Domestic transport effects on regional export trade in Greece

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ABSTRACT

This paper examines the role of domestic transport on regional export trade in Greece. It aims to understand how changes in the transport conditions of a region can affect its own and neighboring regions' ability to improve foreign trade. The proposed dynamic spatial panel model extends previous ones in the scant related literature, by accounting for spillover effects and own time lagged responses of export flows to changes in variables related, among others, to network distance and accessibility. The results suggest a considerable number of indirect (spatially lagged) effects that are significant for the regional export trade, including those of highway corridors. Agglomeration economies positively affect manufacturing exports by ship and truck in the own prefecture, while manufacturing specialization has a significant impact on maritime transport. It is also shown that failure to account for long-run responses can significantly underestimate the effect of changes in the distance to major transport facilities on export volume. Especially the enhancement of interregional accessibility and market potential has a major impact on the agricultural exports by road. The findings have implications for the coordination of regional investment policies and the planning of the mainland transport system in connection with the location of logistics hubs.

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1. Introduction

Transport of goods is widely recognized as a catalyst for the economic development of a region. The economic effects of the construction of freight-related transport systems and the improvement of existing ones may significantly vary and interact across different geographical ranges and span multiple timescales. These effects further vary with the mode of transport and the type of improvement, the economic sector and the category of commodity. As far as the export trade is concerned, the spatial structure and dynamics of the systems of production and distribution of goods to the transport hubs can have a crucial impact on the export performance of each region within a country. Specifically, the suitable exploitation of the comparative advantages of a region, in terms of its natural resources, climate, and the availability of and the closeness and access to national and international transport corridors have historically proven to exercise a strong influence on the growth of the amount and value of goods moved from/to foreign markets, relative to other regions (Ioannides, 2013).

The related literature has recently given an increasing attention to the relationship between the geographical distribution of the cost of transporting a good from the places of production to the ports (or other transport nodes) of export and the development of the connected regions (Artuc, Iootty, & Pirlea, 2014; Celbis, Nijkamp, & Poot, 2014; Matthee & Naudé, 2008; Storeygard, 2013). The domestic cost of export trade is regarded as more elastic to the temporal and spatial variations of freight demand and of the related transport system characteristics, in terms of its accessibility, capacity and quality of services, compared to other trade costs which are relatively fixed across regions, such as those for the documents preparation, customs clearance and cargo handling at terminals. Consequently, the success of policies to enhance export trade development in a region necessitates the holistic treatment of both the time and spatial dimensions of the domestic transport and logistics system.

This paper suggests a comprehensive methodological approach to model the production of regional export flows in Greece, as a function of the country's internal geography, economy and transport conditions. The proposed econometric model, which refers to the general dynamic Spatial Durbin Model (DSDM), represents the

spatio-temporal processes influencing exports by broad commodity category and transport mode. The major advantage of such a space−time dynamic model is that it accounts for the impact of a change in the observation of an explanatory variable at a specific year on the contemporaneous and future responses of the dependent variable in the own- and other (neighboring) prefectures.

The output of this model can provide valuable insight into the design and evaluation of policies which aim to support the economic recovery of the country through the export-led growth. In particular, this analysis can inform us about the way the massive transport infrastructure investment allocated during the last decades to enhance regional accessibility have influenced the export trade in Greece. Regarding the rest of the paper, it is organized as follows: Section 2 provides a critical overview of the related literature and the theoretical background of this study, Section 3 presents the data and the methodology, Section 4 reports and discusses the results of the proposed model, and Section 5 summarizes and concludes.

2. Theoretical background and literature review

2.1. Theoretical background

Transport improvement can be considered as an integral part of regional exporters' competitiveness, on the basis of assumptions from the new trade theory (Feenstra, 2004; Helpman & Krugman, 1985) and, particularly, the New Economic Geography (NEG) (Fujita, Krugman, & Venables, 2001), which emphasize the role of market imperfections through externalities linked with scale economies and heterogeneous consumer preferences. Specifically, the market size of a region positively affects its productive specialization and feedbacks with increasing returns to scale and transport cost reductions, which, in turn, reinforce the productivity gains from agglomeration economies and, hence, the competitiveness and intensity of export trade. As it has been theoretically (Fujita & Mori, 2005; Konishi, 2000; Krugman, 1993) and empirically (Becchetti & Rossi, 2000; Coşar & Fajgelbaum, 2016; Diaz-Lanchas, Llano, & Zofío, 2013; Roberts & Tybout, 1997) shown, the specialization and export activity in tradable goods sectors tend to increase around international cargo hubs, industrial districts and export processing zones, as those facilities signify the presence of an advantageous geographical position and improved market access.

Moreover, the influence of enhanced accessibility on the spatial concentration of tradable goods sectors in a region may affect the agglomeration economies and export trade of other regions, according to the form and intensity of transactions and the degree of trade integration among each other (Diaz-Lanchas et al., 2013), the balance of (import−export) trade flows, the sectoral composition and the value−weight relationship of goods (Behrens, Gaigné, Ottaviano, & Thisse, 2006). It is also noted that the benefits obtained from the development of export-oriented trade activities around transport hubs may significantly vary − in both sectoral and geographical terms − with the density of population around the hub catchment area and the diversification of goods and services in the local and neighboring areas.

In some cases, these benefits may decline in analogy with the distance from the trade gateway or cargo hub, resulting in regional disparities and the need for income redistribution. Such phenomena have been widely observed, especially in large developing countries (e.g., China and India), wherein coastal regions with international trade gateways are much more accessible from/to foreign markets, than those in the hinterland (Coşar & Fajgelbaum, 2016). Nonetheless, in other cases, specific tradable sectors or the overconcentration of tradable goods processing and distribution may lead to negative agglomeration economies (e.g., traffic congestion, environmental pollution and land deprivation) in the hub region, diffusing the benefits to other regions or the national level (Grobar, 2008).

2.2. Literature review

Among the first studies which considered the effects of domestic transport conditions on export trade, as they are summarized in Table 1, Nicolini (2003) used panel data regression to show the importance of local transport facilities, in terms of the transport network density, on the textile and mechanical export flows from a small sample of European regions, and Matthee and Naudé (2008) employed a tobit model to stress the role of home-market effect (measured by the size of local gross domestic product) and distance (measured in kilometers from the nearest port) on manufacturing exports from South African districts. More recently, Ciżkowicz, Rzońca, and Umiński (2013) employed panel data models to demonstrate that Polish regional exports of agricultural and food products are positively correlated with the access to the sea, and Albarran, Carrasco, and Holl (2013) used a dynamic probit model to show the positive impact of domestic transport improvements, in terms of the travel time to borders and seaports, on small and medium-sized Spanish firms' probability of exporting. Artuc et al. (2014) developed a gravity model to explain the varying export performance of Croatian counties in relation to their proximity to border gates and seaports as well as to their road network density. Bensassi, Márquez-Ramos, Martínez-Zarzoso, and Suárez-Burguet (2015) employed an augmented gravity model to show that common borders and the number, size and quality (performance) of logistics facilities positively influence regional export flows in Spain. Coşar and Demir (2016) used several gravity-type models to indicate the increase of manufacturing exports from Turkish provinces in response to improvements in the quality and capacity of roads toward gateways, and that the magnitude of this increase is larger for the more time-sensitive industries.

The results of the aforementioned studies mainly verify the positive influence of agglomeration economies and transport or accessibility improvements in some region on the ability of local exporters to sell their products to foreign markets. However, their panel data modeling approaches are non-spatial, in the sense that they ignore spillover effects on the export activity of other (neighboring) regions. Nsiah, Wu, and Mayer (2012) analyzed the exports of 50 US states to 24 Asian countries over a ten-year period with the use of dynamic panel gravity and probit models. They showed the positive impact of highway network density and also found that regions which are geographically close to one another achieve similar export results, and that this effect is stronger in high-tech export industries than in low-tech industries. Regarding the very few related studies which formally employed spatial analysis methods, Alamá-Sabater, Márquez-Ramos, and Suárez-Burguet (2013) used a spatial auto-regressive (SAR) model, which considers origin- and destination-based dependence, to indicate the benefits on Spanish regional exports of agricultural and industrial goods from neighboring regions' transport networks (logistics facilities) for a single year. Márquez-Ramos (2016) applied a dynamic panel SAR gravity model to demonstrate the significance of the existence of seaport facilities in neighboring regions for the export flows of individual Spanish regions.

The approach proposed here (see next Section) extends previous SAR models and puts forward a generalized framework for incorporating both the time and spatial lagged responses of regional export flows to a range of domestic transport-related (infrastructure availability, proximity and accessibility) and other (geographical, economic) covariates. Specifically, the time−space dynamic model recognizes that a transport improvement in a