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CHINESE RESOURCE SECURITY POLICIES AND THE RESTRUCTURING OF THE ASIA-PACIFIC IRON ORE MARKET

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ABSTRACT

This paper reviews the restructuring of the Asia-Pacific iron ore market in the wake of the rise of the Chinese steel industry. Prior to the 2000s, this market was characterised by two key features – high firm-level concentration on both the producer and consumer sides, and price determination through annually negotiated benchmark pricing between Australian mining and Japanese steel firms. However, owing to rapid growth in the Chinese steel industry and its emergence as the region's principal iron ore consumer, the Asia-Pacific iron ore market has been dramatically restructured during the last decade. This process has been accelerated since 2005 by Chinese governmental resource security policies, which have sought to address current record high iron ore prices through the use of foreign investment to sponsor new market entrants and the formation of an import cartel amongst the Chinese steel firms. This paper evaluates how these policies have driven restructuring in the Asia-Pacific iron ore market, through an analysis of the growth of China's steel industry, Chinese resource security policies aimed at lowering iron ore import costs, and their effects upon the regional market's ownership structure and price determination mechanisms. It argues that while Chinese investment and cartelisation policies have catalysed significant changes to the ownership and pricing structures of the Asia-Pacific iron ore market, they have carried only mixed benefits for the Chinese steel industry's resource security.

1. INTRODUCTION

The Asia-Pacific iron ore market is in flux. Since the first establishment of iron ore trade between Australia and Japan in the late 1960s, the regional market distinguished from other international mineral markets by two features – high degrees of firm-level concentration on both producer and consumer sides, and price determination through annually negotiated benchmark pricing. However, during the last decade these features have been dramatically transformed. Under conditions of booming demand due to surging Chinese imports, the region's 'Big-3' iron ore producers (Vale, BHP Billiton and Rio Tinto) have been able to push for rapid price rises, which have increased nine-fold since 2000. These price rises have posed major cost-inflation pressures for the Chinese steel industry, and in response the Chinese government announced a series of 'resource security' measures to address soaring iron ore import prices in 2005. These policies aimed to restructure the regional iron ore market through: (a) the sponsorship of new mining projects through foreign investment; and (b) the cartelisation of Chinese steel firms in order to influence annual price negotiations. These Chinese policies have catalysed major changes in the regional market, diluting levels of ownership concentration on the producer side and resulting in the abandonment of negotiated pricing in favour of an index-based pricing model in early 2010.

This paper examines these recent patterns of restructuring in the Asia-Pacific iron ore market. Following a review of the market's structure prior to 2000, it examines how rising Chinese imports have driven price increases in the last decade, and reviews the resource security policies that the Chinese government has deployed in an effort to ameliorate them. It then provides a detailed assessment of the effects of these Chinese policies on regional market structures, in terms of reductions in producer-side ownership concentration and the shift from negotiated to index-based pricing mechanisms. Drawing on this analysis, it argues that Chinese resource security policies have achieved only mixed successes in their goal of restructuring the regional market in ways that improve the resource security of Chinese steel firms. The paper concludes by evaluating implications for the future operation of the Asia-Pacific iron ore market – demonstrating that while changes to pricing mechanisms have moved the market closer to that for other mineral commodities, high levels of ownership concentration are likely to remain despite Chinese efforts to sponsor new market entrants.

2. HISTORICAL FEATURES OF THE ASIA-PACIFIC IRON ORE MARKET

During the recent global resources boom, iron ore has been among the fastest growing mining sectors. Between 2000 and 2009, world iron ore exports almost doubled in volume terms, from 478 to 935 million tonnes per annum (mtpa); and increased six-fold in value, from USD 9.2 billion to 55.6 billion (UN Comtrade, 2011). The majority is conducted as seaborne trade, and due to high transport costs the market is geographically segmented into two regions – with Atlantic-based trade connecting suppliers in Latin America and Africa to West European consumers, and a Pacific-based trade linking Latin American, Australian and Indian producers to Northeast Asian consumers. While geographically distinct, prices in the two markets are linked due to the role of Latin American producers that supply both sets of consumers, which acts as a price transmission mechanism (European Commission, 2001: 32-34). However, the Asia-Pacific market has been the driving force behind recent growth in world iron ore trade. Asian iron ore imports tripled from 240 mtpa to 775 mtpa between 2000 and 2009 – largely due to booming demand from the Chinese steel industry – and the Asia-Pacific now accounts for over 80% of world iron ore trade (Table 1).

Table 1 World iron ore imports by major steelmakers, 2000-2009 (mtpa)

	Asia-Pacific			Total	Rest of World	World Total
	Japan	Korea	China			
2000	131.7	39.0	70.0	240.7	238.0	478.7
2001	126.3	45.9	92.3	264.5	213.9	478.4
2002	129.1	43.3	111.5	283.9	230.5	514.4
2003	132.1	43.1	148.1	323.3	287.2	610.5
2004	134.9	44.2	208.1	387.2	248.4	635.6
2005	132.3	43.5	275.2	451.0	246.0	697.0
2006	134.3	43.9	326.3	504.5	250.2	754.7
2007	138.9	46.2	382.8	567.9	253.4	821.3
2008	140.4	49.5	443.4	633.3	240.3	873.6
2009	105.5	42.1	627.8	775.4	148.2	923.6

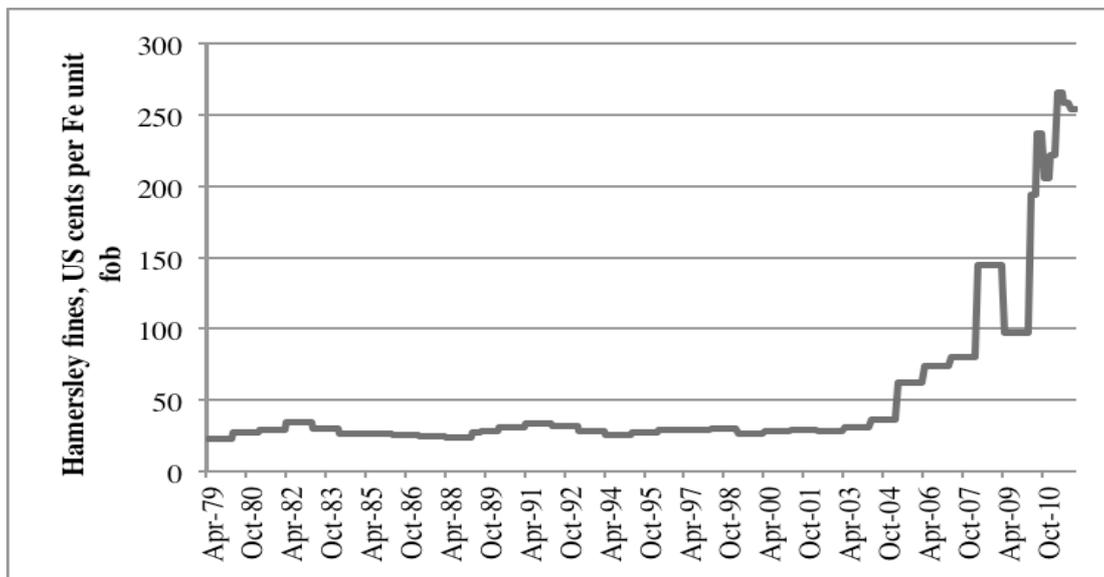
Source: UN Comtrade (2011)

Prior to the 2000s, the Asia-Pacific iron ore market had two features that distinguished it from other international minerals markets. The first was its ownership structure, which was characterised by high firm-level concentration on both the producer (mining) and consumer (steel) sides. On the supply side, the bulk of regional exports came from Australia and Brazil, which in 2000 supplied 74% of the Northeast Asia import market (UN Comtrade, 2011). Three firms, known as the 'Big-3' iron ore miners – Companhia Vale do Rio Doce (Vale) in Brazil, and Rio Tinto and BHP Billiton in Australia – accounted for almost all regional exports. Firm-level concentration was also pronounced on the consumer side, which was made up by the Japanese, Korean and Chinese steel industries. The Japanese industry was dominated by a group of five firms and Korea's by one; though the Chinese steel sector was somewhat less concentrated, with its largest ten firms accounting for only half of national production in 2000 (CSY, 2001). There were also patterns of vertical integration between the steel and mining firms, with Japanese steel mills holding minority shares in several joint-venture projects run by BHP and Rio Tinto in Australia (BHP Billiton, 2009a; Rio Tinto 2009).

The second distinguishing feature was the Asia-Pacific market's sales and price determination mechanisms, which were unlike those for almost all other international minerals trade. Historically, sales volumes were regulated by long-term contracts (LTCs) of five- to ten-years duration between the steel and mining firms. First negotiated by the Japanese steel and Australian mining firms in the 1960s, these contracts served as a stabilisation device – providing long-term supply stability for the steel firms, and allowing mining firms to raise the necessary loans to finance project development costs (Rogers & Robertson, 1987). Price determination was also unique, and was based on the practice of negotiated annual benchmarks rather than spot market pricing. Initially developed during the 1970s, benchmark pricing took the form of an oligopoly-oligopsony negotiation between the Australian mining and Japanese steel firms. The two groups were respectively organised into informal cartels, with a representative firm from each side (typically Japan's Nippon Steel and Australia's Rio Tinto) acting as a 'champion' that would negotiate prices on behalf of the

groups as a whole. These cartelised Australia-Japan negotiations then set an annual benchmark price at which all regional sales would be conducted (Sukagawa, 2010). This negotiated pricing system acted to stabilise regional iron ore prices, which remained relatively stable in nominal terms from the late 1980s onwards (Figure 1). LTCs and negotiated pricing also distinguished iron ore from most other international energy and minerals markets – such as oil and base metals – in which trade is conducted at arm’s length between firms, and price determination is market-based through either spot or index pricing systems.

Figure 1 Asia-Pacific benchmark iron ore prices, 1979-2011



Source: Author’s calculations, from UNCTAD (2011) and Table 3.

3. THE RISE OF THE CHINESE STEEL INDUSTRY

However, after nearly three decades of stable operation, the structure of the Asia-Pacific iron ore market has in the last decade entered a period of rapid reform. The primary cause has been the rapid growth of the Chinese steel industry, and its emergence as the region’s main buyer of iron ore.

The origins of the contemporary Chinese steel industry date to the country’s liberalising economic reforms from 1978, which called for the gradual replacement of central planning with a ‘socialist market economy’ and set off a three-decade period of industrialisation and high speed growth. However, given steel’s role as a critical industrial input, the state opted to maintain tighter control of the sector than it did for other industries. Privatisation was eschewed in favour of ongoing state ownership, and extensive subsidies were extended to promote the growth and modernisation of the industry (Taube & in der Heiden, 2009). State control of the industry was further reinforced by activist industrial policy interventions in the 2000s that offered state financial support to consolidate and nurture a group of top-ten state-owned steelmakers (Sun, 2007). Partly due to this supportive policy environment, and partly as a result of China entering a ‘heavy’ phase of industrial development that saw rapidly increasing steel demand from the construction and machinery sectors, these Chinese steel industry has boomed over the last decade. Between 2001 and 2009 Chinese crude steel production increased four-fold to 577 mtpa, and its share of world output rose from 18% to 47% (WSA, various years).

Rapid and state-supported growth saw the Chinese steel industry emerge as a major participant in the Asia-Pacific iron ore market from around the beginning of the 2000s. While China's large coal reserves meant it has remained self-sufficient for the supply of metallurgical coal, domestic sources of iron ore proved less reliable. The bulk of Chinese iron ore reserves are of a poor grade, technically difficult to exploit, and are located far from the major steel producing centres on the eastern seaboard (Labson et al., 1995). Chinese steel firms therefore turned to regional markets as their iron ore requirements grew during its period of high-speed growth. Chinese iron ore imports soared as a result – from 70 mtpa in 2000 to 628 mtpa by 2009 – which tripled the size of the regional market and displaced the Japanese steel industry as the region's primary consumer (Table 1).

However, the Chinese steel mills' institutional position in the regional market was qualitatively different from the Japanese mills they displaced. First, the Chinese joint ventures with the Big-3 mining firms were relatively small in comparison to those of the Japanese¹, meaning patterns of ownership integration with their main suppliers was relatively weak. Second, the Chinese mills lacked the institutional mechanisms for inter-firm cooperation during annual price negotiations that characterised the Japanese mills, and negotiated with the Big-3 suppliers individually rather than as a group. As the Chinese mills gradually replaced the Japanese as the region's main buyers, there was no longer an informally organised import cartel capable of negotiating with the Big-3 miners collectively and on behalf of all the region's steel firms. In the context of soaring demand, this lack of price leadership on the consumer side allowed the Big-3 to successfully press for extremely rapid price increases. Following the negotiation of an unprecedentedly large annual increase of 71% in April 2005 regional iron ore prices began a steady upward march, and by April 2011, Asia-Pacific benchmark prices peaked at USD 170 per tonne – a nine-fold increase on their levels only a decade earlier (Figure 1).

By threatening their resource security – a situation where a consumer enjoys the *continuous availability* of needed raw materials at *reasonable prices* – these price increases have proven extremely problematic for Asian steelmakers. Soaring prices have posed heavy cost-inflation pressures, as slower growth in world steel prices has meant steel firms have been unable to fully pass input cost rises onto consumers. Driven by booming Chinese demand, world steel billet prices also grew during the last decade – setting an historical record of around USD 1100 a tonne in mid-2008, roughly four times their level in 2000 (OECD Steel Committee, 2009). However, steel prices then collapsed in the wake of the global financial crisis (GFC) beginning in September 2008, and by early 2011 had only recovered to half their pre-GFC levels (LME, 2011). In comparison, regional iron ore prices have grown far more quickly and consistently than those for steel – reaching five times their 2000 levels by a peak in April 2008, falling only slightly during the GFC, before resuming growth again to double their pre-GFC peak by mid-2011 (Figure 1). As a result, steel mills in the region have suffered declining margins as increasing iron ore input costs have not been matched by equivalent steel price rises.

4. CHINESE RESOURCE SECURITY POLICIES

While iron ore cost inflation pressures posed a resource security problem for all Asian steelmakers, the Chinese industry was especially affected. Due to its comparatively lower technology levels than its Asian competitors, the

¹ In 2008, the combined output of the Big-3's iron ore joint ventures with Chinese mills was 30 mtpa; compared to 181 mtpa for those with Japanese firms. Author's compilation, from BHP Billiton (2009a), Rio Tinto (2009b), Vale (2009).

Chinese industry's product mix is concentrated in lower value-added bulk steel lines for which raw materials make up a large proportion of final costs (OECD, 2006: 14). This exposes the Chinese sector to input prices more than its competitors, and as iron ore prices soared from 2005 carried extremely adverse effects on its profitability – with gross margins falling from a peak of 8.5% in 2004 to 2.2% by 2009 (CSY, 2010). By early 2009 the Chinese industry had begun describing itself as in crisis, which was officially attributed by both the industry and government to rising raw material costs (Steel Guru, 2009a).

It was within this context that China launched its first resource security initiatives to address soaring iron ore prices in the middle of the 2000s. Given pervasive state ownership and control of the Chinese steel sector, it was the Chinese government that led and directed the industry's response. Spurred into action by the 71% price increase in April 2005, the Chinese government issued an *Iron and Steel Industry Development Policy* in the middle of the year which included several elements to support the industry in the face of rising cost pressures (NDRC, 2005). As an industry-level initiative, the 2005 Steel Policy included a broad range of measures to improve the competitiveness of Chinese steel mills – particularly through government-brokered mergers and state-financed technical upgrading projects (Taube & in der Heiden, 2009: 60-72). However, it also specifically aimed to address iron ore supply difficulties, by outlining two new policy measures that aimed to improve the industry's iron ore supply security. These measures included:

- *Sponsoring new iron ore suppliers* – by encouraging steel firms to investment in iron ore projects overseas. This was assisted by the Chinese state-owned banking system, which was to provide steel mills loan finance on concessionary terms (NDRC, 2005: Article 30)
- *Creation of a Chinese importers' cartel* – by promoting co-ordination between Chinese steel firms, with the intention of improving the industry's bargaining position in annual benchmark price negotiations. This was assisted by the China Iron and Steel Association (CISA), which was delegated authority over the distribution of iron ore import licenses² (NDRC, 2005: Article 39).

Fundamentally, these investment and cartelisation initiatives aimed to improve Chinese steel mills' resource security by restructuring the Asia-Pacific iron ore market – by sponsoring new China-backed mining entrants that would dilute the market share of the Big-3 producers, and by creating a Chinese steelmakers' cartel capable of challenging the Big-3's market power in annual price negotiations. As a result of this government-sponsored program major changes have occurred to the ownership structure and price determination process in the regional iron ore market since 2005. However, the outcomes of this program have fallen short of its goals, and have carried only mixed benefits for the Chinese iron ore security.

5. OWNERSHIP RESTRUCTURING AND CHINESE INVESTMENT INITIATIVES

The first element of restructuring in the Asia-Pacific iron ore market – changes to its producer-side ownership structure – has resulted from a rapid surge of Chinese investment in new iron ore projects. Given ready access to state financing Chinese firms embarked on an aggressive foreign investment strategy from 2005, the results of which are summarised in Table 2. Between 2000 and 2010, Chinese steel and mining firms invested in thirty-five overseas iron

² This import licensing authority was not included in the 2005 Steel Policy itself, but was awarded to CISA soon thereafter in early 2006 (WTO, 2006).

ore projects, almost all occurring after state financial support was made available under the 2005 Steel Policy. The cumulative value of those for which data is publicly available is AUD 29 billion; and twenty-five of the investments (72% by value) were located in Australia. The majority of these investments have sponsored new entrants to the regional market through joint-venture packages, which have included Chinese firm taking minority equity stakes and offering long-term contracts to some thirty new iron ore exporters.

Table 2 Chinese investments in overseas iron ore projects, 2000-2010.

Firm	Project	Country	Date	Equity acquired	Value*	Size (mtpa) and associated LTCs (% of output)
Baosteel	BaoHI	Australia	2002	46%	NA	7.0 (100%)
SOE Consortium	Wheelarra	Australia	2004	40%	NA	12.0 (100%)
Rockcheck	Aurox	Australia	2007-08	12%	15	Plan 6.0 (100%)
Ansteel	Gindalbie	Australia	2007-09	36%	200	Parent company
	Karara JV	Australia	2007	50%	530	Plan 10.0 (100%)
Tonghua I&S	Cairn Hill	Australia	2007-10	10%	14	Plan 1.4 (100%)
Sinosteel	Midwest	Australia	2008	100%	1400	Plan 15.0 (100%)
Sinosteel	Murchison	Australia	2008-09	6%	15	2.0 (None)
Wugang	Centrex	Australia	2008	15%	10	Parent company
	Eyre Iron JV	Australia	2008	40%	260	Plan 10.0 (80%)
Shougang	Balmoral South	Australia	2008	13%	58	Plan 12.0 (100%)
Jiangsu Shagang	Grange^	Australia	2008	45%	NA	2.5 (100%)
Shougang	Mt Gibson	Australia	2008	40%	NA	Plan 9.0 (60%)
CMG	Cape Lambert	Australia	2008	100%	400	Plan 15.0 (100%)
Hunan Valin	Golden West	Australia	2008	11%	27	Exploration (45%)
CITIC Pacific	SinoIron	Australia	2008	100%	560	Plan 27.6 (100%)
China Western Mining	FerrAus	Australia	2008	10%	21	Exploration
Chinalco	Rio Tinto^	Australia	2008	9%	15500	217.0
CNMIEC	Belinga	Gabon	2008	85%	955	Exploration
Hunan Valin	Fortescue Metals	Australia	2009	15%	1200	40.0, Plan 150.0 (100%)
Baotou	Bungalow	Australia	2009	50%	40	Plan 3.0 (33%)
China Metallurgical Investment	Beyondie	Australia	2009	50%	200	Exploration
Chongqing Minerals Dev.	Extension Hill	Australia	2009	60%	NA	3.0 (100%)
China Railway Material Corp.	FerrAus	Australia	2009	12%	13	Exploration (100%)
Jinchuan Group	Fox Resources	Australia	2009	11%	18	Exploration
Baosteel	Aquila	Australia	2009	15%	240	Plan 30.0 (50%)
Shunde Rixin	Unnamed	Chile	2009	70%	NA	Exploration
Wugang	Consolidated Thompson^	Canada	2009	25%	360	8.0 (50%)
Wugang	MMX^	Brazil	2009	21.50%	435	11.0, Plan 40.0 (50%)
Sichuan Taifeng	IMX	Australia	2010	20%	47	Parent company
	Cairn Hill JV	Australia	2010	49%	47	Plan 1.4 (100%)
Huaxi	Lincoln	Australia	2010	13%	8	Plan 2.0 (50%)
China Railway Materials Corp	African Minerals	Sierra Leone	2010	12.50%	280	Plan 45.0 (80%)
Shandong				25%	275	
CIF	Kalia	Guinea	2010	NA	2914	Development (100%)
ECE	Itaminas^	Brazil	2010	100%	1316	3.0 (100%)
Wugang	Bong	Liberia	2010	60%	75	Exploration
Chinalco	Simandou	Guinea	2010	47%	1481	Plan 95.0
Subtotal to Australia					20776	
Subtotal to Others					8091	
Total					28867	Planned new capacity: 425 mtpa

* For comparison, investment values are converted to AUD millions at then-current exchange rates

^ Indicates an existing enterprise. All other investments are in new ventures.

Source: Adapted from Wilson (2011) and various media sources

Several goals motivated this Chinese investment program. A first, stressed in official Chinese statements on the program, has been to increase regional iron ore supply by providing finance and LTCs to new export projects (see Zhang, 2009). However, diluting the ownership position of the Big-3 firms through the sponsorship of new suppliers was also a goal of the program. This was to be achieved by the development of ‘captive mines’ that were tied to the Chinese market through LTCs and minority ownership stakes, which the Chinese government and industry intended would provide a strategic foothold in the regional iron ore market and lessen the market power of the Big-3 firms (Wilson, 2011). For example, Baosteel claimed its 2009 investment in Aquila Resources would “*strengthen Baosteel's control over strategic resources [and] weaken the monopolistic grip over global iron ore supplies and lower purchasing costs*” (Reuters, 2009). Moreover, in March 2011 the China Mining Association officially described the investment program as aimed at ‘breaking the monopoly’ of the Big-3 producers (China Daily, 2011), leaving little doubt that a restructuring of regional ownership arrangements was also a central objective of the investment program.

In addition to sponsorship for new suppliers, the goal of gaining a strategic foothold in the regional iron ore market was also evident in a series of investments made by Chinalco in Rio Tinto soon after the Chinese investment program was announced. A first, undertaken in February 2008, saw Chinalco make a government-funded ‘dawn raid’ on 9% of Rio Tinto’s shares in order to block an attempted takeover of the company by BHP Billiton that would further concentrate the regional iron ore market (Leaver & Ungerer, 2010). A second investment was proposed in February 2009, under which Chinalco would acquire a further 9% of the company but gain marketing rights to 30% of the output of Rio’s Hamersley operations (Rio Tinto, 2009a). While this second investment was ultimately abandoned due to both shareholder and governmental concerns in Australia, it highlights how Chinese firms have attempted to strategically use investments to gain control over regional iron ore supplies.

However, an analysis of the results of the Chinese investment program show that it has achieved only mixed success in restructuring regional ownership arrangements. Its principal achievement has been to sponsor some thirty new China-backed entrants to the regional market – a dramatic change to the market’s ownership structure, which before 2005 was almost wholly dominated by the Big-3 firms. This program is still in its infancy in terms of increasing regional iron ore supply – as of early-2012, only five³ of the thirty China-sponsored projects have made production, with most planning to become operational between 2012 and 2015. Nonetheless, as the projects gradually proceed to production over the next five years, they will make a significant addition to the regional market, as the combined planned output of the eighteen projects that have given estimates of their development plans is approximately 425 mtpa, the majority of which is tied through LTCs to their Chinese investors (Table 2). This is equivalent to approximately half the current regional market and two-thirds of China’s 2009 import needs, and will go some way toward satiating the Chinese steel industry’s soaring iron ore requirements.

However, the extent to which these new projects will dilute the ownership position of the Big-3 miners in coming years is limited, due to issues regarding their prospective economic viability. First, while large in size when considered together, most of the Chinese-sponsored joint-ventures are individually quite small. With the exception of a few medium-sized projects (Fortescue Metals, MMX, African Minerals and Simandou), the bulk of the sponsored projects are planning for between 5 and 15 mtpa of production. In comparison to the Big-3 – whose size in 2009

³ Fortescue Metals, Wheelarra, BaoHI, Murchison and Extension Hill.

ranged from 140 mtpa (BHP) to 250 mtpa (Vale) – these projects are extremely small, and in the heavily scale-reliant iron ore industry are unlikely to be cost-competitive. Second, many of the new projects will require costly transport and shipping infrastructure to be constructed before commencing exports. This is proving particularly difficult in the new Midwest region of Australia, where infrastructure development work is currently at a halt due to financing difficulties faced by Oakajee Port and Rail, the region's joint-venture infrastructure provider (Sydney Morning Herald, 2011). Furthermore, many of these projects have faced significant cost blowouts since their first announcement (Sydney Morning Herald, 2012), which has forced their Chinese backers to pay a 'supply security premium' – in the form of increased investment commitments – to guarantee their continued development⁴. As a result of their small size and comparatively high costs, it is unlikely most of these projects will be cost-competitive with the Big-3 incumbents.

Conditions of tight supply and record iron ore prices are at present justifying these high cost projects, but it is unlikely that this situation will continue in coming years. As of 2010, the Big-3 producers have themselves committed to expansion plans that would see their combined output increase by 450 mtpa by 2015⁵ – approximately the same scale as the China-sponsored entrants' development plans. These expansions will limit the extent to which the Big-3's market share declines as a result of new entrants. Big-3 capacity increased will further ameliorate the current pattern of extremely tight supply, and may moderate regional iron ore prices in the process. It is likely that the poor cost-competitiveness of the new market entrants will make many unviable under a future scenario of reduced prices and market-share competition with the rapidly expanding Big-3, and will necessitate that their Chinese sponsors pay further supply security premiums to ensure they proceed to production. Of course, the issue of future price trends will depend on the future balance between Chinese steel production and regional iron ore supply. Presently, the nature of this balance is a debated question – with some forecasters predicting that regional prices will fall only slightly on current levels due to strong Chinese domestic demand for steel (The Age, 2011), while others point to the aggressive capacity expansion plans to suggest a rebalancing of supply and demand that will see prices fall by half by the middle of the next decade (Australian, 2011a). Nonetheless, it remains an open question as to whether the majority of the thirty new China-backed iron ore entrants will ultimately succeed in moving from development to production over the coming years.

6. PRICE DETERMINATION AND CHINESE CARTELISATION INITIATIVES

Alongside restructuring ownership arrangements, the Chinese government's resource security policies have also driven major changes to pricing mechanisms in the Asia-Pacific iron ore market. The catalyst for change came during the annual benchmark negotiations of April 2005, when Vale and Japan's Nippon Steel struck a deal for a 71.5% increase – a rise unprecedented in the history of the negotiations. Considered catastrophic in China, the result was blamed on the fact the deal was settled by the Japanese firms, whose declining share of regional imports meant it had now become ineffective at negotiating on behalf of the regional steelmakers as a whole (Caijing, 2005). In response, a number of Chinese governmental policies were announced that sought to establish a Chinese iron ore importers' cartel that could substitute for the Japanese in annual negotiations. In March, the Chinese Ministry of Commerce

⁴ This parallels a similar strategy used by Chinese oil companies in their recent acquisitions abroad, where Chinese firms have paid higher investment prices for projects on the 'competitive fringe' of the oil and gas industry in order to gain a foothold in the world market (Moran, 2010).

⁵ Author's calculations, from BHP Billiton (2009a), Rio Tinto (2009b), Vale (2009).

announced an iron ore import licensing system, under which the China Iron and Steel Association (CISA) – a private industry association run by the Chinese steel mills – was empowered to distribute and enforce iron ore import licenses (WTO, 2006). CISA was then formally granted industry coordination powers by the government in July under the 2005 Steel Policy, with the specific goal of strengthening “*self-discipline*” amongst the Chinese mills in price negotiations. Baosteel, the largest Chinese steel firm, was appointed as the industry’s ‘champion’ negotiator, with CISA promising to support Baosteel in this role by using its import licensing powers to prevent any other Chinese mills from participating in the negotiations (China Daily, 2006). Initially, the officially stated goal of these policies was only to “*stabilise*” raw materials prices (NDRC, 2005: Article 30). However, by 2008 CISA was explicitly describing the program as aimed at cartelisation, claiming its purposes was to achieve a “*united front*” amongst the Chinese importers (Steel Guru, 2008).

Chinese cartelisation policies had an immediate effect on price negotiations, and between 2006 and 2008 achieved several successes in challenging the pricing power of the Big-3. In 2006, the Japanese mills abstained from the talks, leaving price negotiation to Baosteel and CISA’s government-backed cartel. The resulting negotiations were arduous, and when a deal was ultimately settled between Rio Tinto and Baosteel some eleven weeks after the April deadline, the unexpectedly low result of a 19% rise was widely considered to have resulted from the Chinese cartelisation policies (Dow Jones, 2006). In 2007, the Chinese cartel was able to split the Big-3 during negotiations – with Baosteel and Vale agreeing to another below-expectation rise of 9.5% in December 2006 before negotiations had officially begun, which BHP and Rio Tinto were then forced to reluctantly accept (Australian, 2008a). In February 2008, Baosteel again made an early deal with Vale for a 65% price rise, well below a demand for a 140% rise made by the two Australian firms. BHP and Rio Tinto initially refused to accept the 2007 Baosteel-Vale agreement, and threatened to boycott spot market sales to China in order to try and force a better deal (Australian, 2008b). However, they only proved able to extract an agreement for a 79% rise from Baosteel in July (Australian, 2008c) – a price much closer to original Chinese demand, which resulted in two regional benchmark prices (Brazil-Asia and Australia-Asia) rather than one. Thus, by late 2008 the state-backed Chinese iron ore import cartel had transitioned into the role of representing regional steelmakers in annual price negotiations, and had successfully balanced against the pricing power of the Big-3 miners by splitting the mining firms during price talks.

Table 3 Asia-Pacific iron ore benchmark price settlements, 2001-2011

Date	Settling parties	Reference price* (USD per tonne)	Change
Apr-01	BHP/Rio Tinto - Nippon	18.5	4.0%
Apr-02	BHP/Rio Tinto - Nippon	18.1	-2.4%
Apr-03	BHP/Rio Tinto - Nippon	19.7	9.0%
Apr-04	BHP/Rio Tinto - Nippon	23.0	16.7%
Apr-05	Vale - Nippon	39.5	71.5%
Apr-06	Rio Tinto - Baosteel	47.0	19.0%
Apr-07	Vale - Baosteel	51.5	9.5%
Apr-08	<i>Brazil - All: Vale - Baosteel</i>	84.9	65.0%
	<i>Aust - All: Rio Tinto - Baosteel</i>	92.6	79.9%
Apr-09	<i>All - Japan: Rio Tinto- Nippon</i>	62.1	-32.9%
	<i>All - China: No agreement</i>		
Apr-10		124.0	99.7%
Jul-10		151.2	22.0%
Oct-10		131.6	-13.0%
Jan-11	Quarterly index	141.7	7.7%
Apr-11		170.0	20.0%
Jul-11		164.9	-3.0%
Oct-11		162.1	-1.7%

Source: Author's compilation, from (The Australian, 2010b, 2011b; Platts, 2010; Reuters 2010, 2011b, 2011c; Rio Tinto, 2011; Steel Guru, 2010).

* Reference prices are calculated as the free-on-board price of 64% iron ore fines from Rio Tinto's Hamersley operations.

With annual negotiations becoming increasingly fraught, a major clash broke out between the two sides in 2009 as a result of intensified efforts by the mining firms to resist the Chinese cartel. Having paid the price of disunity in 2007 and 2008, the Big-3 took a more coordinated approach into the 2009 negotiations, jointly proposed a radical new 'index pricing' formula which would see the benchmark for LTC sales set with reference to regional spot market prices rather than through negotiation (Bloomberg, 2009a). Intent on protecting the negotiated pricing (upon which their cartel depended), CISA refused to agree to the Big-3's index pricing proposal; and in the context of the then-current GFC also demanded that 2009 prices should fall by 45% back to their 2007 level.

The conflict between the competing pricing models of the Big-3 and the Chinese mills proved so intractable that by negotiation deadline in April no agreement was reached. Fearful that negotiations would collapse entirely, the Japanese steel mills broke ranks with the Chinese cartel and settled with the mining firms in May for a 33% reduction, albeit without the index pricing model that had been proposed (Australian, 2009). In turn, CISA responded by threatening a Chinese import boycott against Big-3 in an attempt to force a deeper price cut. However, when this threat failed to split the mining firms, many of the smaller Chinese steel mills began making purchases from the Big-3 on a spot market basis, seriously compromising the Chinese negotiating position (Steel Guru, 2009b). CISA attempted to revoke the small mills' import licenses to restore discipline to the cartel; but this proposal was overruled by the Chinese Ministry of Commerce (from which its import licensing powers were legally delegated) on the grounds that cutting off the small mills' iron ore imports would seriously harm the industry, at the time exceedingly fragile due to the effects of the GFC (China Daily, 2009).

Before a formal settlement could be reached, the 2009 negotiations were then interrupted by a major political scandal. On July 5, the Shanghai Public Security Bureau arrested four members of Rio Tinto's negotiating team on charges of bribing Chinese steel mills to provide inside information on the Chinese position during price talks (Bloomberg, 2009b). The arrests, which became known as the 'Stern Hu Affair'⁶, proved extremely contentious. The Chinese government's handling of the arrest was less than transparent and drew official criticism from the US and Australian governments, and doubts were also raised over the authenticity of the evidence brought against the group during trials that were only partially open to outside observers. Rumours (founded or otherwise) began to circulate the arrests were a Chinese attempt to intervene in the price negotiations; though the Chinese government defended the veracity of the allegations against the group and rejected the suggestion that the arrests were in any way politically motivated (Australian, 2010a; Sydney Morning Herald, 2009). For its part, Rio Tinto initially denied the allegations made against the group, but when they each pleaded guilty to bribery charges during trials in March 2010 was forced to publicly accept their guilt and terminate their employment (Rio Tinto, 2009c, 2010). The immediate effect of the arrests was the total collapse of the 2009 talks, and no regional benchmark was agreed for the first time in the three-decade history of the price negotiations.

The Stern Hu Affair became the catalyst for a dramatic change to regional iron ore pricing arrangements in 2010. Having decided that negotiations had become too politically fraught to be viable, in February 2010 the Big-3 firms declared they would no longer participate in price negotiations. Instead, they jointly proposed a 'quarterly index' system, which would see benchmark prices for LTC sales change quarterly, in line with average iron ore spot market prices during the previous quarter⁷. With annual negotiations having now entirely broken down due to the mining firms' jointly refusing to participate, CISA was forced to allow Chinese mills to import using the quarterly index pricing system in February (China Daily, 2010), bringing to an end the Chinese iron ore import cartel. Given then-current spot prices, the adoption of quarterly index pricing resulted in a 99.7% price rise in its first quarter of operation alone (Table 3), an unprecedentedly large increase even in the context of the preceding five years.

Since April 2010, all the involved parties have officially adopted the quarterly index as the price determination mechanism for the Asia-Pacific iron ore market. The Big-3 miners have defended the system as being more transparent than the negotiated benchmark (BHP Billiton, 2009b), and argued that it reflects maturation in the regional iron ore market towards a more market-based pricing system (Vale, 2010). In practice, however, quarterly index pricing has so far favoured the mining companies - both by delivering further price increases (with the index continuing to rise before stabilising just over USD 160 in mid-2011), as well as definitively ending the scope for the cartelisation efforts sponsored by the Chinese government. Recognising the latter consequence, CISA has since abandoned the cartelisation program entirely, and replaced it two new iron ore pricing strategies. First, in July 2010 CISA announced a new import diversification program to challenge the market power of the Big-3, under which it intends to reduce China's iron ore import dependence on the Big-3 producers to only one-third of its total consumption by 2015, with the difference to be replaced by increased imports from the new market entrants being sponsored under the Chinese investment program (Bloomberg, 2010). This was followed in February 2011 by a CISA

⁶ Named after the head of the Rio Tinto negotiating team, who was the only Australian national amongst the group.

⁷ See statements by BHP (Mining Weekly, 2010a), Rio Tinto (Mining Weekly, 2010b) and Vale (Dow Jones, 2010).

plan that encouraged Chinese steel firms to build iron ore stockpiles, which it argued could be strategically released in order to prevent rapid price rises and “*guard against monopoly from global mining companies*” (China Daily, 2011a).

Whether Chinese steel mills will be able to use iron ore stockpiles to strategically manipulate regional iron ore prices in the coming years is a matter of debate. During 2011, Chinese steel mills increased their iron ore stockpiles by a third (to around 100 million tonnes, or two months of imports) (Bloomberg 2012); which Leaver (2011: 385) has suggested could potentially act as a “*market-breaking weapon*” under the new quarterly index system. However, as of early 2012 there has been no evidence of Chinese firms using stockpiles to manipulate regional prices, and whether such a tactic could succeed is an open question. In order to use stockpiles to manipulate spot market prices, Chinese steel mills would need to coordinate their individual purchasing activities to ensure the simultaneous release of stocks, which would presumably occur under CISA’s leadership. However, given CISA’s failure to effectively organise cartel activities its ability to orchestrate such a strategy is arguably weak at present. It may also invoke retaliation from the mining firms, and as the experience of the 2009 and 2010 price negotiations demonstrates the Big-3 have increasingly and effectively managed to collectively in dealing with Chinese cartel operations.

Conversely, the strategy of diversifying imports away from the Big-3 through a reinvigorated investment program could potentially prove workable for the Chinese steel industry. Based on the most recent official Chinese steel production figures (2009), the new CISA investment plan would require obtaining approximately 300 mtpa of iron ore from the Big-3, and a further 600 mtpa of ‘direct shipping ore’ (DSO) (or its equivalent) from other sources (CSY, 2010). Given Chinese domestic output is around 250 mtpa of DSO-equivalent production, and that some 425 mtpa of additional capacity is currently planned by the new China-sponsored projects, this diversification goal is achievable so long as Chinese steel and iron ore production are maintained at roughly their current levels and the new projects make it to market.

Nonetheless, and as noted before, the success of the new China-sponsored projects will crucially depend on future price levels. If record-high prices moderate as planned additional supply comes onto the market – 425 mtpa from the new entrants and 450 mtpa from the Big-3 – many of the less cost-competitive new projects will be unable to match the prices offered by the incumbents. This will necessitate Chinese investors to make even greater financial commitments to their sponsored projects (potentially also in the form of increased export prices) to ensure they remain in the market. While financial assistance from state banks at least makes it possible for Chinese investors to pay such supply security premiums, whether they will choose to do so also remains an open question. It is possible that under a scenario of significantly reduced prices it may become attractive for Chinese steel firms to abandon import diversification and continue to rely primarily on the lower-cost Big-3 firms. Much therefore depends on future price trends, which suggests that from the Chinese perspective import diversification is essentially a hedging strategy. If loosening supply does price out many of the new market entrants, the high prices rationalising the payment of supply security premiums to the new projects will largely be obviated; whereas if prices remain high the new projects will be a critical component of ongoing resource security efforts to diversify supply away from the Big-3 producers.

7. OUTCOMES AND IMPLICATIONS FOR THE ASIA-PACIFIC IRON ORE MARKET

As this analysis has shown, Chinese governmental resource security policies have driven rapid change in the Asia-Pacific iron ore market during the last decade. However, while Chinese investment promotion and cartelisation efforts have carried significant effects for the structure of the regional market, in terms of improving the resource security of the Chinese steel industry the program has at best delivered mixed results.

The most significant change has been to regional iron ore price determination mechanisms. As soaring Chinese demand drove rapid price rises and undermined the Japanese mills' effectiveness as price negotiators, the Chinese industry deployed state-led cartelisation efforts from 2005 in an attempt to reinstate a representative cartel on the steelmakers side of negotiations. However, Chinese attempts to moderate price rises through cartelisation have largely failed. Despite some success in its early years between 2006 and 2008, the increased assertiveness of the Big-3, combined with the politically controversial arrests of the Rio Tinto negotiating team, terminally compromised the Chinese cartel in 2009. Moreover, the response of the Big-3 to these cartelisation efforts has been to force the abandonment of annual benchmark negotiation entirely in 2010 in favour of a market-based quarterly index system, which has (thus far) ended the scope for Chinese cartel actions. The Chinese cartelisation initiative also did little to arrest price increases, which have increased four-fold since their announcement in 2005 and are presently at record levels. Overall, cartelisation has largely failed to improve the Chinese resource security in terms of either stabilising or reducing iron ore import prices.

The broader implication of the shift from negotiated to index-based pricing is that iron ore is coming to be priced like other internationally traded mineral commodities for the first time. While a benchmark price still exists for LTC sales in the form of the quarterly index (unlike the daily spot quotes used to price minerals on the London Metals Exchange), quarterly indexing is nonetheless a major step towards the transparent and market-based pricing systems used for most other mineral commodities. Indeed, as of mid-2011 there are currently efforts from both BHP and Rio Tinto for a move to a monthly- rather than quarterly-based index (Reuters, 2011a) which, if successful, would move iron ore pricing a further step closer to other minerals. Most importantly, the shift to index pricing has removed political factors – such as the degree of coordination between steel and mining firms, and the pricing power this confers – from regional price determination, which now occurs on the basis of supply and demand balances reflected in transparent spot price movements. As Sukugawa has recently suggested, iron ore is in the process of joining the “*commodity club*” for the first time (2010: 62).

Changes to the ownership structure of the Asia-Pacific iron ore market have been less dramatic than those for its price determination arrangements, but somewhat more successful from the Chinese perspective. On the one hand, producer-side ownership has become less concentrated as a result of Chinese governmental investment promotion policies to sponsor new regional suppliers. Some thirty new entrants to the Asia-Pacific iron ore market have received Chinese sponsorship, which collectively intend to add at least 425 mtpa of new supply to regional markets over the coming five years. This marks a major change in producer-side ownership from the situation in 2005, when the Big-3 producers faced few competitors and dominated the regional market. If these new entrants can successfully proceed from the development to production stage, they will also add a sizeable portion of additional capacity to the Asia-

Pacific market. This will go some way toward restoring balance between regional demand and supply, and improve the Chinese mills' resource security in terms of the availability of iron ore supply.

However, it is less likely that these new projects will ultimately dilute the ownership position of the Big-3 as the Chinese investment program has intended. As few are yet to enter production, the degree to which these new entrants have restructured producer-side ownership has so far been negligible. Moreover, whether all (or most) of these new entrants will actually enter the regional market in the coming years is an open question, as the majority are unlikely to be cost-competitive with the Big-3. The Big-3 are also aggressively expanding their operations, and the massive volume of new supply (around 875 mtpa) that both groups plan to add to the market can be expected to at least moderate the recent trend toward record iron ore prices. The degree to which regional prices will fall is currently debated, but nonetheless raises questions over whether the new China-sponsored entrants will be able to survive market-share competition with the Big-3, and whether Chinese investors will continue to pay supply security premiums to ensure their survival. Thus, while the sponsorship of new entrants will assist Chinese resource security by increasing regional iron ore supply in the coming years, only minimal reductions in producer-side concentration has either yet occurred or can be expected. The ultimate extent of diversification in ownership will depend upon future price trends and Chinese willingness to sponsor new market entrants, both of which suggest that expectations for a shift away from Big-3 dominance should at best be modest.

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