



Shipping route choice across geographies: Coastal vs. landlocked countries [☆]



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ABSTRACT

This paper investigates how geography and transportation costs influence the decisions by shippers of which port of export to use. Using a large sample of disaggregated shipments originating from several countries in Europe, we show that European logistics networks exhibit a low level of international integration that affects shipping route choice. Furthermore, we find significant differences in shipping behaviors across landlocked and coastal countries, with shippers in landlocked countries avoiding long land transportation, crossing borders readily, and placing more value on transportation infrastructure. These findings have implications in designing port competitiveness strategies and economic development policies in landlocked countries.

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1. Introduction

The inception of freight containerization and the altered competitive landscape that ensued among seaports have prompted scholars to better understand the underlying factors of port choice and port hinterland delineation (Anderson et al., 2009; Guerrero, 2014; Ducruet and Itoh, 2015). While many variables related to transportation infrastructure and services have been tested for their impacts on port choice (e.g., Veldman and Bückmann, 2003; Tiwari et al., 2003; Ferrari et al., 2011; Steven and Corsi, 2012), geographical circumstances have so far been rather poorly investigated. Among important geographical forces that could impact trade costs (Limao and Venables, 2001), being a landlocked territory has been recognized as critical to port competition (de Langen, 2007) and cries out for a detailed analysis of its effects on shipping route choice behavior. Furthermore, frictional effects of national borders, as another important geographical dimension, have been studied extensively in the international trade literature (Anderson and van Wincoop, 2003; Combes et al., 2008; Head and Mayer, 2013), but they remain largely neglected in studies of shipping route choices (Guerrero, 2014).

This research applies cross-country analysis to understand how geographies affect choices for shipping route on the hinterland side. It particularly focuses on ports as intermediate nodes on international trade routes and compares shipping route choice factors across coastal and landlocked countries of Europe. Understanding the shipping behavior specific to landlocked countries is important from two perspectives. On the one hand, the geography of landlocked countries turns them into highly contestable hinterlands that can readily switch among ports (Kashiha and Thill, 2015); thus, given the highly

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competitive nature of these territories, they should be the subject of great interest to further our understanding of port competition and competitive strategies (de Langen, 2007). On the other hand, the geographical disadvantage of landlocked countries has been the focus of a large body of literature in economic development and international trade (Gallup et al., 1999; Shepherd and Wilson, 2006). It has been argued that the sluggish economic growth of many landlocked countries can be attributed to their lack of access to seaports. Yet, the port choice behavior of landlocked countries is rather understudied so that the causal linkage remains to be established.

We examine the role of distance and national borders as critical elements of the geographical impedance to cargo movements. Our analysis also includes infrastructure quality of shipping routes, the level of efficiency and connectivity of ports, and the presence of transshipment services. We use a rich dataset of shipper-level seaport choices that covers the entire European economic space. The dataset has been compiled from the PIERS Trade Intelligence database that describes containerized door-to-door freight shipments from points of origin within the European free-trade zone to one of twenty-two major European forwarding ports in October 2006, before their long-haul journey to the United States. In addition to these major forwarding ports, some other European ports may play a significant role in trade with the U.S., but as terminal points of a feeder service only and not as forwarding port. Therefore, our analysis recognizes three types of countries: countries that have at least one port with shipping service to the U.S. (coastal countries); countries that have one or more seaports, but whose ports are not directly involved in the trade with the U.S. (so-called pseudo-landlocked); and countries that have no port (landlocked). This functional typology of countries allows us to contrast shipping behaviors across relevant geographies.

We test if there are any differences between the weights that shippers from landlocked, pseudo-landlocked, and coastal countries place on route choice factors. In short, our results suggest that port choice behavior differs significantly between shippers in the three types of countries. Contrasted behaviors are noted in terms of sensitivity to journey distance to ports, to the crossing of national borders and infrastructure quality on the journey to a port of export, as well as the efficiency, connectivity, and transshipment function of ports.

These findings quantify how geography and infrastructure impact regional economic competitiveness and the effectiveness of economic development policies in the port regions and landlocked nations. They allow port authorities to evaluate the quantitative importance of geographical and infrastructural forces that could assist in port competitiveness strategies and policies. Our results indicate that enhancement in infrastructure from the 25th percentile to the median is equivalent to a distance reduction of 32 km for an average shipper in a coastal country and 151 km for an average shipper in a landlocked country. This suggests that the geographic handicap of landlocked countries that imposes extra kilometers to reach a port can be offset by improvements in transportation infrastructure domestically and in transit countries.

The rest of the paper is organized as follows: The next section reviews the literature on port choice as well as international trade in relation to the landlockedness of countries. Then, we discuss our modeling approach that is based on the discrete choice framework. In the following section we present the data used in this research. It is followed by analytical results and discussion. The last section concludes the paper.

2. Background

The importance of ports as gateways to global markets and the reliance of national economies on port efficiency and competitive power have been researched in multiple disciplines (Ng et al., 2014; Woo et al., 2011). Our approach is more in line with transportation studies that empirically model port choice. Also of relevance to the choice of shipping routes is the study of international trade, which shares a common context. This section reviews port choice studies and then provides brief background on the international trade literature, particularly in the case of landlocked countries.

2.1. Port choice

The transportation literature has two strands of research investigating port choice and port competition; namely optimization and discrete choice analysis. The first approach is built on the assumptions of deterministic choice behavior; where a unique shipping route minimizes the total cost. Luo and Grigalunas (2003), Levine et al. (2009), and Fan et al. (2010) use operations research methods to find a unique optimal solution, including port of export, port of import, and intermodal routes that minimizes the total costs of the whole shipping process. The second approach is built on the random utility framework which allows for probabilistic consumer behavior. We follow the second approach, as initiated by Malchow and Kanafani (2001) in port selection studies.

In order to identify port choice determinants with sufficient validity, understanding who makes the choice is necessary. Research characterizes the decision making process under three scenarios: 1 – when the shipper or consignee selects a port; 2 – when the shipper delegates the responsibility for port selection to freight forwarders; 3 – when the shipper gives the responsibility of port choice to the shipping line as a part of a door-to-door service (Cahoon and Notteboom, 2008; Meersman et al., 2010). Interview-based studies clearly identify that port selection factors are evaluated differently by forwarders, shippers, and carriers (Murphy and Daley, 1994; Tongzon and Sawant, 2007; de Langen, 2007).

However, empirical research has ignored the potential differences in choice behavior across decision makers, mainly due to a lack of information that explicitly recognizes who made the port decisions. Recently, Steven and Corsi (2012) controlled

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