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Building a bridge between port and city: Improving the urban competitiveness of port cities

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ABSTRACT

Historically, ports have been an important location factor for cities, enabling international trade and investment and facilitating urbanization processes. However, the traditionally strong relationship between ports and port cities has gradually weakened due to the emerging negative externalities of ports. Therefore, port-city municipalities need to better understand the relationship between port activities, urban competitiveness, and the attraction of investment. This paper uses the Quadratic Assignment Procedure (QAP) and related regression models to test this relationship as well as identify the determinants of urban competitiveness. The results show that despite the positive relationship between port and urban networks, port cities currently exhibit no significant advantages over non-port cities in attracting Foreign Direct Investment (FDI); in addition, port-city competitiveness depends more on urban characteristics than on port factors. Based on these results, we propose various strategies for port-city developments.

1. Introduction

Ports traditionally serve as economic catalysts for surrounding cities, facilitating the integration of markets and the agglomeration of services that generate economic benefits and socioeconomic welfare (Funke and Yu, 2011; Song and van Geenhuizen, 2014). By observing the historical development of global cities, the relationship between the development of a port city and the emergence of a large port becomes apparent. According to Merk et al. (2011), the value added by the port cluster to the city of Rouen amounted to >21% of regional Gross Domestic Products (GDP) in 2007. In the recent past, most coastal cities had a unique port, and every port sustained a city (Hall and Jacobs, 2012). Ports impact on cities by attracting firms in a variety of industries. Yochum and Agarwal (1988, 1987) classified them into three types: port-specific industries that represent transportation and port services necessary for maritime trade; port-related industries that represent firms engaged in import and export trade; and port-induced industries that take advantage of the hub to expand their markets. Moreover, a symbiotic cluster of non-port industries can emerge in port cities, such as financial and legal services. Depending on their geographic and economic location advantage, port cities can rapidly grow; for example, Ningbo and Shenzhen have emerged as important Chinese port cities and economic hubs over the past three decades (Ng, 2003; Tang et al., 2015). Hence, the geographic and economic advantages that a port confers upon its immediate city remain important at the operational, policy and research levels (Dooms et al., 2015; Lee et al., 2012; Lehrer and Laidley, 2008).

On the other hand, the previously strong relationship between ports and port cities is said to be weakening, both in economic and geographic terms. Fujita and Mori note that although growth has traditionally been initiated by the advantage of good water access in many large cities (e.g. Chicago and Paris), this does not play as important a role today as in the past (Fujita and Mori, 1996). Furthermore, the decline of ports can synchronize with urban growth, e.g., Stockholm, and vice versa, e.g., Rotterdam (Merk, 2013). Some studies even highlight that the existing and potential role of ports is somewhat exaggerated in the regional development process. Gripaios and Gripaios (1995) examined the case of Plymouth and found that ports were not big employers of labor and were no longer the interrelated industrial complexes that they had once been. In addition to this diminishing economic relationship, geographic tensions have also emerged between port and urban areas (Daamen and Vries, 2013; Hoyle, 2001, 1989; Notteboom et al., 2009). Different land use patterns among the economic activities of port and city result in increasing

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Period	Western Port City Model	Asian Hub Port City Consolidation Model
Ancient-medieval to 19th century	**Primitive city port** Close spatial and functional association between city and port	**Fishing coastal village** Small community of natives practice self-sufficient local trade
19th to early 20th century	**Expanding city port** Rapid commercial and industrial growth forces port to develop beyond city confines with linear quays and break-bulk industries	**Colonial city port** Dominant external interests develop both port and city for raw products exportation and geopolitical control
Mid-20th century	**Primitive city port** Close spatial and functional association between city and port	**Entrepot city port** Trade expansion and entrepot function, modern port development from sea reclamation
1960s-1980s	**Retreat from the waterfront** Changes in maritime techology induce growth of seperated maritime industrial development areas	**Free trade port city** Export-led policy attracts industries using port facilities through tax-free procedures and low labor cost
1970s-1990s	**Redevelopment of the waterfront** Large-scale modern port consumes large areas of land and water space, urban renewal of original core	**Hub port city** Increasing port productivity due to hub functions and territorial pressure close to the urban core
1990s-2000s	**General port city** Rising environmental concern for intermodal transport, city economy develops alike non-port cities	**Global hub port city** Maintained port activity and new port building due to rising costs in the hub, possible hinterland expansion

Fig. 1. Transformation of ports and port cities in different stages.
Sources: Hoyle, 1989; Lee et al., 2008.

geographic segregation (Hoyle, 2001, 1989). Limited land, ineffective logistics and the so-called siphon effect have made it difficult for cities to develop in proximity to their ports. With much of the potential economic benefits being syphoned to other cities, environmental pollution, traffic congestion and increased crime negatively impact the city, reducing urban competitiveness and hence the ability to attract investment (Merk, 2013; Merk and Hesse, 2012; OECD, 2014).

In this context, the following questions are pertinent: Do port activities still attract investment to their immediate cities? If so, do they play a pivotal role? Moreover, do port cities have disadvantages compared to non-port cities in attracting investment due to the siphon effect? These theoretical questions have never been explored. In this paper, it is argued that these relationships must be better understood so that municipal development policies on port and city development are better informed. These relationships are investigated by comparing the attractiveness of port cities to non-port cities and by comparing the difference between urban characteristics and port characteristics in terms of their contribution to urban competitiveness. There are four main sections. First, social network analysis is used to explore the structures of city investment and maritime networks, primarily through centrality and cohesive continental scale analysis. Second, the relationship between these networks is determined by a QAP correlation test. Third, by means of regression models, the question of whether port cities have a competitive advantage over non-port cities is investigated. Fourth, the determinants of port city competitiveness are explored.

2. The relationship between port activities and urban competitiveness

2.1. Spatial and economic relationships

The spatial pattern of ports and port cities has changed over time and in different contexts. Numerous theoretical models have been developed to interpret this transformation (Ng and Ducruet, 2014). Hoyle (1989) developed the port-city evolution model, dividing the history of western port-city transformation into five stages: (1) primitive port-city, (2) expanding port-city, (3) modern industrial port-city, (4) the retreat from the waterfront, and (5) the redevelopment of the waterfront. Lee et al. (2008) added the "general port city" as a sixth stage in Hoyle's model based on rising environmental concern for intermodal transport. They also put forward the new Asian hub port city consolidation model to reflect the continuation of port activities close to the urban core in Asia, which shows a different regional feature from the western one, as shown in Fig. 1.[1] The disassociation of Asian ports and port cities (since the 1970s) exhibits an approximately 80-year lag behind than that of the West (since the 1890s) and shows a dissimilar pattern, athough both are based on land conflicts, environmental concerns, and the rising costs of port activities.

We can conclude that the main trend is the increasing disassociation of ports and port cities over the past decades (as noted by Hoyle, 1989 and Lee et al., 2008), which has also been verified in many influential studies (e.g., Notteboom and Rodrigue, 2005; Ducruet, 2006). There are a number of underlying reasons for this. According to Hoyle (1989), ports and cities are closely related to each other in their spatial and functional aspects, particularly in the earliest stages of their development. Later, the advancement of port technologies generated the need to expand port areas, which accelerated their separation from urban areas. This emphasized the redevelopment of port areas into waterfronts (Hoyle, 2001). Stemming from this transformation, port-related industries have moved away from port areas because of environmental concerns and labor concentration. Despite this migration, competition for vacant space and water accessibility continues between port activities and other urban functions such as housing, commerce, and recreation. (See Fig. 2.)

Trends in spatial distribution reflect changes in the economic relationship between ports and port cities. Port cities usually benefit from a dependence on port economic activities, for example, the lower transaction costs provided by port areas. At the same time, urban spaces also provide ports with advantages that cannot be easily accessed outside of urban agglomerations, such as labor pools and infrastructure (Hall and Jacobs, 2012). Port-related industries are attracted by such environments, which allows ports and port cities to maintain a symbiotic

[1] It is specified here that the black dots in the general port city and at the top of the Asian hub model have nothing to do with each other. The former is used to show the decline of western port, the latter is used to show the weakness of Asian ports on the emerging stage.