Determinants of international tourist choices in Italian provinces: a joint demand-supply approach with spatial effects

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Abstract

This paper uses a unilateral gravity model augmented by including spatial effects to investigate the determinants of international tourist choices (arrivals, overnight stays, length of stay, expenditures), in Italian provinces (NUTS 3). The elements of originality are that both demand and supply variables are considered in the model and possible spillover effects originating from contiguous provinces are analysed using a spatial Durbin model. Moreover, the distance between origin and destination is included to take into account travel costs. Results indicate the importance of both demand and supply factors and demonstrate the existence of a competition effect generated by the tourism capacity of contiguous provinces.

Keywords: tourism, spatial spillover, gravity model, regional economic activity
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1. Introduction

According to a recent *UNWTO World Tourism Barometer*, receipts in destinations worldwide from expenditure by international visitors on accommodation, food and drink, entertainment, shopping and other services and goods, reached an estimated US$ 1159 billion in 2013. Growth exceeded the long-term trend, reaching 5% in real terms. The growth rate in receipts matched the increase in international tourist arrivals, also up by 5%, reaching 1087 million in 2013. International tourism (travel and passenger transport) accounts for 29% of the world's exports of services and 6% of overall exports of goods and services. As a worldwide export category, tourism ranks fifth after fuels, chemicals, food and automotive products, while ranking first in many developing countries. These figures demonstrate the importance of the tourism sector in the world economy.

Since the tourism market increasingly operates as a competitive one, where destinations at different territorial levels are horizontally differentiated (Marrocu and Paci, 2013), understanding the determinants of competitiveness is crucial to address tourism planning and destination management. Research trying to explain tourism flows and expenditures for different destinations has so far adopted either a tourism-demand or a tourism-supply approach. Whereas on the one hand the former ignores the product specificities (Papatheodorou, 2001), the latter, on the other, fails to take into account the characteristics of the tourist origin markets. In recent years attempts to merge the two views have come from scholars using origin-destination models (O-D), which have been able to consider both effects simultaneously. The majority of these studies investigates the determinants of tourist flows at the local level, i.e. at the regional or provincial level. Indeed, while tourism competitiveness is prevalently studied at the country level, the local level - the territory - more than the macro and the micro level, determines the capacity of a country to be competitive (Courlet, 2008) also in tourism (Lorenzini et al., 2011). When using a territorial perspective, recent research highlights also the importance of considering spatial dependence and hence local spillovers in estimating the impact of different variables in tourism attractiveness.

This paper contributes to this literature by investigating the determinants of tourist flows to 103 Italian provinces (NUTS 3) from the top 20 origin countries. The elements of originality with respect to previous literature are the following. First, we estimate a (unilateral) gravity model considering demand- and supply-side factors jointly. The observations of our cross-section database reflect the foreign tourist arrivals, expenditures, length of stay and overnight stays in 103 Italian province from the 20 highest spending countries of origin. We will disentangle the effects of both demand and supply variables on a province's tourism flows and exports. Among the former ones, *per capita* GDP levels, population and a measure of relative price will be considered. Among the latter ones: *per capita* GDP levels at destination and supply variables such as capacity constraints of tourist accomodations; tourism and transport infrastructures; crime, cultural and environmental capital. Moreover, the role of the distance between origin and destination is taken into account as a proxy for travel costs.

Second, our model includes spatial effects to examine the possible spillovers originating from supply variables in contiguous provinces. Besides the Spatial Autoregressive model usually employed in tourism studies, following the suggestion of Halleck Vega and Elhorst (2013), spatial effects will be analysed using the spatial lag of independent variables as well. Finally, we consider as dependent variables foreign tourist arrivals, tourist expenditures, length of stay and overnight stays. The variable tourist expenditures, recently made available by the Bank of Italy, is very informative because it captures not only the number of tourist arrivals and stays, but also their contribution to a destination's GDP. However, given that sample selection bias due to the survey origin of the data may affect the goodness of the results, we compare the results of this model with those for overnight stays.

Italy has been selected as a case study for various reasons. First, it is one of the world top countries for tourism arrivals and overnight stays. In 2012 it was fifth for number of international arrivals (46 million according to World Bank Database) after France, USA, China and Spain. Second, in Italy tourism accounts for 10.3% of GDP and 11.6% of employment.[1] Moreover, the high diversification of its provinces in terms of natural, cultural, environmental and business endowments makes of Italy a good case to study the different impact of supply variables. We believe that the province can be a proper unit of analysis since its size is enough large to capture agglomeration economies while at the same time enough small to highlight the differences between territories.

Italian provinces have been the focus also of the analyses carried out by Massidda and Etzo (2012) and Marrocu and Paci (2013). While they examined the determinants of domestic tourism flows, we are interested in foreign flows. Indeed, these latter are a relevant and increasing share of the total, accounting for 47.4% in 2012 compared to 43.3% in 2008. Moreover they increase at a higher rate with respect to domestic tourism. In the period 2008-2012 inbound tourist arrivals and nights have grown by 3.1% and 2.2% respectively, compared to 0.5% and -1.1% of domestic ones. This because foreign flows, like exports, are exogenously determined and independent from domestic economic conditions and business cycle. For this reason they can foster tourism demand also in periods of internal stagnation.

The paper proceeds as follows. Section 2 provides an examination of the relevant literature about how to model tourist flows' determinants. Section 3 describes the data and the variables employed in the analysis. Section 4 illustrates the methodology adopted. Section 5 shows the main results and section 6 concludes with policy suggestions.

2. Literature review: modelling tourism flows

Research trying to explain tourism flows to destinations has prevalently adopted either a tourism-demand or a tourism-supply approach.

Tourism demand studies assess the importance of country-of-origin factors in determining the incoming of inbound tourist flows. The majority of the econometric studies examine the demand of tourism for one or more destination countries originating from a set of top partner countries using time series or panel data analysis. Income is the most important explanatory

[1] WTTC - Travel & Tourism Economic Impact 2014 Italy, as reported by Enit.

variable: Crouch (1994) reveals that the income elasticity generally exceeds unity but is below two, which implies that international travel is still regarded as luxury consumption. Economic theory also indicates that the price of tourism products and services is related negatively to tourism demand. Additional variables sometimes incorporated in the models are marketing expenditure, consumer tastes, consumer expectations, habit persistence, population of the country of origin and one-off events (Song and Witt, 2000). One of the advantages of demand models is that they are employable as a short-run forecasting tool to estimate the demand for a destination country from its main markets.

Tourism-supply studies, instead, aim at estimating the importance of destination supply factors in influencing the arrival, stay and expenditure of international or domestic tourists. The explanatory variables generally used are: population, income per capita, hotel capacity, price, infrastructures, agglomeration economies, cultural and natural capital, crime, climate, institutional capacity.

Both demand and supply models suffer from at least one drawback. On the one hand, the former ignores the product specificities (Papatheodorou, 2001); on the other, the latter fails to take into account the characteristics of the tourist origin markets.

In recent years few scholars have succeeded in merging the two views by using spatial interaction models, i.e. gravity or origin-destination (O-D) models, to consider both effects simultaneously. Marrocu and Paci (2013), Massidda and Etzo (2012), de la Mata and Llano-Verduras (2012), Keum (2010), Deng and Athanasopoulos (2011), Patuelli et al. (2013), all employ spatial interaction models considering bilateral tourism flows between regions of a same country to take into account both demand and supply determinants. These models reveal to policy makers and tourism stakeholders what elements of the supply help in attracting tourism flows and what are the determinants of the arrivals on the demand side. Massidda and Etzo (2012), for instance, find that the main determinants of domestic tourism demand in Italian provinces are relative prices and per capita tourist income, jointly with environmental quality.

Although robust empirical evidence supports the use of gravity models not only for trade in goods but also in services,[2] until recently their application to trade in services and tourism was threatened by the lack of a theoretical background. Morley et al. (2014) contribute to fill in this gap in the literature by providing a theoretical foundation, derived from the consumer's utility theory, for the current version of the gravity equation applied to tourism.

Following the above mentioned empirical and theoretical literature, in this paper spatial interaction models are used to examine the demand and supply determinants of tourism flows to Italian provinces. A point of departure from the previous literature is that our interest is focused on international tourism, while most of the previously cited empirical studies are interested in modeling domestic tourism flows. In doing so they consider bilateral tourism flows between regions of a same country, while we consider unilateral tourism flows from the top 20 origin countries of provenance of tourism flows to Italian provinces.

Even though spatial interaction models provide a good starting point for our analysis, recent tourism literature has highlighted also the importance of considering the likely impact of spatial spillover effects when dealing with the study of regional tourism determinants. Marrocu and Paci (2013), for example, find significant impact of both demand and supply factors, but they warn

[2] Kimura and Lee (2006) show that trade in services is better predicted by gravity equations than trade in goods.

that if spatial spillover effects are not considered the usual omitted variable estimation problem may arise making the gravity estimates upward biased.

Moreover, the authors highlight a further advantage of incorporating spatial dependence. Indeed, understanding the distinction between the relative effect of internal and external determinants of tourism flows may have important implications for policy makers and tourist operators.

Following this suggestion, our gravity model has been augmented by including variables able to capture spatial spillover effects. Yang and Wong (2012) provide a framework for the interpretation of spillovers, identifying the following typology:

- productivity spillovers: they may result, first, from labor movements across regions. Once staff members move, knowledge and skills move as well, contributing to the tourism growth of the host region. Second, from demonstration effects associated with knowledge diffusion processes, whereby firms tend to learn from their counterparts in regions with higher productivity, consciously or unconsciously. Third, from competition effects;
- market access spillovers: when one city or region possesses a high share of a certain market, its neighboring cities are highly likely to receive the market access spillover and gain easy access to this market;
- joint promotion: collaboration in marketing amplifies the overall and the single destination attractiveness.

Since these effects are difficult to be captured by spatially lagged proxies, it is common practice in the literature to use Spatial Autoregressive (SAR) Models. They consist in augmenting the basic model with an additional spatial autoregressive term, based on a connectivity matrix for destination dependence. Yang and Wong (2012), indeed use this method in their study on 341 cities in mainland China and confirm the presence of spatial autocorrelation. Similarly, Marrocu and Paci (2013) find highly significant evidence of neighboring provinces spillovers, which amplify the impact of internal determinants of tourism flows.

Despite its prevalent use in tourism studies, the SAR model is not able to disentangle the causes of spatial spillovers, e.g. if and how differences in the carrying capacity or resource endowment of one destination affect the differences in tourism flows' attraction. In order to overcome this limit, Halleck Vega and Elhorst (2013) suggest that spatial effects should be analysed using the spatial lag of some independent variables as well. Only a few empirical works make use of this estimation strategy in tourism studies. Among them, Yang and Fik (2014) use a Spatial Durbin Model (SDM) including spatially lagged autoregressive and explanatory variables. In this way they are able to provide insights on the cross-city competition/agglomeration effects.[3] In particular, they note that a positive association between spatially lagged explanatory variables and dependent variable indicates an agglomeration effect, while a negative association points at a competition effect. Their analysis on tourism growth in Chinese prefectures indicates that more tourism resource endowments in the neighbouring regions hinder local inbound tourism growth because of the competition effect across nearby cities. Likewise, Patuelli et al. (2013), studying the impact of World Heritage Sites endowment on 20 Italian regions' flows using a spatial interaction panel data model, find that WHS generate a phenomenon of spatial substitution.

[3] Other scholars use the terms *substitution* and *complementarity* in order to define these effects.

Capone and Boix (2008), instead, study the Italian case but they use a supply-model and their reference unit is the Local Labour System. At this scale, they do not find statistically significant coefficients for spatial spillovers either using the lag of the independent variables, the Autoregressive or the Spatial Error models.

In what follows the determinants of inbound tourism flows to Italian provinces are examined using a spatial interaction model augmented to account for spatial dependence. Further details on the methodology are provided in the next section.

3. Data and variables

Data used in the analysis refer to the Italian provinces of destination of tourism flows ($n=103$) and the top 20 countries of origin (P=20).[4] The number of observation is then equal to n x P = 2060. Figure 1 and 2 show the distribution of tourist flows in the 103 considered provinces. Table 1 shows the list of the top 20 origin countries and the arrivals, expenditures, nights and average length of stay for each of them.

Table 2 shows the complete list of variables, the source of the data, the definition and the year of reference. Most of the variables are collected for the year 2012, with the exception of some independent variables for which a different year has been chosen. Table 3 shows the main descriptive statistics and Table 4 the correlation matrix.

3.1 Dependent variables

Tourist arrivals and tourist expenditure (receipts) are the most commonly used tourism demand measures in empirical studies (Song et al., 2010). Tourist arrivals are important for tourism product/service suppliers in planning their supply capacity. For example, the decisions of investing in new hotels and new aircrafts rely largely on accurate forecasts of tourist arrivals (Sheldon, 1993). However, the tourist volume measure does not take account of the economic impact of tourism on the related sectors/activities. Hence, tourist expenditure (that is, the receipts of the destination) is the main concern of governments and central banks. Moreover, when foreign tourist expenditures are used, they are a direct measure of tourism exports. Although expenditures would be our main variable of interest, this variable suffers from biases due to problems in the data collection process by means of surveys. Hence, following the relevant literature we investigate the determinants of both arrivals and expenditures. Moreover, as a robustness check, our model will be also checked using overnight stays as independent variable. Finally the model is tested also on the dependent variable average length of stay.

As anticipated, data on arrivals and nights are retrieved from the Italian Statistical Office (ISTAT), while data on expenditures are retrieved by the Bank of Italy and collected by means of a survey at the borders and at the main points of arrival of international tourists (airports, railway stations).

[4] In the last decades the number of Italian provinces has changed from 103 in 1992 to 107 in 2001 to 110 in 2004. We have chosen the former classification since some variables were not available for the latter ones. As for the number of origin countries included in the analysis, we have selected the top 20 which account for 83% of arrivals, 86% of nights and 84% of foreign tourists' expenditure.

3.2 Explanatory variables

Moving on to examine independent variables, for the sake of clarity we describe, first, the one referring both to origin and destination, then those related only to the origin countries and, finally, those related only to the destination provinces.

3.2.1 Origin-Destination variable (demand side)

The distance between origin and destination measured in kilometers is included in the model in order to account for (both monetary and time) travel costs. This is a standard practice in tourism studies as well as in gravity equations. Given the high number of origin-destination pairs, the distance has been measured as follows. The distance between extra-European countries and Italian provinces is obtained by adding up the distance between the capital of the country and Rome (where the tourist is assumed to land) plus the distance between Rome and each capital of province. The distance between European countries and Italian provinces is given by the distance between the capital of the country and the capital of the region. When the distance between capital of the region and capital of the province exceeds 100 km, a specific distance has been measured. Distance is expected to have negative impact on tourist flows.

3.2.2 Origin variables (demand side)

Population of the country of origin measures the size of each specific market. It is expected to be positively correlated with tourist flows.

As explained in Section 2, income in the origin country is one of the main determinants of tourism flows in demand models. In our specification we use gross domestic product (GDP) per capita in order to distinguish the effect of market size (population) from that of income.

The necessity to include variables that represent tourism prices imposes a big challenge to empirical tourism research due to the difficulty of finding proxies for tourism prices. For our purpose a price level index has been calculated in order to account for the differences in the purchasing power parity (PPP) between origin countries. The index is obtained using the PPP conversion factor for GDP but rescaled in order to consider Italy as the reference country. The result has then been divided by the exchange rate of the country with respect to the Euro (the Italian currency). The obtained price index varies for country of origin while it is constant for destination units since a relative index of tourism prices is not available for the Italian provinces. As shown in Table 4, the variable is highly correlated with GDP per capita (0.79). Consequently, it has been excluded from the regression analysis.

3.2.3 Destination variables (supply side)

3.2.3.1 Leisure tourism attractions

Natural and cultural amenities are a relevant pull factor of the Italian touristic supply. Given the diffusion of the cultural endowment on the national territory and the difficulty of finding a single proxy for it, we have chosen more than one variable to disentangle the diversity of possible effects.

The variable *TCI* measures the touristic places of average or high cultural importance, as indicated by the Guide of the Touring Club Italiano (TCI), the top Italian association operating in the fields of tourism, culture and the environment from over a century.
TCI also sponsors the program Orange Flags, established in 1998 in order to identify and promote the smaller cities of the Italian inland that are enriched by a historic, cultural and environmental heritage, and quality in the visitors' welcoming. The number of Orange Flags of the Province (*Orange Flag*) is included as a proxy of the quality of inland extra-urban tourism.
The number of museums (*Museum*) is an additional proxy for cultural endowment. It includes all museums, art galleries, archeological sites and monuments of the province.
Coast is a proxy for the coastal surface of the province, intended to measure the importance of sea-sun-sand attractions. The variable *Blue Flag*, instead, indicates the number of beaches awarded of the quality label by Legambiente.
Park indicates the surface area of the province belonging to Natura 2000, a network including all protected natural areas. Since this variable is only available at the regional level, the squared kilometers of protected areas of a region have been divided according to the weight of the province on the regional surface area.
Given the high collinearity of *Parks* with *Mountain*, indicating the number of squared kilometers of mountain surface per province, the former variable has been used also as a proxy of the latter.
The variable *Restaurant*, indicating the number of restaurants awarded with at least one Michelin star, was selected to assess the role played by gastronomy and culinary reputation in attracting tourism flows. This variable has never resulted significant and its inclusion worsened the goodness of fit of the models, hence it has been excluded from the analysis.
All variables referring to cultural and natural resources are expected to have positive coefficients.
Finally, following other studies (Eilat and Einav, 2004; Massidda and Etzo, 2012), we have collected data for the diffusion of crime. The data collected from ISTAT refer to the number of reported crimes but, in our opinion, do not adequately reflect the actual level of criminality in the Italian provinces. This may be due to the level of legalistic culture and the confidence in the judicial system which are not homogenously distributed in the national territory. Not surprisingly, *Crime* has never resulted statistically significant in any model and hence has been excluded from the analysis.

3.2.3.2 Business tourism attractions and quality of the services

GDP per capita (*GDP pc i*) is an indicator of the level of economic development at the destination and can be interpreted in two ways (Marrocu and Paci, 2013). First, as an indicator of business trips importance, since a high income area is more likely to attract business tourism. Second, as an indicator of quality of the services, since a high income region provides better quality public and territorial services (public transport, health care, law enforcement and so on). In both cases it is expected to have positive influence on arrivals, while its expected sign is ambiguous for overnight stays and length of stay since business trips are usually shorter than leisure ones.

3.2.3.3 Tourism services capacity

The number of beds (*Beds*) is an indicator of the capacity of the tourism sector in a given province. It can also be considered as a proxy of investment in tourism infrastructure.

Furthermore, a certain volume of accommodation is necessary for a destination to reach the so-called 'critical mass' (Naudé and Saayman, 2005) needed to attract investments (i.e., convince airlines to establish routes or justify investment in complementary infrastructures). Data for this variable refer to the year 2009 because some time is needed in order for the effects to have place.
Besides, the number of employees in commerce and tourism-related services and its ratio with respect to total employees have been considered as indicators of specialization in tourism. However, given the high correlation with *Beds*, the two variables have been used as alternatives. *Beds* has finally been selected because when the model has been estimated with both explanatory variables only *Beds* resulted significant. Moreover, when considered as alternatives, the goodness of fit of the model was higher when using *Beds*.

3.2.3.4 Accessibility

Many studies have investigated the tourist behavior towards the degree of congestion in the destination (Massidda and Etzo, 2012; Saarinen, 2006; Marrocu and Paci, 2013). Population density (*Popden*) is the variable usually used to verify the preference of tourists for more or less crowded areas. In our model we have preferred to use as alternative variable the total surface area of the province (*Area size*), which in our database is highly (negatively) correlated with *Popden*, in order to verify this effect. Moreover, we have included a dummy variable for provinces with population greater than one million inhabitants (*Popbig*) in order to verify the effect of urbanization economies. This variable has been preferred to the number of residents in the province in order to avoid collinearity problems with other variables.
It is also worth noting that total surface can be thought as a measure of accessibility as well, since a larger area can imply a higher dispersion of attractions and a higher effort to reach them.
Additionally, to account for the level of accessibility, the number of airports with more than 10,000 passengers was considered (*Airport*). As an alternative variable, an index of accessibility (*Infrastructure*) was tested. Results coincided and hence the number of airports has been preferred because of the higher reliability of the variable.

In order to apply the gravity model as specified by Morley et al. (2014), all variables have been transformed in natural logarithm with the exception of the dummy variable *Popbig*. As a common practice in the literature, in order to avoid negative values, the natural logarithm transformation has been applied to the value of the variable plus one, so as to obtain a value of zero in the transformed variable in correspondence with a value of zero in the original one.
Since both dependent and independent variables are expressed in logarithms, estimated coefficients can be interpreted as elasticities.

4. Econometric strategy

We use a regression model whose general specification is (Elhorst 2014):

$$y_{ip} = \beta_0 + \rho \sum_{j=1}^{n} w_{ij} y_{jp} + \sum_{k=1}^{K} \beta_k x_{ipk} + \sum_{l=1}^{L} \vartheta_l \sum_{j=1}^{n} w_{ij} z_{jpl} + \gamma_i + \varepsilon_{ip} \quad (1)$$

where y_{ip} denotes the value taken by response variable y on province i and origin country p; β_0 denotes an overall constant; w_{ij} denotes the spatial weight connecting province i with province j; ρ denotes the endogenous interaction coefficient; x_{ipk} denotes the value taken by regressor X_k on province i and origin country i; β_k denotes the regression coefficient associated with regressor X_k; x_{jpl} denotes the value taken by regressor Z_l on province i and origin country p;[5] ϑ_l denotes the exogenous interaction coefficient associated with regressor Z_l; γ_i denotes the random effect for province i; and ε_{ip} denotes the error term.

All model unknowns are estimated by maximum likelihood using the Stata user-written command xsmle (Belotti et al. 2013).

Following Florax et al (2003) we estimate first a simple a-spatial model and introduce the complexity successively. Hence, in the first specification we estimate a basic gravity model setting $\rho = 0$ and $\vartheta_l = 0$. Next the gravity model is augmented to take into account spatial spillovers. The Spatial Durbin Model of Equation 1 is estimated including the spatial lag of the dependent variable and of the regressors referring to the province of destination.

The spatial distance between provinces is represented by the symmetric n by n matrix **W** whose entries are the geographical distances in kilometres between each province's centroid with a cut-off point of 100 kilometres. This threshold has been chosen because it is unlikely that tourists travel daily a greater distance. In order to check the robustness of the results a different specification of **W** with a cut-off point of 80 kilometres has been tested but results remained unchanged. On the contrary, a lower cut-off point has not been used because some provinces would have remained isolated.

5. Results

Our estimation strategy involved testing international tourist expenditures as the main dependent variables. However, since the variable suffers from biases due to problems in the data collection process by means of a survey, we paired it with a more traditional dependent variable, i.e. international tourist arrivals. First, for each of them we estimated a model with both demand and supply determinants but without spatial effects; at a second stage we re-estimated a model including also spatial spillover effects. Finally, as an extension and robustness check, the baseline and the spatial models were estimated also for two other dependent variables, namely international tourist overnight stays and international tourist average length of stay, both of which are proxies of the tourist propensity to spend at destination.

5.1 The basic model

First of all we estimated the a-spatial specification of our model for expenditures and nights. The estimated models are shown in Table 5 columns 1 and 3.

[5] In our specification we are interested only on the spatial lag of destination variables in province i while we omit the spatial lags of variables related to origin country p since we believe that spillover effects among different origin countries are not relevant.

As for tourist expenditures, the a-spatial model explains 36% of total variation of international tourist expenditures. Estimated coefficients are significant for nine out of fifteen independent variables (of which seven at 1%). Actual signs correspond to expected signs for all nine significant variables. All demand-side regressors are statistically significant with coefficients equal to 1.90 for country-of-origin per capita GDP and 0.81 for population. Origin-destination distance has a high coefficient equal to -1.85 while significant supply-side variables are, in descending order: provincial per capita GDP (2.72), museums (1.42), Touring Club landmark cities (1.24), the dummy for big city provinces (1.16), beds (1.07), top quality beds (0.63). This result implies that provincial per capita GDP, which is a proxy of both business tourism attractiveness and quality of territorial services, is the only supply-side element with greater impact than demand-side elements. Cultural tourism attractiveness, carrying capacity and quality of the accommodation have a sizeable impact as well, although relatively less important. International tourist expenditures seem therefore to be mostly influenced by high spenders such as business and cultural tourists, as well as by the country of origin of the flows.

As for international tourist arrivals the a-spatial model explains 71% of total variation. Estimated coefficients are significant for ten out of fifteen independent variables (of which six at 1%). They are the same as for expenditures, with blue flags as the additional significant variable. Actual signs correspond to expected signs for nine of the ten significant variables (the exception being blue flags). The largest coefficients were associated with the following variables, in descenting order for size of the coefficients: provincial per capita GDP (1.07), beds (0.94), origin-destination distance (-0.85), country-of-origin per capita GDP (0.60), Touring Club landmark cities (0.54), country-of-origin population (0.51), top quality beds (0.45). Coefficients are smaller with respect to column (3) because of magnitude differences in the characteristic values of the two dependent variables. *Beds* is the only variable with the same impact on arrivals as on expenditures. This result implies that demand side variables are highly statistically significant in determining arrivals but their impact is lower with respect to that on expenditures. Instead, business tourism and territorial services and carrying capacity are main determinants of arrivals, followed by distance.

Our empirical results support the hypothesis that both demand and supply factors play an important role in determining tourist flows and expenditures. As a check, we ran separate tests with demand or supply variables and both groups explained a sizable share of total variation, with little overlapping.

5.2 The model with spatial effects

Then, based on the discussion on the relevance of externalities generated by neighbouring provinces presented above, we selected a model specification accounting for spatial dependence.

First, we introduced in the model the spatial lag of all supply-side independent variables, in order to ascertain their potential spillover impact. Since various tests proved *Beds* to be the only highly statistically significant variable, we retained only this variable in the final specification, together with the auto-regressive term.

The estimated model for expenditures is shown in Table 5, column 4. Coefficients are statistically significant and have the expected sign for the same independent variables as in the base model. As in the base model, most variables show large coefficients, in descending order as follows: provincial per capita GDP (2.32), museums (1.54), international per capita GDP (1.43), international distance (-1.32), Touring Club landmark cities (1.21), the dummy for big city provinces (1.13), beds (1.07), top quality beds (0.68), international population (0.57). Compared to the a-spatial model, the size of the coefficient slightly increases for *Museums* while decreases for business tourism attractiveness. As for the spatially lagged variables, both the autoregressive term and the spatial lag of *Beds* are highly statistically significant and have coefficients equal to 2.26 and -2.44, respectively.

This result indicates, on the one hand, the existence of remarkable spillover effects and, on the other, a strong competitive pressure whereby the higher carrying capacity of neighbouring provinces may go at the detriment of expenditures in a destination. The model explains 34% of total variation of international tourist expenditures, a loss of two percentage points. However, both Log-Likelihood and the Akaike Information Criterion improve by almost a percentage point.

As for arrivals, the model explains 66% of total variation, with a loss of five percentage points with respect to the a-spatial one, compensated by gains of six percentage points in both Log-Likelihood and Akaike Information Criterion. Estimated coefficients are significant for ten independent variables as in the base model; however, total surface area replaces the dummy for big city provinces. Actual signs correspond to expected signs for all eleven significant variables. The largest coefficients were associated with the following variables: beds (0.93), total surface area (-0.76), provincial per capita GDP (0.74), origin-destination distance (-0.50), Touring Club landmark cities (0.49), top quality beds (0.45), museums (0.44), country-of-origin per capita GDP (0.38), country-of-origin population (0.29). The negative coefficient for total surface area can be interpreted as a sign of the preference of tourists for more crowded areas or of the tourist aversion for local mobility. Again, coefficients are smaller than for expenditures, because of scale differences between the two dependent variables, but for a majority of variables they are noticeably smaller also compared to the base model. This because of the high and significant coefficients for both the autoregressive term (3.45) and the spatial lag of beds (-2.59). This result implies that the competitive effect of the carrying capacity of neighbouring provinces is even stronger for arrival, i.e. in determining the choice of destination, than for expenditures.

Generally-speaking, the supply side plays a more important role than the demand side in the choice of destination, whereas expenditure decisions depend on both almost equally.

We now pass to examine the variables which are not statistically significant. Indeed, while business and cultural tourism attractions play an important role for both arrivals and expenditures, variables referring to infrastructures, environment and sea-sun-sand supply are not statistically significant in any model. The first result indicates that arrivals and expenditures are independent of the presence of an airport both on the province and on nearby ones. The same finding was achieved when using an alternative index of infrastructure endowment. This has important policy implications since it indicates that the choice of the destination and the expenditures at destination are driven by factors other than infrastructures. The statistical insignificance of *Parks* and *Coast* can be due to a low price-competitiveness of Italian mountain and sea-sun-sand destinations for foreign tourists with respect to other more affordable ones. Since distance plays a significant role, international tourists seem to be willing to pay for it when cultural and business trips are concerned, but the same does not seem to hold for mountain and seaside vacations. This would explain also the negative coefficient for *Blue Flag* in explaining *Arrivals*. Finally, the insignificance of the coefficient for *Orange Flag* (and *Blue Flag* for expenditures) points at a poor international knowledge of quality labels for Italian small destinations by foreign tourists.

In sum, our empirical results support the expectation that spatial spillovers play an important role in determining tourist flows. On the one hand, the significance of the autoregressive term points at an important role of productivity, market access and joint promotion spillovers between neighbouring provinces. On the other hand, the relevance of the spatial lag of the carrying capacity is a sign of a strong competitive pressure based on supply side issues. Moreover, when considering spatial effects, supply variables play the primary role in destination choice, whereas demand variables are more important in the decision to spend. We believe this is interesting and novel evidence.

As a final remark it is worth noting that the opportunity of using the spatial specifications is confirmed not only by the values of the AIC and Log-Likelihood which diminish passing from the a-spatial to the spatial model, but also by the same behaviour of the indicator *sigma_e* which measure the residuals' variance. Indeed, the lower the indicator, the higher the predictive power of the model.

5.3 Robustness checks: alternative specifications of the dependent variable

Generally speaking, robustness tests may be conducted on alternative aggregations of the spatial unit of analysis; alternative indicators of independent variables, or dummies for omitted factors (e.g. regional ones); alternative specification of the dependent variable.

The first check is beyond the scope of this analysis and is left for future research efforts. Extensions of this analysis may include testing the model using sub-samples of destination provinces homogeneous for tourist supply or sub-samples of origin countries homogenous for distance (13 European countries compared to 7 non-European countries) or business/vacation prominence (11 long-stays countries compared to 9 short-stays countries).

As for the second test, we checked for alternative specification of some independent variables. Details are provided in Section *Data and variables* but results are not reported since they did not improve or change our findings.

We focused instead on the third test by using two additional dependent variables: foreign tourist overnight stays and average length of stay.

The estimated models the baseline a-spatial specifications are shown in Table 6, columns 1 and 3.

The a-spatial model for international overnight stays explains 70% of total variation, just below arrivals but well above expenditures. Estimated coefficients are significant for ten out of fifteen independent variables (of which six at 1%), the same as in the spatial model for arrivals. Actual signs correspond to expected signs for nine of the ten significant variables (the exception being blue flags, again). The largest coefficients were associated with the following variables: beds (1.10), international distance (-0.93), provincial per capita GDP (0.85), international per capita GDP (0.54), total surface area (-0.52), Touring Club landmark cities (0.47), international population (0.45), top quality beds (0.36). The size of the coefficients is comparable to those for arrivals. Business tourism attractiveness has a noticeably smaller impact on overnight stays than on arrivals, as should be expected, given that business trips tend to need shorter stays. On the contrary, the availability of tourist services (beds) has a larger impact. The role played for arrivals by the dummy for big city provinces is taken on by total surface area, which already did so in the spatially-lagged model for arrivals. Apart from these details, both demand-side and supply-side variables have significant and comparable impacts on overnight stays, just as they did on arrivals. These findings confirm the validity of the results obtained for the main dependent variable expenditures, since variations in significant independent variables and in coefficient sizes are fairly small and easily explained by the specificities of the different dependent variables.

With regard to average length of stay, the a-spatial model in column (3) explains 31% of total variation, the poorest performance of all four dependent variables. Moreover, estimated coefficients are significant for just six out of fifteen independent variables (of which four at 1%). Actual signs correspond to expected signs for just four of the six significant variables (the exceptions being international population and international per capita GDP). Due to the small magnitude of the dependent variable, independent variables show very small but still highly significant coefficients, the largest being for beds (0.15), followed by top quality beds (-0.09), origin-destination distance (-0.08), country-of-origin population (-0.07), and country-of-origin per capita GDP (-0.06). Apart from tourist service issues, demand-side influences prevail, as with expenditures. Their negative signs are likely due to the fact that tourists from richer and more populous countries prefer itinerant to sedentary tourism and/or frequent short-stays to a few long-stay vacations. The negative sign of top quality beds can be explained by the trade-off with length of stay inherent in budget-constrained choices.

Again, we repeated the estimation after introducing spatial spillovers. The estimated models are shown in Table 6, columns 2 and 4.

Starting from column (2), the model explains 63% of total variation of overnight stays, a loss of seven percentage points, which is largely compensated by gains of 5.5 percentage points in both Log-Likelihood and the Akaike Information Criterion. Estimated coefficients are significant for only eight variables in addition to the spatially lagged variables, the downgraded ones being blue flags and provincial per capita GDP. Actual signs correspond to expected signs for all significant variables, though. The largest coefficients were associated with the following variables: spatially lagged overnight stays (3.57), spatially lagged beds (-3.09), beds (1.07), total surface area (-0.79), international distance (-0.55), Touring Club landmark cities (0.44), top quality beds (0.36), museums (0.35), international per capita GDP (0.33), international population (0.24). Demand-side coefficients (distance, population, per capita GDP) were smaller than in the a-spatial model, whereas supply-side coefficients were stable or even larger.

With regard to average length of stay, the spatial model in column (4) explains 28% of total variation, with a loss of three percentage points. However, the improvement in both Log-Likelihood and the Akaike Information Criterion is much greater, at over 14 percentage points. Estimated coefficients are significant for just five variables in addition to the spatially lagged ones. However, the lost variable was almost non-significant and had a small impact (coast length). Actual signs correspond to expected signs for just three variables and the spatially lagged variables (the exceptions being the same as in the a-spatial model). As in the a-spatial model, most variables show small coefficients, in descending order as follows: spatially lagged length of stay (3.21), spatially lagged beds (-0.36), beds (0.14), top quality beds (-0.09), international distance (-0.06), international population (-0.04), and international per capita GDP (-0.04). Despite being a supply-side variable, the spatially lagged variable further reduces the impact of demand-side variables.

We interpret these findings as meaning that our empirical results support the importance of spatial spillovers as an additional explanatory element of international tourist behaviour, highlighting the role of both positive effects deriving from competition, market access and joint promotion spillovers and spatial competition among destinations.

6. Conclusions

This paper investigates the determinants of tourist flows to 103 Italian provinces (NUTS 3) from the top 20 origin countries. Dependent variables are foreign tourist arrivals and expenditures. Length of stay and overnight stays are also considered as an extension and robustness check. The effects of both demand and supply variables on a province's tourist flows and exports are considered together with distance between origin and destination, as a proxy of travel costs. Moreover, spatial effects are included in the model to examine the possible spillovers originating from supply variables in contiguous provinces. Besides the Spatial Autoregressive model usually employed in tourism studies, following the suggestion of Halleck Vega and Elhorst (2013), spatial effects have been analysed also by means of a Spatial Durbin Model, using the spatial lag of some destination variables. Results are quite homogeneous for arrivals, expenditures and nights and indicate the high statistical significance of all country-of-origin's variables and distance for all models except that for length of stay. This indicates the opportunity of directing promotional efforts towards high-income, highly populated markets, although distance plays a negative role. From the supply side, the most important variables are museums and TCI localities, income per capita as a proxy of business tourism attractiveness and quality of territorial services, carrying capacity and the presence of high-quality accommodation structures (four stars or more). This shows the importance of the cultural offer and of quality tourism and territorial services in attracting tourism flows and expenditures. On the contrary, coastal and environmental tourism variables are not significant (or even negatively associated as in the case of Blue flags). Although a measure of relative price with respect to competitors was not available for Italian provinces, we can assume as a possible explanation of this result the low price-competitiveness of Italian sea-sun-sand and mountain destinations with respect to those of other countries. It is also worth noting that the presence of airports is not a significant determinant of flows and expenditures.

If the objective of a destination is to increase the average length of stay, results suggest that promotional efforts should better focus on closer although less populated and rich countries. Moreover, coastal endowment is in this case a positive element and the presence of high-quality beds a negative one. This is consistent with the expectation that leisure holidays are usually longer than business trips.

A final result worth of notice is the high significance of spatial variables. In particular, the positive sign of the autoregressive term indicates that a province acquires benefit from being close to tourist-attractive provinces and suggests the opportunity of engaging in joint promotional efforts in order to expand the demand towards contiguous provinces. However, the negative estimated coefficient for the spatial lag of *Beds* indicates the existence of a competition effect between neighbouring provinces. Verifying the adequacy of the carrying capacity should therefore be the first concern for destinations wishing to improve their tourism attractiveness.

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FIGURES

Figure 1 – Distribution of tourist arrivals per province, 2012

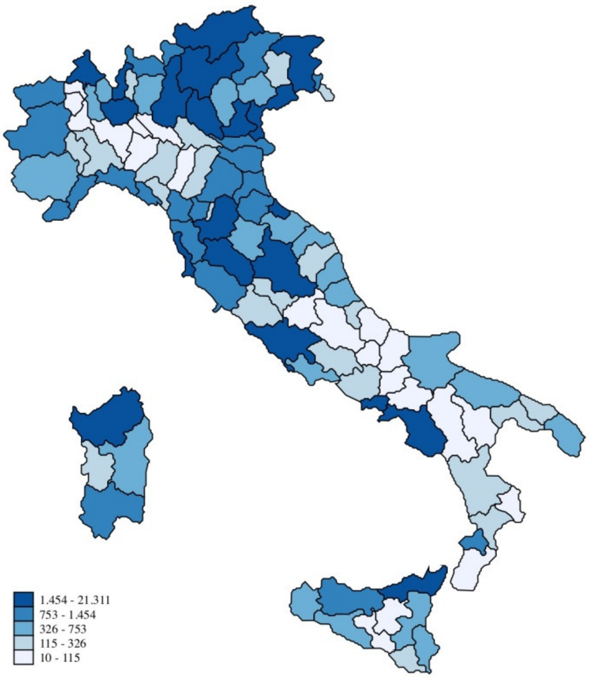
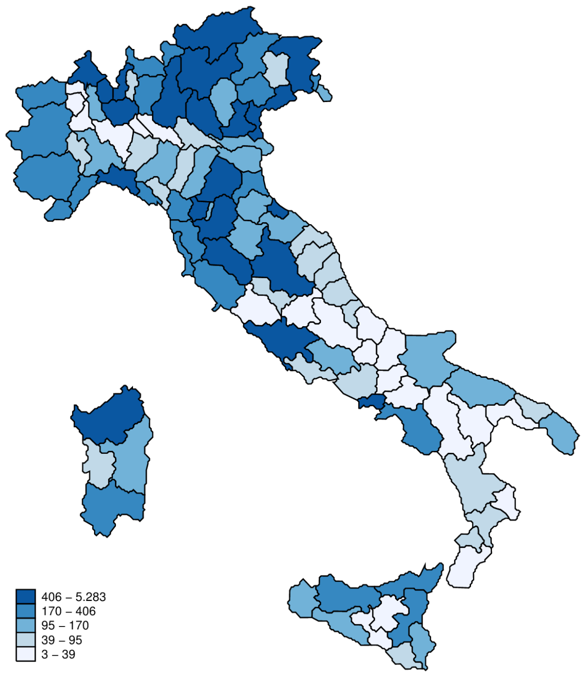


Figure 2 – Distribution of tourist nights per province, 2012



TABLES

Table 1 Top 20 countries of origin to Italy for tourist flows and expenditures, 2012

	Arrivals	*Expenditure*	*Nights*	*Average length of stay*
Germany	10,192,697	5,076,792,878	51,752,263	5.1
USA	4,442,549	3,152,635,869	11,449,446	2.6
France	3,700,775	2,736,598,760	11,369,866	3.1
UK	2,890,015	2,106,027,947	11,131,968	3.9
Switzerland	2,151,675	2,017,715,572	8,734,765	4.1
Austria	2,110,605	1,504,193,460	8,505,045	4.0
Netherlands	1,959,306	1,072,190,616	11,303,681	5.8
Spain	1,711,807	1,326,127,870	4,698,626	2.7
Russia	1,707,998	913,203,743	6,179,785	3.6
China	1,583,479	216,399,853	2,496,287	1.6
Japan	1,449,115	427,245,927	2,765,414	1.9
Belgium	1,103,629	767,728,201	4,749,059	4.3
Poland	919,013	583,449,554	3,742,801	4.1
Australia	820,562	759,357,273	2,157,363	2.6
Brazil	765,174	372,076,052	1,848,507	2.4
Canada	706,427	642,318,899	1,948,324	2.8
Czech Republic	639,847	428,570,718	3,248,662	5.1
Denmark	626,425	271,910,182	3,375,537	5.4
Sweden	599,239	408,377,597	2,278,494	3.8
Romania	508,132	363,746,158	2,092,480	4.1
Total top 20 countries	40,588,469	25,146,667,129	155,828,373	3.84
% on Total	83%	84%	86%	

Table 2 Variables description and data sources

Variable	*Source*	*Definition*	*Year*
Dependent variables			
Arrivals	ISTAT	Number of inbound tourist arrivals	2012
Expenditure	Bank of Italy Survey	Expenditures of foreign tourists in Italy	2012
Nights	ISTAT	Number of inbound tourist overnight stays	2012
Length	ISTAT	Length of stay (Nights/Arrivals)	2012
Independent variable origin Country j - destination Province i			
Dist_ip	Our elaboration on Cepii Data and Viamichelin	Distance between Province i and Country p in kilometers	
Independent variables origin Country j			
Pop p	World Bank	Population (million)	2012
GDP pc p	World Bank	GDP per capita in USD	2012
Ppp/er p	Our elaboration on World Bank data	Purchasing Power Parity of Country p with respect to Italy/Exchange rate with respect to Euro	2012
Independent variables destination Province i			
TCI	TCI Guide	Touristic places of average or high cultural importance	2012
Museums	ISTAT	Number of museums, art galleries, archeological sites and monuments	2008 (national museums); 2006 (other ownership)
Parks	ISTAT	Squared kilometers of Natura2000 areas (regional data divided by provincial	2012

		area)	
Orange flag	www.bandierearancioni.it	Number of Orange flags (Touring Club Italiano)	2012
Blue flag	www.bandierablu.org	Number of Blue flags	2012
Coast	ISTAT	Kilometers of costal surface	2011
Mountain	ISTAT	Squared kilometers of Mountain surface	2011
Restaurant	Michelin Guide	Number of restaurants with at least one Michelin star	2012
Crime	ISTAT	Number of minor crimes (x 1,000 inhabitants)	2012
GDP pc i	ISTAT	GDP per capita in Euros (latest figure available)	2010
Popbig	ISTAT (Census)	Dummy variable: population > 1 million inhabitants	2011
Beds	ISTAT	Number of beds	2009
Top beds	ISTAT	Number of beds in 4 and 5 stars hotels	2009
Tertiary	ISTAT	Number of employees in the tertiary sector	
Specialization	ISTAT	Share of tertiary employees on total employees	2012
Airport	ENAC	Number of Airports with more than 10.000 passengers	2012
Infrastructure	Italian Government (http://dati.italiaitalie.it/opendata.aspx)	Index of accessibility	2012
Area size	ISTAT	Total surface area (km^2)	2011
Popden	ISTAT	Number of inhabitant per km^2	2011

Table 3 Descriptive Statistics

Variable	*Mean*	*Std. Dev.*	*Coeff. variation*	*Median*	*Min*	*Max*
Arrivals	75,645	422,081	5.58	10,611	10	14,200,000
Expenditure	12,207,119	45,274,220	3.71	1,881,448	0	1,140,000,000
Nights	19,703	89,779	4.56	3,127	8	2,675,189
Length	3.6	2.0	0.56	3.1	1.1	30.0
Dist_ip	4,157.3	4,232.9	1.02	1,999.0	205.0	16,926.9
Pop p	129.0	291.0	2.26	36.6	5.6	1,350.0
GDP pc p	29,970.8	1,5700.3	0.52	36,751.3	3,348.0	54,995.9
Ppp/er p	1.1	0.3	0.27	1.1	0.5	1.6
TCI	1.8	1.7	0.94	2.0	0	7
Museums	46.2	31.9	0.69	40.0	8	219
Parks	619.3	421.5	0.68	520.6	40.5	1,829.5
Orange flag	1.9	2.4	1.26	1.0	0	15
Blue flag	1.3	2.2	1.69	0.0	0	11
Coast	72.5	127.6	1.76	20.5	0.0	877.3
Mountain	1,586.4	1,615.0	1.02	1,193.9	0.0	7,398.4
Restaurant	2.8	3.6	1.29	2.0	0	17
Crime	4,264.6	1,470.6	0.34	3,946.9	598	12,210
GDP pc i	24,064.3	5,980.2	0.25	24,600.0	13,200.0	42,164.2
Popbig	0.1	0.3	3.00	0.0	0	1
Beds	44,663.7	54,172.9	1.21	28,139.0	2,133	398,299
Top beds (%)	17.8	10.9	0.61	15.7	1.7	54.9
Tertiary	45,155.5	48,080.9	1.06	30,601.0	6,341	316,648
Specialization (%)	21.0	2.9	0.14	20.8	15.8	30.9
Airport	0.4	0.5	1.25	0.0	0	2
Infrastructure	100.8	76.7	0.76	82.0	21.0	555.0
Area size	2,932.7	1,735.9	0.59	2,567.8	212.5	7,692.1
Popden	248.6	330.1	1.33	174.1	37.4	2,591.3

Table 4 Matrix of correlations

	Arrivals	Nights	Expenditure	Length	Dist_ip	Pop p (million)	GDP pc p	Ppp/er p	TCI	Museums	Parks	Orange flag	Blue flag	Coast	Mountain	Restaurant	GDP pc i	Popbig	Beds	Top beds (%)	Tertiary	Specialization (%)	Airport	Infrastructure	Area size	Popden	Crime
Arrivals	1.00	0.97	0.63	0.32	-0.35	-0.05	0.17	-0.02	0.47	0.50	0.08	0.16	0.15	0.08	-0.01	0.41	0.37	0.27	0.65	-0.03	0.54	0.18	0.24	0.32	0.13	0.31	0.32
Nights	0.97	1.00	0.64	0.09	-0.31	0.00	0.17	0.01	0.49	0.52	0.06	0.15	0.08	0.00	-0.03	0.45	0.42	0.30	0.60	0.03	0.59	0.12	0.26	0.35	0.12	0.36	0.33
Expenditure	0.63	0.64	1.00	0.09	-0.29	-0.12	0.26	0.07	0.32	0.37	0.02	0.11	0.06	-0.02	-0.01	0.29	0.30	0.21	0.35	0.01	0.41	0.01	0.14	0.27	0.08	0.26	0.27
Length	0.32	0.09	0.09	1.00	-0.23	-0.24	0.03	-0.11	0.02	0.03	0.10	0.04	0.28	0.35	0.07	-0.07	-0.13	-0.05	0.32	-0.24	-0.07	0.27	-0.01	-0.02	0.05	-0.13	0.02
Dist_ip	-0.35	-0.31	-0.29	-0.23	1.00	0.57	-0.24	0.16	-0.01	-0.04	0.06	-0.04	0.01	0.10	0.02	-0.06	-0.14	0.01	-0.02	0.06	-0.03	0.04	0.00	-0.03	0.03	-0.03	-0.05
Pop p (million)	-0.05	0.00	-0.12	-0.24	0.57	1.00	-0.52	-0.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
GDP pc p	0.17	0.17	0.26	0.03	-0.24	-0.52	1.00	0.79	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Ppp/er p	-0.02	0.01	0.07	-0.11	0.16	-0.35	0.79	1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
TCI	0.47	0.49	0.32	0.02	-0.01	0.00	0.00	0.00	1.00	0.50	0.35	0.25	0.07	0.07	0.10	0.37	0.13	0.39	0.49	0.13	0.54	0.22	0.24	0.13	0.34	0.17	0.18
Museums	0.50	0.52	0.37	0.03	-0.04	0.00	0.00	0.00	0.50	1.00	0.41	0.37	0.09	-0.02	0.27	0.45	0.42	0.37	0.60	0.02	0.68	-0.08	0.25	0.16	0.52	0.14	0.36
Parks	0.08	0.06	0.02	0.10	0.06	0.00	0.00	0.00	0.35	0.41	1.00	0.18	-0.01	0.20	0.43	0.12	-0.31	0.22	0.34	0.08	0.28	0.12	0.15	-0.44	0.92	-0.47	-0.24
Orange flag	0.16	0.15	0.11	0.04	-0.04	0.00	0.00	0.00	0.25	0.37	0.18	1.00	0.09	-0.17	0.27	0.22	0.23	-0.05	0.22	-0.26	0.08	0.11	-0.07	-0.15	0.27	-0.24	0.06
Blue flag	0.15	0.08	0.06	0.28	0.01	0.00	0.00	0.00	0.07	0.09	-0.01	0.09	1.00	0.48	-0.03	0.00	-0.03	0.01	0.35	-0.30	0.06	0.34	0.03	0.30	-0.09	0.07	0.21
Coast	0.08	0.00	-0.02	0.35	0.10	0.00	0.00	0.00	0.07	-0.02	0.20	-0.17	0.48	1.00	-0.02	-0.30	-0.53	0.09	0.34	-0.03	0.03	0.41	0.11	0.25	0.06	0.04	0.00
Mountain	-0.01	-0.03	-0.01	0.07	0.02	0.00	0.00	0.00	0.10	0.27	0.43	0.27	-0.03	-0.02	1.00	-0.01	-0.09	0.05	0.13	-0.06	-0.06	0.04	-0.08	-0.29	0.43	-0.41	-0.19
Restaurant	0.41	0.45	0.29	-0.07	-0.06	0.00	0.00	0.00	0.37	0.45	0.12	0.22	0.00	-0.30	-0.01	1.00	0.48	0.42	0.40	0.04	0.54	-0.04	0.22	0.11	0.21	0.25	0.31
GDP pc i	0.37	0.42	0.30	-0.13	-0.14	0.00	0.00	0.00	0.13	0.42	-0.31	0.23	-0.03	-0.53	-0.09	0.48	1.00	0.01	0.25	-0.23	0.31	-0.28	0.17	0.29	-0.13	0.24	0.45
Popbig	0.27	0.30	0.21	-0.05	0.01	0.00	0.00	0.00	0.39	0.37	0.22	-0.05	0.01	0.09	0.05	0.42	0.01	1.00	0.24	0.28	0.60	-0.09	0.33	0.16	0.22	0.43	0.34
Beds	0.65	0.60	0.35	0.32	-0.02	0.00	0.00	0.00	0.49	0.60	0.34	0.22	0.35	0.34	0.13	0.40	0.25	0.24	1.00	-0.25	0.57	0.39	0.25	0.27	0.37	0.11	0.28
Top beds (%)	-0.03	0.03	0.01	-0.24	0.06	0.00	0.00	0.00	0.13	0.02	0.08	-0.26	-0.30	-0.03	-0.06	0.04	-0.23	0.28	-0.25	1.00	0.28	-0.14	0.24	-0.01	0.04	0.32	-0.01
Tertiary	0.54	0.59	0.41	-0.07	-0.03	0.00	0.00	0.00	0.54	0.68	0.28	0.08	0.06	0.03	-0.06	0.54	0.31	0.60	0.57	0.28	1.00	-0.01	0.39	0.38	0.34	0.61	0.46
Specialization (%)	0.18	0.12	0.01	0.27	0.04	0.00	0.00	0.00	0.22	-0.08	0.12	0.11	0.34	0.41	0.04	-0.04	-0.28	-0.09	0.39	-0.14	-0.01	1.00	-0.01	0.05	0.00	-0.12	-0.03
Airport	0.24	0.26	0.14	-0.01	0.00	0.00	0.00	0.00	0.24	0.25	0.15	-0.07	0.03	0.11	-0.08	0.22	0.17	0.33	0.25	0.24	0.39	-0.01	1.00	0.12	0.15	0.22	0.27
Infrastructure	0.32	0.35	0.27	-0.02	-0.03	0.00	0.00	0.00	0.13	0.16	-0.44	-0.15	0.30	0.25	-0.29	0.11	0.29	0.16	0.27	-0.01	0.38	0.05	0.12	1.00	-0.46	0.70	0.51
Area size	0.13	0.12	0.08	0.05	0.03	0.00	0.00	0.00	0.34	0.52	0.92	0.27	-0.09	0.06	0.43	0.21	-0.13	0.22	0.37	0.04	0.34	0.00	0.15	-0.46	1.00	-0.50	-0.15
Popden	0.31	0.36	0.26	-0.13	-0.03	0.00	0.00	0.00	0.17	0.14	-0.47	-0.24	0.07	0.04	-0.41	0.25	0.24	0.43	0.11	0.32	0.61	-0.12	0.22	0.70	-0.50	1.00	0.48
Crime	0.32	0.33	0.27	0.02	-0.05	0.00	0.00	0.00	0.18	0.36	-0.24	0.06	0.21	0.00	-0.19	0.31	0.45	0.34	0.28	-0.01	0.46	-0.03	0.27	0.51	-0.15	0.48	1.00

Table 5 - Demand and supply determinants of tourism flows: baseline model specification and spatial effects

	Arrivals		*Expenditures*	
	(1) Nonspatial	(2) Spatial	(3) Nonspatial	(4) Spatial
Dist_ij	-0.85***	-0.50***	-1.85***	-1.32***
	(-34.35)	(-17.93)	(-14.57)	(-9.76)
Pop_j	0.51***	0.29***	0.81***	0.57***
	(27.96)	(14.63)	(8.62)	(5.95)
GDP_pc_j	0.60***	0.38***	1.90***	1.44***
	(23.28)	(14.70)	(14.32)	(10.47)
TCI	0.54***	0.49***	1.24***	1.21***
	(4.34)	(4.45)	(4.27)	(4.13)
Museums	0.31*	0.44***	1.42***	1.54***
	(1.94)	(3.08)	(3.76)	(4.03)
Parks	-0.08	0.32	-0.63	-0.03
	(-0.35)	(1.41)	(-1.13)	(-0.04)
Orange flag	-0.02	0.00	-0.11	-0.08
	(-0.21)	(0.00)	(-0.47)	(-0.32)
Blue flag	-0.23**	-0.18*	-0.19	-0.20
	(-2.00)	(-1.78)	(-0.73)	(-0.73)
Coast	-0.02	0.01	0.07	0.14
	(-0.40)	(0.33)	(0.73)	(1.25)
GDP_pc_i	1.07**	0.74*	2.72***	2.32**
	(2.47)	(1.91)	(2.67)	(2.25)
Popbig	0.39*	0.31	1.16**	1.13**
	(1.71)	(1.55)	(2.18)	(2.10)
Beds	0.94***	0.93***	1.07***	1.07***
	(10.52)	(11.45)	(5.07)	(5.01)
Top beds	0.45***	0.45***	0.63**	0.68***
	(4.11)	(4.57)	(2.46)	(2.59)
Airport	-0.07	-0.03	-1.43	-1.55
	(-0.12)	(-0.06)	(-1.07)	(-1.15)
Area_tot	-0.43	-0.76***	-0.31	-0.77
	(-1.60)	(-3.08)	(-0.48)	(-1.18)
Constant	-19.17***	-13.11***	-45.68***	-38.30***
	(-4.26)	(-3.25)	(-4.23)	(-3.52)
Spatial				
rho		3.45***		2.26***
		(20.52)		(9.45)
Beds		-2.59***		-2.44***
		(-12.49)		(-4.82)
Variance				
lgt_theta	-0.71***	-0.69***	0.95***	0.83***
	(-6.68)	(-6.38)	(3.71)	(3.52)
sigma_e	0.70***	0.58***	18.56***	17.54***
	(31.28)	(30.98)	(31.28)	(31.08)
R^2	0.71	0.66	0.36	0.34
Log-Likelihood	-2667.84	-2506.81	-5965.24	-5924.55
AIC	5371.68	5053.63	11966.48	11889.09

*Notes: *(**)[***] indicates significance at 10(5)[1] per cent level.*

Table 6 - Demand and supply determinants of tourism flows: robustness and extensions

	Nights		*Length of stay*	
	(1) Nonspatial	(2) Spatial	(3) Nonspatial	(4) Spatial
Dist_ij	-0.93***	-0.55***	-0.08***	-0.06***
	(-33.02)	(-17.59)	(-8.60)	(-6.78)
Pop_j	0.45***	0.24***	-0.07***	-0.04***
	(21.26)	(11.48)	(-9.43)	(-6.11)
GDP_pc_j	0.54***	0.33***	-0.06***	-0.04***
	(18.25)	(11.77)	(-6.20)	(-4.19)
TCI	0.47***	0.44***	-0.07	-0.05
	(4.21)	(4.36)	(-1.57)	(-1.21)
Museums	0.27*	0.35***	-0.04	-0.09
	(1.87)	(2.66)	(-0.73)	(-1.64)
Parks	-0.02	0.34	0.06	0.02
	(-0.08)	(1.64)	(0.75)	(0.19)
Orange flag	0.00	0.01	0.02	0.01
	(0.02)	(0.17)	(0.65)	(0.43)
Blue flag	-0.19*	-0.15	0.04	0.03
	(-1.88)	(-1.61)	(0.86)	(0.74)
Coast	0.01	0.04	0.03*	0.03
	(0.30)	(1.02)	(1.86)	(1.60)
GDP_pc_i	0.82**	0.58	-0.25	-0.16
	(2.10)	(1.63)	(-1.61)	(-1.09)
Popbig	0.32	0.30	-0.07	-0.02
	(1.57)	(1.63)	(-0.82)	(-0.21)
Beds	1.10***	1.07***	0.15***	0.14***
	(13.61)	(14.42)	(4.70)	(4.65)
Top beds	0.36***	0.36***	-0.09**	-0.09**
	(3.70)	(3.98)	(-2.19)	(-2.38)
Airport	-0.10	-0.03	-0.03	-0.01
	(-0.20)	(-0.07)	(-0.15)	(-0.05)
Area_tot	-0.52**	-0.79***	-0.09	-0.03
	(-2.15)	(-3.50)	(-0.90)	(-0.31)
Constant	-13.91***	-9.46**	5.26***	3.62**
	(-3.43)	(-2.56)	(3.24)	(2.34)
Spatial				
rho		3.57***		3.21***
		(21.03)		(16.33)
Beds		-3.09***		-0.36***
		(-14.51)		(-5.90)
Variance				
lgt_theta	-0.33***	-0.34***	-0.59***	-0.62***
	(-2.65)	(-2.75)	(-5.32)	(-5.60)
sigma_e	0.91***	0.75***	0.11***	0.09***
	(31.28)	(30.92)	(31.28)	(30.96)
R^2	0.70	0.63	0.31	0.28
Log-Likelihood	-2917.98	-2755.41	-723.55	-619.93
AIC	5871.97	5550.83	1483.09	1279.87

*Notes: *(**)[***] indicates significance at 10(5)[1] per cent level.*