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Abstract: Given the economic importance of the tourism sector, countries actively compete for attracting tourism flows. In a bilateral perspective, an important determinant of the degree of competition is the geographical structure of tourism inflows, i.e., the relative importance of the different source countries. A higher overlap of these flows indicates greater competition. The goal of the present study is to propose a methodological approach to quantify this overlap. Taking some indicators traditionally used in international trade analysis as inspiration, we propose a methodology that measures, for each pair of countries, the degree of similarity between the geographical structures of tourism inflows. The methodology takes a multidimensional concept of structural similarity in order to incorporate relevant dimensions of international tourism flows today.

Keywords: Tourism flows; Arrivals; Geographical similarity; Competitiveness; Index.

JEL Classification: F14, L83.

1 Introduction

The tourism industry is widely recognized as a crucial element in the development strategies of the countries (European Commission, 2007). Tourism activities have considerable economic effects. As surveyed by Sinclair (1998), they contribute to economic growth and job creation, they improve the balance of payments, increase household incomes and government revenues, generate important multiplier effects in other sectors, and may cause an increase of trade. Because of this, countries compete intensively, seeking to increase their market shares of world tourism. In this context, two aspects should be highlighted. First, despite the fact that distance is still an important determinant of international tourism flows (McKercher, Chan, & Lam, 2008; McKercher & Lew, 2003), there is a trend toward globalization of tourism. This trend is driven by, among other things, falling transportation costs and the rise of emerging countries as important sources of tourists. Second, heterogeneous demand for tourism services has led to segmentation as a critical dimension of the marketing strategy.

At the level of the different countries (and regions), we now see the emergence of strategic planning for the development of the tourism sector (Kirovska, 2011; Lusticky, 2011). This strategy naturally involves the strengthening of their competitive conditions as emphasized in the literature on tourism destination competitiveness (Crouch, 2011; Dwyer & Kim, 2003; Mazanec & Ring, 2011; Mazanec, Wöber, & Zins, 2007; Ritchie & Crouch, 2003).

In this study we focus on another important determinant of tourism competition: the geographical structural similarity (GSS) of tourism demand between countries. Specifically, we propose a method to quantify this similarity. To that end, we take as inspiration the indices traditionally used in international trade analysis to evaluate the

degree of competition between two countries in a specific market, but provide a new conceptual framework that allows us to incorporate the additional complexity and the new dimensions that are specific to the evaluation of tourism flows. Measuring the GSS between pairs of countries gives us information on the competition between these countries as tourism destinations. Additionally, the development of a multidimensional approach such as the one we propose in this study allows us to identify in greater detail the causes behind the levels of competition calculated.

The remainder of the paper is organized as follows. In the next section we provide a literature review on tourism destination competitiveness. In the third section we develop a methodology to assess geographical structural similarity. The methodology proposed is illustrated in the fourth section. In the last section, conclusions are presented.

2 Theoretical Background

Tourism destination competitiveness is a research topic of growing interest not only among tourism researchers but also for policy makers and practitioners. Therefore, the emergence of several research strands on this topic is not surprising. A first group of studies focuses on specific dimensions of destination competitiveness, including destination management systems, destination marketing, quality management, environment, nature-based tourism, and strategic management. There are also some studies focusing on price competitiveness, which can be seen as a first and simpler interpretation of the competitiveness concept (Mazanec et al., 2007). Dwyer, Forsyth, and Rao (2000, 2002) are examples of important studies on this topic. In their turn, Dwyer and Forsyth (2010) provide an important contribution to this literature,

discussing the importance of destination price competitiveness and analysing their determinants and measures in detail.

A second strand of the literature seeks to evaluate the competitive positions of specific destinations, including the cases of Australia and Korea (Kim & Dwyer, 2003), Spain and Turkey (Kozak, 2002), Hong-Kong (Enright & Newton, 2004), Asia-Pacific (Enright & Newton, 2005), Slovenia (Gomezelj & Mihalic, 2008), Southern Italian regions (Cracolici & Nijkamp, 2009), and Hungarian regions (Dávid & Tóth, 2012), among others.

Finally, a third research avenue develops general models and theories of destination competitiveness (Crouch, 2011). This research field represents the critical background for the present study. The most important contribution in this area is, without doubt, the model(s) proposed by Ritchie and Crouch in several studies (Crouch & Ritchie, 1999; Ritchie & Crouch, 2000, 2003). Their main goal is to consider all of the important factors that characterize tourism competitiveness of a destination. This is concretized through the development of a conceptual framework that simultaneously includes critical elements of the comparative advantage and competitive advantage theories. In fact, this approach assumes that destination competitiveness depends not only on the destination's resource endowments (i.e., comparative advantage), but also on its capacity to deploy resources (i.e., competitive advantage). Additionally, the model recognizes the importance of global macro-environmental forces (including, for instance, the evolution of the global economy, demographic trends, and terrorism) as well as competitive micro-environmental elements affecting the tourism system. In the most recent versions of this model, destination competitiveness is determined by five groups of factors: core resources and attractors, supporting factors and resources, destination management, destination policy, and qualifying and amplifying

determinants. In total, 36 destination attributes are included. Despite its importance and wide application, this model has some limitations, such as the fact that some indices proposed by the authors cannot be calculated and the exclusion of eco-environmental quality (Zhang, Gu, Gu, Zhang, 2011).

Similar to this model of Ritchie and Crouch (2000, 2003), the study of Dwyer and Kim (2003) proposes a holistic approach of determinants and indicators that define destination competitiveness (Mazanec et al., 2007). The indicators proposed are grouped in the following subgroups: endowed resources, supporting factors, destination management, situational conditions, demand factors, and market performance indicators. In a related study, Dwyer et al. (2004), factorized 83 competitiveness indicators discussed in Dwyer and Kim (2003), obtaining 12 principal components.

An important and recent contribution for measuring destination competitiveness is provided by the Travel & Tourism Competitiveness Report, published by the World Economic Forum (2013). Beginning in 2007, this report presents the Travel and Tourism Competitiveness Index (TTCI), which, in an effort to evaluate the competitiveness of each country regarding the travel and tourism industry, considers 14 pillars of competitiveness, namely: policy rules and regulation, environmental sustainability, safety and security, health and hygiene, prioritization of travel and tourism, air transport infrastructure, ground transport infrastructure, tourism infrastructure, ICT infrastructure, price competitiveness in the industry of travel and tourism, human resources, affinity for travel and tourism, natural resources, and cultural resources. Based on these pillars, three sub-indices are obtained: the Travel and Tourism (T&T) regulatory framework index, the T&T business environment and infrastructure index, and the T&T human, cultural, and natural resources index.

This approach is not immune to criticism. In fact, several authors stress important methodological limitations concerning the lack of a theoretical support for several of the variables included, the statistical methods used to demonstrate the usefulness of the index, the simultaneous inclusion of countries with different development levels, the weights of the variables, and the combining of hard data with survey data, among other aspects (Mazanec & Ring, 2011; Mazanec et al., 2007; Squalli, Wilson, & Hugo, 2008). Hall (2007) presents a more substantive criticism to the mainstream approach of destination competitiveness, emphasising that some weaknesses emerge when, at conceptual level, destination competitiveness is analysed in the same way as firm competitiveness (on this topic, see also, Bristow, 2005).

3 Methodology

3.1 The base index

3.1.1 Preliminary considerations

Given the important economic impacts of the sector, the countries compete fiercely to attract tourists. They do this by reinforcing their competitive conditions, namely by improving their resource endowments and creating differentiation *vis-à-vis* other destinations. Developing more aggressive marketing strategies is also important in promoting the destination countries.

However, competition between countries depends not only on their supply conditions but also on the geographical structure of demand. Obviously, these two perspectives are linked, since tourism demand depends critically on the characteristics

of the supply. We seek to develop here a new approach that focuses on the degree of GSS between the countries, i.e., which analyses and quantifies the level of proximity between the structures of tourism flows going to the two countries in terms of source countries .

The methodology proposed in this study is inspired by an approach commonly used in international trade analysis. As applied there, the purpose is to assess the degree of competition between two export structures for a given market (Crespo & Fontoura, 2007; De Benedictis & Tajoli, 2007; Palan & Schmideberg, 2010; among many others). Such analyses consider measures such as the Finger-Kreinin, the Gini, the Krugman, and the Herfindahl-Hirschman indices (Palan, 2010). The most frequently applied of these measures - the Krugman index - can be expressed as:

$$KR_{12} = \frac{1}{2}\sum_{q=1}^{Q}\left|\frac{Exp_{1q}}{\sum_{q=1}^{Q} Exp_{1q}} - \frac{Exp_{2q}}{\sum_{q=1}^{Q} Exp_{2q}}\right| \quad (1)$$

in which KR_{12} represents the Krugman index between countries *1* and *2*, with Exp_{1q} and Exp_{2q} being the exports of sector q by country *1* and *2*, respectively. GSS will be maximum - indicating the highest level of competition - when the share of each sector q is exactly the same in the export structures of both countries. In such a case, KR_{12} assumes the value 0. In its turn, when the dissimilarity is maximum, the Krugman index takes the value 1, indicating the lowest level of trade competition.

Recently, Crespo and Simoes (2012) propose two extensions to this measure, incorporating in a single index, three dimensions of structural similarity: the sectoral weights (as in the Krugman index), the inter-sectoral similarity, and the intra-sectoral similarity.

The method proposed in this study adapts and extends this approach to the study of tourism destination competition. However, the application of such indicators to the analysis of tourism flows is not direct and calls for a new conceptual framework. Two adaptations are especially noteworthy. First, a detailed analysis of the degree of GSS demands the consideration of new dimensions that are specific to the analysis of tourism flows (including, for instance, different forms of segmentation), leading to a multidimensional and more complex concept of GSS. Second, the fact that we perform the evaluation of geographic similarity instead of sectoral similarity (as in the case of trade analysis) creates additional difficulties at the methodological level. The main problem in this regard is the fact that while in the case of sectoral similarity all the countries export the same products, in the evaluation of GSS, the group of source countries is different for every country, requiring the adaptation of the measures.

3.1.2 Definitions

The index of similarity that we propose allows us to compare the structures of tourism inflows between two countries, *f* and *g*. The index *h* (*h* = 1, 2, ..., *H*) expresses the source country of the tourism flows (excluding *f* and *g*). Therefore, A_{fh} and A_{gh} represent the flows of tourists from *h* to *f* and *g*, respectively. In turn, A_{fg} expresses the flow of tourists from *g* to *f*, while A_{gf} represents the flow of tourists from *f* to *g*. Thus, the total volume of tourism inflows into each country (*f* and *g*) is given by:

$$A_f = \sum_{h=1}^{H} A_{fh} + A_{fg} \qquad (2)$$

and

$$A_g = \sum_{h=1}^{H} A_{gh} + A_{gf} . \quad (3)$$

Aiming to build, below, the GSS index, we must also take into consideration the importance of the bilateral tourism flows between the countries that are being evaluated (*f* and *g*). To this end we begin by defining, for each of these countries, the weight of the flow of tourists that come from the other country as a proportion of total arrivals:

$$X_{fg} = \frac{A_{fg}}{A_f} \quad (4)$$

and

$$X_{gf} = \frac{A_{gf}}{A_g} . \quad (5)$$

Finally, the average of these values is given by:

$$X'_{fg} = \frac{X_{fg} + X_{gf}}{2} . \quad (6)$$

3.1.3 An Index of Geographical Structural Similarity

In order to measure the degree of GSS between the tourism flows arriving at *f* and *g*, we calculate the following index:

$$M_{fg} = 1 - \beta\left[\sum_{h=1}^{H}\left|\theta_{fh} - \theta_{gh}\right|\right] \tag{7}$$

in which:

$$\theta_{fh} = \frac{A_{fh}}{\sum_{h=1}^{H} A_{fh}} \tag{8}$$

and

$$\theta_{gh} = \frac{A_{gh}}{\sum_{h=1}^{H} A_{gh}}. \tag{9}$$

As is clear from equation (7), the GSS index directly compares the relative weight of each source country in the tourism that goes to *f* and *g*. The parameter β allows us to adjust the valid range of M_{fg}. Hereinafter, we assume, following the usual procedure in trade literature, $\beta = 1/2$ and, therefore, M_{fg} ranges between 0 and 1. The maximum value represents a perfect similarity in the geographical structure of tourism flows that go to *f* and *g*, i.e., the case in which each source country has exactly the same weight in the structures of the two countries. For its part, $M_{fg} = 0$ when there is a perfect dissimilarity between these structures, which occurs when the source countries of the tourism flows that go to *f* are different from those that go to *g*. While this case expresses the minimum level of competition between *f* and *g*, a higher value of M_{fg} indicates a stronger potential

competition between the two countries, since, in that case, *f* and *g* depend, in more similar proportions, on the same countries as sources of tourism flows.

As results from the explanation above, the index M_{fg} presented in equation (7) is a modified version of the Krugman index (equation (1)), which increases with the level of structural similarity and therefore with the degree of tourism competition between *f* and *g*.

However, M_{fg} compares only the geographical structure of tourism flows coming from the various countries *h*. In order to have a complete index that also considers the influence of the bilateral flows between *f* and *g*, we introduce the following correction:

$$M'_{fg} = \left(1 - X'_{fg}\right) M_{fg} + X'_{fg} \left(1 - \left| X_{fg} - X_{gf} \right|\right). \tag{10}$$

This index - our base measure - reaches the value 1, representing maximum GSS, when: (1) there is structural similarity in the flows from countries *h*; and (2) the weight of the flow of tourists that come from *f* to *g* as a proportion of total arrivals to *g* is equal to the weight of tourists from *g* to *f* as a proportion of total arrivals to *f* (i.e., $X_{fg} = X_{gf}$). The indicators that will be introduced below to capture other dimensions of tourism competition will follow this same logic.

3.2 Other Dimensions

In the previous section, we proposed a GSS index that measures the degree of overlap between the geographical structures of tourism arriving at *f* and *g*. However, this indicator considers only the relative weights of the different source countries. In this section we argue that a more detailed analysis of the degree of structural similarity

requires that other dimensions be taken into account. We consider four additional dimensions (volume of tourism, groups of countries, and two forms of market segmentation - trip motivation and types of tourists), allowing us to qualify the results obtained from M'_{fg}. These new dimensions will first be included on an individual basis. Following, we will propose a measure that aggregates all of them.

3.2.1 The Volume of Tourism

The first new dimension considered is the volume of tourism. As suggested by Jenkins (2008) in the context of trade literature, the level of competition between two countries with regard to tourism inflows will be higher when the total number of tourists arriving in the two countries is similar than in the case where there is a large discrepancy in these flows, even if the geographical structure is exactly the same. To measure the level of overlap between the total volumes of tourism in the two countries, we calculate:

$$\psi_{fg} = \frac{Min\left(\sum_{h=1}^{H} A_{fh}, \sum_{h=1}^{H} A_{gh}\right)}{Max\left(\sum_{h=1}^{H} A_{fh}, \sum_{h=1}^{H} A_{gh}\right)}. \qquad (11)$$

To adjust M_{fg} in order to include both the geographical structure of tourism flows going to f and g and the level of overlap between the volume of these flows, we obtain:

$$V_{fg} = M_{fg} - \frac{1}{\tau}(1-\psi_{fg})M_{fg}. \qquad (12)$$

Compared with M_{fg}, the index V_{fg} corrects the level of similarity between the two distributions according to the degree of overlap of the total volume of tourism inflows arriving at *f* and *g*. The parameter τ ($\tau \geq 1$) works as an adjustment factor, in which higher values reflect a lower importance attributed to this dimension of structural similarity, translated into a smaller adjustment to M_{fg}.

The index of structural similarity that considers this dimension, aside from the weights of the source countries, can then be expressed as:

$$V'_{fg} = (1 - X'_{fg})V_{fg} + X'_{fg}\left(1 - \left|X_{fg} - X_{gf}\right|\right). \quad (13)$$

In this case, the maximum similarity between the structures of the tourism flows arriving at *f* and *g* requires: (1) structural similarity concerning the tourism flows from countries *h* to *f* and *g,* (2) equality between the total volumes of tourism associated with these flows, and (3) $X_{fg} = X_{gf}$.

3.2.2 Groups of Countries

The GSS index proposed above treats all countries equally and does not incorporate any distinction between countries that, in light of a given criterion, belong or do not belong to a more homogeneous group. However, in terms of competition analysis, it seems desirable to differentiate between groups of countries. In our context of analysis, two criteria seem to be especially relevant: the development level of the countries (for example, following the United Nations classification; see United Nations Development Programme, 2011) or their geographic location (for example, groups of geographically close countries, continents, etc.).

To illustrate the importance of this dimension, let us consider the geographical criterion as example. To include this dimension, we start by considering various levels of geographical separation, defined by the index j (j = 1, ..., J) such that, as we consider more disaggregated levels, geographical proximity between the countries of each group is higher, until we reach the final level of disaggregation, corresponding to the country level ($j = J$).

The first step to incorporate this dimension in the index of geographical structural similarity is to calculate the previously proposed index - M_{fg} - for each of the J levels of spatial disaggregation. Thus, we have:

$$M_{fg}^{j} = 1 - \frac{1}{2}\left[\sum_{h_j=1}^{H_j}\left|\theta_{fh_j} - \theta_{gh_j}\right|\right]. \qquad (14)$$

It is expected that M_{fg}^{j} increases as the level of spatial disaggregation becomes lower.

The second step is to obtain the weighted average of the indices calculated at the different levels of disaggregation. The aim of this procedure is simple. When a more aggregate level is used, source countries of tourist flows geographically distant between them belong to different groups, while neighbouring countries belong to the same group. Thus, we calculate:

$$B_{fg} = \sum_{j=1}^{J} \mu^{j} M_{fg}^{j}\ , \qquad (15)$$

in which, obviously $\sum_{j=1}^{J} \mu^{j} = 1$.

The greater the importance assigned to this dimension, the greater should be the weight given to the indicators based on more geographically aggregated levels. Increasing the weight attributed to these levels should be interpreted as assigning more relevance to the potential competition from near source countries. The corrected index which includes this dimension is obtained as:

$$B'_{fg} = \left(1 - X'_{fg}\right) B_{fg} + X'_{fg} \left(1 - \left| X_{fg} - X_{gf} \right|\right). \quad (16)$$

In this case, the maximum structural similarity is achieved when: (1) whatever the level of disaggregation considered, the weight of each group of countries is exactly the same with regard to tourism inflows in *f* and *g*, and (2) $X_{fg} = X_{gf}$. It should be noted that if $\mu^J > 0$ the condition (1) mentioned at the end of Section 3.1.3 concerning the base index is sufficient to ensure compliance with the condition (1) above.

All the analysis proposed in this section for the case of geographical proximity can be easily adapted for the development criterion.

3.2.3 Trip Motivation

The existence of a heterogeneous demand for tourism services, along with increasing competition in the market, has led to the development of segmentation as a fundamental feature of the marketing strategy (Bloom, 2004; Chen, 2003; Dumitrescu & Vinerean, 2010). The goal of market segmentation is to divide the tourism demand into more homogeneous subgroups based on several characteristics such as socio-economic factors, geographical location, and trip motivation. In fact, as emphasized by

Papatheodorou (2001), "consumer heterogeneity is a stylized fact and all the efforts of marketing aim at discovering and targeting specific leisure groups" (p. 165).

Let us consider the case of trip motivation. We incorporate this dimension in our index of structural similarity, reducing the degree of GSS if tourists have different motivations for their trips, even if the source country is the same. In this case, the competition between the two countries under comparison is weaker.

We start by defining the index t (t = 1, 2, ..., T) concerning the motivation of the trip, which will break down the flow from each source country in T segments, leading to the consideration of HT flows (to which is added, of course, the flow coming from the other country under comparison). For the sake of simplicity, we exclude the case where more than one motivation is behind a given tourism flow.

A simple way to incorporate this dimension in the GSS index is to calculate the following measure:

$$I_{fg} = 1 - \frac{1}{2}\left[\sum_{h=1}^{H}\sum_{t=1}^{T}\left|\theta_{fht} - \theta_{ght}\right|\right], \tag{17}$$

where:

$$\theta_{fht} = \frac{A_{fht}}{\sum_{h=1}^{H}\sum_{t=1}^{T}A_{fht}} \tag{18}$$

and

$$\theta_{ght} = \frac{A_{ght}}{\sum_{h=1}^{H}\sum_{t=1}^{T} A_{ght}}. \quad (19)$$

The index that jointly captures the two dimensions of GSS - weights of each source country and trip motivation - could then be represented as:

$$I'_{fg} = \left(1 - X'_{fg}\right) I_{fg} + X'_{fg}\left(1 - \left|X_{fg} - X_{gf}\right|\right). \quad (20)$$

However, this approach is not immune to criticism. An important limitation derives from the fact that different travel motivations coming from the same country are treated in the same way as are flows from different countries. This may be considered excessive. Accordingly, we propose a simple alternative approach that consists of calculating the weighted average of the indicator with and without disaggregation by travel motivation, weighted respectively by κ_1 and κ_2. A higher value for κ_1 indicates greater emphasis on the motivation of the trip as a dimension of geographic structural similarity. Thus, we have:

$$U_{fg} = \kappa_1 I_{fg} + \kappa_2 M_{fg} \quad (21)$$

with $\kappa_1 + \kappa_2 = 1$.

In this case, the index that considers both dimensions is expressed as:

$$U'_{fg} = \left(1 - X'_{fg}\right) U_{fg} + X'_{fg}\left(1 - \left|X_{fg} - X_{gf}\right|\right). \quad (22)$$

The maximum level of GSS requires, in this case, that: (1) the relative weight of each segment *t* coming from each country *h* is the same in the flows that go to *f* and *g*, and (2) $X_{fg} = X_{gf}$.

3.2.4 Types of Tourists

The fact that two countries capture tourists from the same country (perhaps even in the same proportion of the total number of tourists that arrive at those countries) does not imply that they are reaching the same segment in terms of, for example, purchasing power. A more detailed indicator of GSS should incorporate this distinction, indicating a higher level of similarity when the countries capture not only tourists from the same country but also from the same segment in terms of purchasing power.

This dimension shares with the previous one the fact that it involves the breakdown of the flows from each source country. However, unlike what occurs in the previous dimension, there is now a more explicit hierarchy (i.e., a ranking of the different segments). To that extent, although direct adaptations of the two approaches applied in the previous section are also valid, in this section we seek to define more adequate approaches for this specific case.

The first step is to define the segment to which the flow from each country belongs. Considering first the case of country *f*, let us compare the level of *per capita* income of the tourists coming from *h* to *f* (Y_{fh}) with the level of *per capita* income of all the tourists that come out of *h* (Y_h):

$$\lambda_{fh} = \frac{Y_{fh}}{Y_h}. \tag{23}$$

Next, we define the different segments corresponding to different levels of average income. For simplicity, we consider three segments but the generalization to a different number of segments is immediate, being enough to define new criteria for the separation between the various segments:

$$D_{fh} = \begin{cases} 1 \text{ if } \lambda_{fh} > 1+\gamma \\ 2 \text{ if } \dfrac{1}{1+\gamma} \le \lambda_{fh} \le 1+\gamma \\ 3 \text{ if } \lambda_{fh} < \dfrac{1}{1+\gamma} \end{cases}. \tag{24}$$

γ ($\gamma > 0$) is a parameter that allows us to establish the separation between the three segments considered.

Analogously, in the case of country *g*, we have:

$$\lambda_{gh} = \frac{Y_{gh}}{Y_h} \tag{25}$$

and

$$D_{gh} = \begin{cases} 1 \text{ if } \lambda_{gh} > 1+\gamma \\ 2 \text{ if } \dfrac{1}{1+\gamma} \le \lambda_{gh} \le 1+\gamma \\ 3 \text{ if } \lambda_{gh} < \dfrac{1}{1+\gamma} \end{cases}. \tag{26}$$

Having classified the flows as belonging to a specific segment, the next step is to determine how to incorporate this dimension in the GSS index. For this purpose, we suggest two alternative methods. The first is realized through a procedure whose first step is to obtain:

$$L_{fgh} = \begin{cases} 1 \text{ if } \left| D_{fh} - D_{gh} \right| = 0 \\ 1 - \xi \text{ if } \left| D_{fh} - D_{gh} \right| = 1 \\ 1 - \upsilon \text{ if } \left| D_{fh} - D_{gh} \right| = 2 \end{cases} \tag{27}$$

where $0 < \xi,\ \upsilon \leq 1$, and $\xi \leq \upsilon$. L_{fgh} indicates the difference, in terms of segments related to income levels, between the flows coming from each country h to f and g.

The average differential (i.e., considering all source countries) can be obtained as a weighted average of the differential concerning each source country, the weights corresponding to the relative importance of each country h as a source of tourists for f and g. Thus, we calculate:

$$R_{fg} = \sum_{h=1}^{H} L_{fgh} \eta_{fgh} \tag{28}$$

in which:

$$\eta_{fgh} = \frac{\theta_{fh} + \theta_{gh}}{2} \tag{29}$$

with $\sum_{h=1}^{H} \eta_{fgh} = 1$.

Having obtained R_{fg}, we can now use it to correct the GSS index, calculating:

$$Z_{fg} = R_{fg} M_{fg}. \tag{30}$$

In this case, the level of similarity, obtained using M_{fg}, will be reduced according to the average differential between f and g with respect to income segments in each market.

Finally, the GSS indicator that includes this dimension is expressed as follows:

$$Z'_{fg} = \left(1 - X'_{fg}\right) Z_{fg} + X'_{fg} \left(1 - \left| X_{fg} - X_{gf} \right|\right). \tag{31}$$

Let us now consider the second approach. In this case, the initial step is to compare directly the *per capita* income associated with the flows arriving at the two countries (Y_{fh} and Y_{gh}):

$$W_{fgh} = \frac{\text{Min}\,(Y_{fh}, Y_{gh})}{\text{Max}\,(Y_{fh}, Y_{gh})}. \tag{32}$$

The remaining procedure is similar to that of the first approach. Thus, we calculate:

$$E_{fg} = \sum_{h=1}^{H} W_{fgh} \eta_{fgh} \tag{33}$$

and

$$S_{fg} = E_{fg} M_{fg} . \quad (34)$$

The index including the two dimensions of structural similarity is obtained as:

$$S'_{fg} = \left(1 - X'_{fg}\right) S_{fg} + X'_{fg} \left(1 - \left| X_{fg} - X_{gf} \right|\right). \quad (35)$$

Concerning the second approach, the maximum degree of GSS between *f* and *g* requires: (1) geographical similarity of the flows directed to *f* and *g*, (2) $X_{fg} = X_{gf}$, and (3) equality of *per capita* income of the tourists coming from each of the source countries to *f* and *g*.

3.3 An Overall Index of Geographical Similarity

As a first step of our analysis, we proposed a GSS index that compared the relative weights of each source country. Then, we extended that index to include additional dimensions. The purpose of this section is to propose a way to combine in a single indicator all five of the dimensions discussed in this study. To obtain this new measure, we calculate the weighted average of the indicators of structural similarity corrected by the level of overlap between the volume of tourism flows obtained considering different levels of geographical disaggregation. Thus, the first three dimensions identified above - relative weights of the source countries, volume of tourism flows, and groups of countries - are taken into account. In order to incorporate the remaining two dimensions, the index calculated at the country level (i.e., the most disaggregated level) is obtained

according to the second methodology proposed to capture the dimension related to the motivation of the trip and incorporates a penalization depending on the degree of dissimilarity in terms of income, following the second procedure presented in the section on types of tourists.

Thus, we obtain:

$$P_{fg} = \sum_{j=1}^{J-1} \mu^{j} V_{fg}^{j} + \mu^{J} E_{fg}^{J} O_{fg} , \tag{36}$$

where:

$$V_{fg}^{j} = M_{fg}^{j} - \frac{1}{\tau}(1-\psi_{fg}) M_{fg}^{j} \tag{37}$$

and

$$E_{fg}^{J} = \sum_{h_J=1}^{H_J} W_{fgh_J} \eta_{fgh_J} . \tag{38}$$

Additionally:

$$O_{fg} = \alpha_1 V_{fg}^{J} + \alpha_2 C_{fg}^{J} \tag{39}$$

in which:

$$C_{fg}^{J} = I_{fg}^{J} - \frac{1}{\tau}(1-\psi_{fg})\, I_{fg}^{J} \tag{40}$$

and

$$I_{fg}^{J} = 1 - \frac{1}{2}\left[\sum_{h_J=1}^{H_J}\sum_{t=1}^{T}\left|\theta_{fh_Jt} - \theta_{gh_Jt}\right|\right] \tag{41}$$

with

$$\theta_{fh_Jt} = \frac{A_{fh_Jt}}{\sum_{h_J=1}^{H_J}\sum_{t=1}^{T} A_{fh_Jt}} \tag{42}$$

and

$$\theta_{gh_Jt} = \frac{A_{gh_Jt}}{\sum_{h_J=1}^{H_J}\sum_{t=1}^{T} A_{gh_Jt}} \tag{43}$$

with $\alpha_1 + \alpha_2 = 1$.

The overall GSS index, which, as noted above, incorporates the five dimensions discussed as being relevant for the purpose of assessing the geographical similarity of the tourism structures arriving at *f* and *g*, is obtained as follows:

$$P_{fg}^{'} = \left(1 - X'_{fg}\right)P_{fg} + X'_{fg}\left(1 - \left|X_{fg} - X_{gf}\right|\right). \tag{44}$$

Clearly, the existence of a maximum level of GSS is now more demanding, requiring, simultaneously, all the conditions mentioned earlier in the individual analysis of the different dimensions.

Finally it is important to stress that this methodology requires that specific values are set for several parameters. This is of course a subjective exercise but sensitivity analysis may be used in order to assess how robust the results are to variations in the values specified for those parameters.

4 Results and Discussion

In this section, the methodology proposed above is illustrated with data for some important tourism destinations. In this example we use data on inbound and outbound tourism flows provided by the World Tourism Organization for 2009 (the last year available in the database) and consider 222 origin countries of tourists and 16 destination countries from the five continents:

- Africa: Egypt (EG) and Morocco (MA);
- America: Canada (CA), Cuba (CU), Chile (CL), and United States of America (USA);
- Asia: China (CN), Republic of Korea (KR), India (IN), and Israel (IL);
- Europe: Belgium (BE), Italy (IT), Russian Federation (RU), and United Kingdom (UK);
- Oceania: Australia (AU) and New Zealand (NZ).

In order to calculate the indices that take into account the dimension 'groups of countries', we assume three disaggregation levels, including, respectively, five continents, 22 regions, and 73 sub-regions. To that end, we take as reference the

information provided by the United Nations geoscheme. Regarding the trip motivation, this database provides three alternative motivations: (1) holidays, leisure, and recreation, (2) other personal purposes, and (3) business and professional.

In order to illustrate the measures discussed in the previous section, we obtain 17 indicators, as shown in Table 1. Despite the fact that the empirical analysis conducted in this study should be seen as a preliminary exercise, we consider some alternative values for τ, μ_1, μ_2, μ_3, κ_1, κ_2, α_1, and α_2 and discuss the implications for the results.

[Table 1]

Since the database does not contain the necessary information to measure E_{fg}^{J}, we test the robustness of the results using two alternative values (0.9 in the case of $P_{fg}^{'}(1)$ and 0.75 in $P_{fg}^{'}(2)$). Applying these indicators to the database allows us to rank country pairs according to their degree of GSS. In this example, since 16 countries are analysed, we obtain 120 bilateral comparisons. In Table 2, the 12 country pairs showing the greatest similarity (top 10%) are shown.

[Table 2]

Three main conclusions can be drawn from this Table. First, according to all indicators, the highest similarity level belongs to one of the following country pairs: Australia-New Zealand or Italy-United Kingdom. There are only three indices in which these two pairs do not occupy the first two positions of the ranking ($V_{fg}^{'}(1)$ with Australia-New Zealand appearing in fourth place and $B_{fg}^{'}(5)$ and $B_{fg}^{'}(6)$ where Italy-United Kingdom ranks in third place). Second, there are also other pairs in which the competition assessed by the geographical structure of the tourism flows is relatively

high: Belgium-Italy, Belgium-United Kingdom, Canada-United States of America, Belgium-Morocco, Cuba-Israel, and Israel-United Kingdom. Third, when multidimensional indices are considered (i.e., all indicators with the exception of M'_{fg}) there is a considerable effect on the level of similarity, in which the impact is greater in the case of the adjustment by the 'volume of tourism' (V'_{fg}) and 'groups of countries' (B'_{fg}).

In order to evaluate the consistency of the evidence provided by these indices, we calculate correlation coefficients between these alternative measures (Table 3). Below the diagonal we present the correlation coefficients calculated using the values of the indices, while to obtain the coefficients above the diagonal we started by ranking country pairs according to each measure and then established the correlation between these rankings.

[Table 3]

The evidence presented in this Table gives us some interesting insights. First, on average, the correlation coefficients between the different indicators are high, with 91% of the correlation coefficients above 0.8 and 61% above 0.9. Second, the adjustment with the greatest influence on the level of structural similarity arises when the dimension 'volume of tourism' is introduced into the analysis (V'_{fg}), in particular when full adjustment of the base index to the volume is carried out ($\tau = 1$). In this last case, several coefficients drop below 0.6. Third, the sensibility of U'_{fg} and B'_{fg} to alternative parameters is lower than in the previous case. Considering B'_{fg}, the adjustment is higher when we reduce the weight given to more disaggregated levels of geographical separation. Finally, a comparison between the correlation coefficients based on the

indices with those obtained from the ranking shows that these coefficients are very similar (the average correlation is 0.892 using the indices and 0.898 when we consider the rankings).

5 Conclusion

In a context of tourism globalization and increasing market segmentation, countries actively compete to attract tourism flows. In this study we have proposed a set of indicators to measure an important determinant of the competition between two countries for the attraction of tourism: the degree of geographical structural similarity of the tourism inflows. Beyond the consideration of the relative weight of each source market, we argued that a detailed analysis of the geographical structural similarity implies the consideration of a multidimensional concept, in order to accommodate important elements of the tourism flows today.

Using a sample of 16 countries from the five continents, Australia-New Zealand and Italy-United Kingdom emerged as the two country pairs showing the highest degree of similarity. At the methodological level, we found a high correlation between the results produced by the different indicators. Starting with the base index, the most significant change occurs when the adjustment by the 'volume of tourism' is introduced.

In concluding, we emphasize three aspects. First, it should be noted that the approach proposed can be extended to include other dimensions considered as relevant, including other forms of market segmentation. Second, the methodology suggested has a high degree of flexibility, in the sense that only the dimensions considered as relevant in each particular analysis are taken into account. In fact, it emerges from the presentation above that it is easy to adapt the measures discussed in order to retain only

the relevant dimensions in each specific empirical analysis. Third, the discussion above also makes it clear that the implementation of the methodology involves setting specific values for several parameters. Despite introducing an increased subjectivity, this fact has, in our opinion, the important advantage of implying the explicit assumption of the methodological options assumed by each study, making clear the perspective adopted and the underlying assumptions.

This study sought primarily to propose a methodological contribution to the assessment of the degree of geographical structural similarity between two countries with regard to tourism attraction. Beyond the intrinsic interest of the analysis, as it provides a summary measure of tourism competition between a pair of countries, it should be noted that the suggested methodology and the resulting measures may be a contribution to a broader framework of analysis on tourism competition which takes into account both supply and demand factors. In fact, the level of tourism competition derives not only from the supply conditions traditionally evaluated in the literature on tourism competitiveness but also on the characteristics of demand. A main conclusion emerging from this study is therefore the need to enlarge the commonly applied approaches being the indicators that we purpose here a contribution in this direction.

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Table 1 Geographical structural similarity indices

Index	Parameters
M'_{fg}	
$V'_{fg}(1)$	$\tau = 1$
$V'_{fg}(2)$	$\tau = 1.5$
$V'_{fg}(3)$	$\tau = 2$
$V'_{fg}(4)$	$\tau = 3$
$B'_{fg}(1)$	$\mu_1 = 0.05; \mu_2 = 0.05; \mu_3 = 0.9$
$B'_{fg}(2)$	$\mu_1 = 0.025; \mu_2 = 0.075; \mu_3 = 0.9$
$B'_{fg}(3)$	$\mu_1 = 0.125; \mu_2 = 0.125; \mu_3 = 0.75$
$B'_{fg}(4)$	$\mu_1 = 0.1; \mu_2 = 0.15; \mu_3 = 0.75$
$B'_{fg}(5)$	$\mu_1 = 0.25; \mu_2 = 0.25; \mu_3 = 0.5$
$B'_{fg}(6)$	$\mu_1 = 0.2; \mu_2 = 0.3; \mu_3 = 0.5$
I'_{fg}	
$U'_{fg}(1)$	$\kappa_1 = 0.9; \kappa_2 = 0.1$
$U'_{fg}(2)$	$\kappa_1 = 0.75; \kappa_2 = 0.25$
$U'_{fg}(3)$	$\kappa_1 = 0.5; \kappa_2 = 0.5$
$P'_{fg}(1)$	$\tau = 2; \alpha_1 = 0.5; \alpha_2 = 0.5; \kappa_1 = 0.5; \kappa_2 = 0.5; \mu_1 = 0.1; \mu_2 = 0.15; \mu_3 = 0.75$
$P'_{fg}(2)$	$\tau = 2; \alpha_1 = 0.5; \alpha_2 = 0.5; \kappa_1 = 0.5; \kappa_2 = 0.5; \mu_1 = 0.1; \mu_2 = 0.15; \mu_3 = 0.75$

Table 2 Country pairs with the highest geographical similarity

	M'_{fg}	$V'_{fg}(1)$	$V'_{fg}(2)$	$V'_{fg}(3)$	$V'_{fg}(4)$	$B'_{fg}(1)$	$B'_{fg}(2)$	$B'_{fg}(3)$	$B'_{fg}(4)$	$B'_{fg}(5)$	$B'_{fg}(6)$	I'_{fg}	$U'_{fg}(1)$	$U'_{fg}(2)$	$U'_{fg}(3)$	$P'_{fg}(1)$	$P'_{fg}(2)$
1	AU-NZ 0.799	IT-UK 0.539	IT-UK 0.585	IT-UK 0.609	AU-NZ 0.672	AU-NZ 0.808	AU-NZ 0.808	AU-NZ 0.811	AU-NZ 0.811	AU-NZ 0.815	AU-NZ 0.814	AU-NZ 0.774	AU-NZ 0.777	AU-NZ 0.780	AU-NZ 0.787	IT-UK 0.594	AU-NZ 0.540
2	IT-UK 0.679	AU-IN 0.448	AU-NZ 0.544	AU-NZ 0.608	IT-UK 0.632	IT-UK 0.709	IT-UK 0.706	IT-UK 0.725	IT-UK 0.721	BE-IT 0.779	BE-IT 0.775	IT-UK 0.663	IT-UK 0.665	IT-UK 0.667	IT-UK 0.671	AU-NZ 0.581	IT-UK 0.533
3	CU-USA 0.648	CU-IL 0.440	AU-IN 0.474	AU-IN 0.487	CA-USA 0.501	CU-IL 0.689	CU-IL 0.687	BE-IT 0.707	BE-IT 0.704	IT-UK 0.750	IT-UK 0.744	IL-UK 0.579	IL-UK 0.584	IL-UK 0.590	IL-UK 0.601	CU-IL 0.497	CU-IL 0.445
4	BE-UK 0.625	AU-NZ 0.417	CU-IL 0.444	CA-USA 0.460	AU-IN 0.500	CU-USA 0.663	CU-USA 0.661	CU-IL 0.700	CU-IL 0.698	CU-IL 0.718	CU-IL 0.714	CA-USA 0.579	CA-USA 0.579	CA-USA 0.580	CA-USA 0.581	CA-USA 0.450	CA-USA 0.433
5	IL-UK 0.623	AU-KR 0.412	AU-KR 0.436	BE-EG 0.450	BE-UK 0.480	BE-IT 0.663	BE-IT 0.661	BE-UK 0.681	BE-UK 0.676	BE-MA 0.713	BE-MA 0.707	IL-IT 0.523	IL-IT 0.527	IL-IT 0.532	BE-UK 0.557	AU-IN 0.441	AU-IN 0.395
6	BE-IT 0.623	BE-EG 0.371	BE-EG 0.424	AU-KR 0.448	BE-EG 0.477	BE-UK 0.662	BE-UK 0.657	CU-USA 0.671	CU-USA 0.669	BE-UK 0.712	BE-UK 0.702	BE-UK 0.489	BE-UK 0.503	BE-UK 0.523	BE-IT 0.550	AU-KR 0.432	AU-KR 0.385
7	CA-USA 0.583	CA-USA 0.337	CA-USA 0.419	CU-IL 0.445	AU-KR 0.460	IL-UK 0.641	IL-UK 0.639	IL-UK 0.658	IL-UK 0.656	IT-MA 0.698	IT-MA 0.693	IT-MA 0.480	BE-IT 0.492	BE-IT 0.514	IL-IT 0.542	BE-EG 0.426	BE-EG 0.380
8	IL-IT 0.560	IL-NZ 0.317	BE-MA 0.371	BE-MA 0.410	BE-IT 0.458	EG-IL 0.600	EG-IL 0.599	BE-MA 0.628	BE-MA 0.625	IL-UK 0.686	IL-UK 0.682	BE-IT 0.477	IT-MA 0.482	IT-MA 0.483	CU-USA 0.533	BE-MA 0.402	BE-MA 0.366
9	EG-IT 0.557	BE-IN 0.315	BE-IN 0.361	BE-UK 0.408	IN-IL 0.449	EG-IT 0.595	EG-IT 0.592	EG-IL 0.619	EG-IL 0.618	CU-USA 0.684	CU-USA 0.680	MA-UK 0.460	MA-UK 0.465	CU-USA 0.475	IT-MA 0.487	BE-UK 0.380	BE-UK 0.347
10	IN-IL 0.549	BE-MA 0.293	IN-IL 0.350	IN-IL 0.400	BE-MA 0.449	CA-USA 0.587	CA-USA 0.587	EG-IT 0.610	EG-IT 0.607	EG-IL 0.650	EG-IL 0.649	CA-IL 0.453	CA-IL 0.454	MA-UK 0.472	EG-IT 0.486	BE-IT 0.366	BE-IT 0.331
11	EG-IL 0.541	CL-IL 0.292	BE-UK 0.335	BE-IN 0.384	CU-IL 0.447	IL-IT 0.577	IL-IT 0.575	IT-MA 0.606	IT-MA 0.603	MA-UK 0.638	EG-IT 0.630	AU-KR 0.450	AU-KR 0.454	AU-KR 0.459	MA-UK 0.484	IL-MA 0.358	IL-MA 0.318
12	EG-UK 0.530	AU-BE 0.280	IL-MA 0.335	BE-IT 0.375	CU-USA 0.443	BE-MA 0.577	BE-MA 0.573	IL-IT 0.591	CA-USA 0.589	EG-IT 0.636	MA-UK 0.627	IL-MA 0.433	BE-EG 0.441	BE-EG 0.456	BE-EG 0.480	BE-IN 0.349	BE-IN 0.309

Table 3 Correlation matrix

	M'_{fg}	$V'_{fg}(1)$	$V'_{fg}(2)$	$V'_{fg}(3)$	$V'_{fg}(4)$	$B'_{fg}(1)$	$B'_{fg}(2)$	$B'_{fg}(3)$	$B'_{fg}(4)$	$B'_{fg}(5)$	$B'_{fg}(6)$	I'_{fg}	$U'_{fg}(1)$	$U'_{fg}(2)$	$U'_{fg}(3)$	$P'_{fg}(1)$	$P'_{fg}(2)$
M'_{fg}		0.615	0.885	0.945	0.979	0.980	0.982	0.960	0.964	0.911	0.921	0.932	0.951	0.971	0.988	0.917	0.913
$V'_{fg}(1)$	0.595		0.895	0.821	0.747	0.630	0.630	0.610	0.610	0.571	0.577	0.547	0.563	0.579	0.596	0.813	0.808
$V'_{fg}(2)$	0.852	0.927		0.986	0.957	0.885	0.886	0.863	0.865	0.815	0.823	0.808	0.828	0.848	0.868	0.967	0.962
$V'_{fg}(3)$	0.929	0.850	0.985		0.990	0.940	0.941	0.920	0.922	0.871	0.880	0.871	0.891	0.911	0.930	0.978	0.973
$V'_{fg}(4)$	0.974	0.762	0.949	0.989		0.970	0.971	0.949	0.953	0.901	0.911	0.907	0.926	0.946	0.965	0.968	0.963
$B'_{fg}(1)$	0.980	0.612	0.854	0.924	0.963		1.000	0.992	0.994	0.960	0.967	0.897	0.918	0.941	0.961	0.942	0.941
$B'_{fg}(2)$	0.981	0.612	0.855	0.925	0.964	1.000		0.990	0.993	0.955	0.963	0.900	0.921	0.943	0.964	0.941	0.940
$B'_{fg}(3)$	0.967	0.600	0.840	0.910	0.949	0.996	0.994		1.000	0.986	0.990	0.872	0.894	0.919	0.941	0.940	0.942
$B'_{fg}(4)$	0.970	0.601	0.842	0.912	0.951	0.997	0.996	1.000		0.982	0.987	0.877	0.899	0.923	0.945	0.939	0.940
$B'_{fg}(5)$	0.930	0.570	0.804	0.872	0.911	0.972	0.968	0.989	0.987		0.999	0.817	0.840	0.866	0.890	0.915	0.920
$B'_{fg}(6)$	0.939	0.573	0.810	0.879	0.919	0.978	0.975	0.993	0.991	0.999		0.828	0.851	0.876	0.910	0.920	0.924
I'_{fg}	0.924	0.564	0.797	0.865	0.904	0.881	0.883	0.862	0.865	0.817	0.826		0.997	0.990	0.973	0.860	0.856
$U'_{fg}(1)$	0.940	0.572	0.809	0.879	0.919	0.899	0.901	0.880	0.884	0.836	0.846	0.999		0.996	0.985	0.877	0.873
$U'_{fg}(2)$	0.960	0.581	0.825	0.897	0.938	0.922	0.925	0.905	0.908	0.861	0.871	0.994	0.998		0.995	0.895	0.891
$U'_{fg}(3)$	0.984	0.592	0.843	0.917	0.960	0.952	0.954	0.936	0.939	0.895	0.904	0.978	0.986	0.995		0.910	0.906
$P'_{fg}(1)$	0.895	0.856	0.974	0.981	0.963	0.920	0.919	0.918	0.918	0.898	0.902	0.851	0.862	0.877	0.892		0.999
$P'_{fg}(2)$	0.894	0.850	0.969	0.977	0.960	0.919	0.918	0.918	0.918	0.901	0.904	0.851	0.862	0.876	0.891	0.999	