Manganese and ferrochrome: falling prices, rising costs – what next?

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Manganese and ferrochrome: falling prices, rising costs – what next?

- Mn ore and FeCr prices are falling, disappointing expectations – why?

- What is the outlook for Mn ore and FeCr demand? What about supply?

- What are the costs of Mn ore and FeCr production today? What is the outlook?

- Who are the lowest and highest cost producers today? How will this change?

- Can investors expect future price rises? What does the outlook mean for margins?
Mn ore and FeCr prices underperform other bulks and base metals; iron ore – steel price contrast important

Bulk commodities and base metals prices

Source: CRU, LME, Platts, SBB, Macquarie Research, May 2011. Note: indices calculated based on month average prices
Mn ore prices fall as import demand declines in China, fail to rally as crude steel output rebounds in Q1 2011

Source: CISA, CRU, GTIS, worldsteel, Macquarie Research, May 2011
Chinese Mn ore port stocks build up steeply, reflecting current supply side pressure on prices

Source: IMnI, Macquarie Research, May 2011
Despite reported drop in output by major producers of Mn ore in Q1 2011

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<tbody>
<tr>
<td><strong>BHP Billiton</strong></td>
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<tr>
<td>- S. Africa</td>
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<tr>
<td>- Australia</td>
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<tr>
<td>Wessels, Mamatwan</td>
<td>781</td>
<td>514</td>
<td>1,599</td>
<td>3,343</td>
<td></td>
</tr>
<tr>
<td>Groote Eylandt</td>
<td>929</td>
<td>838</td>
<td>2,327</td>
<td>4,039</td>
<td></td>
</tr>
<tr>
<td>Sub Total</td>
<td>1,710</td>
<td>1,352</td>
<td>3,926</td>
<td>7,382</td>
<td>79.1%</td>
</tr>
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<td><strong>AUMANG</strong></td>
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<td>- S. Africa</td>
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<td>- (Sales quant.)</td>
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<tr>
<td>Nchwaning</td>
<td>e 770</td>
<td>e 653</td>
<td>1,990</td>
<td>2,852</td>
<td>84.8%</td>
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<tr>
<td><strong>Vale</strong></td>
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<tr>
<td>- Brazil</td>
<td></td>
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<td></td>
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<tr>
<td>Azul (Para)</td>
<td>356</td>
<td>417</td>
<td>1,382</td>
<td>1,550</td>
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<tr>
<td>Urucum (Mate Grosso)</td>
<td>41</td>
<td>52</td>
<td>169</td>
<td>184</td>
<td></td>
</tr>
<tr>
<td>Others (Minas Gerais)</td>
<td>-</td>
<td>29</td>
<td>105</td>
<td>106</td>
<td></td>
</tr>
<tr>
<td>Sub Total</td>
<td>397</td>
<td>498</td>
<td>1,656</td>
<td>1,840</td>
<td>125.4%</td>
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<tr>
<td><strong>Comilog (Eramet)</strong></td>
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<td>- Gabon</td>
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<tr>
<td>Moanda</td>
<td>755</td>
<td>797</td>
<td>1,992</td>
<td>3,201</td>
<td>105.5%</td>
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<tr>
<td><strong>OM Holdings</strong></td>
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<tr>
<td>- Australia</td>
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<tr>
<td>Boets Creek</td>
<td>175</td>
<td>182</td>
<td>648</td>
<td>831</td>
<td>104.1%</td>
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<tr>
<td><strong>ENRC</strong></td>
<td></td>
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<td></td>
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<tr>
<td>- Kazakhstan</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td>e 4,025</td>
<td>e 3,554</td>
<td>11,116</td>
<td>17,102</td>
<td>90.8%</td>
</tr>
</tbody>
</table>

However, Chinese Mn ore import data show strong rise in arrivals from most major producer countries

![Chinese Mn ore imports - key suppliers](chart)

Source: GTIS, Macquarie Research, May 2011. Note: new entrants are Indonesia, Malaysia, Myanmar, Namibia, Vietnam
Strong long-term outlook for steel demand through Chinese urbanisation; construction is main end use

- Raising China to Japanese levels of urbanisation will involve ~300 million people
- This number is equal to almost the entire population of the USA today
- China has urbanised ~300 million people in the last 20 years

Population and urbanisation levels

Source: NBS, World Bank, UN, Macquarie Research, May 2011
Global crude steel production is forecast to increase substantially in the coming years, driven by China.

And Mn intensity in steelmaking has been increasing, although we think this trend will now moderate.
China’s Mn ore supply switch – 70% imports today; 70% domestic ten years ago

Source: GTIS, SBB, Macquarie Research, May 2011
There has been a substantial shift in the mix of world Mn ore supplies; points to future direction

Source: IMnI, SBB, Macquarie Research, May 2011
Macquarie’s Mn ore market balance – surplus in 2011, moving into balance from 2012

Global Mn ore market balance

Global Mn ore market balance ('000 tonnes)

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>14,990</td>
<td>15,900</td>
<td>16,600</td>
<td>17,800</td>
<td>18,600</td>
<td>19,350</td>
</tr>
<tr>
<td>Consumption</td>
<td>15,105</td>
<td>15,600</td>
<td>16,700</td>
<td>17,700</td>
<td>18,550</td>
<td>19,350</td>
</tr>
<tr>
<td>Balance</td>
<td>-115</td>
<td>300</td>
<td>-100</td>
<td>100</td>
<td>50</td>
<td>0</td>
</tr>
</tbody>
</table>

Mn ore prices forecast to rise from dip in 2011, but not repeating price spike of late 2000s

Source: CRU, Macquarie Research, May 2011
Spot FeCr prices have been falling for three months; drop in rand terms leaves prices down year-on-year.

Source: SBB, Macquarie Research, May 2011. Note: Spot prices, 58%-60% Cr, 6%-8% C.
Strong rebound in stainless steel output from recession; largest swing seen for at least 40 years

Global stainless steel production

Source: AISI, Eurofer, IBS, ISSF, KOSA, TSIIA, Macquarie Research, May 2011
FeCr demand recovers to reach new record in 2010. China now accounts for over 40% of world demand.

Global FeCr consumption

Source: CRU, ICDA, Macquarie Research, May 2011
FeCr responds robustly to rising in demand in 2010 – global output up by over one-third, S.Africa by over half

- S.Africa’s HC FeCr production increased by 55% YoY to new record of ~3.6m tonnes in 2010. Some producers reported to be pricing aggressively in China in 2H 2010, increasing discounts on sales into Europe

- China’s output increased by one quarter in 2010 to new record of over 1.8m tonnes. Output has doubled in only five years

- Indian output also up by one quarter to new record of ~900,000 tonnes in 2010

- Kazakh output up more modest 14% YoY but still sets new record of ~1.2m tonnes

- 2.4m tonnes gain in global output equal to S.Africa’s entire production in 2009

Source: CRU, ICDA, Macquarie Research, May 2011
Global stainless steel output is forecast to rise by 33% 2010-2015, driven by China
China’s FeCr import trend has been flat but imports of chrome ore are on a rising trend; expected to continue.

Source: GTIS, Macquarie Research, May 2011. Note: all data are gross weight.
China is expected to lead expansion of FeCr output over next five years

Forecast expansions of HC FeCr production 2010-2015

Source: Macquarie Research, May 2011. Note: data are forecasts
Macquarie’s FeCr market balance – market in surplus over next two-to-three years

Global FeCr market balance

<table>
<thead>
<tr>
<th>Year</th>
<th>Production ('000 tonnes)</th>
<th>Consumption ('000 tonnes)</th>
<th>Balance ('000 tonnes)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>8,540</td>
<td>8,514</td>
<td>26</td>
</tr>
<tr>
<td>2011</td>
<td>9,470</td>
<td>9,348</td>
<td>122</td>
</tr>
<tr>
<td>2012</td>
<td>9,954</td>
<td>9,770</td>
<td>184</td>
</tr>
<tr>
<td>2013</td>
<td>10,341</td>
<td>10,242</td>
<td>99</td>
</tr>
<tr>
<td>2014</td>
<td>10,799</td>
<td>-39</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>11,420</td>
<td>-14</td>
<td></td>
</tr>
</tbody>
</table>

Source: Macquarie Research, May 2011. Note: 2011-2015 data are forecasts
FeCr prices are forecast to increase in 2011, remaining high by historic standards in future.

Average Mn ore cash production costs rise 50% from 2006-11; mining and inland transport are key drivers

Source: SBB, Macquarie Research, May 2011
2011 Mn ore industry cash cost curve

Source: SBB, Macquarie Research, May 2011
Mn ore costs: summary of key developments

- Average Mn ore cash costs increase from ~US$2.50/dmtu to ~US$3.70/dmtu over past five years on a CIF China basis

- Industry cost curve has a steep tail while major the high-volume producers – BHP Billiton, Assmang, Vale, Eramet – are all low-cost

- Highest cost supply at US$5.00-5.50/dmtu CIF China – smaller Australian mines and new producers in the Kalahari. Cost position for S.Africans will increasingly depend on percentage of shipments that need to be trucked from the Kalahari to port

- Emerging low-grade producers in Asia (Myanmar, Indonesia, Malaysia) are believed to be low-cost at sub-US$3/dmtu CIF China due to their proximity to China plus frugal operations. There is little sustaining capex and this is not a tenable cost position if such supplies are to be significantly expanded

Source: SBB, Macquarie Research, May 2011
Average FeCr cash production costs double from 2006-11; raw materials and power are key drivers
2011 FeCr industry cash cost curve

FeCr industry cost curve

Source: SBB, Macquarie Research, May 2011. Note: data are for HC and charge FeCr
FeCr costs: summary of key developments

- Average FeCr ex-works production costs up from ~40¢/lb to ~85¢/lb over last five years

- Significant loss of competitiveness for S.Africa. There is little difference now between costs of S.Africans and non-integrated Chinese and Indian FeCr producers

- Highest cost supply needs 100-110¢/lb FOB (non-integrated Chinese, Indians and S.Africans). This represents ~30% of global production

- Power tariffs in South Africa will continue to rise at ~25% pa for next few years and will cause further significant deterioration in competitiveness

- Kazakh production is now very well established as by far the lowest cost suppliers; well placed to expand at very competitive cost

Source: SBB, Macquarie Research, May 2011
Mn ore market outlook: summary

- Mn ore price currently under pressure from strong supply, high stocks. However, production – trade data contrasts suggest supply side pressure may soon ease, although steel output also likely to dip short term.

- Don’t doubt demand – outlook for Mn ore demand is positive, in our view, driven steel consumption in ongoing urbanisation and industrialisation of China. However, Mn intensity in steelmaking may not rise much further.

- New mine output will be needed, which will depend on higher prices to incentivise investment. S.Africa probably has a key role to play but currently infrastructure constrained.

- However, China’s Mn-rich slag supplies and the way its steelmakers use.

Source: Macquarie Research, May 2011
FeCr market outlook: summary

➤ Don’t doubt demand – outlook for FeCr demand is positive, in our view, driven by ongoing urbanisation and industrialisation of China

➤ China is expected to pursue imports of raw materials from overseas and to increase alloy production at home

➤ New output will be needed. The most competitive producers are expected to contribute most to increasing production

➤ Sufficient capacity to maintain market surplus in short-to-medium term, putting prices under some pressure; risk of supply-side shake out in South Africa

➤ If this happens, prospects for stronger prices in the medium term

Source: Macquarie Research, May 2011
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**Recommendation definitions**

**Macquarie - Australia/New Zealand**
- **Outperform** – return >5% in excess of benchmark return (>2.5% in excess for listed property trusts)
- **Neutral** – return within 5% of benchmark return (within 2.5% for listed property trusts)
- **Underperform** – return >5% below benchmark return (>2.5% below for listed property trusts)

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

**Macquarie First South - South Africa**
- **Outperform** – return >10% in excess of benchmark return
- **Neutral** – return within 10% of benchmark return
- **Underperform** – return >10% below benchmark return

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

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

**Recommendation** – 12 months

**Note**: Quant recommendations may differ from Fundamental Analyst recommendations

**Volatility index definition**
This is calculated from the volatility of historic price movements.

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

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

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

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

**Low** – stock should be expected to move up or down at least 15-25% in a year.

*Applicable to Australian/NZ stocks only

**Financial definitions**
All "Adjusted" data items have had the following adjustments made:

**Added back**: goodwill amortisation, provision for catastrophe reserves, IFRS derivatives & hedging, IFRS impairments & IFRS interest expense

**Excluded**: non recurring items, asset revals, property revals, appraisal value uplift, preference dividends & minority interests

**EPS** = adjusted net profit / equivalent fully paid ordinary weighted average number of shares

**ROA** = adjusted ebit / average total assets

**ROA Banks/Insurance** = adjusted net profit /average total assets

**ROE** = adjusted net profit / average shareholders funds

**Gross cashflow** = adjusted net profit + depreciation

*Applicable to Australian/NZ stocks only

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

**Recommendation proportions** – For quarter ending 31 March 2010

<table>
<thead>
<tr>
<th></th>
<th>AU/NZ</th>
<th>Asia</th>
<th>RSA</th>
<th>USA</th>
<th>CA</th>
<th>EUR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outperform</td>
<td>50.55%</td>
<td>62.20%</td>
<td>42.25%</td>
<td>42.39%</td>
<td>62.16%</td>
<td>46.74%</td>
</tr>
<tr>
<td>Neutral</td>
<td>36.63%</td>
<td>19.02%</td>
<td>47.89%</td>
<td>50.35%</td>
<td>31.89%</td>
<td>34.78%</td>
</tr>
<tr>
<td>Underperform</td>
<td>12.82%</td>
<td>18.78%</td>
<td>9.86%</td>
<td>7.27%</td>
<td>5.95%</td>
<td>18.48%</td>
</tr>
</tbody>
</table>

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