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FULL ARTICLE

European cultural heritage and tourism flows: The magnetic role of superstar World Heritage Sites

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Abstract

Cultural heritage is a potentially important determinant of international tourism flows. Apart from being an enrichment for both individuals and communities and an opportunity for different cultures to meet, tourism also represents a significant industry for European economies. We empirically investigate the impact of the endowment of tangible cultural heritage on tourism attractiveness of European regions. We measure material forms of cultural heritage both as regional density of locally defined monuments, cultural landscapes and museums, and as number of cultural sites listed in the UNESCO World Heritage Sites international programme. Using a Bayesian multilevel gravity model, we find that UNESCO cultural World Heritage Sites are associated with an increase of 6,000 (one site) to 60,000 (eight sites) international tourists from each European country to an average European region. On the other hand, regionally or nationally defined tangible forms of heritage play a more limited role as pull-factors for international tourism. Moreover, we show that the presence of UNESCO sites reduces the distance decay effect. International tourists are willing to travel longer distance if a destination is endowed with UNESCO cultural World Heritage Sites.

KEYWORDS

cultural heritage, European regions, multilevel gravity model, tourism flows

JEL CLASSIFICATION
R11; Z32

1 | INTRODUCTION

With the expansion of cultural tourism since the 1980s, cultural heritage is increasingly considered as a relevant factor able to enhance and exploit destinations' attractiveness and competitiveness (OECD, 2009). Even though both national and international public institutions recognize and highlight the strong relationship between cultural heritage endowments of destinations and tourism attractiveness, the empirical evidence on this relationship is still limited. Empirical findings supporting the existence of this relationship serve the debate related to the economic role of heritage as a resource for local development (European Commission, 2015). In fact, international tourism represents a relevant industry for European economies and it is one of the mechanisms through which cultural heritage has an impact on regional economic growth.

As highlighted by the United Nations World Tourism Organization (UNWTO), tourist flows showed an increasing trend in the last eight years. In 2017, worldwide tourist arrivals reached 1,323 million corresponding to an average annual growth rate of 7%. Out of the total number of tourist arrivals, 51% travelled to Europe which witnessed an 8% expansion relative to 2016 (World Tourism Organization, 2017). Tourism represents 10% of the European Union GDP, 12 million people are employed in the tourism sector (corresponding to 9% of total EU employment) and a share of 22% of total services exports is ascribed to tourism (World Tourism Organization, 2018a). As evidenced by Paci and Marrocu (2014) both domestic and international forms of tourism are relevant determinants of regional economic growth in Europe.

Focusing on cultural tourism, four out of ten tourists make decisions about their trips based on destinations' cultural offering (*cf.* World Tourism Organization, 2018b). As Noonan and Rizzo (2017) point out, even though positive estimates related to cultural tourism growth have been reported by both OECD and UNWTO, it is not possible to find a distinction in international tourism statistics between leisure and cultural tourism, nor to know whether culture is the main motivation to travel or just an ancillary activity. Besides, the notion of cultural tourism has been subject to a progressive expansion following the enlargement of the concept of culture itself. Cultural tourism implies the consumption by tourists of different forms of culture including monuments and sites, museums, theatres, cultural events, performing arts, but also different ways of life experiences, gastronomy, traditions and habits.

However, negative impacts might derive from over-tourism phenomena, for instance, deterioration of the environment or disrespect for local community's quality of life (see, e.g., Cocola-Gant & Gago, 2019). As argued in Aguilera, Artioli and Colomb (2019), politicians, citizens and scholars started to raise awareness on the potential adverse impacts of vast tourist flows on local economies, neighbourhoods' metamorphoses and residential lives. This increased the call for tourism regulation and control. Focusing on cultural-heritage-driven tourism, a large number of tourists could cause issues related to, for instance, de-contextualization of heritage, disconnection with the local community, congestion, discomfort and commodification or, so-called, Disneyfication of cultural heritage (see, e.g., Hampton, 2005; Rodzi, Zaki, & Subli, 2013; Smith, 2006). Finally, cultural heritage sites are unequally distributed across European regions leading to potential concerns for spatial equity. Without expressing judgement related to the positive or negative impacts of cultural tourism, we focus on the potential regional tourism attractiveness stemming from the endowment of tangible cultural heritage.

In this paper we test the hypothesis that, because of their unique and idiosyncratic nature, tangible cultural heritage sites in destination regions enhance international inward tourist flows. To do so, we estimate a Bayesian multilevel gravity model to identify the determinants of international tourist arrivals to European NUTS 2 regions. The aim of the paper is twofold: (i) we contribute to the debate about the relationship between destination endowments of tangible cultural heritage and tourist movements focusing on European destinations; and (ii) draw attention to the

heterogeneous appeal of different kinds of tangible cultural heritage. Since diverse measures of heritage carry different conceptual implications, we implement different proxies for the endowment of cultural heritage. To do so, we first use a bundle of quantitative measures provided by ESPON,[1] namely territorial density of monuments, cultural landscapes and museums. As these indicators are built using national and regional heritage lists, we investigate whether regionally or nationally defined cultural heritage acts as a tourist attractor. Second, we consider the regional endowment of UNESCO World Heritage Sites starting from the idea that these kinds of sites are able to engage international tourist acting as an appealing territorial resource for tourism.[2] This indicator of tangible heritage is more related to international visibility and promotion rather than to quantity and local relevance. Moreover, we test whether UNESCO World Heritage Sites represent a quality guarantee attracting tourists from further origins. In other words, whether tourists are more willing to travel longer distances to visit their destination if a UNESCO site is there. We therefore analyse whether UNESCO listings reduce the distance decay effect. Our main findings are that UNESCO World Heritage sites are an important determinant of attracting international tourists rather than nationally defined monuments, museums and cultural landscapes. We find that the regional presence of UNESCO World Heritage Sites correlates with an increase of 6,000 (one site) to about 60,000 (eight sites) in international tourist flows from each country in our dataset. Furthermore, we find that the presence of World Heritage Sites indeed flattens out the distance-decay curve, making regions endowed with these sites more appealing for tourists travelling from further away.

This paper contributes to the existing literature by proposing some original approaches to the research issue. First of all, the scope of the analysis is the whole European Union and, more specifically, its regions. It is common to find studies focusing on single countries and therefore able to include and consider the characteristics of the analysed country and the specific type of cultural heritage endowment (see, for instance, Faber & Gaubert, 2019; Yang, Lin, & Han, 2010). When instead multiple countries are included, the usual chosen territorial unit is the country (see, for instance, Arezki, Cherif, & Piotrowski, 2009; Culiuc, 2014). By enlarging the scope of the analysis to the entire European Union it is possible to detect if and how, on average, the relationship between the endowment of heritage and tourism attractiveness works in Europe identifying a general mechanism. Furthermore, by considering more disaggregated territorial units, as per our case the European regions, it is possible to take into consideration regional specificities which are not equally spread across the countries to which each region belongs. The second main contribution is the adoption of a Bayesan multilevel gravity model through which we are able to analyse both origin and destination-specific effects (representing multilateral resistance terms) and origin and destination-specific variables (e.g., destination endowment of tangible cultural heritage) overcoming some of the limitations associated with the traditional use of gravity models. Finally, distinct heritage-related indicators (measured by ESPON and UNESCO data) are included in the analysis and an indirect mechanism through which tangible forms of cultural heritage influence tourism flows is identified, namely through an interaction with the distance decay effect. Since measuring cultural heritage is a challenging and difficult task, by considering more than one heritage-related indicator it is possible to take into consideration different nuances and meanings grabbed by diverse indicators and, therefore, detect the consequences stemming from this variety and the differences in influencing tourism attractiveness exerted by different kind of cultural heritage. Finally, to the best of our knowledge, the potential ability of cultural heritage to mitigate the discouraging effect of distance on tourism willingness to travel has never been tested before.

The paper is structured as follows: Section2 briefly summarizes the literature related to the nexus between tangible heritage sites and tourist flows; Section 3 introduces the data and describes our multilevel gravity model focusing on both the different measures of tangible cultural heritage used in the analysis and the description of the model; model performance and the results will be presented and discussed in Section 4. The final section concludes.

[1]Or in full: ESPON EGTC and self-defined as an European Grouping on Territorial Cooperation focuses on building a pan-European knowledge base related to territorial dynamics.

[2]UNESCO stands for The United Nations Educational, Scientific and Cultural Organization and—citing directly from their website "seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity."

2 | TANGIBLE CULTURAL HERITAGE AND TOURISM

The relationship between cultural heritage and tourism has been extensively discussed within the academic literature and it has been studied from different perspectives and with different aims of the analyses. Several studies have explored the determinants of tourism demand in the attempt of modelling and forecasting it focusing on the attributes of tourist origins and destinations (see, for instance, Faber & Gaubert, 2019; Petit & Seetaram, 2018). Likewise, several other studies have investigated the determinants of tourists' choices based on micro data related to, for instance, socio-economic conditions of the traveller or psychographic characteristics (see, for instance, Brida & Scuderi, 2013; Marrocu, Paci, & Zara, 2015; Park, Woo, & Nicolau, 2019). In some cases, these two approaches have been combined simultaneously taking into consideration micro (personal characteristics of tourists) and macro (place-specific characteristics) determinants of tourism demand and participation (see, for instance, Bernini, Cracolici, & Nijkamp, 2017). The endowment of cultural heritage sites and cultural amenities has been considered as a relevant attribute to be included both when the analysis aims at investigating the determinants of tourists' decision-making process and when the focus is on modelling tourism demand. Competitiveness and attractiveness of destinations have also been evaluated using tourist happiness and satisfaction at destination which have been analysed in relation with the presence of historical or cultural sites (see, for instance, Bernini, Cerqua, & Pellegrini, 2020).

So far, the literature does not provide a clear consensus on the existence or direction of causality of the nexus between destination endowment of tangible cultural heritage and tourism attractiveness. This is partly due to the different aims of the contributions, the heterogeneity in the methods, and the multiplicity of measures adopted.

Notably, given the heterogeneity and place-based nature of material cultural heritage, several studies focus on individual countries or site-specific case studies which do not leave much space for generalizing the results. As a result, different quantitative approaches have been applied as well to shed light on this relationship ranging from panel regressions (Culiuc, 2014) to economic impact analysis (Campoy-Muñoz, Cardenete, & Delgado, 2016), spatial interaction models (McKercher, 2002; Patuelli, Mussoni, & Candela, 2013) and qualitative methods (Nuryanti, 1996).

A main concern regarding heritage-related empirical evidence is the problem of empirically operationalizing a multi-faceted element such as cultural heritage. Even narrowing the scope of the research to tangible forms of cultural heritage, different typologies or forms of culture can be included in this category leading to the inability to find a comprehensive measure allowing to consistently compare empirical results. In fact, different measures, corresponding to different typologies of tangible cultural heritage have been included in the empirical analysis by the literature intensifying the heterogeneity across studies. Among others, Di Lascio, Giannerini, Scorcu, and Candela (2011) include in their panel-data analysis a variable related to temporary art exhibitions; Cuccia and Cellini (2007) use museums and monuments attendance in their time-series analysis; Yang et al. (2010) add the number of cultural areas as classified according to Chinese regulation to their gravity model; Pompili, Pisati, and Lorenzini (2019) use a proxy for cultural importance together with the number of museums in their spatial Durbin model, and several studies use the UNESCO World Heritage Sites classification (Groizard & Santana-Gallego, 2018; Huang, Tsaur, & Yang, 2012; Ribaudo & Figini, 2016). Regarding the inclusion of UNESCO World Heritage Sites as a heritage-related variable a different interpretation of the results is needed: the focus is shifted from the pure endowment of cultural heritage to its internationally recognized outstanding value (subsequent to a spontaneous candidacy) and visibility or on the impact of the labelling procedure.

Irrespective of the measure used for tangible cultural heritage in the analyses, the results are mixed. For example, as found by Cellini and Cuccia (2013) a co-integrated relationship emerges between tourism and museums and monuments attendance in the Italian context and, especially in the long-run, the causality relationship goes from tourism arrivals to heritage attendance and not vice versa. Ribaudo and Figini (2016) show the absence of a clear empirically evident link between World Heritage Sites endowment and tourism attractiveness in Italy, highlighting a considerable diversity throughout different destinations within the same country. Both these studies, in agreement with Poria, Reichel, and Cohen (2010), confirm that the main tourism-related advantages gained through cultural

heritage endowment refer to the potential extension of tourists length of stay, destinations supply differentiation and tourism seasonality problem solution (Cuccia & Cellini, 2007). Huang et al. (2012) came up with similar results focusing on the Chinese case study of Macao arguing that the effect of World Heritage Site labelling in attracting tourists is minor in the long run. In contrast, Di Lascio et al. (2011) find that temporary art exhibitions in Italy, when continuous over time, play a positive role in attracting tourists; Massidda and Etzo (2012) show that local government support to cultural activities is a determinant of tourism growth; Pompili et al. (2019) find that museums and cultural importance are among the most important variables to attract tourist flows and expenditures; and, finally, Park and Jang (2014), Patuelli et al. (2013), VanBlarcom and Kayahan (2011), and Yang et al. (2010) focusing on World Heritage Sites role, all find a positive effect stemming from the presence of UNESCO World Heritage Sites (WHS) on tourism attractiveness.

Even though empirical results provided by the literature appear to be ambiguous, some connection between cultural heritage and tourism is undeniable and it carries relevant implications both for local economic development and heritage conservation and preservation. Citing from the OECD report on the impact of culture on tourism "culture has been increasingly employed as an aspect of the tourism product and destination imaging strategies, *and tourism has been integrated into cultural development strategies as means of supporting cultural heritage and cultural production. This synergy between tourism and culture is seen as one of the most important reasons for encouraging a more direct relationship between these two elements.*" (OECD, 2009, p. 20).

In short, and as highlighted by Noonan and Rizzo (2017), given the economic relevance of the culture-tourism nexus and the policy implications in terms of efficiency and effectiveness both related to tourism strategies and heritage conservation and preservation, more research is needed to shed empirical light on this relationship. However, special attention must be paid to the potentially dangerous downsides and consequences of mass tourism for both heritage conservation and local communities well-being. Citing from the OECD report on Tourism Trends and Policies 2020 "Continued [tourism] growth is causing pressure on infrastructure, the environment, local communities, other economic sectors, and wider society. When unchecked, this growth can lead to significant impacts on sensitive cultural heritage and environmental sites, as well as the day-to-day lives of residents, often resulting in negative perceptions or even resentment towards tourists and tourism more broadly" (OECD, 2020, p. 90). As highlighted in Pasquinelli and Trunfio (2020) three main issues have been identified since the 1970s related to overtourism, namely growing visitor numbers and temporal and spatial concentration; tourist behaviour which impacts destination quality of life; and changes to the physical environment (e.g., exploitation of natural resources, touristification). In more recent years, the displacement of residents from the urban residential areas caused by rental platforms has also emerged as a consequence of mass tourism. Undeniably, tourism carries potentialities and opportunities for destinations. However, neglecting to recognize the risks of overexploitation might neutralize the advantages leading to a "vicious cycle" especially if we are dealing with cultural tourism. As highlighted in Russo (2002, p. 168) "the quality of the experience enjoyed […] deteriorates with the physical stress imposed by tourism, with declining quality of environment where the act of consumption takes place, and with the quality of the auxiliary facilities". Several indications have been proposed to guarantee tourism sustainability, such as supporting evidence-based decision making, strengthening sustainability policies and partnerships, diversifying to sustainable products and services, creating and marketing alternative tourism products, improving infrastructures (OECD, 2020; Pasquinelli & Trunfio, 2020). Being aware of whether or not the endowment of tangible forms of cultural heritage is a relevant determinant of tourism attractiveness plays a fundamental role in the subsequent definition of policies and strategies aimed at plan and control both cultural tourism and conservation and valorization interventions.

3 | DATA AND MODEL DESCRIPTION

As shown by the literature reviewed, the impact of cultural heritage on tourism depend significantly on the aim of the contribution and the modelling approach. Our aim is to analyse the determinants of the aggregate number of

arrivals of international tourists in European NUTS 2 regions and to highlight the role of tangible heritage endowment. We show both the shape of tourism flows and the spatial distribution of the cultural heritage variables together with the description of the other used variables in subsection 3.1. Subsequently, we present our specific type of gravity modelling approach in subsection 3.2, where we specifically focus on the possible interaction between UNESCO World Heritage Sites and the distance decay pattern.

Before introducing a detailed description of the data used and the model adopted a clarification on the specific type of heritage we are analysing is due. Even though cultural tourism nowadays relates to a bundle of material (e.g., arts, architecture, historical buildings) but also intangible, intellectual and emotional traits of a community (e.g., culinary heritage, literature, music, lifestyles, beliefs, traditions), the main focus of the present work lies in tangible forms of heritage as a potential determinant of tourism attractiveness. This choice has been made for two main reasons. First of all, as argued by Richards (2018), cultural tourism does not represent a niche market anymore and it is expected to grow further in the years to come causing potential threats to the preservation state of material forms of heritage.[3] If an empirical validation of the attractive power of tangible heritage sites is given, a political choice needs to be made to avoid deterioration and devaluation of the sites. Furthermore, since tourism is a significant sector for European economies, highlighting the nexus between material cultural heritage and tourism represents a step forward in the direction of certifying its economic role and therefore justifying conservation and valorization investments. This is particularly relevant for tangible forms of heritage because of their mainly public and common essence. Given the typical traits of public goods, low levels of excludability and rivalry, tangible forms of heritage are owned by the collectivity and easily accessible by both the local community and tourists. Furthermore, tangible forms of heritage can be considered as territorial assets that need to be activated to generate their effects whatsoever. Intangible forms of heritage can instead be seen as either specific projects (e.g., festivals or events) or already alive type of heritage (e.g., values and traditions). In addition, following Cerisola (2019), intangible traits and meanings can be considered to be somehow encompassed by tangible sites that represent physical support of collective memory. Intangible forms of heritage or cultural environment, as argued by Capello and Perucca (2017), can as well be considered as "facilitators" of the mechanisms through which tangible heritage influences tourism and local economic growth. Certainly, considering tangible forms of heritage only is a partial analysis of the story. However, in addition to the previous mentioned statements, a still scarce empirical consensus on the relationship between material cultural heritage and tourism attractiveness justifies our choice. Furthermore, severe data limitation related to intangible heritage makes its empirical analysis a promising field for future research.

3.1 | Data

As highlighted in Culiuc (2014), research concerning international tourism suffers from scarcity of cross-country data. The main issues relate to missing recorded information (e.g., destination of outbound tourists), different interpretations of tourist arrivals (e.g., arrivals at the border or arrivals to hotels), non-consistent grouping of countries of origin or destination (e.g., "South and Central America" or "Other European countries"). Even though novel and original ways of collecting tourism-related data are growing (see, e.g., Preis, Botta, & Moat, 2020), it is still difficult to find comprehensive and consistent databases. Likewise, collecting and finding data on the endowment of cultural heritage, even when the considered type of heritage is restricted to the tangible one, is a rather complex task. As mentioned in Cicerchia (2019) the available European statistics come from different data collections which means that a specific univocal collection dedicated to cultural data is still missing. Citing from Cicerchia (2019, p. 107) "Other areas, instead remain uncovered: cultural diversity, cultural participation and, paradoxically, cultural heritage.

[3]Although at the time of finalizing this paper, tourism flows were substantially reduced because of the Corona-crisis, we see little reason for the past trends to continue after the Corona-crisis is over.

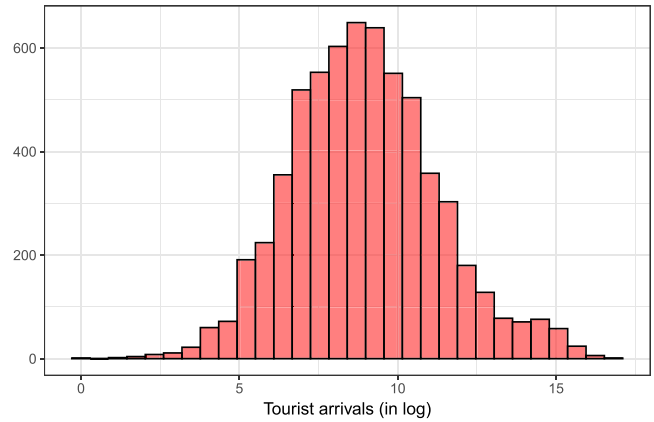

FIGURE 1 Histogram of size of tourist flows to European NUTS regions in 2017

Some are indeed difficult to measure with statistics. Others are not difficult, but still suffer from a negative political priority".

Targeting international tourism flows towards European regions, we built a database as consistent as possible trying to overcome some of the above-mentioned limitations by gathering data on tourist flows both from European national statistical offices and the Eurostat database. More specifically, we first collected data from Eurostat on the number of tourist arrivals (our dependent variable) to each European NUTS 2 region. These tourist flows are disaggregated by origin differentiating domestic, foreign and total tourists. Since we were interested in a finer disaggregation of the origins, we then contacted and collected data from each country's statistical office. Twenty European countries provide data on tourism arrivals to each NUTS 2 region disaggregated by European country of origin.[4] In order to build a database as consistent as possible, the total number of tourist arrivals towards each NUTS 2 region provided by each country's statistical office has been checked with the one provided by Eurostat. Whenever the number was slightly different, we kept the Eurostat value and we adjusted the number of tourist arrivals disaggregated by country of origin keeping their respective weights on the nationally provided total. Furthermore, in order to obtain a complete and consistent set of bilateral flows between European countries of origin and European regions of destination we estimated the number of arrivals to the regions for which the values were missing starting from the country level. First, we used the number of tourist arrivals to each European country disaggregated by country of origin provided by Eurostat to compute the weight corresponding to each origin over the total number of arrivals. Second, assuming that the weights of the origins are constant over the regions belonging to the same country, we calculated the number of tourist arrivals disaggregated by European country of origin and region of destination.[5] Altogether, we obtained a database with 7,557 origin–destination tourism flows terms of intra-European tourism arrivals for 2017.[6]

Figure 1 shows the distribution of tourist flows, here expressed in natural logarithms, in our database. The dependent variable is the number of arrivals at tourist accommodation establishments (including hotels, holiday and

[4]The data are available for the following countries: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Greece, Spain, Finland, Italy, Lithuania, Luxembourg, Latvia, Malta, the Netherlands, Poland, Portugal, Sweden, Slovenia and the United Kingdom.

[5]Note that the number of domestic tourist arrivals to each region is made available by Eurostat. We therefore used this information to compute the weight of domestic tourist arrivals over the total at the regional level. We adjusted the weights corresponding to the other European countries of origin (computed as previously explained using country level data) accordingly. To check the validity of our estimation strategy we applied the same method to the whole database. In other words, we obtained the estimation of the number of tourist arrivals from all European countries to all European regions. We then compared the estimated values with the available data provided by statistical offices. Between 0 and 4.5% of the values show a difference between the available and the estimated data, in percentage points, greater than 3.5%. The only exception is Portugal: 8.4% of the estimated values show a difference with the available ones greater than 3.5%.

[6]The total origin–destination tourism flows should be equal to 7,728 since we have 276 regions and 28 countries. We therefore have 171 missing values coming from the data gathered from national statistical offices. In fact, whenever the percentage of tourist arrivals coming from a specific European country is very low some of the national statistical offices do not report that country of origin in their disaggregation.

TABLE 1 Descriptive statistics of control variables

Name	Description	Source	Mean	Max
Distance	Distance in kilometres between European countries capitals and European regions centroids	GIS (own calculation)	1,480	9,498
Origin GDP *per capita*	Gross Domestic Product of origin countries *per capita* (Euro per inhabitant at current market prices)	Eurostat	29,528	93,622
Destination GDP *per capita*	Gross Domestic Product of destination regions *per capita* (Euro per inhabitant at current market prices)	Eurostat	31,257	66,153
Origin population	Population of origin countries (in million)	Eurostat	18.26	82.52
Destination population	Population of destination regions (in million)	Eurostat	1.85	12.15
Area	Area measured in square kilometres	Eurostat	161	45,227

short-stay accommodation, camping grounds, recreational vehicle parks and trailer parks) in 2017 by European NUTS 2 region. Data have been gathered both from Eurostat and national statistical offices. Tourist flows present a minimum value of 0, a maximum value of 20,066,591, and a mean and a median equal to 223,822 and 10,357, respectively.

As expected, tourist flows vary greatly across European destination regions presenting a standard deviation of 886,633 which is almost four times the sample mean. The mean is much higher than the median, indicating, as evident from Figure 1 as well, that the distribution of our dependent variable is remarkably right skewed with a long tail.[7] Moreover, tourist flows towards European NUTS 2 regions in 2017 range from a minimum of 0 to a maximum of 20 million showing great over-dispersion (unconditional on other variables).

Regarding the explanatory variables, our main interest lies in the destination endowment of tangible forms of heritage. However, other variables have been included to take into account the common attributes considered to be relevant determinants of tourism demand. In line with traditional gravity model, we adopt a measure of distance between origin and destination proxying geographical or physical but also intangible measures of distance, hypothesized to play a discouraging role on tourist flows (for a comprehensive overview of the role of distance in tourism flows see, for instance, Cafiso, Cellini, & Cuccia, 2018). The variable has been calculated as the distance between European countries centroids and each European NUTS 2 region centroid and measured in kilometres. Origin and destination populations have been included to account for the gravitational attraction forces between the two entities and origin and destination GDPs *per capita* appear as right-hand-side variables to control for economic conditions and wealth of countries and regions. Table 1 reports the control variables and the corresponding main descriptive statistics.

The main explanatory variables of interest are the ones related to destination endowment of tangible cultural heritage. We decided to include in the model different measures of heritage sites gathered from two sources: the European Spatial Planning Observation Network (ESPON) and the United Nations Educational, Scientific and Cultural Organization (UNESCO). More specifically, ESPON provides data related to the number of monuments, museums and cultural landscapes in each European NUTS 2 region[8] and UNESCO indicates the typology (cultural, natural and mixed), number and location of UNESCO World Heritage Sites, making possible to detect the number of UNESCO WHS per each NUTS 2 region. Following Cerisola (2019) we control for area size (i.e., we use the number

[7]The largest tourist flows are from France to Île de France corresponding to 20,066,591. The lowest number of tourist arrivals is 0 and corresponds to four countries of origins towards Ceuta and three countries of origin towards Melilla.

[8]Data referred to monuments, museums and cultural landscapes come from ESPON project 1.3.3 titled "The role and spatial fffects of cultural heritage and identity (2004–2006)."

TABLE 2 Descriptive statistics of cultural heritage related variables

Name	Description	Source	Mean	SD
Number of monuments per square kilometre	Includes tangible heritage assets included in national and regional lists (historical buildings, churches, mansions, sites, archeological remains, caves, etc.) weighted by stars received in TCI tourist guide	ESPON	0.836	1.783
Number of museums and galleries per square kilometre	Includes collections of movable tangible heritage and focuses on their "institutionalization" in a man-made exhibition space (museum or gallery) which also has value as a place for furthering, interpretation and dynamization of a specific cultural theme or identity of a place	ESPON	0.023	0.073
Number of cultural landscapes per square kilometre	Includes protected conjuncts and cultural landscapes (battlefields, parks and gardens, historical and walled cities, protected rural landscapes, etc.)	ESPON	0.071	0.424
Number of UNESCO Cultural World Heritage Sites	Cultural World Heritage Sites	UNESCO	1.3	1.5

of monuments, landscapes and museums per square km) to get an indicator of intensity of cultural heritage. For UNESCO World Heritage Sites, only cultural classified sites are considered, leaving natural and mixed sites out of the scope of this analysis.

Table 2 reports the definition of each heritage-related variable, the source and the main descriptive statistics. Our main interest lies in empirically testing whether European cultural heritage affects international tourist flows. In fact, synergies between culture and tourism are oftentimes taken for granted (Noonan & Rizzo, 2017). For instance, UNWTO reports that Europe, with its rich and diverse cultural heritage, is the most visited region attracting half of the total number of international tourist flows (World Tourism Organization, 2018a). As highlighted in the cultural heritage counts for Europe report, European regions possess unique identities, cultural heritage being both the result and the source, enabling the development of marketing strategies aimed at fostering cultural tourism (CHCfE, 2015). Citing from the UNWTO report on the tourism and culture synergies: "In recent decades, tourism and culture have become inextricably linked partly due to the increased interest in culture, particularly as a source of local identity in the face of globalization, the growth of tourism and easier accessibility of cultural assets and experiences. Furthermore, cultural tourism has been viewed as a desirable, 'good' form of tourism for nations and regions to develop, because it generates cultural, social and economic benefits" (World Tourism Organization, 2018b, p. 13).

When attempting to empirically test for the relationship between cultural heritage and tourist movements not focusing on specific case-studies or single countries, the choice of a suitable measure for heritage represents one of the main challenges. In fact, as reported by the ESPON project on the Role and Spatial Effects of Cultural Heritage and Identity, data collection is less advanced in the cultural domain rather than in other sectors. The main difficulties in collecting data arise from the multifaceted nature of cultural heritage itself and from the focus on conservation that sometimes shadows the necessity to collect "use" statistics. The lack of a consistent European database represents an additional problem.

Both categories of variables we included in the analysis carry different limitations and advantages but, more importantly, conceptual implications. Data related to regional supply of monuments,[9] museums[10] and landscapes[11] are collected from national and regional systems of listing resulting in inconsistencies across countries due to

[9]The minimum number of monuments per square kilometre corresponds to Cyprus and the maximum number corresponds to Berlin.

[10]The region Övre Norrland presents the lowest number of museums per square kilometre and Inner London-West presents the highest.

[11]Regions with no cultural landscapes are the following: Stuttgart, Karlsruhe, Unterfranken, Berlin, Hamburg, Gießen, Kassel, Weser-Ems, Saarland, Leipzig, Thüringen, Flevoland and Bucuresti-Ilfov. The region with the maximum number of cultural landscapes per square kilometer is Malta.

differences in the regulation related to cultural heritage treatment and diverse data availability. Using these measures, the heterogeneity in the endowment of cultural heritage across European regions could be due to differences in terms of definitions or listing regulations rather than to effective supply of tangible cultural heritage. To partially correct for this, within the context of ESPON project, data have been weighted and integrated with tourist guides or national websites. Figures 2a–2c represent the European regional supply of tangible cultural heritage, measured as number of monuments, cultural landscapes and museums per square kilometre, respectively.

The distribution of heritage highlighted in these maps might reflect both an effective difference in endowment of monuments, cultural landscapes and museums or a diverse approach to definition and recognition of tangible cultural heritage. This potential inconsistency issue, when used in tourism attractiveness analysis, might result in

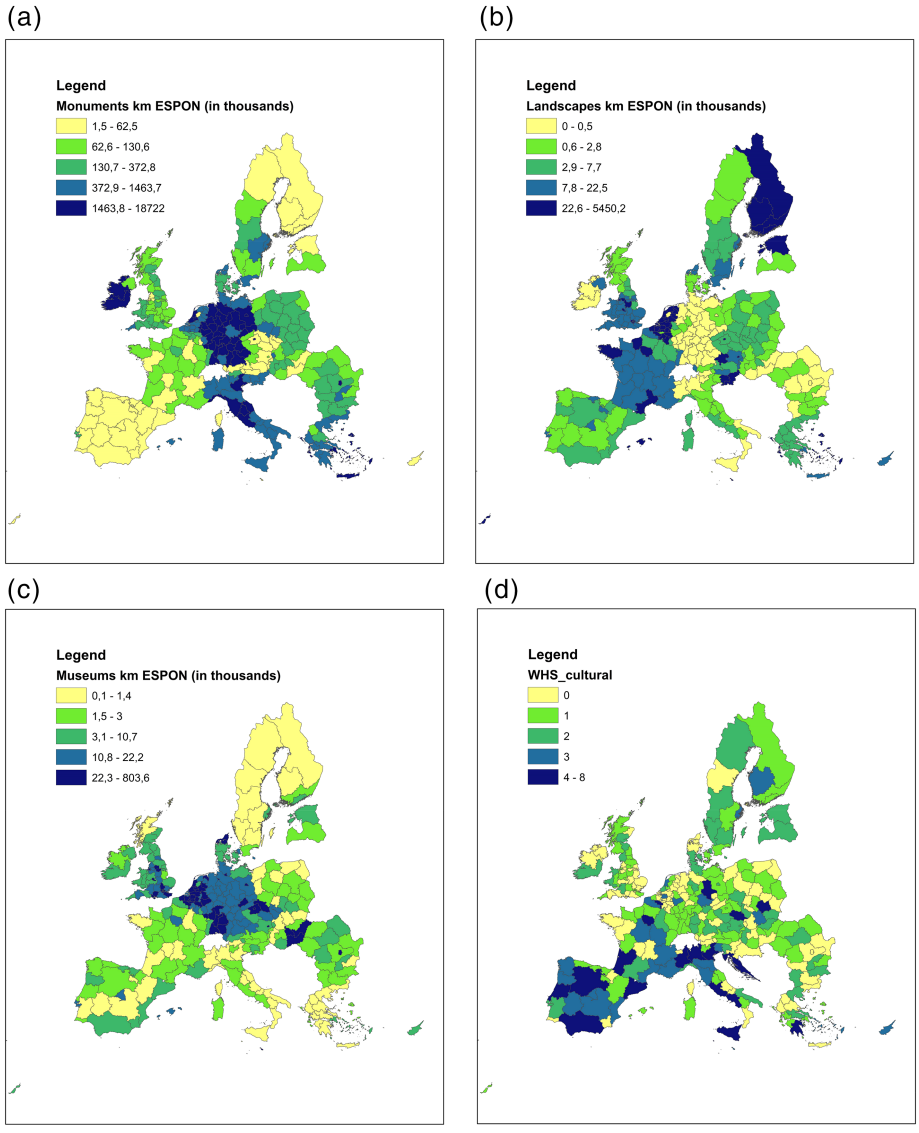

FIGURE 2 European regional distribution of cultural heritage: (a) Number of monuments per square kilometre (source: ESPON data); (b) Number of landscapes per square kilometre (source: ESPON data); (c) Number of museums per square kilometre (source: ESPON data); (d) Number of UNESCO World Heritage Sites source: UNESCO

differences in the interpretation of data and results. Adopting the supply of monuments, cultural landscapes and museums as a measure of tangible cultural heritage we are focusing on the quantity of sites present in a region and not on the quality or state of preservation or effectiveness of valorization strategies. Moreover, the number indicating regional quantitative endowment of tangible cultural heritage might be biased by either national or regional conception of heritage reflecting and resulting in different management strategies more or less able to attract international tourists.

If instead the number of sites inscribed in the UNESCO World Heritage List is considered, a homogeneous and consistent measure is included in the analysis. Figure 2d shows the distribution of UNESCO World Heritage Sites across European regions in 2017.[12] Every site listed by UNESCO must meet at least one out of 10 criteria reported in the Operational Guidelines for the Implementation of the World Heritage Convention (UNESCO World Heritage Centre, 2017) and respect the uniqueness, historical authenticity and integrity requirements. UNESCO World Heritage Sites are declared to be of outstanding value for humanity therefore deserving to be recognized and protected. Even though in this case the same definition and listing procedure is applied to all heritage sites, some issues related to the selection process have to be mentioned. As Bertacchini and Saccone (2012) argue, economic and institutional conditions of countries may influence their capability to submit a candidature for listing a heritage site and to influence the final decision through involvement in the World Heritage Committee. This might cause an over-representation of more influential or richer countries resulting in a non-representative database. Besides, as argued by Bertacchini, Liuzza, and Meskell (2017) the decision-making process can be influenced by political power and positioning of states leading to different capabilities of exerting their pressures on the final choice. Nevertheless, the number of UNESCO World Heritage sites has been widely used in the literature as a cultural heritage-related indicator and it represents the most homogeneous available heritage measure. When this measure is adopted, we need to be aware that, rather than measuring the overall endowment of tangible cultural heritage, we are considering the regional presence of one or more outstanding site. The high global relevance of this type of heritage is recognized and shared by the international community and not just by local or national communities. The international visibility of UNESCO World Heritage Sites is strong. Beyond acting as a potential territorial branding and marketing tool, the UNESCO World Heritage Site label might represent a quality guarantee for tourists, especially for those travelling longer distances and being less aware of cultural heritage in distant regions (for a comprehensive overview of the concept of place branding see Kavaratzis & Kalandides, 2015).

3.2 | A multilevel gravity model of tourism flows

To assess the impact of the destination endowment of tangible cultural heritage on tourist movements, we adopt a Bayesian multi-level gravity model. The gravity model itself grounds its theoretical fundamentals on the Newtonian gravity model first introduced in economics by Tinbergen (1962). It was originally applied by economists to explain and predict trade flows, but gravity equations have also been widely used to model tourist flows. Tourism has been considered by the literature as a form of trade in services and therefore justifying the application of the gravity model which, in its basic version, assume the following form:

$$T_{ij} = \frac{Y_i^{\alpha} Y_j^{\beta}}{d_{ij}^{\gamma}}, \tag{1}$$

where T_{ij} indicates tourism flows between origin i and destination j which are supposed to be directly proportional to origin and destination GDP's (Y)—when population flows are considered also population is oftentimes used to proxy

[12]Nineth five European NUTS 2 regions do not include a UNESCO World Heritage Site; three European regions have eight UNESCO World Heritage Sites.

mass—and inversely proportional to their geographic distance (d_{ij}). To estimate model (1), the gravity equation can be log-linearized leading to:

$$logT_{ij} = logK + \alpha \log(Y_i) + \beta \log(Y_j) - \gamma \log(d_{ij}) + \epsilon_{ij}, \quad (2)$$

which we can use to estimate *logK* (the constant), α, β, γ and ϵ.

The model is known for its good fit to data and its ability to explain and predict tourist movements (WTO, 2012). Furthermore, as highlighted in Yang, Xue, and Jones (2019), the basic gravity model allows the inclusion of both origin and destination-specific elements together with pair-wise origin–destination variables. Given the flexibility of the model, it is therefore possible to test theoretical hypotheses on multiple levels (origin, destination or bilateral level), by allowing for additional origin, destination or flow specific variables.

However, as shown by Anderson and van Wincoop (2003), the gravity model must take into account so-called multilateral resistance terms (MRT's), most of the time represented in the gravity equations by origin and destination specific effects which can be seen as unobserved time-invariant factors. Typically, these origin and destination effects are implemented by fixed effects, which control for all time in-varying origin and destination specific characteristics. However, if the interest of the research relies on the origin or destination-specific characteristics—such as, in our case, cultural endowments—the perfect collinearity of these variables with origin and destination-specific dummies precludes direct estimation of origin or destination-specific explanatory variables' partial effects on tourist flows (WTO, 2012).

Since our research interest is on the impact on movements of tourists of the destination endowment of cultural heritage which is a destination-specific variable that would drop out the model due to this perfect collinearity issue, we need to adopt a different strategy to overcome the limits of the traditional gravity model and estimate the effects of a cultural heritage-related variable on tourist flows. To do so, we estimate a Bayesian multilevel gravity model with partial pooling that is able to include both origin and destination-specific effects (representing multilateral resistance terms) and origin and destination-specific variables (e.g., destination endowment of tangible cultural heritage). To estimate the parameters, we adopt an approach in which origin and destination-specific effects are drawn from, in our case, a normal distribution meaning that regional-specific effects are completely probabilistic. In addition to the inclusion of both origin and destination-specific effects and characteristics, another advantage of a multilevel gravity model with partial pooling is that it fits better out-of-sample than fixed effects (as we will show below), which is a large advantage for predictions and counterfactuals.

As mentioned before, the multiplicative nature of the gravity model allows us to render it linear in the parameters through a log-linearization. As highlighted in Silva and Tenreyro (2006) this log-linearization in the presence of heteroscedasticity results in estimation problems. To take into account this issue and given the fact that the tourist flows are non-negative integers, we use a Poisson-type model for the dependent variable. However, Poisson-distributed data present the so-called equidispersion property, that is, equality of mean and variance of the dependent variable which is violated in our case since the variance largely exceeds the mean. Therefore, a negative binomial model or gamma-Poisson model is used to account for over-dispersion. The same type of model has been applied in the migration literature (see, e.g., Congdon, 2010; de Graaff, 2019; Ranjan & Tobias, 2007).[13]

The model we estimate rests mainly on three assumptions. The first main assumption is that tourism flows *T* from origin *i* to destination *j* (T_{ij}) are negatively binomially distributed with two parameters; λ_{ij} being the expected amount (rate) of tourists and a parametre τ controlling for heterogeneity. Usually, the expected amount of tourists is

[13]Recently, the usage of negative binomial models received some criticism. One part of the criticism concerned the sensitivity of the estimates for the scaling of the dependent variable (Head & Mayer, 2014), a concern perhaps less applicable for our application. A second concern, however, is that negative binomial models do not automatically impose origin and destination restrictions (all estimated flow originating from a region should add up to total observed flows coming out of that region; likewise for flows going in a region). Poisson models do, but because of the restrictions, estimation is more cumbersome and out-of-sample performance is inferior to that of the negative binomial. In this stage we are not interested in totals of origin and destination and therefore opt for the better performing negative binomial model.

modelled using logarithms and therefore effectively transforming it to a rate instead of a level. In other words, λ_{ij} is given a logarithmic link, which bring us back to the original gravity specification. And it is log (λ_{ij}) that we are interested in and that we would like to explain by, among others, cultural endowment variables.

The second main assumption of our model is that, instead of fixed effects we adopt varying effects to allow for inclusion of origin and destination specific variables and for better out-of-sample performance. This entails that in our estimation procedure we draw origin and destination specific effects from a, in this case, normal distribution as follows: $oi \sim N(0, \sigma_o)$ and $di \sim N(0, \sigma_d)$ where σ_o and σ_d govern the heterogeneity in the origin and destination specific effects, respectively. If σ_o and σ_d converge to 0, then there is no heterogeneity and we have a case of perfect pooling (no difference between regions). If σ_o and σ_d converge to infinity (become relatively very large) there is a large amount of heterogeneity and regions are very different from each other, leading to the case of fixed effects. When σ_o and σ_d are in between, then we have the case of partial pooling. Here, there is a moderate amount of heterogeneity among regions, indicating that many regions behave similarly in expected base levels of tourism rates. When data exhibits partial pooling, varying effects models outperform fixed effects models in terms of out-of-sample prediction as varying effects models use less (often far less) effective parameters, reducing the probability of overfitting (McElreath, 2016). A potential disadvantage of using varying effects or partial pooling models is that it may introduce additional bias in the model, because the additional random term might correlate with the other explanatory variable. A solution to this concern is to introduce means of the explanatory variables (this solution is similar to the correction of Mundlak, 1978, and is further discussed by Bafumi & Gelman, 2006.)

A third main assumption of our model is the specific treatment of the number of UNESCO World Heritage Sites in our model: namely, these run from 0 to 8. Treating them as a continuous variable would indicate that two UNESCO World Heritage Sites would have twice the impact as one UNESCO World Heritage Site, but given the idiosyncratic nature linearity in the impact of the number of UNESCO World Heritage Sites is highly unlikely. An alternative would be to treat the number as a factor. However, this misses the (assumed) restriction one might assume that two UNESCO World Heritage Sites should have a larger (in absolute sense) impact than one site. We therefore model the number of UNESCO World Heritage Sites as an ordered variable, where 0 sites is the minimum impact, 8 the highest (again in absolute sense) and all numbers in between constitute shares of the total impact.

Consistent with these assumptions, our model is finally applied to the three model specifications displayed below in which the dependent variable—being the number of tourist arrivals—is always modelled as:

$$\text{Tourists}_{ij} \sim \text{Negative Binomial}\left(\lambda_{ij}, \tau\right), \tag{3}$$

and where the rate (λ_{ij}) always follows a log-link (has a logarithmic specification).

1. European regional endowment of tangible cultural heritage is able to attract international tourist flows. Heritage endowment is proxied by the territorial density of monuments, cultural landscapes and museums and galleries therefore providing a quantitative measure. As this indicator is built using national and regional heritage lists, this specification investigates whether the quantity of material cultural heritage regionally defined and recognized acts as a tourist's attractor:

$$\begin{aligned}\log\left(\lambda_{ij}\right) = {} & \alpha + o_i + d_j + \beta_1 \log(\text{pop}_i) + \beta_2 \log\left(\text{pop}_j\right) + \\ & \beta_3 \log(\text{GDP}_i) + \beta_4 \log(\text{GDP}_j) + \beta_5 \log\left(\text{area}_j\right) + \beta_6 \log\left(\text{dist}_{ij}\right) + \\ & \beta_7 \log\left(\text{monuments}_j\right) + \beta_8 \log\left(\text{cultural landscapes}_j\right) + \\ & \beta_9 \log\left(\text{museums}_j\right).\end{aligned} \tag{4}$$

2. European regional endowment of UNESCO World Heritage Sites (WHS) engages international tourists acting as an appealing territorial resource for tourism. This indicator of tangible heritage is more related to international visibility rather than on quantity and local relevance:

$$log(\lambda_{ij}) = \alpha + o_i + d_j + \beta_1 \log(pop_i) + \beta_2 \log(pop_j) + \beta_3 \log(GDP_i) + \beta_4 \log(GDP_j) + \beta_5 \log(area_j) + \beta_6 \log(dist_{ij}) + \beta_{10}(WHSj). \quad (5)$$

Note that we model WHS_j as the total impact of the maximum amount (in this case being 8) of UNESCO World Heritage Sites. We estimate the model such that 1 to 7

UNESCO World Heritage Sites constitute a cumulative share of the total effect.[14] This enforces that the impact of each additional UNESCO World Heritage Site is positive but that the difference in impacts between subsequent numbers are not the same. Thus, the impact of four UNESCO World Heritage Sites is not necessarily twice the impact of two UNESCO World Heritage Sites.

3. UNESCO World Heritage Sites (WHS) represent an internationally recognized label of quality guarantee attracting tourists from further origins. If a region is endowed with a World Heritage Site, tourists are more willing to travel longer distances to visit their destination. We therefore test the assumption that UNESCO listing is able to indirectly impact on tourist flows reducing the distance decay effect.

$$\log(\lambda_{ij}) = \alpha + o_i + d_j + \beta_1 \log(pop_i) + \beta_2 \log(pop_j) + \beta_3 \log(GDP_i) + \beta_4 \log(GDP_j) + \beta_5 \log(area_j) + \beta_6 \log(dist_{ij}) + \beta_{10}(WHS_j) + \beta_{11}(WHS_j \times \log(dist_{ij})). \quad (6)$$

The following section reports and discusses the results of the analysis.

4 | MODEL PERFORMANCE, RESULTS AND DISCUSSION

The models have been estimated using the No U-Turn Sampler (NUTS) in Stan. NUTS is a relatively recent developed Hamiltonian Monte Carlo (a specific form of Markov chain Monte Carlo simulation) method, able to draw samples efficiently from large Bayesian multilevel models (Hoffman & Gelman, 2014). Stan itself is a probabilistic programming language for specifying statistical models and provides full Bayesian inference for continuous-variable models (Carpenter et al., 2017). In particular, we use the interface via the statistical programming platform R (Stan Development Team, 2020) and the package brms (Bürkner, 2017). Given the relatively low number of observations and parameters, sampling of Model 1, Model 2 and Model 3 runs quite smoothly, and test-statistics show high ratios of efficient sampling.[15]

4.1 | Model performance

To illustrate the performance of a model with varying regional effects of both origin and destination, we first estimate the following two simple models (for comparison reasons as fixed effects models cannot incorporate regional specific variables):

[14]We implement this technically using a Dirichlet prior distribution, which enforces that the impact of 1–8 UNESCO World Heritage Sites are modelled as a probability distribution.

[15]To be precise, there are usually two indicators used to see whether sampling of the model is correct. First, the number of efficient number of samples, needed for the posterior distributions for the parameters, and the Gelman-Rubin convergence diagnostic, R^ (Gelman & Rubin, 1992). Ideally, the latter needs to be between 1 and 1.1 and as close to 1 as possible. All the R^'s of parameters presented are 1 or 1.01 based on 3 chains consisting of 5,000 iterations from which 2,000 are used for warm-up.

1. A fixed effects model with only a distance variable and an origin specific effect, μ_i, and destination specific effects, ν_j:

$$\log(\lambda_{ij}) = \mu_i + v_j - \gamma \log(d_{ij}) \tag{7}$$

2. A varying effects model with only origin and destination specific varying effects and a distance variable:

$$\log(\lambda_{ij}) = o_i + d_j - \gamma \log(d_{ij}) \tag{8}$$

To compute the out-of-sample performance we now compute the information criteria of both models—more specifically the widely applicable information criterion (WAIC) (McElreath, 2016).[16] The WAIC computes for each observation the out-of-sample deviance based on the (posterior) likelihood and the number of effective parameters used—as usual with information criteria, the lower the better the performance. For the models above we find for the first, fixed effects, model a WAIC of 129,281 and for the second, varying effects, model a WAIC of 128,854. As the difference is 417 with a standard error of 73 it is not difficult to see that the varying effects models should be preferred when it comes to out-of-sample performance.

Already looking ahead to our results section, with respect to Model 1, Model 2 and Model 3, we find that Model 3 outperforms the other models as the difference in WAIC between Model 3 and Model 1 is 66 (standard error is 24) and between Model 3 and Model 2 is 64 (standard error is 24).

4.2 | Results and discussion

The parameter estimates related to Model 1, Model 2 and Model 3 are reported in Table 3. Focusing on the results of Model 1 in Table 3 we argue that the sheer endowment of local tangible cultural heritage as defined by the ESPON data does not function as a main tourists' attractor. A higher number of monuments or museums and galleries does not result in larger tourist flows (the results point even at smaller tourist flows), being the estimated coefficient close to zero or negative. Only cultural landscapes have a small positive elasticity of 0.1 with respect to the number of international tourists. These results suggest that using these indicators for heritage sites we are mostly focusing on quantity without any reference to quality of sites, uniqueness, authenticity, state of conservation or international recognition and appealing. Therefore, our interpretation is that these typologies of heritage might be less known or meaningful for international tourists and more relevant for local communities.[17]

Considering the results displayed for Model 2 we instead notice a positive influence of the presence of UNESCO World Heritage Sites on tourist movements. The higher the number of UNESCO World Heritage Sites the more destinations become appealing for international tourists, given the estimated coefficient of 0.33 for regions that have eight UNESCO World Heritage Sites leading to an impact of almost 40% more international tourist arrivals. If we look at lower numbers of UNESCO World Heritage Sites, then we see that especially one to three sites contribute significantly to this effect. However, the marginal effects of numbers lower than eight sites are difficult to infer directly from the results. Therefore, Figure 3 depicts these for the average across all

[16]Although the WAIC is very often used, more recent packages implement the leaving-one-out cross- validation (LOO) criterion. As the WAIC is very insightful and intuitive and both types of information criteria point to the same conclusion, we only report WAIC results (LOO results can be presented upon request).

[17]As one referee remarked, there may be another explanation. Namely, if we look at the total length of stay instead of the total number of arrivals, then local cultural heritage might become important, as tourists who stay longer, might consume more locally defined or lesser known cultural heritage. We tested this hypothesis and our inference does not change based upon these new estimates. Again, all code and data for both these estimates can be readily extracted from the associated GitHub account.

TABLE 3 Results for Model 1, Model 2, Model 3 and Model 4

	Model 1		Model 2		Model 3		Model 4	
Parameter	**Mean**	**Std dev**	**Mean**	**Std dev**	**Mean**	**Std dev**	**Mean**	**Std dev**
Intercept (α)	3.28	2.30	8.18	2.31	8.51	2.30	6.43	2.30
$\log(pop_i)$ (β_1)	0.34	0.21	0.33	0.21	0.33	0.21	0.32	0.20
$\log(pop_j)$ (β_2)	0.44	0.17	0.09	0.17	0.13	0.17	0.00	0.15
$\log(GDP^{pc})$ (β_3) i	0.63	0.20	0.63	0.20	0.64	0.20	0.64	0.19
$\log(GDP^{pc})$ (β_4) j	0.51	0.14	0.36	0.13	0.31	0.13	0.71	0.12
$\log(area_j)$ (β_5)	0.01	0.07	−0.04	0.06	−0.03	0.06	0.04	0.05
$\log(dist_{ij})$ (β_6)	−2.12	0.02	−2.12	0.02	−2.20	0.03	−2.23	0.02
$\log(monuments_j)$ (β_7)	−0.05	0.05						
$\log(cult.\ landsc._j)$ (β_8)	0.12	0.04						
$\log(museums_j)$ (β_9)	−0.31	0.09						
WHS_j (β_{10})			0.33	0.07	−0.30	0.08	−0.42	0.11
$WHS_j \times \log(dist_{ij})$ (β_{11})					0.08	0.01	0.09	0.01
Cooling index (β_{12})							0.37	0.05
Coastal areas (β_{13})							0.54	0.12
No. of metrop. areas (β_{14})							−0.05	0.08
No. of WHS_j:								
1			0.22	0.08	0.09	0.08	0.08	0.06
2			0.17	0.09	0.06	0.06	0.05	0.04
3			0.17	0.10	0.25	0.15	0.39	0.14
4			0.08	0.07	0.16	0.12	0.12	0.09
5			0.09	0.08	0.13	0.11	0.11	0.09
6			0.15	0.11	0.13	0.11	0.11	0.09
7			0.12	0.10	0.17	0.13	0.14	0.11
No. of $WHS_j \times \log(dist_{ij})$:								
1					0.19	0.05	0.19	0.05
2					0.05	0.04	0.05	0.03
3					0.32	0.08	0.31	0.08
4					0.07	0.05	0.08	0.06
5					0.07	0.06	0.07	0.05
6					0.20	0.10	0.20	0.10
7					0.10	0.08	0.12	0.09
Model parameters:								
sd(orig.) (σ_{oi})	1.15	0.05	1.12	0.05	1.12	0.05	0.90	0.04
sd (dest.) (σ_{dj})	0.66	0.10	0.65	0.10	0.65	0.10	0.65	0.10
shape (τ)	1.56	0.03	1.56	0.03	1.58	0.03	1.58	0.03

Note: Parameters in bold represent effects whose 95% credible intervals do not include zero and are therefore viewed as statistically significantly different from zero.

regions (so, doing this for Paris or London would give a much higher impact). Clearly, the impact is very significant for all numbers of sites and ranges between 6,000 (for one site) and 60,000 (for eight sites)—that is for *each* regional inward tourist flow from an average origin country. We interpret that this positive effect is

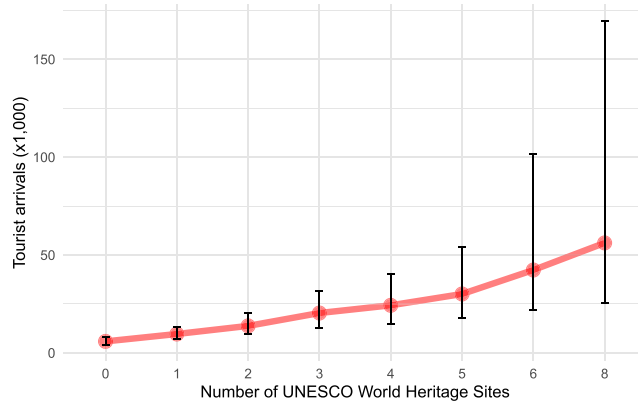

FIGURE 3 Marginal Effects of UNESCO World Heritage Sites on total amount of tourist arrivals (all other variables are fixed at mean values)
Source: own calculations

due to the internationally recognized relevance of UNESCO World Heritage Sites initiative. Since international tourists travel longer distances to reach their destinations, the certified and, in most cases, acknowledged values of UNESCO listed sites might result as being more appealing for international travellers. In any case, the international coverage of the initiative ensures large exposure to these sites. Results reported in Table 3 for Model 3 confirm our assumption that UNESCO World Heritage Sites indirectly impacts tourist flows by mitigating the negative effect of distance. In fact, the estimated parameter of the interaction term between geographic distance and number of UNESCO World Heritage Sites is positive leading to the conclusion that the distance-decay effects become weaker for regions with more World Heritage Sites. But, similarly to the results in Model 2, the marginal effect of one additional UNESCO World Heritage Site is difficult to assess. Therefore, Figure 4 shows the marginal effects of log (distance) for each number of UNESCO World Heritage Sites. Clearly, the higher the amount the 'flatter' the distance-decay curve.

Figure 5 maps out the estimated destination specific varying effects (d_j) obtained from Model 3. These destination specific varying effects denote the attractivity of a region for international tourists once controlled for GDP *per capita*, area, population, distance and number of UNESCO World Heritage Sites. To be an attractive region for international tourists, it seems that distance to the coast is very important (and especially the Mediterranean Coast), just as being in the southern part of Europe (or parts of Scandinavia or the Baltic states) and containing large (capital) cities.

To test these hypotheses, we expand Model 3 with three additional variables. First, we adopt an index for the number of warm days additional cooling is needed (*cooling*).[18] Second, we measure whether a region is adjacent to the coast (*coastal*). Finally, we count the number of metropolitan regions within a region (*metro)*, ranging from 0 to 4. Model 4 gives the updated specification and the result can be seen in Table 3.

$$\begin{aligned}\log(\lambda_{ij}) = {} & \alpha + o_i + d_j + \beta_1 \log(\text{pop}_i) + \beta_2 \log(\text{pop}_j) + \\ & \beta_3 \log(\text{GDP}_i) + \beta_4 \log(\text{GDP}_j) + \beta_5 \log(\text{area}_j) + \beta_6 \log(\text{dist}_{ij}) + \\ & \beta_{10}(\text{WHS}_j) + \beta_{11}((\text{WHS}_j) \times \log(\text{dist}_{ij})) + \\ & \beta_{12}(\text{cooling}_j) + \beta_{13}(\text{coastal}_j) + \beta_{14}(\text{metro}_j).\end{aligned} \tag{9}$$

The results are mostly in line with Figure 5. A standard deviation increase in the cooling index—so more warmer days— leads to a 53% increase of international tourist flows. Being adjacent to the coast leads to an increase of

[18]We use data from Eurostat's Energy Statistics where the index is defined as $\sum_i (T_i^m - 21^\circ C)/100$ if $T_i^m > 24^\circ C$, when T_i^m is the daily mean air temperature at day *i*. The number in the denominator is used for scaling and the index ranges from 0 to about 7, with standard deviation of 1.45.

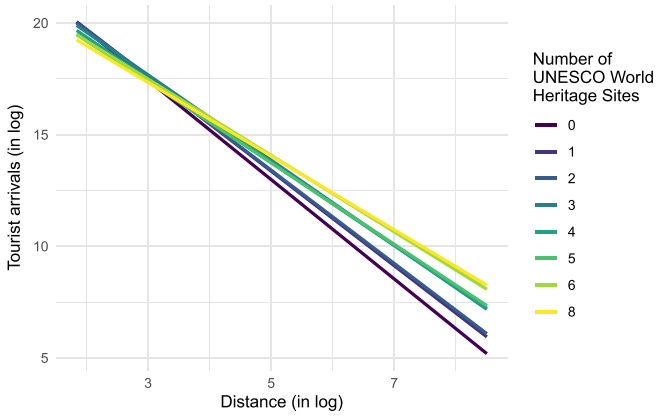

FIGURE 4 Distance effects on amount of tourist arrivals by amount of UNESCO World Heritage Sites (all other variables are fixed at mean values)
Source: own calculations

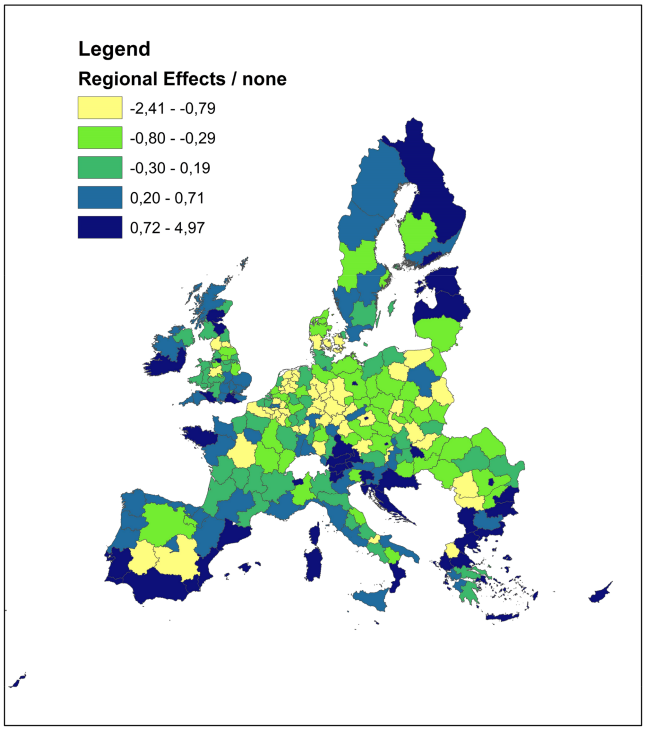

FIGURE 5 Destination specific varying effects
Source: own calculations

70% (= exp (0.54) − 1) international tourist flows. Only the number of metropolitan areas within a region does not seem to correlate with international tourist flows. Finally, the coefficients of the other included variables are mostly in line with the findings reported by the existing literature on gravity models applied to tourism. As expected, distance presents a negative impact on tourist arrivals. Albeit not always significantly different from zero, origin population and GDP *per capita* positively influence tourism flows and the same holds for destination population and GDP *per capita*. The larger the origin market size—proxied by population size—and the higher the wealth of origin countries—proxied by origin GDP *per capita*—the larger the outbound tourist flows. On the other hand, bigger and richer European regions attract more tourists. The size of the destination region, however, does not have an impact on the size of tourism flows.

5 | CONCLUSION

European regions are endowed with unique and irreplaceable cultural heritage. A strong link between cultural heritage and tourism is undeniable and widely recognized by national, international and supranational institutions. Nevertheless, a strong and conclusive empirical agreement on this nexus has not yet been found by the academic literature.

Focusing on material cultural heritage and its potential positive impact on European tourist flows, we applied a Bayesian multilevel gravity model to shed empirical light on this relationship. More specifically, we used two different typologies of tangible cultural heritage indicators as explanatory variables for tourist arrivals: the first comprises the destination supply of monuments, cultural landscapes and museums and galleries; the second includes the number of heritage sites listed as UNESCO cultural World Heritage Sites. The latter typology of tangible heritage appears to be the one able to attract international tourists towards European regions. UNESCO World Heritage Sites are internationally recognized for their outstanding universal value for humanity and therefore turn out to be more attractive for tourists because of their promoted and disclosed relevance and their international visibility. In contrast, material cultural heritage measured as the number of nationally classified monuments, cultural landscapes and museums and galleries does not appear to play a statistically significant role in international tourism attractiveness. This typology of tangible cultural heritage is not as well-known to international tourists as UNESCO World Heritage Sites and it is more related to national or regional approaches to cultural heritage and to local communities. It is not necessarily true that a regional heritage site is appealing for an international tourist. However, all the classified and protected cultural sites are relevant for local communities. Furthermore, UNESCO World Heritage Sites are more easily promoted and communicated internationally and therefore known by tourists coming from further origins. In fact, we showed that the presence of UNESCO World Heritage Sites influences inbound tourist flows also indirectly through its mitigating effect on distance decay. If a destination is endowed with UNESCO World Heritage Sites, the discouraging effect of distance is alleviated.

The results of this paper reveal that the sheer endowment of tangible forms of cultural heritage is not sufficient for attracting international tourists. The willingness to internationally promote the sites and to put in place valorization and communication strategies is an essential condition for cultural heritage to bring the expected consequences on tourism attractiveness. Our finding that only UNESCO cultural World Heritage Sites have an impact on the size of international tourist flows might lead to three main issues. First, because of the potential biases in the selection procedure (i.e., commitment and ability to propose a valid application and politicization of the selection process) an unequal distribution of these sites might favour some regions at the expense of others regardless of the actual endowment of valuable tangible heritage. Second, since cultural heritage labelled as a "superstar" exerts a magnetic role on tourists, the risks of congestion and discomfort for local communities as well as the risk of deterioration are actual and real. Furthermore, if the sites are affected by mass tourism their original authenticity might be undermined by a Disneyfication effect. Finally, the fact that the sheer locally defined endowment of tangible forms of heritage does not seem to be correlated to higher tourist flows does not mean that these sites should be neglected or abandoned. If a touristic vocation is desired by a region endowed with heritage then more attention should be paid to promotion, communication and valorization strategies. Otherwise, these typologies of heritage might be highly relevant for the local community and other transmission mechanisms to economic dynamics should be explored. Even though tourism represents a stimulus for regional economic development, other economic sectors might be influenced by the endowment of heritage (such as creative industries, conservation and renovation activities and real estate). Intangible elements might also be considered as derived from cultural heritage and able to influence local economy such as sense of belonging to a place or social connectivity.

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Resumen. El patrimonio cultural es un determinante potencialmente importante de las corrientes turísticas internacionales. Además de ser un enriquecimiento tanto para los individuos como para las comunidades y una oportunidad para el encuentro de diferentes culturas, el turismo también representa una industria importante para las economías europeas. En este artículo se investiga empíricamente el impacto de la dotación de patrimonio cultural tangible en el atractivo turístico de las regiones europeas. Se midieron las formas materiales del patrimonio cultural, en lo que respecta tanto a la densidad regional de los monumentos, paisajes culturales y museos definidos localmente, como al número de sitios culturales incluidos en el programa internacional de Lugares UNESCO Patrimonio de la Humanidad. Mediante el uso de un modelo bayesiano de gravedad multinivel se encontró que los Lugares UNESCO Patrimonio de la Humanidad están asociados con un aumento de entre 6.000 (para un sitio) a 60.000 (para ocho sitios) turistas internacionales de cada país europeo para una región europea media. Por otra parte, las formas tangibles de patrimonio definidas a nivel regional o nacional desempeñan un papel más limitado como factores de atracción para el turismo internacional. Además, se muestra que la presencia de sitios UNESCO reduce el efecto de decaimiento por distancia. Los turistas internacionales están dispuestos a viajar más lejos si un destino está dotado de Lugares UNESCO Patrimonio de la Humanidad.

抄録: 文化遺産は、国際観光客の移動の重要な決定要因となりうる。観光は、個人とコミュニティの両方を豊かにするもの、または異文化交流の機会であるばかりでなく、欧州経済の重要な産業でもある。本稿では、欧州の地域の観光地としての魅力に対する有形文化遺産の資源の影響を実証的に検討する。文化遺産の物質的形態を、地域的に定義されるモニュメント、文化的景観、博物館の密度およびUNESCO世界遺産の国際プログラムに登録されている文化遺産の数として測定する。階層ベイズ重力モデルによる分析から、UNESCOの文化世界遺産は、平均的な欧州地域に訪れる欧州各国からの国際観光客が6,000人(1つの目的地)から6万人(8つの目的地)に増加することに関連していることが分かった。一方で、地域または国が定義した有形遺産は、国際的な観光旅行の誘因として、かなり限定的な役割しか果たしていない。さらに、UNESCO世界遺産の存在が距離減衰効果を低減していることが示された。国際観光客は、目的地にUNESCO指定文化世界遺産があれば、長距離でも厭うことなく訪問している。