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Are freight futures markets efficient? Evidence from IMAREX

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ABSTRACT

The International Maritime Exchange (IMAREX) is the leading regulated marketplace for trading and clearing shipping freight derivatives. We investigate for the first time whether the IMAREX freight futures market is efficient over the daily and weekly horizons. To this end, we address the question in both a statistical setting and an economic setting by employing an extensive dataset of freight futures prices. In the statistical setting, we form both point and interval forecasts using alternative models, and evaluate them using a number of statistical tests. We assess the economic significance of the obtained forecasts by means of trading strategies, taking into account the presence of transactions costs. We find that IMAREX is not efficient over the shorter daily horizon. The results have implications for the economics of freight futures markets and the pricing of freight derivatives.

1. Introduction

The primary task of the shipping industry is to move cargo around the world; it is estimated to account for the transfer of 80% of the world's merchandise trade (United Nations Conference on Trade and Development, 2008). The freight rate is the cost of hiring/leasing transportation (chartering). Freight rates differ depending on the type of cargo to be carried, the vessel size and the route to be followed, and are determined in the freight market where the sea transport is bought and sold (see Stopford, 1997, for the factors that determine demand and supply in the freight markets). Typically, they exhibit cyclicality, extreme volatility and seasonality, and are affected by the international business environment. Consequently, they entail a significant market risk (see Angelidis & Skiadopoulos, 2008), which calls for the development of hedging schemes and motivates the implementation of speculative strategies. As a response, freight derivatives have been being traded in the over-the-counter market and exchanges over the last three decades (see Kavussanos & Visvikis, 2006a,b, and Alizadeh & Nomikos, 2009, for an extensive description of the markets).[1]

Focusing on exchange-traded freight derivatives, the first freight futures contract, termed BIFFEX (Baltic International Freight Futures Exchange), was introduced in the

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[1] Forward Freight Agreements (FFAs) are the most well-known over-the-counter freight derivatives. They are agreements between two principals that set a freight rate for a specified volume of cargo and vessel type on certain routes on a given date in the future. A charterer would be a natural buyer of an FFA, in order to protect herself against a potential rise in the physical market, which would force her to pay higher freight rates. Similarly, a ship owner would sell futures to cancel out the losses in his revenues from a potential decline in freights. FFAs usually negotiate through a broker (e.g., Clarksons, Simpson Spence & Young). However, FFAs entail a significant credit risk, and the position cannot be closed prior to expiry. To circumvent this problem, FFAs have started being marked-to-market daily in the Norwegian Futures & Options Clearinghouse (NOS) since 2001, and in LCH. Clearnet (formed following a merger of the London Clearing House and the French Clearing House Clearnet) since 2005.

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London International Financial Futures Exchange (LIFFE) in 1985; BIFFEX was written on the Baltic Freight Index (BFI). In April 2002, LIFFE ceased the trading of BIFFEX due to its low liquidity.[2] In November 2001, the International Maritime Exchange (IMAREX) was founded, and freight derivatives written on various freight indices and routes were introduced among the other derivative products traded in the Exchange. In partnership with the Norwegian Options and Futures clearing house (NOS), IMAREX is the leading regulated marketplace for trading and clearing shipping freight derivatives written on various freight indices, with freight futures being the most liquid instrument.[3] Currently, it has over 200 direct members, including oil companies, ship owners, traders and financial companies. It is estimated that the total nominal trade volume in IMAREX amounted to US$18 billion in 2008. This paper investigates for the first time whether the IMAREX freight futures market is efficient, by assessing both the statistical and economic significance of formed forecasts of futures prices. Given the role of this particular market and the vast body of literature on the efficiency of other futures markets, the question of the efficiency of the IMAREX is of particular importance to academics. It is also important to practitioners, since fluctuations in freight rates affect shipowners' cash flows, charterers' costs, and commodity and energy producers.

There is already an extensive body of literature investigating the question of whether the prices of stock index, interest rate, currency, commodity, and volatility futures can be forecasted. The significance of the results has been evaluated using either statistical or economic (trading profits) metrics. A number of studies have documented a statistically predictable pattern in futures returns (see Bessembinder & Chan, 1992, for commodity and currency futures returns; Miffre, 2001a, for the FTSE 100 futures; and Miffre, 2001b, for commodity and financial futures). On the other hand, the empirical evidence of predictability in futures markets under an economic metric is mixed. For instance, Hartzmark (1987), employing daily data of all contract maturities, finds that, in aggregate, speculators do not earn significant profits in commodity and interest rate futures markets. Yoo and Maddala (1991), considering daily data for a number of futures maturities, study commodity and currency futures and find that speculators tend to be profitable. Similar findings are reported by Hartzmark (1991), Kho (1996) and Wang (2004). On the other hand, Konstantinidi, Skiadopoulos, and Tzagkaraki (2008) and Konstantinidi and Skiadopoulos (2011) find that the VIX volatility futures market is efficient using both statistical and economic settings. Chincarini (2011) also reaches similar conclusions for the weather derivatives market.

In the case of the freight markets, a number of papers have examined whether spot freight rates can be forecasted rather than futures (see e.g., Cullinane, Mason, & Cape, 1999, Jonnala, Fuller, & Bessler, 2002, Adland & Strandenes, 2006, and Glen, 2006, for a review of the approaches employed for modeling the dry and tanker markets). The implicit hypothesis is that predictability in the underlying freight spot rate implies predictability of the corresponding derivative contract, as well. However, from a theoretical point of view this is not a valid implication, since the standard cost-of-carry relationship for financial futures does not hold for the freight ones. This is because the underlying asset is not tradable, and hence the pricing by arbitrage argument cannot be applied. Hence, there may be other factors/information flows which also affect freight futures markets. This is analogous to the interest rate derivatives literature, where it is well documented that models which describe the dynamics of the underlying interest rate quite well, cannot account for the properties of the prices of the corresponding interest rate derivative ("unspanned stochastic volatility problem", see e.g. Jarrow, Li, & Zhao, 2007, and references therein). To circumvent this constraint, a series of papers have examined the efficiency of the BIFFEX market (see e.g., Haigh, 2000, Kavussanos & Nomikos, 1999, 2003), as well as those of various forward freight markets (see e.g., Kavussanos & Visvikis, 2004, Kavussanos, Visvikis, & Menachof, 2004), written on alternative spot freight rates (for various routes and both dry and wet cargoes). The analysis is carried out within a statistical setting which tests the unbiasedness hypothesis of the market, i.e. whether the current futures price is the best predictor of the future value of the underlying spot freight rate that will prevail on the maturity date of the contract. The acceptance of this hypothesis implies that futures prices evolve as martingales, and hence that the market is efficient. The literature finds mixed results, depending on the market and type of contract under investigation (see Kavussanos & Visvikis, 2006a, for a review). Adland and Cullinane (2005) argue that time-varying premia are the source of the rejection of the martingale property. Batchelor, Alizadeh, and Visvikis (2007) also study whether freight forward prices can be predicted, by performing a horse race of alternative forecasting models. They find that all models outperform the random walk model, but do not test the economic significance of the outperformance.

This paper, however, takes a different research approach and makes at least three contributions to the literature on whether freight derivatives markets are efficient. First, we employ an extensive dataset from IMAREX and analyze the futures prices of various maturities written on various major freight indices of the dry and wet markets. The use of alternative indices is necessary, given that freight markets are highly segmented. To the best of our knowledge, this is the first study to investigate the efficiency of this growing market; the previous literature

[2] The demise of the BIFFEX market was attributed to the fact that the BIFFEX contract did not serve as an efficient hedging instrument; this was because the underlying Baltic Freight Index (BFI) was not taking all routes and vessels into account, giving rise to a basis risk in the case of cross-hedging strategies (see e.g., Kavussanos & Nomikos, 2000, Haigh & Holt, 2002). As a response to this, BFI was split into the Baltic Capesize Index (BCI) and the Baltic Panamax Index (BPI) in April 1999, and the Baltic Handymax Index (BHMI) was added in November 1999 for even greater transparency.

[3] Freight futures and options have also been being traded in the New York Mercantile Exchange (NYMEX) and the Singapore Exchange (SGX) since 2005 and 2006, respectively (see also Kavussanos & Visvikis, 2006a, and references therein, for a detailed review of the advances in the freight derivatives market).