Metal Bulletin Manganese Ore Index
Methodology and Results

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Metal Bulletin Index

- **What is an Index?**
  A statistical measure to provide a robust price for the physical market taking into account chemistries and geographical specifications

- **How is it created?**
  A tonnage weighted calculation of actual transactions which are normalised on chemistry, origin and delivery port to a single reference point.
Demand for a Manganese ore Index
Index Requirements

1. Liquidity (volume)

2. Competition in both sides (producers and consumers)

3. Comparable Prices
1. **Survey of key players of the Mn Ore market**

   We have spent significant time in consultation with all sides of the market.

2. **Statistical independent analysis of Mn ore market**

   Using Internet search engines.
Why Manganese Indices?

People who looked for Mn also looked for:

- manganese ore india: 100
- price manganese ore: 65
- manganese price: 65
- manganese ore limited: 35
- manganese ore prices: 30
- manganese prices: 30
- manganese ore ltd: 30
- manganese ore ipo: 25
- manganese mining: 25
- manganese mines: 20

Google Trends related terms that includes price word or similar:

- Manganese ore: 4
- chrome ore: 3
- iron ore: 2
- Lead ore: 1
- bauxite: 0

Google Trends for: price / ore
Indices details
The New Weekly Indices

- 44% Mn Ore CIF Tianjin, China
- 38% Mn Ore FOB Port Elizabeth, South Africa

Weekly publications of tonnage weighted calculation of actual transactions which are normalised on chemistry, origin and port to a single reference point.
Why these two Indices?

World production (Mt)

- High Grade (>44% Mn) 33%
- Mid Grade (>30% and <44% Mn) 30%
- Low Grade (<30% Mn) 37%

Internal Chinese consumption

Traded material

Source: IMnI
## Index Specifications

<table>
<thead>
<tr>
<th></th>
<th>MBMnOI44</th>
<th>MBMnOI38</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manganese content</td>
<td>Base 44%, Range 42% to 48%</td>
<td>Base 38%, Range 37% to 39%</td>
</tr>
<tr>
<td>Iron content</td>
<td>Base 5%, Maximum 16%</td>
<td>Base 5%, Maximum 16%</td>
</tr>
<tr>
<td>Silica content</td>
<td>Base 4%, Maximum 12%</td>
<td>Base 6%, Maximum 12%</td>
</tr>
<tr>
<td>Phosphorous content</td>
<td>Base 0.10%, Maximum 0.16%</td>
<td>Base 0.04%, Maximum 0.16%</td>
</tr>
<tr>
<td>Alumina content</td>
<td>Base 6%, Maximum 12%</td>
<td>Base 1%, Maximum 8%</td>
</tr>
<tr>
<td>Moisture content</td>
<td>Base 4%, Maximum 12%</td>
<td>Base 4%, Maximum 12%</td>
</tr>
<tr>
<td>Delivery Port</td>
<td>Tianjin (China)</td>
<td>Port Elizabeth (South Africa)</td>
</tr>
<tr>
<td>Unit measure</td>
<td>US$ per dry metric tonne unit, CIF China</td>
<td>US$ per dry metric tonne unit, fob Port Elizabeth, South Africa</td>
</tr>
<tr>
<td>Granularity</td>
<td>5.5mm - 75mm</td>
<td>5.5mm - 75mm</td>
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<tr>
<td>Form</td>
<td>Lumps</td>
<td>Lumps</td>
</tr>
<tr>
<td>Publication</td>
<td>Weekly</td>
<td>Weekly</td>
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<td>Trade Size</td>
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<tr>
<td>Payment method</td>
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<td>Cash or equivalent</td>
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<tr>
<td>Delivery window</td>
<td>9 weeks</td>
<td>Loading within 6 weeks</td>
</tr>
</tbody>
</table>
Methodological Model
The model

Metal Bulletin Mn Ore Index

Data collected from wide range of participants: with option of NDA

Phone

Email

Data Collection Model

Normalisation procedure
Prices normalized based on Mn content, origin, and freight rates

Producers

Consumers

Traders

Preliminary MB Mn Ore Index Figure

A preliminary index figure is calculated from the three sub-indices. Each sub-index is volume weighted.

Three preliminary subindices are calculated to balance market.

Mn Ore Index

The final index is the non-weighted average of the three subindices.

Metal Bulletin Price book

Metal Bulletin Magazine

Bloomberg

Freight rates

Metal Bulletin's Calculated Coefficients

Mn content

Materials from different origins exhibit different prices at the Chinese market regardless of Mn content and freight. As a result, different origins have unique normalisation coefficients.

Australia

Brazil

Gabon

South Africa

Other...

Outliers lying more than 4% away from the mean price are excluded and the index recalculated once more.

Manganese content has a very significant effect on prices.
Data Collection

- Designed to maximise the number of data points used in the Index calculation
- The index is based on actual transactions
3 different price inputs:

- **Chinese CIF US$**
- **Chinese FOT RMB**
  - Exclude Loading and unloading costs.
  - Exclude VAT
  - Exchange Rate RMB / US
  - **Chinese CIF US$**

- **South African FOB US$**

**44% Mn Ore Index**
- Tianjin, China

**38% Mn Ore Index**
- Port Elizabeth, South Africa

Exclude Loading and unloading costs.
Exclude VAT
Exchange Rate RMB / US

Freight rate SA to China

Exchange Rate RMB / US

44% Mn Ore Index
- Tianjin, China

38% Mn Ore Index
- Port Elizabeth, South Africa

Exclude VAT
Exchange Rate RMB / US

Freight rate SA to China

Exchange Rate RMB / US
Control methods:

Two independent control methods:

1. Continue experts review of the coefficients (Loading and unloading costs) and methodology

2. Statistical revaluation and checking
Normalisation is critical

- No other data provider has access to the MB normalisation curves
Freight rates adjustment

We apply two freight rates adjustments for the most common vessels in the Manganese market:

1. The Supramax South Africa to Tianjin freight rate
2. The Supramax freight rates to different cities in China

1. The Supramax South Africa to Tianjin for FOT and CIF inputs to convert them to FOB prices.

2. As all qualifying deals (not only CIF Tianjin but also Lianyungang, Zhanjiang ...) are included in the calculation of the index, an adjustment for the freight is necessary for the spread. Metal Bulletin researches and publishes every Monday the relevant freight spreads, calculated in US$/metric tonne.
Value in use

- The content of Mn is a key factor for the final price of the ore. Using the historical data for Mn content and price, a linear relationship can be constructed. MB utilises recent historical data to calculate the value-in-use applied by the market for Mn content. The normalisation coefficients are updated every week using last quarter data.
The central line is the median, the end of the boxes are the 25th and 75th percentiles and the ends of the whiskers are 5th and 95th percentile.
Preliminary calculation of Index

- Three sub-indices are created to balance the market based on a tonnage weighted calculation of actual transaction data supplied by Producers/Consumers/Traders, which are then equally weighted. This ensures that all sides are equally represented and prevent any bias between the different market participant groups, which may occur due to the timing of data reporting etc.
Final Calculation of Index

- The Three sub-indices are recalculated without excluded data points.
  - Again equal weighting (33.3%) for each sub-index

- Only the final index is published
Indices  Results
Figures so far: Final Indices

Index 38% FOB South Africa
Index 44% CIF Tianjin

+ 12%
+ 19%
Why recent pattern?

China’s manganese ore imports jump in March

Chinese manganese ore imports significantly increased in March, as traders actively imported the raw material after prices climbed in the beginning of the year.

Manganese ore and concentrate imports stood at 1.39 million tonnes last month, 40.2% higher than March 2012, China’s customs showed.

“The cargoes that arrived in March were booked in late January and February. Prices at that time were high, so traders bought actively,” an importer from Shanghai said.

Some cargoes from February were also delayed because of the Chinese New Year break, added the importer.

The imports were up 48.4% month-on-month.

In mid-January and February, prices of manganese ore rose on tight availability of lump ores in the spot market.

Metal Bulletin’s Index of 38% manganese ore, for Port Elizabeth rose nearly 5% from mid-January to $4.45 per mtu on March 1.

Metal Bulletin’s Index for 44% manganese ore, for Shanghai also gained 3% to $6.69 per mtu during the period.

“I think imports in April will drop as Chinese spot prices have declined after so many cargoes arrived. Overseas miners’ offers are still holding,” an analyst from Shanghai said.

In March, South Africa was the biggest exporter, selling 464,492 tonnes in the month, 146.4% higher than last year.

The exports from the country were up 140% month-on-month.

Australia was the second biggest exporter for the month, responsible for 411,092 tonnes of the material, 5.9% higher month-on-month, and 22.8% higher year-on-year.
Data mining
Figures so far: observations

**Observations per week**

Observations per country

- **South Africa**
  - Observations: 50%
  - 2010 actual % Imports to China: 30%

- **Australia**
  - Observations: 40%
  - 2010 actual % Imports to China: 30%

- **Brazil**
  - Observations: 20%
  - 2010 actual % Imports to China: 10%

- **Gabon**
  - Observations: 10%
  - 2010 actual % Imports to China: 10%

Source: IMnI
Three possible explanations:

- Better normalisations
- Higher consensus on the recent market trend.
- MB Mn Indices are providing information to the market.
Herfindahl–Hirschman Index

Figures so far: concentration of data

• A HHI index below 0.01 (or 100) indicates a highly competitive market.
• A HHI index below 0.15 (or 1,500) indicates an unconcentrated market.
• A HHI index between 0.15 to 0.25 (or 1,500 to 2,500) indicates moderate concentration.
• A HHI index above 0.25 (above 2,500) indicates high concentration.

Source: Horizontal Merger Guidelines, U.S. Department of Justice and the Federal Trade Commission
Figures so far: Traders influence

$/dmtu

- Index 44% CIF Tianjin (Avg. = 5.447)
- Weighted Average of Traders (Avg. = 5.454)
Figures so far: %Mn Value-in-Use

%Mn Value-In-Use evolution

Cents / dmtu

90% confidence interval

MetalBulletin
Mn Ore Index

31/33
Thank you very much for your attention

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