Ship demolition activity. An evaluation of the effect of currency exchange rates on ship scrap values.

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Abstract

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 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 support the view that ship scrap prices are affected by the currency exchange rates at the main demolition countries. We apply regression to evaluate our hypothesis. The regression results indicate a strong relation between ship scrap price and currency exchange rates of the main demolition countries albeit with some differentiations between vessel sizes.

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. The level of freight rates depend on the balance of demand and supply for ships and any shift in this balance affects freight levels. On the demand side the factors that shift the balance are: world economy, seaborne trade volumes, trade distances, political disturbances and transport costs (Scarsi, 2007). Supply of ships on the other hand depends on the existing fleet (Greenwood and Hanson, 2014), the productivity of the fleet, the ships to be delivered and ships demolished or scraped (Jugović, et al., 2015). These factors are endogenous in the shipping market in the sense that depend on the shipowners' decisions.

In this paper we focus on the demolition market which acts as the balancing lever in times of ship oversupply. 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).

Thus from the 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. Our hypothesis in the paper is that currency exchange rates affect the ship scrap prices offered by shipbreakers. We test our hypothesis by applying regression on ship scrap price against the exchange rates to US dollar of the leading demolition countries of Bangladesh, India, China and Pakistan, the freight rate conditions and the number of ships scrapped. The regression results indicate a strong relation that supports our hypothesis although not all countries' currencies are found to be statistically significant for all size sectors.

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. The regression and the results are presented in the rest of the paper and 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.

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.

Sujauddin 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

According to Pour, et al., (2012) in the mid 1980 around three quarters of the demolition activity was made in Taiwan, China and South Korea. Today only China is still within the top shipbreaking countries. India, Bangladesh and Pakistan are now 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 (Graph 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)

Graph 1: Demolition activity by major country
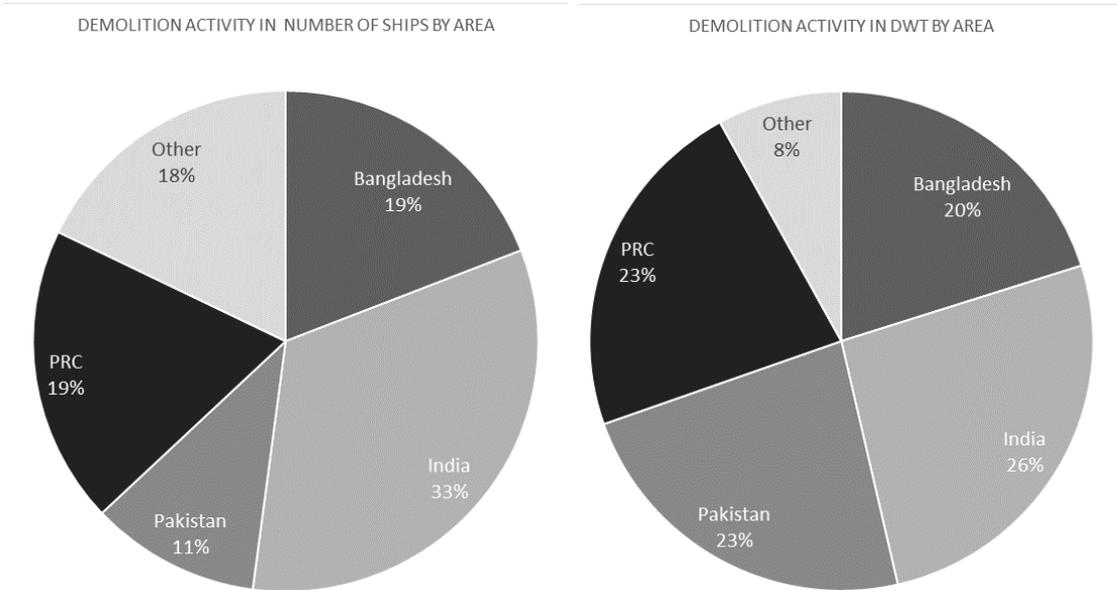
Source: Authors' elaboration with data from Clarksons SIN, 2015

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 (Graph 2).

Graph 2. BFI index and demolition activity in DWT 1996-2014
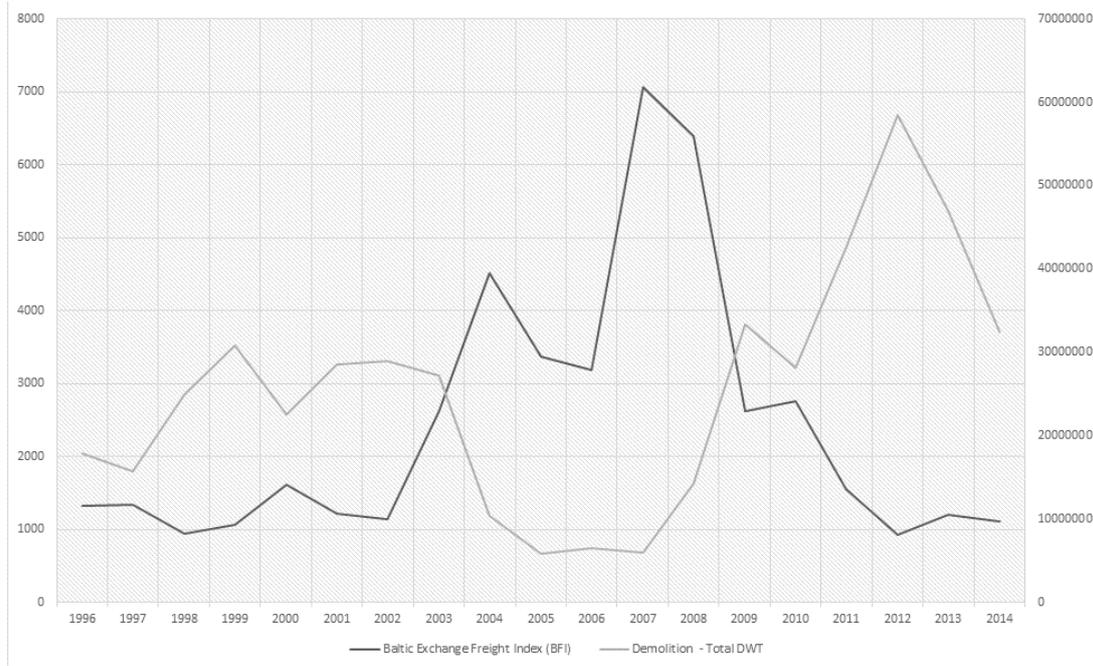
Source: Authors' elaboration with data from Clarksons SIN, 2015

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). 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 Assocation, 2016). Apart from China, only India is within the top 10 crude steel producing countries that are also among the top ship dismantling countries (Graph 3). This means that the scrap steel produced in those two countries would most probably be consumed locally.

Graph 3: Top 10 producers' percentage of world's crude steel production

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

4. 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). Usually they operate as a facilitator of the process between the owner and the demolition yard.

A Cash Buyer can buy a ship for dismantling either on "As Is- Where Is" basis or on a "Delivered Basis" (Graph 4). In the first option 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, 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).

One could say that in both options a Cash Buyer acts as a financial facilitator. This means that Cash Buyers bear a financial risk from exchange rates fluctuations. In both options there is a financial risk due to the time difference between the cash payment and the sale of ship to the shipbreaking yard. The time difference creates 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.

Graph 4: Ship breaking sale process
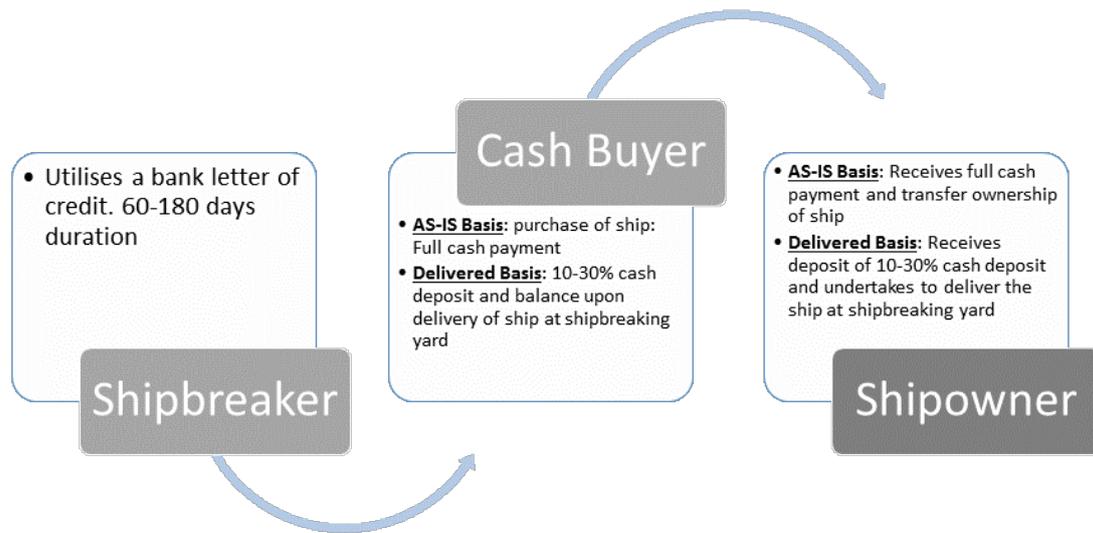
Source: Authors' elaboration

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 (Graph 4).

Graph 4: The flow of money in the shipbreaking process
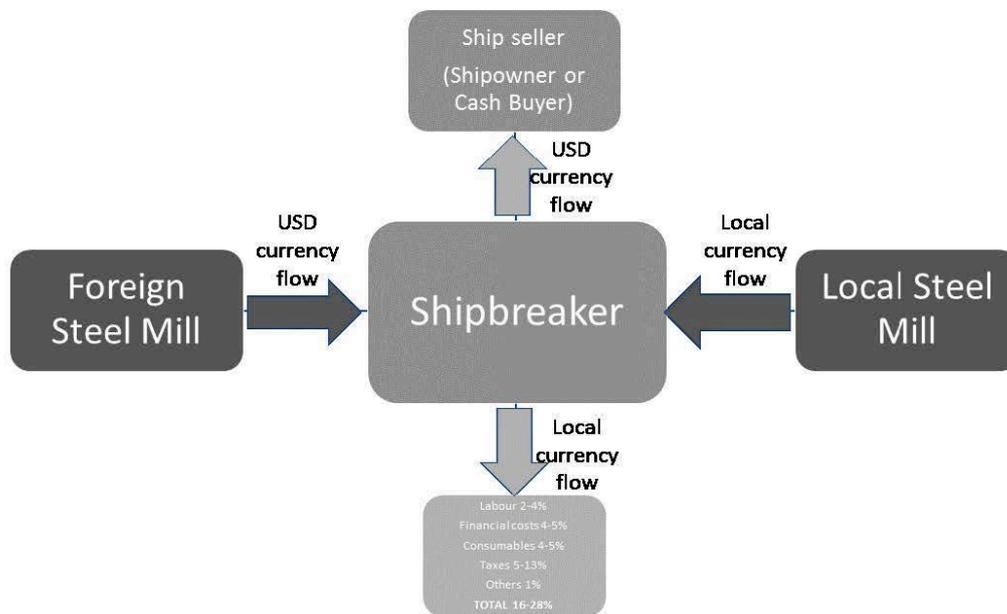
Source: Authors' elaboration

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 and range between 16% for Bangladesh to 28% for Pakistan (World Bank, 2010). 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.

Therefore, the flows of money described above will 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. As the shipbreaker is mainly located in a developing country there is increased possibility of adverse exchange rate shift with the USD increasing in value. In case the sale of the scrap steel is made overseas an additional financial risk accrues for the shipbreaker as the sale will again be in USD that always entails a risk of adverse exchange rate movements.

In addition currency exchange rates will also affect financial costs of the letter of credit issued for the ship purchase. The letter of credit is drawn in the foreign currency. The financial cost therefore will include a risk for an adverse shift in the foreign exchange rate. This risk is higher the longer the duration of the Letter of credit. The duration of the letter of credit also affects the financial cost in terms of interest. This financial cost is also affected by the exchange rates as it regards purchase of ships in a foreign currency.

5. Methodology

Following the above analysis in this paper we focus our investigation on the relation between exchange rates and the ship scrap prices.

In order to evaluate our hypothesis we used Microsoft Excel for our regressions and utilized secondary monthly data from Clarksons (Clarksons SIN, 2016) with ship scrap value between May 2006 and April 2016. The period chosen includes a shipping cycle from trough to trough and thus our investigation will not be affected by the cyclical shipping market conditions (Scarsi, 2007).

From the same database we utilized the relevant freight indices of Baltic HandySize Index (BHSI) Baltic Supramax Index (BSI), Baltic Panamax Index (BPI) and Baltic Capesize Index (BCI) (Balticexchange.com, 2016) for the Handysize[1], Supramax[2], Panamax[3] and Capesize[4] bulk carriers respectively. These variables were chosen as a proxy for the market freight levels at each size category.

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[1] Baltic Handysize description: 28,000mt dwt on 9.78m SSW draft Max age 15 yrs LOA 169m, beam 27m , TPC 39.6
37,523cbm grain, 35,762cbm bale 5 holds, 5 hatches 4 x 30mt cranes 14 knots average laden/ballast on 22mt fuel oil (380cst), no diesel at sea
[2] Baltic Supramax description: 52,454mt dwt on 12.02m SSW draft Max age 15 yrs LOA 189.99m, beam 32.26m , TPC 54 67,756 cbm grain / 65,600 cbm bale 5 holds, 5 hatches 4 x 30mt cranes with 12cbm grabs 14 knots laden / 14.5 knots ballast on 30mt fuel oil (380cst), no diesel at sea
[3] Baltic Panamax description: 74,000mt dwt on 13.95m SSW draft, Max age 12 yrs, LOA 225m, beam 32.2m, TPC 66.5 89,000 cbm grain 14 knots laden on 32mt fuel oil (380cst) / 14 knots ballast on 28mt fuel oil (380cst), no diesel at sea
[4] Baltic Capesize description: 180.000mt dwt on 18.2m SSW draft Max age 10 yrs, LOA 290m, beam 45m, TPC 121
198,000cbm grain, 14 knots laden / 15 knots ballast on 62mt fuel oil (380cst), no diesel at sea, 12 knots laden / 13 knots ballast on 43mt fuel oil (380cst), no diesel at sea

The exchange rates for the same period of the Indian and Pakistani Rupee, as well as the Chinese RMB and the Bangladeshi Taka were taken from Oanda. (2016). The choice of countries and the relevant currency exchange rates were based on their significance as demolition centers.

From the above variables the target variable (Y) is the average scrap price of a ship in the relevant size category which was used as a proxy of the scrap value of the ship. The rest of the variables were used as predictor variables. Our aim is to evaluate the extent the variations in the predictor variables collectively determine the variation in the target variable. Simply put, the predictor variables will be the measuring tools used to influence and monitor the changes to the target variable (Field, 2009).

The simple linear regression model will be applied as follows:

$Y = \beta_0 + \beta_1 * X_1 + \beta_2 * X_2 + \beta_3 * X_3 + \beta_4 * X_4 + \beta_5 * X_5 + \beta_6 * X_6 + \varepsilon$

Where:
- Y: average scrap price of the relevant ship size category on a monthly basis
- X_1: the currency exchange rates of Bangladesh
- X_2: the currency exchange rate of India
- X_3: the currency exchange rates of China
- X_4: the currency exchange rates of Pakistan
- X_5: the Baltic index of the particular size category
- X_6: The number of dry bulk carriers on a monthly basis of the relevant size category scrapped in the period of examination
- β_1 to β_6 represent the model coefficients to be estimated
- B_0 represent the constant.

According to Frost (2013): "*The p-value for each term tests the null hypothesis that the coefficient is equal to zero (no effect). A low p-value (< 0.05) indicates that you can reject the null hypothesis. In other words, a predictor that has a low p-value is likely to be a meaningful addition to your model because changes in the predictor's value are related to changes in the response variable*". To that context a step by step regression process was adopted. After each step, the variable with the highest p>0.05 will be withdrawn from the data set and a new regression is undertaken until all included variables have p <0.05 in order to secure statistical significance.

6. Regression results and analysis

The synopsis of the regressions' results are presented in the following table (Table 1). The table provides a summary of the independent variables found to be statistically significant. The regressions are presented in the Appendix A.

Table 1: Synopsis of the results of the regressions.
(Statistically significant coefficients only)

	Handysize	Supramax	Panamax	Capesize
R Square	0.6974	0.6766	0.6167	0.6316
Adjusted R Square	0.6813	0.6653	0.6033	0.6154
F Significance	43.3988	60.1442	46.2531	39.0829
Intercept	16.1035	9.4131	24.8325	34.7030
Bangladesh taka (USD/BDT)	0.0710	0.1032	0.1040	0.2304
India rupee (USD/INR)	-0.0296	-	-	-0.0938
CN Reminbi (USD/CNY)	-1.7989	-1.2355	-2.7157	-3.9935
Pakistan rupee (USD/PKR)	-0.0556	-0.0649	-0.1131	-0.1378
Baltic Freight Index	0.0004	0.0005	0.0002	0.0003
Nr. Of vessels scrapped	-0.0229	-	-	-

Source: Authors' elaboration from regressions results

6.1 Handysize Bulk carriers

The regression for the Handysize bulk carriers returned a R^2 value of 0.697, indicating that almost 70% of the variations in ship scrap value can be explained by the variations of the independent variables selected. Our model was found statistically significant based on the F-test (see Appendix A). All the independent variables – currency exchange rates, number of ships scrapped and Baltic Handysize index were found to be statistically significant.

6.2 Supramax Bulk carriers

The regression for the Supramax size bulk carriers returned a R^2 value of 0.682. For this type of vessel, though, some of the independent variables were found to be statistically insignificant. From the first regression, the exchange fluctuations of USD against the Indian Rupee was not statistically significant (p value of 0.348) and was therefore excluded from the dataset. This could be related to the size of ships that the Indian shipbreaking industry is focusing.

At the second regression (R^2 =0.679) the number of Supramax vessels sold for scrap was also found not statistically significant (p value of 0.29) for explaining the relevant average ship scrap value. In fact this was repeated for all the remaining size categories (Panamax and Capesizes).

For the next regression step the variable of the number of ship scraped was excluded from the dataset. The third step regression resulted indicated all independent variables to be statistically significant. R^2 was 0.676 and the F-test of overall significance very low (see appendix A).

6.3 Panamax Bulk carriers

The first regression of the Panamax size vessels indicated that the number of Panamax vessels sold was not statistically significant. In the next regression step the currency fluctuation of the US Dollar against the Indian Rupee was also found to be statistically insignificant (p value = 0.086). The third and final step indicated all remaining variables to be statistically significant. The R^2 value of this regression analysis was 0.61 and the overall significance F-test very low (see appendix A). In

line with the other size categories the Panamax size vessel regression indicated that the currency fluctuations of the chosen countries affect the scrap prices offered with the exception of the Indian Rupee. The same applies for the relevant Baltic Index as BPI was found to affect the average scrap price of a Panamax bulk carrier.

6.4 Capesize Bulk carriers

The last size vessel category examined was the Capesize. Following the same approach as with the other size categories the number of Capesize vessels sold for scrap was again found statistically insignificant (p value=0.74). During the second step all remaining variables were found to be statistically significant.

7. Conclusions - Discussion

Initiating from the analysis of the process of the sale of a ship for dismantling we evaluated the effect of currency exchange rates on the average ship value for scrap. The evaluation was made by applying regression on the dry bulk market. The results indicate that currency exchange rates affect the average ship scrap value in general. However, not all currency exchange rates affect the ship scrap values the same way at different size categories.

Based on the regression results the currency exchange rates of Pakistan, Bangladesh and China are statistically significant for all size categories. India's currency exchange rate is statistically significant only for the smaller (handysize) and larger (Capesize) size vessel category. For the Supramax and Panamax size categories the Indian currency was not found statistically significant. This finding was not expected and provides a challenge to be interpreted. We believe that this is the result of some kind of specialization of the Indian shipbreaking industry in either small or large sized vessels. However, the data available to us did not provide such insight and further research should be undertaken.

Furthermore, where the currency exchange rates of India, China and Pakistan found to be statistically significant the relevant coefficient signs were found to be negative. In fact this finding is consistent in all regressions for all size categories. It seems that this finding is consistent with our analysis. The negative signs indicate the negative relation of the average scrap ship price and the currency exchange rates. If the local currency depreciates (which means that the USD/Currency ration increases) against the USD the financial costs of the ship breakers increase. As costs increase, the profit margin decreases. This leads to decrease demand for ships to scrap and the scrap prices decreases as well.

As an exception the sign for the currency of Bangladesh was found positive. There is consistent positive relation in all regressions with the average scrap ship price. This could be the result of the economic and strategic role of the shipbreaking industry in the country as the scrap steel from the shipbreaking process represents around 50% of the country's steel production (World Bank 2010). Thus the regression sign could be the result of the dependence of Bangladesh on ship recycling (Sujauddin et al., 2014) due to lack of recycling industry. Therefore it is valid to assume that currency fluctuations will not affect negatively demand for ships to scrap.

Our examination also indicated for all the vessel categories - except for the Handysize average scrap value of the bulk carrier is not directly affected by the number of vessels sold for scrap. This was an interesting finding although not entirely expected. According to the law of demand a negative relation was expected between the number of ships scrapped and the average scrap price of the ship. However steel from ships represents a very small percentage of the total consumption of recycled steel worldwide (European Commission Directorate General Environment, 2007) and therefore the level of ship scrapping activity plays a negligible role in determining the price of recycled steel. Based on this our findings are consistent with the theory.

Finally, as was to be expected, the Baltic Indices chosen as a proxy for the market conditions were found statistically significant for all size categories. In other words average scrap prices are affected by the freight market conditions. This was expected based on the theory. When market condition are favourable with increased freight rates a shipowner would be reluctant to sell his ship for dismantling. With this in mind ship breakers tend to provide financial incentives to attract ships. The fact that the regressions applied supported this fundamental principle provides further support for our remaining findings.

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Appendix

A-Regression results & Final step regression results.

SUMMARY OUTPUT HANDYSIZE VESSELS

Regression Statistics

Multiple R	0.835086496
R Square	0.697369455
Adjusted R Square	0.681300577
Standard Error	0.411945153
Observations	120

ANOVA

	df	SS	MS	F	Significance F
Regression	6	44.18831073	7.364718455	43.39876342	0.0000000000000000000000000003898
Residual	113	19.17599539	0.169698809		
Total	119	63.36427612			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	16.10351683	2.982169851	5.399932812	0.0000003732388348609100000000	10.19530049	22.01173317	10.19530049	22.01173317
bangladesh taka (USD/BDT)	0.070991839	0.014844615	4.782329476	0.0000052684314477551000000000	0.04158198	0.100401698	0.04158198	0.100401698
india rupee (USD/INR)	-0.029624252	0.012977511	-2.282737666	0.0243166108607381000000000000	-0.055335041	-0.003913463	-0.055335041	-0.003913463
china renminbi (USD/CNY)	-1.798857159	0.269418792	-6.67680657	0.0000000009542846949212000000	-2.332624378	-1.26508994	-2.332624378	-1.26508994
pakistan rupee (USD/PKR)	-0.055570597	0.014062576	-3.951665628	0.0001355553451306960000000000	-0.083431095	-0.027710098	-0.083431095	-0.027710098
BHSI	0.000380294	0.000108245	3.513266179	0.0006375403520017330000000000	0.000165841	0.000594747	0.000165841	0.000594747
Nr. Of hsize scrapped	-0.022933648	0.006439136	-3.561603073	0.0005407591835186950000000000	-0.035690738	-0.010176557	-0.035690738	-0.010176557

SUMMARY OUTPUT SUPRAMAX SIZE VESSELS

Regression Statistics

Multiple R	0.822545949
R Square	0.676581838
Adjusted R Square	0.665332511
Standard Error	0.574718927
Observations	120

ANOVA

	df	SS	MS	F	Significance F
Regression	4	79.46296612	19.86574153	60.14420392	0.0000000000000000000000002585
Residual	115	37.9847122	0.330301845		
Total	119	117.4476783			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	9.413141995	3.234705337	2.910046207	0.004339869329772210000000000000	3.005813271	15.82047072	3.005813271	15.82047072
bangladesh taka (USD/BDT)	0.103235831	0.018914289	5.458086711	0.000000280667403200314000000000	0.065770264	0.140701398	0.065770264	0.140701398
china renminbi (USD/CNY)	-1.235511034	0.277046542	-4.459579335	0.0000192175500367026000000000000	-1.784286913	-0.686735154	-1.784286913	-0.686735154
pakistan rupee (USD/PKR)	-0.064902905	0.012220017	-5.311195916	0.00000053863105302778600000000000	-0.089108407	-0.040697403	-0.089108407	-0.040697403
BSI	0.0004666	6.03367E-05	7.733277422	0.000000000000436868884491027000	0.000347085	0.000586116	0.000347085	0.000586116

SUMMARY OUTPUT PANAMAX SIZE VESSELS

Regression Statistics

Multiple R	0.785291263
R Square	0.616682367
Adjusted R Square	0.60334958
Standard Error	0.757703906
Observations	120

ANOVA

	df	SS	MS	F	Significance F
Regression	4	106.2183683	26.55459207	46.25307199	0.0000000000000000000004134646
Residual	115	66.02324898	0.574115209		
Total	119	172.2416173			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	24.83246001	4.255092446	5.835939014	0.00000005030719896074670000000000	16.40394081	33.26097922	16.40394081	33.26097922
bangladesh taka (USD/BDT)	0.104022086	0.025010618	4.159117036	0.00000061838947602177000000000000	0.054480866	0.153563305	0.054480866	0.153563305
BPI	0.00024821	4.63411E-05	5.352060374	0.00000044973130017066200000000000	0.000156228	0.000339813	0.000156228	0.00039813
china renminbi (USD/CNY)	-2.715698436	0.365539332	-7.429292	0.00000000020822174685450400000000	-3.439761501	-1.99163537	-3.439761501	-1.99163537
pakistan rupee (USD/PKR)	-0.113088673	0.015828108	-7.144800232	0.00000000000881941185508573000000	-0.14444111	-0.081736236	-0.14444111	-0.081736236

SUMMARY OUTPUT CAPESIZE VESSELS

Regression Statistics

Multiple R	0.794708988
R Square	0.631562375
Adjusted R Square	0.61540283
Standard Error	1.317245474
Observations	120

ANOVA

	df	SS	MS	F	Significance F
Regression	5	339.07093	67.81418599	39.08293073	0.0000000000000000000000032674106
Residual	114	197.8054629	1.735135639		
Total	119	536.8763928			

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95,0%	Upper 95,0%
Intercept	34.70296676	9.558575247	3.630558516	0.00042500270924573300000000000	15.76750282	53.63843071	15.76750282	53.63843071
bangladesh taka (USD/BDT)	0.230429152	0.046618275	4.942893097	0.00000266824108507168000000000	0.13078707	0.32279597	0.13078707	0.32279597
BCI	0.000265294	5.23388E-05	5.068775651	0.00000156188330750107000000000	0.00016161	0.00368976	0.00016161	0.00368976
china renminbi (USD/CNY)	-3.993491347	0.85553094	-4.667851457	0.00000836541999295980000000000	-5.68829155	-2.29869143	-5.68829155	-2.29869143
pakistan rupee (USD/PKR)	-0.13779812	0.045944167	-2.999251683	0.00332385783673190000000000000	-0.228813161	-0.046783079	-0.228813161	-0.046783079
india rupee (USD/INR)	-0.093761828	0.041966109	-2.234227326	0.02741842692828330000000000000	-0.176896367	-0.010627289	-0.176896367	-0.010627289