# SPECIAL REPORT

ASPI

## Iron ore futures

Possible paths for Australia's biggest trade with China

David Uren

September 2021

ASPI
AUSTRALIAN STRATEGIC POLICY INSTITUTE

TWENTY YEARS OF ASPI STRATEGY
2001 - 2021

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# Iron ore futures

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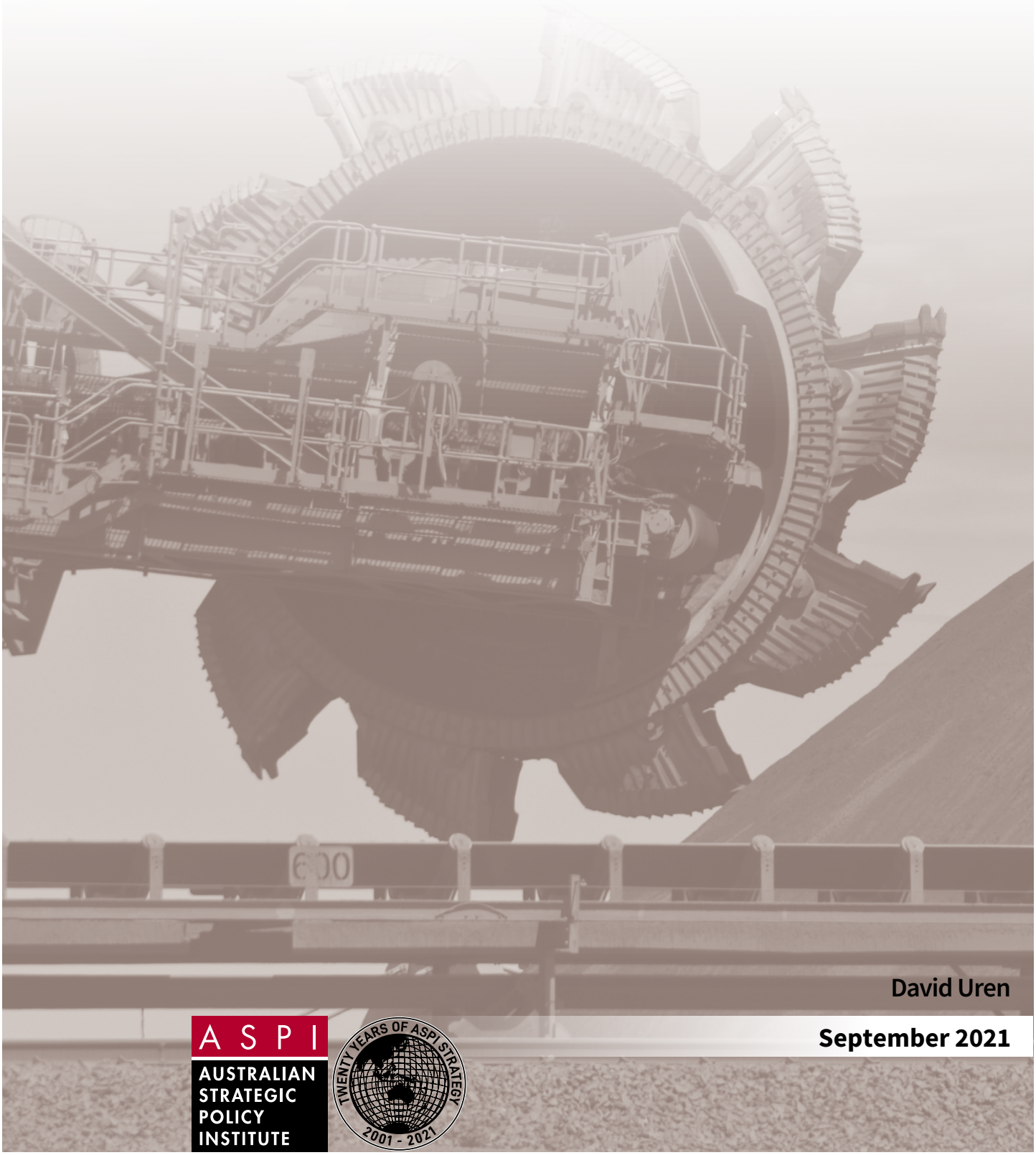

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# Executive summary

Iron ore has been at the heart of Australia's commercial relationship with China ever since the early 1980s, when Prime Minister Bob Hawke sealed a deal with China's Premier Zhao Ziyang for the joint development of Rio Tinto's Channar deposit in the Pilbara. It was modern China's first ever foreign investment.

Until very recently, it seemed like a perfect match. Australia possesses abundant high-quality iron ore reserves with relatively easy rail access to deepwater ports that are at the start of a direct sea route to China of just 7,500 kilometres.

Bulk carriers from Brazil—Australia's main competition in the Chinese iron ore market—must travel over 20,000 kilometres to reach their destination, usually taking three months to do the round trip.

Australia's big iron ore miners had the capital, the technology and the scale to keep pace with the extraordinary growth of China's steel industry over the first two decades of the 21st century. Brazil lagged far behind.

Without Australian iron ore, China's great economic advances, built on rail and highway networks stretched across the country, vast high-rise cities and the world's biggest manufacturing industry, couldn't have happened.

It's been a bonanza for Australia's iron ore miners, whose export sales reaped more than $150 billion last year, of which around 80% came from China. The benefits have flowed through to shareholders, state and federal governments and, through the impact of such profits on the exchange rate, to ordinary consumers who have gained from cheaper imports.

But, with the collapse of bilateral relations as China attempts to teach Australia (and anyone else who's watching) a lesson by imposing such economic damage on Australia that Canberra is forced to kowtow, China wants to break its continued dependence on Australian iron ore.

Its latest five-year plan sets ambitious goals for increasing China's self-sufficiency, whether through its own iron ore production, the use of scrap steel as a feedstock or its wholly owned iron ore mines overseas.

The plan spells out that 2020 should mark the peak for China's steel production, and output would decline from 2021 onwards. That's partly to reduce its dependence on Australia as a supplier and partly to meet climate objectives laid down by Chinese President Xi Jinping.

China's new bitterness about its dependence on Australia for iron ore is evident in commentary from the central economic agency—the National Development and Reform Commission (NDRC)—and in nationalist state-owned media, such as the English-language daily, the *Global Times*.

In June 2020, a *Global Times* editorial column declared:

> While there is no denying that China would face economic repercussions if it bans or restricts Australian iron ore imports, the Australian economy would definitely suffer more. It would be a big mistake for anyone to think that despite its dependence on iron ore China wouldn't cut Australian imports.[1]

The NDRC, which is guiding the search for alternative supplies, says Australia must 'bear full responsibility' for the deterioration in the bilateral relationship—a consistent narrative out of Beijing that it uses not just with Australia but with any governments or even companies whose actions don't align with its wishes.

China's authorities are unhappy both with China's dependence on Australia and with the prices its mills have had to pay for iron ore, which surpassed US$200/tonne in the first half of 2021, before diving in August and September. The China Iron and Steel Association believes excessive dependence on Australia, combined with a contentious spot pricing system, amounts to a market failure.

But can China succeed in curbing its dependence on Australian iron ore? If it can, would iron ore join the long list of lesser Australian exports subject to Chinese coercion?

By contrast, if it fails and its dependence on Australia continues, would the Australian Government be able to respond with some economic coercion of its own, as former resources minister Senator Matt Canavan has suggested? He has proposed the imposition of a levy on iron ore sales to China to compensate for losses from Chinese barriers to other exports.

In a recent report on supply-chain vulnerability, the Productivity Commission argues that the mutual dependence of both Australia and China on the iron ore trade reduces the geopolitical tension:

> Both Australia and China are vulnerable to disruptions in the iron ore market. It is equally a situation that lessens the risk of geopolitically-inspired disruptions, as the two economies have a vested interest in the efficient functioning of the market for iron ore.[2]

However, geopolitical tension may prove to be a greater force than vested interests in market efficiency.

It isn't easy for China to break its dependence on Australian iron ore. China's domestic iron ore grades are declining; Australia's major competitor, Brazil, has had chronic production problems; and Africa's vast reserves of high-quality iron ore have never been exploited at scale because of the high political and development risk.

China's latest five-year plan for its steel industry sets targets for raising the share of iron ore provided by Chinese-owned mines both domestically and overseas and for raising the share of China's steel made using scrap steel as a feedstock.

The major iron ore miners and China's authorities both assume that the unprecedented boom in China's steel production is over. China's share of global steel output rose from 12% to an astonishing 57% in little more than 15 years, but its production is believed to be close to, or already at, its peak. China's authorities are pushing for the closure of inefficient and polluting plant, but the dispersed, fragmented nature of the Chinese steel industry and its contribution to local economic and development aspirations has complicated Beijing's control before.

Demand for iron ore will be shaped in part by the politics of climate change. The steel industry is the source of 8% of global emissions and 17% of China's carbon emissions. In the short term, the pressure to control emissions will favour high-quality iron ore such as Australia produces as a feedstock for blast furnaces but, in the medium and longer terms, there will be shifts away from traditional blast-furnace technology.

The iron ore market has consistently wrong-footed commodity forecasters. Few in the early 2000s predicted the magnitude of the growth in China's steel production over the following decade. A downturn in demand from China's steel mills in 2014 and 2015 took markets by surprise, as has the surge in steel production in the wake of the pandemic.

It is possible that the failure of the Chinese property group, Evergrande, represents another unforeseen development with far-reaching consequences for the Chinese real estate market which is the biggest single user of steel and hence iron ore. The Evergrande financial implosion bears similarities to the US sub-prime crisis with the accumulation of property-related bad debts and losses having the potential to spark a loss of confidence in the financial system

This report canvasses several possible futures, based on a central, a high and a low forecast, for the iron ore trade between Australia and China and explores their implications for relations between the two countries:

- **Central forecast**: China's demand stabilises at its current level, and India's demand grows, as does South Korea's. The use of scrap as a feedstock instead of iron ore increases around the world. Demographic growth and urbanisation continue. There's only modest growth in Australia's production, Brazil's production recovers, but other sources of supply to global markets weaken. African production occurs in the late 2020s but only meets overall growth in demand. Prices drop back to $US50–$70/tonne, which would still be as much as double the production costs for either major Australian or Brazilian producers. This is broadly the view of both the Department of Industry and BHP.[3]
- **High forecast**: China's demand keeps rising as investment continues to lead growth. Central government efforts to curtail steel production fail, as they have over the past decade. Brazil fails to recover output, and Africa remains difficult. The supply of scrap remains inadequate. New Australian projects only replace depletions. Prices rise towards US$300/tonne.
- **Low forecast**: Iron ore switches from shortage to surplus as China's demand drops, whether because of the switch from investment to consumption, as suggested by official plans, or because of an economic downturn that the authorities prove unable to arrest. The use of scrap rises. African production comes on stream, and Brazil's output rises. The surplus ore could be significant—several hundred million tonnes a year. Australian ore remains the lowest cost, but the price drops back to US$20–30/tonne, jeopardising higher cost operations and potentially exposing Australian iron ore miners to Chinese coercion.

Suggestions that the Australian Government should exploit the market power currently held by Australia's miners to retaliate against Chinese economic coercion are misplaced.

The Whitlam government's imposition of a minimum iron ore export price in the 1970s led Japan to finance the development of Brazil's iron ore industry as an alternative supplier to the Asian market.

The geopolitical tensions in Australia's relationship with China, which weren't present in our dealings with Japan in the 1970s, would make Chinese authorities even more determined to obtain alternative supplies and to punish Australia.

This report argues that China is already paying dearly for its hostility towards Australia. Given the deterioration in the relationship, mining company boards are reluctant to sanction any significant new investment for servicing the Chinese market. That has contributed to the iron ore shortage this year, which has resulted in China paying prices of as much as 10 times the production costs for the major Australian miners.

Australia remains the cheapest, closest and most reliable source of high-quality iron ore for China. China's development of alternatives for political or security reasons comes at a significant cost.

As a commodity-exporting nation, Australia's national interest is in the mediation of a free market to settle prices and to channel our goods to their customers. Australia has a corresponding interest in the rules administered by the World Trade Organization (WTO) to ensure that markets are run fairly.

It's striking that soaring iron ore prices have been managed by the market this year without adding to geopolitical tension, as occurred in 2009–10 when prices were settled by bilateral negotiation that included representatives of the Chinese state.

While WTO rules are being flouted by China in its campaign of discriminatory barriers to other Australian exports, they remain our best and only defence. Although the WTO's processing of disputes can drag on for years, there's precedent for China complying with adverse rulings: notably, it dismantled export controls and duties on rare earths in 2015 after the WTO ruled them illegal.

In the event that an iron ore glut emerges over coming years, Australian miners could be susceptible to the same kind of discriminatory action that China has taken against Australian coal.

Australia could make it more difficult for China to take such a step by taking action now against China over its ban on Australian coal. This was canvassed by Prime Minister Scott Morrison late last year, but there's been no follow-up as yet. Australia is already taking action against China in the WTO for Beijing's tariffs on barley and wine, while China has countered with complaints to the WTO about Australian dumping duties levied on several Chinese manufactured products.

While Australia must choose its fights, there's a strong case for the government to advance a complaint on coal: it doesn't involve a formal tariff but is pure discrimination against a single supplier nation. Importantly, success before the WTO in a case over coal could act as a precedent for any similar discrimination against Australian iron ore.

# Australia's place in China's steel revolution

Iron ore has been the most crucial commodity input to the transformation of the Chinese economy over the past 20 years. Steel is the 'skeleton' of the modern economy. It's from steel that infrastructure, buildings and industrial plant are constructed. It's the essential supply for a vast range of China's manufactured goods.

Steel is also a strategic metal of critical importance to naval shipbuilding and military hardware more generally, giving it a national security standing.

China has built an extraordinary steel industry, and its share of global production rose from 12% in 2000 to 57% by 2020. China's steel output is 10 times that of next-ranked India and 30 times larger than the production of Germany's famed steel industry.

China's steel industry grew by an average of about 7% a year through the 1980s and 1990s, but then production took off, rising through the first decade of the 2000s at an average annual rate of almost 20% as the nation rolled out continental rail and highway networks and constructed dozens of high-rise cities. Annual growth in China's steel production in some years was equivalent to Japan's total production.

Although China has been seen as a disruptive force in global steel markets, about 94% of its raw steel output is directed to domestic Chinese users. In 2020, its net steel exports were only 13 million tonnes (from exports of 51 million tonnes and imports of 38 million tonnes, both of which figures are tiny in the context of 1.1 billion tonnes of production).[4]

The Chinese leadership's mantra, from Mao Zedong onwards, had been self-reliance. China is rich in resources and it was largely self-sufficient in most crucial supplies until very recently. It didn't start importing oil in any quantity until 1997. Imported iron ore didn't account for more than about 15% of its needs until the mid-1990s, and that share had climbed to only 24% by 2000.

By 2020, China was sourcing 88% of the iron ore needed by its steel industry from the global seaborne market. China's demand accounted for two-thirds of the global iron ore trade.

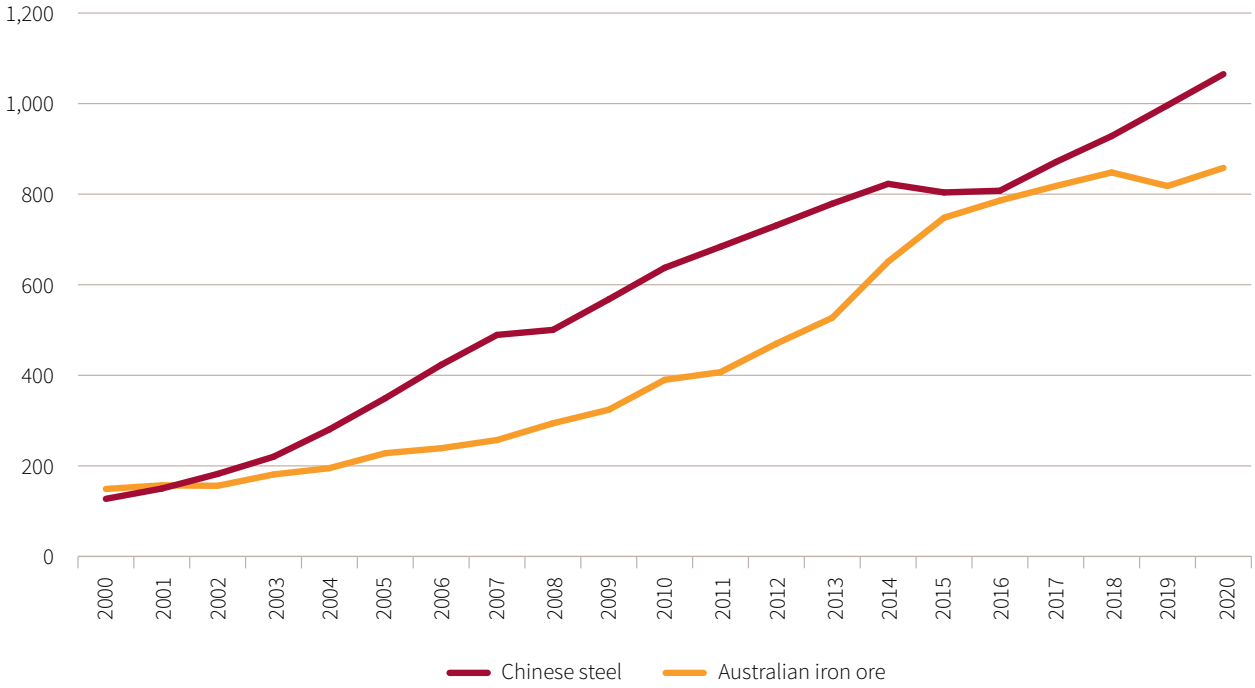
So the past two decades have been a steel- rather than oil-intensive burst of growth. China isn't nearly such a dominant force in the oil market. It accounts for 24% of seaborne oil trade and is still around 40% self-sufficient.

The ability of Australia's iron ore mines to keep pace with the meteoric rise in China's demand for steel over the past 15 years has been made possible by the high quality of our iron ore reserves and by mining companies mounting the greatest earthmoving operation that the world has ever seen.

About 900 million tonnes of ore are now being taken annually, mostly from the Pilbara, and loaded onto giant carriers for shipment to Asia, where China takes the lion's share.

That volume has doubled in the past 10 years and quadrupled in the past 20 in response to mining companies ploughing over $90 billion into high-tech plant operating at a scale unimagined at the beginning of the century (Figure 1 and Table 1). That's the product of the 'mining investment boom' that peaked in 2012–13 and brought historic shifts in the place of Australia's economy in the world, making us the pre-eminent supplier of minerals.[5]

**Figure 1: Australian iron ore and China steel production (million tonnes)**




Source: *World Steel* Association and *Resources and Energy Quarterly*.

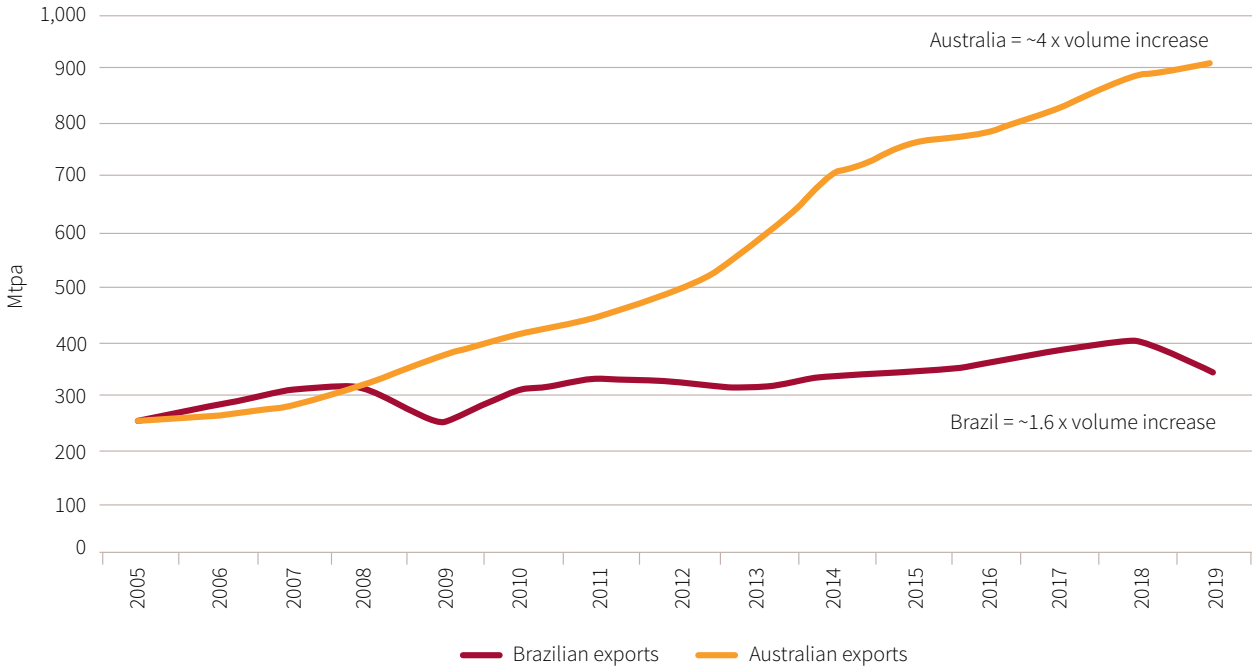
Table 1: Top ten iron ore producers, 2019

| Company | Country | Production (M/t) | % world total |
|---|---|---|---|
| Vale | Brazil | 302.4 | 12.9 |
| Rio Tinto | Australia | 281.2 | 12.0 |
| BHP | Australia | 272.0 | 11.6 |
| Fortescue | Australia | 182.8 | 7.8 |
| Hancock | Australia | 79.1 | 3.4 |
| Anglo American | UK | 65.5 | 2.8 |
| Acelor | UK/India | 57.1 | 2.4 |
| NMDC | India | 45.3 | 1.9 |
| Metalloinvest | Russia | 40.2 | 1.7 |
| CSN | Brazil | 32.1 | 1.4 |
| Top 10 | | 1,357.7 | 57.9 |
| World total | | 2,346.4 | 100 |

Source: *World Steel Association*.

At the beginning of the China steel boom, Brazil was a marginally larger supplier to the global seaborne iron ore market than Australia, but it has managed to lift production by only 60% over the past two decades. Competing against Australia's freight advantage, Brazil now accounts for only 20% of China's imports (Figure 2).

**Figure 2: Australia vs Brazilian iron ore exports, 2005 to 2019 (millions wet metric tonnes)**




mtpa = million tonnes per annum
Source: Minerals Council, 'Best in class: Australian iron ore', 8, online.

Despite the deterioration of its relationship with Australia, China has been unable to materially reduce its dependence on Australian iron ore. It has instead been forced to pay prices that both the China Iron and Steel Association (CISA) and Beijing's key economic agencies believe are excessive.

Ultimately, the reason for high prices is because the steel mills can't get enough low-cost supplies and have had to draw on high-cost local supplies. In any commodity market, the price for all suppliers is determined by the highest cost marginal supplier.

The peak body for the Chinese steel industry (and particularly the large state-owned mills) doesn't accept that it's a freely competitive market and is calling for state intervention. 'We believe that the supply side is highly concentrated and the market mechanism is not working, so we call for the authorities to play a bigger role in the event of market failure,' CISA vice president Luo Tiejun told a recent conference.[6]

The major mining companies enjoy good relations with their Chinese steel mill customers. Both Rio Tinto and BHP have established partnerships with their Chinese steel customers to explore technologies for reducing greenhouse emissions. At the risk of being seen to be putting self-interest ahead of the national interest, the chairman of Fortescue Metals, Andrew Forrest, has been forthright in calling on the Australian Government to improve its relationship with China. Chinese state-owned steel mill, Hunan Valin—based in Mao Zedong's home town of Xiangtan in Hunan Province—has a 9% stake in Fortescue and two representatives on its board.

However much it may be in the interests of both suppliers and customers to continue their business as usual, both sides face risk in a relationship shaped by China's diplomatic freeze and economic coercion.

# The fraught history of iron ore price negotiations

At this point, it's useful to review the history of Australian iron ore price negotiations.[7]

Japan encouraged the development of Australia's iron ore export industry in the 1960s, providing long-term contracts against which mining companies could secure financing.

The long-term contracts were subject to annual pricing reviews negotiated between Japan's mills, operating as an effective cartel, and the Australian-based miners.

The Menzies government regarded the first contract negotiations as inequitable, offering Australian miners 20% less than Japan was paying for supplies from Asia, Africa and America.

Its Department of National Development sought to impose a price floor below which no Australian producer would be allowed to sell. It rejected the 1966 negotiated iron ore price, leading Japanese buyers to boycott contract negotiations and threatening to shift purchases to Peru, Angola and India.

Australian mines were still under development and Japan's threat was credible, so Australia was forced to back down.

The Whitlam government, elected in 1972, again implemented a price floor, requiring annual ministerial approval for export permits, which would be given only if the 'full world market price' was offered.

Japan again threatened a boycott, but Australia was by then providing 36% of Japan's iron ore and also had other markets. Japan buckled, agreeing to a 120% price hike, but resolved to support the development of a rival iron ore industry in Brazil, financing the development of huge deposits in the Amazon. Brazil had never previously serviced Asian markets. Japan was also worried about the security of its Australian supplies because of extensive industrial disruption in the Australian mines and ports.

When Japanese buyers forced a 10.8% price cut in 1983, the new Hawke government threatened to intervene if it happened again, saying that Japan had funded unnecessary investment in Brazilian capacity. However, the potential for Japan's mills to switch from Australia to Brazil meant Australia was forced to accept a further 9.8% price cut in 1984.

China overtook Japan as the leading global steel-maker in 2000. Its mills were buying seaborne iron ore using the same long-term contracts as the Japanese and accepting the same prices as those negotiated with Japan.

By 2004, as China's steel output surged, responsibility for setting the annual iron ore price benchmark passed to China, and negotiations were conducted between Rio Tinto, BHP, Brazil's Vale and the major Chinese miners. Seaborne iron ore production couldn't keep up with the growth in Chinese demand, and the miners were able to exact large price increases.

China's initial response was to boost its ownership of mines and prospects around the world, arguing that ownership of mines would enable it to weaken the price control of the 'big three': BHP, Rio Tinto and Vale.

Chinese authorities were alarmed when BHP made a takeover bid for Rio Tinto in 2007. They sought to disrupt it by supporting a share-raid on Rio by the state-owned Chinalco, which swept up a 9% stake for US$14 billion without seeking the required Australian Foreign Investment Review Board approval.

The 2007–08 global financial crisis meant that the BHP takeover didn't proceed, although there were contested endeavours for Rio to form joint ventures, first with Chinalco and then, when Foreign Investment Review Board opposition became obvious, with BHP.

The price negotiations became increasingly hostile. At one stage, China's Premier Wen Jiabao made a plea for the Australian and Chinese governments to devise a new pricing mechanism that would preserve 'a fair, open and reasonable market order'.[8] The Australian Government declined.

When the global financial crisis hit, several of the major Chinese steel mills realised that spot prices, which were used by smaller mills, were delivering lower prices than their long-term contracts. There were defaults, as some mills switched their purchases to the spot market.

When markets recovered in the wake of China's stimulus, Rio Tinto started selling some of its output on spot markets, leading the Chinese to cry foul.

In 2009, CISA demanded that the iron ore price be linked to the steel price, which would result in an 82% price cut. The big three miners responded with a call for the spot market to be used instead.

With negotiations at a standstill, CISA attempted to force a boycott of the big three miners; however, smaller mills started doing deals to secure their access to supplies and the boycott collapsed.

Relations reached a nadir in the wake of the 2009 contract negotiations when the Chinese arrested the entire Rio Tinto negotiating team on the capital charge of stealing state secrets, as well as bribery. The charges were later downgraded, but four Rio employees, including an Australian citizen, Stern Hu, were sentenced to lengthy terms of imprisonment.

The miners refused to send negotiating teams to China in 2010, agreeing instead to negotiate in the neutral territory of Singapore. On the day after the Rio negotiators were sentenced, the benchmark system for settling iron ore prices collapsed. The miners sealed deals with the major Chinese mills to settle prices quarterly on the basis of the spot prices over the preceding three months. The miners would be paid for the price of iron ore landed in China, which forced Brazil's Vale to discount the cost of freight. The arrangement favoured the miners, as prices doubled in the first three months, and also underpinned investment in production capacity.

# A clash of economic ideologies

While China's 'socialism with Chinese characteristics' avows a respect for market disciplines, its dominant economic ideology has been mercantilism, which may be roughly defined as a belief that economic might measured by the accumulation of surpluses is the bedrock of national power and that the state's paramount duty is to build economic strength in partnership with the private sector.

Beijing's mercantilism also comes with the notion that state power comes from 'seizing the commanding heights' of the world economy, and its pattern of economic coercion against numerous countries and companies shows how it uses that power.[9]

Mercantilism was the driving force of the European powers from the 16th to the 18th centuries until it was supplanted by the liberal idea of Adam Smith that the 'invisible hand' of the market, in which everyone pursues their own self-interest, would lead to the fairest distribution of resources and the greatest prosperity for all.

Economic liberals argue that the state has a role in ensuring markets operate transparently in accordance with accepted rules but has no role in determining their outcomes. Economic liberalism was the driving force behind the era of globalisation from the 1980s until the 2007–08 financial crisis.

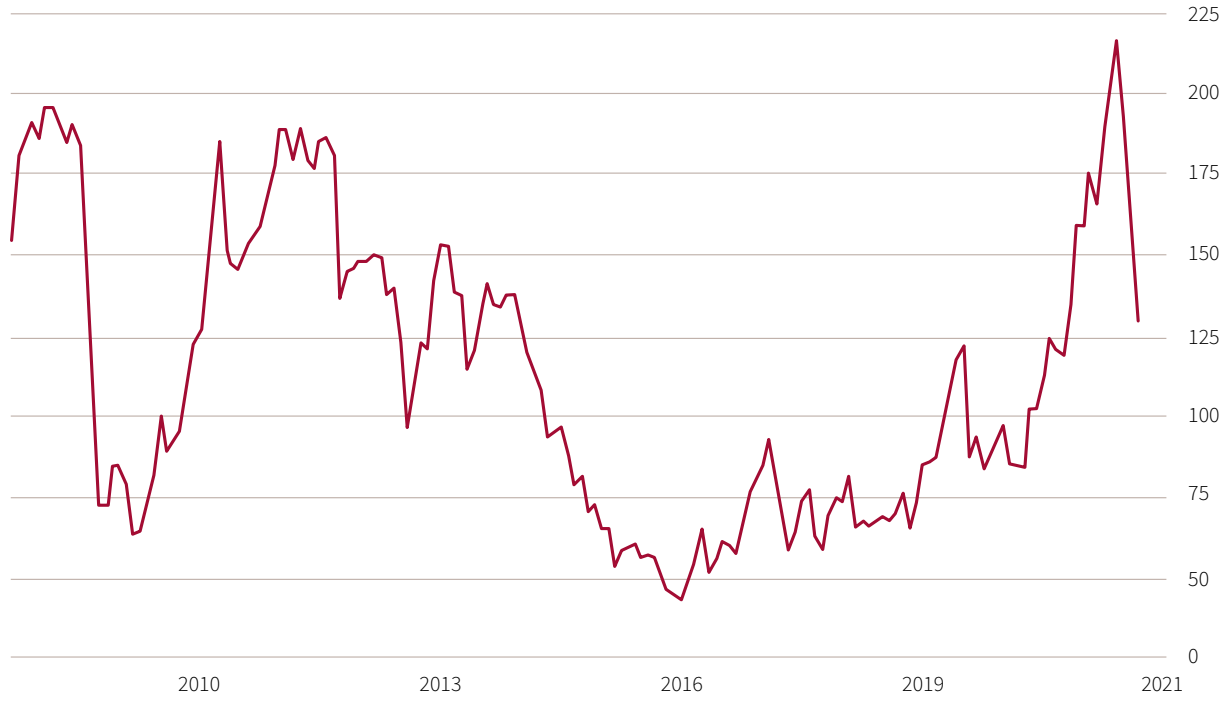
In 2006, Australia used its chairmanship of the G20 finance ministers' forum to attempt to persuade Beijing of the merits of using the market to secure China's supply of resources. The then Treasury Deputy Secretary, Martin Parkinson, argued that viewing the supply of resources as a strategic issue would result in 'policy prescriptions that focus on rushing to lock in available energy and mineral resources'. He said the uneven geographical distribution of mineral and energy resources meant that some consuming nations would inevitably face trade dependency.[10]

In 2010, in a triumph for economic liberalism, BHP persuaded China's largest steel mill, BaoSteel, to shift the basis of pricing in the iron ore market from long-term contracts decided in hard-fought negotiations in which the Chinese state saw itself as a party to shorter term contracts based on prices in China's spot market.

For the past decade, the iron ore market has been an example of the free market at work in the midst of a state-led economy. Both the steel mills and the miners have been able to secure their trade beyond the vagaries of daily shifts in the spot price through the Dalian Commodities Exchange in northeast China, which turns over iron ore futures contracts worth about US$1.8 trillion/year. Iron ore options have also been introduced, and there's a large, Shanghai-based industry of financial brokers mediating the trade.

The use of China's spot market index as the basis for iron ore markets has enabled successive price spikes and falls (Figure 3) to be managed between buyers and sellers without any intervention of the state and without adding to political tensions between Australia and China. This is in sharp contrast to 2009, when China arrested Rio Tinto's entire negotiating team.

**Figure 3: Iron ore prices, 2007 to 2021 (US$/tonne)**




Source: *Trading Economics*, online.

And yet the classic insecurities about dependence on the market to deliver reliable supplies remain. In a study of China's mercantilist approach to energy markets, US academics Jennifer Lind and Daryl Press say that China's insecurity about resource supplies arises when there are fears of suppliers colluding, when supplies are geographically concentrated, when there are doubts about the force of contracts and when there's geopolitical instability.[11]

In the case of iron ore, China is concerned about the geographical concentration of its supplies in Australia and holds fears about suppliers colluding.

Although the iron ore market doesn't have the geopolitical instability of the Middle Eastern oil market, the ascendence of Australia's security concerns in the bilateral relationship and Beijing's increasingly contested relationship with the US mean that China has lost the comfort it once held about sourcing more than 60% of its iron ore from a principal US ally.

China's insecurity about its dependence on Australia for iron ore is similar in nature to the US administration's concern about its dependence on China for supplies of rare earths, although the scale and significance of the iron ore trade to China is many times greater. Of course, China's concerns are more hypothetical, as Australia hasn't used Chinese dependence as a weapon, in contrast to Chinese behaviour vis-a-vis 'non-essential' imports from Australia.

The system of market settlement doesn't leave China insecure about the force of contracts, as Lind and Press argue is the case in the oil market. However, the rise of iron ore prices above US$200/tonne earlier this year led to claims in China that the spot market was no longer reflecting fundamental forces of supply and demand, but was being driven by speculation and a supplier oligopoly.

Steel and other metal industry executives were summonsed in May 2021 by the central economic planning agency, the National Development and Reform Commission (NDRC), to a meeting with all the key economic regulatory agencies to be warned that the government was watching for any signs of market manipulation and that 'excessive speculation, price gouging and other violations' would be severely punished.[12]

The NDRC sent teams out to all the steelmaking provinces to investigate the nature of futures transactions and announced that the iron ore market was under close monitoring.

According to CISA, there aren't enough US-dollar-based transactions to provide a stable index. 'The current [dollar-based] spot sales volume is too low to achieve fair and just prices, which is not conducive to the long-term stability and healthy development of the industrial chain,' the organisation's chief economist, Wang Yingsheng, told a recent conference.[13] The implication is that a yuan-based index, which tracked China's domestic iron ore sales, would provide a lower price; however, it's unlikely that either Australian or Brazilian suppliers would agree to settle on those terms.

There's some basis for the Chinese perception that Australian-based suppliers wield market power. In 2010, BHP and Rio Tinto were forced to abandon a planned joint venture to combine their iron ore production operations while retaining separate marketing after encountering opposition from competition authorities in Europe, Japan and Australia. The opposition from European Union and German regulators was striking because very little iron ore from Australia was sold in those jurisdictions, but the concerns were that the two producers would have an incentive to coordinate and delay capacity expansions to push the world price higher.[14]

Since then, Fortescue Metals and Hancock Prospecting have become significant competitors to BHP and Rio; however, there remains a concern in China that the two largest companies have the ability to restrain supply and raise prices. Some share-market analysts share that view, arguing that majors could engage in gamesmanship to push prices higher by indicating to the market that their production will grow by more than their capital investment will in fact deliver, thereby creating unmet expectations of supply . Both BHP and Rio Tinto would argue that their lack of commitment to major expansion reflects their view that the market for iron ore has peaked.

A study of economic power in the iron ore market by four academics from China's Central South University in Changsha and published in the peer-reviewed *Resources Policy* journal concluded that Australia and Brazil both exercise power in the Chinese iron ore market.[15]

The study found that, over the decade from 2006 to 2016, Australian miners had enjoyed a market profit equivalent to 33.4% of the export price, which was more than double the level enjoyed by Brazil. The study established that Australia had pricing power and that demand showed little response to changes in supply. Australia's pricing power increased dramatically after the switch from long-term contracts to spot-market pricing in 2010. Australia's market power has been rising, while Brazil's has been weakening. The study concluded:

> The international iron ore trade is a monopolistic market for sellers. China, as a price taker, has a high degree of external dependence and faces many challenges. To reduce the dependence on some specific countries with the continuous high market power, it is necessary to expand the sources of iron ore imports and improve the import structure of the Chinese iron ore market.

The study treated Australia as a monolithic supplier, whereas in practice each company pursues its own economic logic. The margins that Australian producers achieve are partly attributable to the innovation they have displayed in mining technology and logistics as well as to the size and quality of their deposits; however China's perception that Australian producers are extracting extraordinary rents contributes to its response.

China's draft five-year plan for its steel industry, released in January this year, sets ambitious targets for increasing self-sufficiency in feedstock, curbing production growth, improving environmental performance and strengthening central government control.

The previous plan, covering 2016 to 2020, set a target for reducing excess capacity by between 100 million and 150 million tonnes but didn't have the same focus on either self-sufficiency or environmental improvement. While the authorities claim success in meeting the excess capacity targets, the count may have included capacity that was already mothballed. In line with widespread market forecasts at the time, the plan predicted that both Chinese production and consumption would decline, while global production would remain steady.[16]

The emphasis of the latest plan—consistent with China's mercantilist philosophy—is on increasing the share of iron ore obtained from sources that China controls, whether that's scrap steel, domestic iron ore mines or offshore mines in which China has an equity position.

The target is to lift the share of 'controlled' production from 30% to 45% by 2025. That includes an increase in the share of direct equity-held offshore production to rise from 8% to 20%, while domestic production should provide the balance. At least two substantial new iron ore mines overseas should be commissioned by 2025. According to the plan, that may include the development of a Chinese-owned project in Australia as well as African production. The administration is encouraging an expansion of domestic Chinese exploration and production.

The share of steel production produced by electric arc furnaces should rise from 10% to between 15% and 20% by 2025, while the share of feedstock provided by scrap steel should rise from 22% to 30%.

The plan calls for steel production to be capped at 2020 levels. Steel companies won't be allowed to offset the closure of inefficient mills with a matching amount of new production capacity and will be barred from relocating production from inland to the coast.

The central government has struggled to exercise control over the hundreds of smaller provincial steel mills. The plan calls for the consolidation of the industry and for the share of production held by the top 10 producers to rise from 36.6% in 2020 to 60% by 2025.

# The perils of forecasting

The great surge in China's steel production since 2004 is so far outside the historical experience of any commodity market that it's been hard for anyone to develop forecasts that will stand the test of time.

Through the 1990s, China's steel production had been rising by a steady 6–9 million tonnes/year, but, in 2001, it leapt by 23 million tonnes, and then by 30 million tonnes in 2002 and 40 million tonnes the year after that until there was a 75 million tonne jump in 2005. The mining companies were slow to react, as their hopes for Japanese growth had gone unfulfilled in the 1990s—a decade that ended with the Asian financial crisis and then the 2000–01 global recession.

But, by 2006, the resources companies were putting enormous capital into expanding production to supply the Chinese market. Expectations that the global financial crisis would temper demand from China's steel sector proved incorrect, as Chinese authorities responded with a massive expansion of credit and infrastructure programs. Having spent decades languishing at less than US$20/tonne, in 2011 iron ore prices reached hitherto unimaginable heights of US$190/tonne.

However, a Chinese credit squeeze that hit in 2014 just as huge expansion projects in Australia were coming on stream sent prices plunging, dropping at one stage below US$40/tonne. The miners switched their attention from investing in growth to cutting costs.

There was a widespread view that China's steel production was approaching its peak. There's a well-established pattern among emerging economies in which steel use accelerates rapidly during a period of industrialisation but then stabilises or declines. China's steel consumption had gone from 125 kilograms per capita in 2001 to 540 kilograms by 2013 , which put it slightly ahead of Germany and Japan and a long way ahead of the US, which had consumption of 300 kilograms of steel products per person. China's steel consumption fell during the credit squeeze.

Prominent economist Ross Garnaut, who has deep experience of both China and the resources industry, wrote in 2015 that slowing Chinese economic growth would have a disproportionate effect on steel.[17] Less capital investment would be needed to support a lower growth rate, and that would 'inexorably' mean less demand for steel. Chinese steel production would fall from a bit above 800 million tonnes to 600 million tonnes over the next 15 years. Falling demand would collide with a 'tsunami' of new supply from Australia and Brazil, he said.

Garnaut's prediction aligned with many others and was consistent with official Chinese policy, which was demanding cutbacks in what was seen as excess steel production capacity. In early 2016, Australia's Department of Industry forecast that China's iron ore imports wouldn't change over the next five years, while total iron ore exports from Australia and Brazil would rise by almost 200 million tonnes, with exports from other countries falling by a similar amount.

China's 13th five-year plan for the steel industry, released in 2015, forecast that China's steel consumption would fall over the 2016 to 2020 period.

However, over the following five years, China's steel output rose by 33%, and its total production exceeded 1 billion tonnes in 2020. Iron ore supply from Australia and Brazil rose by little more than 50 million tonnes over the five years as Brazil's Vale confronted two catastrophic tailings dam collapses. The result has been the surge of prices seen in the first half of 2021 as China is forced to exploit its high-cost domestic production.

While China's authorities claimed success in meeting their goal of shutting between 100 million and 150 million tonnes of steelmaking capacity, analysts suggested that much of it had already been mothballed, while new capacity was installed across the country.

Some of the forecast failures reflect factors beyond prediction, such as the collapse of Brazilian tailings dams, a Chinese credit squeeze and a pandemic, but the core problem over the past 20 years, and one that remains, is the difficulty in estimating growth in China's steel production (Table 2).

Table 2: Iron ore forecasts versus outcomes (million tonnes)

| Imports | March 2016 forecast for 2021 | March 2021 forecast for 2021 | Error % |
|---|---|---|---|
| EU | 129 | 97 | –24.8 |
| Japan | 136 | 112 | –17.6 |
| China | 1,019 | 1,268 | 24.4 |
| South Korea | 76 | 76 | 0.0 |
| India | 46 | 5 | –89.1 |
| Total | 1,406 | 1,558 | 10.8 |
| Production | | | |
| Australia | 926 | 897 | –3.1 |
| Brazil | 503 | 396 | –21.3 |
| India | 0 | 22 | |
| Ukraine | 43 | 40 | –7.0 |
| Total | 1,472 | 1,355 | –7.9 |
| World trade | 1,596 | 1,686 | 5.6 |

Source: *Resources and Energy Quarterly*.

While China's latest steel plan calls for production to be capped at 1 billion tonnes/year, implying a small reduction from 2020, output in the first six months of the year grew 12% to 563 million tonnes so achieving the target was going to require real cuts in production in the second half of the year. The ructions in the property market flowing from the Evergrande debt crisis may deliver those cuts without further official intervention.

Chinese Government efforts to cut steel production reflect a drive to reduce both particulate air pollution and greenhouse gas emissions (the steel industry is responsible for 46% of industrial emissions and 17% of China's total greenhouse gas emissions).

However, central government edicts from Beijing can be frustrated by provincial authorities, many of which own their local mills, while the steel mills are responding to broader demand. For example, a recent official push to increase shipbuilding will require additional steel, and the mills will respond. Orders to curb production push steel prices higher, increasing the incentive to produce in defiance of those orders.

Over the next decade, there are several possible futures for China's steel industry and the iron ore market. China's steel industry could continue defying the official cap on production to scale new heights or it may again encounter a fall as the economy softens, such as was experienced in 2014–15. Supply could rise strongly if Brazil overcomes its production problems and if China is successful in gaining fresh production in Africa. However, Brazil's struggles may continue, and the establishment of a robust iron ore industry in Africa may remain a pipedream, as it has been for the past 40 years.

Australian iron ore will remain a central supplier for China's steel mills in any scenario, but where the power and the profit lie will be shaped by the path that's taken.

# A central outlook

To the extent that there's a consensus on the medium-term outlook, it holds that China's steel production is close to, if not already, at a peak and will enter a long slow decline from around 2025–26 onwards. China's use of steel will continue rising. BHP estimates that the accumulated stock of steel in use in China is 7–8 tonnes per person and expects that to rise at least to the level of use in the US, where it's 15 tonnes per person (use in Germany, Japan and South Korea is higher than in the US). However, that can be achieved without an increase in the annual run rate from China's mills.

Urbanisation has been one of the big demand drivers of China's steel industry, as the proportion of the population living in cities has risen from 30% to 60% over the past 25 years. The UN Population Division's estimates suggest that this will continue, approaching 80% over the next 25 years;[18] however, the slower pace of urbanisation can be met from the current installed steel capacity.

There may be some short-term recovery in steel production in advanced nations, where output has been at recession levels, but that's unlikely to be sustained. The rest of Asia, and to a lesser extent Latin America, will have the largest expansions in global steel capacity and hence iron ore demand.

India, which is the second largest steel producer after China, is expected to see the biggest increase in production over the next decade. Its official steel plan calls for output to rise from 110 million tonnes in 2020 to 300 million tonnes by 2031. That target might not be met, but India should at least double its capacity over the next decade.

There will also be significant growth in Southeast Asia. Chinese steel companies are driving much of the investment in Southeast Asia as they look for ways around the limits on additional production in their home market. The Chinese have planned steel mills in the Philippines, Malaysia and Indonesia, while Vietnam's steel production is rising rapidly. The South East Asia Iron and Steel Institute estimates that, if all the planned Chinese investment in the region were completed, that would lift capacity by 62 million tonnes to 150 million tonnes/year, putting the region ahead of the European Union.[19]

Globally, the rise in non-Chinese steel production in the developing world should be sufficient to more than offset the tapering of China's steel industry, adding another 150 million tonnes to annual steel output over the next five years and perhaps the same again over the remainder of the 2020s.

The supply of iron ore is likely to remain tight for the next year or two, but beyond about 2023 Brazil should be lifting its production. There are doubts about whether Brazil will get back to the 400 million tonnes/year run rate that was expected when the giant new S11 mine started up in 2016, as some of the less efficient mine capacity in southern Brazil approaches exhaustion.

A central forecast also envisages some lift in Australian production. A series of large new mines have been approved or are coming into production, including BHP's South Flank, Rio Tinto's Gudai-Darri and Fortescue's Eliwana and Iron Bridge projects, which between them add about 180 million tonnes to Australia's capacity, although two-thirds of that's intended to offset the declining production and closure of existing mines.

China's domestic production has been declining as low-grade mines are exhausted, but renewed investment in exploration and development is expected to bring an increase over coming years. There are about 50 iron ore projects underway in China. Although the grades of Chinese iron ore are low and require a high-emissions process of sintering before they can be used in blast furnaces, many deposits are close to mills. They have the potential to raise China's domestic production by 50% or 100 million tonnes of concentrate.[20] In the longer term, there's potential for Chinese exploration in Xinjiang and further afield in Siberia and Kazakhstan to reveal major ore bodies.

Africa is also likely to add to iron ore production over the next decade, although it may be only towards the end of the decade that the giant Simandou project in Guinea starts producing, assuming it gets a final go-ahead. Simandou, which would add 200 million tonnes to global output when fully operational, has been on the drawing board for the better part of 25 years. Final investment decisions have been deterred by the political difficulty of dealing with unstable government and the engineering challenge of mining a mountain top at 1,600 metres, shipping ore 650 kilometres through difficult terrain to the coast, where a 15-kilometre jetty over extensive mudflats would be needed. The most difficult aspect of the project is the Guinean Government's demand that the rail link must run through major population zones of central Guinea and service passengers, general freight and the country's bauxite operations. That was an election promise by the recently deposed government of President Alpha Condé. Trying to hammer out a shared user agreement to enable the shipment of 2 million tonnes of iron ore every week across the same infrastructure ferrying commuters from one station to the next will be extraordinarily difficult. The project is divided into two joint ventures, one of which is entirely Chinese and the other divided between a Chinese company and Rio Tinto. Because it will make sense to share infrastructure, a joint decision will be required. The stance of the new military government towards the project isn't known, but open Chinese criticism of the coup indicates Beijing's concern.

A range of smaller projects could add between 5 million and 20 million tonnes each in African countries such as Liberia, the Republic of the Congo, Ghana, Algeria, Sierra Leone and South Africa. Chinese companies are very active, and in 2021 the Australian firm Sundance Resources was stripped of its rights in the Republic of the Congo, which were then handed to a Chinese firm. These projects could add more than 50 million tonnes a year over the next five years and more beyond that.

A key issue in the outlook is the response of the steel industry to climate change. The industry is responsible for around 7% of greenhouse gas emissions globally. In China, it generates closer to 17% of total emissions and almost half of industrial emissions.

Globally, several new technologies are being explored: using hydrogen in place of coal, using electrolysis (as used to smelt aluminium) rather than heat, and carbon capture and storage. However, on a central forecast, they will make only minor, if any, inroads into established production in the next decade. Instead, the focus will be on high-quality iron ore, improving efficiencies in existing blast furnaces and increasing the share of steel produced with electric arc furnaces using mainly scrap as a raw material.

Electric arc furnaces account for only 10% of China's steel production, compared with 68% in the US and 56% in India (where much of the local iron ore is unsuitable for blast furnaces). China has set a target to raise the share produced by electric arc furnaces to 15%–20% by 2025, but there's considerable inertia in the installed blast furnace infrastructure. BHP notes that a blast furnace typically has a 50-year life span and that the average age of China's blast furnaces is only 12 years. China also wants to increase the use of scrap as a feed for its blast furnaces from around 10% to 30%. At present, China doesn't have that volume of scrap. Although it recently removed a prohibition on scrap imports, there isn't the global availability to achieve a shift of that scale. BHP estimates that it will take until 2050 before China can raise the proportion of steel produced with scrap to 20%.

There will be increased use of scrap and electric arc furnace technology, but under a central forecast that wouldn't displace more than 50 million tonnes/year of iron ore in China's market over the next decade. Any push to lower emissions from the existing steel mills will favour high-quality imported ore from Australia and Brazil over lower quality domestic Chinese product.

# Central outlook: market implications

The iron ore price has tumbled since its US$237 peak reached in May. On a central forecast, which assumes steady growth in the Chinese economy, the price would recover from its current volatility and potentially hold at levels above US$100/tonne for the next two or three years and then decline to US$55–75 by 2025, drifting towards the lower end of that range over a decade.

BHP says that, in the long term, the iron ore price will fall to a level of the higher cost mines in Australia or Brazil and that this would still be the case if West African production comes on stream.[21] This would imply that Chinese mines would have their losses subsidised to retain some level of domestic production. The major mine operators in Australia and Brazil would still be profitable because of the scale economies they have achieved.

China's share of world iron ore imports would decline from about 75% now to 70% by 2025 and to 65% by 2030. The Department of Industry, which projects to 2026, envisages demand from non-Chinese importers rising by 6% a year, and that may continue through the decade.

In this scenario, there are no major upsets—a brave assumption in disrupted times but useful for thinking things through. The world economy remains firm, Chinese GDP growth continues at 5%–7% per year, the iron ore price continues to be set in the Chinese spot market and, although the mix of China's steelmaking inputs may shift, Australia will still be providing more than half of China's imported iron ore needs by the end of the decade.

If China's campaign of economic coercion of Australia continues, iron ore will remain exempt because of China's continuing need and lack of options at scale. The fall in price will relieve tensions within China's steel industry about its dependence on an oligopoly of suppliers in Australia and Brazil.

# High outlook: the squeeze continues

The shortage of iron ore that has forced China to exploit marginal local mines took the industry—both the mills and the ore producers—by surprise. As discussed above, China's steel production wasn't expected to keep growing from 2016, given that the five-year plan released in that year called for capacity to be retired. Since 2015, China has shut 700 small steel mills with 140 million tonnes of capacity and another 150 million tonnes of inefficient capacity at larger mills, and yet output last year rose to a massive 33% above 2015 levels. Over the past four years, China's steel output has been rising by an average of 7.2% per year.

The larger mills have been replacing the capacity they have retired with new, higher output plant, while the government has been complaining about 'illegal' mills, including mills built without approval and outdated mills that have been reopened after they were supposed to have shut.

The failure of the last steel plan to gain traction raises the possibility that China's steel output will continue responding to rising demand from infrastructure, real estate and industry. There's momentum behind demand growth in each of those sectors.

China's economy remains extraordinarily dependent on steel-intensive investment to drive its growth: business investment accounted for 43% of China's GDP in 2020, unchanged from 2015 (the global average is 24%). China's annual steel consumption per person has continued rising and is now high by global standards at 691 kilograms/year, but it's still short of Taiwan's at 777 kilograms or South Korea's at 955 kilograms.

The 2015 plan for China to raise the share of steel produced by electric arc furnaces from 10% to 20% of production didn't made any measurable inroads, so it's possible that progress in that direction will also continue to disappoint, leaving the steel industry heavily dependent on seaborne iron ore deliveries.

If China's demand for steel continues rising at, say, 5% a year for the next four years (average annual growth over the past four years has been 7%), that would add another 300 million tonnes to steel output by 2025 and another 450 million tonnes to demand for iron ore. Steel production in India and Southeast Asia, rising in line with the central forecast, would add a further 220 million tonnes to iron ore demand by the middle of the decade.

Existing investment plans don't get anywhere close to meeting such need. In Australia, the big two producers (BHP and Rio Tinto) believe they have had their great China expansion. Although they're investing to replace capacity approaching exhaustion, they haven't put any money into raising output since 2016. Expansion plans at the third and fourth producers (Fortescue Metals and Hancock Prospecting) are incremental rather than orders of magnitude. China's widespread use of export barriers as a means of economic coercion over Australia would make major mining company boards reluctant to sanction new investment aimed at servicing the Chinese market.

The Department of Industry's projections, used in the central forecast, envisaged Australian and Brazilian exports rising by 350 million tonnes over the next five years, offset by some decline in exports from India and Ukraine. That would fall at least 200 million tonnes short of requirements (and probably more) by the middle of the decade if China's demand continues to rise.

Although Africa is the most obvious untapped source of high-quality iron ore, the political difficulties that have so far prevented the development of those resources continue—a point underlined by the coup in Guinea. Although the leader of the putsch, Colonel Mamady Doumbouya, is from the same ethnic group as the ousted 82-year-old leader, Alpha Condé, the country is riven by conflict between different ethnic groups. The biggest risk in the development of the Simandou mine in Guinea might not be the cost of the infrastructure but the impossibility of securing it against sabotage, as a long rail link through rugged country presents an easy target.

Africa has been seen as the continent of promise for new iron ore supplies for a long time, and yet production across the continent last year of 81 million tonnes was the lowest since 2011 and only two-thirds of the 2014 peak output, so it's possible that Africa will continue to disappoint.

# High outlook: market implications

The doubling of the iron ore price between June 2020 and May 2021 as it rose above US$200/tonne came as a shock to China's steel industry.

The fall in the market over July and August was by design: having surpassed the authorities' production target in the first half of the year, the steel industry was under orders to cut output in the second half to ensure the 1.06 billion tonnes of steel delivered in 2020 was not exceeded in 2021 .

But in September, the authorities faced a new and unexpected challenge, with the debt crisis at the property group Evergrande threatening the stability of the property market. Property development is the largest single consumer of steel accounting for about a third of Chinese domestic demand.

The authorities face conflicting pressures: they want to meet environmental objectives by curbing steel output but they want to sustain economic growth. A fall in the property market would threaten the latter. The default response of the Chinese authorities to threats to growth is to stimulate bank lending and infrastructure development, which would result in a recovery in steel demand. Whether this would work in the face of a loss of confidence in the property market remains to be seen.

Chinese policy is less centrally orchestrated than is generally supposed. It's often the case that different arms of the Chinese bureaucracy may head in different directions. A study by a Finnish environmental group established that, in the first six months of 2021, Chinese authorities approved the construction of 18 new blast furnaces with a total annual capacity of 35 million tonnes (roughly equivalent to Germany's entire annual production), which was double the additional capacity approved throughout 2020.[22]

These tensions are likely to continue. It's probable that sustaining economic growth will come out ahead of environmental objectives over coming years, although concern to limit air pollution may result in temporary curbs, particularly ahead of next year's winter Olympics.

Analysts expect the iron ore price to weaken further until the consequences of the Evergrande failure become clear however continued growth in demand could see it moving higher again. Most analysts think a price of US$300/tonne or more is unrealistic; however, they would have said the same about US$200/tonne a year ago.

A further leap in the iron ore price would reflect China having to tap more marginal domestic deposits for a larger share of the needs of its steel industry. That would have to come at the cost of the country's aspiration to lower carbon emissions and air pollution more generally, as the lower quality ore needs heat treatment before it can be used by the mills.

China's avowed goal of diversifying its iron ore supplies away from Australia (along with its campaign of blocking other Australian exports, including coal), has probably become a barrier to further large-scale investment in expanding Australia's iron ore capacity. Mining company boards would see expansions that depended on growth of sales to China as high risk, particularly in the new coercive environment Beijing has created. Australia would have been the cheapest and easiest source of additional high-quality iron ore supply for China.

China's latest five-year plan for its steel industry included mention of possible expansion projects in Australia. While there are a number of iron ore prospects in Australia with Chinese equity, by far the biggest and most promising is the West Pilbara Project involving Baosteel and Korea's Posco, in which private rail operator Aurizon provides Australian equity. It would be the quickest and cheapest way for China to obtain an additional 40 million tonnes/year of iron ore, while the development of the Ankatel port near Karratha to service it could become the base for 250 million tonnes of additional annual production. It's low grade by Pilbara standards (58% iron ore) but high relative to Chinese domestic ore.

In the current state of bilateral relations, such a project is unthinkable for either the Chinese or the Australian Government. Australia's Foreign Investment Review Board wouldn't countenance it while China is pursuing a campaign of coercion. It's an example of the opportunity costs that the Chinese Government is incurring as a result of its campaign.

The Chinese authorities' first instinct when the iron ore price rose above US$200/tonne was to target participants in the spot market accused of market manipulation. A substantial industry has developed around the spot market, allowing suppliers and the steel mills to achieve security over future prices and facilitating price discovery.

Some have suggested that the Chinese authorities may seek to exploit China's position as the largest national buyer in the global iron ore market to nominate a single buyer—presumably its largest steel business, China Baowu Group—and impose its will on iron ore prices. This proposition was raised in a recent Lowy Institute paper and has been canvassed among analysts.[23]

There are several obstacles to this, besides the installed infrastructure in the spot market. China's steel industry is too fragmented and hence too competitive. The 2015 five-year plan set out a target for the top 10 mills to lift their share of China's total production from 34% to 60%, but, by 2020, the share had risen to only 36.2%. The latest five-year plan pushes the target date out by five years.

Mills would worry about the security of their supply: if there were a single buyer, how would its global purchases be allocated in the absence of the efficient distribution of the spot market? A steel mill requires constant supply, as it's expensive to restart a mill that has cooled down.

More pointedly, the appointment of a single buyer wouldn't alter a shortage of global seaborne supply in the face of strong demand, which is the real reason why prices soared in the first half of this year.

A different response would be for the Chinese authorities to provide direct subsidies to China's iron ore mines in order to reduce the pass-through of their high marginal costs to the global iron ore market. That would be expensive and leave the Chinese state frustrated and carrying the burden of the shortage of global supply.

Unlike minerals such as copper and nickel, iron ore isn't rare and is found on all continents. A sustained price of US$300/tonne, or indeed a sustained price above US$100/tonne, would generate concerted exploration, particularly in Africa and Latin America where geological conditions are encouraging, and would eventually yield new supplies.

# Low outlook: an iron ore glut

China's main responses to high iron ore prices have been to encourage the development of supply, both domestic and overseas, while putting a cap on overall steel production and pushing for greater use of scrap and electric arc furnace production. If those responses were successful, China's demand for seaborne iron ore would start falling.

Relative to the Department of Industry's prediction, used in the central forecast, that China's demand for iron ore would grow by a modest 1.8% annually out to 2026, a fall of, say, 1.5% annually would add up to a shortfall in demand of 235 million tonnes against expectations in five years and potentially 400 million tonnes by the end of the decade.

The pressure both on China and on steel mills around the world to develop a credible strategy for reducing carbon emissions may result in a faster shift away from blast-furnace steel technology than is currently expected. Europe still uses blast furnaces to produce about 90 million tonnes of steel, while Japan relies on them for about 75 million tonnes. The average age of the furnaces in both economies is around 45 years, so their replacement with electric arc technology may accelerate over the next five years.

Demand could also be depressed by any global or Chinese economic downturn. The central and high scenarios both assume that a reasonable rate of economic growth is sustained, but it took only a modest credit squeeze in China in 2014–2015 to send iron ore prices diving. The fall in iron ore prices from the $US237/tonne peak reached in May 2021 partly reflects a modest softening in the Chinese economy. It is possible that the fall-out from the Evergrande property group's financial crisis could lead to a more substantial weakness in the Chinese economy.

Global supply, excluding Australia, could also start rising more rapidly than expected. The difficulties and risks of Simandou in Guinea seem formidable, but its strategic importance to China as a diversification away from Australia gives it momentum. 'Simandou will take place with or without the involvement of Rio Tinto,' Rio Tinto's former chief executive, Jean-Sebastien Jacques, said last year.[24]

The project is divided into two consortiums. The non-Rio Tinto group, which includes Singaporean, French, Chinese and Guinean interests, has experience in getting major mining projects built in Guinea, having successfully developed a large bauxite project. It has committed to building the infrastructure, with a production start date of 2025. That sounds too ambitious, but success even a year or two later could bring a further 100 million tonnes/year of iron ore to the market. It's possible that other Chinese ventures in Africa could add another 50 million tonnes/year over the next five or six years.

Brazil could also show a sharp lift in production as it recovers from the setbacks of both tailings dam disasters and the pandemic. The ratings agency Fitch estimates that Brazil's production will rise by 140 million tonnes over the next five years to 542 million tonnes.[25]

If Simandou comes on stream, Brazil recovers in line with the forecasts from Fitch and China's demand for seaborne iron ore stays roughly where it is, there could be surplus capacity outside China of 200 to 300 million tonnes.

# Low outlook: market implications

China's 2014–2015 credit squeeze wasn't a global event—even in China it resulted in only a small fall in economic growth, which was still above 7% in both years. Steel production dipped in 2015 by 20 million tonnes, when it might have been expected to rise to 50 million tonnes. The global seaborne iron ore trade dropped by 45 million tonnes or 2.5%. However, that was enough to send the iron ore price diving from a 2013 peak of US$160/tonne to a February 2015 low of US$39/tonne.

The lesson is that the iron ore market is finely balanced. The price was pushed above US$100/tonne only when demand from China's steel mills required marginal Chinese iron ore deposits to be brought out of mothballs and into production. Through most of the past 60 years during which Australia has been exporting iron ore, it has languished at prices that barely covered the cost of extraction.

That may partly have reflected the market power of Japan's effective buyers' cartel (often the preferred explanation of Australian governments), but it was mainly attributable to the fact that iron ore is relatively plentiful on the Earth's surface and easily found and mined.

BHP's view that, in the long term, the iron ore price will be set by the small number of relatively higher cost Australian and Brazilian operations reflects a belief that supply will be sufficient to render marginal Chinese ore production obsolete. It expects its economies of scale and efficient mining and logistics to continue delivering profits from its Pilbara mines. The Sino Iron mine in the Pilbara owned by China's CITIC is one of the higher cost operations in Australia and would be one of the first to face pressure to close.

However, in a market in which there's surplus iron ore and China has the market power, it's possible that political rather than market forces may determine which mines survive or close. It might not be the world's lowest cost producers, which both Rio Tinto and BHP would consider themselves to be, that win the lion's share of the business.

There's no plausible scenario in which China can dispense with Australian iron ore, but, in a market with surplus supplies, it could limit supplies through quotas. If China's campaign of economic coercion against Australia were to continue, it could take, say, 500 million tonnes/year from Australia rather than the 740 million tonnes it bought in 2020.

China has shown that it's prepared to take losses when exercising economic coercion, so business might not be directed to the lowest cost producers. When China banned the purchase of Australian coal in mid-2020, prices in China leapt above US$300/tonne for coking coal (for steel mills), while Australian coal was selling in non-Chinese markets for little more than US$100/tonne. Disruptions to supplies from Mongolia and China's own mines have pushed the domestic price above US$440/tonne. Chinese buyers haven't been allowed to touch Australian coal, despite the huge discount.

In theory, China could use its power in the market to dictate the terms of settlement, reverting to the long-term contracts at fixed prices that served Japan so well for many years. However, that would raise the same problems as appointing a single buyer: it would leave smaller mills insecure about their supply. China's steel industry had a bad time negotiating long-term contracts between 2007 and 2010. Although the spot market has been volatile, the mills have been able to secure prices through futures markets. The authorities would be more likely to leave the spot market in place as a means of distributing iron ore within China while regulating the flow of ore into the country.

# Options for the Australian Government

Australia's current market power has led to suggestions that the government should use it as leverage over China. Former resources minister Senator Matt Canavan has suggested a levy of 1% on iron ore exports to China to offset the cost of Chinese barriers to other Australian exports. 'We need to make the Chinese Communist Party pay a price because that will be the only thing that will stop further trade restrictions,' he wrote in *The Australian*.[26]

With the iron ore price set by the Chinese spot market, an export levy such as Senator Canavan proposes would be borne by the Australian exporters rather than by the Chinese buyers, and certainly not by the Chinese Communist Party. It wouldn't alter the balance of supply and demand in the Chinese market or the price to end users. It would be akin to a resources tax or a federal royalty.

Although it's possible to mount an argument for a redistributive tax on a highly profitable export sector to compensate for losses incurred by other export sectors, that would be difficult to implement in practice. If the levy were imposed only on sales to China, it would be likely to breach WTO rules. Although China has exercised such discrimination with impunity, Australia has a greater dependence on the defence provided by the WTO's global trading rules than does a major power such as China. As Foreign Affairs Minister Marise Payne commented after her department's review of Australia's participation in multilateral institutions, including the WTO, 'Multilateral institutions, especially international standard-setting bodies, create rules that are vital to Australia's security, interests, values and prosperity.'[27]

Rather than pursuing WTO-inconsistent retaliation for China's assault on trade, the Australian Government would be wiser to stick with its use of the WTO to challenge China's trade actions. The wheels of justice grind slowly at the WTO, and trade disputes take years to resolve, but have a demonstrated force with major powers; for example, both China and the US have bowed to WTO rulings that they argued strongly against. In the case of China, it was ordered to abolish a system of export quotas and permits for rare earths and, after losing appeals, it complied in 2015.

A key issue for Australia's use of the WTO is that the US has rendered the WTO's appeals tribunal inoperative by blocking the appointment of judges—a matter about which Australia has made representations to the Biden administration.

Australian coercion would be no more likely to encourage a political about-face in China than has been the experience of China's coercion against Australia. On the contrary, it would harden China's view of Australia as a hostile nation and lead to a redoubled effort to secure non-Australian sources of iron ore, regardless of cost. The industry in Australia would never recover.

The 1973 oil embargo, when the Organization of the Petroleum Exporting Countries (OPEC) halted oil shipments to the US, provides a lesson. On the eve of the crisis, the OPEC nations were producing 1,500 million tonnes/year of oil, while the rest of the world's output was 1,400 million tonnes. Within a decade, OPEC annual production had dropped to 850 million tonnes, while the rest of the world's output had soared to 2,000 million tonnes.

Japan's development of Brazil's Amazon basin iron ore deposits following the Whitlam government's use of export permits to establish a minimum price is another example of the limited power of commodity exporters to achieve a lasting change in their prices by political fiat.

The high-market scenario would be likely to see increased effort by China to manipulate the market index to its benefit. However, the index is only a measure of the price at which iron ore is changing hands—manipulation of the index wouldn't necessarily change the terms of trade between China's steel mills and their Australian suppliers, which are negotiated bilaterally. In a tight market, iron ore will still go to the highest bidder on the day.

While iron ore is in short global supply, the Australian Government doesn't need to exercise additional leverage to 'make China pay'—they're paying already with their purchases of iron ore at prices many times the cost of production, delivering $7 billion in royalties to the Western Australian Government and around $20 billion in company tax revenue to the federal government over the past year.

One of the contributing factors behind the rise of iron ore prices over the past year was the concern among Chinese steel mills that the authorities may follow their action against Australian coal with limits on purchases of Australian iron ore, so mills were competing with each other to get priority for their supplies ahead of any action. Deloitte Access Economics partner Chris Richardson deemed it a 'fear tax'.[28]

To the extent that the Chinese Government's hostility to Australia prevents China's steel industry from taking further advantage of our abundant iron ore resources and forces it to look at high-cost alternatives such as Simandou, it imposes a further impost on the efficiency of its steel industry and of its economy more generally.

In the low-market scenario, market power shifts to China and, if China's campaign of coercion against Australia continues, it could be tempted to use it in a discriminatory fashion against Australian producers.

Discrimination against individual suppliers is allowed under WTO rules only for security, public health or limited environmental purposes. China's barriers to Australian exports of coal, timber and cotton have been imposed informally (unlike the tariffs imposed on Australian wine and barley). There's been no official Chinese Government statement or, in some cases, any acknowledgement that the barriers exist.

Following the implementation of the ban on Australian coal in 2020, the Australian Government sought clarification from China. Prime Minister Scott Morrison commented that any Chinese ban on Australian coal 'would obviously be in breach of WTO rules'.[29] No clarification was provided, and Australia is yet to take any action against China over the ban at the WTO.

Australia must pick its battles before the WTO and has so far chosen to pursue cases against the tariffs imposed on wine and barley. China has taken a potentially far-reaching action against Australian anti-dumping duties imposed on wind towers, stainless steel sinks and railway wheels.

The Australian Government should prepare a formal WTO challenge to China's ban on Australian coal, which had earned $14 billion in the year before the ban was imposed. China offset its purchases from Australia by increasing purchases from the US, Canada, the Philippines and Colombia, clearly demonstrating discrimination.

Such an action could serve as a precedent against any effort by China to discriminate against Australian iron ore.

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# Acronyms and abbreviations

| | |
|---|---|
| CISA | China Iron and Steel Association |
| GDP | gross domestic product |
| NDRC | National Development and Reform Commission (China) |
| OPEC | Organization of the Petroleum Exporting Countries |
| WTO | World Trade Organization |

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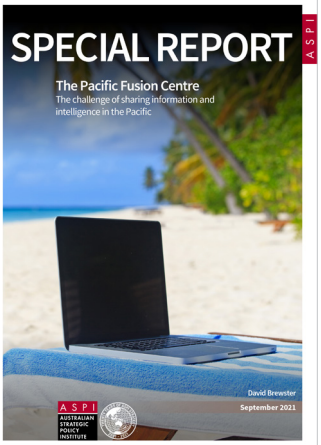

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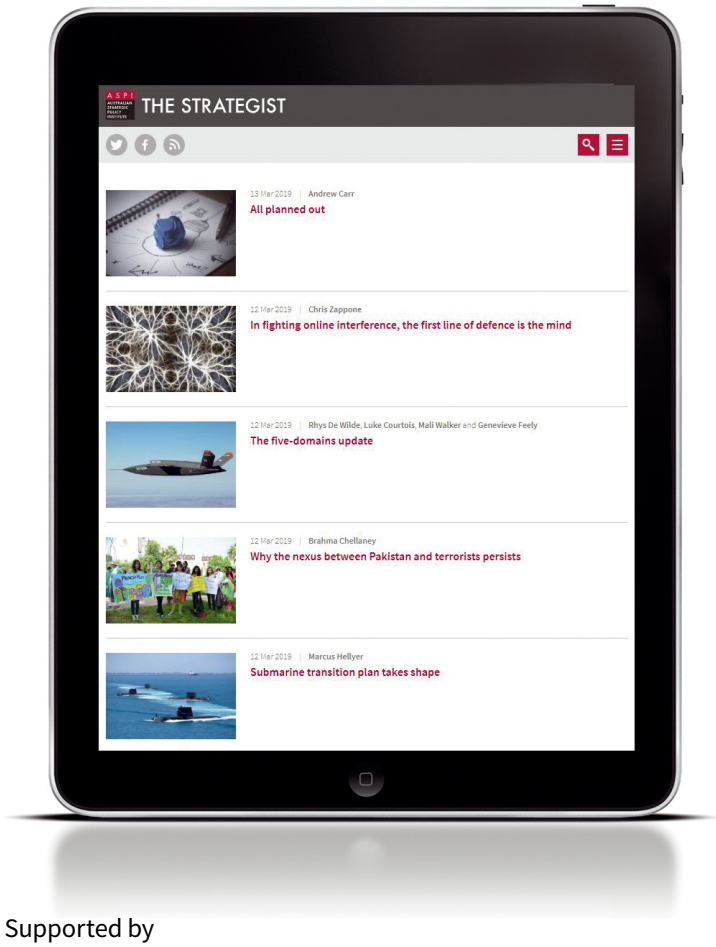


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