Land Use Policy 117 (2022) 106081

Contents lists available at ScienceDirect

Land Use Policy

journal homepage: www.elsevier.com/locate/landusepol

Controversial effects of tourism on economic growth: A spatial analysis on Italian provincial data

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ARTICLE INFO

JEL classification:
Z32
C31
P48
Q56

Keywords:
Tourism
Territorial pressure
Growth
Spatial analysis
Italian provinces

ABSTRACT

The aim of the paper is to estimate the contribution of tourism to per capita GDP growth taking into account the congestion that could arise from an excess of presences. The interaction of tourism with the territory is captured by a novel indicator of tourism pressure based on both the pre-existing congestion and the economic contribution the tourism sector provides to the resident population. Spatial analyses detecting interdependences across Italian data at NUTS3 level (2005–2018) reveal, as foreseeable, that tourism exerts beneficial effects on growth. However, the pressure indicator proves also the existence of nonlinear effects suggesting that an excess of tourism is detrimental for per capita income in the observed area and, due to the presence of spatial spillover, also in adjacent territories. Results provide the opportunity to reflect on the circumstance that tourism has an enormous potential in terms of growth effects, but it can be exploited until it comes into conflict with the needs of the resident population.

1. Introduction

The tourism sector plays a very important role in the world economy as shown by the results achieved before the collapse due to the COVID-19 pandemic. The whole travel and tourism sector, indeed, with a share of 10.3% of global GDP, registered annual growth rates far exceeding those of the world economy until 2019. It is therefore undeniable that tourism offers income and employment opportunities, fosters infrastructure investments and improves national balance of payments (Balaguer and Cantavella-Jordá, 2002; Durbarry, 2004; Dritsakis, 2012; Fahimi et al., 2018; Santamaria and Filis, 2019). This has been proven even more true for structurally weak and peripheral areas, where tourism demonstrated to provide jobs and income, attract capital and avoid outmigration more than other sectors (Sugiyarto et al., 2003).

Alongside these contributions, however, there is also evidence that an excessive growth of tourism can generate unfavourable results (Ehigiamusoe, 2020; Po and Huang, 2008; Albaladejo and González-Martínez, 2019). Among the detrimental effects of an out-of-control tourism expansion, the most acknowledged refers to the environmental degradation caused by an excessive exploitation of tourism resources (Apergis and Payne, 2012) or by a rise in energy use and human activities such as production, consumption, transport, urbanization and industrialization.

In this study, we concentrate on the economic results of tourism in an attempt to shed light on the relation between the expansion of the sector and economic growth accounting for the arising benefits as well as the detrimental effects. Tourism usually arises as a natural vocation in those territories which, rich in archaeological and natural endowments, want to preserve and enhance their heritage for present and future generations. Furthermore, tourism is a labour-intensive productive activity that contributes to the growth of per capita product in a more rapid and widespread way. It is neither an alternative nor a limit to the diffusion of production activities with a higher technological intensity but, if correctly managed, it can be a tool matching growth, development and well-being of local population (Scarlett, 2021). Therefore, it is important to understand to what extent tourism guarantees a positive contribution and when it starts conflicting with local development needs.

To this aim, we analyse the growth-tourism connection introducing a new indicator of tourism pressure that, in comparison to those most commonly used in the reference literature, allows at the same time the economic, social and physical impact of tourists' flows to be captured in a given geographical area. This indicator is obtained as the ratio between the number of presences and the inhabitants per square kilometre (see also Canale and De Siano, 2021). It detects the interaction between tourism and the territory, taking into account both the pre-existing congestion and the economic contribution of tourism to the

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https://doi.org/10.1016/j.landusepol.2022.106081
Received 25 May 2021; Received in revised form 15 February 2022; Accepted 4 March 2022
Available online 17 March 2022

population living in the geographical area under observation. It is, therefore, rather than a simple physical measure of congestion, an indicator capturing how tourism pressure interacts with the territory and enhances individual income growth (see below for a detailed explanation and for comparison with the standard indicators). The empirical analysis concentrates on Italian provinces from 2005 to 2018 with the aim of evaluating the economic performances and to what extent tourism expansion can eventually compromise them. Following the tourism-led growth hypothesis (Balaguer and Cantavella-Jordá, 2002, Scarlett, 2021) we build an empirical model to be estimated with two different empirical strategies: the first is a panel estimation approach accounting for spatial and temporal dependence across cross-sectional units; therefore capturing the general phenomenon without setting aside the close interconnection between Italian provinces. The second is a spatial panel specification that enables to evaluate specifically the role of the geographical interconnection and to measure the spillover effects across adjacent provinces. The rational of the latter approach relies on the presence of positive or negative spillover and spatial effects from neighbour tourism growth that can either benefit or damage local development thus modifying, from a tourism perspective, the attractiveness of a given destination (Yang and Wong, 2012). Despite the importance of this issue, studies detecting tourism spillover remain scarce and, in most cases, they focus on effects arising mainly from non-tourism factors such as conflicts, terrorism, natural disasters and so on (Drakos and Kutan, 2003; Gooroochurn and Hanley, 2005; Neumayer, 2004). We try to fill this gap by investigating whether the proximate growth of economies or changes in their growth influencing factors, as they have proved to be for tourism in recent decades, can have a significant role in determining the economic outcome in a given economy.

The main novel contribution of this paper relates to the indicator we use to evaluate tourism interaction with the territory. Existing measures refer to the "carrying capacity", as for presences divided either by the number of residents (tourism intensity) or by km^2 (tourism density), that, in our opinion fails to connect tourism inflows with economic outcomes. Furthermore, our indicator can be used as a broad measure to account for over-tourism and to be applied at a macroeconomic level without neglecting specific social, cultural and natural features of each territory.

The analysis shows, as expected, that tourism has a positive connection with growth. However, if positive effects are found when the indicator of tourism pressure is considered in its value at level, when considered in its squared value, the indicator reveals a negative impact on per capita GDP growth, thus signalling a non-linear effect of tourism congestion on economic growth (Scarlett, 2021). We can say that "not all that glistens is gold" as tourism can either favourably or adversely impact economic growth, which would suggest the involvement of all the stakeholders (tourism enterprises, resident population and visitors) in planning tourist services enabling socially efficient economic results to be achieved.

The paper is organized as follows: Section 2 provides information on the theoretical and empirical literature on the subject; Section 3 refers to the empirical investigation and is divided into three subsections: 3.1 describes the dataset, the rationale behind the proposed empirical investigation and the analytical and geographical details about the new proposed index for the sample of Italian provinces; 3.2 contains standard panel estimations in presence of cross-sectional dependence and a comparison with the results obtained with standard congestion indicators; Section 3.3 presents the spatial panel model and estimation results accounting specifically for spatial interdependences; finally, Section 4 draws conclusions and some policy implications.

2. Literature review on tourism contribution to growth and the spillover effects

The tourism-led growth hypothesis is widely shared among scholars (Balaguer and Cantavella-Jordá, 2002, Antonakakis et al., 2019). According to this strand of the literature, tourism contributes to income and employment through direct effects on individual incomes and indirect effects on the connected sectors (Durbarry, 2002, Apergis and Payne, 2012). It supports the balance of payments and, in some cases, it is one of the main sources of currency inflows to be invested in domestic physical capital (Balaguer and Cantavella-Jordá, 2002; Saleh et al., 2015). However, the precondition of these beneficial effects seems to be a low initial specialization level in the tourism sector (Po and Huang, 2008).

In evaluating tourism contribution to growth, the interaction with the territory and the eventual presence of congestion effects has very great importance as highlighted in the literature debate from Butler's (1980) seminal contribution connected to Kuznets Environmental Curve in Panayotou (1993) onwards. Unfavourable results might compromise tourism economic outcomes both in the short and in the long run (Alkhathlan and Javid, 2013; Mirza and Kanwal, 2017) because of an environmental spoilage affecting tourist destinations permanently and the well-being of resident populations. The effect of tourism on growth is sometimes detected as non-linear (Po and Huang, 2008; Scarlett, 2021), suggesting a positive connection until a certain threshold above which it turns into a negative one, namely a situation characterized by a prevalence of negative externalities (increased pollution, congestion, despoliation of natural environments, adverse socio-cultural impacts) which is usually acknowledged as "overtourism" (Peeters et al., 2018). Over-tourism is identified as a multidimensional phenomenon involving both the unmanageable increase of volumes and the consequences for resident population due to the reduction in usability of touristic attractions and increasing demand for daily life services (Jordan et al., 2018). Tourist destinations, although benefiting from tourism income, higher employment and tax revenue (Haralambopolous and Pizam, 1996) appear to suffer from disadvantages caused by uncontrolled arrivals, such as congestion, environmental degradation and noise pollution (Mason and Cheyne, 2000; Ehigiamusoe, 2020). The increase in low-cost airlines, cruise tourism and short-term holiday rentals as well as the proliferation of online booking platforms (Veiga et al., 2018; Postma and Schmuecker, 2017) and the diffusion of Airbnb, have in many cases led to an invasion of the residential space by tourists (Namberger et al., 2019). These criticalities strengthened the concerns not only for environmental issues, accessibility conditions and marketing, but also for the specificity of the destination (Weber et al., 2017; Goodwin, 2017). Cities, among all destinations, appear to be more vulnerable to this phenomenon because, in addition to the previous critical points, they already suffer from gentrification, rise in real estate prices and runaway privatization of public spaces (Milano, 2018).

A large part of the empirical literature has as framework of reference the one by Johnston and Tyrrell (2005) who present a theoretical model connecting local choices with economic results. The model, presented in this study, describes the presence of an inverted U-shaped relationship between the degradation of local environment and tourism economic results. This relation is connected with local preferences in search of an optimal solution. The authors show that a universal optimal choice, reconciling economic results with environmental effects, cannot be found and indeed their framework displays two solutions: the first according to the preferences of the local communities and the second to tourism firms preferences. The final outcome and the satisfaction of all stakeholders is determined by policy-makers' ability to take into account and adjust both the preferences of citizens and firms (Johnston and Tyrrell, 2005).

Nevertheless, despite tourism activities being strictly connected to territorial characteristics and geographical proximity being possibly crucial to inter-regional tourism flows, the previous empirical literature presents very few studies accounting for tourism spatial dependence across neighbouring destinations. Different factors, indeed, can favour the presence of spatial spillover across tourist destinations. First of all, the productivity spillover arising from labour migration, favouring the

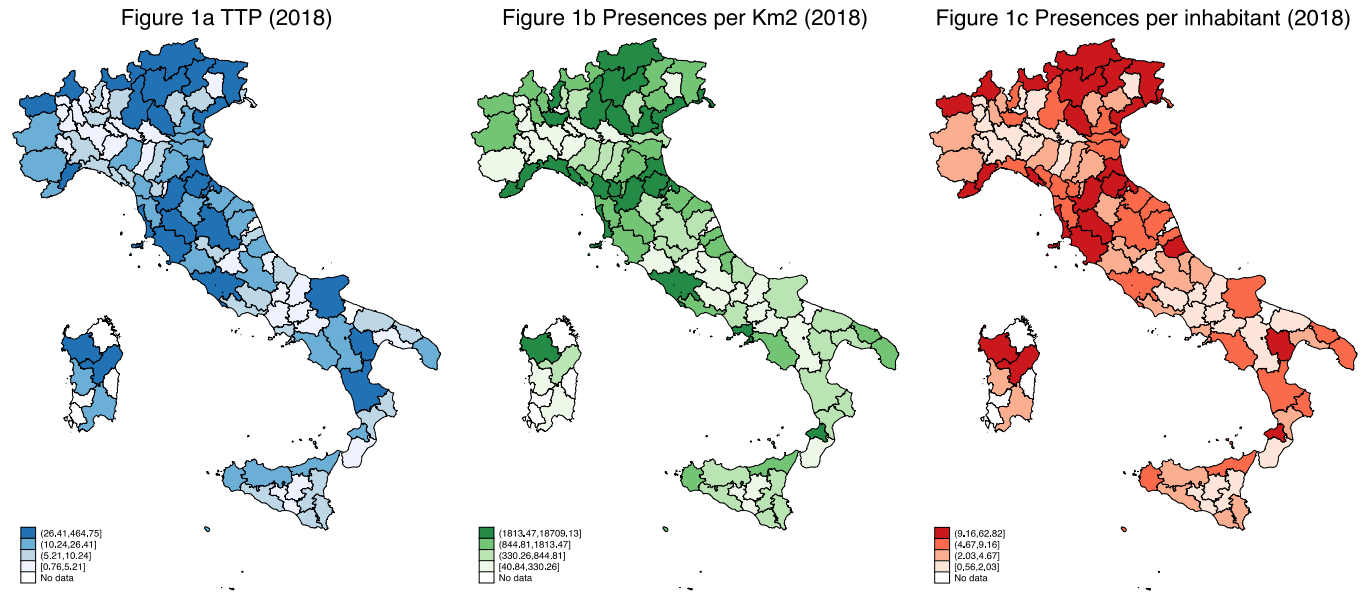

Fig. 1. The TTP index and the standard measure of congestion in Italian provinces (2018).

exchange of knowledge and skills (Gu et al., 2006; Yang and Wong, 2012), or competition effects bringing tourism enterprises to achieve competitive advantages through the successful use of innovation-based technologies and proficiencies. From a different perspective, the joint promotion undertaken by two or more destinations can generate positive spatial interdependences (Gooroochurn and Hanley, 2005) while negative events, such as conflicts, political turmoil, diseases or natural disasters, can cause negative spillover across neighbouring destinations (Drakos and Kutan, 2003; Neumayer, 2004; Sönmez and Graefe, 1998).

Among the previous studies attempting to estimate tourism spatial dependence, Romão (2015) finds positive spatial effects at the European regional level driven by tourism demand benefits in the neighbourhood of each region. Positive spillover, arising from tourism dynamics in neighbourhood of European regions, prevailing over potential negative effects related to the competition between destinations are shown in Romão et al. (2017). Positive spatial effects are found also by Ouchen and Montargot (2021) who, looking at a sample of countries around the world demonstrate that more cooperation and coordination in developing tourism policies can increase their overall tourism attractiveness of neighbouring destinations. The territorial impact of national tourism policies is investigated also by Kang et al. (2014) with reference to South Korea tourists' destinations. Yang and Fik (2014), instead, examined spatial spillover and spatial heterogeneity with the attempt to explain differences in tourism growth across a large sample of Chinese cities. Finally, inter-regional agglomeration effects in tourism are found by Majewska (2015) in Poland, through a set of exploratory spatial analysis tools, while Kim et al. (2021), using microeconomic panel data, find significant spatial spillover effects on agglomeration economies and productivity in the tourism industry across local authority districts in the UK.

The literature presents few studies specifically dealing with tourism spatial dependence in Italy. Marrocu and Paci (2013), analysing a set of 107 Italian provinces, had the merit of demonstrating the importance of spatial dependence across both origins of and destinations for trips, an issue that had been neglected in previous investigations. Lazzeretti and Capone (2009), instead, find positive spatial dependence in the long-period employment dynamics of the tourism industry across local production systems (LPSs). Patuelli et al. (2013) show that the presence of world heritage sites exerts a positive influence on internal tourism in the regions where these are located and negative effects in the surrounding regions, thus suggesting the presence of competitive effects at regional level. Di Matteo et al. (2018), similarly, by analysing the weight of digital endowment and the role of Information Communication Technology in the tourism industry at the provincial level, reveal the presence of a positive spatial autocorrelation in the domestic tourism demand function.

By contrast, Detotto et al. (2014), by means of a global autocorrelation test, namely Moran's I test applied to the DEA efficiency scores, do not find any spatial dependence in the productivity of the Italian hospitality sector (hotel and restaurants) at regional level.

Our investigation, in line with the recent empirical literature (Anselin, 2013) acknowledging the importance of spatial linkages when analysing the determinants of economic growth, proposes a spatial panel model with an attempt to verify the presence and evaluate the size of tourism spillover effects on the economic performances of adjacent provinces.

3. Empirical analysis

The aim of our investigation is to disentangle the role played by the tourism sector in the growth process at a disaggregated geographical level. The empirical analysis refers, in particular, to Italian provinces at NUTS3 level during 2005–2018. The reason for choosing this sample is the wealth of cultural and natural heritage sites of the country and of some provinces in particular, attracting millions of tourists from all over the world every year. In Italy, indeed, tourism is the third largest economic sector with a share of 13%. We expect our analysis to enable us to understand not only the controversial role played by one of the main driving sectors for economic growth but also the importance of interactions emerging across different geographical areas. Currently there are 110 Italian provinces, but some of them were established only in 2011. On the basis of data availability, we have built a balanced panel dataset including 103 provinces out of 110 provinces, with the exclusion of the most recent ones.

3.1. Data

The provincial economic performance, representing the dependent variable in our investigation, is measured by the per capita added value growth rate (PC_GR) while the impact of tourism flows is captured by two different covariates, international arrivals (INT_ARR) and a novel indicator of the tourism territorial pressure (TTP). The latter indicator is given by the ratio between thousands of presences (number of arrivals multiplied by the number nights) and the population density (popula-

Table 1
Summary statistics.

Variable*	Description	Mean	Std. Dev.	Min	Max
PC_GR	Per capita value-added growth rate	0.007	0.032	-0.188	0.207
INT_ARR	International arrivals	468,252	1,044,416	2969	7,645,856
TTP	Tourism territorial pressure: Presences dived by inhabitants per km^2	23.157	47.9062	0.577	464.753
RF	Change in registered firms as share of the value added	1.07e-08	7.76e-08	-2.10e-06	2.51e-07
EXT_COMP	Balassa index of external competitiveness	1.392	6.549	0.000	180.0897
RW	Recycled waste as share of total waste	39.499	20.542	1.727	87.853
LF	Labour force	238.180	268.171	31.47	2042.288
TD	Tourism density: Presences per km^2	1580.229	2609.5	37.40799	18,780.41
TI	Tourism intensity: Presences per inhabitants	7.4285	9.562537	.277757	62.81824

* Observations are 1442 for all the considered variables.

tion per square kilometre):

$$TTP = \frac{Presences}{Population \quad density}$$

This indicator is aimed at capturing the interaction of tourism with the territory of a given province taking into account how tourism flows affect the pre-existing congestion level and their contribution to the per capita income growth of residents. The advantage of this novel indicator is its capacity to detect the natural vocation of the territories, distinguishing between those relying on environmental "gifts", and therefore characterized by a lower population density, and those endowed with more cultural and archaeological resources provided by the intense past and present population settlements. This distinction defines also the attitude of residents to welcoming tourists and deriving income from directly and indirectly connected activities. Therefore, it can occur that – given the number of presences – an area with a low population density registers a lower territorial pressure with respect to one with a higher number of residents per square km (and vice versa). This is the result of a calculation strategy that, despite being technically simple, captures the complex phenomenon of interaction between tourism flows, the territory and its contribution to per capita growth.

Fig. 1, based on tourism flows in Italian provinces in 2018, provides a comparison between the TTP indicator (panel a) and the two most-used indicators of congestion: tourism density (presences per square km – panel b) and tourism intensity (presences per inhabitants – panel c). In each map, the darker colour refers to higher values of the corresponding indicator, and Italian provinces differ according to the values they present: 103 provinces out of 110 are coloured while the remaining 7, even if reported in their boundaries, remain white because of the lack of data. What emerges from this comparison is that, in some cases, the colour intensity for a given province changes from one indicator to another. For example, when referring to the TTP indicator (Fig. 1, panel a) the province of Bolzano, at the top right of the map close to the Alps, appears much more congested than that of Naples which overlooks the Tyrrhenian Sea and has tourist attractions known all over the world such as Capri, Pompeii etc. This difference is confirmed when comparing TTP with tourism density, while it disappears when observing the indicator of tourism intensity. The province of Naples, according to the TTP index and tourism intensity, indeed, seems to be less overburdened than Bolzano, although having a higher population density. The pressure difference between TTP and both the standard indicators of tourism remains unchanged, instead, when comparing Bolzano with Foggia, the province at the heel of the boot-shaped peninsula. The province of Venice (located in the gulf at the top of the Adriatic Sea), is one of the cases in which the colour intensity does not change with the indicator, it is always very dark thus revealing that increasing arrivals generate anyway higher costs. This evidence suggests that an indicator bringing together the links with the territory and those with the inhabitants and their need to receive higher income, could be useful to grasp better the complexity of the tourism phenomenon and its economic contribution. The TTP index, introduced at level as well as at square value to test the hypothesis of a non-linearity in the relationship between tourism and growth, should be able to capture the potential negative role of local congestion in the added-value growth rate analysis.

Furthermore, the map in panel (a) demonstrates that, from the perspective of a carrying capacity outcome, the TTP indicator reveals greater criticalities for a larger number of provinces and, finally, it highlights clusters of high, medium and low values suggesting the presence of an ongoing spatial interdependence across Italian provinces in terms of tourism pressure and congestion effects. Such evidence suggests the need to investigate the interactions across different economies more in depth by means of adequate, both descriptive and econometric, spatial tools. Spatial econometric techniques, indeed, allow us to account for growth interactions and tourism spatial spillover across geographical units (Chhetri et al., 2017) which, if neglected, would cause bias and inefficient parameter estimate results (Arbia, 2014).

The empirical model specifications used in our investigation connect per capita value-added growth with tourist arrivals and the TTP index. A set of control variables capturing other factors determining growth is included to obtain reliable estimate results. In detail, the controls are the following: the yearly change in registered firms weighted by the added value (*RF*) as a proxy of physical capital; the external competitiveness (*EXT_COMP*) measured, following the consolidated literature (Balassa, 1989), as the ratio between exports in dynamic sectors in percentage of the total exports of each single province and the same percentage for the whole country; social capital synthetized by the share of recycled waste on total waste (*RW*); labour force (*LF*) i.e. the number of employable people aged between 15 and 64. In addition, two dummy variables are considered: the first accounts for the 2008 financial and economic crisis (D_{2008}) and the second for the extraordinary development of low-cost tourism facilities recorded from about the year 2014 (D_{2014}). The list of control variables is not exhaustive, as the choice has been conditioned by the limited data availability at NUTS3 level. The whole dataset was retrieved from ISTAT (http://dati.istat.it/).

Table 1 provides synthetic information about the variables considered in the main model, together with tourism density (TD) and tourism intensity (TI) indexes included for robustness check.

The empirical investigation is implemented following two estimation strategies: a panel regression with fixed effect and a spatial panel regression. The first panel estimation accounts for the presence of a close interconnection across provinces, a circumstance that paves the way to the spatial empirical investigation strategy.

3.2. Standard panel estimation in the presence of cross-sectional dependence

The econometric analysis begins with the estimation of a linear relationship between the average value of per capita GDP growth and the variables capturing the complex phenomenon of tourism, together with a set of control variables. In investigating the properties of our data, after a first check with a simple fixed-effects or GMM (Arellano and Bond, 1991) panel specification, we found that they are affected by the presence of cross-sectional dependence. Pesaran CD test (Pesaran, 2004)

Table 2
Discroll-Kraay panel estimation results using TTP index or alternative tourism pressure indicators.

Explanatory variables	Dependent variable: per capita value added growth		
	(1) Main model	(2) Robustness check	(3)
INT_ARR	9.66e-09*(5.26e-09)	9.26e-09(5.89e-09)	1.08e-08* (6.49e-09)
TTP	0.000830*** (0.000261)		
TTP^2	-1.01e-06** (3.35e-07)		
TD		0.0030312** (0.0012544)	
TD^2		-0.0000179 (0.0000128)	
TI			9.17e-06* (4.04–06)
TI^2			-4.53e-10 (2.74e-10)
D_{2008}	-0.0318*** (0.00528)	-0.0268773** (0.0110819)	-0.0273** (0.0111)
D_{2014}	0.0173*** (0.00405)	0.0171085* (0.0087897)	0.0170* (0.0088)
RW	0.000319** (0.000127)	-0.0003204 (0.0002272)	0.0003(0.0002)
EXT_COMP	0.00600*** (0.000672)	0.0000435 (0.0000607)	0.00003 (0.0000)
RF	0.0219** (0.00907)	0.0088597 (0.0120711)	0.0108(0.0120)
LF	3.21e-05*(1.65e-05)	-1.54e-06 (0.0000288)	-4.76e-06 (0.0000)
Constant	-0.0205*(0.0117)	-0.01581**(0.0159)	-0.0064734 (0.0000)
Observations	1442	1442	1442
Number of groups	103	103	103

Note: ***, **, and * reject the null at 1%, 5% and 10% respectively: Standard errors are presented below the estimated coefficients. INT_ARR is international arrivals, TTP is the tourism territorial pressure, TD is tourism density, TI is tourism intensity, D_{2008} is the dummy variable at the year 2008, D_{2014} is the dummy variable at the year 2014; RW is the recycled waste as percentage of total waste; EXT_COMP is the external competitiveness; RF is the change in registered firms in percentage of total value added; LF is the total labour force.

rejects the null hypothesis of cross-sectional independence (83.395***) signalling a close interconnection across panel members that, if disregarded, would lead to misleading results. Therefore, we have chosen to apply the Driscoll and Kraay (1998) panel methodology to release consistent and efficient results in the presence of a heteroskedastic, autocorrelated and correlated across the error structure of panel members. It has the advantage of releasing consistent estimates in the presence of a close geographical interconnection such as that characterizing the Italian provinces. The empirical model is as follows:

$$AV\_PC\_GR_{i,t} = \alpha_1 INT\_ARR_{i,t} + \beta_1 TTP_{i,t} + \gamma_1 TTP^2_{i,t} + \zeta X_{i,t} + \mu_i + \varepsilon_{i,t} \quad (1)$$

All variables relate to province i ($i = 1,\ldots 103$) and year t ($t = 1,\ldots 14$), X indicates the whole set of control variables, μ_i the province-specific fixed effects and ε_{it} the error term.

The results presented in the first column of Table 2, under the header "Main Model", reveal that international arrivals exert a positive effect on the economic growth of Italian provinces (9.66e-09*). The coefficient for TTP at level indicates that the pressure of tourism on an area exerts a positive effect on growth (0.000830***) while, when considered in its square value, it indicates the presence of a non-linearity effect of tourism, implying that a larger number of arrivals proves detrimental to provincial growth (−1.01e-06**). This evidence shows that the relationship between the proposed indicator of tourist congestion and economic outcome is parabola-shaped: tourism contributes positively to growth up to a threshold beyond which the relationship starts decreasing, indicating that the relationship with the territory and with the per capita income of people living there will be jeopardized. These results can be comparable with those obtained by Po and Huang (2008), Scarlett (2021), or Zhang and Cheng (2019) who detect non-linearity effects. However, these studies, besides dealing with different samples, are focused on tourism itself rather than on an explicit measure of tourism congestion. Evidence for the remaining control variables is consistent with the empirical literature on growth. The positive estimate for the variable D_{2014} (0.0173***), capturing the impact of the extraordinary increase of tourism due to the implementation of accommodation facilities and low travelling costs on provincial growth rate, deserves to be noted.

As a robustness check, the same standard panel estimation strategy has been replicated using alternatively the tourism density and tourism intensity indexes as indicators of tourism pressure on the territory. The results presented in columns 3 and 4, respectively, show that tourism can have the same impact on economic growth when the indexes are considered at level. By contrast, when taken in their square values, these variables lose in terms of statistical significance, which implies that both tourism density and tourism intensity fail to capture the congestion effects. Furthermore, the robustness check estimations, when considered as a whole, seem to fail to explain growth as many independent variables lose their explanatory power.

The TTP index, by contrast, captures the macro-dimension of the phenomenon and, hence, seems to provide a wide picture of the overall effect of tourism on growth while accounting for the excessive pressure of increasing number of presences on the territory inside a general tourism-led growth model.

3.3. Spatial model estimation

The second step of our empirical investigation is to account specifically for the influence of a spatial interdependence across the growth dynamics of Italian provinces. The existence of spatial effects is suggested by the clusters based on different patterns of the tourism indicators shown in the three maps of Fig. 1. The presence of spatial autocorrelation between proximate provinces is investigated by employing a first-order contiguity matrix to define whether two provinces are neighbours. That is, for each pair of provinces, if they share a boundary will be defined as neighbours and the correspondent weight in the matrix is set equal to 1 and 0 otherwise.[1]

Following LeSage and Pace (2009), we start the spatial analysis of provincial growth pattern using the general Spatial Durbin model (SDM). This model specification has the advantage of including, in addition to growth determinants referred to the province itself, two other components: the spatially lagged dependent variable (growth rate in neighbouring provinces) and spatially lagged independent variables (growth determinants in neighbouring provinces). The first accounts for the endogenous interaction effects emerging when the growth in province i is influenced by growth in neighbouring province j (with $i \neq j$). The second refers to the exogenous interaction arising from growth determinants observed in neighbouring units. Moreover, the SDM allows accounting for direct and indirect effects of the explanatory variables within the province itself. Changes in the covariates, indeed, can directly affect income growth in the province (direct effect) and, in addition, income growth in surrounding provinces that, in turn, exerts an influence back to the province itself (indirect effects). The latter represents the spatial spillover arising between provinces. The combination of both direct and indirect effects provides the total impact of an explanatory variable on the dependent variable (LeSage and Pace, 2014; LeSage and Dominguez, 2012). The SDM panel specification for our growth model is as follows:

[1] Spatial weight matrix is standardized by row because each province can have a different number of neighbours.

Table 3
Spatial Durbin model estimation results for per capita added value growth in Italian provinces (2005–2018).

	SDM				
VARIABLES	X	W*X	Direct	Indirect	Total
INT_ARR	6.34e-09*	2.45e-08***	9.86e-09***	4.39e-08***	5.38e-08***
	3.25e-09	6.00e-09	3.56e-09	1.04e-08	1.27e-08
TTP	0.000195	0.000697*	0.000306	0.00129**	0.00160**
	0.000268	0.000365	0.000265	0.000597	0.000707
TTP^2	-1.46e-07	-1.28e-06*	-3.30e-07	-2.25e-06**	-2.58e-06**
	3.24e-07	6.68e-07	3.39e-07	1.12e-06	1.29e-06
D_2008	-0.0187***	0.00250	-0.0196***	-0.0092***	-0.0288***
	0.00268	0	0.00278	0.00202	0.00448
D_2014	-0.00101	0.00815	0.000188	0.0127***	0.0129***
	0.00193	0	0.00198	0.00131	0.00320
RW	0.000154	7.31e-05	0.000183**	0.000219	0.000401**
	0.000101	0.000132	9.21e-05	0.000179	0.000180
EXT_COMP	-3.54e-05	0.000179	-1.57e-05	0.000268*	0.000252*
	5.11e-05	0.000113	4.34e-05	0.000157	0.000147
RF	-760.5	35,099*	4149	56,779*	60,928*
	-8544	-19,775	-9134	-32,104	-35,808
LF	2.35e-05	-0.000168***	2.46e-06	-0.00025**	-0.000254**
	2.27e-05	6.40e-05	2.63e-05	0.000111	0.000125
ρ (Rho)	0.435***				
	0.0326				
Sigma2_	0.000691***				
	7.31e-05				
Observations	1442				
Provinces	103				
R-squared	0.1696				
Tests					
SDM vs SARChi2Prob>chi2	3.150.0759				
SDM vs SEMChi2Prob>chi2	243.920.0000				
SDM vs SACAIC (SDM)AIC (SAC)	-6317.204–6406.225				
Observations	1442	1442	1442	1442	1442
N. of groups	103	103	103	103	103

Note: ***, **, and * reject the null at 1%, 5% and 10% respectively: Standard errors are presented below the estimated coefficients. INT_ARR is international arrivals, TTP is the tourism territorial pressure, TD is tourism density, TI is tourism intensity, D2008 is the dummy variable at the year 2008, D2014 is the dummy variable at the year 2014; RW is the recycled waste as percentage of total waste; EXT_COMP is the external competitiveness; RF is the change in registered firms in percentage of total value added; LF is the total labour force.

$$PC\_GR_{i,t} = \rho WPC\_GR_{i,t} + \alpha_1 INT\_ARR_{i,t} + \beta_1 TTP_{i,t} + \gamma_1 TTP^2_{i,t} + \alpha_2 WINT\_ARR_{i,t} + \beta_2 WTTP_{i,t} + \gamma_2 WTTP^2_{i,t} + \zeta X_{i,t} + \theta WX_{i,t} + \mu_i + \varepsilon_{i,t} \quad (2)$$

where W is the spatial weight matrix, WPC_GR the spatial lagged dependent variable and ρ the spatial autoregressive coefficient capturing endogenous interactions. Exogenous interactions are accounted for through the explanatory variables multiplied by the spatial weight matrix, μ_i indicates province-specific fixed effects and, finally, ε_{it} the error term. In addition to the interest variables (international arrivals and TTP indicator), all the controls indicated by X are the same as in Eq. (1).

The estimation results for the SDM are presented in Table 3. Model selection test statistics, observable at the bottom of table,[2] reveal that the SDM is the most appropriate specification to detect spatial interdependencies of growth between neighbouring provinces. Interdependencies are driven not only by the growth patterns of neighbouring provinces, as they also pass through changes in explanatory variables observed in neighbouring provinces. As we applied a row normalization of the weight matrix, the spatial autoregressive coefficient $\rho = 0.435$ indicates the average percentage increase in a given province growth when its neighbours register a 1% growth rate.

Regarding the impact of changes in explanatory variables, LeSage and Pace (2009) demonstrate that in the presence of spatial dependence it makes no sense to look at the isolated effect of each variable's change as spillover effects should properly be taken into account as well. To this end, the last three columns in Table 3 presents the results for, respectively, direct, indirect (spillover) and total effects of each explanatory variable. International arrivals, because of the importance of the tourism sector in the country, cause a direct positive effect on the province where they take place and positive feedback from surrounding provinces which benefit from the growth of their neighbours. The same we find for the TTP indicator, suggesting that an initial increase in the tourism pressure can improve overall economic performance in the province itself and in the surrounding areas, thus favouring positive feedbacks. By contrast, further increases in territorial pressure, caused by over-tourism phenomena, exert direct detrimental effects on the province observed and additional negative feedback due to a worsening in the degree of attractiveness of the areas surrounding the congested province.

All other covariates show the expected effects, both direct and indirect, with the extent of impacts caused by a change in the number of registered firms that appears particularly large and noteworthy.

Finally, our findings show that spatial linkages arise also from growth determinants of neighbouring provinces. International arrivals and tourism pressure in neighbouring provinces, indeed, have a positive impact on the economic performance of a given province. This suggests the presence of positive externalities arising from tourists looking for accommodation in the neighbourhood of overcrowded destinations. By contrast, the congestion of tourism flows in proximate provinces, detected by the spatial lag of the square value of the TTP indicator, has a negative effect on the economic growth of a given province's.

[2] Log-likelihood ratio tests indicate whether the SDM can collapse to the spatial autoregressive (SAR), spatial error (SEM) or spatial autocorrelation (SAC) models and information criteria such as Akaike and BIC help us to identify the appropriate model specification.

4. Conclusions

This paper contributes to the literature about tourism-led growth confirming the existence of a positive connection. However, our findings show that this connection is non-linear as the congestion generated by the excess of presences can at some point be detrimental for economic outcomes. We implemented the investigation at the highest possible level of disaggregation compatible with the applicability of the results from a macroeconomic perspective. The results are consistent with those obtained in previous studies finding a non-linear effect of tourism on economic growth (Po and Huang, 2008; Scarlett, 2021; Zhang and Cheng, 2019). Differently, previous studies focused mainly on tourism itself and did not take into account explicitly the congestion issue. Besides, they drove conclusions by confronting several (advanced and developing) countries using data at the national level, thus, having a limited capacity of interpreting the special case of Italy, where – for example - the high number of inscriptions in the word heritage list at provincial level exerts an extraordinary power of attraction on international arrivals (Canale et al., 2019). Our investigation, implemented at NUTS3 level, while preserving the macro-perspective provided by the aggregate level of analysis, returns results that take into account the specific nature of each territory. Studies using a more detailed level of specification, such as those comparing cities, coastal zone or mountain areas (as the studies presented in Peeters, 2018), end up with empirical findings that cannot be considered as general cases useful to evaluate tourism congestion within a country as a whole.

The non-linearity effect of tourism on growth, captured by the proposed TTP index, suggests that an excessive level of specialization in tourism activities is detrimental for economic results, even when we consider the resident population that should gain in terms of higher earnings.

Furthermore, the study helps the understanding of spatial interaction in economic growth across Italian provinces and of the extent to which tourism can contribute to this spatial dependence. The novel tourism pressure indicator confirms tourism to be an enhancing sector and, moreover, disentangling the channels through which it influences each economy, we prove that the impact of tourism is strongly conditioned by a spatial interdependence. The increase of tourism pressure in a given province, indeed, proves to generate positive spillover as growth in nearby provinces can benefit from the attractiveness of the province observed. However, as the tourism develops into an overtourism status, which is captured by the square value of the tourism pressure indicator, the economic performance of the province no longer appears to be directly affected by this detrimental condition but, rather, its slowdown seems to be caused mainly by most proximate destinations suffering from this phenomenon.

The broad implications of our results are two-fold: the first – self-evident – relates to the conflict with the territory. The objective of sustained growth in the tourism sector should be pursued whilst reconciling the ability to produce income and ensure a good quality of life. Inappropriate and excessive exploitation of touristic resources and the potential conflict with inhabitants can compromise the enhancement of economic results. The second refers to the risks of an excess of specialization, namely an excess of tourism share on GDP. It distorts resources from more productive destinations that can grant a positive, lasting and stable contribution to economic growth. Economies highly relying on tourism are exposed to external shocks and, in the presence of a lack of resilience, have difficulties to recover their trajectories of employment and growth (as in the case of the 2008 financial crisis, Milio et al., 2014). This fragility has emerged even more dramatically in the present times of the Covid-19 pandemic.

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