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An Empirical Analysis on the Lack of Iron Ore's Pricing Power in China

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Abstract: This study respectively gives a deep study at international iron ore oligarchic monopoly market, obstruction factors that effect on our country's pricing power, empirical analysis of the lack of our pricing power and policy implications on how to recapture the pricing power.

Key words: Iron ore, pricing power, index pricing

INTRODUCTION

Since the reform and opening, our country rapidly has become the world's second big trade country. Especially with the development of the "made in China", resource imports soared (Li, 2010). However, China faced a huge demand which have not equivalent pricing power and plunged into an extremely embarrassing predicament for a long time. And our country is in a critical period of industrialization, urbanization. Thus, the lack of iron ore pricing power not only restricts the development of iron and steel industry, shock the downstream shipbuilding industry, engineering machinery and real estate related industries such as automobile, home appliance.

Research idea and innovation: This article focuses on the theme of iron ore pricing power, along a path price formation mechanism, through dual the oligarchic conspiracy to motivation analysis and establishing modeling of iron ore supply and demand gap and formed China's imported iron ore pricing power loss theoretical basis under the oligopoly. By establishing the dynamic comparison (R), the international pricing power (V) and iron ore supply security evaluation model, China has become the world's imports of iron ore superpower since 2003. The level of annual loss of pricing power has respectively measured, forming a complete continuous changes in imports of iron ore pricing trajectory and trends in our country over the past decade and fill in the defects of the previous literature limited to one year and one index of coherence analysis.

METERALS AND METHODS

Iron ore pricing power measurement: The dynamic comparison (R) measure: (1) Calculation model, in order to measure the size of a commodity pricing in a country, Bai (2006) designed a calculating model used to measure from the price point. The model as a frame of reference, are based on the authority of this commodity price on the international market. If a country commodity prices compared to the authority of prices on the international market are lower, the country's commodity prices means good quality; On the contrary, the country's commodity prices is poor. To closer to reality, the model uses the price relative of quantity, through compared of the commodity price rise with the authority of the international market prices in the same period, concluded the result of the goods from the lack of pricing power in the country. This is the model for calculating the dynamic comparison (R). That is:

$$R = \frac{PM_t - PM_{t-1}}{PW_t - PW_{t-1}} \quad (1)$$

Wherein, R represents a dynamic comparison, if R>1, show that pricing power degradation; if R<1, indicates that pricing power optimization. And R is larger, the more pricing power inferior; R is smaller, the more pricing power excellent. PW_t and PW_{t-1} stand for a country for this year and the last year the prices of imports of goods, while PW_t and PW_{t-1}, respectively correspond to the international market price of commodities for this year and the previous year.

Data sources and processing: Take the historical data into the Eq. 1 and respectively calculated and then the dynamic price comparison for all imported iron ore prices in China (R) are shown in Table 1.

Empirical results: We analysis the calculation results of Table 2 and come to the following conclusions:

- In addition to the 2005 and 2009, China's imported iron ore dynamic value are more than 1. And even in 2004 and in 2008, it reached 1.50 and above, showing that there is lack of pricing power in China

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Table 1: China imported iron ore prices, the international iron ore market, 2002-2010 Unit: us $/ ton

Year	2002	2003	2004	2005	2006	2007	2008	2009	2010
PM	24.8	32.80	61.10	62.60	77.30	88.70	143.00	111.30	155.60
PW	29.3	31.50	37.90	55.60	67.50	73.50	131.20	97.20	140.00
PM-PW	-4.5	1.30	23.20	7.00	9.80	15.20	11.80	-2.25	1.55
R	-	1.23	1.55	0.64	1.02	1.05	1.50	0.93	1.04

Data sources: THE price of imports from China customs statistics data, the international market price from Brazil ore CIF price to Europe

Table 2: Output of major national steel product and mining production from 2003 to 2010 Unit, one hundred million tons, (%)

Year	2003	2004	2005	2006	2007	2008	2009	2010
China's crude steel production	2.22	3.09	3.49	4.19	4.89	5.00	5.68	6.27
China's crude steel CR4	20.98	18.52	17.92	18.71	19.97	23.96	24.41	28.20
China's crude steel CR2	13.51	11.18	10.00	9.92	10.49	13.73	13.93	11.29
China's crude steel CR1	8.93	7.86	8.00	5.37	5.84	7.07	7.08	7.15
Japan's crude steel production	1.11	1.15	1.12	1.16	1.20	1.19	0.88	1.22
Japan's crude steel CR4	73.29	74.00	74.50	75.00	87.00	77.60	73.20	83.00
Brazilian iron ore production	2.15	2.65	2.82	3.11	3.37	3.46	3.80	3.81
Vale iron ore production	1.66	2.15	2.25	2.55	2.80	3.01	3.08	3.12
Brazilian iron ore CR1	77.21	81.09	79.79	81.90	83.20	75.00	81.50	82.00
Brazilian iron ore CR4	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
Australian iron ore production	2.34	2.63	2.98	3.86	3.36	3.50	3.94	4.25
Rio and BHP iron ore production	1.83	2.05	2.35	3.01	2.68	3.01	3.34	3.67
Australian iron ore CR2	78.12	77.97	78.76	78.23	79.93	86.00	84.77	86.35

Data source: China's steel association (2003-2010), the China iron and steel industry yearbook

- The absolute price of China's imported iron ore over the years except 2002, are greater than the international market. Especially in 2004, the price was actually 161% of the international market price, indicating that our pricing not only lacking, but also quite serious
- In addition to the 2002, 2009, the difference between China imported iron ore PM and the international iron ore market PW were positive over the years and looking from the price increase, shows that China's pricing power is missing
- For 2005, R = 0.64<1, doesn't mean the year China's pricing power optimization. Because R is calculated under the premise of price increases sharply in the last fiscal year and the international market is small price. In the fiscal year, the price of imports is greater than the international market price
- For 2009 (PM-PW) is negative, by the financial crisis, the global recession and steep drop in demand for iron ore. Even so, in the fiscal year, the decline for the price of iron ore in a country is also less than the international market. Even in the international financial crisis, China's pricing power is missing

In summary, by the empirical analysis of the dynamic comparison, whether from the absolute price or model calculations since 2003, have proved that China's imports of iron ore pricing is missing.

The international pricing power (V) measure: The calculation results can be seen from the dynamic comparison .In 2005 R = 0.64<1, this fiscal year, our pricing power should be optimized theoretically. But in fact, this year China's pricing power is missing. Only by price cannot be accurately defined the degree of pricing power pros and cons. Therefore, Bai (2006) study found that measuring pricing size, not only depends on the price fluctuations, as well as with the international market share and Herfindahl-Hirschman Index (H), at the same time also consider the country both imports and exports of the double impact of the commodity. So, he introduced two concepts: market power and the Herfindahl-Hirschman Index (H); which established the international pricing power quotient (V) measurement model.

Model assumptions:

- If a country mainly imports a commodity without export the commodity, or even if the export, but the quantity is small, negligible. Such as, China's export iron ore is very low
- By the same token, if a country mainly export of certain goods and not import the goods, or even import, the number is small and negligible. Such as Brazil, Australia and other section of imported iron ore can be neglected
- In view of the international market, Herfindahl-Hirschman Index calculation is difficult for buyers and sellers. The model of H will be instead of CRn (industry concentration) in order to improve the accuracy of the model calculation. In the same formula, buyers and sellers of n values consistent, such as, are 1, 2, 3, 4,... and so on
- The data select from the mining companies and steel enterprises of the model and the output of crude steel represent concentration. That is in line with the technological characteristics of the steel enterprises and international practice

Model design: Give pricing power measure general Eq:

$$V = \frac{C_x.H_x + C_m.H_m}{H_x + H_m} \quad (2)$$

Among them, the V represents the international pricing suppliers, Between 0 to 1, the greater the V, the better pricing power is; Instead, the smaller the V, the more bad. C_x and C_m respectively represent the international market share of a country's import and export of a commodity. H_x and H_m stand for Herfindahl-Hirschman index for buyers and sellers in the international market.

Based on the above assumptions, this particular commodity of imported iron ore in China, ignore asymmetric Herfindahl-Hirschman Index for buyers and sellers, the Eq. is simplified to:

Importing country:

$$V_x = \frac{C^a_x.H^a_x}{H^a_x + H^b_m}$$

Exporting country:

$$V_m = \frac{C^b_m.H^b_m}{H^a_x + H^b_m}$$

The meaning of each index is unchanged in the Eq. According to the model assumptions, H_{ax} replace Cr^a_n and H^b_m substitute CR^b_n, will be get:

$$Vx = \frac{C^a_x.CR^a_n}{CR^a_n + CR^b_n} \quad (3)$$

$$V_m = \frac{C^b_m.CR^b_n}{CR^a_n + CR^b_n} \quad (4)$$

And:

$$CR_n = \sum_{i=1}^{n} S_i$$

S_i means the market share in the enterprise and n is the total number of enterprises.

In general, usually compare the V values between the two countries and come to the pricing factor calculation model:

$$G = \frac{C^a_x.CR^a_n}{C^b_m.CR^b_n} \quad (5)$$

Data processing and calculation results: The data used in this article comes from the China statistical yearbook, the China Iron and Steel Statistics Yearbook and the world steel association. I make every effort to obtain data due to the limited statistical coverage. However, the author gains some data for purposes of research, which may affect the research depth to some extent.

China has become the world's imports of iron ore superpower since 2003. The phenomena that lack of pricing power become more and more serious. Therefore, this article selects the period from 2003 to 2010 as the research object.

Put the data in Table 2 and 3 into the model (2.1 5) respectively and the result will be calculated in the Table 4.

Table 3: Major national iron ore import and export trade statistics from 2003 to 2010 units, one hundred million tons, (%)

Year	2003	2004	2005	2006	2007	2008	2009	2010
China imports	1.48	2.08	2.75	3.26	3.83	4.44	6.28	6.18
China's share of world ratio	28.50	36.00	43.10	41.80	44.70	47.50	77.00	57.20
Japan imports	1.32	1.35	1.32	1.34	1.39	1.40	1.06	1.15
Japan's share of world ratio	25.50	23.30	20.70	17.20	16.20	15.00	12.90	10.70
World imports	5.19	5.78	6.39	8.03	8.56	9.33	8.15	10.80
Brazilian exports	1.75	2.18	2.25	2.40	2.69	2.82	2.66	3.05
Brazil accounted for the world ratio	33.70	37.70	35.20	30.80	31.50	30.80	27.70	29.00
Australian exports	1.87	2.10	2.39	3.09	2.69	3.09	3.68	3.97
Australia's share of world ratio	36.00	36.30	37.40	39.20	31.40	33.70	38.20	37.80
The world output	5.19	5.78	6.39	7.88	8.54	9.16	9.62	10.50

Data source: Steel Statistical Yearbook (2003-2010), International Iron and Steel Institute (IISI), China statistical yearbook, my steel nets calculated

Table 4: China and major countries pricing coefficient (G) results

Pricing power quotient (V)	2003	2004	2005	2006	2007	2008	2009	2010
China and Pakistan G1	0.098	0.093	0.123	0.089	0.100	0.145	0.241	0.172
China and Pakistan G4	0.197	0.196	0.244	0.282	0.315	0.411	0.754	0.618
China-Australia G2	0.137	0.142	0.146	0.135	0.187	0.199	0.331	0.198
Sino-Japanese G4	0.320	0.387	0.501	0.606	0.633	0.978	1.990	1.816

Data source: This study

RESULTS AND CONCLUSION

In addition to the financial crisis of 2009, we analyzed the other years data and have the following conclusions.

- Comparison between buyers and sellers: whether it's Brazil, Australia, any the seller, or any results of, suggests that China's pricing power was far less than the other in the Table 4. Seen from the most representative result G_1, in the past "one-on-one" price negotiations, 2010 was our optimal pricing power year. But at best it is only 17.2% of Brazil's, the worst in 2003 just 8.9% of Brazil's pricing power. This indicated that the negotiations both sides were not a dialogue platform, China completely in a subordinate position. It was coincide with the soaring price of imported iron ore in China since 2003
- Sino-Japanese buyer comparison: From the table, our pricing was less than Japan when China and Japan as the purchaser and just have 32% of Japan's in 2003. Although from Table 4 in the past two years, the data looked like our pricing power over Japan; the actual was the model did not consider the overseas equity mine factors of pricing power (Komiya *et al*., 1988)
- Seen from the table, whatever, our pricing was increased year by year for the demand of market share playing a role. The China-Japan pricing game was evident. In 2004, Baosteel represented China in negotiating iron ore prices and a number of steel enterprises attended in 2005; China gained the starting pricing power for the first time in 2007.However, in 2010, the data on China's pricing power were better than Japan's. The CR4 of China's steel enterprises only had 28.2%, which would not form a price alliance. In 2009 and 2009 two years, China could not be around Japan of CR4 about 83% and influenced CR4 about 80-90% of seller's monopoly, which finally could be fruitless

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