Transportation Research Part E 76 (2015) 58–75

Contents lists available at ScienceDirect

Transportation Research Part E

journal homepage: www.elsevier.com/locate/tre

Liquidity effects and FFA returns in the international shipping derivatives market

Amir H. Alizadeh [a], Konstantina Kappou [b], Dimitris Tsouknidis [c], Ilias Visvikis [d,*]

[a] Cass Business School, City University London, 106 Bunhill Row, London EC1Y 8TZ, UK
[b] ICMA Centre, Henley Business School, University of Reading, Whiteknights, Reading RG6 6BA, UK
[c] School of Management, Faculty of Management and Law, University of Bradford, Emm Lane, Bradford BD9 4JL, UK
[d] World Maritime University, Citadellsvägen 29, Malmö, Sweden

ARTICLE INFO

Article history:
Received 31 July 2014
Received in revised form 30 January 2015
Accepted 2 February 2015
Available online 2 March 2015

Keywords:
Forward freight agreements
Liquidity risk
Bid–ask spreads
Shipping
Panel data

ABSTRACT

The study examines the impact of liquidity risk on freight derivatives returns. The Amihud liquidity ratio and bid–ask spreads are utilized to assess the existence of liquidity risk in the freight derivatives market. Other macroeconomic variables are used to control for market risk. Results indicate that liquidity risk is priced and both liquidity measures have a significant role in determining freight derivatives returns. Consistent with expectations, both liquidity measures are found to have positive and significant effects on the returns of freight derivatives. The results have important implications for modeling freight derivatives, and consequently, for trading and risk management purposes.

1. Introduction

International shipping is an industry characterized by significant operational and commercial risks, with the latter occurring predominately from high volatility in freight rates and vessel prices as well as in operating and capital costs. These fluctuations in rates and costs subsequently affect the cash flows and profitability of the economic agents operating within the sector, including shipowners, ship-operators and charterers. As a result, shipping derivatives instruments, such as Forward Freight Agreements (FFAs), freight futures and freight options, have been developed and evolved over time to enable these agents involved in international shipping to manage risks that arise from fluctuations in freight rates (see Kavussanos and Nomikos, 1999; Kavussanos and Visvikis, 2004) and vessel prices (Alizadeh and Nomikos, 2012).

To hedge against freight rate volatility and to diversify their asset base, participants in shipping markets began trading, through an international network of FFA brokers, Over-the-Counter (OTC) FFAs since 1992. An FFA is defined as a cash-settled contract between two counterparties to settle a freight rate for a specified quantity of cargo or hire rate type of vessel in one (or a basket) of the major shipping routes in the dry bulk, tanker and container shipping sectors at a certain date in the future. At the same time, freight rate derivatives give the opportunity to non-shipping related market participants to gain exposure to international maritime transportation and to the shipping freight markets as an asset class within their

* Corresponding author. Tel.: +46 40 356372; fax: +46 40 128442.
E-mail addresses: a.alizadeh@city.ac.uk (A.H. Alizadeh), k.kappou@icmacentre.ac.uk (K. Kappou), d.tsouknidis@bradford.ac.uk (D. Tsouknidis), ivisvikis@wmu.se (I. Visvikis).

http://dx.doi.org/10.1016/j.tre.2015.02.001
1366-5545/

investment portfolios.[1] The underlying asset of the FFA contracts can be any of the routes (or basket of routes) that constitute the freight indices produced mainly by the Baltic Exchange or by other providers of freight market information.[2]

Following the growth in the freight derivatives market since mid-1990s, there has been a large body of literature on different aspects of freight derivatives, such as their dynamic behavior, hedging effectiveness, market microstructure and information content of these instruments for forecasting purposes. Kavussanos and Visvikis (2006b, 2008) provide thorough surveys of the available empirical studies on the freight derivatives market. For example, Kavussanos and Visvikis (2011) provide market participants' different viewpoints for the uses of freight derivatives. Kavussanos and Visvikis (2004) examine the return and volatility interactions between spot and forward freight rates in the dry bulk sector. In another study, Batchelor et al. (2005) focus on the relationship between the bid–ask spread and the volatility of FFA prices and conclude that as bid–ask spread increases, indicating the rise of economic agent's uncertainty, the volatility of FFA prices eventually increases. Batchelor et al. (2007) reveal that the use of FFA prices together with spot freight rates in a multivariate dynamic model, improves the forecasting performance of spot freight rates. Tezuka et al. (2012) derive an equilibrium price model of spot and forward shipping freight markets, while Alizadeh (2013) investigates the interaction between trading volume and volatility of FFA prices. Finally, Kavussanos et al. (2014) investigate economic spillovers between the freight and commodity derivatives markets. However, despite the plethora of literature on freight derivatives, there has not been any investigation into the existence and importance of liquidity risks in FFA price changes.

In financial markets, the term liquidity is used to describe the extent to which investors are able to trade large quantities quickly, at low cost, and with little price impact. Similarly, liquidity risk refers to the uncertainty of having to trade large contracts with significant impact on prices, incurring high transaction costs or delays in transactions. The liquidity of the FFA market has always been an important issue to the market participants, as it is a relatively new market, still developing, with some unique characteristics. For instance, the introduction of clearing systems, electronic trading and the arrival of non-shipping participants as well as changes in the overall shipping market conditions have all resulted in the evolvement of the market to its current state. Therefore, this study attempts to extend the literature by investigating the role of liquidity risk and the existence of a relationship between liquidity measures and excess returns in the FFA derivatives market.

The contributions of this study are drawn upon three important viewpoints. First, the results provide important evidence of liquidity risks in an OTC derivatives market where the underlying asset is the non-storable ocean freight service. Following the seminal study by Amihud and Mendelson (1986), several studies in equity and fixed income markets have shown that assets with lower liquidity have lower prices and require higher expected returns. However, there are only a few studies that have examined the effect of liquidity on derivatives markets (see Brenner et al., 2001; Bongaerts et al., 2011; Deuskar et al., 2011) and none, to the best of our knowledge, on shipping freight derivatives markets. In this study, a panel-estimation methodology is used to examine the effects of liquidity, as expressed by the Amihud illiquidity measure (Amihud, 2002) and the bid–ask spread on FFA excess returns after controlling for industry-specific and macroeconomic variables. Furthermore, a modified version of Fama–MacBeth two-step methodology is utilized to assess the liquidity effects along other risk factors on FFA excess returns. Second, the effect of liquidity on FFA prices is examined by testing whether liquidity measures can explain the difference between FFA prices and future settlement prices, or in other words, deviations from the Unbiasedness Hypothesis which postulates that a forward price should be an unbiased predictor of the realized price of the underlying asset at the settlement. Third, the investigation of liquidity risks in a continuously evolving freight derivatives market, where the underlying asset is the non-storable shipping freight service and with no active market makers, allows for direct comparisons with other well-developed commodity derivatives markets.[3]

Results indicate that both liquidity measures used in this investigation (a liquidity measure which incorporates trading volumes and the bid–ask spread measure) have a significant role in determining *near-month* dry bulk FFA returns and are in accordance with the liquidity theory and expectations. More specifically, the Amihud trading volume-related liquidity measure and the bid–ask spread measure are both found to be positive and statistically significant in explaining returns on FFA contracts, providing new evidence, for the first time, that market participants incorporate transaction costs in their required returns. For *near-quarter* FFA returns, in contrast, only the volume-related liquidity measure has a significant role.

Information on how illiquidity affects returns in freight derivatives markets is of primary interest not only to shipowners and charterers, but also to financial institutions, individual and institutional investors, traders and regulators alike. This is due to the fact that market liquidity influences the frequency of transactions and the level of tradable prices, and consequently, affects the overall portfolio performance. For instance, discovering any liquidity related component of FFA returns as well as information about the historical level of relative bid–ask spreads are essential for the process of pricing FFA returns, especially when the average level of transaction costs could be as high as 2% of the trade notional amount. This is important not only for the shipping market participants, but also for other investors and financial institutions interested in diversifying their portfolios by using freight derivatives. The latter emerges from the fact that several major financial

[1] For a detailed discussion and analysis of the freight derivatives markets, see Kavussanos and Visvikis (2006a, 2011) and Alizadeh and Nomikos (2009).

[2] FFA contracts can be written on dry bulk routes of the Baltic Capesize Index (BCI), the Baltic Panamax Index (BPI), the Baltic Supramax Index (BSI) and the Baltic Handysize Index (BHSI). Similarly, tanker FFAs can be written on routes of the Baltic Dirty Tanker Index (BDTI) to represent the dirty oil cargoes and of the Baltic Clean Tanker Index (BCTI) to represent the clean petroleum product cargoes. Finally, in the container sector the routes of the Shanghai Containerized Freight Index (SCFI), constructed by the Shanghai Shipping Exchange (SSE), and the routes of the World Container Index (WCI), which is a joint venture between Drewry Shipping Consultants and Cleartrade Exchange, are used as underlying assets of container freight derivatives.

[3] Szymanowska et al. (2014) provide evidence for the existence of liquidity-related premia in the futures commodities market.