# Determinants of European freight rates: The role of market power and trade imbalance

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A B S T R A C T

This paper investigates the determinants of freight rates between six European countries and 47 partners. We show that the inward freight rates are, on average, 23% higher than for outward ones, indicating that the cost of repositioning empty containers is mainly carried by European importers. Moreover, we have broken down the freight rates into basic ocean freight and surcharges in order to analyze the impact of each explanatory variable on these two components. It appears that basic ocean freight depends mainly on factors that define the structure of shipping lanes, while surcharges are more time sensitive.

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## 1. Introduction

Transport cost is a component of import price, which implies that a variation in this cost has an impact on trade development. Transport charges are an important part of the trade cost (Anderson and Van Wincoop, 2004), as freight rates have a higher mean and variance than tariff barriers (Hummels, 2001). In some cases, such as Chile and Ecuador, transport costs are twenty times higher than average tariffs, which these countries face in the North American market (Clark et al., 2004). Therefore, any attempt to improve the integration of a country into the international trading system, should consider the effects of transport cost and its determinants.

The determinants of transport cost have been a subject of investigation for several authors who focus on different issues such as the quality of transport and communication infrastructures (Limao and Venables, 2001), economies of scale (Hummels and Skiba, 2004), port efficiency (Sanchez et al., 2003; Clark et al., 2004; Wilmsmeier et al., 2006; Blonigen and Wilson, 2008), the countries' connection with international liner-shipping networks (Marquez Ramos et al., 2007; Martinez-Zarzoso and Nowak-Lehmann, 2007; Wilmsmeier and Hoffmann, 2008; Wilmsmeier and Martínez-Zarzoso, 2010). At the heart of the debate about determinants of transport costs, is the role of the level of competition in the sector of freight rates.

Liner-shipping companies are allowed to collaborate on prices, capacity or schedules on some maritime routes.[1] The standard practice has been to include proxies for restriction policy (Fink et al., 2002; Clark et al., 2004). Because the main feature of the evolution of this industry is the increased concentration, recent studies pay more attention to competition intensity on specific trade routes (Hummels et al., 2009; Wilmsmeier and Hoffmann, 2008). However, several questions remain. One of them is how market power is reflected in the freight rates components. Here, we attempt to directly measure the impact of competition intensity and we examine empirically the extent to which this impact matters in explaining each component of freight rates.

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[1] These collaborations take the shape of various types of agreements: maritime conferences, operational and discussion agreements.

Another important factor on the determination of freight rates is the directional imbalance in trade between regions. This leads to an asymmetric freight rate between the outward and inward[2] journeys for a given itinerary in order to take into account the cost of empty container repositioning, on the leg where the loading factor is lower. According to Theofanis et al. (2009), the trade imbalance on transpacific routes increased from 18% to 67% between 1995 and 2005, while on Europe/Far East routes the figures are 27% and 65% for these years.

However, the impact of trade imbalance is difficult to measure and generally this effect is underestimated. Thus, one should wonder whether the import-to-export ratio is the best way to measure imbalances (Wilmsmeier and Hoffmann, 2008). Here, we investigate not only the determination of freight rates, but also whether the impact of these factors changes with journey direction.

We contribute to this literature in two main directions: (i) we control for the direction of a journey, since our data takes into account the inward as well as the outward freight rates for each itinerary, and (ii) for the first time, we provide a detailed analysis by breaking down the freight rates into two components: the basic freight rates and maritime surcharges.

We find: (i) the inward freight rates are, on average, 23% higher than for outward ones; (ii) a one-standard-deviation rise in distance leads to an estimated increase of 15% in inward freight rates and only 6% for the outward ones; (iii) the freight rates for return journeys tend to be higher for indirect services than for long journeys; (iv) it appears that basic freight rates depends mainly on factors that define the structure of shipping lanes, while surcharges are more time sensitive; (v) except for the Terminal Handling Charge, all components of freight rates are affected by competition intensity; and (vi) the surcharges, and in particular, the ancillary charges, seem to be used as one of the main revenue-makers.

This article is organized as follows. The Section 2 shows a review of literature on determinants of freight rates and presents a theoretical model. Section 3 focuses on describing data sources and on the econometric considerations. Section 4 deals with empirics on the estimation of freight rates. Section 5 provides some general implications and concludes.

## 2. The review of the literature and theoretical model

### 2.1. Different approaches to obtain freight rates data

The relative importance of transport on trade costs explains the growing interest of economists in the determinants of transport costs and their impact on international trade.

In the analysis of transport costs, the main issue is to obtain reliable data, and according to the literature there are three sources (Martinez-Zarzoso and Suarez-Burguet, 2005). First, some authors have used the mirror data[3] as a proxy of transport costs (Baier and Bergstrand, 2001; Limao and Venables, 2001). The advantage of this data is that they are available for most countries and for different periods (International Monetary Fund), but their main drawback is that they do not take into account the type of goods and the mode of transport. Furthermore, these data are unreliable due to differences in the methodologies used by countries to collect this information. Therefore, (Hummels and Lugovskyy, 2006) warn against the use of the matched-partner data, mainly when it comes to analyzing transport costs in level.

Another potential data source is to deduce the freight rates from import-charges data (freight and insurance costs) provided by customs declarations (Hummels, 2001; Fink et al., 2002; Sanchez et al., 2003 Clark et al., 2004; Martinez-Zarzoso and Suarez-Burguet, 2005; Wilmsmeier et al., 2006; Martinez-Zarzoso and Nowak-Lehmann, 2007; Hummels et al., 2009; Wilmsmeier and Martínez-Zarzoso, 2010).

To overcome the lack of data, some authors have used the shipping lines' freight rates (Limao and Venables, 2001; Wilmsmeier and Hoffmann, 2008). This provides an indication of the shipping price for a homogeneous unit (container) on a given route. Even if published freight rates are rarely applied, they are still a good indicator, and one could say that they at least apply to the small one-time shipper.

### 2.2. Review of the literature on determinants of freight rates

To estimate the determinants of the transport costs, Fink et al. (2002) use a reduced form of the price function, which takes into account the distance between countries, the technological effects of containerization, the existence of economies of scale, and the public trade policies and private anti-competitive practices followed in various countries. These last two elements are crucial in their analysis, since they emphasize the impact of competition rules in the liner-shipping sector.

Clark et al. (2004) and Sanchez et al. (2003) use the same approach but they focus mainly on the impact of port efficiency on transport cost. To do so, Clark et al. (2004) assume that the "*Limao and Venables*" infrastructure index is strongly correlated with port efficiency. These authors also use indicators obtained from a survey of exporting firms from different countries, and from their perceptions of port efficiency (World Economic Forum). Similarly, Sanchez et al. (2003) apply the principal component analysis to construct port-performance indicators, and their results show a negative correlation between port efficiency and the freight rates for Latin American countries. According to Wilmsmeier et al. (2006), doubling port efficiency in both the importing and exporting countries would have the same effect on the freight rate as reducing the distance between them by half.

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[2] Inward and import mean goods coming into the six European countries selected, while outward and exports refer to commodities leaving these countries.

[3] Imports in 'cif' (Cost, Insurance and Freight) of the destination country minus exports in 'fob' (Free On Board) in country of origin.