, offsetting the drop in domestic supply. We note that spot TC's have increased by USD 30/t over the course of November from June, which further suggests that there may be some further relief for the weak primary smelter profitability.

This is an indication of decent mined supply growth, especially in the world ex-China. China's lead in concentrate was c.270kt for October. The year to date output is 2.5Mt, 8% lower than 2013.

Figure 14: Chinese mined lead production versus concentrate imports (kt)

— China lead ore ore production (3m rolling)
— China lead ore import (3m rolling)

Source: Deutsche Bank, National Statistic Bureau

Figure 15: Lead TCs (USD/t)
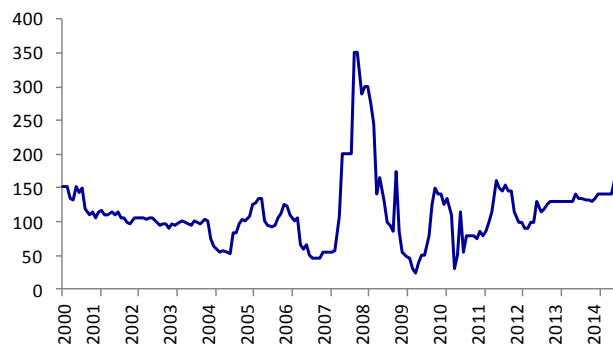
Source: Deutsche Bank, Brook Hunt

Figure 16: Deutsche Bank Global lead supply & demand model

		2010	2011	2012	2013	2014e	2015e	2016e	2017e
China mine production	Mt	1.8	2.4	2.5	2.8	2.9	2.9	2.9	3.0
China mine production growth	%	*30%*	*28%*	*6%*	*13%*	*3%*	*0%*	*0%*	*2%*
Australia mine production	Mt	0.6	0.6	0.6	0.7	0.7	0.7	0.6	0.7
Australia mine production growth	%	*19%*	*-11%*	*-1%*	*15%*	*8%*	*1%*	*-14%*	*8%*
Peru mine production	Mt	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3
Peru mine production growth	%	*-13%*	*-11%*	*7%*	*9%*	*1%*	*5%*	*2%*	*-4%*
North America mine production	Mt	0.6	0.6	0.6	0.6	0.6	0.6	0.7	0.7
North America mine production growth	%	*1%*	*0%*	*2%*	*-3%*	*3%*	*9%*	*4%*	*2%*
World Mine Production	**Mt**	**4.04**	**4.64**	**4.82**	**5.32**	**5.36**	**5.53**	**5.70**	**6.09**
World Mine Production Growth	%	*14%*	*15%*	*4%*	*10%*	*1%*	*3%*	*3%*	*7%*
Losses	Mt	0.27	0.29	0.30	0.33	0.35	0.36	0.35	0.38
Scrap	Mt	1.0	1.0	0.8	0.8	0.9	1.0	0.9	1.0
Production at Primary Refinaries	Mt	4.7	5.1	5.2	5.7	5.9	6.1	6.3	6.7
Secondary refined prodcution capability	Mt	5.1	5.3	5.6	5.6	5.7	6.0	6.2	6.3
Total Refined Availability	**Mt**	**9.81**	**10.47**	**10.86**	**11.24**	**11.59**	**12.05**	**12.42**	**13.03**
World refined availability growth	%	*6%*	*7%*	*4%*	*3%*	*3%*	*4%*	*3%*	*5%*
China Refined Consumption	Mt	4.2	4.3	4.8	5.1	5.4	5.6	5.9	6.3
Consumption growth	%	*14%*	*3%*	*11%*	*7%*	*6%*	*5%*	*6%*	*6%*
NAFTA (US, Canada, Mexico)	Mt	1.7	1.7	1.8	1.7	1.8	1.8	1.8	1.8
Consumption growth	%	*1%*	*3%*	*2%*	*-2%*	*3%*	*1%*	*1%*	*1%*
Japan	Mt		0.2	0.2	0.2	0.2	0.2	0.2	0.2
Consumption growth	%		*-2%*	*9%*	*1%*	*2%*	*2%*	*-2%*	*-2%*
EU (15)	Mt		1.3	1.3	1.3	1.3	1.3	1.3	1.3
Consumption growth	%		*2%*	*-3%*	*0%*	*1%*	*2%*	*1%*	*0%*
Brazil/India/Russia Refined Consumption	Mt	0.9	0.9	1.0	1.1	1.2	1.3	1.3	1.4
Consumption growth	%	*12%*	*5%*	*12%*	*8%*	*8%*	*6%*	*6%*	*6%*
World Refined Consumption	**Mt**	**9.85**	**10.16**	**10.77**	**11.22**	**11.72**	**12.15**	**12.60**	**13.06**
World Refined Consumption Growth	%	*9%*	*3%*	*6%*	*4%*	*4%*	*4%*	*4%*	*4%*
Market balance	**Mt**	**-0.05**	**0.30**	**0.09**	**0.02**	**-0.13**	**-0.11**	**-0.18**	**-0.03**
Exchange stocks	Mt	1.17	1.33	1.46	1.48	1.35	1.24	1.06	1.03
Reported-stock-to-consumption ratio	Wks	6.2	6.8	7.1	6.9	6.0	5.3	4.4	4.1
Annual average LME cash prices	**USD/t**	**2,171**	**2,391**	**2,074**	**2,156**	**2,113**	**2,150**	**2,275**	**2,358**
Annual average LME cash prices	**USc/lb**	**98.5**	**108.5**	**94.1**	**97.8**	**95.9**	**97.5**	**103.2**	**107.0**

Source: Wood Mackenzie, Deutsche Bank

Grant Sporre, (44) 20 7547 3943
grant.sporre@db.com

#11 Steel-Making Materials

Another Tough Year

- Despite the risks posed by the Chinese property market, we continue to forecast positive **Steel** production growth, both in China and globally for 2015E. Chinese property sales (a lead indicator of steel production) are showing tentative signs of stabilizing with Soufun property sales up 1% year on year in the latest survey. However, our expectations for global steel production in 2015 are modest, at 2.7%. This level of growth is not sufficient to absorb the additional supply in either iron ore or metallurgical coal, currently slated to come on in 2015.

- We already factor in a further 100Mt of Chinese **Iron ore** mine closures over the next three years. This is over and above the 50Mt of closures seen in 2014E. Even if this level of supply curtailments out of China could be guaranteed, it is not enough to offset the strong growth in output from the large cap diversified miners over the next three years. The market needs a further 150Mt of supply cuts from producers outside of China to balance the market. These will undoubtedly come, but with weaker producer currencies and survival mode cost cutting, a sub USD70/t price environment is likely to persist for the next 18 to 24 months in our view.

- The **Metallurgical coal** market is ahead of the iron ore market in terms of adjusting to an over-supply. The 26Mt of supply cuts announced in 2014 seemed to be sufficient to stabilize the price. However, the weak demand environment and continued supply momentum in China, means that the industry will have to find further cuts to balance the market in 2015. Weaker currencies and lower oil prices mean that these cuts will only come once the price has taken another leg down.

Steel outlook: An improving China steel balance, but no respite for the steel-making materials

Due to slowing macro lead indicators for Europe and slowing economic growth in China, we expect steel production growth to slow in 2015. We forecast global steel production growth of 2.7% for 2015E after 3.1% in 2014E. In Europe, 2014 was the first year of steel demand recovery after two years of decline, however, leading indicators now point towards a renewed slowing but still growing demand scenario in 2015. We therefore forecast a 1.5% production growth in Europe 2015E, mostly driven by continuous solid growth in Auto production.

As discussed previously, balance sheet distress has forced several privately held assets (particularly in Italy) to review its strategy and we would not rule out further consolidation. Nevertheless, consolidation is unlikely to increase utilization rates significantly and we expect European operating rates to remain around 69% in 2015 in our base case scenario.

A modest decline in global crude steel output growth from 3.1% to 2.7%

Figure 1: European crude steel production
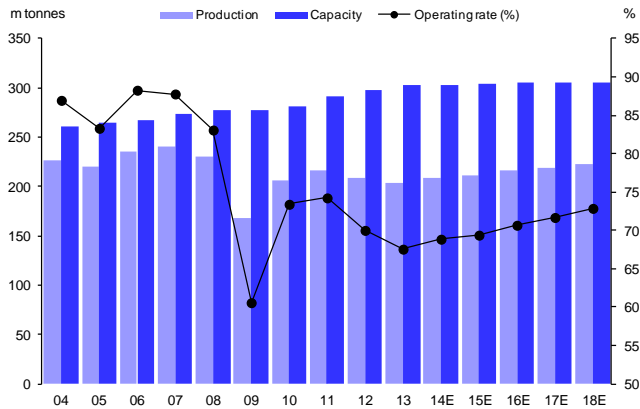
Source: Deutsche Bank, CRU

Figure 2: European crude steel production, % yr/yr
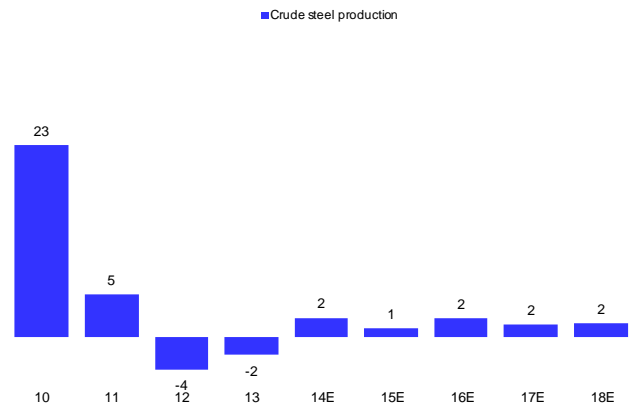
Source: Deutsche Bank, CRU

Figure 3: Global crude steel production, yr/yr
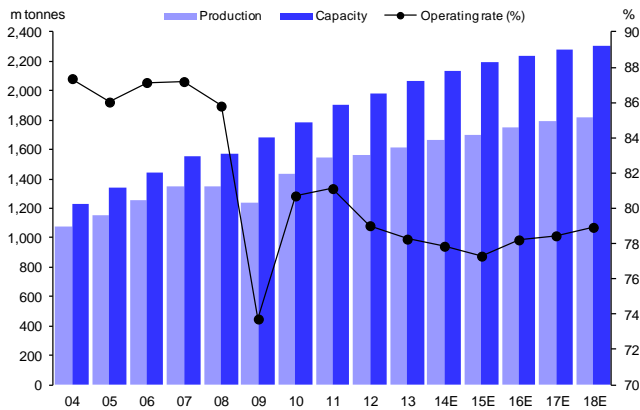
Source: Deutsche Bank, CRU

Figure 4: Global crude steel production, % yr/yr
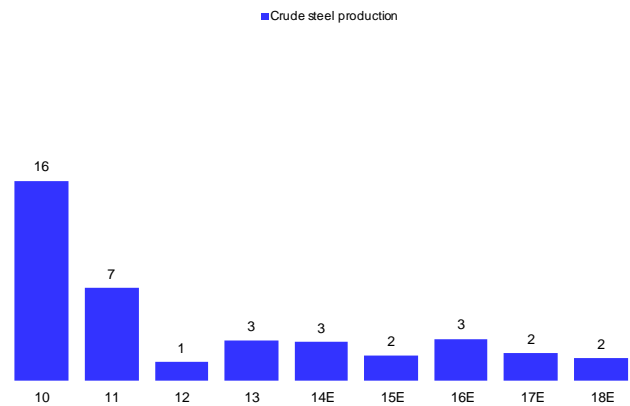
Source: Deutsche Bank, CRU

Leading indicators point towards slowing Europe

Although 2014 marked a turning point, the European Steel sector remains a tough place given the structural overcapacity and lack of pricing power. Furthermore, key leading indicators such as PMIs, US ISM as well as German Ifo (which are highly correlated with steel output) have lost momentum recently. We would however stress that these still point towards growth. We therefore expect a sluggish 1% - 1.5% growth environment for steel in Europe and even though several sectors pose risks (construction, capital goods) we see the Automotive sector as a continuous driver. On the contrary, US indicators remain strong and we expect the region to continue delivering solid growth next year.

Figure 5: European steel production vs. Eurozone PMI

European steel production (mt) - LHS — Eurozone PMI - RHS
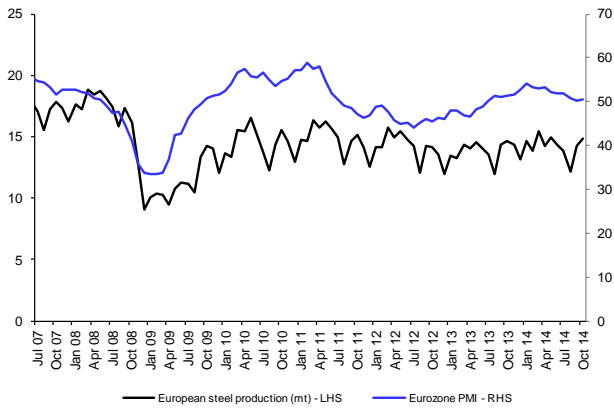
Figure 6: European steel production vs. Germany IFO

European steel production (mt) - LHS — Germany IFO - RHS
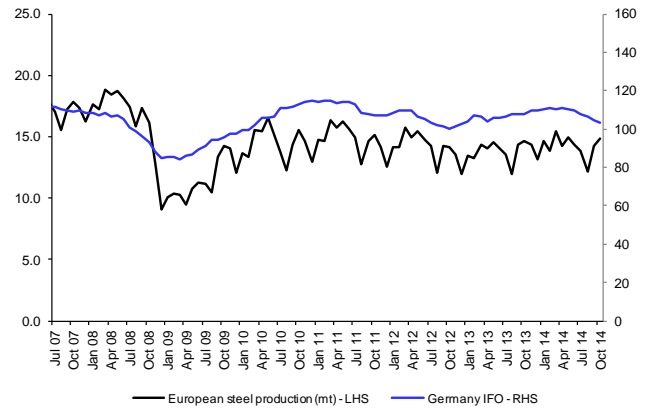
Figure 7: US steel production vs. US PMI

US steel production (mt) - LHS — US PMI - RHS
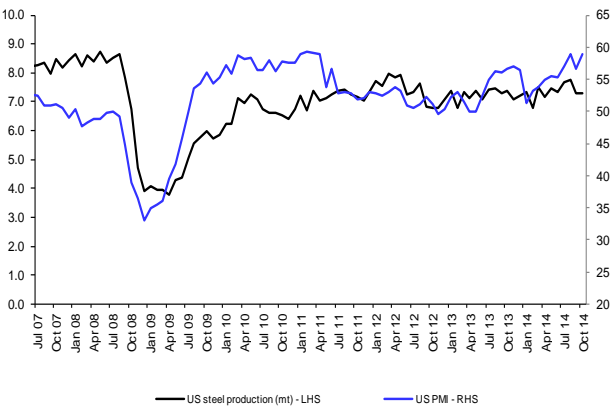
Figure 8: US steel production vs. US ISM

US steel production (mt) - LHS — US ISM - RHS
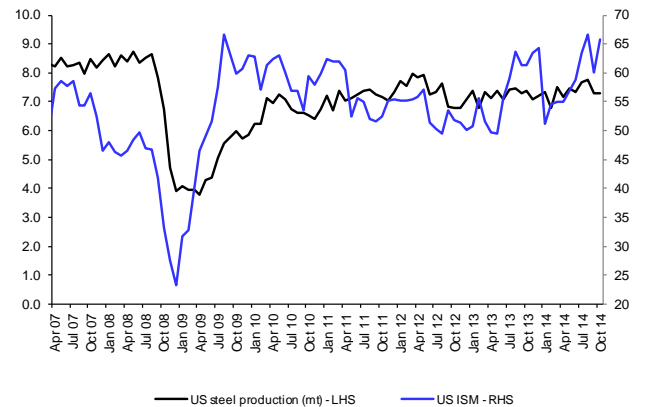
Inventory restocking possible but falling commodity prices make it tough

Inventory levels in Europe have come down significantly in the last couple of months, as the market anticipated a further drop in prices due to the falling iron ore price. While we would expect H1 to benefit from seasonal restocking, we believe it would require a bounce in commodity prices to drive a more material restocking. Given our raw material price scenario, we however doubt that this will materialize as the continuing decline in iron ore forces traders to keep inventories low.

Figure 9: European inventory index (2001 = 100)
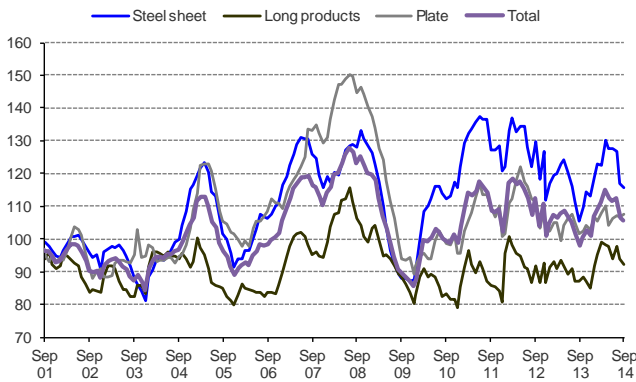
Source: Deutsche Bank, CRU

Figure 10: Lead times
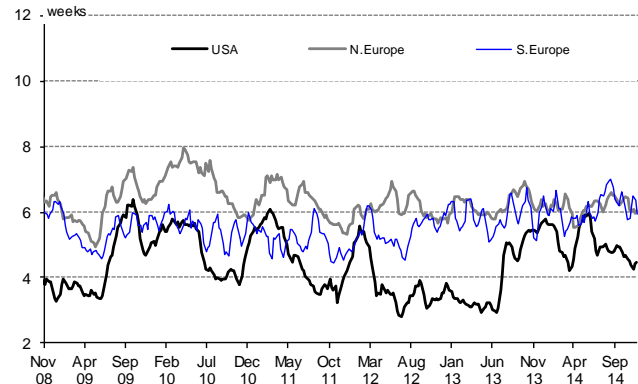
Source: Deutsche Bank, CRU

Chinese inventories have followed iron ore prices down exacerbated by weaker H2 demand. The inventory levels are at a multi-year lows. While this suggests at least there is no inventory bubble, slowing domestic demand and lack of price discipline continues to put supply pressure on South-East Asian export markets. US inventories still look "normal" and should have be well aligned with solid demand and spot price dynamics on the US market.

Figure 11: China inventories
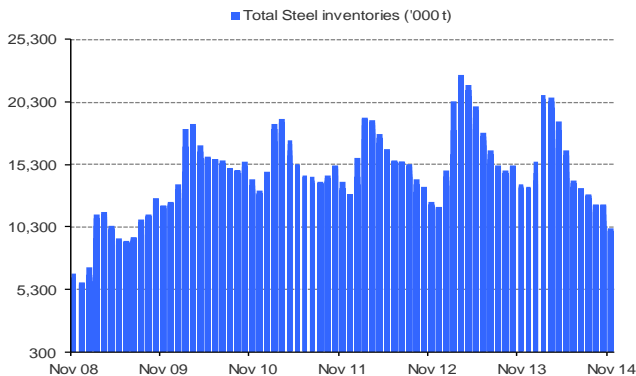
Source: Deutsche Bank

Figure 12: US inventories
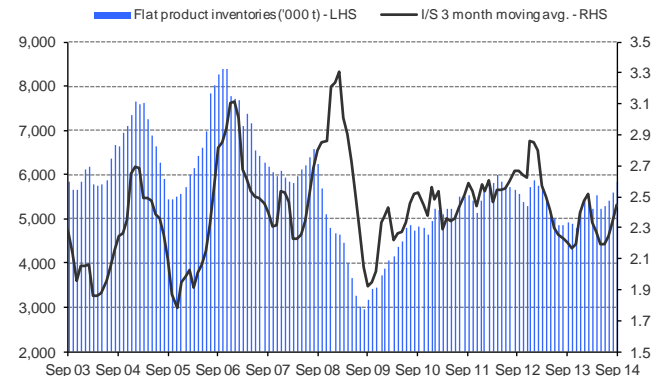
Source: Deutsche Bank

Europe remains a net exporter but imports have started to rise

Although imports into Europe remain below previous peak levels, import pressures have started to rise. Even though in low volumes, our sources suggest this is also driven by Asian material. We think that the weak Euro, the currently low price level in Europe and the structural overcapacity and weak demand makes the region unattractive (unlike the US market where prices are at a significant premium to other regions). Nevertheless, history has told us that oversupply can lead to irrational behavior of market participants on a temporary basis. Anti-dumping regulation is likely to keep Chinese imports in check, and we only expect a modest increase in 2015E.

Figure 13: European steel imports vs. exports
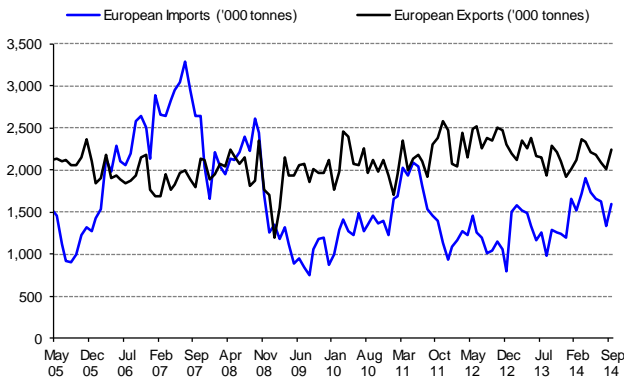
Source: Deutsche Bank, Eurofer

Figure 14: China HRC export price
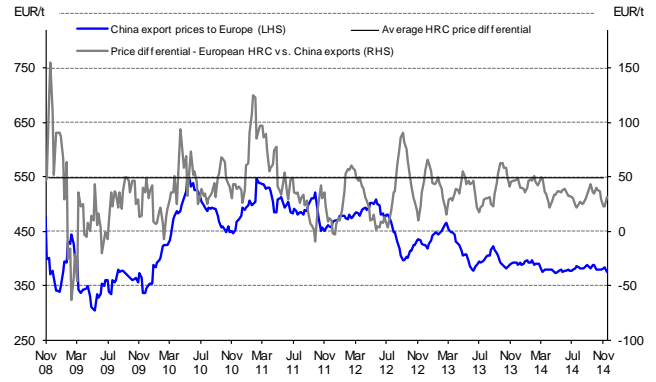
Source: Deutsche Bank, The Steel Index

The Chinese steel balance is improving

After years of poor profitability and balance sheet quality for the Chinese steel industry, Chinese steel mills have started to slow new capacity additions. Figure 15 below shows how the aggregate net debt of 19 A/H listed steel companies stayed at the plateau level and how their aggregate net gearing ratio has started to reverse since 1H13. The aggregate net gearing peaked in 2H12 at 85% and then started to come down. The simple average of net gearing of 19 A/H listed steel producers in 1H14 was 113%, implying some smaller players' balance sheet quality is even worse than the aggregate level has shown. We believe the decline in net gearing can largely be attributed to the Chinese government's loan policies since 2013. The Chinese government, in trying to rationalize steel overcapacity in China, has limited new loans to the steel industry. As such, steel mills are unable to further gear up their balance sheets and need to address their cash flow issues via "self-help" measures. We believe that might mark the inflection point for the Chinese steel industry, as far as profitability is concerned.

Figure: 15 listed steel companies' aggregate net gearing ratio and net debt
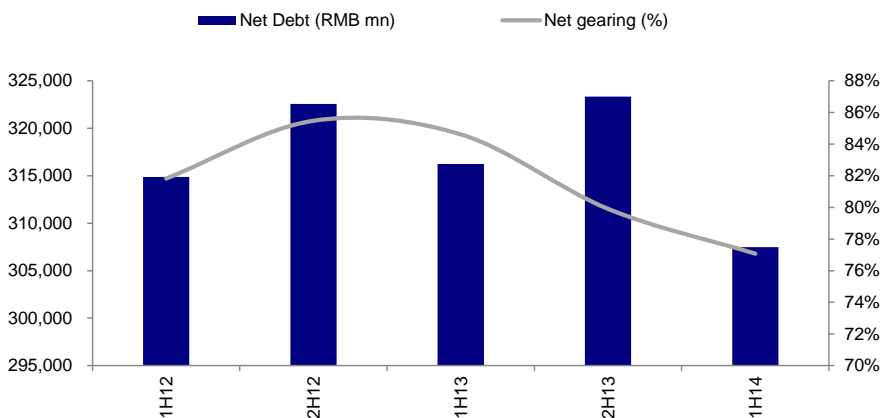
Source: Deutsche Bank, company data

Meanwhile, due to a shortage of new capital, steel mills are continuing to reduce their investments in new steel capacity (below Figure 16 and Figure 17). From our recent checks, a large proportion of the new capital expenditure at the steel mills is for value-added manufacturing facilities such as cold-rolling or galvanized plants. As such, we believe crude steel capacity addition in the coming two years will be very limited.

Figure 16: FAI for steel sector (monthly)
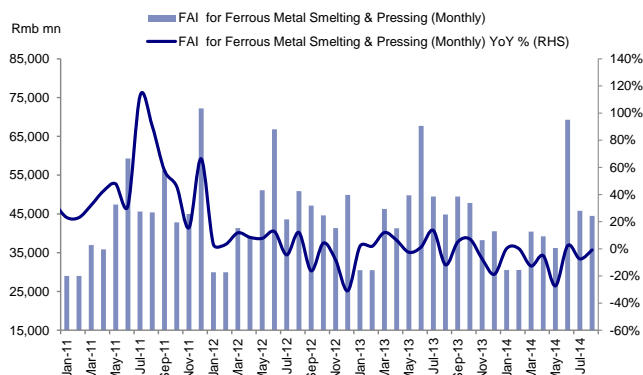
Source: Deutsche Bank

Figure 17: FAI for steel sector (YTD)
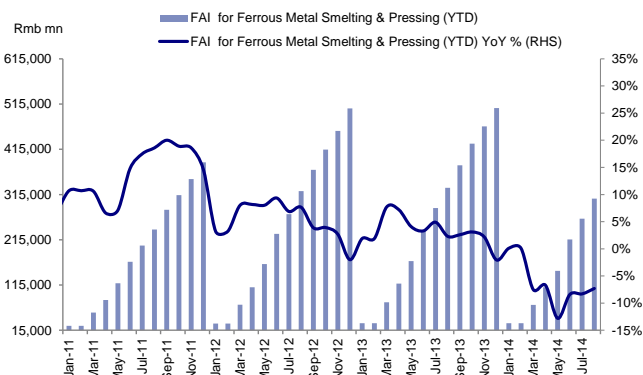
Source: Deutsche Bank

As shown below in Figure 1818 and Figure 1919, we forecast that the Chinese steel industry might see a slight net capacity reduction, in 2015. As such, even though we cut our 2015DBe Chinese apparent steel demand growth from 4.5% to 1.4%, the China steel industry utilization rate will still improve from 81.2% in 2014 to 82.5% in 2015. Thus, we believe steel mills' profitability in 2015 will improve from the 2014 level due to the industry utilization rate improvement.

Figure 18: China Crude Steel supply and demand

(Mt)	2008	2009	2010	2011	2012	2013	2014E	2015E	2016E
Capacity	660	718	800	863	932	993	1003	998	997
+ Net/Gross addition	115	58	82	63	69	69	35	10	9
- Phase out						8	25	15	10
Capacity growth %	21.1%	8.8%	11.4%	7.9%	8.0%	6.6%	1.0%	-0.5%	-0.1%
Production	503	572	637	685	724	779	810	826	856
Production growth	2.8%	13.7%	11.4%	7.5%	5.6%	7.6%	4.0%	2.0%	3.6%
Capacity utilization	83.5%	83.0%	84.0%	82.4%	80.7%	80.9%	81.2%	82.5%	85.8%
Net import (export)	-45	-8	-26	-33	-42	-48	-70	-75	-75
Total apparent consumption	458	564	611	652	682	731	741	751	781
Apparent consumption growth	4.7%	23.2%	8.3%	6.7%	4.6%	7.2%	1.3%	1.4%	4.0%

Source: Deutsche Bank

Figure 19: China steel industry net capacity addition
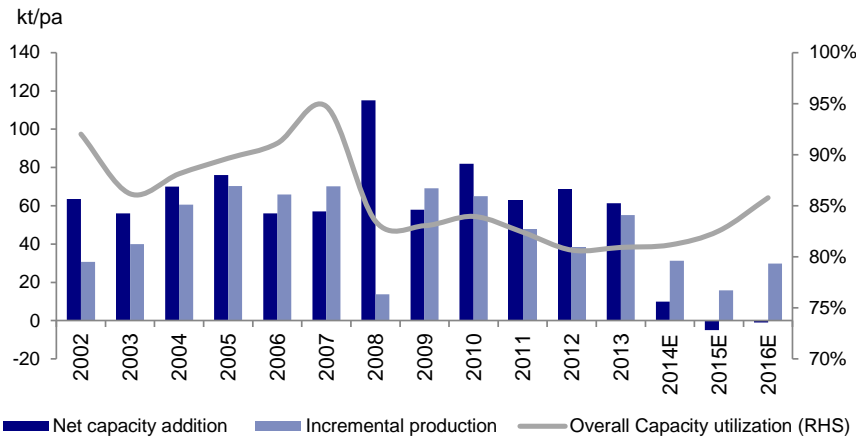
Although we are seeing the first signs of inventory declines in the Chinese property sector, we think there needs to be further price declines before sales volumes pick up meaningfully. The process of inventory clearing could take could take a further 6-9 months. We expect that this will translate into another year of negative steel consumption for the Chinese property sector, with our expectation of a second half pick-up..

Figure 20: Chinese steel consumption by category in 2014E
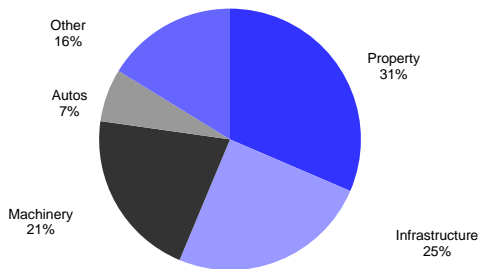
Figure 21: Chinese steel consumption growth by category
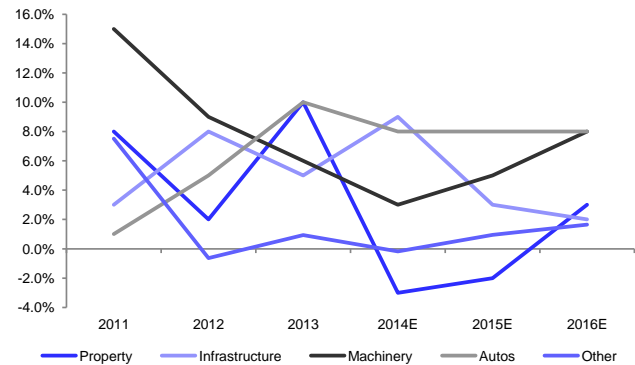
Whilst the improving utilization in the Chinese steel market should be positive for steel prices, due to the over-supplied markets in iron ore and coking coal, the price stabilization in steel may not feed through to the underlying raw materials in 2015. We see the tentative signs of price stabilization in the market as sustainable. But in our view, stabilization is not enough to drive up the raw material prices, only sufficient to stem the magnitude of the decline.

Figure 22: Average HRC price in China
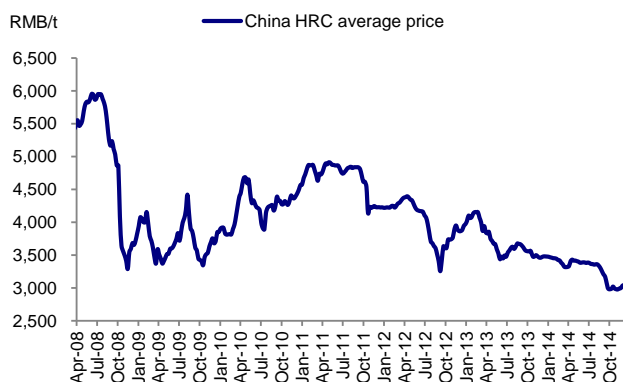
Source: Bloomberg Finance LP, Deutsche Bank

Figure 23: Average rebar price in China

Source: Bloomberg Finance LP, Deutsche Bank

Iron ore outlook: Supply cuts required, and soon

The maths in the Iron ore market is simple. We expect demand growth of 150Mt over the next three years, based on low single digit steel production growth. Supply growth from the big four producers, Hancock Prospecting's Roy Hill, and Anglo American's Minas Rio is 300Mt over the same period. This means that supply cuts of 150Mt are required elsewhere. We already assume that Chinese production declines by 100Mt over this period, and that Indian production simply keeps pace with domestic steel growth.

Figure 24: Estimating the required supply cuts to balance the market

Mt	2014 - 2017E
Demand growth	**148**
Supply growth	**301**
Vale	65
Rio	87
BHPB	65
FMG	7
Anglo (Minas Rio)	25
Roy Hill	52
Cuts required to balance the market	**153**

Source: Deutsche Bank

The major iron ore producers have delivered on the project ramp-up schedules over the course of 2014.

Given our view of a positive, but slowing global steel production outlook, we think the two themes that emerge from this market view are as follows:

- How "sticky" will Chinese iron ore supply be, or is it realistic to assume that a further 100Mt of capacity will close?

- Where will the supply cuts – ex China come from?

How sticky will Chinese iron ore capacity be?

The problem with simply assuming that there will be mass closures in the Chinese iron ore production base is that the official production statistics do not support this assumption; until very recently that is. Chinese production is up 6.6% YTD, with October being flat YoY. We would however point out that there have been periods when Chinese production has moved into negative territory, demonstrating that there is very definite price sensitivity. Price related shuts are evident in H1'09 and H2'12. Channel checks suggest that c.50Mt of Private mine capacity has been shut in 2014, but also that some State Owned Enterprises (SOE) have increased output.
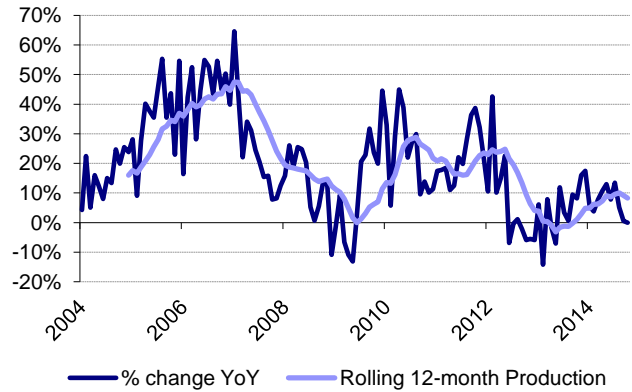
Figure 25: Domestic Chinese iron ore production
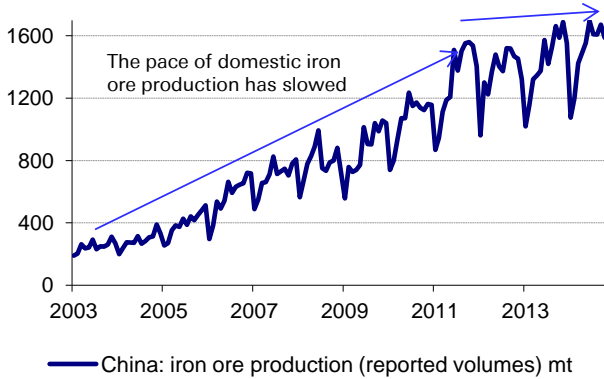
Figure 26: Chinese iron ore production momentum

Source: CEIC, Deutsche Bank
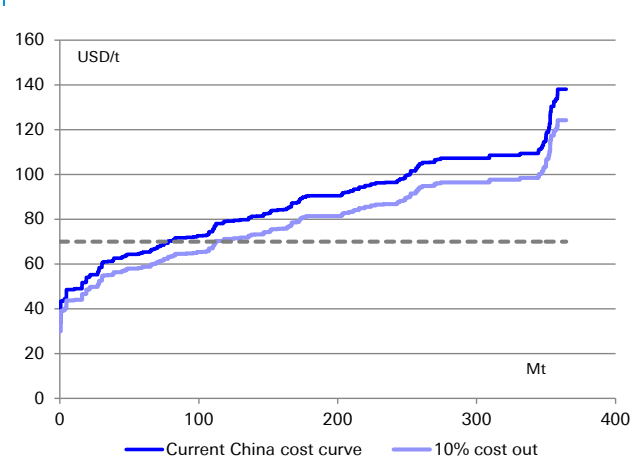
Source: Deutsche Bank, CEIC

The Chinese iron ore market is forecast to produce 300Mt of 62% equivalent iron ore this year, although capacity is estimated to be closer to 400Mt. Around 100Mt comes from the major producing regions of Sichuan and Inner Mongolia. These mines are effectively captive and are unlikely to see any production curtailments. The remaining 200Mt of active capacity comprises c.80Mt of SOE capacity and 120Mt of Private capacity. We would expect the SOE capacity to be price inelastic and remain operational, as employment is a key consideration. At the current spot price of c.USD70/t, only 80Mt of Chinese capacity is profitable. If we assume that the average Chinese cash costs can be reduced by 10% through a combination of benefit cuts (a form of remuneration) and taxes and levies (grey costs), this still means that a mere 105Mt remains profitable. This would take average cash costs from USD92/t at the beginning of 2014 to USD80/t by the end of 2015.

Figure 27: China ex-mine total cost curve – 62% Fe equiv. in 2014
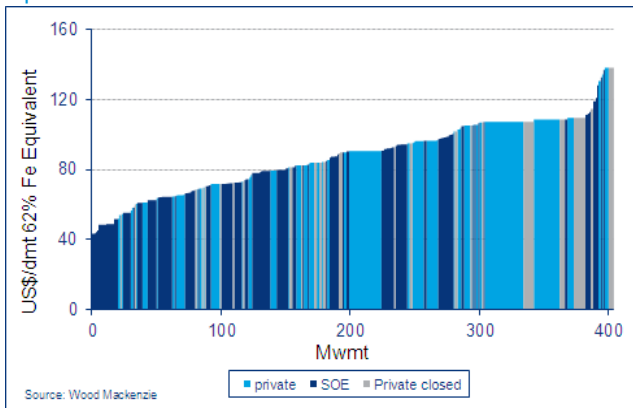
Figure 28: Cutting deeply into the cost curve

Source: Wood Mackenzie

Source: Wood Mackenzie, Deutsche Bank

Our base case assumption is that 100Mt of Chinese capacity will be shut over the next two years, leaving only 20Mt of viable Private capacity remaining. The market will keenly monitor production data out of China in order to assess the "stickiness" of Chinese production in our view.

Where will the supply cuts outside of China come from?

There have been limited closure announcements from the iron ore market, although we expect the rate of announcements to pick up over the course of 2015. The highest profile announcement is that of African Minerals where a lack of working capital has forced the company to shut operations. We estimate a total of c.40Mt of closures have been announced.

Figure 29: Mine production cuts

Country	Company	Asset	Date	Reason/Impact	Prod'n (Mtpy)
Australia	Kimberley Metals	Ridges	Jul-14	Price related production cut	1.7
Australia	IMX Resources	Cairn Hill	Jun-14	Placed into administration - likely closure	1.6
Australia	Noble Resources	Frances Creek	Jul-14	Price related mine closure	1.5
Australia	Shree Minerals	Nelson Bay River	Jun-14	Price related mine closure	0.1
Brazil	MMX	Serra Azul	Aug-14	30 day closure - price and environmental	6
Canada	Labrador Iron Mines	Stage 1 (Schefferville)	Jul-14	Price related mine closure	1.7
Canada	Cliffs	Wabush (Scully)	Feb-14	Price/cost related mine closure	1.5
Russia	IRC	Kuranakh	Aug-14	Profit warning - possible closure.	1
Guinea	Bellzone	Forecariah	Aug-14	Lack of finance - likely closure in Q4'14.	0.5
Canada	Cliffs	Bloom Lake	Oct-14	Lack of Funding with Phase I not feasible	7
Sierra Leone	African Minerals	Tonkolilli	Nov-14	Lack of working capital	20
				Total annualised production	**42.6**

Source: Wood Mackenzie

A number of non-traditional suppliers emerged as exporters to China as prices starting increasing in 2003. Chinese imports from countries such as Indonesia, Malaysia and Iran have declined since the middle of 2014, as increased tonnage from Australia and Brazil has pushed out higher cost producers. We note that imports from these smaller suppliers are down 22Mt in the first 10 months of the year or c.25Mt on an annualized basis. Total imports are up 16% or 117Mt for the first 10 months of the year.

Figure 30: Chinese iron ore imports by source YoY change
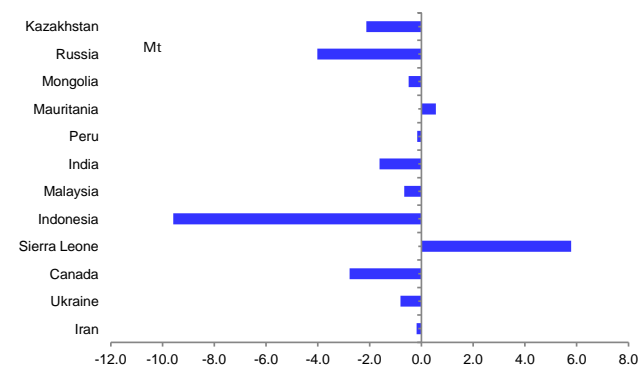
Source: Bloomberg Finance LP, Deutsche Bank

Figure 31: Chinese iron ore imports (monthly)


China Total Iron Ore Imports, mt
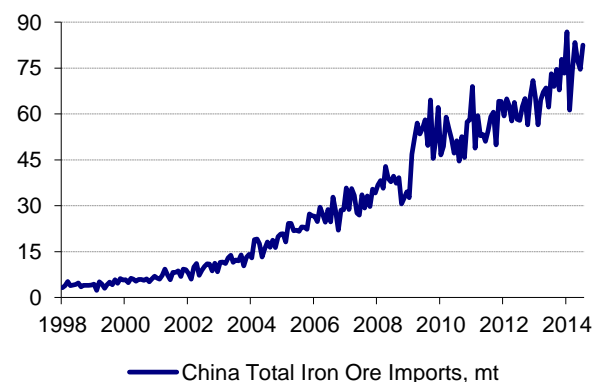
Source: NBS, Deutsche Bank

In addition to the supply curtailments from supply which can be considered as non-traditional, we have identified a further 100Mt which is loss-making on a Total cash cost basis, including royalties and levies. If we include sustaining capex, then a further 100Mt (a total of 200Mt) is loss making. The total of the announced cuts of 40Mt, plus the implied non-traditional cuts of 25Mt and the 100Mt of at risk production exceeds the 150Mt of production that is required
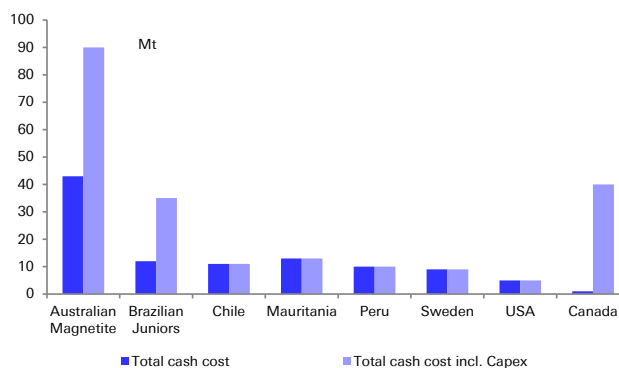
to balance the market. However the margin between the required cuts and the identified cuts is modest, especially given the tailwind on weaker currencies and energy costs.

Figure 32: Iron ore mined supply additions and cutbacks
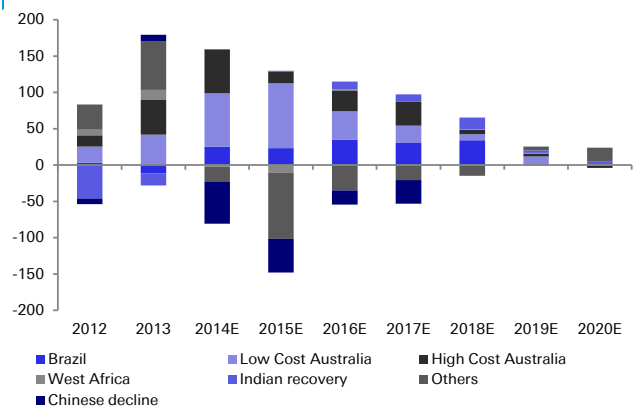
Source: Deutsche Bank

Figure 33: Iron ore volumes loss-making at the current spot price

Source: Wood Mackenzie, Deutsche Bank

Limited chance of a significant Q1 bounce

We continue to forecast a modest price recovery in Q1'15 to USD72/t, although we recognize that this view is not consensual. Steel inventories at both the traders and the Large and Medium steel mills remain relatively low.

Figure 34: Traders' steel inventory in 26 major cities
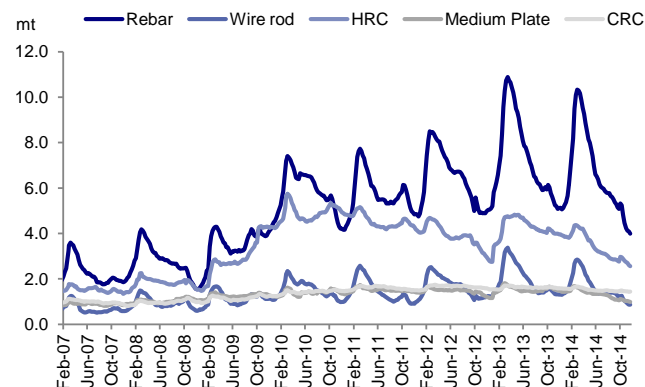
Source: Wind, Mysteel , Deutsche Bank

Figure 35: Large & medium steel mills inventory
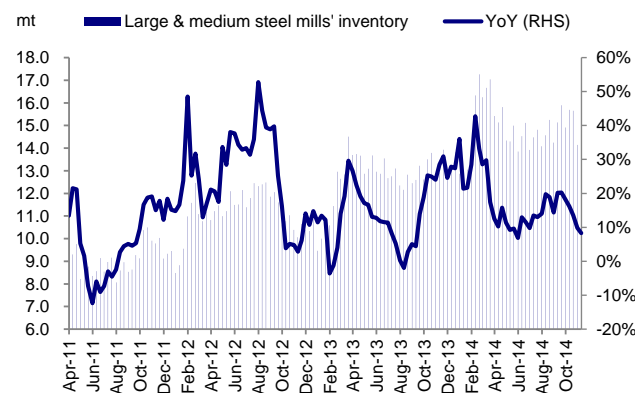
Source: CISA, Deutsche Bank

Iron ore inventories at the steel mills remain relatively low. Although port stocks remain high, these have stabilized at c.100Mt. The rather muted economic outlook in China, despite the recent rate cut means that buyers are not under pressure to restock prior to Chinese New year. However, the usual cocktail of seasonal supply disruptions and further supportive policy changes being announced, could result in a modest rally in prices in Q1'15.
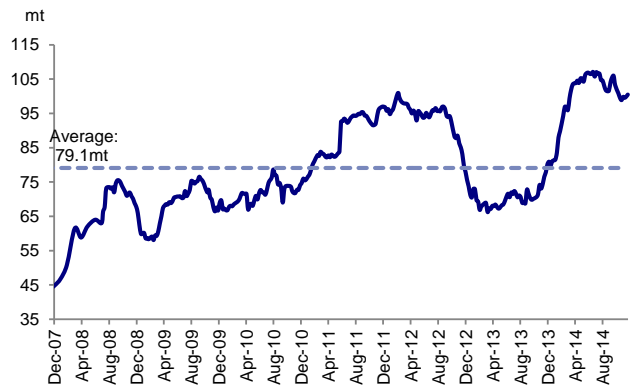
Figure 36: Imported iron ore inventory at the steel mills
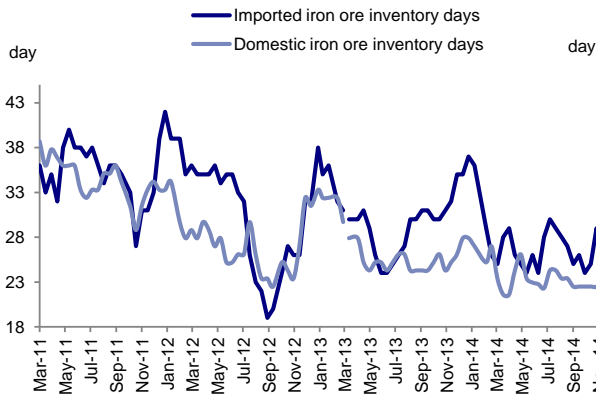
Source: CEIC, Wind, Deutsche Bank

Figure 37: Iron ore port inventories

Source: Bloomberg Finance LP, Deutsche Bank

Figure 38: Deutsche Bank Global Iron Ore supply – demand model

Supply		2009	2010	2011	2012	2013	2014e	2015e	2016e	2017e
Brazil	Mt	285	349	373	372	387	415	433	461	492
growth	%	-12%	22%	7%	0%	4%	7%	4%	6%	7%
Australia	Mt	393	433	477	529	621	733	800	850	904
growth	%	14%	10%	10%	11%	18%	18%	9%	6%	6%
South Africa	Mt	56	58	58	61	68	71	68	67	65
growth	%	18%	4%	0%	6%	11%	5%	-4%	-2%	-2%
India	Mt	206	200	181	135	118	119	120	130	140
growth	%	8%	-3%	-10%	-25%	-12%	0%	1%	9%	8%
China	Mt	220	324	355	347	357	299	252	233	200
growth	%	-25%	47%	9%	-2%	3%	-16%	-16%	-8%	-14%
CIS incl. Russia	Mt	176	198	208	218	215	210	193	199	205
growth	%	-5%	12%	5%	5%	-1%	-2%	-8%	3%	3%
North America	Mt	71	105	114	115	127	126	117	121	122
growth	%	-30%	47%	8%	1%	10%	-1%	-7%	3%	1%
West Africa	Mt	10	12	14	21	35	33	22	25	25
growth	%	-11%	14%	19%	55%	65%	-7%	-33%	12%	0%
Other regions	Mt	31	42	61	73	93	94	77	58	33
Total iron ore supply	**Mt**	**1,448**	**1,721**	**1,840**	**1,870**	**2,021**	**2,100**	**2,082**	**2,143**	**2,187**
growth	%	-4.2%	18.8%	6.9%	1.6%	8.1%	3.9%	-0.9%	2.9%	2.1%
Demand		2009	2010	2011	2012	2013	2014e	2015e	2016e	2017e
Global steel production (crude steel)	Mt	1,235	1,430	1,534	1,543	1,609	1,659	1,704	1,753	1,790
Global Hot Metal production	Mt	1,004	1,125	1,204	1,240	1,292	1,340	1,361	1,408	1,437
growth	%	2.0%	12.0%	7.0%	3.0%	4.2%	3.7%	1.6%	3.4%	2.1%
% Non scrap production	%	81%	79%	78%	80%	80%	81%	80%	80%	80%
European crude steel production	Mt	168	206	217	209	205	208	211	213	215
European Hot metal production	Mt	103	106	104	105	106	110	106	106	106
growth	%	16%	3%	-2%	1%	1%	4%	-4%	0%	1%
% Non scrap production	%	61%	51%	48%	50%	52%	53%	50%	50%	50%
Japan crude steel production	Mt	88	110	108	107	111	112	113	113	113
Japan hot metal production	Mt	67	82	81	81	84	84	85	85	85
growth	%	-22.3%	22.9%	-1.5%	0.5%	3.0%	0.4%	0.8%	0.2%	0.0%
% Non scrap production	%	77%	75%	75%	76%	76%	75%	75%	75%	75%
India crude steel production	Mt	64	69	74	78	81	84	91	99	107
India hot metal production	Mt	60	63	66	68	68	74	80	87	94
growth	%	3.0%	4.5%	4.1%	3.7%	0.0%	8.2%	9.0%	9.1%	7.5%
% Non scrap production	%	95%	91%	89%	88%	84%	88%	88%	88%	88%
China steel prodution (crude steel)	Mt	577	639	702	717	779	809	826	846	859
China steel production (iron ore)	**Mt**	**553**	**613**	**672**	**709**	**756**	**785**	**793**	**821**	**833**
growth	%	15.6%	10.8%	9.7%	5.4%	6.6%	3.9%	0.9%	3.6%	1.5%
% Non scrap production	%	96%	96%	96%	99%	97%	97%	96%	97%	97%
Iron Ore										
China	Mt	831	923	1024	1077	1162	1207	1218	1261	1280
growth	%	15%	11%	11%	5%	8%	4%	1%	4%	1%
Japan	Mt	102	125	124	124	127	126	129	128	126
growth	%	-22%	23%	-1%	0%	3%	-1%	2%	-1%	-2%
S. Korea & Taiwan & other	Mt	65	79	94	91	94	95	100	104	108
growth	%	-13%	23%	19%	-3%	3%	2%	5%	4%	4%
Europe	Mt	119	153	153	149	153	157	151	151	152
growth	%	-30%	29%	0%	-3%	2%	3%	-4%	0%	1%
India	Mt	92	97	100	104	103	112	122	133	143
growth	%	3%	5%	4%	3%	0%	8%	9%	9%	8%
Brazil	Mt	35	43	46	38	37	43	45	46	47
growth	%	-28%	23%	7%	-19%	-3%	17%	5%	2%	3%
CIS	Mt	125	135	138	141	141	138	143	149	153
growth	%	-11%	7%	3%	2%	0%	-3%	4%	4%	3%
Total iron ore demand	**Mt**	**1,483**	**1,695**	**1,827**	**1,873**	**1,969**	**2,036**	**2,072**	**2,142**	**2,184**
growth	%	-2.9%	14.3%	7.8%	2.5%	5.1%	3.4%	1.7%	3.4%	1.9%
Implied scrap ratio	%	25%	26%	26%	24%	24%	23%	24%	24%	24%
Disruption allowance	Mt						0	0	0	0
Notional market balance	**Mt**	**-34**	**26**	**13**	**-3**	**52**	**64**	**11**	**1**	**4**
China imported fines (62% CFR)	**USD/t**	**79.8**	**146.6**	**167.0**	**123.8**	**130.0**	**97.2**	**68.0**	**71.3**	**78.0**

Source: Wood Mackenzie, CEIC, Deutsche Bank

Figure 39: Global and sea-borne iron ore supply-demand balance
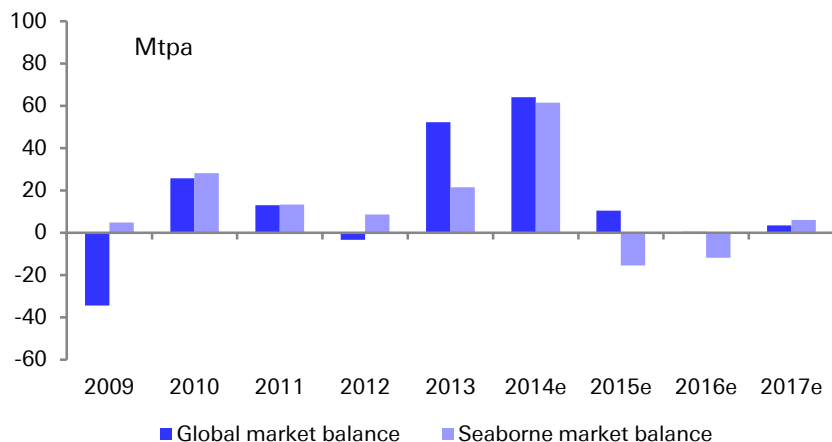
Source: Wood Mackenzie, Deutsche Bank

Metallurgical Coal: Another leg down in 2015

The past eight to nine months have seen stable prices in the coking coal export market. This would suggest that supply cuts and curtailment announcements have been successful at stabilizing the price, and that any small improvement in demand would lead to price appreciation. However, we forecast even lower Chinese imports, with weak (albeit positive) steel growth and modest growth in Chinese supply, exacerbated by a continuation of rising Coke exports. This means that the Coking coal market needs a further 10Mt of curtailments, to achieve a balance in 2015E, in our view. Lower oil prices and weaker producer currencies will benefit the cost bases of all the producers, especially the non-US producers. This may delay the inevitable tranche of cuts required, and will in all likelihood see another leg down in coking coal prices.

Initial indications of a likely settlement for quarterly Q1 Hard Coking coal prices are USD117/t. Had it not been for the lower oil prices and weaker currencies, we would have expected a roll-over of the Q4 USD119/t level, given the gradual recovery of the spot price (USD112/t), and the recovering Chinese domestic price at RMB800/t. Indeed, these two reference prices may well be enough to convince the steel mills that a roll-over is justified. We think the moves in currencies and oil was enough to justify a small decrease in the settlement. Our forecast was USD115/t.

Spot prices have held firm, but we expect the quarterly settlement to be down due to lower input costs.

Figure 40: China domestic coking coal price (Liulin No.4 FOR)

RMB/t

Liulin No.4 coking coal FOR
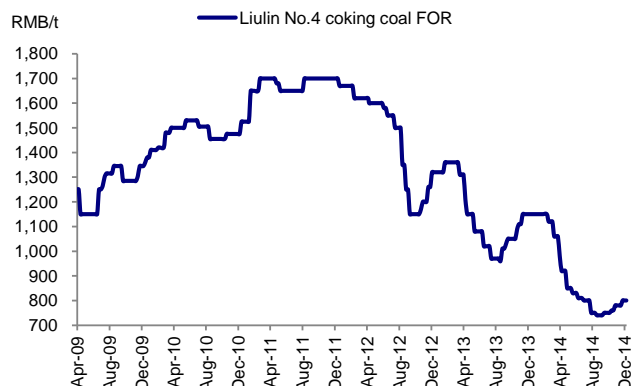
Source: Sxcoal, Deutsche Bank

Figure 41: Australian prime coking coal CIF Chine

USD/t

Australia Prime Coking Coal CIF
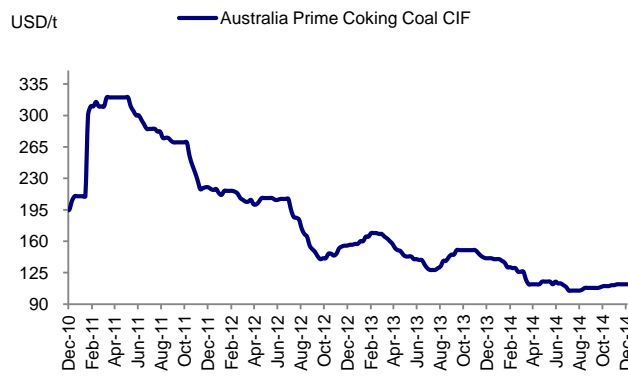
Source: Thomson Reuters Datastream, Deutsche Bank

The recovery in the domestic China price has outstripped the spot Australian export price, which has meant that the Australian premium has narrowed to RMB30/t. This suggests that the economic incentive to increase imports into China remains low. We expect a further decline in imports in 2015, with domestic supply still in expansion mode.

Supply cuts and the consequential lower exports, particularly out of the US, has limited the surplus to c.5Mt in our view. However, additional exports from Australia, Mozambique and Mongolia will lead to a supply increase of c.4Mt in 2015E. In a flat demand environment, the surplus is likely to increase to 11Mt for 2015E, unless further cuts are announced.

Figure 42: Metallurgical Coal supply – demand balance (seaborne market)

Seaborne market balance (Mt) - lhs   Price (USD/t) - rhs
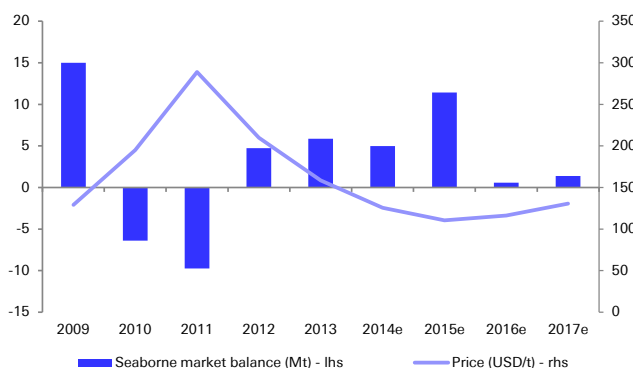
Source: McCloskey's, Wood Mackenzie, Deutsche Bank

Figure 43: Price parity vs. net import: Australia ex-tank vs. Shanxi Liulin No. 4

RMB/t

China coking coal net import (RHS)
Current price gap in China (Australia - China)

mt
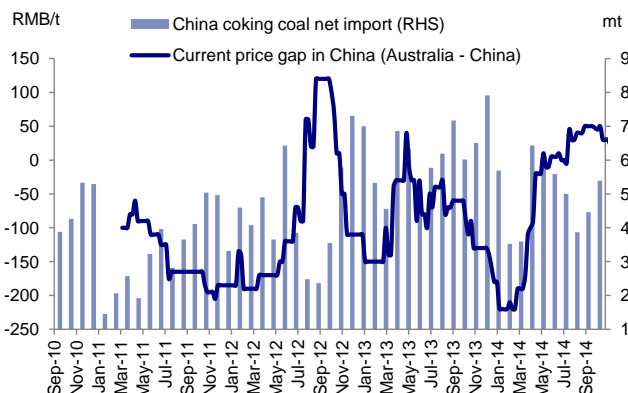
Source: Wind, Sxcoal, Deutsche Bank

The three "hot" topics for the metallurgical coal market for the next twelve to eighteen months, in our view are:

- **China's trade dynamics**: Will exports continue to drift lower at the same time as coke exports continue to increase? A reversal of these trends will be positive for the market, but is unlikely in 2015 in our view. The momentum in domestic production and our forecast of weak (2%) steel production growth means that this is unlikely.

- **The re-acceleration of supply cuts:** Supply cut announcements have stalled over the past three months. We think another tranche is required, mostly from the US producers and possibly some Indonesian curtailments, which will offset the additional volumes from Australia, Russia and Mozambique.

- **Falling unit cash costs:** We estimate that the trend of a falling and flattening industry cost curve will continue in 2015. We estimate that c.40% of the coking coal market had negative margins in September (on spot coking coal prices), but that this will fall to just 16% post the fall in the oil price and weaker producer currencies.

Limited new supply cuts announced

Coking coal closure announcements amounted to c.27Mt in 2014, with a further 5Mt in 2015. We estimate that the cuts implemented in 2014 should reduce traded volumes by 2% to 316Mt, but will not quite be sufficient to offset growth in Australia, Russia and Mozambique in 2015. We forecast traded supply to increase by c.4Mt or 1% in 2015. In our view a further 10Mt of cuts are required to balance the market, which would mean flat supply year on year.

Figure 44: Coking Coal closures announced YTD

Company	Region / Basin	Mines	Met volume, Mt (2014)	Met volume, Mt (2015)
Alpha Natural Resources	PRB, Appalachia	Various	3.45	0.23
Anglo American	Australia (Queensland)	German Creek Aquila	0.30	
Anglo American	Canada	Peace River		2.50
Arch Coal	PRB, Appalachia	Various	1.27	
Banpu/Centennial	Australia (NSW)	Angus Place		0.00
Borneo Lumbung Enerji	Indonesia	Asmin Koalindo Tuhup	1.10	
CONSOL Energy	Appalachia	Buchanan, Bailey/Enlow Fork	1.50	
Glencore	Australia (NSW)	Ravensworth u/g	0.60	
Glencore	Australia (Queensland)	Newlands surface	1.00	
Glencore	Australia	All mines		1.00
James River	CAPP	Various	0.18	
Jizhong Energy	China	Various	11.50	
Mechel	CAPP	Bluestone	1.50	
Patriot Coal	Appalachia	Various	0.18	
Peabody Energy Corp	Australia (Queensland)	Burton	0.26	
Rhino Natural Resources	Appalachia		0.18	
Solid Energy	New Zealand	Stockton	0.50	
Suncoke	Appalachia	Various	0.27	
Vale	Australia (NSW)	Integra surface + u/g	0.54	
Vale/Sumitomo	Australia (Queensland)	Isaac Plains		1.70
Walter Energy	Canada	Willow Creek, Brule, Wolverine	1.91	
Yancoal	Australia	Duralie/Stratford	0.33	
Total			**26.6**	**5.4**

Source:, Wood Mackenzie, Deutsche Bank

Exports of metallurgical coal from the Queensland ports are up 13% YTD or 15Mt of additional supply. We forecast an increase of 15Mt of additional supply from Australia for the whole of 2014E, followed by a more modest 4Mtpa increase in 2015E. If the current run rate were to be maintained, this would suggest some upside to our 2014E numbers. Glencore's three-week holiday at all of its Australian mining operations which started on the 15th of December, is unlikely to result in a significant reduction of volumes (c.1Mt). We see this more as a signal to the market for further supply discipline.
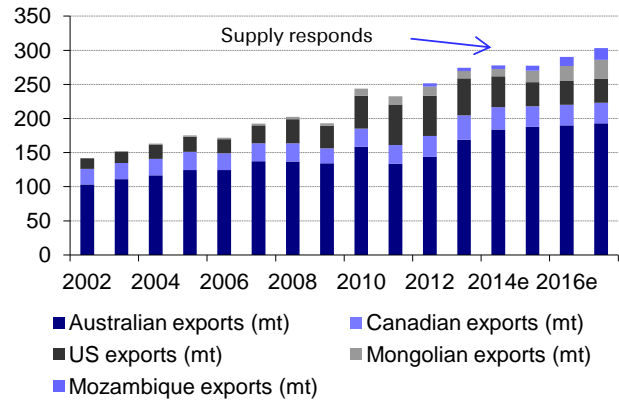
Figure 45: Queensland Metallurgical coal exports
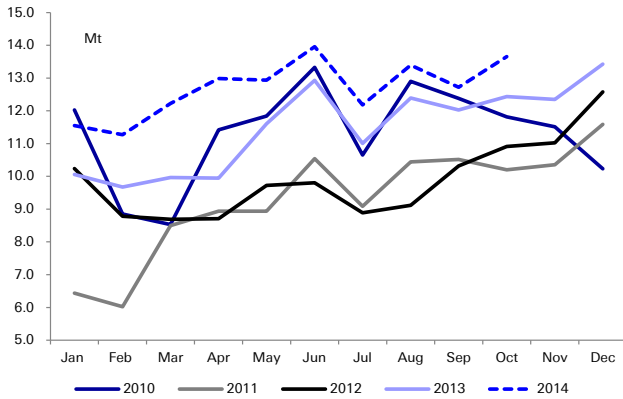
Source: Wood Mackenzie, Deutsche Bank

Figure 46: Exports from the key regions

Source: Deutsche Bank

Could China become a net exporter of Coking coal?

We think this is unlikely, but Coke exports could certainly continue to increase. Channel checks suggest that China is considering lowering the export tax on coal from 10% to 3% in order to help the domestic producers. Even if this were the case, there is still a quota system in place which restricts exports to 3.8Mt. Chinese coking coal imports are down 17% YTD at 49Mt or 59Mt for the full year. Our current full year forecast is 63Mt which implies strong import numbers for the last two months. We forecast c.56Mt of net coking coal imports for 2015E, a further 10% decline, despite a modest 1% growth in domestic supply. In contrast, Coke exports are up c.100% to 6.6Mtpa, or 8Mt for the full year in 2014. The level of exports is still down from the peak at 12 – 14Mtpa prior to a change in the export tax regime, suggesting there is scope for further increases.

Figure 47: Chinese Coking Coal imports (monthly)
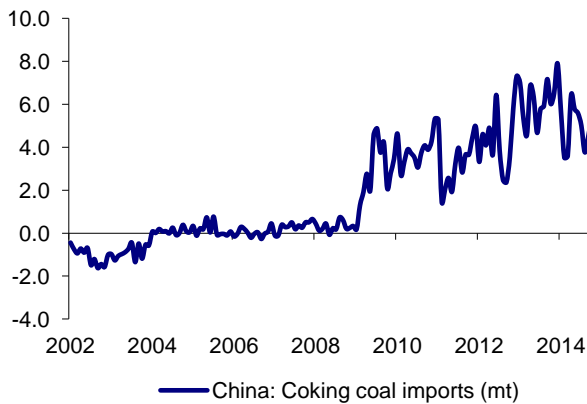
Source: NBS, Deutsche Bank

Figure 48: Chinese Coke exports
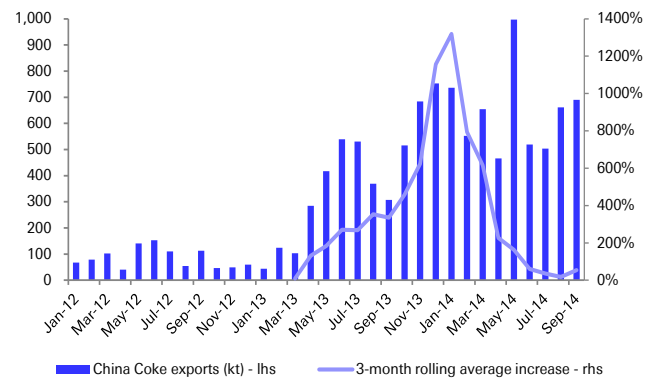
Source: NBS, Deutsche Bank

Inventories of imported coal in China have continued to fall sharply over the course of Q4, as imports have slowed. However, these have stabilized since the middle of November. In contrast however, stocks at the surveyed coke plants have continued to rise and are close to the threshold 20 day level. This suggests that the likelihood of a strong restocking rally in Q1 is unlikely.

Figure 49: Imported coking coal at four major ports
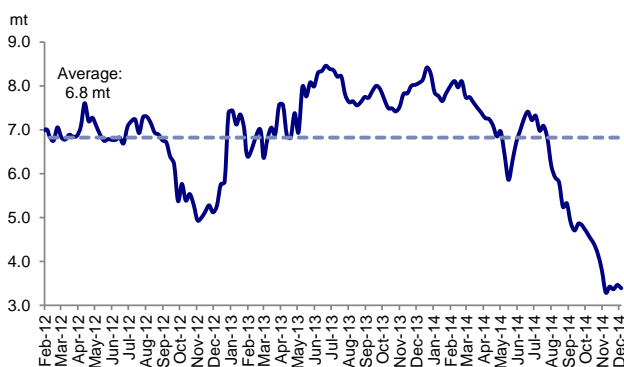
Source: Mysteel, Deutsche Bank

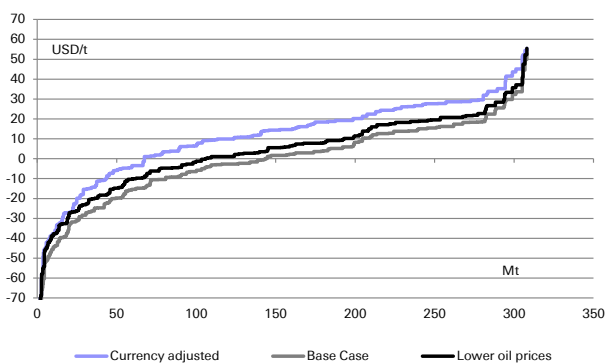**Figure 50: Coking coal inventory at coke plants**
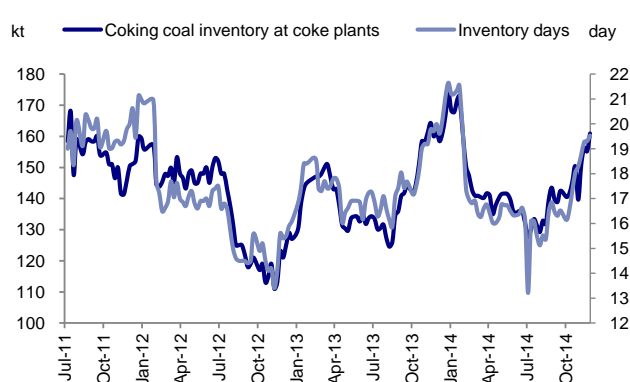
Source: Mysteel, Deutsche Bank

A temporary relief in margins, before prices fall again…

As coking coal is not an homogenous product, it is sometimes more useful to view the market on an operating margin basis, as shown in figure 51 below: At current spot hard coking coal prices, we estimate that c.45% or 150Mt of the market was loss making, based on August exchange rates and oil price. The mining of Metallurgical coal is relatively diesel intensive, especially in the open-cut operations. We estimate that c.15 - 20% of the average producers costs have either a direct or indirect link to the oil price. This means that a 30% fall in oil prices will result in a 5% drop in unit cash costs. This impact is unlikely to be realized immediately as many of the producers hedge their oil exposure for at least one year. However, at oil prices of c.USD70/bbl (versus a current spot price of USD62/bbl), the percentage of the industry that is loss-making, falls to c.30%.

We estimate that c.50% of costs are local currency denominated, as an average across the industry. If we assume that the major producer currencies, the Australian dollar (-23%), the Ruble (-35%) and the Canadian dollar (-8%) all continue to depreciate versus the August 2014 levels, then margins would improve rather significantly. We estimate that only 15% on the industry or 50Mt would be loss making factoring in both the oil and currency impact. Industry profitability is in a lot better shape under a lower oil price and weaker currency environment, which ultimately means that a lower price is required to force further closures.

Figure 51: Coking coal margin curves

Source: Wood Mackenzie, Deutsche Bank

Figure 52: Coking coal inventory at coke plants
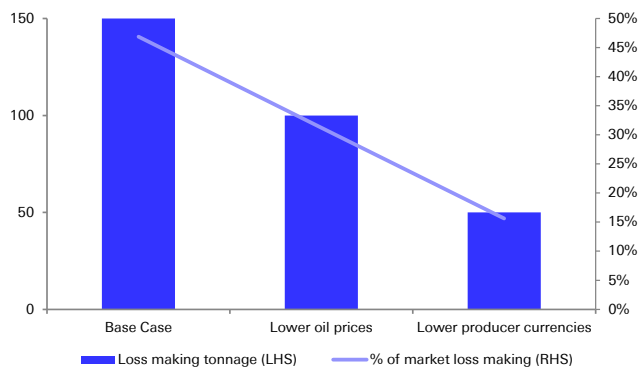
Source: Wood Mackenzie, Deutsche Bank

Figure 53: Deutsche Bank Metallurgical Coal supply – demand balance

		2009	2010	2011	2012	2013	2014e	2015e	2016e	2017e
Australian exports	Mt	134	158	134	144	169	184	188	190	193
growth	%	*-2%*	*18%*	*-16%*	*8%*	*17%*	*9%*	*2%*	*1%*	*2%*
Canadian exports	Mt	22	27	28	31	36	33	30	30	30
growth	%	*-18%*	*23%*	*2%*	*11%*	*16%*	*-7%*	*-9%*	*0%*	*0%*
US exports	Mt	33	48	59	59	54	45	35	35	35
growth	%	*-7%*	*45%*	*24%*	*0%*	*-8%*	*-17%*	*-22%*	*0%*	*0%*
China exports	Mt	4	5	8	7	6	8	9	10	10
growth	%	*-59%*	*39%*	*45%*	*-17%*	*-8%*	*33%*	*13%*	*11%*	*0%*
Other supply	Mt	43	29	33	61	59	46	58	74	87
Disruption allowance			0	0	0	0	0	0	0	0
Global traded coking coal supply	**Mt**	**236**	**268**	**261**	**301**	**324**	**316**	**320**	**339**	**355**
growth	%	*1%*	*13%*	*-2%*	*15%*	*7%*	*-2%*	*1%*	*6%*	*5%*
Japanese imports	Mt	66	77	69	61	62	63	63	63	63
growth	%	*9%*	*17%*	*-11%*	*-12%*	*3%*	*1%*	*1%*	*0%*	*0%*
Korea & Taiwan imports	Mt	25	34	38	40	40	41	42	43	44
growth	%	*-23%*	*36%*	*13%*	*5%*	*0%*	*2%*	*4%*	*3%*	*1%*
European imports	Mt	46	52	53	53	54	54	54	53	53
growth	%	*-30%*	*14%*	*2%*	*0%*	*0%*	*0%*	*0%*	*-1%*	*-1%*
China imports	Mt	34	47	45	62	80	63	56	80	88
growth	%	*912%*	*37%*	*-5%*	*38%*	*29%*	*-21%*	*-10%*	*41%*	*10%*
India imports	Mt	31	34	34	36	37	40	43	47	50
growth	%	*17%*	*11%*	*-1%*	*7%*	*0%*	*8%*	*9%*	*9%*	*8%*
Brazil imports	Mt	11	14	13	17	16	19	20	20	21
growth	%	*-32%*	*20%*	*-4%*	*31%*	*-5%*	*17%*	*5%*	*2%*	*3%*
Other imports / inventory adjustment	Mt	12	20	24	24	25	25	26	27	29
Global traded coking coal demand	**Mt**	**221**	**274**	**271**	**297**	**318**	**311**	**309**	**339**	**354**
growth	%	*-4%*	*24%*	*-1%*	*9%*	*7%*	*-2%*	*-1%*	*10%*	*4%*
Notional market balance	**Mt**	**15**	**-6**	**-10**	**5**	**6**	**5**	**11**	**1**	**1**
Contract Hard Coking Coal	**USD/t**	**129**	**195**	**289**	**210**	**159**	**126**	**111**	**116**	**131**

Source: McCloskey's, AME, Wood Mackenzie, CEIC, Deutsche Bank Research

Grant Sporre, (44) 20 7547 3943
grant.sporre@db.com

James Kan, (852) 220 36146
james.kan@db.com

Bastian Synagowitz, (41) 44 227 3377
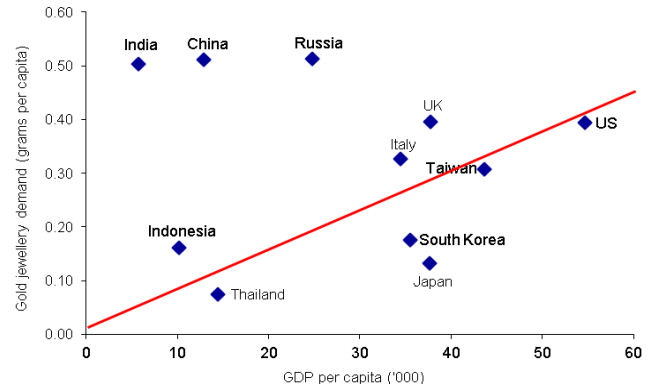*bastian.synagowitz@db.com*

Commodities Chartbook

Commodity consumption around the world relative to per capita income

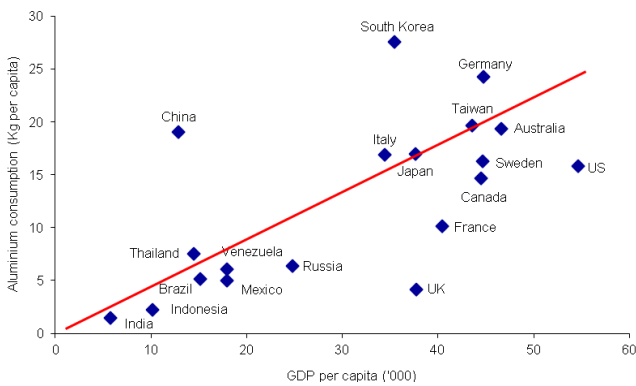### Figure 1: Oil consumption intensity
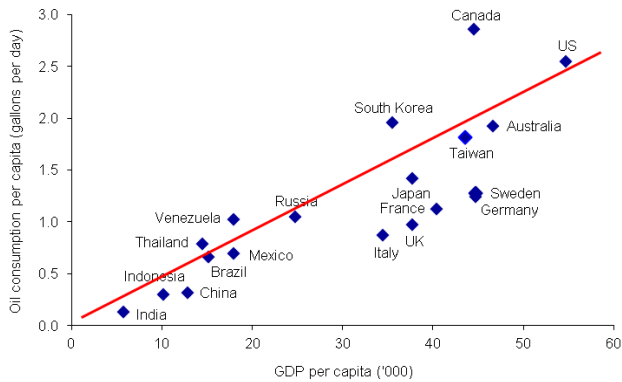
Source: DB Global Markets Research, IMF, IEA (2014)
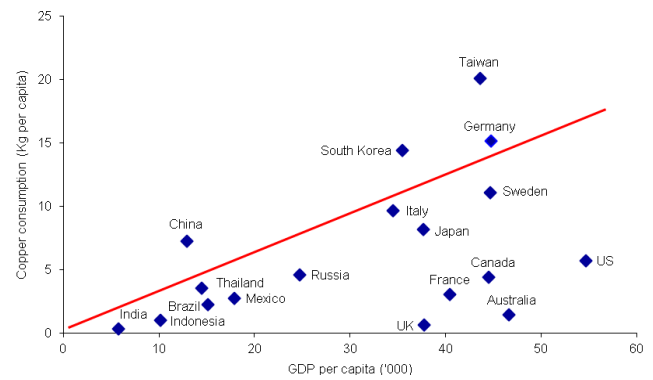
Figure 2: Gold consumption intensity

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

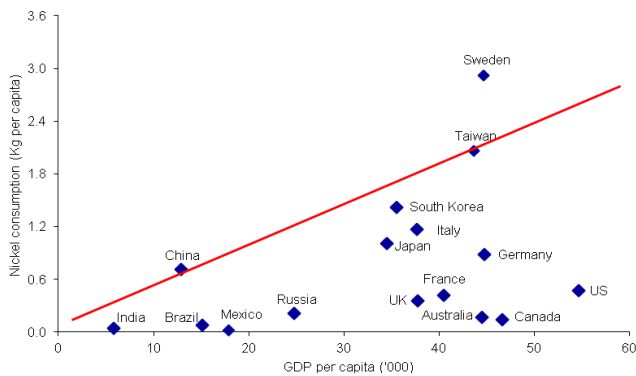### Figure 3: Aluminium consumption intensity

Source: DB Global Markets Research, IMF, Brook Hunt (2014)
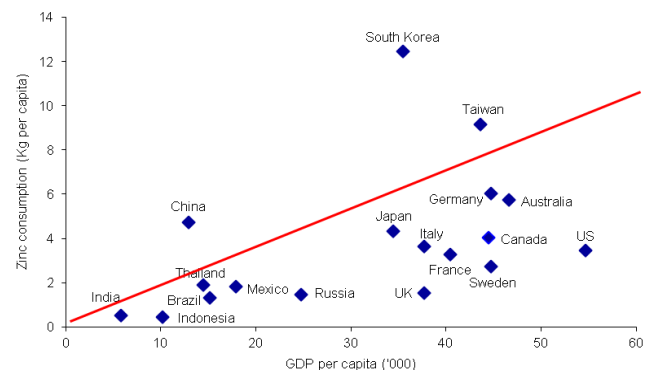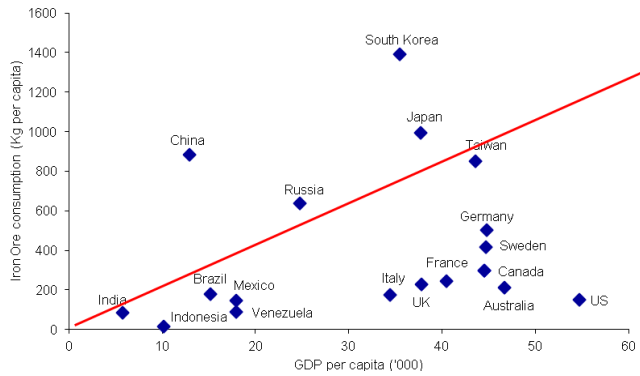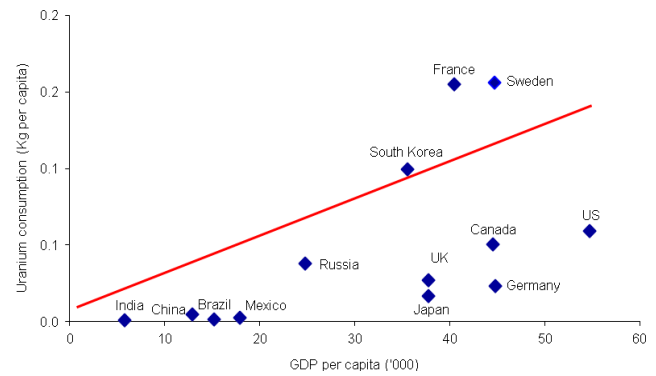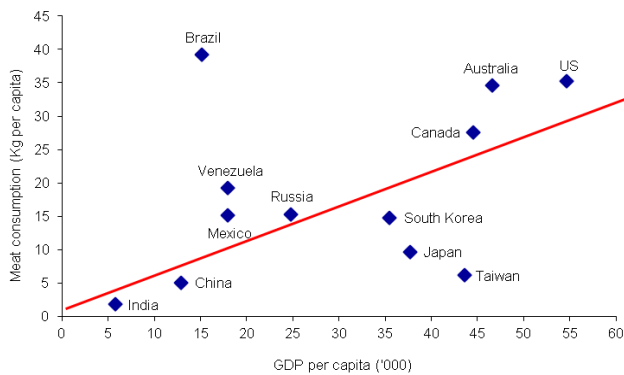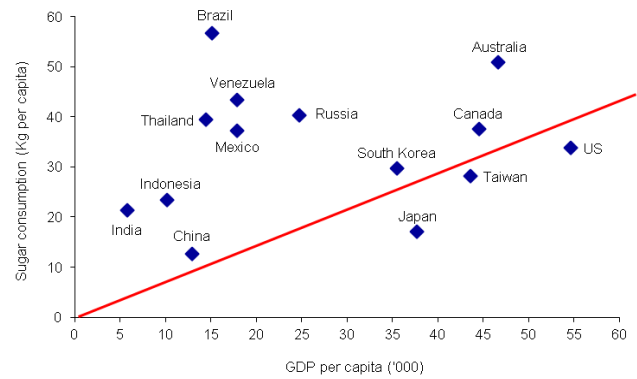
Figure 4: Copper consumption intensity

Source: DB Global Markets Research, IMF, Brook Hunt (2014)

Figure 5: Nickel consumption intensity

Source: DB Global Markets Research, IMF, Brook Hunt (2014)

Figure 6: Zinc consumption intensity

Source: DB Global Markets Research, IMF, Brook Hunt (2014)

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 (2014)
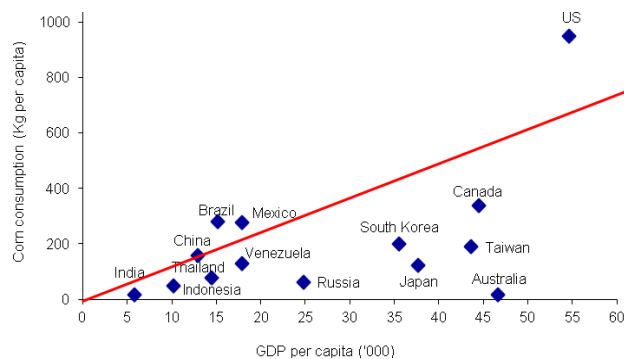
Figure 9: Meat consumption intensity

Source: DB Global Markets Research, IMF, USDA (2014)
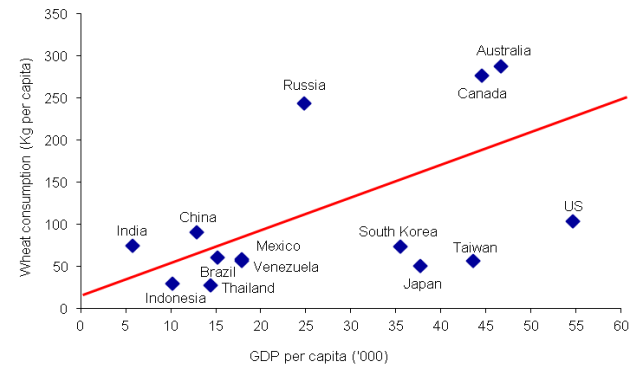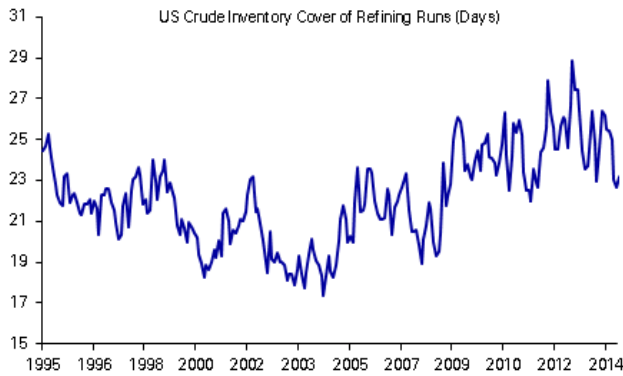
Figure 10: Sugar consumption intensity

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

Figure 11: Corn consumption intensity

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

Figure 12: Wheat consumption intensity

Source: DB Global Markets Research, IMF, USDA (2014)
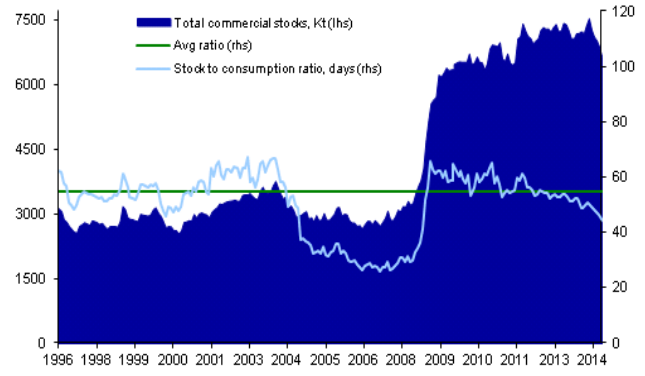
Commodities Chartbook

Commodity inventory-to-use ratios

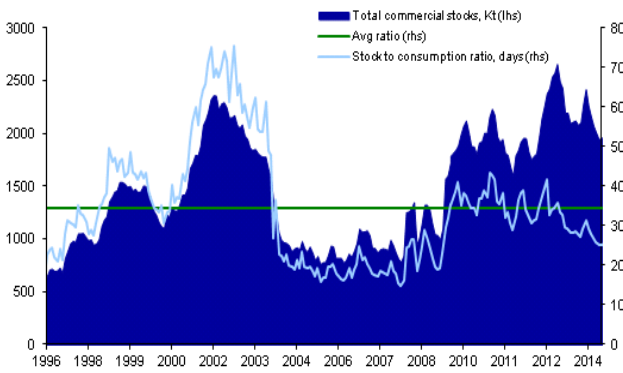### Figure 1: US oil inventory-to-use ratio

Source: IEA

Figure 2: Aluminium stock-to-consumption ratio
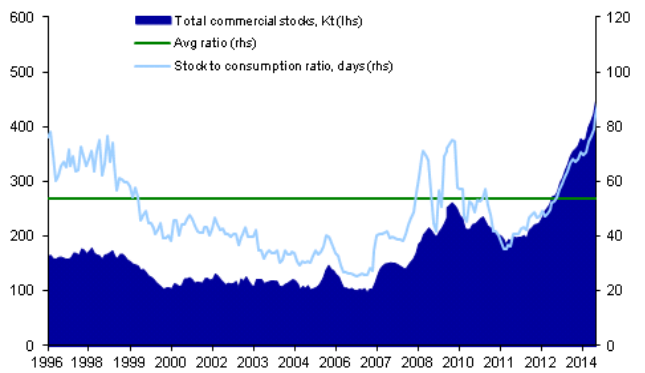

Source: Reuters, WBMS

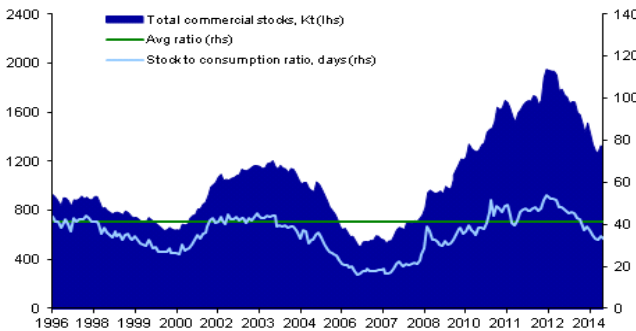### Figure 3: Copper stock-to-consumption ratio

Source: Reuters, ICSG, WBMS

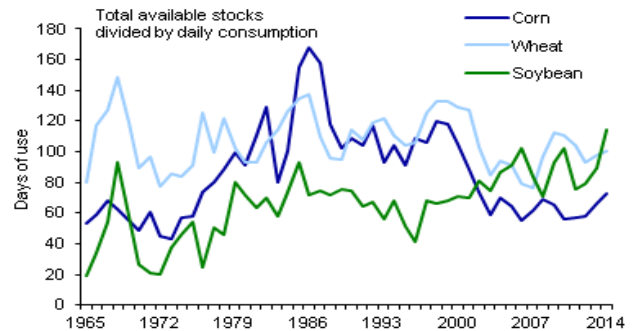### Figure 4: Nickel stock-to-consumption ratio

Source: Reuters, INSG, WBMS

Figure 5: Zinc stock-to-consumption ratio

Source: Reuters, ILZSG

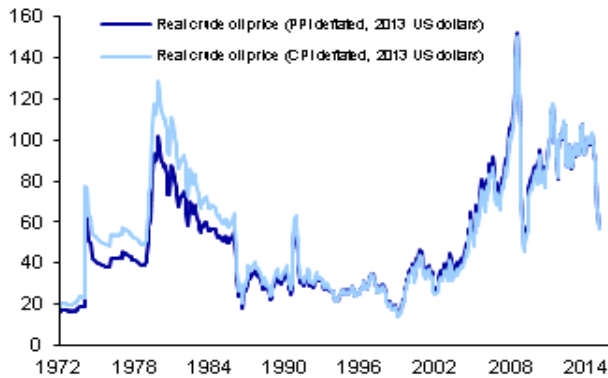### Figure 6: Corn, soybeans & wheat stock-to-consumption ratio
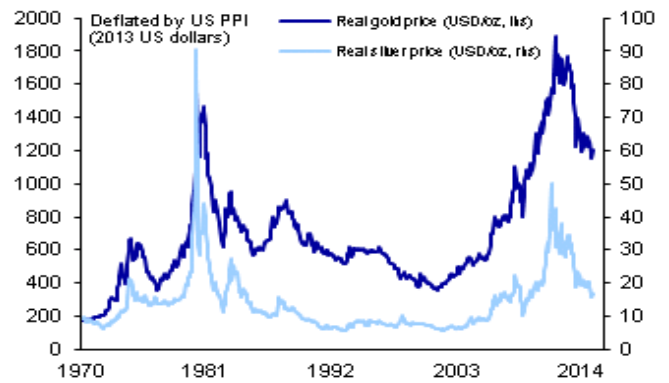

Source: USDA, Deutsche Bank

Commodities Chartbook

Commodities prices in real terms
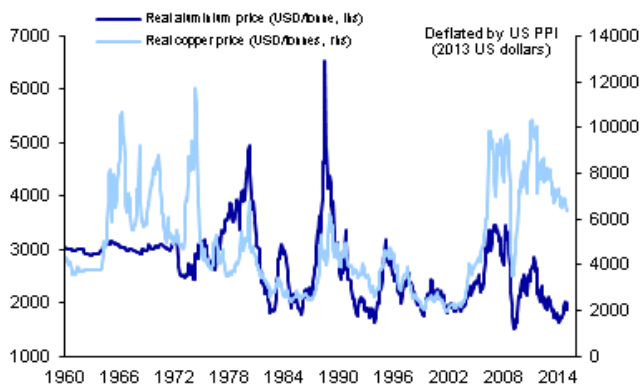
Figure 1: Crude oil prices in real terms

Source: IMF, Bloomberg Finance LP

Figure 2: Precious metal prices in real terms
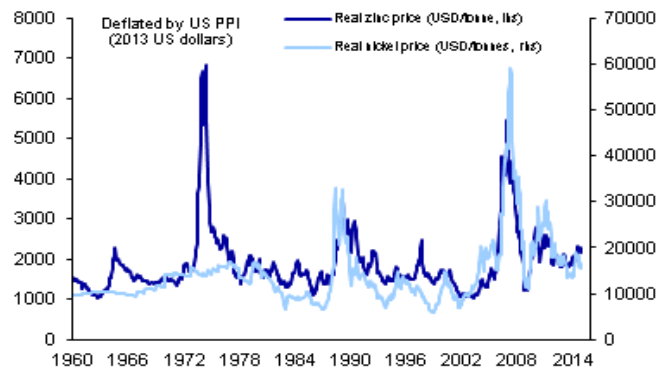

Source: IMF, Bloomberg Finance LP

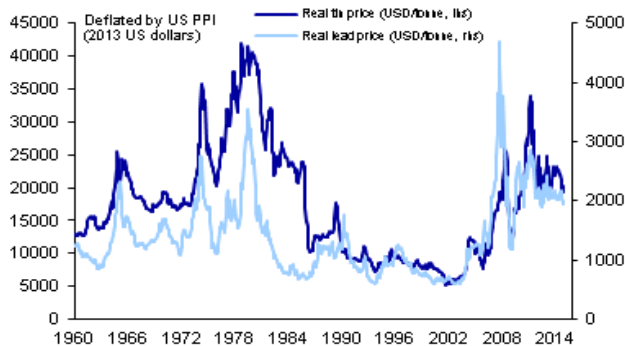### Figure 3: Aluminium & copper prices in real terms

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
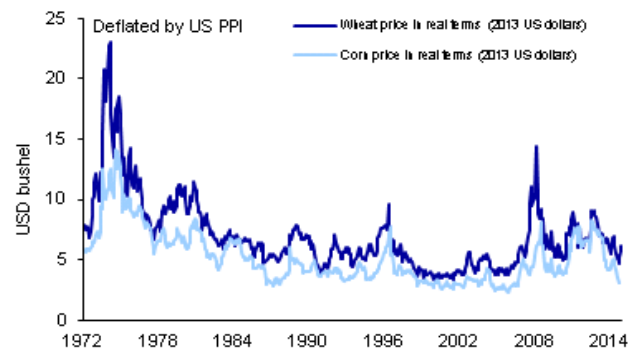
Source: IMF, Bloomberg Finance LP

Commodities Chartbook

Commodity Forward Curves

Figure 1: WTI crude oil forward curve
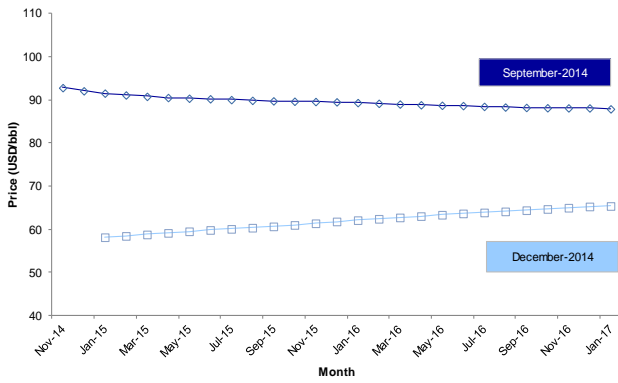
Source: DB Global Markets Research, Bloomberg

Figure 2: Aluminium forward curve
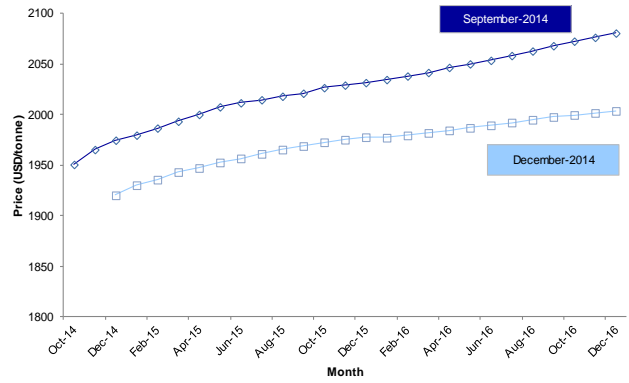
Source: DB Global Markets Research, Bloomberg

Figure 3: Copper forward curve
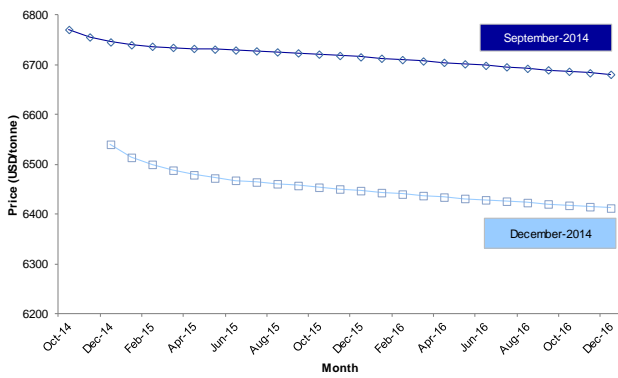
Source: DB Global Markets Research, Bloomberg

Figure 4: Nickel forward curve
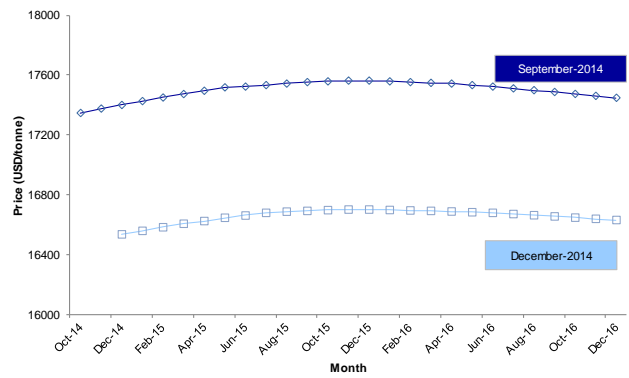
Source: DB Global Markets Research, Bloomberg

Figure 5: Zinc forward curve
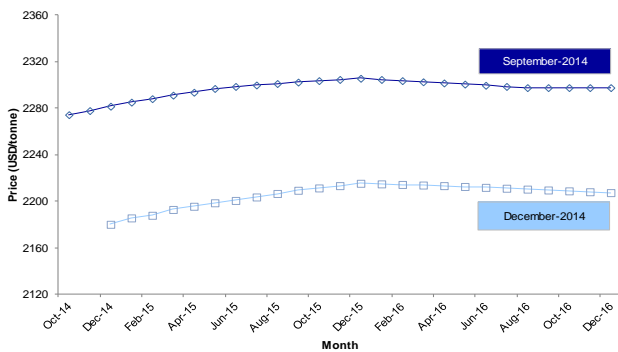
Source: DB Global Markets Research , Bloomberg

Figure 6: Wheat forward curve
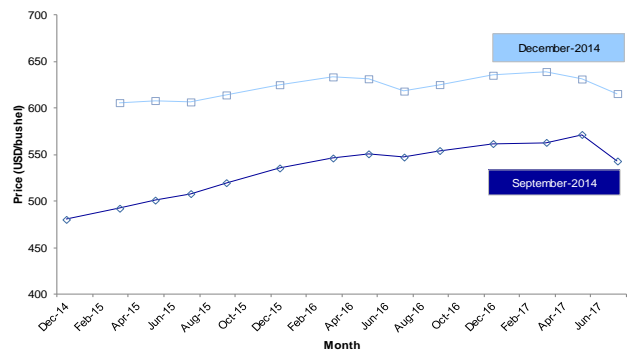
Source: DB Global Markets Research, Bloomberg

Commodities Chartbook

BRIC & OECD commodity demand

Figure 1: Aluminium demand
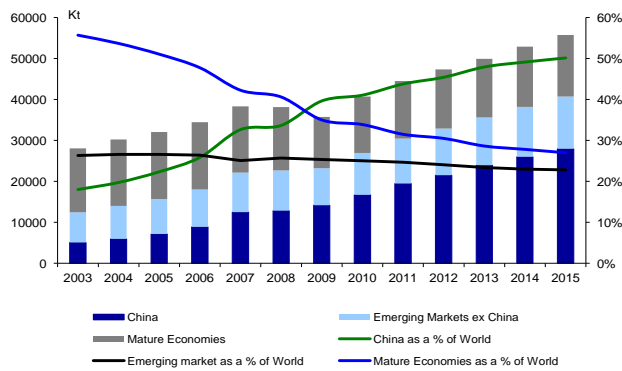
Source: DB Global Markets Research, Brook Hunt

Figure 2: Copper demand
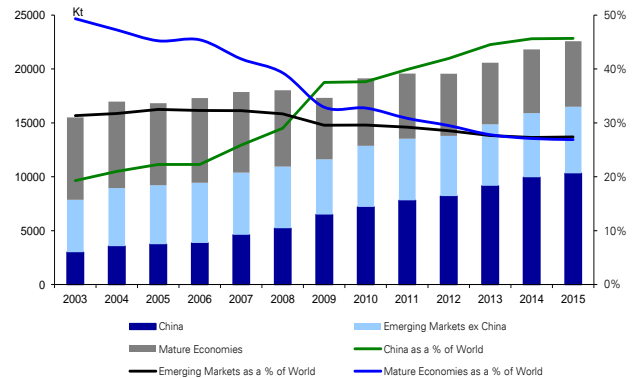
Source: DB Global Markets Research, Brook Hunt

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

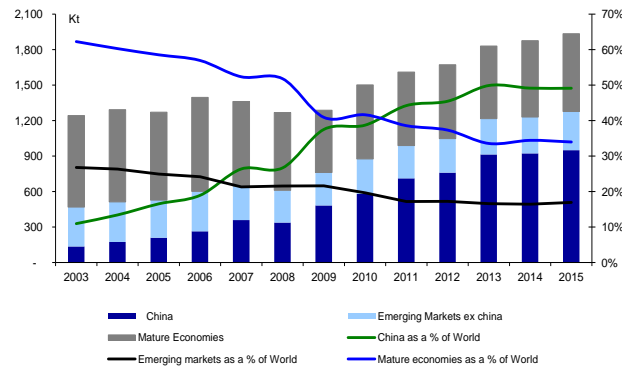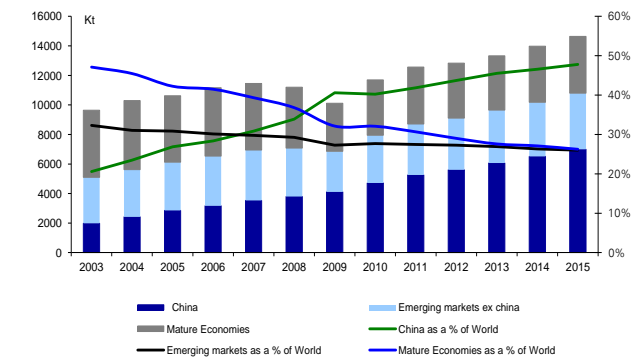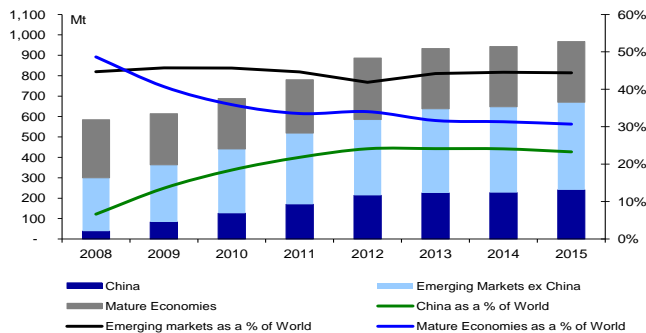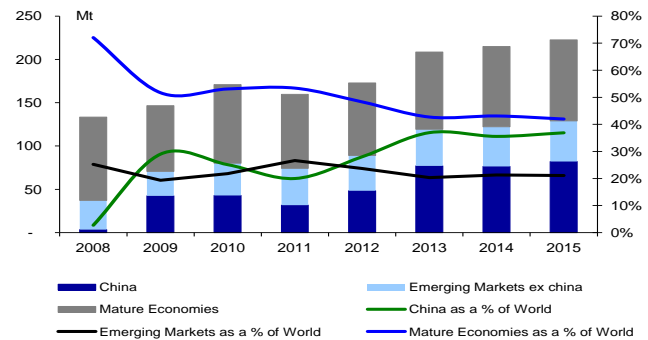| USD	Q3 14	Q4 14	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	2016	2017
WTI (bbl)	97.25	77.00	93.96	65.00	65.00	70.00	70.00	67.50	72.00	79.00
% Change from previous forecast		-6.1%	-1.3%	-19.8%	-19.8%	-12.5%	-12.5%	-16.1%	-10.0%	-1.3%
Brent (bbl)	103.46	80.00	100.27	70.00	70.00	75.00	75.00	72.50	77.00	84.00
% Change from previous forecast		-8.0%	-1.7%	-20.5%	-21.3%	-15.7%	-15.7%	-18.3%	-14.4%	-6.7%
RBOB gasoline (g)	2.75	2.06	2.65	1.81	2.03	2.07	1.84	1.94	1.97	2.05
% Change from previous forecast		-17.6%	-4.0%	-27.6%	-24.8%	-20.4%	-26.4%	-24.8%	-21.2%	-25.5%
Heating oil (g)	2.83	2.41	2.80	2.22	2.12	2.23	2.21	2.20	2.27	2.45
% Change from previous forecast		-13.9%	-3.4%	-20.7%	-24.3%	-20.4%	-21.1%	-21.6%	-18.9%	-14.0%
IPE gasoil (t)	863.84	706.00	847.48	639.00	643.00	681.00	674.00	659.25	700.00	763.00
% Change from previous forecast		-17.7%	-4.3%	-26.7%	-26.5%	-22.2%	-23.0%	-24.6%	-18.9%	-13.8%
Singapore Jet (bbl)	116.54	96.00	113.44	87.00	87.00	92.00	91.00	89.25	90.00	95.00
% Change from previous forecast		-16.5%	-4.0%	-24.3%	-24.3%	-20.0%	-20.9%	-22.4%	-23.1%	-20.8%
US Natural Gas (mmBtu)	3.94	3.85	4.27	3.90	3.75	3.65	3.70	3.75	3.90	4.25
% Change from previous forecast		-19.8%	-9.3%	-22.0%	-15.7%	-16.1%	-18.7%	-18.3%	-17.9%	-13.3%
Thermal Coal - Japanese Guide Price (JFY)	82.00	82.00	85.25	82.00	67.00	67.00	67.00	70.75	64.00	60.00
% Change from previous forecast		0.0%	0.0%	0.0%	-19.3%	-19.3%	-19.3%	-14.5%	-27.4%	-34.2%
API4 (Richard's Bay) FOB (t)	70.24	66.00	71.91	65.00	63.00	62.00	62.00	63.00	60.00	57.00
% Change from previous forecast		-14.3%	-4.9%	-15.6%	-19.2%	-21.5%	-22.5%	-19.7%	-26.8%	-32.9%
Newcastle FOB (t)	67.96	63.00	71.14	62.00	60.00	59.00	59.00	60.00	57.00	55.00
% Change from previous forecast		-19.2%	-6.2%	-20.5%	-25.0%	-27.2%	-28.0%	-25.2%	-32.9%	-37.5%
Uranium (U3O8) (lb) [term]	48	52	49	55	56	57	57	56	58	61
% Change from previous forecast		0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Deutsche Bank, Figures are period averages

Precious Metals Price Forecasts

USD/oz	Q3 14	Q4 14	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	2016	2017
Gold	1284	1195	1265	1200	1175	1150	1150	1169	1125	1125
% Change from previous forecast		0.0%	0.0%	2.1%	0.0%	0.0%	0.0%	0.5%	0.0%	-2.2%
Silver	20	17	19	17	17	17	17	17	17	18
% Change from previous forecast		-10.8%	-2.6%	-13.2%	-13.2%	-10.5%	-10.5%	-11.8%	-8.1%	-6.9%
Platinum	1438	1220	1384	1250	1350	1350	1400	1338	1475	1600
% Change from previous forecast		-12.9%	-3.1%	-13.8%	-10.0%	-12.3%	-10.3%	-11.6%	-6.3%	-4.8%
Palladium	865	785	803	835	855	845	865	850	900	1000
% Change from previous forecast		-5.4%	-1.4%	0.0%	0.0%	-1.7%	-3.9%	-1.4%	-5.3%	0.0%
Rhodium	1288	1220	1172	1200	1300	1300	1200	1250	1400	1700
% Change from previous forecast		6.1%	1.5%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: Deutsche Bank, Figures are period averages

Industrial Metals Price Forecasts

Cash price	Q3 14	Q4 14	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	2016	2017
Aluminium										
USc/lb	91.2	90.7	86.2	88.5	93.0	95.3	97.5	93.6	102.7	108.0
USD/t	2010	2000	1901	1950	2050	2100	2150	2063	2263	2381
% Change from previous forecast		*2.6%*	*0.7%*	*2.6%*	*2.5%*	*5.0%*	*4.9%*	*3.8%*	*2.8%*	*2.0%*
Copper										
USc/lb	317.0	299.5	310.2	301.7	304.0	301.7	294.9	300.6	289.8	326.7
USD/t	6986	6600	6838	6650	6700	6650	6500	6625	6388	7200
% Change from previous forecast		*-4.3%*	*-1.1%*	*-1.5%*	*-0.7%*	*0.0%*	*-0.8%*	*-0.7%*	*-1.7%*	*-2.7%*
Lead										
USc/lb	99.7	91.2	95.9	95.3	97.5	97.5	99.8	97.5	103.2	107.0
USD/t	2197	2010	2113	2100	2150	2150	2200	2150	2275	2358
% Change from previous forecast		*-4.3%*	*-1.1%*	*-6.7%*	*-5.5%*	*-4.4%*	*-6.4%*	*-5.8%*	*-2.2%*	*-1.6%*
Nickel										
USc/lb	850.2	726.0	770.9	816.7	748.6	907.4	998.2	867.7	1066.2	1179.7
USD/t	18739	16000	16990	18000	16500	20000	22000	19125	23500	26000
% Change from previous forecast		*-15.8%*	*-4.2%*	*-10.0%*	*-19.9%*	*-9.1%*	*-4.3%*	*-10.6%*	*-2.1%*	*-3.7%*
Tin										
USc/lb	998.2	907.4	994.8	930.1	952.8	952.8	998.2	958.5	1020.9	1015.5
USD/t	22000	20000	21925	20500	21000	21000	22000	21125	22500	22382
% Change from previous forecast		*-9.1%*	*-2.2%*	*-8.9%*	*-8.7%*	*-10.6%*	*-8.3%*	*-9.1%*	*-8.4%*	*-6.5%*
Zinc										
USc/lb	105.1	101.2	98.1	100.7	102.1	102.1	108.9	103.4	112.3	118.0
USD/t	2316	2230	2162	2220	2250	2250	2400	2280	2475	2600
% Change from previous forecast		*1.4%*	*0.3%*	*0.0%*	*-1.7%*	*-5.1%*	*-4.0%*	*-2.8%*	*1.0%*	*3.7%*

Source: Deutsche Bank, Figures are period averages

Bulk Commodities Price Forecasts

USD	Q3 14	Q4 14	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	2016	2017
Iron Ore Spot Landed Fines Price in China CIF (t)	90.68	75.00	97.19	72.00	65.00	65.00	70.00	68.00	71.25	78.00
% Change from previous forecast		*-18.5%*	*-4.2%*	*-26.5%*	*-27.8%*	*-23.5%*	*-23.9%*	*-25.5%*	*-20.8%*	*-11.4%*
Hard Coking Coal JFY (t)	120.00	119.00	125.50	115.00	112.00	110.00	105.00	110.50	116.25	130.66
% Change from previous forecast		*-0.8%*	*-0.2%*	*-11.5%*	*-10.4%*	*-15.4%*	*-25.0%*	*-15.8%*	*-22.5%*	*-16.2%*
Low-volatile PCI JFY (t)	100.00	100.00	104.50	95.00	92.00	90.00	85.00	90.50	96.25	106.97
% Change from previous forecast		*0.0%*	*1.2%*	*-13.6%*	*-12.4%*	*-18.2%*	*-29.2%*	*-18.7%*	*-26.0%*	*-19.1%*

Source: DB Global Markets Research

Minor Metals Price Forecasts

USD	Q3 14	Q4 14	2014	Q1 15	Q2 15	Q3 15	Q4 15	2015	2016	2017
Molybdenum (lb)	13.27	9.90	11.64	9.50	10.00	10.50	10.00	10.00	11.00	12.00
% Change from previous forecast		*-22.0%*	*-5.7%*	*-25.2%*	*-20.0%*	*-16.0%*	*-16.7%*	*-19.5%*	*-8.3%*	*-7.7%*

Source: Deutsche Bank, Figures are period averages

Key Economic Forecasts

Advanced economies	GDP growth (% yoy)			CPI inflation (% yoy)			Current Account (% of GDP)			Fiscal Balance (% of GDP)		
	2014F	2015F	2016F	2014F	2015F	2016F	2014F	2015F	2016F	2014F	2015F	2016F
US	2.4	3.5	3.1	1.7	1.2	2.1	-2.5	-2.6	-2.9	-2.9	-2.5	-2.9
Japan	0.5	1.4	1.6	2.9	1.4	1.0	0.4	1.9	2.4	-7.2	-6.4	-5.4
Euro area	0.8	1.0	1.3	0.5	0.5	1.3	2.4	2.2	2.0	-2.6	-2.5	-2.3
Germany	1.4	1.0	1.2	0.8	1.0	1.5	7.6	7.2	7.0	0.1	-0.5	-0.7
France	0.4	0.9	1.4	0.6	0.5	1.2	-1.8	-1.8	-1.5	-4.4	-4.2	-3.9
Italy	-0.4	0.3	0.9	0.2	0.4	1.1	1.6	1.8	1.6	-3.0	-2.8	-2.7
Spain	1.3	1.9	1.8	-0.2	0.4	1.4	0.4	0.6	0.9	-5.6	-4.5	-3.8
Netherlands	0.7	1.7	1.1	0.3	0.6	1.3	10.9	11.4	11.5	-2.5	-2.0	-1.9
Belgium	1.0	1.0	1.4	0.6	0.8	1.4	1.0	1.5	1.0	-2.8	-2.8	-2.5
Austria	0.4	0.8	1.5	1.4	1.2	1.7	1.5	1.8	2.4	-3.0	-1.9	-1.2
Finland	0.0	0.8	1.3	1.2	1.1	1.4	-1.3	-1.0	-0.6	-2.7	-2.3	-1.7
Greece	1.2	2.7	3.1	-1.3	-0.7	1.0	0.5	1.5	2.0	-1.3	0.5	1.9
Portugal	0.9	1.2	1.6	-0.2	0.7	1.3	0.5	0.8	1.0	-4.7	-3.5	-3.3
Ireland	4.0	3.3	3.2	0.3	0.6	1.6	4.5	5.5	6.0	-3.6	-2.9	-2.8
United Kingdom	3.0	2.5	2.3	1.5	1.3	1.8	-5.0	-4.0	-3.5	-4.9	-3.9	-2.0
Denmark	0.9	1.7	1.8	0.6	1.0	1.5	6.8	6.5	6.0	-1.0	-2.5	-2.0
Norway	2.2	2.4	2.5	2.0	2.0	2.0	10.5	10.0	9.5	10.0	9.5	9.0
Sweden	1.9	2.3	2.8	-0.2	0.5	1.5	5.9	5.3	4.8	-2.0	-1.5	-1.0
Switzerland	1.7	1.8	2.0	0.1	0.4	0.8	11.0	10.8	10.5	0.0	0.4	0.8
Canada	2.5	3.2	2.9	2.0	2.3	2.0	-2.0	-2.0	-1.7	-0.8	0.0	0.3
Australia	2.8	2.6	4.0	2.5	1.9	2.6	-2.9	-2.8	-2.1	-2.5	-1.5	-0.8
New Zealand	3.2	2.8	2.5	1.3	1.5	2.7	-3.5	-5.5	-4.7	-0.7	-0.1	0.4
EEMEA*	2.3	1.9	2.5	6.0	6.7	6.0	2.3	0.6	0.4	-1.7	-3.9	-3.4
Czech Republic	2.4	2.5	2.7	0.4	1.5	1.9	-1.0	-0.8	-0.6	-1.6	-2.1	-2.2
Egypt	2.2	3.7	3.8	10.1	12.0	9.0	-0.8	-1.6	-2.0	-12.7	-10.5	-9.5
Hungary	3.4	2.4	2.3	-0.1	1.9	3.1	3.8	3.7	3.6	-2.9	-2.7	-2.4
Israel	2.4	2.9	3.2	0.5	0.8	2.0	2.8	3.5	3.4	-3.0	-3.6	-3.1
Kazakhstan	3.9	2.1	2.6	6.8	8.4	8.3	2.0	2.1	1.6	5.3	2.4	1.9
Nigeria	6.0	4.8	5.7	8.6	10.0	9.0	2.7	0.1	1.2	-2.9	-4.2	-3.7
Poland	3.3	3.3	3.5	0.1	0.9	1.7	-2.6	-2.9	-3.1	-3.4	-2.9	-2.7
Romania	2.5	2.9	3.0	1.2	2.2	2.6	-1.2	-1.3	-1.3	-2.2	-2.5	-2.6
Russia	0.5	-0.9	-0.4	7.7	8.9	7.2	4.0	5.3	5.0	0.5	-1.4	-1.2
Saudi Arabia	4.3	2.8	3.5	2.9	3.2	3.4	12.2	-0.4	-0.7	-0.1	-11.2	-9.6
South Africa	1.4	2.6	3.2	6.1	4.6	5.6	-5.2	-4.2	-4.4	-4.2	-3.4	-2.5
Turkey	3.0	3.2	3.5	8.9	6.8	7.3	-5.2	-4.7	-5.0	-1.6	-1.8	-1.6
Ukraine	-6.9	-4.5	1.5	11.9	18.6	9.8	-3.5	-2.5	-2.0	-5.5	-4.5	-3.0
United Arab Emirates	3.5	3.5	3.8	2.2	2.5	3.0	12.3	3.9	2.8	4.9	-2.0	-1.1
Asia (ex-Japan)	6.0	6.2	6.1	3.6	3.6	3.7	2.4	2.5	2.3	-2.4	-2.5	-2.7
China	7.3	7.0	6.7	2.2	2.6	3.0	3.1	3.4	3.3	-2.1	-2.5	-3.0
Hong Kong	2.2	2.9	3.0	4.2	3.5	3.2	2.2	2.0	1.8	2.6	2.9	3.0
India	5.5	6.5	6.5	7.3	6.0	6.0	-1.4	-1.7	-1.7	-4.5	-4.0	-3.8
Indonesia	5.0	5.0	5.5	6.4	7.4	5.1	-2.6	-1.7	-1.2	-2.2	-1.7	-1.7
Korea	3.4	3.6	3.6	1.3	1.7	2.1	6.4	6.8	5.9	0.2	-0.5	-0.4
Malaysia	5.9	4.8	5.4	3.1	4.0	3.7	5.7	2.9	3.3	-3.5	-3.4	-2.8
Philippines	5.9	6.5	6.6	4.3	3.5	3.8	4.6	4.3	2.3	-1.8	-2.2	-2.4
Singapore	3.0	3.0	3.5	1.0	0.5	1.5	18.9	19.6	18.2	6.9	6.8	6.6
Sri Lanka	7.5	7.5	7.0	3.3	4.0	6.0	-2.9	-2.5	-2.0	-5.0	-5.0	-4.5
Taiwan	3.4	3.6	3.6	1.2	0.7	0.9	12.6	13.9	14.4	-2.0	-1.8	-1.5
Thailand	0.5	3.5	3.0	1.9	0.5	2.1	1.9	1.4	0.5	-2.8	-2.5	-2.0
Vietnam	5.8	6.2	6.2	4.2	4.7	5.5	4.3	3.5	0.0	-5.9	-5.3	-5.3
Latin America	0.8	1.5	2.9	12.5	13.5	11.9	-3.0	-3.0	-3.1	-4.5	-4.7	-3.6
Argentina	-1.5	-2.8	3.0	38.6	38.6	26.1	-1.6	-0.9	-1.4	-5.4	-5.8	-5.1
Brazil	0.1	0.7	1.9	6.3	6.4	5.8	-4.2	-4.2	-4.2	-5.1	-4.9	-3.7
Chile	1.6	2.6	3.2	4.5	4.0	3.2	-1.9	-2.0	-2.8	-1.9	-2.4	-1.7
Colombia	4.7	4.2	4.0	2.8	3.2	2.7	-4.5	-4.9	-3.5	-2.7	-3.0	-2.5
Mexico	2.1	3.4	3.7	4.0	3.8	3.5	-2.3	-2.5	-2.7	-4.2	-4.2	-3.5
Peru	2.7	5.5	5.0	3.2	2.4	3.1	-5.1	-4.7	-4.7	0.2	-0.1	0.6
Venezuela	-3.6	-2.0	2.0	60.0	80.0	85.0	1.6	0.4	0.6	-8.4	-11.4	-6.6
G7	1.8	2.5	2.4	1.6	1.2	1.8						
Advanced economies	1.7	2.4	2.3	1.4	1.1	1.7						
EM economies	4.4	4.5	4.9	5.5	5.7	5.4						
Global	3.2	3.6	3.8	3.7	3.7	3.9						

Source: Deutsche Bank Research, National statistical authorities
* Nigeria has been included (as part of EEMEA) in the aggregation from this edition.

Key Economic Forecasts

QUARTERLY GDP								(% yoy)				
	Q1 2014	Q2 2014	Q3 2014	Q4 2014F	Q1 2015F	Q2 2015F	Q3 2015F	Q4 2015F	Q1 2016F	Q2 2016F	Q3 2016F	Q4 2016F
US	1.9	2.6	2.4	2.6	3.9	3.6	3.4	3.2	3.1	3.1	3.0	3.0
Japan	2.6	-0.1	-1.1	0.6	-0.5	1.8	2.5	1.6	1.6	1.6	1.7	1.7
Euro area	1.0	0.8	0.8	0.6	0.6	0.9	1.0	1.3	1.3	1.3	1.3	1.4
Germany	2.3	1.4	1.2	0.8	0.2	0.5	0.7	1.1	1.1	1.1	1.0	0.9
France	0.8	0.0	0.4	0.3	0.5	0.9	0.9	1.1	1.3	1.4	1.5	1.6
Italy	-0.3	-0.4	-0.5	-0.5	-0.3	0.2	0.6	0.9	1.0	1.0	0.9	0.8
United Kingdom	2.9	3.2	3.0	3.0	2.9	2.5	2.3	2.2	2.2	2.1	2.2	2.3
Canada	2.1	2.5	2.6	2.6	3.2	3.2	3.2	3.4	3.2	3.0	2.9	2.6
Australia	3.0	2.7	2.7	2.6	2.1	2.4	2.9	3.1	3.6	3.8	4.1	4.3
EEMEA	2.8	0.6	1.3	1.4	0.7	1.0	1.3	1.3	1.4	1.4	1.4	1.6
Poland	3.4	3.2	3.3	3.4	3.0	3.2	3.3	3.4	3.5	3.6	3.3	3.5
Russia	0.9	0.8	0.7	-0.4	-1.5	-1.2	-0.4	-0.3	-0.2	-0.4	-0.6	-0.7
South Africa	1.9	1.3	1.4	0.9	2.0	2.5	2.9	2.8	3.0	3.2	3.3	3.3
Turkey	7.4	-1.8	1.5	4.5	3.9	3.8	3.4	3.1	2.8	3.4	4.0	4.7
Asia (ex-Japan)	6.2	6.5	6.3	6.2	6.2	6.1	6.5	6.8	6.4	6.4	6.3	6.3
China	7.4	7.5	7.3	7.2	7.1	6.7	7.1	7.2	7.1	6.9	6.7	6.5
India	4.6	5.7	5.3	5.4	5.7	6.2	6.5	7.4	6.0	6.3	6.7	6.9
Indonesia	5.2	5.1	5.0	4.7	4.6	4.6	4.7	5.8	5.6	5.5	5.2	5.9
Korea	3.9	3.5	3.2	3.0	3.1	3.6	3.8	3.8	3.7	3.7	3.3	3.7
Taiwan	3.4	3.9	3.6	2.8	3.1	3.6	3.9	3.7	3.8	3.7	3.6	3.4
Latin America	1.6	-0.1	0.3	0.4	0.8	1.3	1.5	2.0	2.5	2.8	2.9	3.1
Argentina	-0.2	-1.5	-2.8	-3.0	-2.0	-2.0	-2.0	0.8	2.5	3.4	3.9	4.0
Brazil	1.9	-0.9	-0.2	-0.3	-0.1	0.7	1.0	1.1	1.6	1.9	2.0	2.2
Mexico	1.9	1.6	2.5	3.0	3.2	3.5	3.5	3.7	3.7	3.8	3.8	3.9
G7	1.9	1.8	1.5	1.8	2.3	2.5	2.6	2.4	2.4	2.4	2.3	2.3
Advanced economies	1.8	1.7	1.5	1.8	2.2	2.4	2.5	2.3	2.3	2.3	2.3	2.3
EM economies	5.0	4.6	4.7	4.6	4.6	4.7	5.0	5.3	5.1	5.2	5.1	5.2
Global	3.5	3.2	3.2	3.2	3.5	3.6	3.8	3.9	3.8	3.8	3.8	3.8

Source: Deutsche Bank Research, National statistical authorities.
*Note: All aggregates here are calculated on the basis countries mentioned in this table only.

Correlation Matrix

	CL	LCO	XB	HO	LGO	NG	MAL	MCU	MPB	MNI	MZN	TSIPIO62	GC	PL	SI	PA	W	C	S	DBLCI	DBLCI-MR	GSCI-TR
Light Crude		0.93	0.86	0.84	0.62	0.25	0.29	0.45	0.33	0.13	0.31	-0.36	0.34	0.26	0.52	-0.10	-0.05	0.02	0.12	0.94	0.78	0.96
Brent	0.93		0.89	0.89	0.72	0.28	0.37	0.49	0.41	0.16	0.38	-0.39	0.28	0.28	0.47	0.00	-0.10	-0.03	0.13	0.90	0.74	0.96
Unleaded Petrol	0.86	0.89		0.84	0.65	0.29	0.31	0.43	0.36	0.21	0.36	-0.43	0.30	0.28	0.43	0.03	-0.07	0.01	0.15	0.84	0.70	0.91
Heating Oil	0.84	0.89	0.84		0.75	0.37	0.34	0.43	0.34	0.14	0.35	-0.23	0.25	0.26	0.43	0.08	-0.11	0.02	0.16	0.84	0.69	0.90
Gas Oil	0.62	0.72	0.65	0.75		0.24	0.35	0.42	0.41	0.10	0.46	-0.19	0.13	0.20	0.25	0.17	-0.24	-0.04	0.11	0.60	0.49	0.70
Natural Gas	0.25	0.28	0.29	0.37	0.24		0.29	0.16	0.14	0.19	0.02	-0.13	-0.09	-0.18	-0.00	-0.12	-0.10	0.01	-0.03	0.27	0.23	0.35
LME Al	0.29	0.37	0.31	0.34	0.35	0.29		0.50	0.64	0.45	0.63	-0.09	0.07	0.34	0.18	0.28	0.13	0.34	0.39	0.48	0.58	0.41
LME Cu	0.45	0.49	0.43	0.43	0.42	0.16	0.50		0.62	0.48	0.67	0.03	0.39	0.47	0.57	0.36	0.09	0.41	0.35	0.58	0.65	0.56
LME Lead	0.33	0.41	0.36	0.34	0.41	0.14	0.64	0.62		0.50	0.67	-0.03	0.27	0.46	0.36	0.44	0.08	0.13	0.29	0.47	0.49	0.45
LME Nickel	0.13	0.16	0.21	0.14	0.10	0.19	0.45	0.48	0.50		0.55	0.12	-0.01	0.18	0.10	0.26	0.13	0.19	0.23	0.23	0.28	0.22
LME Zinc	0.31	0.38	0.36	0.35	0.46	0.02	0.63	0.67	0.67	0.55		0.10	0.17	0.36	0.27	0.44	0.12	0.30	0.37	0.45	0.53	0.43
Iron Ore	-0.36	-0.39	-0.43	-0.23	-0.19	-0.13	-0.09	0.03	-0.03	0.12	0.10	1.00	-0.19	-0.13	-0.27	0.24	0.15	0.24	-0.01	-0.29	-0.19	-0.34
Comex Gold Future	0.34	0.28	0.30	0.25	0.13	-0.09	0.07	0.39	0.27	-0.01	0.17	-0.19		0.74	0.84	0.33	0.08	0.06	0.06	0.42	0.44	0.34
NYMEX Platinum	0.26	0.28	0.28	0.26	0.20	-0.18	0.34	0.47	0.46	0.18	0.36	-0.13	0.74		0.68	0.58	0.19	0.31	0.26	0.43	0.52	0.33
Comex Silver	0.52	0.47	0.43	0.43	0.25	0.00	0.18	0.57	0.36	0.10	0.27	-0.27	0.84	0.68		0.34	0.17	0.14	0.15	0.60	0.61	0.54
NYMEX Palladium	-0.10	0.00	0.03	0.08	0.17	-0.12	0.28	0.36	0.44	0.26	0.44	0.24	0.33	0.58	0.34	1.00	0.21	0.35	0.25	0.10	0.24	0.04
Wheat CBOT	-0.05	-0.10	-0.07	-0.11	-0.24	-0.10	0.13	0.09	0.08	0.13	0.12	0.15	0.08	0.19	0.17	0.21		0.52	0.23	0.19	0.38	0.02
Corn	0.02	-0.03	0.01	0.02	-0.04	0.01	0.34	0.41	0.13	0.19	0.30	0.24	0.06	0.31	0.14	0.35	0.52		0.58	0.26	0.54	0.12
Soy beans	0.12	0.13	0.15	0.16	0.11	-0.03	0.39	0.35	0.29	0.23	0.37	-0.01	0.06	0.26	0.15	0.25	0.23	0.58		0.29	0.43	0.22
DBLCI	0.94	0.90	0.84	0.84	0.60	0.27	0.48	0.58	0.47	0.23	0.45	-0.29	0.42	0.43	0.60	0.10	0.19	0.26	0.29		0.94	0.97
DBLCI-MR	0.78	0.74	0.70	0.69	0.49	0.23	0.58	0.65	0.49	0.28	0.53	-0.19	0.44	0.52	0.61	0.24	0.38	0.54	0.43	0.94		0.85
GSCI-TR	0.96	0.96	0.91	0.90	0.70	0.35	0.41	0.56	0.45	0.22	0.43	-0.34	0.34	0.33	0.54	0.04	0.02	0.12	0.22	0.97	0.85	
EUR	0.08	0.13	0.07	0.11	0.02	0.14	0.11	0.16	0.00	-0.05	-0.07	-0.07	0.11	0.07	0.25	0.10	0.11	0.20	0.08	0.14	0.18	0.13
GBP	0.08	0.17	0.21	0.12	0.13	0.09	0.18	0.18	0.20	0.10	0.05	-0.06	0.11	0.22	0.23	0.25	-0.05	0.03	-0.00	0.12	0.12	0.16
NOK	-0.30	-0.40	-0.35	-0.29	-0.31	0.11	-0.26	-0.32	-0.29	-0.03	-0.28	0.29	-0.24	-0.26	-0.32	-0.17	0.28	-0.00	-0.09	-0.28	-0.26	-0.32
CAD	-0.16	-0.29	-0.17	-0.19	-0.33	0.16	-0.21	-0.21	-0.23	-0.14	-0.30	0.06	0.02	-0.12	-0.08	-0.17	0.13	-0.04	-0.14	-0.16	-0.15	-0.21
AUD	-0.09	-0.04	-0.11	-0.09	-0.02	-0.16	0.18	0.21	0.25	0.17	0.21	0.21	0.09	0.14	0.06	0.40	0.06	0.25	0.26	-0.01	0.10	-0.05
JPY	0.02	0.03	0.03	0.00	0.04	0.05	0.07	-0.08	0.10	0.19	0.07	-0.15	-0.29	-0.11	-0.22	-0.04	-0.14	-0.25	-0.10	-0.05	-0.13	-0.01
ED	-0.08	-0.10	-0.11	-0.03	0.10	-0.14	0.31	-0.10	0.06	-0.20	-0.11	0.11	0.02	0.01	-0.00	-0.02	-0.11	-0.11	-0.06	-0.13	-0.16	-0.10
ECU 3m	0.02	-0.01	0.05	-0.03	0.12	-0.04	0.14	0.29	0.12	0.08	0.30	0.02	0.02	0.16	0.12	0.20	0.09	0.14	0.08	0.07	0.14	0.07
AUD 3m	0.25	0.20	0.21	0.10	0.27	0.00	0.09	-0.10	0.05	-0.08	0.04	-0.04	-0.07	-0.10	-0.14	-0.12	-0.11	-0.17	-0.17	0.14	0.09	0.18
SHCOMP Index	-0.39	-0.39	-0.36	-0.36	-0.33	-0.26	-0.18	-0.28	0.02	0.22	-0.09	0.26	-0.38	-0.10	-0.31	0.04	0.10	-0.09	-0.06	-0.39	-0.37	-0.40
SPX	0.30	0.33	0.21	0.29	0.26	-0.01	0.17	0.12	0.11	0.10	0.13	-0.10	-0.32	-0.10	-0.13	0.03	-0.07	-0.02	0.02	0.24	0.16	0.28
iBOXX Euro Corp All	-0.16	-0.19	-0.14	-0.08	-0.08	-0.15	-0.05	-0.08	0.03	-0.16	0.03	0.06	0.10	0.15	-0.10	0.06	-0.06	0.04	0.01	-0.15	-0.11	-0.18

Source: Deutsche Bank

Appendix 1

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David Folkerts-Landau
Group Chief Economist
Member of the Group Executive Committee

Raj Hindocha	Marcel Cassard	Richard Smith and Steve Pollard
Global Chief Operating Officer	Global Head	Co-Global Heads
Research	FICC Research & Global Macro Economics	Equity Research

Michael Spencer	Ralf Hoffmann	Andreas Neubauer	Steve Pollard
Regional Head	Regional Head	Regional Head	Regional Head
Asia Pacific Research	Deutsche Bank Research, Germany	Equity Research, Germany	Americas Research

International Locations

Deutsche Bank AG	Deutsche Bank AG	Deutsche Bank AG	Deutsche Securities Inc.
Deutsche Bank Place	Große Gallusstraße 10-14	Filiale Hongkong	2-11-1 Nagatacho
Level 16	60272 Frankfurt am Main	International Commerce Centre,	Sanno Park Tower
Corner of Hunter & Phillip Streets	Germany	1 Austin Road West,Kowloon,	Chiyoda-ku, Tokyo 100-6171
Sydney, NSW 2000	Tel: (49) 69 910 00	Hong Kong	Japan
Australia		Tel: (852) 2203 8888	Tel: (81) 3 5156 6770
Tel: (61) 2 8258 1234			

Deutsche Bank AG London	Deutsche Bank Securities Inc.
1 Great Winchester Street	60 Wall Street
London EC2N 2EQ	New York, NY 10005
United Kingdom	United States of America
Tel: (44) 20 7545 8000	Tel: (1) 212 250 2500

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