A NEW PROPOSAL OF SPATIAL SHIFT SHARE ANALYSIS: AN APPLICATION TO TOURISM

Una nuova proposta di analisi shift share spaziale: un'applicazione al turismo

Salvatore Costantino, Maria Francesca Cracolici, Davide Piacentino

Abstract The study proposes an extension of the spatial shift-share method by combining the formulations developed by Mayor and López (2008) and Espa *et al.* (2014). Our proposal enables to assess if and how the economic performance of a region is influenced by that of its neighbouring regions, taking into account differences in the industrial composition. Applying our approach to the case of Italian incoming tourist flows at NUTS3 regional-level, we are able to provide novel evidence.

Abstract Lo studio propone un'estensione della tecnica shift-share con struttura spaziale attraverso la combinazione delle formulazioni sviluppate da Mayor and López (2008) ed Espa *et al.* (2014). La nostra proposta consente di valutare se e come la performance di una regione è influenzata da quella del suo vicinato, tenendo conto delle differenze nella composizione industriale. L'applicazione del nostro approccio al caso dei flussi turistici Italiani in entrata a livello NUTS3, ci consente di fornire nuove evidenze.

Key words: shift-share analysis, spatial statistics, tourism services, tourist flows, Italian regions

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1 Introduction

The spatial shift-share was firstly introduced by Nazara and Hewings (2004). Later, Mayor and López (2008) (ML) proposed a spatial formulation of the Esteban-Marquillas (1972) method, and subsequently Espa *et al.* (2014) (ES), starting from some criticism of Nazara and Hewings (2004) approach, proposed a new decomposition formula.

The paper contributes to this stream of literature by proposing a new shift-share decomposition that overcomes some main limitations of previous approaches. Specifically, we extend the ES decomposition on the basis of ML approach. As a result, our decomposition allows to more accurately look at the spatial effects, one of the main limitations of ML approach, but at the same time taking properly into account differences in the industrial composition, a limitation of ES approach. More in detail, our decomposition allows to separate a 'pure'competitive effect from an allocation effect in all spatial components of the ES decomposition. In other words, we are able to draw out the specialization effect in both the spatial comparisons, i.e. "region *vs* neighbours" and "neighbours *vs* nation". We provide an empirical example to the case of tourism in Italian NUTS3 regions. From this empirical analysis, we are able to provide novel evidence on the geography of tourism in Italy and advantages/disadvantages of different nature. The analysis exploits data on tourist arrivals in Italian NUTS3 regions by country of origin, collected by the Italian National Statistical Institute (ISTAT).

2 Method and Data

The introduction of spatial structure in shift-share decomposition allows to take into account possible dependence across neighbouring regions in the analysis. Research on this topic has followed up to now two main paths. On one hand, some studies have proposed to include some spatial components in the traditional decomposition by Dunn (1960) (see Nazara and Hewings, 2004; Espa *et al.*, 2014). On the other hand, others aim to extend the decomposition by Esteban-Marquillas (1972) in a spatial setting (see Mayor and López, 2008). Looking at the two approaches as complementary and not as alternative, we propose a novel spatial shift-share decomposition that origins from their combination. Our proposal decomposition enables us to compare economic performance of a given region with that of its neighbours, controlling at the same time for all possible differences in industrial composition of both the region and its neighbours. We formally describe our decomposition as follows:

$$\begin{aligned} \sum_i \Delta X_{ij} &= \sum_i X_{ij}^{(t)} g_{..} + \sum_i X_{ij}^{(t)} (g_{i.} - g_{..}) + \sum_i \hat{X}_{ij}^{(t)} (\breve{g}_{ij} - g_{i.}) + \\ &+ \sum_i \left(X_{ij}^{(t)} - \hat{X}_{ij}^{(t)}\right) (\breve{g}_{ij} - g_{i.}) + \sum_i \hat{X}_{ij}^{(t),v} (g_{ij} - \breve{g}_{ij}) + \sum_i \left(X_{ij}^{(t)} - \hat{X}_{ij}^{(t),v}\right) (g_{ij} - \breve{g}_{ij}) \end{aligned} \tag{1}$$

where,

$$\breve{g}_{ij} = \frac{\sum_{k\in v} w_{jk} X_{ik}^{(T)} - \sum_{k\in v} w_{jk} X_{ik}^{(t)}}{\sum_{k\in v} w_{jk} X_{ik}^{(t)}} \tag{2}$$

and,

$$\hat{X}_{ij}^{(t)} = \left(\sum_j X_{ij}^{(t)}\right) \frac{\sum_i X_{ij}^{(t)}}{\sum_i \sum_j X_{ij}^{(t)}} = \left(\sum_i X_{ij}^{(t)}\right) \frac{\sum_j X_{ij}^{(t)}}{\sum_i \sum_j X_{ij}^{(t)}} \tag{3}$$

and,

$$\hat{X}_{ij}^{(t),v} = \sum_i X_{ij}^{(t)} \frac{\sum_j X_{ij}^{(t),v}}{\sum_{i,j} X_{ij}^{(t),v}} \qquad \text{with} \qquad X_{ij}^{(t),v} = \sum_{k\in v} w_{jk} X_{ik}^{(t)} \tag{4}$$

where v is the set of neighbours of a region j and w_{jk} is an element of the row standardized spatial distance W matrix and it measures the intensity of the relationship between the j-th region and the k-th region of its neighbourhood. $\breve{g}_{ij}$ is the spatial growth rate of tourist arrivals from the i-th country to the neighbours of j-th region as defined in (2); $g_{..}$ is the national growth rate of tourist arrivals; g_{ij} is the growth rate of tourist arrivals from the i-th country to the j-th region; $g_{i.}$ is the growth rate of tourist arrivals from the i-th country to Italy; $X_{ij}^{(t)}$ are the tourist arrivals from the i-th country to the j-th region at time t. $\hat{X}_{ij}^{(t)}$ and $\hat{X}_{ij}^{(t),v}$ are the *homotetic* and *spatial homotetic* tourist arrivals respectively.[1]

In Equation (1), the first two components on the right side are the national share (NS) and the industrial mix (IM), respectively (Dunn, 1960). The third component is the 'pure' spatial competitive effect of the neighbours of region j, in sector i (in our case the tourists' country of origin), with respect to the entire nation (*Neighbours-Nation Competitive Effect* – NNCE). The fourth component of Equation (1) is the spatial allocative effect of the neighbours of region j, in sector i, with respect to the nation (*Neighbours Allocative Effect* – NAE). The allocation effect, in our case, captures the ability of a region to invest resources in origin countries where its neighbourhood is competitive with respect to the nation. Moreover, crossing signs of these two components provides evidence on the sectors (or origin countries) where the neighbourhood of a given region is specialized. The fifth component on the right side of Equation (1) represents the 'pure'spatial competitive effect of the region j with respect to its neighbours (*Region-Neighbours Competitive Effect – RNCE*). This component is positive when a region has competitive advantages with respect

[1] The homotetic variable was introduced by Esteban-Marquillas (1972) in the traditional shift-share, and it was defined as the value that X would take in the i-th sector of j-th region, at time t (the starting point of the interval of time $[t,T]$), if the structure of X were the same of which of the whole nation. Whereas, the spatial homotetic variable was defined by Mayor and López (2008) as: *'the magnitude of sector i in the region j would have taken if the sectoral structure of j were similar to its neighbouring regions'* (p.11).

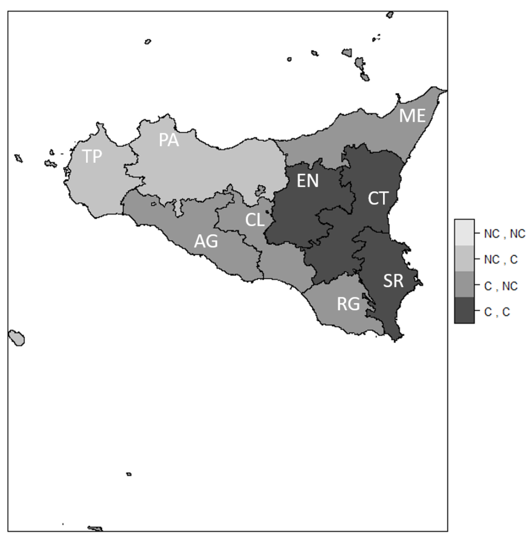
to its neighbours, $(g_{ij} - \breve{g}_{ij}) > 0$; it is negative in the opposite situation. The last component of Equation (1) is the spatial allocative effect of the region j with respect to its neighbours (*Region Allocative Effect – RAE*). This component provides information about the ability of a region to invest resources in sectors (in our case, origin countries of tourist flows) where the same region is competitive with respect its neighbourhood. Comparing RNCE and RAE, we can observe positive or negative specialization effects of a given region. For example, if RNCE (Region-Neighbours Competitive Effect) is positive and RAE (Region Allocative Effect) is positive, we can conclude in favour of a positive specialization of region j.

The proposed decomposition has been applied to data collected by the Italian National Statistical Institute (ISTAT) on tourist arrivals in Italian provinces (NUTS3 regions), from 8 European nations, over the time-span 2011-2014.

3 Results and Conclusions

The discussion of results, for limitation of space, is focused on the specific case of Sicily[2].

Fig. 1 NNCE and RNCE map Map of the two spatial competitive effects, both of neighbours w.r.t. the nation and of one region w.r.t. its neighbouring regions. C and NC represent, the competitive and not competitive effect, respectively. The order of the two components is : the first from the left is the competive effect of neighbourhood (tird component of the method), the second is the competitive effect of one region w.r.t. its neighbours (fifth component of the method).



Comparing the two competitive effects (the one of neighbours and the region's one), as shown in Fig. 1, it is possible to see that *Palermo* (PA) and *Trapani* (TP)

[2] Evidence on other Italian regions is available upon request. In our analysis, allocation effects are computed considering tourists' countries as different sectors of activity.

have a competitive advantage in attracting tourists w.r.t. its neighbours, but their performance is negatively influenced by neighbours that are not competitive w.r.t. the nation. Whereas, provinces like *Agrigento* (AG), *Caltanissetta* (CL), *Ragusa* (RG) and *Messina* (ME) are in the opposite situation. These regions are not competitive in attracting tourists with respect to their neighbours, but their performance is positively influenced by the performance of the neighbours. Finally, some provinces located in the Eastern area of Sicily (e.g., *Catania* (CT), *Siracusa* (SR), *Enna* (EN)) benefit from both two spatial competitive effects.

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