9 May 2012 │ 30 pages

# Metallurgical Coal Update

## Market tightening as demand recovers

- **Scene set for higher Met Coal prices in 2H12** – The outlook for metallurgical coal is looking brighter after a very weak couple of quarters. There are signs of a recovery in Chinese and Japanese steel markets, which should help improve demand just as disruptions in Australia limit growth in supply. While the upside to prices may be capped until consumers work down inventory, the tight market should see this occur relatively quickly; opening up the spectre of higher prices in the 2H12.

- **Supply disruptions starting to bite** – Supply disruptions appear to be greater than the market's expectations. Australian supply is being curtailed by wet weather and strike action, with 2Q exports likely to be subdued. Mongolia supply also looks exposed to geopolitical risks with the government forcing the closure of Ovoot Tolgoi due to overseas ownership concerns. Rising costs have also taken their toll with Australian and US operations curtailed. While the tonnage involved is small, it suggests we have hit a floor in prices.

- **Demand in Asia looking brighter** – There have been some promising signs of a pick up in the Asian steel markets but levels remain subdued. Stronger economic growth in 2H12 should see Japanese demand for met coal improve but this remains wholly reliant on a reconstruction lead rebound in steel output. In China, steel output has picked up strongly with steel production hitting 2Mt/day in April. Elevated stockpiles may hold back any significant increase in Chinese imports of met coal but they should remain strong due to attractive pricing of imports relative to domestic coking coal.

- **Semi-soft unlikely to fully benefit** – Increased supply of lower quality met coal, as well as the use of SSCC reaching the upper technical limits at many mills means that prices are unlikely to benefit from a recovery met coal demand. To compound the issue, the new breed of large furnaces requires higher levels of premium HCC. Therefore, the discount to HCC is likely to remain below its historical range of 65-80% in 2012.

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**Figure 1. METALLURGICAL COAL Quarterly Supply Demand Balance**

| | 1Q12 | 2Q12 | 3Q12 | 4Q12 | 2012e | 1Q13 | 2Q13 | 3Q13 | 4Q13 | 2013e |
|---|---|---|---|---|---|---|---|---|---|---|
| **IMPORTS (Mt)** | **60.4** | **74.4** | **72.6** | **68.0** | **275.4** | **75.4** | **75.9** | **73.0** | **66.6** | **290.9** |
| Asia | 33.0 | 47.0 | 45.5 | 41.2 | 166.8 | 45.7 | 45.7 | 44.3 | 37.9 | 173.6 |
| Europe | 13.6 | 13.8 | 13.5 | 12.9 | 53.8 | 13.7 | 14.3 | 12.7 | 12.6 | 53.3 |
| Others | 13.8 | 13.6 | 13.7 | 13.8 | 54.8 | 16.1 | 15.9 | 16.0 | 16.1 | 64.0 |
| **EXPORTS (Mt)** | **62.5** | **62.6** | **68.2** | **67.7** | **260.9** | **70.7** | **73.3** | **71.6** | **72.6** | **288.3** |
| Australia | 35.9 | 33.5 | 39.7 | 41.2 | 150.3 | 40.7 | 42.1 | 42.6 | 43.1 | 168.5 |
| Nth America | 20.5 | 21.8 | 21.5 | 19.3 | 83.1 | 22.3 | 22.3 | 20.3 | 20.3 | 85.0 |
| Others | 6.1 | 7.3 | 6.9 | 7.3 | 27.5 | 7.8 | 8.9 | 8.8 | 9.3 | 34.7 |
| **IMPLIED BALANCE** | **2.0** | **-11.8** | **-4.5** | **-0.3** | **-14.5** | **-4.7** | **-2.6** | **-1.3** | **6.0** | **-2.6** |

Source: Wood Mackenzie, Platts, China Customs, Tex Report, Citi Investment Research and Analysis

See Appendix A-1 for Analyst Certification, Important Disclosures and non-US research analyst disclosures.

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# Metallurgical Coal Outlook

## Supply disruptions impacting the market

Strike action and wet weather look likely to have a significant impact on the metallurgical coal markets over the next few months.

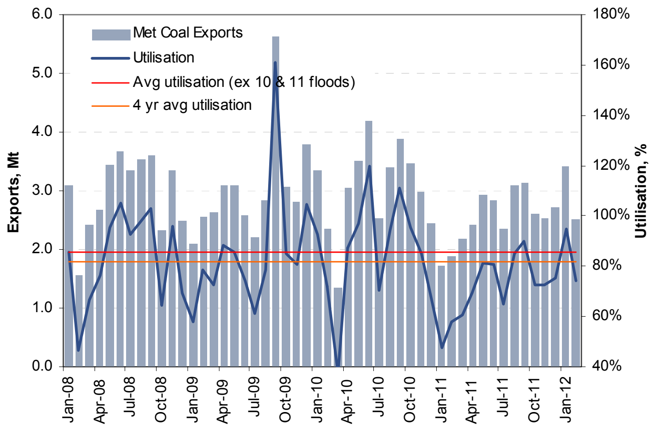
Unions recently stepped up their ongoing industrial action at various BHP Billiton Mitsubishi (BMA) operations after negotiations over a new pay deal broke down. Unions and BHP have been negotiating a new pay deal for nearly 10 months.

The effect of these stoppages on exports in the past from BMA's primary coal terminal, Port of Hay Point is distinct and substantial. Of the two major strikes already undertaken over the past 10 months, a significant drop in exports has been experienced (Figure 3).

And in BHP Billiton's recent quarterly production report (BHP Billiton Ltd (BHP.AX) - Production Slightly Weaker, Minor Earnings Downgrades, 18 April 2012), the company said production of met coal fell 14% to 7.33 million tonnes in the March quarter.

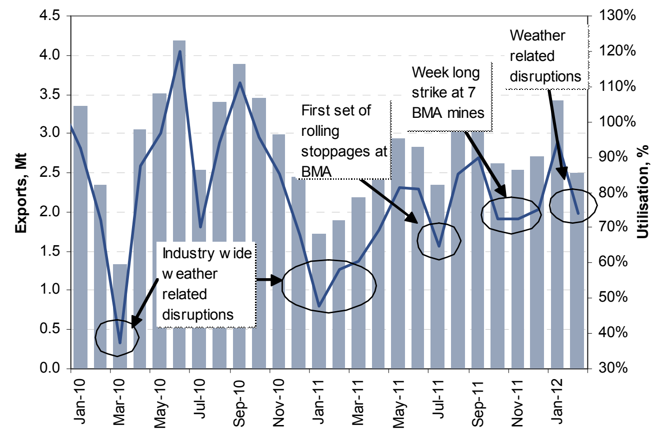
So severe are the strikes that BMA declared force majeure at its mines in Queensland on May shipments. We estimate that these disruptions have resulted in about 3-5m tonnes of lost production for BMA since the labour unrest began 10 months ago. This coincided with a drop in demand from China and Japan.

**Figure 2. Met Coal Exports from Hay Point Coal Terminal, Queensland Australia are still below the long term average**




Source: Port of Hay Point, Citi Investment Research and Analysis

**Figure 3. Over the past 10 months, strike at BMA operations have resulted in significant declines in exports from Hay Point**



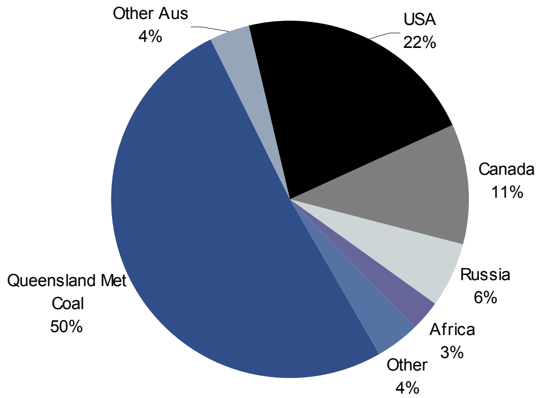

Source: Port of Hay Point, Citi Investment Research and Analysis

This is coming on the back of heavy rainfalls in Queensland which has impacted several metallurgical coal operations. Platts reported that many premium coking coal operations owned by BMA, Peabody and Rio Tinto were severely impacted. We also understand that the Goonyella rail system and Dalrymple Bay coal terminal were temporarily shut. While it's too early to tell the impact on the market, this region produces nearly 30% of globally traded met coal (Figure 4).

The flood-related disruptions are not anticipated to be as severe as those in 2011 but are real enough and present further challenge a supply chain that has yet to recover fully from the 2010/11 floods. Producers are hoping the threat of tighter supply of the premium coals, even against the backdrop of unstable demand, will support their bids to settle above the Teck-Posco level, particularly when the value of higher-quality is factored in.

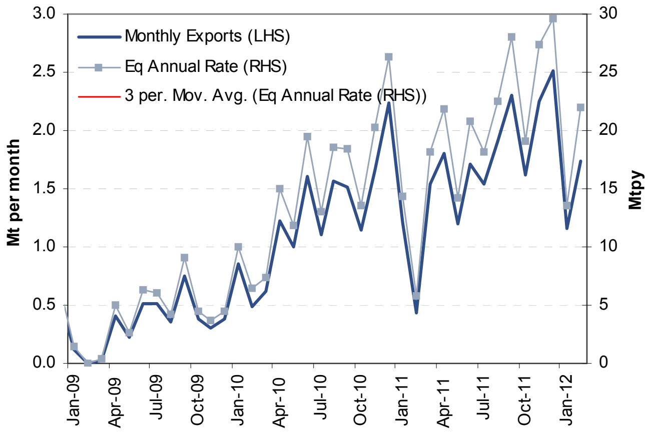
But it's conceivable that the combination of heavy rain in Queensland in March, as well as disruptions from striking BMA workers could see supply of premium coking coal tighten up considerably over coming months.

**Figure 4. Queensland dominates the seaborne metallurgical market**




Source: Tex, Platts, Citi Investment Research and Analysis

**Figure 5. Mongolian exports of coking coal have taken the edge of seaborne imports into China**




Source: GTIS, Platts, Citi Investment Research and Analysis

## Mongolia supply disruptions

Growth in new supply is relatively limited, but one that does have the ability to significantly impact the market is Mongolia. The volume of land-borne Mongolian supply crossing the border to China and availability of domestic supply will determine the level to which China remains in the international market.

Mongolian coking coal producers are ramping up aggressively to fill the supply deficit in China. Based on company announcements, Mongolian coal miners are planning to produce additional supplies of 6.5-8.8Mt of raw coal each year over 2011-13. This implies 4.6-6.2Mt additional clean coking coal supply to the region each year in 2010-13 if we assume a washing yield of approximately 70% for the coal produced in Mongolia. This also indicates a 20-42% YoY increase in Mongolian coking coal exported to China.

At the moment, coal is exported to China via the road network on trucks. Therefore the effective capacity of coking coal exports to China should be no more than 25Mtpy. But if a rail network is constructed (highly unlikely in the short term), China could effectively disappear from the seaborne market.

Of more immediate concern to supply is the threat of suspension of mining and exploration activity at Ovoot Tolgoi (OT) metallurgical coal mine by the Mongolian government due to national ownership issues. OT exports around 4Mtpy of metallurgical coal to China and thus may force Chinese mills into the international seaborne market. At this stage mining activity is still taking place but suspension of activity will remain a significant tail risk.

# Rising costs putting a floor on prices

BMA's recent decision to close the Norwich Park coking coal mine highlights the cost pressure in an industry which has typically enjoyed 30-45% margins. And while the uncertain demand outlook could cap the upside in the short term, we see this as a sign that prices have reached rock bottom.

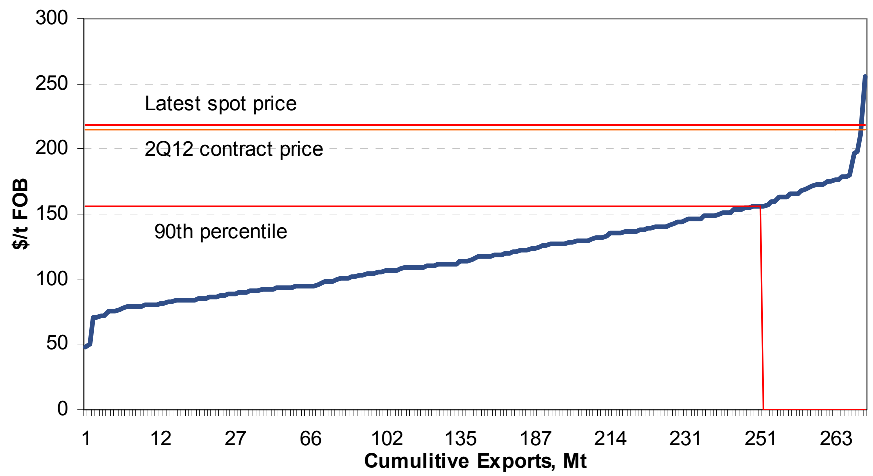
Norwich Park stands out as the highest cost operation in the BMA stable. Wood Mackenzie estimates its cash costs were around $150/t in 2011. This includes royalties and levies but would any taxes, capital cost component or depreciation & amortization charges. Current spot price is around $213/t but has been as low as $207/t in recent months.

Therefore there probably isn't any risk of BHP closing other Queensland Bowen Basin coal operations. But there is another 25Mt (or 9% of world trade) of coking coal production with a cash cost higher than Norwich Park (see cost curve below). These mainly consists of US Appalachian operations.

Not surprisingly, we have seen recent production cut backs in the US as well. Consol Energy announced the idling of the longwall at its Buchanan mine in south-western Virginia, which will see monthly output fall by 70% to by 295,000 short tons. Consol indicated that it was driven more by lack of storage, as it has limited stockpile space on site and the port at Norfolk does not have any ground storage. Wood Mackenzie estimates its cost is around $122/t (FOB). We have also heard that Cliffs Natural Resources has nearly run out of stockpile space at its Pinnacle mine and are facing a decision to possibly idle the mine until the market improved. But this is a high cost mine, with cash costs around $195/t.

Our cost work last year (No more tough times for the Coal Miner's Daughter, 4 July 2011) resulted in us upgrading our long term price for premium hard coking coal to $200/t. This was based on structural cost inflation of 6% per year, projected forward 5 years (plus the addition of an average 30% margin).

**Figure 6. Metallurgical Coal Cost Curve**



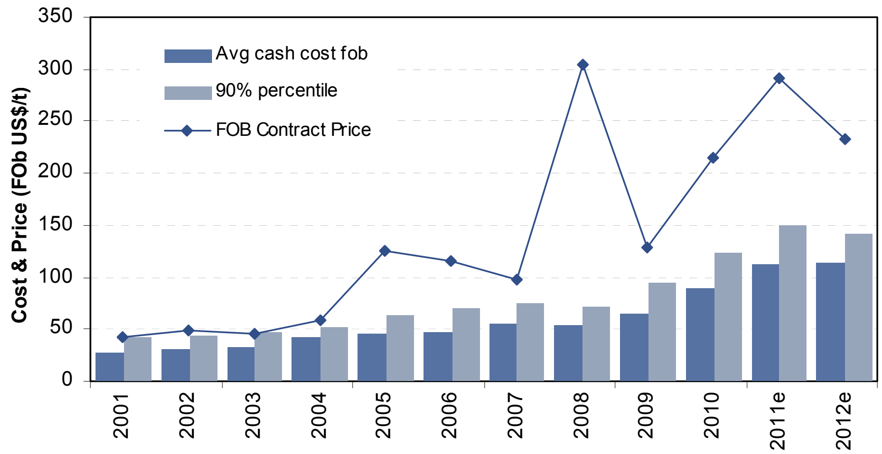

Source: Wood Mackenzie, Citi Investment Research and Analysis

But clearly cost pressures have escalated even further over the past 12 months. Last year we have examined listed coal company cash costs over the period 2005-

2010 and concluded that on average, cost inflation has been ~15% CAGR over the six years. While this includes both thermal and coking coal mines, it highlights the rampant cost pressures on this industry. It also shows that our LT price is based on relatively conservative cost inflation estimates.

While these cost pressures in Australia are unlikely to result in much more supply being curtailed in the short term, what it may do is put at risk some of the 70Mt of expansions in Australia in the pipeline over the course of this decade.

**Figure 7. The scarcity factor has seen met coal prices trade well above cost support levels in recent years**




Source: Wood Mackenzie, Citi Investment Research and Analysis

# Activity picking up in Asia but outlook remains fragile

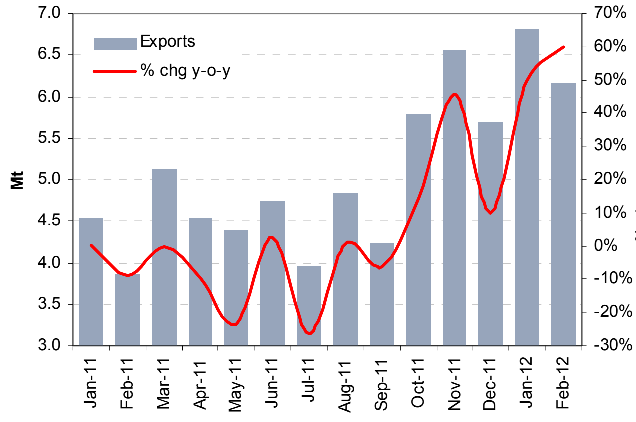
## Japan

Japanese demand is extremely important to the coking coal market. It not only is the biggest importer (19% of global trade), it prefers the premium HCC and sets the industry's benchmark price through negotiations with Australian producers.

Metallurgical coal imports in February reached 6.2 million tonnes, which is up 60% year-on-year (Figure 8). This is also supported by several macro indicators. Auto production has been growing at double digit growth rates over the past 4 months, while steel production has recovered well (from the earthquake/tsunami in Mar-11) and is not far below levels seen this time last year.

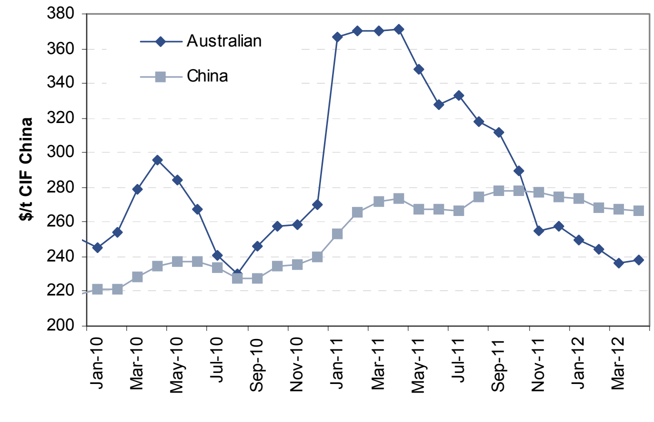
Over the medium term, we are assuming that steel production will hold up relatively well. Steel output is strongly correlated with industrial demand. If we assume, output would keep in line with our economists forecast of 5.4% IP growth in 2012, we would expect to see output reach 123Mt this year. This equates to metallurgical coal imports of 67Mt, up 13% on our forecast of 58Mt in 2011.

**Figure 8. Japanese imports of met coal have risen strongly over the past five months**




Source: Tex, GTIS, Citi Investment Research and Analysis

**Figure 9. Australian HCC is now pricing at a significant discount to domestic Chinese coal**



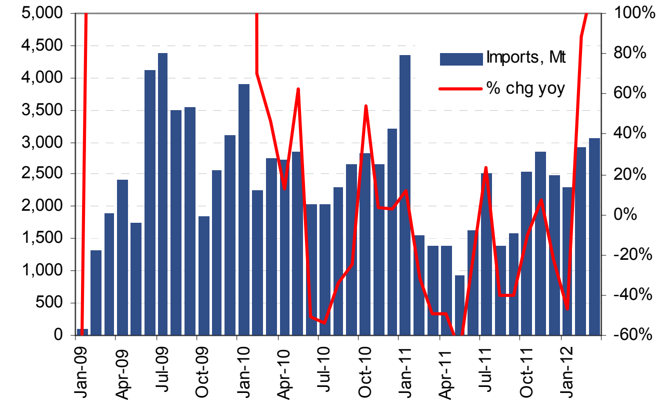

Source: Platts, Citi Investment Research and Analysis

## China

While seaborne hard coking coal prices have stabilised in recent weeks, the tipping point for Chinese buyers to return to the international market appears to have been reached. At current spot prices on the order of US$220/t FOB Queensland, Australian hard coking coal delivers into North China more competitively than domestic coking coals (Figure 9). Indeed, Australian imports notched up slightly in February to 1.34 Mt compared to 1.19 Mt the prior month (Figure 10). Overall imports hit 4.2Mt in March, up nearly 120% y-o-y.

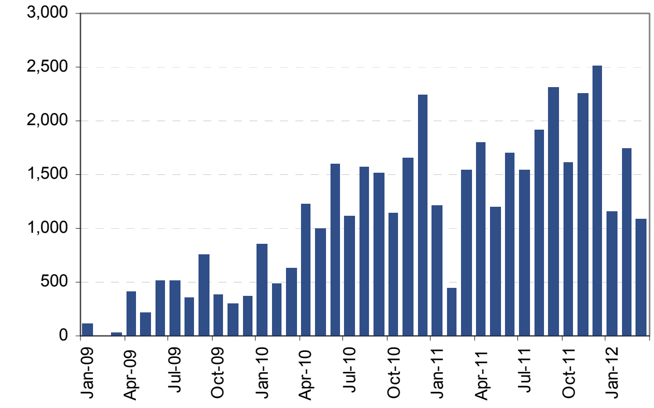
Landborne imports from Mongolia also increased, hitting 2.5Mt in December but have since fallen to 1Mt in March. On aggregate, seaborne imports from other, non-Australian sources (1.57 Mt versus 1.11 Mt).

**Figure 10. China's seaborne imports of met coal**




Source: Platts, GTIS, Tex Report, China Customs, Citi Investment Research and Analysis

**Figure 11. Mongolian exports to China**




Source: China Customs, Citi Investment Research and Analysis

China's slowing industrial activity and robust inventories (both of steel and coking coal) may see Chinese imports of met coal remain lacklustre in the short term. But if as expected, this inventory is exhausted relatively quickly (particularly if steel production remains above 1.9Mtpd); China would be forced back into the international market in a more meaningful way.

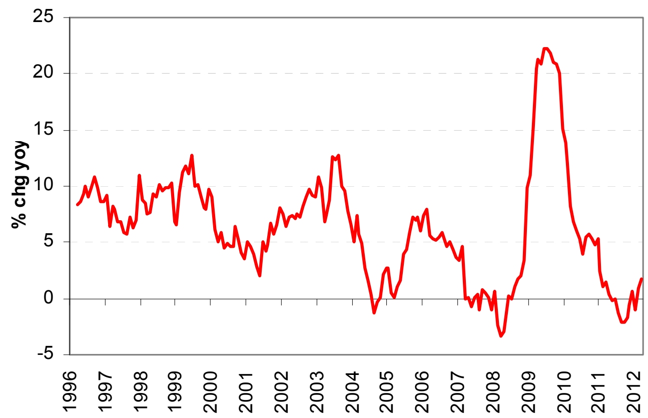
But the major risk remains Mongolia. If supply beats expectations (of around 25Mt), then Chinese demand for imported met coal may be muted, despite strong underlying consumption.

In the short term, we expect China will remain a price-motivated buyer. Lower quality alternatives to Australian supply will be attractive, particularly when discounted heavily enough and supported by the current low freight environment. But this will be contained with the demand for high quality coking coal in large furnaces that are being increasingly built (see below on page 15).

## Chinese residential construction remains a drag on demand

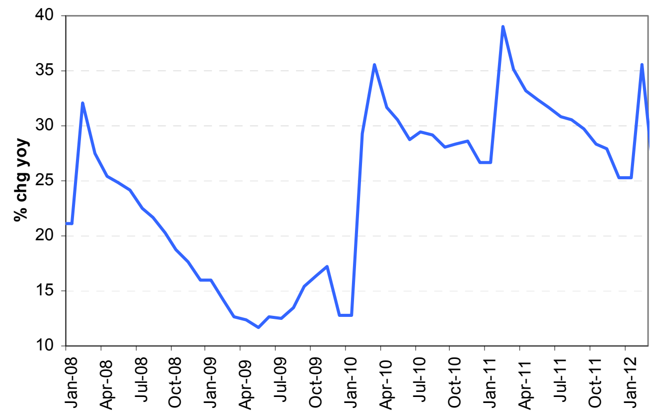
Construction is still the dominant source of demand for steel in China – accounting for ~ 53% of steel demand. Since early 2011, monetary tightening and measures to curb property speculation had been put in place, putting the brakes on a decade long boom in commercial and residential property. This drain in liquidity is apparent in the chart below, which depicts excess money supply (M2 less real GDP % yoy).

**Figure 12. Chinese Excess Money Supply**




Source: Bloomberg, Citi Investment Research and Analysis

**Figure 13. A seasonal rebound in construction in Feb-12**




Source: Bloomberg, Citi Investment Research and Analysis

Our China property team, led by Oscar Choi, notes that despite earlier government interventions, annual transaction volumes grew at a 22% CAGR pace (from 2000 to mid 2011) and prices went up 127%. These trends started to turn down from Q2 2011 and turned clearly negative from September 2011. National residential land prices were flat in 4Q11 – 37 cities reported q/q negative price developments, up from 12 in 1Q11.

Transaction values are down 20.9% yoy in Jan-Feb 12 with the residential segment underperforming (-24.7%). Volumes are down 14% yoy to 70.0mn sq m GFA and residential is the laggard again with volumes down 16% yoy. But during Golden Week (a traditional selling period), average number of units transacted was up 46% YoY. It was also a relatively broad based rebound in Tier 1 and 2 cities. But with inventories relatively high, project construction starts by the major property developers are forecast to decline 2% in FY12 (China Property - Inventories Peaked, Over-Supply Improving in Key Cities, 15 April 2012).

Forecasts from our China property team suggest that at least the residential element of the property complex will be down yoy as far as volumes are concerned. The team is looking for a 19% yoy drop in gross floor area under construction in 2012. While residential construction is less steel intensive than infrastructure, a negative yoy progression will have a negative impact on steel demand in China.

**We are looking for a 19% yoy drop in Chinese GFA in 2012**

**Figure 14. Citi's forecast for gross floor area under construction in China**

| mn sq metres GFA | 2009A | 2010A | 2011A | 2012E |
|---|---|---|---|---|
| Commodity Housing | 1006 | 1408 | 1491 | 1268 |
| Social Welfare Housing | 148 | 230 | 410 | 273 |
| Total housing | 1154 | 1638 | 1901 | 1541 |
| % yoy | | 42% | 16% | -19% |

Source: Citi Investment Research and Analysis

Our China economists believe that restrictive policies on the property sector will be maintained until the majority of the 70 cities monitored by the NBS (National Bureau of Statistics) show a yoy price decline. 2012 will remain challenging for the physical market but a 10% ASP drop is more likely than the market's more bearish view of a 20-30% ASP drop.

Social housing targets (7mn units to be started in 2012) will remain in place and reforms of real estate tax and household registration will be introduced. A near term relaxation of these curbs is likely, and also what the market expects. Given the fall in ASPs, there could be some selective relaxation of policy to relieve the pain of local governments.

Indeed, a slight recovery is already underway. Transaction volumes improved in February and developers have withdrawn discounts in some cities with a view that demand will pick up in the post Chinese New Year period. Mortgage premiums over the base rate have contracted too – currently at 5% over base rate in Chongqing vs. 10% previously – a reflection of looser monetary conditions.

**Some signs of a recovery in property sector confidence, but policy remains fairly restrictive**

Premier Wen's speech at the 11th NPC has delivered limited surprises and appears to be in-line with our China team's expectations. The overall policy of curbing property speculation will remain in place. Residential construction activity is likely to be a drag for steel demand in China until Q3 2012 when the current restrictive policies may be relaxed.

### Chinese auto production – March data stalls

Chinese auto production has bounced back in February. Our autos team estimates China Apr-12 car sales grew 13% YoY to about 896,671 units, based on China Auto Market data. Car sales declined 4% MoM which is lower than ten year April average of 1% MoM growth. Overall, Jan-Apr 2012 car sales grew 1% YoY. The May data will be a key data point to watch, and our China team is looking for +10% yoy in auto sales data as evidence that the growth slowdown has ended.

In addition, the Ministry of Finance, State Administration of Tax and MIIT have announced the Fuel Efficient and New Energy Vehicle and Vessel Tax Policy. Effective immediately, the Vehicle and Vessel Tax (an ownership tax paid annually) will be reduced to zero for eligible vehicles. These include 49 fuel efficient passenger vehicle variants, 154 pure electric commercial vehicles, three plug in hybrids and four fuel cell commercial vehicles. Our China autos team believes that this policy will be mildly positive for passenger vehicle sales.

**Tax breaks for fuel efficient vehicles are being introduced in China**

Post Chinese New Year, truck sales data has rebounded too due to the shorter Feb-11 base effect and New Year timing. 2M12 sales are still down 28% yoy and given previous HDT (heavy duty truck) sales downturns have lasted for 12 consecutive months, the March data will be key to gauge if the current downturn is behind us or not. Specialty trucks used in mining and construction continued to decline yoy – down 11% in Feb-12, although much less that the -55% yoy print in Jan-12.

**Figure 15. Mining/Construction truck sales continue to be weak**

| China HDT sales by type | Feb-12 | Jan-12 | Dec-11 | Feb-11 | % yoy | % m/m |
|---|---|---|---|---|---|---|
| Standard truck (short haul logistics) | 25463 | 11851 | 16206 | 24686 | 3% | -26.9% |
| Semi-tractor trailer (long haul logistics and import/export) | 25814 | 12274 | 15933 | 25814 | 27% | -23.0% |
| Specialty trucks (mining, construction) | 26842 | 13876 | 23990 | 26842 | -11% | -42.2% |

Source: China Auto Market, CAAM

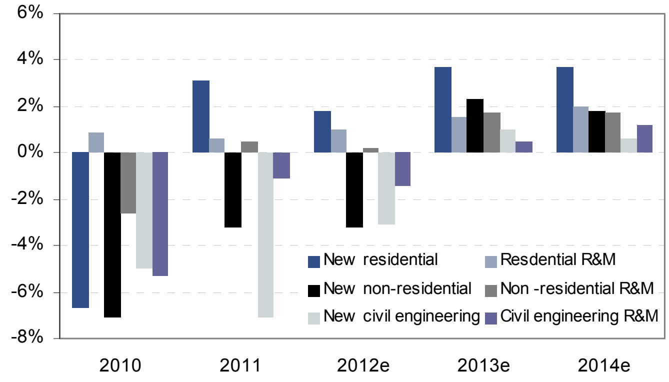
# A European recovery unlikely this year…

A recovery in European construction is unlikely in 2012 and will only begin in 2013, before picking up pace in 2014. This is, quite simply, a multi year debt work-out.

After a modest contraction in 2011, our European construction team expects construction output to fall by 0.4% in 2012. The North-South divide is expected to continue with growth in Germany and France (1.8% and 1.7%) and dire numbers for the south (-9% for Spain, -1.5% for Italy and -12.9% for Portugal). There is common ground with the US – residential construction was the strongest sub-sector in 2011 while public sector construction is the laggard, again.

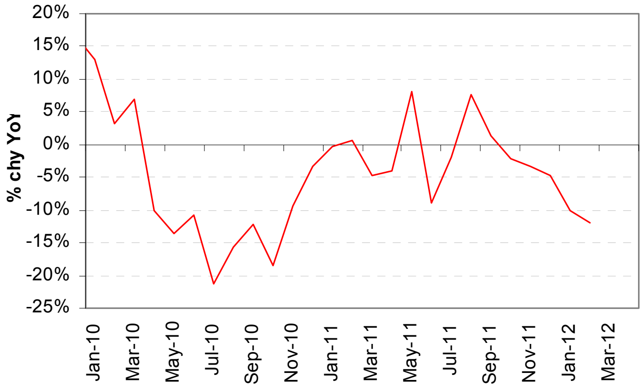
New car registrations have already turned negative in Europe (down 10% yoy in Mar-12) and even strong markets like Germany are barely registering positive growth. France has been the worst hit of the major car markets - down ~ 20% yoy in March 2012, although it has shown signs of stabilisation with sales only falling 1% YoY in April. Our autos team is forecasting a 5% decline in passenger vehicle markets in 2012.

**Figure 16. Euroconstruct forecasts – similar pattern to the US – strong in residential and weak in public sector**




Source: Euroconstruct, Citi Investment Research and Analysis

**Figure 17. A poor start to 2012 for European auto sales**




Source: Bloomberg, Citi Investment Research and Analysis

## …as US offers bombard the continent

The US is currently the world's second largest supplier to the global seaborne metallurgical coal market and exported 59Mt in 2011 (Figure 18). In addition to traditional high-quality hard coking coal supply from the Central and Southern Appalachian regions, Northern Appalachian suppliers have continued to ship more marginal coals (such as low-vol and semi-soft coking coals) to Asian steel producers via the port of Baltimore.

Despite being a major metallurgical coal exporter, it has always been considered a swing supplier in the international seaborne market.

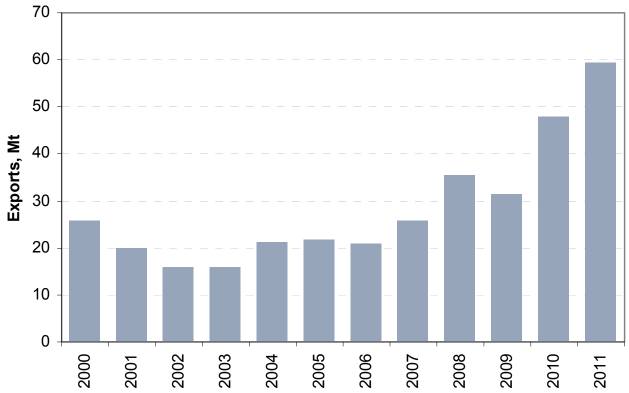
The US is the highest cost producer on an FOB basis. However, because of its relatively close proximity to Europe, it has a substantial ocean freight advantage over Australia.

As a result, over 56% of its exports are shipped to Europe (Figure 19). It also has significant sales into Latin America, as well as Canada by rail. Asian sales are mainly opportunistic spot sales to India.

But the market has suffered the severe supply disruption over the past couple of years; it was North American metallurgical coal producers who filled the void. As prices rallied past $350/t, even the highest cost met coal exporter in the US was able to garner a positive return form shipping coking coal to Asia. This resulted in total met exports jumping from around 3.8Mt per month in late 2010, to nearly 6Mt at the peak of the disruptions in March 2011.

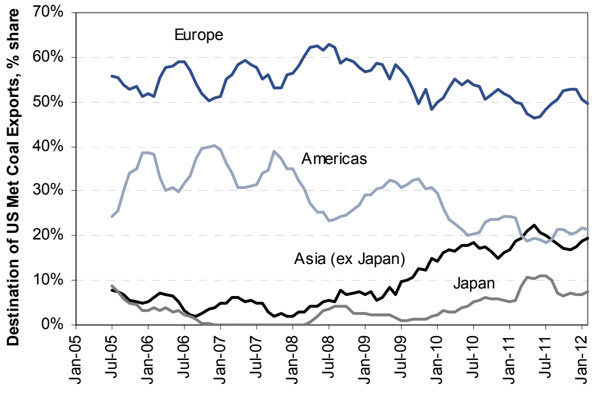
A combination of elevated coking coal prices and record low freight rates meant that US met coal exports to Asia remained strong throughout 2011, despite Australian supply recovering. This has Asian consumers being inundated with offers of met coal and pushing prices down.

**Figure 18. US metallurgical coal exports have risen strongly over the past decade**




Source: Platts, Wood Mackenzie, Citi Investment Research and Analysis

**Figure 19. US exports of met coal have been increasing to Asia, at the expense of Europe**




Source: Citi Investment Research and Analysis

# HCC Market to tighten through 2Q & 3Q 2012

As a consequence of the supply disruptions in Australia and improving demand in China and Japan, we believe the market will tighten up considerably in 2Q12.

Australian supply looks likely to fall quarter-on-quarter in 2Q12 as the industrial action and weather related disruptions bite. At the same time, we are expecting a mild pick up in met coal imports from Asia, as attractive pricing and stronger steel production in China takes hold.

This should result in a relatively tight market over 2Q and 3Q 2012, before a recovering premium hard coking coal out of Australia balances the market later this year. Therefore we continue to rate the likelihood of stronger benchmark HCC prices in 2H12.

**Figure 20. METALLURGICAL COAL Quarterly Supply Demand Balance**

| IMPORTS (Mt) | 1Q12 | 2Q12 | 3Q12 | 4Q12 | 2012 |
|---|---|---|---|---|---|
| Japan | 14.0 | 15.0 | 15.4 | 14.6 | 59.0 |
| South Korea | 6.7 | 8.0 | 9.3 | 8.0 | 32.0 |
| India | 8.2 | 10.5 | 9.9 | 9.8 | 38.4 |
| Europe | 13.6 | 13.8 | 13.5 | 12.9 | 53.8 |
| China (excl Mongolia) | 4.2 | 13.6 | 10.8 | 8.8 | 37.4 |
| Brazil | 4.5 | 4.5 | 4.5 | 4.5 | 18.1 |
| Other | 9.2 | 9.0 | 9.2 | 9.3 | 36.8 |
| **Total** | **60.4** | **74.4** | **72.6** | **68.0** | **275.4** |
| EXPORTS (Mt) | | | | | |
| Australia | 35.9 | 33.5 | 39.7 | 41.2 | 150.3 |
| US | 14.0 | 15.0 | 15.0 | 13.0 | 57.0 |
| Canada | 6.5 | 6.8 | 6.5 | 6.3 | 26.1 |
| China | 0.1 | 0.1 | 0.1 | 0.1 | 0.6 |
| Russia | 2.5 | 3.5 | 3.0 | 3.0 | 12.0 |
| Mozambique | 1.2 | 1.4 | 1.5 | 1.9 | 6.0 |
| Other | 2.2 | 2.2 | 2.2 | 2.2 | 8.9 |
| **Total** | **62.5** | **62.6** | **68.2** | **67.7** | **260.9** |
| **IMPLIED MARKET BALANCE** | **2.0** | **-11.8** | **-4.5** | **-0.3** | **-14.5** |

Source: Citi Investment Research and Analysis

## Semi soft coal unlikely to fully benefit for strong met coal market

Despite tightness in the premium hard coking coal market usually improving demand for mid-ranking coal, we believe semi-soft prices are unlikely to rise in unison with HCC.

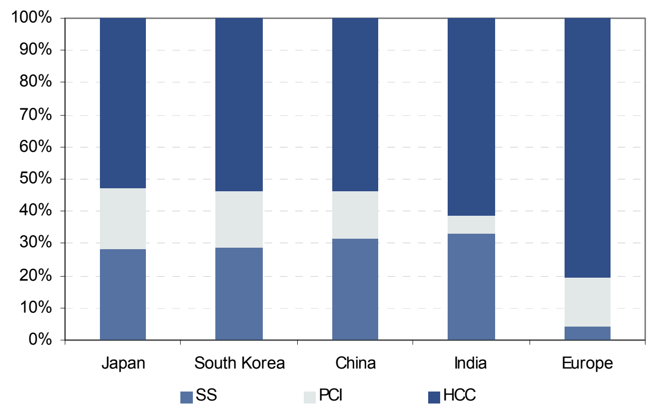
This is due to a combination of steel mills reaching their limit on SSCC and PCI blending, while the development of large BOF increases demand for high quality coking coal.

### History

The seaborne semi-soft market is around 50Mtpy. Australia is the dominant producer accounting for more than 75% of total trade. Minor suppliers are Canada and USA. Small quantities are starting to come from Indonesia. Also some anthracite exported from Vietnam to China is also sold into the PCI market although most is for heating.

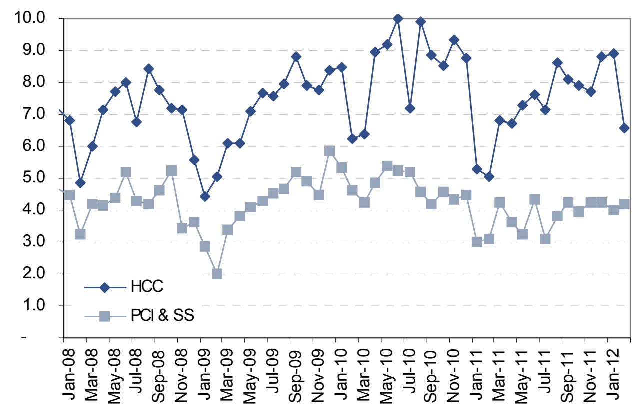
Japan and Korea are the major consumers where semi soft accounts for 30% of met coal consumption.

**Figure 21. Met Coal Consumption by Coal Type, 2012**




Source: Wood Mackenzie, Citi Investment Research and Analysis

**Figure 22. Australian exports of HCC and SS/PCI**




Source: ABS, Citi Investment Research and Analysis

## Relationships between types of metallurgical coals

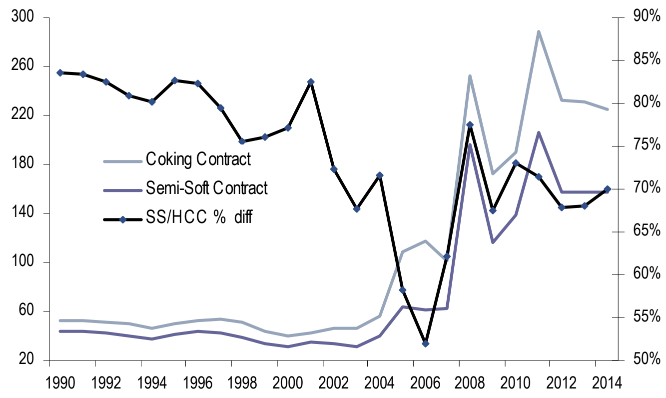
For many years, the price of semi-soft and PCI coal was set by its relationship with thermal coal.

Between 1990 and 2006, the average premium of semi-soft to thermal was $3.50/t. This took into account washing costs and yield losses which would enable semi-soft coking coal to be sold as thermal coal.

But with the advent of China and then India as global steel powerhouses, demand for coking coal has skyrocketed and that relationship has broken down. Since 2006, SSCC and PCI prices have tracked hard coking coal prices closely.

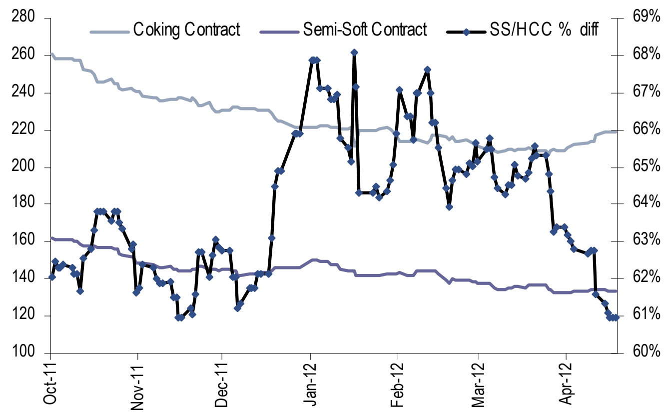
In fact, outside of a brief period around 2007, the semi-soft discount to HCC has averaged 75%, within a band of 65%-80% (Figure 23). But in recent months, that discount has fallen to nearly 60%.

**Figure 23. HCC v Semi Soft prices (annual)**




Source: Platts, Citi Investment Research and Analysis

**Figure 24. HCC v Semi Soft prices (daily)**




Source: Platts, Citi Investment Research and Analysis

## Big gains from blending already made

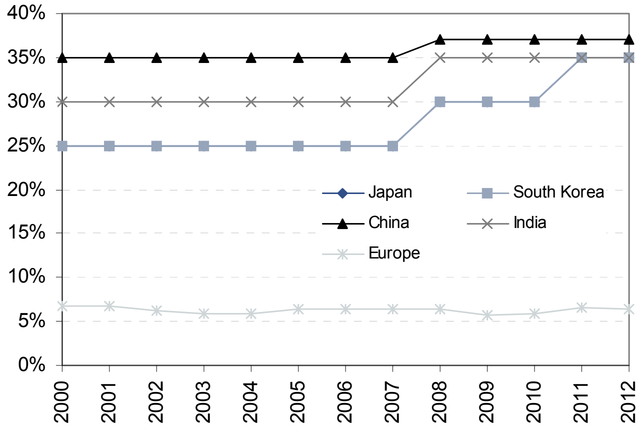
### Semi-soft

As prices for coking coal increased, Japanese mills started blending their hard coking coal with lower quality coking coal in an effort to bring down costs in the 1990s. This resulted in semi-soft coal making up over 25% of their total coking coal needs.

Since then we have seen this becoming widespread practice, with most major steel producing regions using some level of semi-soft coking coal. By the early 2000s, Japan, India, South Korea and China were using semi-soft coal for least 30% of their coking coal needs (Figure 25).

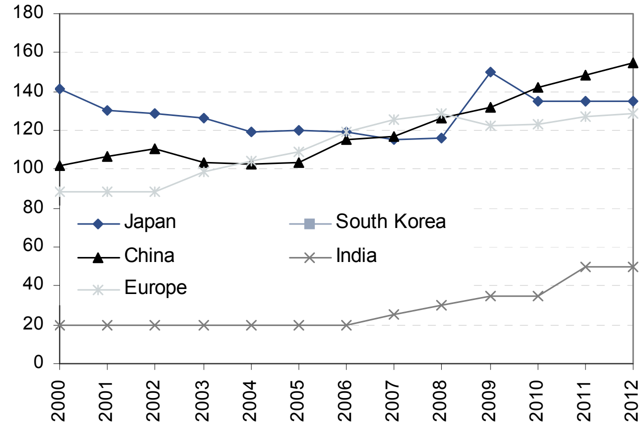
But it's assumed that when the use of semi-soft coking coal moves significantly beyond 30-35% of total coking coal consumption, the quality of steel starts to deteriorate.

**Figure 25. Percentage of semi-soft coking coal used for total coking coal consumption**




Source: Citi Investment Research and Analysis

**Figure 26. PCI Ratio**




Source: Citi Investment Research and Analysis

## PCI

There is a technical limit to how much PCI coal can be injected into a blast furnace. The most advanced plants, such as Ijmuiden in Netherlands use 220-230 kg/thm, but the global average is around 150-170kg/thm.

Japan's PCI ratio actually decreased through the 2000s as a general tightness in the PCI market reduces rates as well as low HCC prices reduced the need to reduce costs. But as HCC prices started rising in 2008, so did the PCI ratio and is now back up at 140kt/thm. We feel this is the natural upper level for PCI use in Japan and thus don't expect the current price environment to increase use.

While other steel markets plateau as technical limits are reached, Chinese PCI ratios are continuing to increase. In China injection ratios have increased from 60kg/t hot metal in 1990 to a current average of 150kg, with the largest blast furnaces reaching 190kg, levels comparable with Japan.

## Trend towards large furnaces benefits HCC

In China, with the government aiming to consolidate the domestic steel industry and improve energy efficiency, it has been closing down all blast furnaces with volumes under 1000 cubic metres, As per the 12th Five-Year Plan, the government wants to remove 75Mt of outdated hot metal capacity by 2015.

At the same time, most of the new projects generally utilise larger blast furnaces to take advantage of increased efficiencies and economies of scale. According to Wood Mackenzie data, over three quarters of Chinese blast furnace production comes from blast furnaces with an capacity of greater than 2Mtpy.

Such blast furnaces require high quality hard coking coal to run at optimum efficiency. Generally, the larger the furnace capacity, the less tolerance it has for ash and sulphur components within coking coal. The harder the coal, the lower the percentage of these residuals it generally contains.

In Japan, semi soft and PCI markets were hit hard in the downturn. Mills cut PCI ratios, preferring to keep coking ovens running. Some mills elected to close some blast furnaces and keep others running at high utilization rates, rather than lower average utilization rates.

Japanese and Korean mills tended to close some blast furnaces and keep others running at high utilization rates, rather than lower average utilization rates.

The effect was to sustain demand for higher quality coking coals, while demand for lower rank and semi-soft coals has been subdued.

### New technology

Efficiency gains and new technology have the ability to increase the use of semi-soft coal in the production of coke. DRI/SRI technologies effectively use thermal coal as a substitute for coking coal and coke. But these are longer solutions based on replacing the blast furnace.

However there are some alternate measures that can be used to lower the amount of coking coal that goes in to the standard blast furnace. One such measure is stamp charging.

Stamping allows for use of poorer quality and volatile coal to be put in to coke oven and reduces the need for premium hard coking coal. As such stamp charging is a technology that offers a reduction in coke production costs.

In the case of semi-soft, stamp charging of coke ovens widely practiced in India, could reduce the proportion of hard coking coal in the coke oven charge from 70 percent to 35.

A major problem with the stamping technology is that when used in conventional coke slot ovens, the higher density coal increases oven wall pressure. The increased pressure causes the charge in the oven to swell and stick to the walls. Over time this causes wall damage and may also reach the extreme of coke oven failure requiring extensive and expensive repairs.

## Downside risk to SSCC/HCC linkage

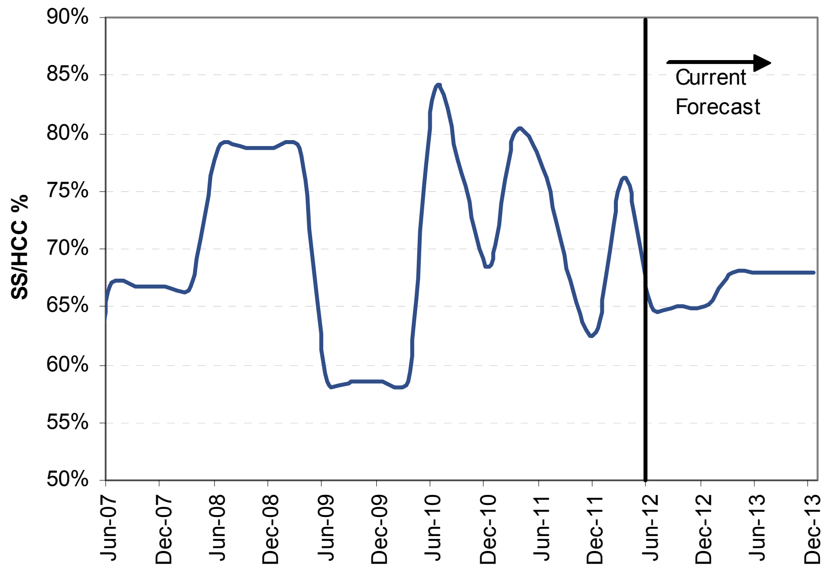
We feel it will be difficult for SS and PCI coals to be priced at higher levels of HCC over the short term.

Going forward the use of higher percentages of these type coals will be required by coke-makers globally due to the combination of increasing demand and reduced resources of hard coking coals. But this will be tempered by the technical limitations. Thus demand for semi-soft coking coal is likely to remain relatively soft, compared with hard coking coal.

At the same time, we see good supply of lower quality of coal from major producers like Australia and US.

Our current forecasts are for the linkage to increase to 65% this year and then 68% in 2013. If consumption of semi-soft coal stagnates due to technical limits of blending while at the same time higher production of SSCC is induced into the market, there is a risk that these linkages may not be achieved.

**Figure 27. Semi-Soft / HCC ratio**




Source: Citi Investment Research and Analysis

# Market Balances & Price Forecasts

**Figure 28. METALLURGICAL COAL Annual Supply Demand Balance**

| IMPORTS (Mt) | 2010 | 2011e | 2012e | 2013e | 2014e | 2015e | 2016e | 2017e | 2018e | 2019e | 2020e | 2021e |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Japan | 64.8 | 54.0 | 59.6 | 59.9 | 61.6 | 59.9 | 61.1 | 62.4 | 63.6 | 64.9 | 66.2 | 67.5 |
| South Korea | 27.4 | 30.9 | 32.0 | 31.4 | 34.6 | 35.2 | 37.7 | 40.3 | 43.1 | 46.2 | 49.4 | 52.9 |
| India | 35.7 | 32.7 | 38.4 | 46.1 | 78.4 | 85.1 | 91.7 | 98.8 | 103.7 | 108.9 | 114.4 | 120.1 |
| Europe | 56.8 | 64.8 | 53.8 | 53.3 | 35.9 | 31.1 | 26.8 | 18.9 | 22.2 | 26.3 | 25.0 | 23.8 |
| China (excl Mongolia) | 38.2 | 24.6 | 37.4 | 36.1 | 43.9 | 43.1 | 48.6 | 61.0 | 57.1 | 56.5 | 45.0 | 63.1 |
| Brazil | 17.7 | 15.8 | 18.1 | 20.6 | 24.1 | 25.6 | 27.7 | 29.9 | 32.3 | 34.9 | 37.7 | 40.7 |
| Other | 26.1 | 31.7 | 36.5 | 43.2 | 39.4 | 43.9 | 44.4 | 48.7 | 51.6 | 55.2 | 56.2 | 56.7 |
| **Total** | **266.7** | **254.5** | **275.9** | **290.7** | **317.9** | **324.0** | **338.0** | **359.9** | **373.7** | **392.8** | **393.9** | **424.8** |
| **EXPORTS (Mt)** | | | | | | | | | | | | |
| Australia | 158.9 | 132.7 | 150.3 | 168.5 | 193.0 | 201.7 | 212.5 | 225.6 | 225.4 | 227.9 | 227.9 | 230.4 |
| US | 47.8 | 59.3 | 57.0 | 56.0 | 56.0 | 56.0 | 55.0 | 55.0 | 55.0 | 55.0 | 55.0 | 55.0 |
| Canada | 26.1 | 26.1 | 26.1 | 29.0 | 27.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 | 25.0 |
| China | 1.1 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 | 0.6 |
| Russia | 10.7 | 14.0 | 12.0 | 12.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | 15.0 | 14.0 |
| Mozambique | 0.0 | 4.4 | 6.0 | 9.6 | 12.2 | 12.2 | 17.2 | 20.2 | 22.2 | 27.2 | 27.2 | 27.2 |
| Other | 4.8 | 7.5 | 8.9 | 12.5 | 7.7 | 12.2 | 14.1 | 18.9 | 17.1 | 18.6 | 20.5 | 24.3 |
| **Total** | **249.6** | **244.6** | **260.9** | **288.3** | **311.6** | **322.6** | **339.4** | **360.3** | **360.3** | **369.3** | **371.2** | **376.6** |
| IMPLIED MARKET BALANCE | | | -14.9 | -2.4 | -6.3 | -1.3 | 1.4 | 0.4 | -13.4 | -23.5 | -22.7 | -48.2 |

Source: Wood Mackenzie, Platts, Citi Investment Research and Analysis

**Figure 29. Bulk Commodity Spot Targets and Annual Average Forecasts**

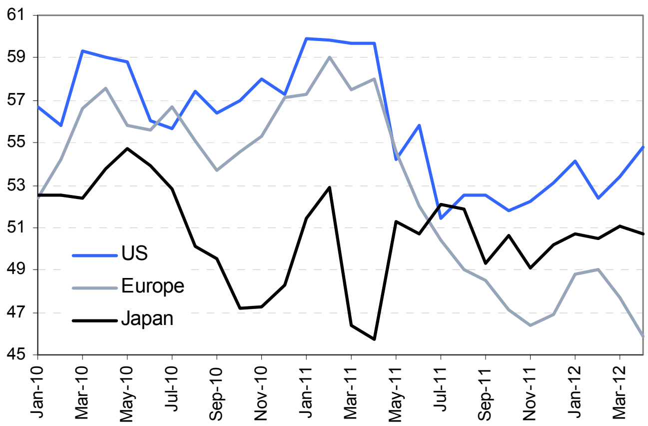
| | Current | Spot Targets | | Annual Average Forecasts | | | | |
|---|---|---|---|---|---|---|---|---|
| | Spot | 0-3M | 6-12M | 2012E | 2013E | 2014E | 2014E | LT |
| Hard Coking Coal (benchmark Asia) | 221.5 | 220 | 240 | 233 | 231 | 225 | 230 | 200 |
| Semi-Soft Coal | n/a | n/a | n/a | 158 | 157 | 158 | 159 | 150 |
| LV-PCI | n/a | n/a | n/a | 159 | 160 | 158 | 163 | 160 |
| Thermal Coal (Newc) | 99.7 | 110 | 130 | 119 | 136 | 148 | 148 | 105 |
| Thermal Coal (API2) | 88.6 | 95 | 125 | 108 | 126 | 139 | 143 | 109 |
| Iron Ore Spot (TSI) | 144.1 | 160 | 145 | 149 | 138 | 130 | 125 | 81 |

Source: Citi Investment Research and Analysis

# Macro

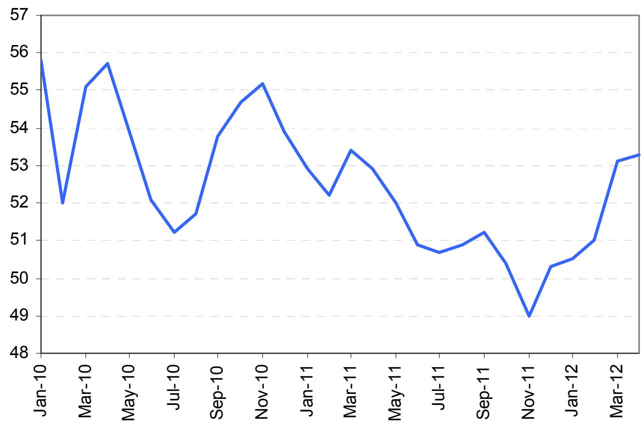
- Chinese PMI crept up by 0.2ppt to 53.3, less than historical average increase for April (0.8ppt) and market expectations. The fifth consecutive monthly increase was mainly driven by production, which increased by 2.0ppts. The improvement in official PMI, along with gains in April HSBC flash PMI reading, suggests sequential QoQ expansion of the economy, but the strength may not be enough to prevent a further mild GDP slowdown on a YoY basis. Production index rose to 57.2, the highest level since end-2010, indicating industrial production is expanding rapidly. However, both raw material inventory and purchases retreated, weighing on production activity going forward. Finished goods inventory index went down from 50.8 to 49.5 amid ongoing destocking process. Despite improvement in export order index which rose to a 1-year high of 52.2, overall new order index dropped by 0.6ppt to 54.5 while import index also declined 1ppt to 50.5. This suggests some uncertainties with regard to domestic demand.

**Figure 30. Developed Economies PMI**



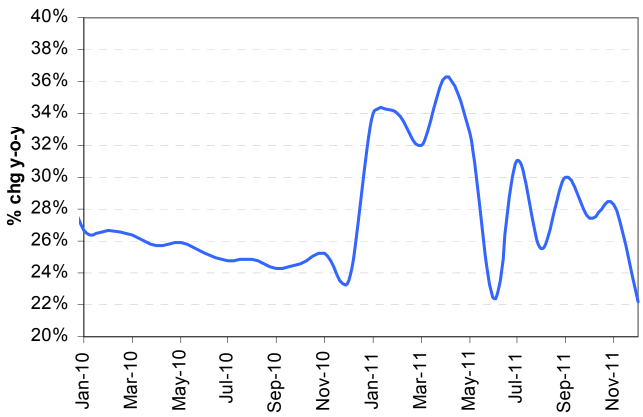

Source: Bloomberg, Citi Investment Research and Analysis

**Figure 31. China PMI**



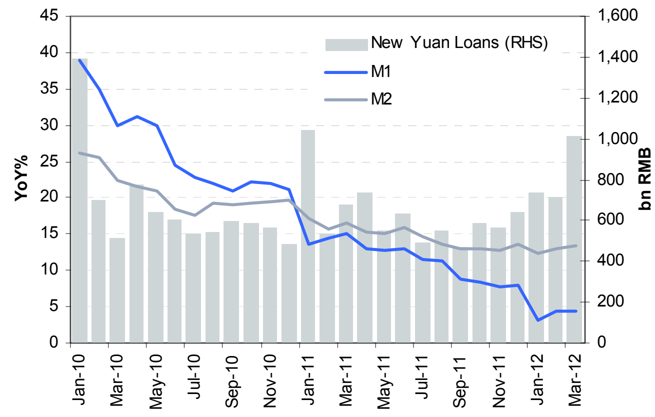
Source: Bloomberg, Citi Investment Research and Analysis

**Figure 32. China Fixed Asset Investment (ex Rural)**




Source: Bloomberg, Citi Investment Research and Analysis

**Figure 33. China Money Growth and New Lending**

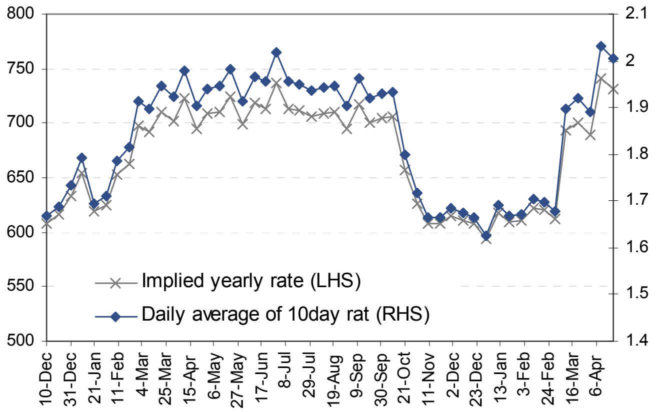



Source: Bloomberg, Citi Investment Research and Analysis

# Steel

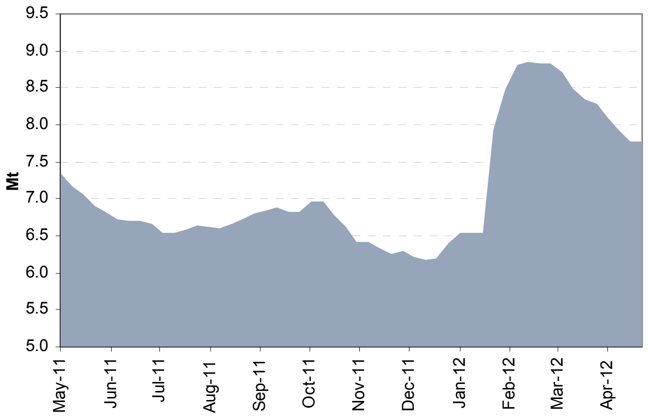
- Steel inventories continued to fall last week and are now down nearly 8% from the record high reached in February. The biggest component remains rebar (construction steel), which has seen a sharp rise over the past 2 months
- After a few strong weeks, rebar prices stabilised over the past week and appear to be struggling to establish an upward trend.

**Figure 34. Chinese Daily Steel Production**



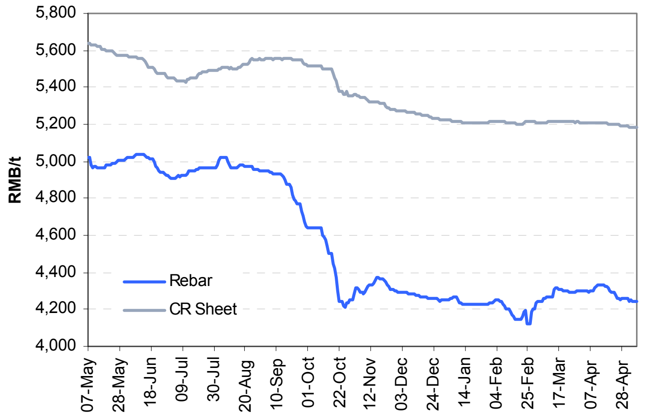

Source: CISA, Citi Investment Research and Analysis

**Figure 35. Chinese steel inventory held by merchant/traders**



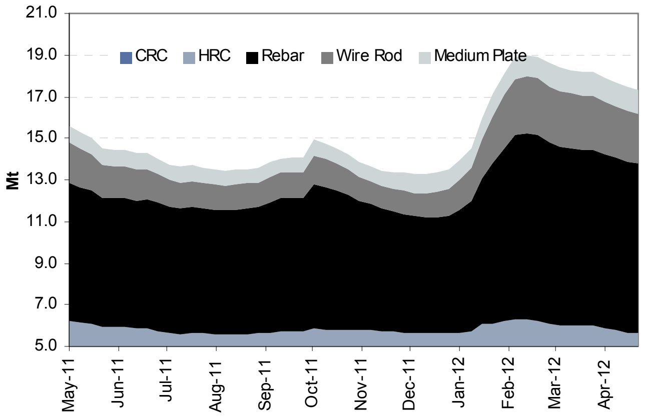

Source: Bloomberg, Citi Investment Research and Analysis

**Figure 36. Chinese Steel Prices**




Source: Bloomberg, Citi Investment Research and Analysis

**Figure 37. Chinese steel inventory by product**

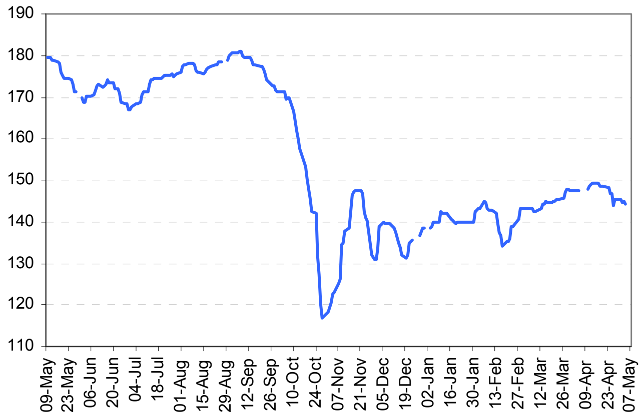



Source: Steelhome, Citi Investment Research and Analysis

# Iron Ore

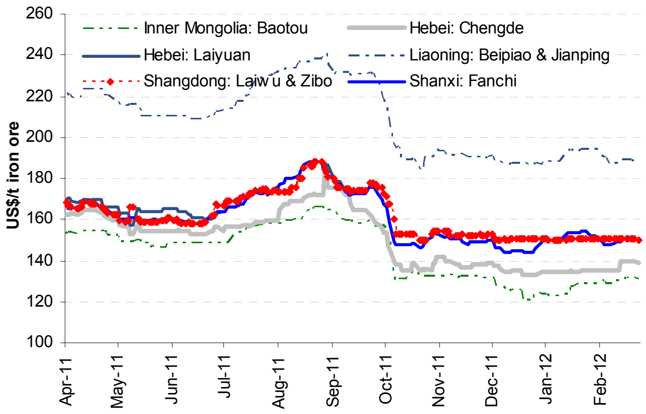
- Iron ore prices edged lower over the past week as sentiment weakened over falling Chinese steel prices.
- Australian exports remain strong while Brazilian output has been slowly recovering after 1Q weather disruptions. Indian supply remains restricted due to the continued ban on iron ore exports from Karnataka.

**Figure 38. TSI Spot Iron Ore Price**



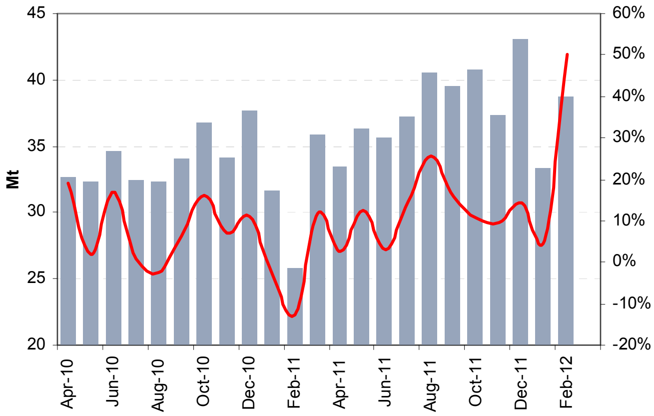

Source: Bloomberg, Citi Investment Research and Analysis

**Figure 39. Chinese domestic iron ore prices**



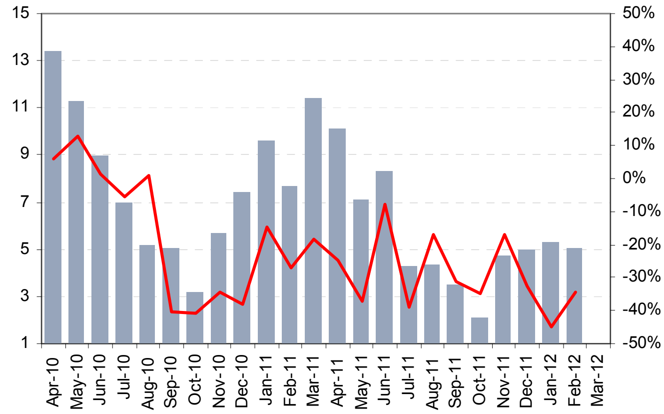

Source: Tex, Bloomberg, Citi Investment Research and Analysis

**Figure 40. Australian Iron Ore Exports**



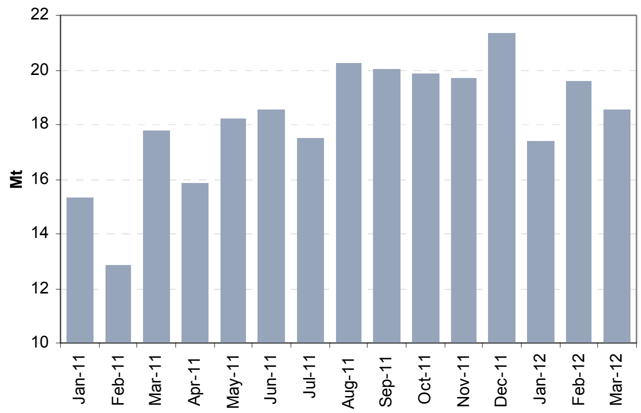

Source: ABS, Citi Investment Research and Analysis

**Figure 41. Indian Iron Ore Exports**



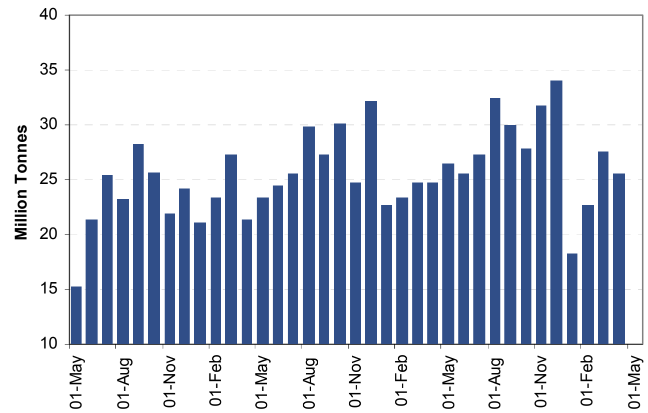

Source: Tex, China Customs, Citi Investment Research and Analysis

### Figure 42. Iron Ore Exports from Port Headland



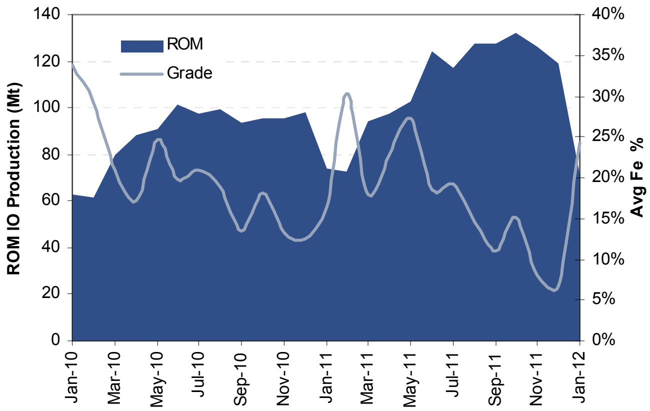

Source: Port Headland Port Authority, Citi Investment Research and Analysis

### Figure 43. Brazil Iron Ore Exports



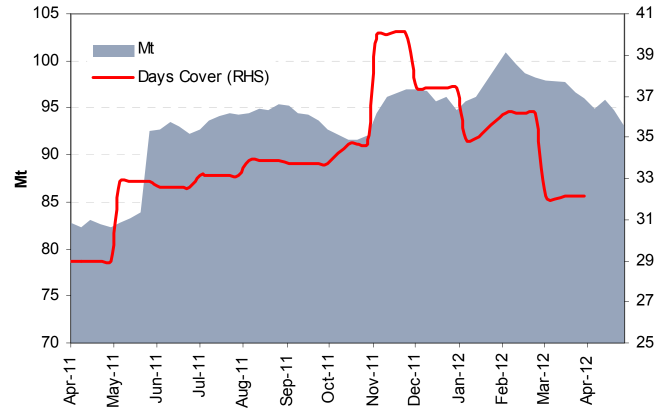

Source: Tex, Citi Investment Research and Analysis

### Figure 44. Chinese Domestic Iron Ore Production and Grade



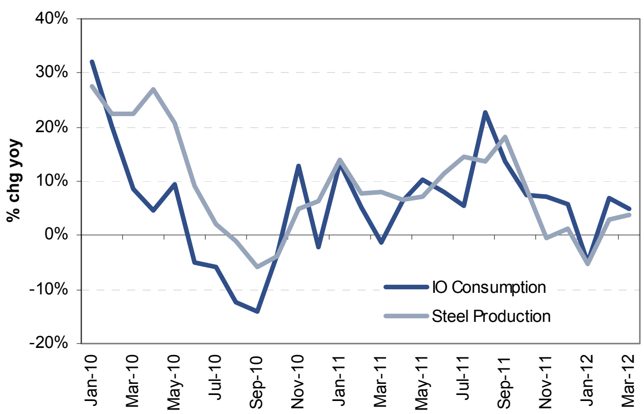

Source: CISA, Bloomberg, Citi Investment Research and Analysis

### Figure 45. China Weekly Iron Ore Inventories at the Port



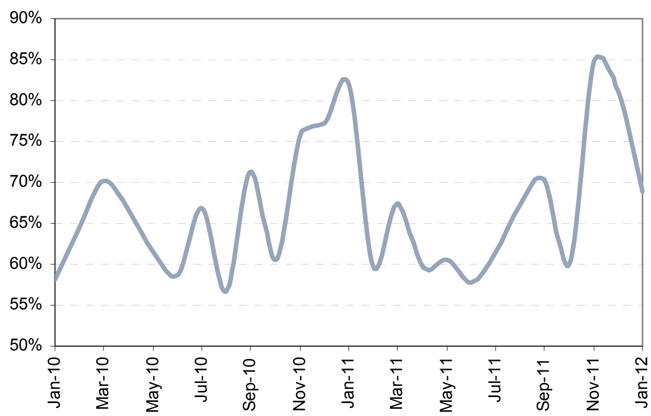

Source: Bloomberg, Citi Investment Research and Analysis

### Figure 46. Chinese Iron Ore Consumption vs Steel Production




Source: CISA, Citi Investment Research and Analysis

### Figure 47. Iron Ore Imports Share of Total Chinese Consumption

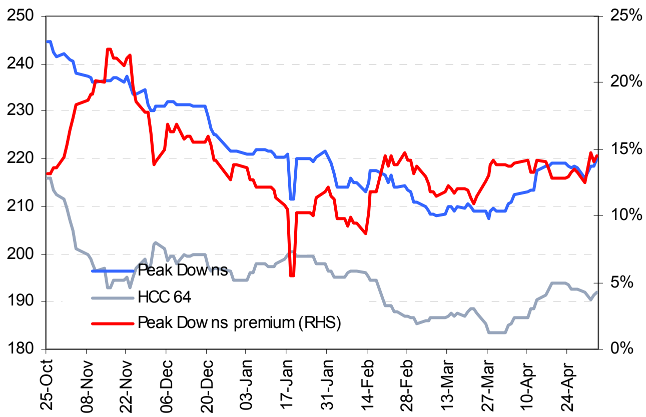



Source: CISA, Bloomberg, Citi Investment Research and Analysis

# Metallurgical Coal

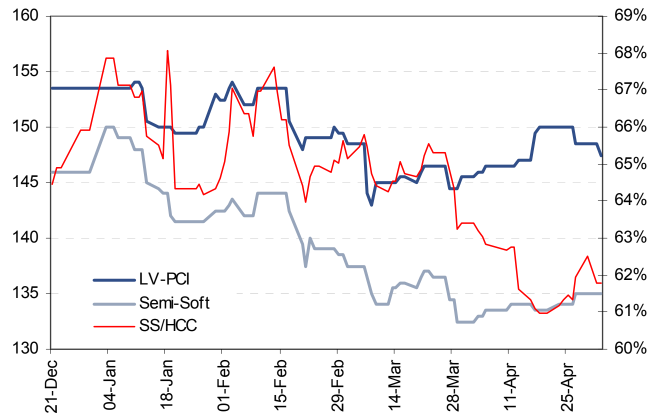
- While international benchmark prices have picked up in recent weeks, Chinese domestic coking coal prices remain higher, thus the arb between Australian and Chinese met coal prices remains open. This has resulted in Chinese met coal imports remain strong in March. We continue to see a pick up in the steel markets pushing demand for international coking coal higher.

**Figure 48. Spot Hard Coking Coal Prices**



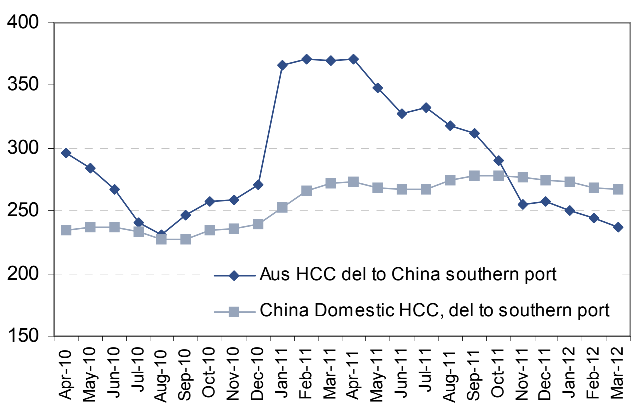

Source: Platts, Citi Investment Research and Analysis

**Figure 49. Spot Metallurgical Coal Prices**



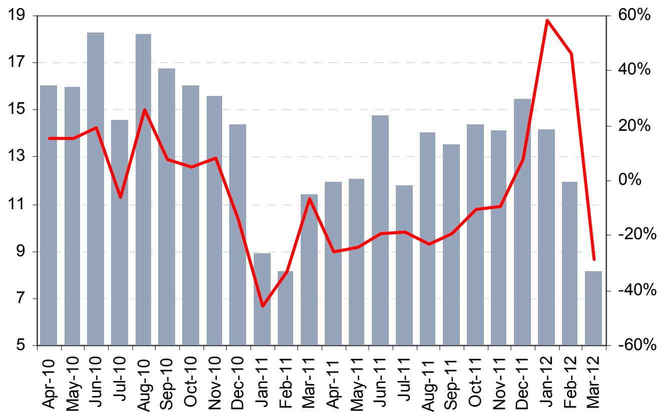

Source: Platts, Citi Investment Research and Analysis

**Figure 50. Coking Coal Aus-China Arb**




Source: Platts, Citi Investment Research and Analysis

**Figure 51. Australian Coal Exports - Queensland**

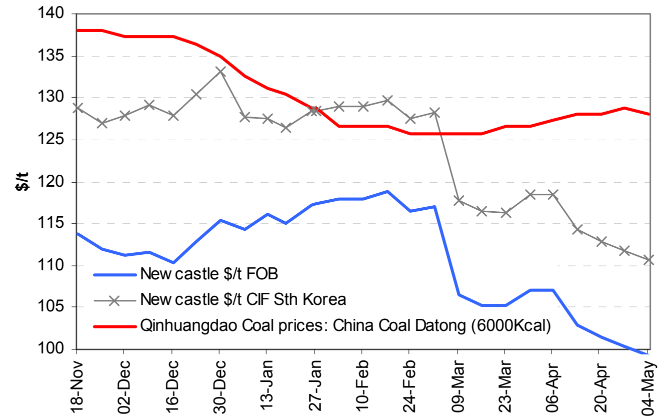



Source: Company reports, Bloomberg, Citi Investment Research and Analysis

# Thermal Coal

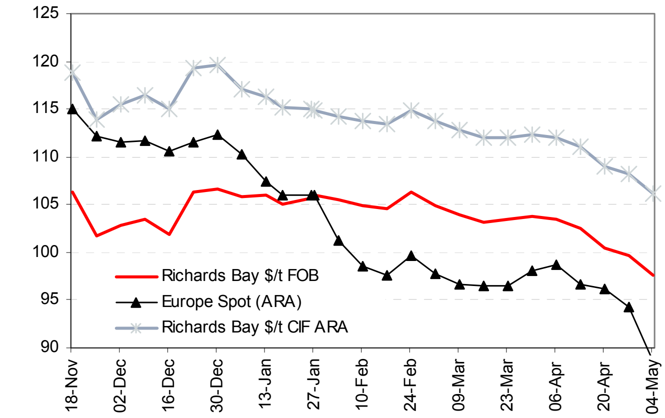
- With the dramatic fall in Newcastle thermal coal prices edged over the past couple of weeks, the arb between Newc and Chinese domestic prices has moved negative which should be supportive for imports in the short term.
- Coal inventories at Newcastle have picked up in recent weeks and now sit at a 6 month high of 10Mt as Asia continues to be bombarded by thermal coal demand from the US and Colombia.
- This weakness in European coal markets has also seen the Newc/API2 spread rebound. We continue to believe the outlook for Asian coal markets remains significantly brighter than in Europe and thus look to this recent trend continuing over the coming months.

**Figure 52. Asian Thermal Coal prices**



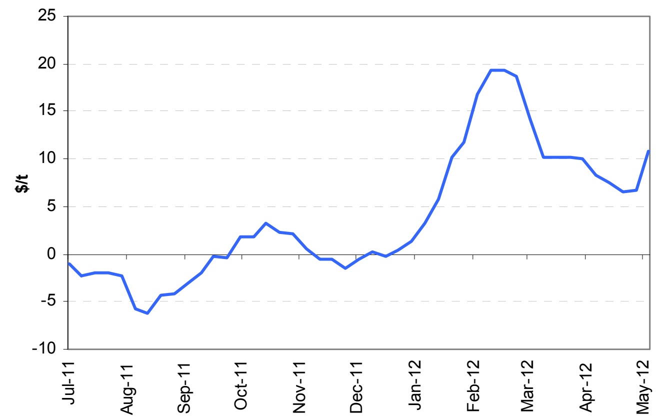

Source: Platts, Bloomberg, Citi Investment Research and Analysis

**Figure 53. European Thermal Coal prices**



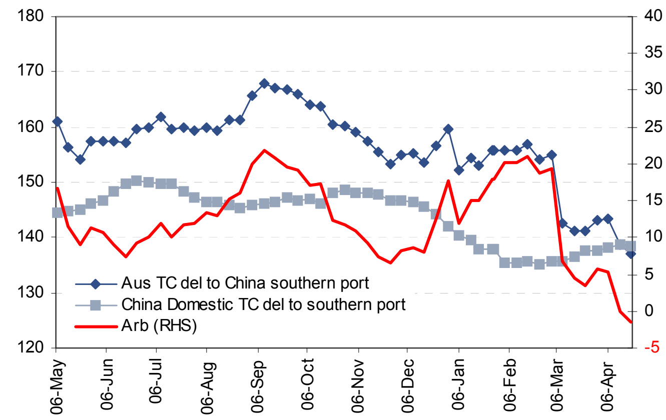

Source: Platts, Bloomberg, Citi Investment Research and Analysis

**Figure 54. Newcastle/API2 Spread**



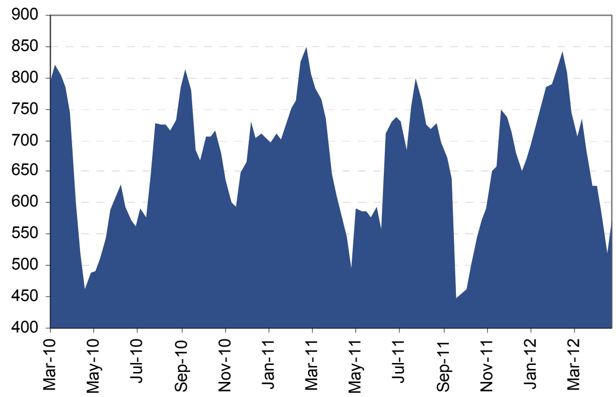

Source: Platts, Bloomberg, Citi Investment Research and Analysis

**Figure 55. Aus-China Thermal Coal Arb**



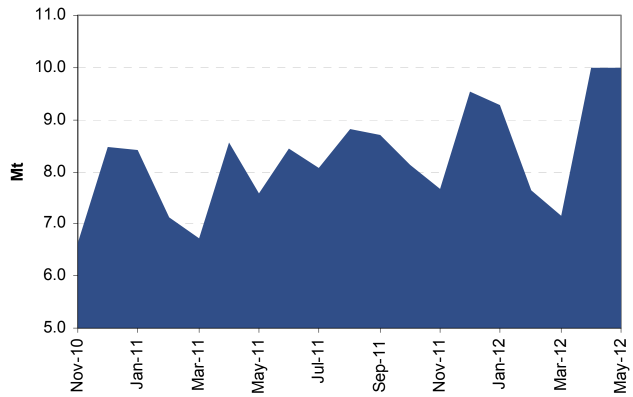

Source: SXCoal, Bloomberg, Citi Investment Research and Analysis

**Figure 56. Thermal coal inventories in Chinese ports**



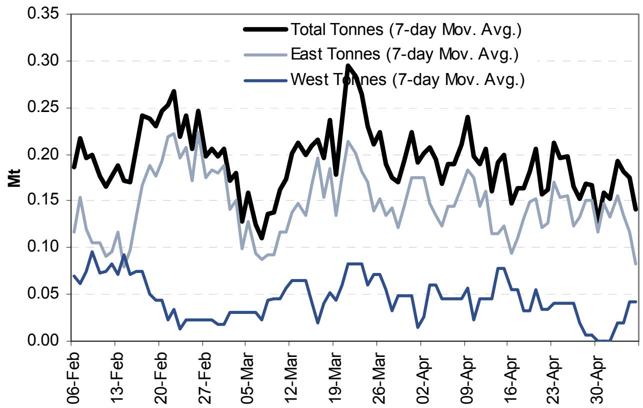

Source: Bloomberg, Citi Investment Research and Analysis

**Figure 57. Thermal coal inventories in Newcastle Port**



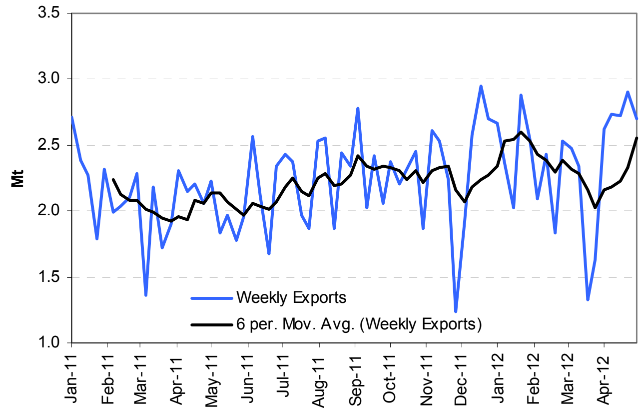

Source: Bloomberg, Citi Investment Research and Analysis

**Figure 58. Coal Exports from Richards Bay (SA)**



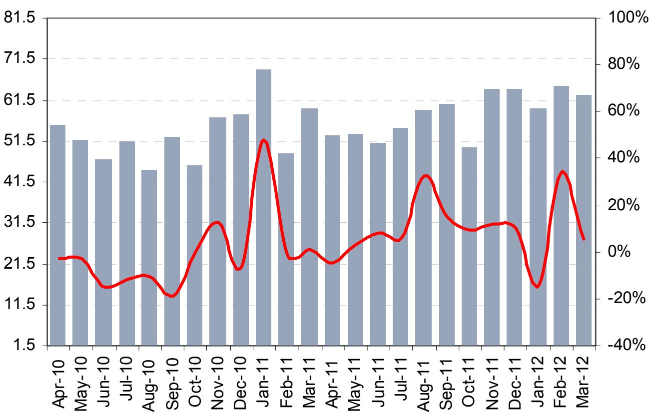

Source: Bloomberg, Citi Investment Research and Analysis

**Figure 59. Weekly Coal Exports from Newcastle (AUS)**



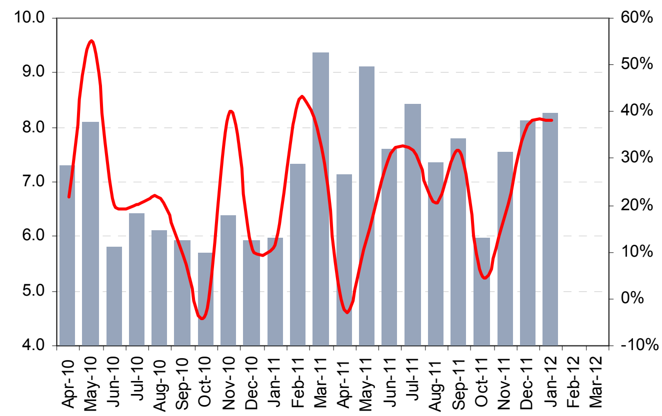

Source: Bloomberg, Citi Investment Research and Analysis

**Figure 60. China Thermal Coal Imports**




Source: China Customs, Bloomberg, Citi Investment Research and Analysis

**Figure 61. Indian Thermal Coal Imports**




Source: Tex, GTIS, China Customs, Citi Investment Research and Analysis

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