Iron Ore

Resources and Energy Quarterly March 2018

Australia is the largest exporter of iron ore in the world.

- 818 million tonnes exported in 2016–17
- That's enough to build 9,700 Sydney Harbour bridges
- $63 billion exported in 2016–17

29% largest iron ore reserves in the world

Major Australian iron ore deposits (Mt)

- <229
- 230–813
- 814–1,777
- 1,778–3,042
- 3,043–5,446
- >5,447

- Deposit
- Operating mine

Australia’s iron ore key export destinations, 2016–17

- 83% China
- 8% Japan
- 6% South Korea
- 2% Taiwan
- 1% Rest of the world

Global share of iron ore exports in 2016

- 53% Australia
- 24% Brazil
- 4% South Africa
- 3% Ukraine
- 3% Canada
- 13% Rest of the world

Global share of iron ore imports in 2016

- 67% China
- 10% European Union
- 8% Japan
- 5% South Korea
- 10% Rest of the world
4.1 Summary

- Australia’s iron ore export earnings grew by 16 per cent to $63 billion in 2017, driven by high prices and growth in export volumes (which increased by 2.5 per cent to 828 million tonnes).
- Australia’s real iron ore export earnings are projected to decrease to $55 billion by 2022–23, as a result of a projected decline in prices.
- The real iron ore price is projected to decline to US$53 a tonne (FOB Australia) in 2023, as a result of falling steel production in China and a well-supplied seaborne market.
- The key uncertainty underpinning the outlook for the iron ore price is the pace and magnitude of the decline in China’s steel production, which in turn, largely depends on government policy.

4.2 Prices

Iron ore price forecast to be supported in the short-term

The iron ore price (FOB Australia) averaged US$68 a tonne in the March quarter of 2018. Price resilience earlier in the quarter gave way to a steady decline in the iron ore price in March, reflecting rising steel inventories, rising iron ore port stocks and concerns about weak demand in China. Nevertheless, positive industrial production and fixed asset investment data released in March indicates that demand will likely remain robust in the near term, and a seasonal rebound in construction activity in China’s spring months is expected to provide some price support.

China’s steel sector will continue to be characterised by ongoing capacity reductions and policies to address air pollution (see the Steel chapter). These factors are expected to provide some support to steel prices, and consequently, the iron ore price, which tracks steel prices very closely. However, weaker steel production also means weaker demand for iron ore. The two conflicting influences will likely result in some price volatility.

The iron ore price is forecast to gradually decline to average US$55 a tonne (FOB Australia) in the December quarter of 2018, reflecting ongoing growth in exports from Brazil (as Vale’s S11D project continues to ramp up).
Iron ore price projected to weaken before a modest recovery

The iron ore price is projected to decline further to US$49 a tonne (FOB Australia, in real 2018 dollars) in 2020, as a result of moderating demand and growing supply, before a modest recovery to US$53 a tonne in 2023 as supply growth softens. The projection is underpinned by the assumption that first, the price will trend towards the break-even level required by producers of the last tonnages needed to meet demand, and second, that a small (5 per cent) proportion of producers (largely in China) will be loss-making. Despite the forecast decline in price, the vast majority of Australian producers are expected to remain highly profitable, reflected in the margin curve below, due to high quality and low-cost production.

The seaborne market is forecast to be well-supplied over the outlook period with low-cost-production from Brazil and Australia. Iron ore import demand is expected to be weighed down by declining steel production in China. The main drivers of declining steel production are slowing construction activity and infrastructure investment, and increasingly stringent environmental regulations.

The discount for lower quality ores averaged 37 per cent in the March quarter of 2018, compared with 16 per cent in 2016. Higher quality iron ore improves the efficiency of steel mills, and the persistently high discount has been driven by both structural (government policy) and cyclical (high steel prices) factors. The divergence is expected to narrow as steel prices decline; however, it is unlikely to revert back to historical levels, with strong signals from the Chinese government of an increasing emphasis on efficiency and air quality.

4.3 World trade

China’s iron ore imports projected to gradually decline

China’s iron ore imports grew by 4.5 per cent to a record 1,075 million tonnes in 2017, propelled by strong growth in steel production. Australia’s iron ore exports accounted for 62 per cent of China’s iron ore imports, while Brazil accounted for 16 per cent. Despite winter production cuts, China’s imports grew by 5.2 per cent year-on-year in the first two months of the year, due to restocking demand in the lead up to Chinese New Year.

![Figure 4.3: Projected iron ore margins by mine in 2023, based on projected price of US$53 a tonne (FOB Australia, in real 2018 dollars)](chart)

Notes: Margins are based on a projected iron ore price of US$53 a tonne (FOB Australia, in real 2018 dollars); Production is in dry metric tonnes.
Source: AME Group (2018)
China’s iron ore imports are projected to decline at an average annual rate of 4.0 per cent over the outlook period, to reach 1.04 billion tonnes in 2023. The outlook for China’s iron ore import demand is driven by a projected decline in steel production (see the Steel chapter).

The effect of declining steel production on iron ore imports is expected to be partially offset by a projected decline in domestic iron ore production. China’s iron ore reserves are largely low grade, with an average iron content of around 30 per cent. There is considerable uncertainty regarding China’s iron ore production, with the authorities playing a large role in driving closures. More stringent environmental policies are expected to weigh on domestic iron ore production, which will drive an increasing preference for higher quality iron ore. Authorities revoked about a third of iron ore mining licenses in 2017, in line with the government’s stricter environmental policy. Conversely, some uneconomic mines may continue to operate, particularly those that are vertically integrated with steel mills or located inland with lower transport costs to nearby steel mills.

Growing scrap use — due to growing environmental pressure — is also expected to dampen the demand for iron ore, with every tonne of scrap steel displacing around 1.4 tonnes of iron ore. The recent winter production cuts have encouraged steel mills to use more scrap to offset the loss in pig iron (an intermediate product) production. Authorities have also been supportive of the construction of electric arc furnaces (EAFs), which uses scrap, rather than iron ore, as the main raw material input.

However, the increase in scrap use is expected to be gradual and be more of a risk towards the end of the outlook period. Steel used in construction has an average lifecycle of 40 years, so growth in scrap output will be slow. The high cost of electricity and constraints in adding new capacity will also limit the pace of growth in EAFs. In 2017, EAFs only accounted for an estimated 8 per cent of steel production in China, and large scale investments are expected over a longer (10 to 15 year) time horizon.

India projected to become a net importer of iron ore

The recent growth in India’s iron ore production is forecast to slow in 2018. The slowdown is underpinned by the cancellation of mining permits in Goa due to renewal issues (representing 20 million tonnes of predominantly low-grade iron ore, mostly exported to China) and the suspension of seven mines in Odisha for non-payment of illegal mining fines (representing another 20 million tonnes, mostly supplying the domestic steel industry). While production at other mines is expected to increase in 2018, imports of iron ore are expected to rise from a low base to meet domestic demand.

India’s iron ore production is projected to recover after 2018, underpinned by rapidly growing demand from the domestic steel industry. While India has the potential to be self-sufficient in iron ore, there are ongoing challenges in the development of new mines. These include difficulties in accessing land and capital, insufficient infrastructure to transport ore, complex regulations, community objections, and ongoing uncertainty in government policy. While government policy is expected to become more supportive to promote self-sufficiency, growth in consumption is projected to outpace production, resulting in modest import growth.

Figure 4.4: China’s iron ore imports and production

Notes: China’s iron ore production is quality adjusted.
Strong export growth forecast in the short-term, primarily from Brazil

The seaborne iron ore market is forecast to be well-supplied in the short-term, with world iron ore exports forecast to grow by 4.6 per cent and 1.2 per cent in 2018 and 2019, respectively.

Much of the export growth will be underpinned by the ramp up of Vale’s S11D project at the Carajás complex, which will bring Vale’s capacity to 400 million tonnes by 2019. Anglo American’s Minas-Rio expansion is also expected to reach full capacity of 26.5 million tonnes by 2020. Vale indicated that the Samarco mine — which has been closed since the tailings dam burst in November 2015 — could return to production by 2019 if environmental licenses can be obtained. Production is expected to gradually ramp up to a third of total capacity, resulting in an additional 9.5 million tonnes of output by 2020.

Australia is also expected to contribute to export growth, although to a lesser extent. This reflects ongoing productivity improvements across Rio Tinto and BHP’s operations, and the ramp up of new capacity.

Seaborne exports projected to be dominated by Australia and Brazil

World iron ore export growth is projected to slow to an annual average rate of 0.3 per cent from 2020 to 2023, reflecting the end of large-scale additions to capacity. Both Australia and Brazil are expected to solidify their share of global iron ore exports at the end of this period, displacing high-cost production elsewhere. Australia is projected to increase its market share from 53 per cent in 2017 to 54 per cent in 2023, and Brazil from 25 per cent in 2017 to 26 per cent in 2023.

The iron ore market is expected to continue to be dominated by the ‘Big 4’ producers, with Rio Tinto, BHP, Vale and Fortescue Metals Group (FMG) projected to account for around 72 per cent of the seaborne market. The first three companies are expected to increase production to reach their long-term targets in the first half of the outlook period. There are several large projects in Australia currently undergoing feasibility studies — Rio Tinto’s Koodaiderie, BHP’s South Flank, and FMG’s Solomon Expansion and Eliwana. These projects are intended to sustain quality, replace depleting mines, and contribute to the medium-term targets, rather than be a major source of growth.

Table 4.1: ‘Big four’ iron ore producers’ targets (million tonnes)

<table>
<thead>
<tr>
<th>Company</th>
<th>2017 production</th>
<th>2018 production guidance</th>
<th>Medium-term production target</th>
<th>Expected year target reached</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vale</td>
<td>367</td>
<td>390</td>
<td>400</td>
<td>2019</td>
</tr>
<tr>
<td>Rio Tinto</td>
<td>330</td>
<td>330–340</td>
<td>360</td>
<td>2021</td>
</tr>
<tr>
<td>BHP</td>
<td>268</td>
<td>275–280</td>
<td>290</td>
<td>2019</td>
</tr>
<tr>
<td>FMG</td>
<td>169</td>
<td>170</td>
<td>170</td>
<td>2018</td>
</tr>
</tbody>
</table>

Notes: On a 100 per cent basis; Vale is expected to reach nominal capacity of 450 million tonnes in 2020; BHP production guidance is for 2017–18; FMG guidance is for 2017–18.

Source: Company reports and presentations

4.4 Australia

Iron ore exploration expenditure decreased in the December 2017 quarter

Australia’s iron ore exploration expenditure totalled $291 million in 2017, an increase of 0.9 per cent from the previous year. Exploration expenditure was $69 million in the December 2017 quarter, a decline of 18 per cent quarter-on-quarter and 6.5 per cent year-on-year. Iron ore exploration expenditure is likely to have largely bottomed out, with ongoing investment increasingly needed to replace depleting reserves.

Australia’s iron ore export volumes continue to grow

Australia’s iron ore export volumes grew by 1.8 per cent to reach a record 218 million tonnes in the December 2017 quarter. Growth was a result of productivity improvements and the commissioning of the Silvergrass iron ore mine at Rio Tinto’s operations, as well as increased plant availability and improved rail performance at BHP’s operations.

Despite record export and production volumes, lower prices saw export earnings decrease to $15 billion in the December quarter 2017, down 7.4 per cent quarter-on-quarter and 11 per cent year-on-year.
Australia’s iron ore export earnings to be weighed down by lower prices

Australia’s iron ore export values are forecast to grow by 2.3 per cent in 2017–18 to $65 billion, driven by strong growth in export volumes (of 5.6 per cent) to 861 million tonnes. Roy Hill faced some technical difficulties in the December 2017 and March 2018 quarters, but is expected to return to its nameplate capacity of 55 million tonnes later in 2018.

Real export values are forecast to decline sharply in 2018–19 and 2019–20 and then modestly recover to reach $55 billion in 2022–23, as a result of the forecast decline and subsequent rebound in the iron ore price.

Australia’s export volumes growth is projected to slow after 2018–19, marking the end of major expansions and additions. The projections for Australia’s iron ore production assume:

- productivity improvements and replacement mines at Rio Tinto and BHP’s operations to reach their long-term production targets
- the commissioning and ramp up of some smaller projects, including Mount Gibson Iron’s Koolan Island, and
- the closure of some mines due to depletion, and the announced cessation of production at Cliff’s Koolyanobbing mine.

There are also several larger iron ore projects currently undergoing feasibility studies, which have not been included in the projections. The potential additional production represents an upside risk to the projections, but whether the projects commence operations depends on a range of factors, including market conditions and access to port and rail infrastructure.

Revisions to export earnings

The forecasts for Australia’s iron ore export earnings in 2017–18 and 2018–19 have been revised up by $5.0 billion and $6.2 billion, respectively. The revision reflects an upwards adjustment to the iron ore price in 2018. The iron ore price has held higher than expected in early 2018, and some short-term support is expected from ongoing resilience in steel prices and production in China.
<table>
<thead>
<tr>
<th>Table 4.2: World trade in iron ore</th>
<th>Million tonnes</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2017 s</td>
<td>2018 f</td>
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<tr>
<td>Total world trade</td>
<td>1,553</td>
<td>1,626</td>
</tr>
<tr>
<td><strong>Iron ore imports</strong></td>
<td></td>
<td></td>
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<tr>
<td>European Union 28</td>
<td>144</td>
<td>157</td>
</tr>
<tr>
<td>Japan</td>
<td>127</td>
<td>131</td>
</tr>
<tr>
<td>China</td>
<td>1,075</td>
<td>1,076</td>
</tr>
<tr>
<td>South Korea</td>
<td>72</td>
<td>76</td>
</tr>
<tr>
<td>India</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td><strong>Iron ore exports</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australia</td>
<td>828</td>
<td>874</td>
</tr>
<tr>
<td>Brazil</td>
<td>384</td>
<td>408</td>
</tr>
<tr>
<td>India</td>
<td>29</td>
<td>11</td>
</tr>
<tr>
<td>Ukraine</td>
<td>33</td>
<td>32</td>
</tr>
</tbody>
</table>

Notes: r Compound annual growth rate for the period from 2017 to 2023; s Estimate; f Forecast; z Projection.
Source: World Steel Association (2017); International Trade Centre (2018); Department of Industry, Innovation and Science (2018)
<table>
<thead>
<tr>
<th>World</th>
<th>Unit</th>
<th>2017</th>
<th>2018 f</th>
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<td>Prices bc</td>
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<tr>
<td>– nominal</td>
<td>Mt</td>
<td>64.3</td>
<td>61.8</td>
<td>51.1</td>
<td>51.0</td>
<td>54.1</td>
<td>56.2</td>
<td>58.4</td>
<td>-1.6</td>
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<tr>
<td>– real d</td>
<td>Mt</td>
<td>65.8</td>
<td>61.8</td>
<td>50.0</td>
<td>49.0</td>
<td>51.0</td>
<td>52.0</td>
<td>53.0</td>
<td>-3.5</td>
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<tr>
<td>Production</td>
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<td>– Steel hs</td>
<td>Mt</td>
<td>5.35</td>
<td>5.40</td>
<td>5.40</td>
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<td>5.40</td>
<td>5.40</td>
<td>5.40</td>
<td>0.2</td>
</tr>
<tr>
<td>– Iron ore</td>
<td>Mt</td>
<td>872.4</td>
<td>905.4</td>
<td>916.5</td>
<td>927.8</td>
<td>933.6</td>
<td>936.1</td>
<td>935.4</td>
<td>1.2</td>
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<tr>
<td>Exports</td>
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<td>Steel</td>
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<tr>
<td>– nominal value</td>
<td>A$m</td>
<td>875</td>
<td>753</td>
<td>701</td>
<td>701</td>
<td>701</td>
<td>701</td>
<td>701</td>
<td>-3.6</td>
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<tr>
<td>– real value hi</td>
<td>A$m</td>
<td>892</td>
<td>753</td>
<td>685</td>
<td>669</td>
<td>653</td>
<td>638</td>
<td>622</td>
<td>-5.8</td>
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<td>Iron ore</td>
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<tr>
<td>– nominal value</td>
<td>A$m</td>
<td>62,617</td>
<td>65,333</td>
<td>57,151</td>
<td>54,386</td>
<td>56,332</td>
<td>59,297</td>
<td>61,549</td>
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<tr>
<td>– real value i</td>
<td>A$m</td>
<td>63,876</td>
<td>65,333</td>
<td>55,839</td>
<td>51,917</td>
<td>52,502</td>
<td>53,936</td>
<td>54,629</td>
<td>-2.6</td>
</tr>
</tbody>
</table>

Notes: b fob Australian basis; c Spot price, 62 per cent iron content basis; d In 2018 US dollars; h Crude steel equivalent; Crude steel is defined as the first solid state of production after melting. In ABS Australian Harmonized Export Commodity Classification, crude steel equivalent includes most items from 7206 to 7307, excluding ferrous waste and scrap and ferroalloys; i In 2017–18 Australian dollars; r Compound annual growth rate for the period from 2017 to 2023, or from 2016–17 to 2022–23; f Forecast; s Estimate; z Projection.