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Interdependence between iron ore production and maritime transport

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INTERDEPENDENCE BETWEEN IRON ORE PRODUCTION AND MARITIME TRANSPORT

The maritime industry plays an important role in international trade, transporting a total of 10,1 billion tons of merchandise in 2015, representing over 80% of all global trade, with dry cargo estimated to account for over two thirds of the total seaborne trade. Bulk carriers supply the raw materials needed by the steel industry and container ships transport the steel products. Demand and supply for seaborne transport is influenced by trends in global economy and worldwide demand for commodities. The paper analyzes the most important economic determinants in the supply of metallurgical raw materials, highlighting the importance of the shipping sector.

Key words: iron ore production, iron ore price, maritime transport, Baltic Dry Index (BDI)

INTRODUCTION

The maritime industry addresses challenges pertinent to the transportation of large volumes of basic commodities and finished products, in the most efficient, and often the only method possible. In 2015, approximately 7,2 billion tons (Bt) of dry bulk cargo was transported by sea, comprising about 71 % of all international seaborne trade (10,1 Bt) [1]. Dry bulk cargo is shipped in large quantities and can be easily stowed in a single hold with little risk of cargo damage. Dry bulk cargo is generally categorized as major or minor bulk. Major bulk cargo constitutes the vast majority of dry bulk cargo by weight, and includes, among others, iron ore, coal and grain [2]. Minor bulks include agricultural products, mineral cargoes (e.g. metal concentrates), cement, timber and steel products. In terms of seaborne trade volumes (and the shipping ton-miles generated),

the dominant influence is that of major bulk trades, especially iron ore.

Maritime transport is heavily dependent on demand and supply in the steel industry. The freight rate indices issued by the Baltic Exchange, based on actual charter hire rates, are important indicators of the demand for transporting major cargoes.

The BDI, which measures the price of moving major raw materials by sea, is regarded by some analysts as a good leading indicator of the health of the global economy [3].

World economic growth for 2015, although positive (3,1 % change vs. 2014), remained below pre-crisis levels, with advanced and developing economies, expanding at very different rates (2,1 %, and 4,2 % respectively) [4]. A 3,8 % increase over 2015 is expected for 2016, according to the International Monetary Fund (IMF) [5], whereas the World Bank forecasts a 3,2 % increase [6]. Trade and development are closely interlinked since a decrease in world economy growth will lower demand with obvious repercussions on the maritime industry.

RESEARCH METHODOLOGY

Relevant information was retrieved from various sources, including IMF and WTO for world economy, UNCTAD, SNL Metals & Mining, Wood Mackenzie, for iron ore volumes and price data, as well as, the International Maritime Organisation (IMO), Baltic and International Maritime Council (BIMCO), Clarksons Research and maritime sources available to the authors, for shipping data and interpretation. In the present paper, different factors influenced by the world economy, trade and shipping are presented highlighting they influence the supply of transport and freight rates of iron ore.

IRON ORE PRODUCTION

Iron ore is mined in about 50 countries, but seven account for about 75 % of the total world production, namely China, Australia, Brazil, India, Russia, South Africa and Ukraine. The world's iron ore exports are dominated by Australia and Brazil (see below). Iron ore production is analyzed in Table 1 and exports in Table 2. The impact of the global economic and financial crisis in 2008 and the recovery after 2009 are clearly demonstrated. In 2015 iron ore production (Table 1)

showed a 109 %, 9 %, 40 % and 44 % increase in Australia (Oceania), Africa, Americas and Europe respectively, whereas Asia showed a decrease of 31 %.

This is also highlighted in Table 2 where Asian volumes decreased by 76 %, whereas Australian exports increased by 124 % in 2015 vs. 2009. Interestingly Africa has become an alternative producer and exporter, since exports rose by 167 % in 2015 vs. 2009. As China accounts for 50 % of the world's crude steel production, it is interesting to note that in recent years, production depends more on imported iron ore, than domestic supply (Table 3). The data indicate a 74 % import ratio for 2015, and reports from Wood Mackenzie expect the ratio to be 84 % by 2020 [8]. This additional demand is met by Australia's high-quality iron ore deposits and close proximity to China, as well as Australian investments in mines which include expanding capacity at existing operations, such as Rio Tinto and BHP Billiton, and the start-up of Fortescue Metals Group Ltd, in Western Australia.

The growth in production has also been supported by the emergence of new producers in the Pilbara region such as Atlas Iron Ltd, BC Iron Ltd and Citic Pacific Ltd. Taking in account that similar projects and investments are taking place

Table 1 Iron ore production, per geographical area / Mt [8, 9, 10]

Geographical area	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Oceania	290	270	289	350	420	417	482	515	603	698	877
Asia	455	595	656	625	508	658	613	576	515	452	353
Africa	65	53	75	75	77	75	87	96	107	110	84
Americas	420	457	468	465	410	505	535	525	519	524	572
Europe	210	225	232	235	205	245	265	268	281	291	296

Table 2 Iron ore exports, per geographical area / Mt [8, 9, 10]

Geographical area	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Europe	75	82	89	73	69	91	101	99	102	103	95
Americas	283	304	320	337	342	396	432	422	422	428	484
Africa	33	32	28	38	36	49	54	64	108	112	96
Asia	91	93	121	130	144	137	128	111	71	57	34
Oceania	231	257	279	325	365	416	446	467	568	698	816

Table 3 Chinese iron ore supply / Mt and import ratio / % [8, 9, 10]

Iron ore supply	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Domestic	275	331	383	296	250	353	368	325	400	300	283
Imports	275	319	367	444	636	620	692	754	841	945	982
Import ratio	50	49	49	60	72	64	65	70	68	76	78

in Brazil, it seems that the market will become more competitive and changes are expected.

IRON ORE TRANSPORT

Based on the continued growth in the steel producing industry, global iron ore trade increased by 7 % doubling the volumes between 2006 and 2015. As shown in Figure 2, iron ore shipments totalled nearly 1,43 Bt in 2015, with Australia and Brazil, accounting for 75,6 % of iron ore shipments.

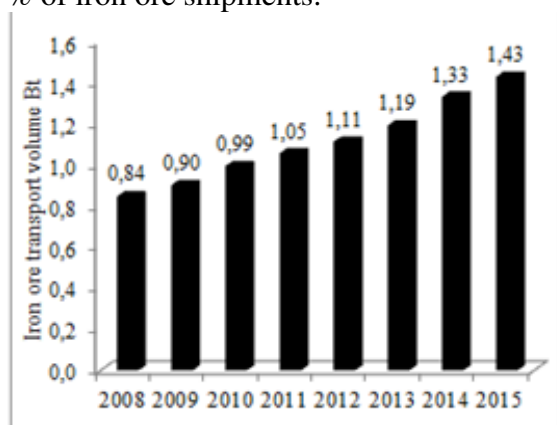


Figure 2 Iron ore sea transport / Bt [12]

In addition to the decrease in steel production, analysts foresee a fall in Chinese steel consumption by more than 100 Mt by 2030, making it difficult to estimate the effect on maritime transport, since 960 Mt of 1425 Mt (2015) of seaborne iron ore went to China. At present, China remains the main import market for iron ore driven by large construction / infrastructure investments.

DRY BULK INDEX AND IRON ORE PRICE

Predicting how the global economy will perform in the coming years is vital to both the steel industry and the maritime sector. Analyzing commodity prices, i.e. world iron ore prices, and the BDI, has been used to provide an insight into the growth rate of industrial production in developed and emerging market economies. The BDI measures the freight rates charged for chartering ships that carry

major bulk cargo, a composite of the dry bulk time charter averages of the various markets for dry bulk. As shown in Figure 3, both the price for iron ore and the BDI decreased in 2008 – 2009, recovered by 2010, but in 2015 the BDI reached a 30-year low. One would expect some kind of link to exist between these two indices, as both are driven by the balance of supply and demand. This interdependence is hard to assess however, since commodity markets operate with a lag, shipping, in turn, moves with an extra lag, as ship owners respond to the higher commodity demand. The supply of ships is also inelastic, as it takes around two to three years between ordering a new vessel and its launch, risking that conditions may have changed. New orders for ships are sustaining an already existing oversupply in transport capacity which, in tandem with the World Trade Organization's (WTO) forecasts of lower world trade growth, highlight the uncertainty of the future. To complicate the matter even further, prices for steel have decreased to an average of \$ 200 / ton in late 2015, while the price of iron ore has risen nearly 50 % in the first half of the year, indicating that steel mills are using their iron ore stocks (destocking), anticipating a fall in ore prices in future.

CONCLUSIONS

Within the context of a stagnating global economy, world seaborne transport serves to provide the volumes of raw materials needed at the lowest price per ton-mile, compared to any other means of transport. This provides the basis for steady growth in steel production and steel commodity trading. World seaborne volumes although depressed in recent years, are forecast to grow driven by major bulk cargoes, in particular iron ore and coal, as well as by containerized trade and gas shipments. China's continued urban development investments and competitive international steel prices support growth in major dry bulk shipping, which however has suffered from the recent decrease in commodities trade growth.

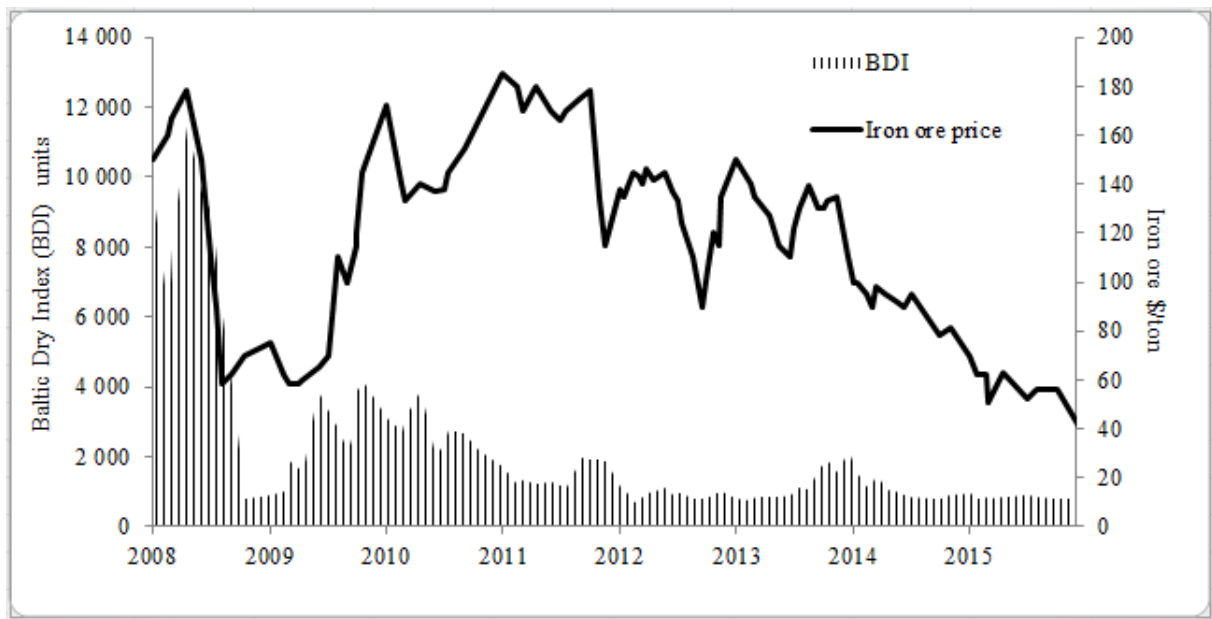


Figure 3 Iron ore price (\$ / ton) and BDI variation [13]

Although some researchers maintain that the BDI can serve as an indicator of the world economy, this study maintains that due to the high volatility in shipping rates indicating an industry, with multiple competing vendors, many more indices are needed to forecast the prospects of shipping within the world economy.

Chronic tonnage oversupply, emerging iron ore market such as Africa, ship scrapping and recycling and CO₂ emissions, are but a few challenges facing the shipping sector. On the other hand, the fragile recovery in developed economies, the difficulties facing large emerging economies, the escalating geopolitical tensions, the financial market volatility including Greece, the lower commodity prices affecting emerging economies and the long term developments in China and India, seem to be risks that can turn the world economy away from positive growth.

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