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Estimating the probability of default for shipping high yield bond issues

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Abstract

This paper uses a binary logit model to predict the probability of default for high yield bonds issued by shipping companies. Our results suggest that two liquidity ratios, the gearing ratio, the amount raised over total assets ratio, and an industry specific variable are the best estimates for predicting default at the time of issuance. In-and-out-of-sample tests further indicate the predictive ability and robustness of our model. The results are of interest to institutional and individual investors as they can identify which factors to look at when making investment decisions, and which issues have a high likelihood to default; shipowners can also benefit by identifying the factors they need to focus on, in order to offer an issue that does not have a high probability of default.
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1. Introduction

There can be little doubt that an increasing number of shipping companies are regarding the capital markets as an integral part of their comprehensive strategy for optimizing financial management through a combination of traditional bank lending, private placements and public issues of debt and equity. Additionally, it has been noticed that operational flexibility and efficiency are achieved: by increasing the size of shipping companies through purchasing secondhand, or ordering, new vessels; by mergers and acquisitions; by the formation of shipping pools. The first and second methods may imply an increased need for capital by the shipping industry – which is also intensified by the replacement requirement of older vessels.

One method for raising capital – as mentioned above – is by tapping the high yield bond market. The first high yield bond offered by a shipping company took place in 1992 when Sea Containers Ltd. issued $125 million of subordinated debentures; since then, more than 60 issues have taken place and raised more than $10

billion. Shipping is an industry characterized as being highly cyclical, volatile, capital intensive and often highly geared. This might constitute a problem for companies when they have to make interest and capital repayments in a recessed shipping market as they may not have sufficient cash flows to meet their obligations. This problem may also be enhanced when the shipping companies operate their fleet in the spot market rather than in the time-charter market.[1] For instance, a number of shipping companies – operating their fleet mainly in the spot market – entered the US high yield bond market in 1997/8 and found themselves unable to meet their debt obligations after the 1999 recession in the shipping market.

However, more recently we have seen an increased interest of shipping companies in the high yield bond market; during 2003–2005, sixteen new high yield bond issues were offered by shipping companies.[2] This, coupled with the capital intensity feature of the shipping industry and the high number of defaults which mainly occurred in 1999, was the main motivation for the creation of this paper. In addition, the importance of industry classification is another significant factor. Fridson and Garman (1998) argued that when studying the pricing of new high yield bonds, it would be better to categorise the bonds by industry in order to avoid biased results; a useful argument as a number of bond portfolio managers allocate their holdings by industries/sectors. As a result, we hypothesize that shipping high yield bonds should be studied as an industry due to its cyclical, volatile and capital intensity characteristics.

Prior research has produced a number of models in predicting financial distress in corporations. Most of the previous studies predict financial distress by using financial data for a number of months or years prior to the default event and only one uses financial data at the time of issuance;[3] when the decision by the high yield bond investor to buy, or not, the financial instrument, is made.[4] This paper utilises the method of the Huffman and Ward (1996) study, and contributes to the existing ship finance literature in the following ways: firstly, and for the first time in the ship finance literature, the probability of default – at the time of issuance[5] – for high yield bonds offered by shipping companies is predicted by employing a binary logit model; investors may benefit from this research since, by employing easily accessible and quantifiable factors, they can identify at the time of issuance (a) which factors to look at in making investment decisions and (b) issues that might have a high likelihood to default; at the same time, shipowners who offer high yield bonds can also identify which factors are important in predicting the probability of default for their issues. Secondly, this is attempted by not only using financial ratios employed in previous models, but with the addition of two industry specific variables and another financial ratio, not used previously. Finally, by employing a bootstrap technique, we run in-and-out-of-sample tests in order to validate the robustness of our model.

The paper is organised in the following manner: in Section 2, we provide a literature review and define the methodology we employ; in Section 3, the data and variable definitions are discussed; in Section 4, the results of our analysis, the predictive ability of the model, and the out-of-sample tests are reported; finally, we conclude in Section 5.

2. Literature review and methodology

Bankruptcy and default on a debt instrument represent different phases of financial distress, and the literature on bankruptcy models can be explored in the search for a methodology to predict the likelihood of default for high yield bonds. Bankruptcy occurs when a company is declared insolvent and the assets are liquefied in order to repay its creditors. On the other hand, default is defined as the failure of the company to

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[1] The freight market – which is the marketplace in which sea transport is bought and sold – has two different types of transactions, the freight contract (spot) in which the shipper buys transport from the shipowner at a fixed price per ton of cargo and the time-charter under which the ship is hired by the day for a period of time (Stopford, 2000).

[2] Source: Bloomberg.

[3] Huffman and Ward (1996).

[4] Although there is a secondary market for high yield bonds, this is very thin, and that is why the bid/ask prices differ between different sources; consequently, predicting the likelihood of default at the time of issuance is of importance to investors.

[5] The reason we focused on the time of issuance is because the financial data for a number of shipping companies were not available prior to default; that was due to the fact that many of shipping high yield bond issues defaulted approximately a year or a year and a half after their issuance.