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Ship demolition activity: A monetary flow process approach

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ABSTRACT

The demolition market assists in balancing the supply and demand in the shipping industry and is a major driver of market equilibrium and the level of freight rates. Even so, literature related to ship demolition, focuses mainly on the environmental and regulatory aspects of the topic. Literature related to the economic analysis of the industry and the factors affecting demolition activity is rather limited and sporadic. From this perspective the current paper is helpful to further build up insight of the shipbreaking industry. The decision to sell a ship for scrap is driven by a number of factors with the most important being the state of the market cycle. The offered scrap price for the ship will also affect the decision of the shipowner. In this paper we analyse the process of ship sale for scrap with particular focus on the monetary flows of the ships sale process.

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1 Introduction

The shipping industry includes four sub markets: The freight market, the shipbuilding, the ship breaking or demolition and the second hand market (Stopford, 2009). These markets are tightly interdependent. In this paper we focus on the demolition market which acts as the balancing lever in times of ship oversupply (Jugović et al., 2015). When supply of ships outstrips demand then the general market freight levels and shipowners' earnings drop. This makes some ships uneconomical to operate and shipowners may choose to sell them for demolition. Usually – but not always – the ships directed for demolition are the older ones that have become technically obsolete (Buxton, 1991). Regulatory changes that speed up technical obsolescence also affect the decision to demolish a ship (Knapp et al., 2008). When ships are driven to the demolition yards at a faster pace than the number of ships entering the market from the shipyards then oversupply is reduced. This will ultimately lead to a new market balance that will allow for higher freight levels and profitable operation (Randers and Göluke, 2007).

From a shipowner's perspective the decision to sell a ship for scrap is driven by a number of factors with the

most important being the state of the market cycle. This is usually evidenced by the general level of freight rates. In addition a shipowner will also evaluate the offered scrap price for his ship which is affected by currency exchange rates and the price of the scrap steel which is the result of the ship demolition process.

The paper starts with the literature review and follows a short presentation of the shipbreaking industry with particular focus on the main shipbreaking countries. We then turn to the presentation of the process of the sale of a ship for demolition focusing particularly on the monetary flows that may be affected by currency exchange movements. Finally a discussion of the findings concludes the paper.

2 Literature review

The demolition market assists in balancing the supply and demand in the shipping industry and from that perspective is a major driver of market equilibrium and the level of freight rates. Even so, literature related to ship recycling or demolition, focuses mainly on the environmental (Hiremath et al., 2016; Hiremath et al., 2015; Reddy and Manoharan, 2014; Deshpande et al., 2013; Abdullah

et al., 2012; Chang et al., 2010; Basha et al., 2006; Sinha, 1998) and regulatory aspects of the topic (Moncayo, 2016; Zhao and Chang, 2014; Samiotis et al., 2013; Bhattacharjee, 2009; Kaiser, 2008; Rousmaniere and Raj, 2007). Literature related to the economic analysis of the industry and the factors affecting demolition activity is rather limited and sporadic. From this perspective the current paper is helpful to further build up insight of the industry from an economic and process approach.

In one of the early papers on the subject, Buxton (1991) explores the fundamentals of the ship demolition market. As he notes the cause for scrapping a ship is either technical or economic obsolescence and the latter is strongly influenced not only by anticipated freight market levels, but the rate at which more efficient ships are being introduced. Furthermore, the scrap value of a ship is a function both of the realizable value of the materials within the ship and cost of demolition. Both are strongly influenced by the cost structures prevailing in the likely country of demolition. With that in mind, the author deals also with the trends between 1960s to 1990 and he notes that the shipbreaking market in that period has shifted from being West European-centered to Asian-centered, concentrating in Taiwan. The author also notes that even from the early '90s the ship demolition activity was shifting to the Indian subcontinent.

Knapp et al. (2008) apply econometric modeling on a data set in order to gain insight into the dynamics of the ship recycling market. The data set employed runs from 1987 to 2007 and focuses on variables that increase the probability of a ship being scrapped such as a vessel's age, type, detention rate, safety profile (number of safety inspections), earnings, demolition price, etc. The results confirm a negative relationship of earnings and a positive relationship of scrap prices for all locations that demolition activity takes place. It was also indicated that Bangladesh seems to be more sensitive to changes in earnings than the other locations and more likely to demolish larger and older vessels.

Pour et al. (2012) deal with the shipbuilding and the scraping industry focusing on the economic factors that affect supply and demand as well as on the processes involved in the two activities. The authors discuss the problem of defining capacity in the shipbuilding industry as well as the factors of productivity, labour cost, exchange rates and the competitive advantage created by material availability. In their analysis of the shipbreaking industry they employ economic principles aiming to explain the reasons why shipbreaking concentrates on developing countries with low labour costs.

Sujaiddin et al. (2014) focus on the ship breaking industry in Bangladesh and suggest that in this country bulk carriers and tankers are preferred vessel types to scrap due to their higher steel content compared to other vessel categories. They make the observation that through the passing of time vessels scrapped in Bangladeshi yards (or beaches) are of increasing size and decreasing age. They

also support that one of the most important drivers for the scrap yards in Bangladesh is the local demand for steel. The authors during their analysis also provide a formula for connecting LDT from basic ship dimensions to DWT.

Finally, Merikas et al. (2015) focus on a similar point and examine the connection of ship demolition prices with the steel industry. The authors support the view that ship recycling industry is a significant supplier of materials to the steel industry and thus the steel industry affects ship recycling activity. This is also supported by Wang et al. (2014). From this principle, Merikas et al. (2015) support the view that favorable freight market conditions lead to high demolition prices in an effort to attract ships for scrapping although the scrap prices offered will never exceed steel price. With the use of monthly time series data between 2004 and 2014 for the tanker, the product and the dry bulk markets, the authors find that the scrap value primarily leads together with the Chinese growth rate, the exchange rate and an index utilized to reflect ship profitability.

3 The shipbreaking industry

China, India, Bangladesh and Pakistan are among the leading shipbreaking countries. Based on data from Clarksons SIN (2015), these four countries hold 82 % in terms of number of ships and 92 % in terms of DWT demolished (Figure 1). These data is similar to the data from Reddy and Manoharan (2014) that report 75 % and 93 % in terms of number of ships and dwt demolished respectively. Based on this it seems that shipbreaking is located usually in low cost labour countries as the process is highly labour intensive (Samiotis et al., 2013)

Lightship Displacement Tonnage (LDT) is the most important measurement unit in the shipbreaking process (Pour et al., 2012). The price a ship is sold for demolition is almost always quoted on a per lightship ton basis. This gives an estimate of the useful material after the demolition. (Mikelis, 2007). The type and size of a ship determine the LDT. Equal in size but of different types ships have different LDT. Again ships of the same type but of different size differ in LDT.

According to Knapp et al. (2008) earnings, and thus freight levels, have a negative effect on the decision to send a ship to the demolition yards. The higher the freight rates the higher the earnings from ship operation. Thus high freight rates allow even inefficient, aged and technologically obsolete vessels to operate profitably. As long as a ship is profitable the ship owner is reluctant to sell it for scrap and thus a negative relation exists between freight levels and number of ships scraped (Figure 2).

On the other hand, the decision to sell a ship for scrap has a positive relation with the scrap price, i.e. the price the vessel is sold for demolition. Scrap prices are connected with the demand for scrap steel (Merikas et al., 2015). This relation is the result of the use of scrap steel in the steel production process (World Coal Association, 2016).

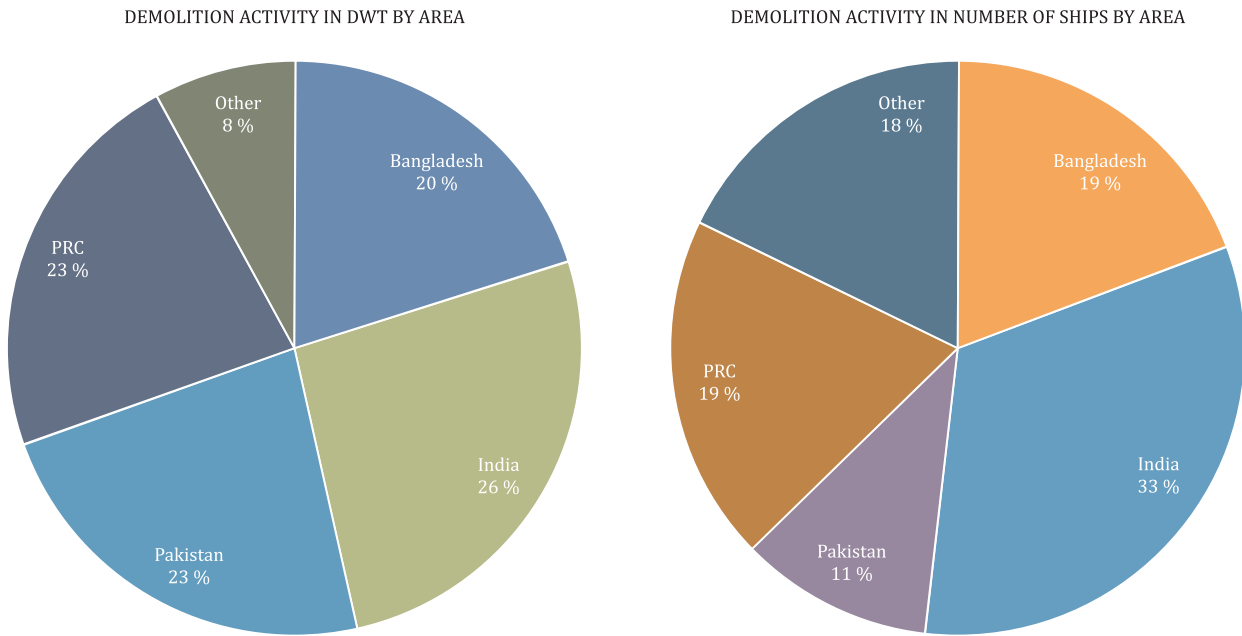


Figure 1 Demolition activity in dwt and ship number by major demolition country

Source: Authors' elaboration with data from Clarksons SIN, 2015

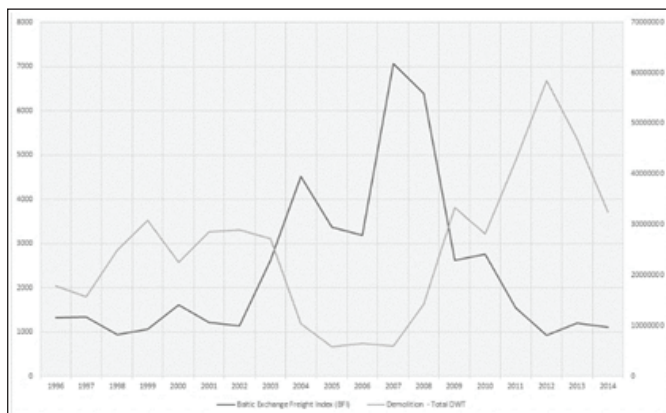


Figure 2 BFI index and demolition activity measured in DWT between 1996-2014

Source: Authors' elaboration with data from Clarksons SIN, 2015

Table 1 Top 10 crude steel producers

Country/Region	2013	2014	2015
World	1649.3	1670.1	1669.9
PR China	779	822.7	803.8
Japan	110.6	110.67	105.2
India	81.2	87.29	89.4
United States	87	88.17	78.8
Russia	69.4	71.46	70.9
South Korea	66	71.54	69.7
Germany	42.6	42.94	42.7
Brazil	34.2	33.9	33.3
Turkey	34.7	34.04	31.5
Ukraine	32.8	27.17	23

Source: Authors' elaboration with data from Worldsteel Association (2016)

In addition due to price differences scrap steel is becoming increasingly important as an alternative source of iron ore (Wang et al., 2014).

The largest steel producers is by far China with around 48 % of worlds' crude steel production in 2015 (Worldsteel Association, 2016). Apart from China, only India is within the top 10 crude steel producing countries that are also among the top ship dismantling countries (Table 1). This means that the scrap steel produced in those two countries would most probably be consumed locally.

4 The monetary flows in the process of the sale of ship for dismantling

The sale of a ship for dismantling can be the result of a direct deal between the demolition yard and the shipowner. However it is more common to be made through a Cash Buyer. Shipbreaking yards usually offer a small deposit and a bank letter of credit of between 60-180 days (Mideast-shipping.com, 2016). The shipowner would prefer cash payments. Because of that most deals are made through Cash Buyers. Cash buyers act as intermediates between the shipowner and the scrap yard (Mikelis, 2013).

A Cash Buyer can buy a ship for dismantling on "As Is-Where Is" basis. In this process the Cash Buyer purchases the ship against full cash payment and for a small period becomes the ship owner. They then negotiate the sale of the ship to the shipbreaking yard usually against a bank letter of credit. In the second option, usually termed a "Delivered Basis", the Cash Buyers provide a cash

deposit of between 10-30 % to the shipowner against a Memorandum of Agreement (MOA) for the delivery of the ship at the shipbreaking yard. The balance of the agreed price is paid to the shipowner upon delivery of the ship (Mideast-shipping.com, 2016).

Based on the above described process, a Cash Buyer acts more or less as a financial facilitator. From this perspective there is a financial risk due to the time difference between the cash payment and the sale of ship to the shipbreaking yard. There is also a risk of currency exchange fluctuation. The financial risk increases further due to the use of a letter of credit by the yard for the payment of the ship.

From the ship breaker's perspective there are also financial and currency exchange risks. Regardless of whether the ship breaker purchases the ship directly from the owner or through a Cash Buyer there are three main money flows.

The first flow is from the shipbreaker to the seller (shipowner or cash buyer) of the ship in USD dollars. This payment constitutes the bigger cost of scrap steel production for the shipbreaker (ICRA, 2012). The second flow regards the payment of the inputs of the shipbreaking process. These mainly include labour costs, taxes, financial costs and consumables. These costs are paid locally. The third and final flow is opposite in direction from the previous two. This time there is a monetary flow from the scrap steel buyer to the shipbreaker. This flow can be in the local currency if the buyer is a local steel mill or in USD if the buyer is a foreign company.

The monetary flows described above affect the profitability of the shipbreaker in a number of ways. Some of the flows are in USD and some in the local currency. The possible difference in the currency exchange rate at the points of payments will affect the profitability. Currency exchange rates will also affect financial costs of the letter of credit issued for the ship purchase.

5 Discussion/Conclusions

In this paper we focused on the demolition market which acts as the balancing lever in times of ship oversupply. When there is oversupply in dry and wet bulk markets there is a need for the supplied tonnage to reduce and this can only be achieved drastically with an increased number of ships scrapped. From this perspective the demolition market acts as the balancing lever in times of ship oversupply.

Today the bulk of the demolition activity is found in the Indian subcontinent and China. India, Bangladesh, Pakistan and China are the leading shipbreaking countries holding 82 % in terms of number of ships and 92 % in terms of DWT demolished. This concentration of the activity is attributed to the fact that shipbreaking is a labour intensive activity due to the low profit margin from the proceeds of the demolition that does not justify investment in capital. Therefore the activity is overwhelmingly concentrated in low cost labour countries.

The demolition activity is primarily driven by the freight market conditions. High earnings, driven by high freight levels have a negative effect on the decision to send a ship to the demolition yards. High freight rates allow even inefficient, aged and technologically obsolete vessels to operate profitably. As long as a ship is profitable the ship owner is reluctant to sell it for scrap and thus a negative relation exists between freight levels and number of ships scrapped. Thus before a shipowner starts to evaluate the option to scrap his ship the freight market conditions must first deteriorate.

When market conditions deteriorate and market freight levels do not allow for a profitable operation then the shipowner will evaluate the demolition option. At this stage the price the vessel can be sold for scrap will play a significant part on the decision making of a shipowner. Scrap prices though are connected with the demand for scrap steel. This relation is the result of the use of scrap steel in the steel production process. When demand for steel is low which is usually the case when shipping freight rates are low the ship scrap price will also be reduced. Thus an interesting situation arises. The shipowner looks for a high scrap price exactly at the time where demand for scrap steel and the price is on a downward trend.

The sale of ships is facilitated by the banking system that provides letter of credits for the purchase of the ships to be demolished. However most of the deals depend on the facilitation provided by the Cash Buyers that play a financial role bridging the gap between the credit process offered by the buyer and the request for cash deposit from the shipowners. The process is highly financial driven and the financial costs associated with this affect the final price offered and accepted. In particular the financial flows engaged in a sale of ships regard flows both in local and foreign currencies. Therefore changes in the foreign exchange rates affect the profitability of the shipbreaker and the price offered to the ship seller and ultimately the scrap sale agreement.

The process of ship sale for scrap is not adequately evaluated in literature. Even more the financial processes of ship sales for demolition are even less examined by researchers. From this perspective the paper offers the fundamentals of the process that allow for further research into the evaluation of the effect of foreign exchange rates movement on the ship sale prices and activity volume.

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