



Capacity retirement in the dry bulk market: A vessel based logit model



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ABSTRACT

The paper investigates the effect of vessel specific and market variables on the probability of scrapping dry bulk ships. Using a dataset from 2012 to 2015, we find that the probability of scrapping increases with age, but that the relation between vessel size and scrapping probability varies across the different segments. In addition, while the relation between earnings and probability of scrapping ships is negative, bunker prices seem to affect only the scrapping rate of smaller tonnage. Scrapping probability also increases with an increase in interest rates, freight market volatility and scrap steel prices.

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1. Introduction

The dry bulk shipping market entered a deep and lasting depression after the 2008 financial crises with extremely low freight rates for the whole of the dry bulk sector. Historically, low earnings for different subsectors within the dry bulk market made it difficult for dry bulk shipping companies and ship owners to keep vessels in operation; some resorted to retiring ships through scrapping. The recurring relapse into successive depression periods over the last few years, interrupted only by modest or short-lived recoveries, relates the extent of the post-2008 shipping crisis to the crises triggered by the 1929 financial crash and later by the oil shock in the 1970s. The scrapping volume in the 1980s marked the second significant capacity retirement in the course of the last century; the first was seen in the early 1930s with lay-up climbing in both instances to a significant percentage of the fleet (Thanopoulou, 1995). However, the current shipping crisis lacks a number of typical characteristics of the previous major shipping depressions. For instance, there has not been significant lay-up activity (Alizadeh et al., 2014) or fleet reduction through scrapping, while, on the contrary, the dry bulk fleet continued to grow after 2008 (cf. Fig. 1).

Excluding losses due to accidents, capacity adjustments in shipping takes mainly three forms at firm and industry level: (a) in the short term, the usual way is speed reduction, (b) in the medium-term, firms resorted traditionally to lay-up, and (c) in the long-term, firms resorted historically to scrapping. In the first two cases, the capacity adjustment is temporary and reversible while in the latter case it is permanent. In addition, the decision to scrap can be triggered only by a prolonged recession with no prospect of market recovery, or due to regulatory changes – as was the case with the compulsory vessel

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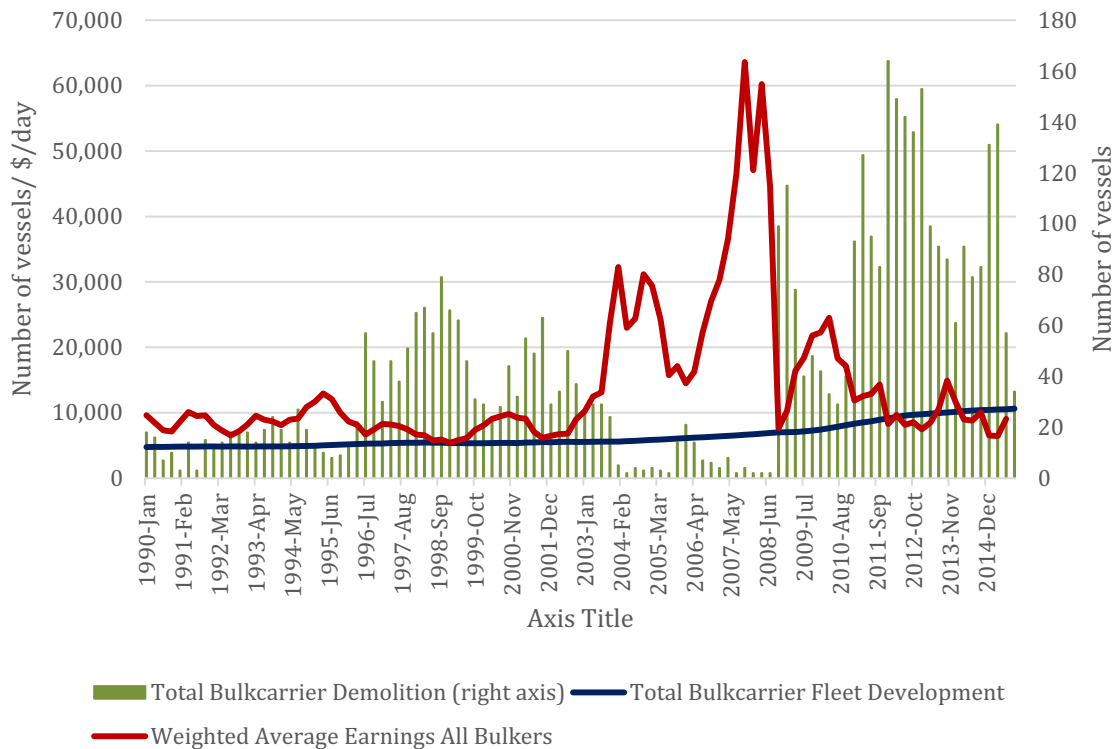


Fig. 1. Bulk carrier earnings, demolition and fleet development 1990–2015 (Oct). Source: Data from [Clarksons \(2015\)](#).

withdrawal after the Oil Pollution Act 1990 – and obsolescence. Otherwise, firms tend to keep the vessel operating or laid-up until maintenance and repair costs exceed economical levels.

In a market downturn, not all vessel size segments are affected in the same way because shipping firms operating in different sectors and sub-sectors might not be under the same financial or cash flow pressure. For many shipping firms the deciding factor for vessel retirement can be the financial situation often related to the timing of vessel acquisitions and to their financial structure. As the crisis deepens and the outlook for recovery worsens all but the financially stronger firms start coming under pressure. In this context, rational choices for firms in financial difficulty are either: (a) lay-up to stop accumulating higher losses at the variable cost level including operating expenses and voyage costs, or (b) to scrap vessels in order to recoup part of the invested capital when liquidity of the firm is low with capacity retirement reflecting then cash-flow pressures.

Recent research suggests that in the context of the current crisis a faster freight rate mean reversion has reduced any gain from laying-up the vessel since the related entry and reactivation costs carry more weight for shorter than for longer lay-up periods ([Alizadeh et al., 2014](#)). However, scrapping or retirement emerged again in recent years as a response to a prolonged depressed freight market, albeit not at the levels necessary to shrink supply as in previous crises (cf. [Fig. 1](#)).

In this research, we utilize a logit model in order to assess the probability of a dry bulk carrier being scrapped depending on vessels' main characteristics, such as age and size, and market specific factors including freight rate level, bunker prices, interest rates, scrap prices and market volatility. Therefore, the paper contributes to the literature in several ways. First, we explore the issue of scrapping using a dataset which covers the period of decline into the worst crisis to hit the dry bulk shipping market. Second, we model the probability of scrapping dry bulk ships both within and across different tonnage segments as well as for each year of sample. Third, we investigate the impact of new variables including bunker price, freight market volatility, and interest rate in determination of probability of scrapping. These variables proxy the cash-flow pressure on the decision to scrap a ship. Finally, the models are used to present the sensitivity of the probability of scrapping different classes of dry bulk carriers with respect to main market factors (freight rate and bunker prices).

As expected, the results confirm the existence of a positive relation between age and probability of scrapping a vessel across all dry bulk sub-sectors. However, the results reveal that the relation between vessel size and scrapping probability can vary across different dry bulk segments. In particular, while the state of freight market is inversely related to the probability of scrapping, higher bunker prices seem to increase the probability of scrapping smaller tonnage. Moreover, market variables such as level of interest rates, scrap values and market volatility seem to have a positive effect on probability of scrapping dry bulk carriers.

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