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Territorial pressure and tourism contribution to GDP: The case of Italian regions

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Abstract

This article focuses on long-run co-movement between tourists' arrivals and per capita income with the aim of evaluating, through a macroeconomic perspective, whether its excessive increase can be detrimental to economic development. To this aim, GDP per capita in Italian NUTS2 regions is connected, through a dynamic panel cointegrating technique, to arrivals and to a measure of touristic congestion (tourism territorial pressure index). Results show that tourism contributes to the increase of per capita GDP. However, when accounting for the congestion effect, the relation appears to be nonlinear, revealing a detrimental effect on growth driven by an excessive tourism pressure on territories.

KEYWORDS
GDP per capita, panel cointegration, Italian regions, territorial pressure, tourism

1 | INTRODUCTION

Tourism direct, indirect, and induced impact accounts for 10.3% of the global GDP in the world (WTTC, 2020). In 2019, its growth rate was equal to 3.5% and, for the ninth consecutive year, far exceeding the performance showed by the overall world economy. Moreover, in the last 5 years, tourism contributed a 25% increase in new jobs to the overall level of world employment. The particular relevance in generating employment, especially for weak components within the labor force such as young people and women, led tourism to become one of the main issues in the recent policy strategies.

A large part of the empirical evidence in the literature confirms the presence of positive effects of tourism on economic growth mainly attributable to income and employment opportunities, investment in infrastructures, and improved balance of payments (Balaguer & Cantavella-Jordá, 2002; Dritsakis, 2012; Durbarry, 2004; Fahimi et al., 2018; Santamaria & Filis, 2019).

Alongside these contributions, however, there is also an evidence that an excessive growth of tourism may generate unfavorable results (Albaladejo & González-Martínez, 2019; Ehigiamusoe, 2020; Poa & Huang, 2008). Among the detrimental effects of tourism on growth, the most acknowledged refer to the environmental degradation caused by an excessive exploitation of tourism resources (Apergis & Payne, 2012) or by a rise in energy use and human activities such as production, consumption, transport, urbanization, and industrialization, all producing high carbon emissions (Alkhathlan & Javid, 2013; Mirza & Kanwal, 2017).

The issue of the negative effects of excess of tourism growth—the overtourism phenomenon—has been widely investigated from many perspectives. It involves economic, social, and environmental aspects and can be identified as the threshold above which tourism is not anymore beneficial for economic growth in a given territory (Jordan et al., 2018).

This threshold is not univocally identified as it depends on the carrying capacity and the specific features of each territory (Milano, 2018; Weber et al., 2017). Being a phenomenon that can be evaluated from a microeconomic perspective, the main difficulty is finding a comprehensive and univocal measure to perform investigations whose outcomes may be functional at aggregated level.

In search for a comprehensive perspective, this article adopts a macroeconomic point of view and, focusing on long-run co-movement between tourists' arrivals and GDP per capita growth, it aims at evaluating both the way tourism contributes to regional income in Italy, and whether its excessive increase can be detrimental to local economic development. The underlying idea is to combine studies related to tourism evolution and economic growth (since the seminal paper by Butler, 1980) with those investigating focusing on the connection between tourism expansion and environmental degradation (originated from the Kuznets, 1955, curve) to asses to what extent touristic sector may have positive effects on growth.

In order to capture the macroeconomic effect of overtourism, we chose to combine the pressure of tourism on the territory with the pre-existing pressure exerted by its inhabitants, with the intention of taking into account not only the quantitative, but also the qualitative aspects of the phenomenon. The most used macroeconomic indicators, namely tourism density—the ratio between tourists and the territory—and tourism intensity—the ratio between tourists and population—are unable to capture the contemporaneous macroeconomic interactions defining overtourism. Our indicator of "tourism territorial pressure (TTP)" obtained as the ratio between the number of arrivals and the inhabitants per square kilometer, compares the dimension of tourism with the congestion of the territory, therefore providing a new perspective from which examining overtourism. Regions may appear to be affected by overtourism even if their territory is very large (differently from the outcome of the tourism density index) or even if their inhabitants are few (differently from tourism intensity). This indicator represents a way to compare arrivals with a measure of the quality of life on the territory, a particularly useful tool to use in the policy making process in the region.

To reach the aim, the empirical investigation connects per capita GDP of 21 NUTS2 level territorial Italian entities (19 regions and 2 autonomous provinces) over the period 1995–2018 with two explanatory variables: touristic arrivals and the chosen measure of congestion, the TTP considered both in its level value and in its quadratic form to account for nonlinearity. It follows a special subset of dynamic panel data cointegrating techniques—the pooled mean group (PMG) estimator—allowing through the error correction (EC) form both the long-run relationship and the short-run speed of adjustment among the variables of interest to be measured within a single estimate. It is not a model that yearns for individuating the whole set of variables affecting per capita GDP. However, as the empirical technique delivers results considered to be consistent even in the presence of different dynamics of each panel member and despite the presence of a reduced number of explanatory variables, it aims at detecting a stable and long run connection between tourism, congestion, and income in Italian regions.

The main contribution of this article is therefore related to the use of an indicator of overtourism (the TTP index) that captures both the physical limit of the territory and the social, environmental, and economic interaction with the local population driven by the touristic fluxes. In addition, the length of the time span, from 1995 to 2018, enables to account for different positive and negative economic and social transformations Italy, as many other countries in Europe, went through, from the adoption of the euro to the more recent financial and economic crises.

The presence of an empirical connection between tourism, its pressure on the territory, and per capita GDP will detect results that can be considered to have a general validity. In fact, the PMG estimator is a cointegrating technique that enables the detection of a long-run and stable relationship among the variables even in the presence of cross-sectional dependence (caused by unobservable common shocks) and different adjustment dynamics in each geographical unit.

The results reveal, as expected, a positive relationship between tourist arrivals, the indicator of congestion, and per capita GDP in Italian regions when considering the index in its pure value, confirming the positive contribution of tourism to economic growth. By contrast, the relation turns negative when looking at the square value of the tourism pressure indicator, suggesting the presence of a nonlinear relationship between tourism and GDP or, in other words, that the overcrowding of tourists has detrimental effects on growth. This is a very general result whose policy implication is that a careful planning of arrivals, in line with the limits of capacity and the specificities of a destination, a reduction of seasonality and a diversification of the touristic product may help to better manage or avoid overcrowding's downsides.

We recognize that to individuate specific policy measures, the nature and the features of each territory should be examined (Peeters et al., 2018; Weber et al., 2017). However, a more detailed investigation at a more disaggregated level of tourist arrivals will not allow us to analyze a long period and will prevent examining the whole Italian territory where tourism is considered to be a never questioned instrument to sustain growth.

The rest of this article is organized as follows: Section 2 reviews the literature about the theoretical and empirical connection between tourism, growth, and the territorial pressure. Section 3 contains the empirical analysis and is divided into four subsections: Section 3.1 describes data, Section 3.2 presents methodology, Section 3.3 provides the results obtained, and Section 3.4 presents alternative methodologies for robustness check. Finally, Section 4 draws some conclusions and derives general policy implications.

2 | TOURISM AND GROWTH: A CONTROVERSIAL RELATIONSHIP

The tourism-growth nexus, when observed from a pure national accounts perspective, is considered unequivocally positive. Tourism is considered as a source of growth due to its contribution to exports. The inflow of currency, following the net increase of foreign demand, generates additional resources to be invested in domestic physical capital (Balaguer & Cantavella-Jordá, 2002). This relation appears to be robust even in the long-run and when considering other factors influencing growth such as investments in education, foreign direct investments, and fixed capital formation (Saleh et al., 2015).

However, especially in countries where it represents the main component of national GDP, tourism is considered to originate the phenomenon of Dutch disease. The excess development of tourism sector, through its effects on currency appreciation, reduces the country general competitiveness, squeezes the other sectors contribution to GDP, and gives rise to an unhealthy mix between the public and private sector (Capó et al., 2007). Poa and Huang (2008) find that the sign and the dimension of the connection between tourism and growth are highly dependent on the specialization level. By means of a threshold regression model, they show that an equal increase in tourism (expressed as the ratio between tourism receipts and GDP) has different effects on economic growth depending on the initial level of tourism specialization. Regimes with a low or a high specialization show, in fact, a significant positive effect, while countries with an intermediate level of specialization do not show any statistically significant effect. This may suggest the existence of a nonlinear tourism–growth nexus.

When observing the phenomenon from the perspective of its interaction with the territory, two streams of thought are detectable: the first one originated from the theoretical contribution by Butler (1980) on the evolution of tourist destinations, the so-called Tourism Area Life Cycle (TALC) approach; the second one deriving from the environmental Kuznets curve (Kuznets, 1955).

The well-known TALC model describes an S-shaped relation between tourist arrivals at a destination and time, suggesting that the congestion of the territory caused by overcrowding reduces tourism and compromises its contribution to economic growth in the future.

The Kuznets curve, on the other hand, connects the environmental degradation to per capita GDP growth, supposing a nonlinear relation between the two variables going from income to pollution. Johnston and Tyrrell (2005) extended this relation to the tourism sector and elaborated a theoretical model describing the presence of an inverted U-shaped relationship between environmental degradation caused by tourism and economic growth. The study strengthens the belief that, although benefiting from tourism income, higher employment, and tax revenue (Haralambopolous & Pizam, 1996), tourist destinations suffer from disadvantages caused by uncontrolled arrivals, such as congestion, environmental degradation, and noise (Mason & Cheyne, 2000). Ehigiamusoe (2020) examines the phenomenon from an empirical point of view and finds a nonlinear relationship between tourism and environmental degradation in African countries. Using cointegrating techniques, the author also found that tourism adversely moderates the impact of economic growth on environmental degradation.

The United Nations World Tourism Organization (UNWTO, 2017) recognizes that tourism can be an opportunity for the host country and its local communities. However, the general result depends on the ability of its policymakers, institutions, and stakeholders to create a sustainable model to manage the sector's growth. In fact, an uncontrolled increase of arrivals can compromise the sustainability of the tourism sector itself and, therefore, weaken its capacity to contribute to GDP in the future. The UNWTO labeled this phenomenon as "overtourism," that is, "the impact of tourism on a destination, or parts thereof, that excessively influences perceived quality of life of citizens and/or quality of visitors' experiences in a negative way" (UNWTO, 2018, p. 4). The emergence of this phenomenon in several touristic destinations has been recently explained by factors such as low-cost airlines, cruise tourism, and increasing short-term holiday rentals. The latter are driven by the proliferation of online booking platforms (Postma & Schmuecker, 2017; Veiga et al., 2018) and by the diffusion of the Airbnb, resulting into an invasion of the residential space (Namberger et al., 2019).

In order to account for the possible negative effects due to "overtourism," in the present article, the causality linkage between tourism and growth is enriched through the introduction of a measure of tourism pressure on the territory. In evaluating the tourism-growth nexus, we suppose it can be positive, but that it can turn to be negative when reaching an excessive dimension. In other words, despite agreeing with the positive relation between tourism and growth, we search for the presence of a congestion effect triggered by a massive presence of tourists on the territory that can be different according to the pre-existing pressures the local population may exert on the same territory.

We share the point of view of the literature about overtourism comprehensively examined in a recent report for the European Parliament's committee on Transport and Tourism (Peeters et al., 2018). Overtourism 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). These criticalities may concern environmental issues, accessibility conditions, marketing efforts as well as the nature of the specificity of the destination (Goodwin, 2017; Weber et al., 2017). Cities appear to be more vulnerable to this phenomenon as they, in addition to the previous critical points, suffer from gentrification, and rise in real estate prices and privatization of public spaces (Milano, 2018).

In search for a synthetic indicator to be used in econometric investigation, the empirical literature measures this congestion effect through the so-called "carrying capacity index." It is identified as the physical limit of the territory expressed in terms of square kilometers—namely, the tourism density (Albaladejo & González-Martínez, 2019) and/or the ratio between the number of tourists and the number of residents—tourism intensity (Butler, 1980; Petrosillo et al., 2006). Peeters et al. (2018), in order to give a more accurate and detailed picture of overtourism, suggest to refer also to two further indicators: the share of Airbnb bed capacity combined with information retrieved from booking.com. Moreover, the share of tourism in regional GDP together with travel intensity (arrivals by air, number of cruise ports) and the presence of UNESCO World Heritage Sites, represent important information to collect in order to evaluate the effective and potential overcrowding effect of incoming tourism. Particular attention should be devoted to indictors capturing social, economic, and physical factors (Diedrich & García-Buades, 2009).

Having in mind the multidimensional and territorial specific nature of the phenomenon of overtourism, we suggest the use an indicator taking into account both the physical limit of the territory and the

societal aspects of congestion. The indicator we refer to is equal to the ratio between thousand arrivals and the population per square kilometer, therefore an index with a more comprehensive meaning and multifaceted perspective of the phenomenon. As far as we know, the attempt to compare tourism with the congestion of the territory has never been previously suggested. According to this index, some regions may appear to be affected by overtourism even if their territory is very large (differently from the touristic density that measures the ratio between tourists and the territory), or even if their inhabitants are few (differently from the number of tourists per thousand inhabitants), since it compares tourism with the degree of existing congestion of the territory. Under this respect, the proposed index is able to capture—despite not explicitly—recent phenomena of overcrowding arising from new forms of accommodation and travel facilities.

Following Saleh et al. (2015), our empirical exercise focuses the analysis on long-run co-movements between tourists' arrivals and GDP per capita growth adding to the model the indicator of touristic pressure on the territory to test whether its excessive increase can be detrimental to regional economic development. The PMG estimator employed is a cointegrating technique that enables the detection of a long-run and stable relationship among the variables—confirmed by the "second generation" unit root and cointegration tests—even in the presence of different adjustment dynamics in each geographical unit. Compared to other cointegrating techniques, such as the fully modified ordinary least squares (FMOLS) and panel dynamic ordinary least squares (PDOLS, Saleh et al., 2015), the PMG estimator accounts for heterogeneity across panel members and cross sectional dependence. Furthermore, it accounts for the presence of the exogenous shocks (dummy variables) that occurred in the time span considered (the birth of the Eurozone or the financial crisis) and it is considered to be valid even in the presence of a reduced number of explanatory variables (Blackburne & Frank, 2007).

3 | EMPIRICAL ANALYSIS

3.1 | Data and descriptive analysis

Italy may be considered as an interesting context in detecting the impact of tourism sector activities on regional sustainable growth. Official data reveal that Italy is one of the most important touristic destinations in the world and therefore tourism achieves such dimensions that it makes this aspect of the national economy a worthwhile phenomenon to investigate. There is no doubt that Italian natural and environmental resources endowments, the presence of numerous cultural and archeological sites (Canale et al., 2019), the high quality of services together with historical, cultural, religious, and food/cooking attractions contribute to the Italian success in terms of international tourism demand. The Italian tourism sector exceeds the European average for both direct and induced contribution to GDP, with a share that exceeded 13% in 2017, and the number of employees, full and part-time, exceeding 23 million (15% of total employment).

The empirical analysis of this article focuses on 19 Italian regions (Abruzzo, Basilicata, Calabria, Campania, Emilia-Romagna, Friuli-Venezia Giulia, Latium, Liguria, Lombardy, Marche, Molise, Piedmont, Apulia, Sardinia, Sicily, Tuscany, Umbria, Aosta Valley, and Veneto) and 2 autonomous provinces (Trento and Bolzano), representing altogether the NUTS2 regional panel as acknowledged in the national and international official statistics. They represent a homogeneous sample, as they are all independent administrative units in which the Italian state is divided. The time span ranges from 1995 to 2018, therefore covering a period long enough for evaluating the controversial effects of tourist arrivals on Italian economic growth. The dependent variable in our empirical model is given by per capita regional GDP: the indicator accounts for the general macroeconomic condition of each geographical unit, making possible a comparison between units of different size. The empirical model includes three explanatory variables, all related to tourist arrivals. The first is the total number of annual arrivals (in thousands) in each geographical unit, regardless the type of accommodation; the second is the pressure of arrivals on the territory and the resident population, the TTP; the third is the square of TTP, enabling to account for the presence of nonlinear effects arising from overtourism. Usually, in the empirical standard literature, the phenomenon of tourism congestion is measured through tourism density—the ratio between the number of arrivals and the population in each territorial unit (Albaladejo & González-Martínez, 2019), or tourism intensity—the ratio between the number of tourists and the number of residents (Butler, 1980; Petrosillo et al., 2006). In our analysis, in order to account for the true pressure of tourism on each panel member (region/province), we have built the TTP index by dividing the number of thousand arrivals in each region by the population per square kilometer. The scope of this choice gives the indicator a wider meaning, including social, economic, and physical aspects of an increasing inflow of tourists (Diedrich & García-Buades, 2009) and provides a more effective measure of the territorial congestion, through the combined consideration of both the dimension of the territory and the number of people living there.

Figure 1 presents a map at 2018—the last observation available—of Italian territorial units under consideration in the empirical analysis. The color intensity describes how the TTP index behaves in each region/province. Veneto, Tuscany, Emilia-Romagna, and the two autonomous provinces of Trento and Bolzano are the most affected. Lombardy, Piedmont, Aosta Valley, Lazio, and Sardinia stand at a lower level of congestion. It appears surprising that Southern regions suffer less from overtourism, as Campania, Basilicata, and Calabria, together with some Centre areas (Marche, Molise, Abruzzo) show a lower intensity colored territory. At an intermediate position are the very famous destinations of Sicily, Apulia, and Liguria. Despite the figure depicts the phenomenon of overtourism at an high level of aggregation, without the ability to distinguish local differences, it contributes to have a straightforward image the interaction between local population and the phenomenon of overtourism.

The TTP indicator time dynamics over the period 1995–2018 in each Italian territorial unit is described in Figure 2.

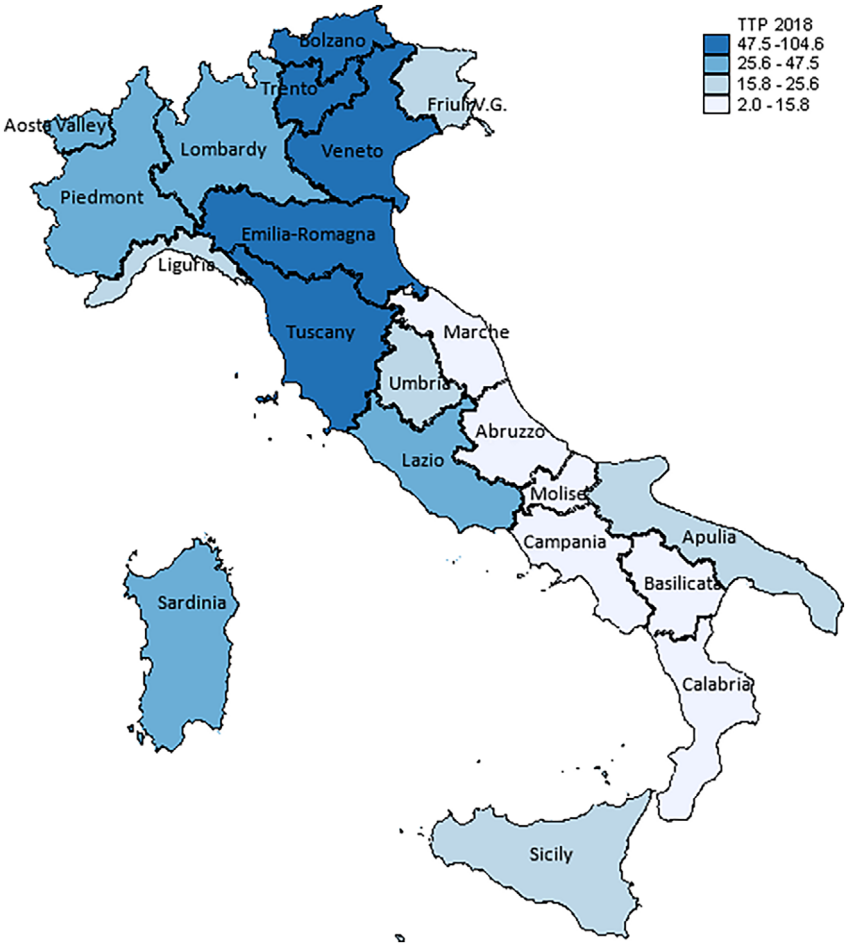

FIGURE 1 Italian NUTS2 regions and TTP index (2018)
Source: Authors' elaboration on ISTAT data

The TTP index shows an overall increase for all Italian regions, with the only exception being Molise. The extraordinary increase in tourist flows contributed to transform the phenomenon into mass-tourism. Figure 2 also shows significant differences between territories, given by different timings of growth accelerations, sudden stops or declines, which can be attributable to different idiosyncratic socio-economic events or natural shocks. This is the case of Expo 2015 for Lombardy and the choice of Matera as European capital of culture for Basilicata, to mention some of the beneficial factors, or natural disasters caused by strong seismic phenomena, as in the case of the regions in central Italy, like Abruzzo, Molise, Umbria, and Marche. Some regions, such as Liguria, Valle d'Aosta (these two bordering France), Emilia Romagna, Sardinia, Lazio, Calabria, and Campania from about 2014, and after a decline registered in previous years, experienced a rapid increase in the TTP index due to a switch in local policy choices and a more favorable context with respect to other countries affected by severe terrorist attacks.

The whole data set has been retrieved from the Italian Statistical National Institute (ISTAT) and Eurostat.

The empirical strategy adopted in this article allows the estimation of the connection between per capita GDP, touristic arrivals and the touristic territorial congestion in the long-run. The investigation of GDP determinants is beyond our objectives, as we are more interested in testing for the presence of a stable relationship over time between the variables in order to define the boundaries inside which tourism can have positive effects on regional income. The econometric strategy used in this study is not a model that investigates on growth determinants, but rather enables an evaluation of a long run stable connection between the variables of interest (Blackburne & Frank, 2007).

3.2 | Methodology

The econometric technique applied to investigate the relationship between tourism growth and per capita GDP is the PMG estimator. This procedure relies on the existence of a long-run relationship among the variables and on the model convergence toward an equilibrium value. This is due to the error correction form of the model (ECM) that estimates separately the coefficients of the variables in a dynamic form with lagged values (long run) and those of the dynamics of the adjustment process (short run). Furthermore, the ECM provides a measure of the speed of adjustment that, if negative and lower than one, indicates that there is a short-run dynamic of adjustment toward a long-run equilibrium value. The advantages of using the PMG are, first, that it is considered to be consistent for estimating dynamic panels even in the presence of endogeneity issues in which variables are nonstationary, and, second, that the short-run parameters are

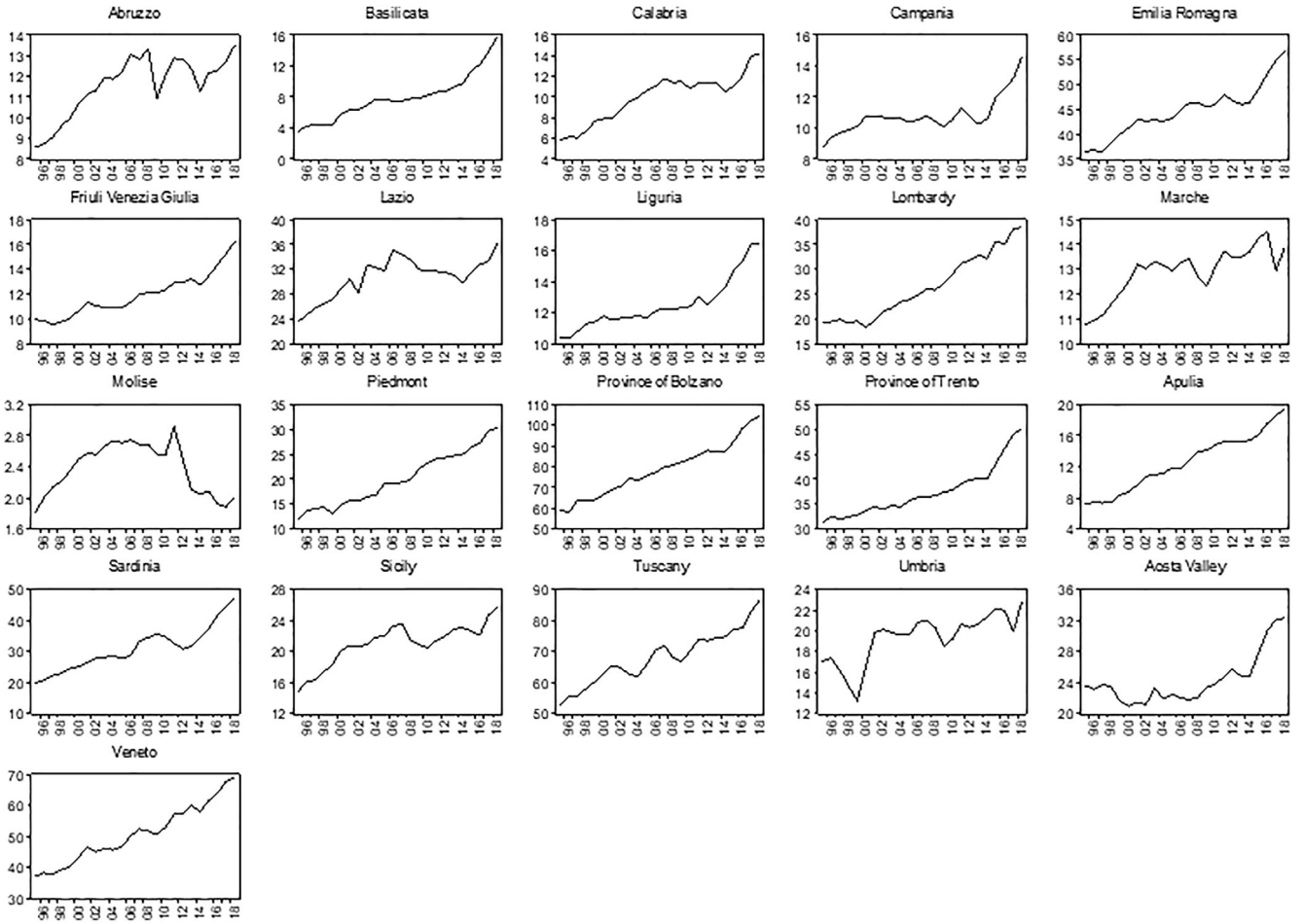

FIGURE 2 TTP index time dynamics by Italian NUTS2 regions/provinces
Source: Authors' elaboration on ISTAT data

heterogeneous across groups. Following the PMG estimator, in fact, short-run coefficients are allowed to vary across groups, while long-run parameters are constrained to be equal (Blackburne & Frank, 2007; Pesaran et al., 1997, 1999). This fits the case of our sample with 21 panel units, where adjustment dynamics in each region could lead to misleading results. The empirical model accounts for the implicit presence of dummy variables that should be introduced to account for the existence of exogenous shocks. In fact, the individual-specific regressors are filtered by means of cross-section averages so that the effects of unobserved common factors (such as the birth of the Monetary Union in 1999 and the 2007 financial crisis) are eliminated (Pesaran, 2006).

In order to have reliable estimates, a preliminary analysis a more in depth investigation of the variable properties is required. In fact, variables included in the empirical model need to be nonstationary in their level, integrated of the same order and cointegrated. In the presence of these prerequisites, the estimates' results are reinforced allowing for the individuation of a stable relationship even in the presence of a reduced number of explanatory variables. This should provide reliable information about the effects of tourism on per capita income.

The equations to be estimated have the long- and the short-run form. The long-run equation follows the autoregressive distributive lag (ADRL) dynamic panel specification, with current and past values of the explanatory variables as follows:

$$\begin{aligned}\text{PC\_GDP}_{i,t} = \alpha_i + \lambda_i \text{PC\_GDP}_{i,t-1} + \beta_{i,0}\text{ARR}_{i,t} + \beta_{i,1}\text{ARR}_{i,t-1} + \gamma_{i,0}\text{TTP}_{i,t} \\ + \gamma_{i,1}\text{TTP}_{i,t-1} + \delta_{i,0}\text{TTP}^2_{i,t} + \delta_{i,1}\text{TTP}^2_{i,t-1} + \varepsilon_{i,t}.\end{aligned} \quad (1)$$

In this specification, PC_GDP is per capita GDP in each administrative unit, ARR indicates the number of arrivals in every tourist accommodation establishment, TTP is the ratio between the number of arrivals and the inhabitants per square kilometer, TTP^2 is the same variable considered in its square value to account for a nonlinear effect of tourism congestion on per capita GDP, α_i is the group-specific effect, and, finally, ε_{it} is the independent and identically distributed error term, with i = 1, 2, ..., 21 indicating the geographical unit and t = 1, 2, ..., 24 the time period. In Equation (1), β_0 and β_1, γ_0 and γ_1, and δ_0 and δ_1 are the coefficients of the explanatory variables for the period considered. According to the ECM form, the residuals coming out of the long-run equation are then used to verify the long-run convergence

toward the equilibrium value or to measure the speed of adjustment, as it is known. Therefore, in the short run, changes in the dependent variable should depend on changes in the independent variables, plus an error term measuring if they converge. Thus, the EC equation describing the short-run speed of adjustment is expressed as follows:

$$\Delta PC\_GDP_{i,t} = \phi_i\left(PC\_GDP_{i,t-1} - \vartheta_i - \vartheta_{1,i}ARR_{i,t} - \vartheta_{2,i}TTP_{i,t} - \vartheta_{3,i}TTP^2_{i,t}\right) - \beta_{i,1}\Delta ARR_{i,t} - \gamma_{i,1}\Delta TTP_{i,t} - \delta_{i,1}\Delta TTP^2_{i,t} + \mu_{i,t}. \quad (2)$$

Confronting Equations (1) and (2), it can be verified that:

$$\vartheta_i = \frac{\alpha_i}{1-\lambda_i},\quad \vartheta_{1,i} = \frac{\beta_{i,0}+\beta_{i,1}}{1-\lambda_i},\quad \vartheta_{2,i} = \frac{\gamma_{i,0}+\gamma_{i,1}}{1-\lambda_i},\quad \vartheta_{3,i} = \frac{\delta_{i,0}+\delta_{i,1}}{1-\lambda_i}.$$

These are the long-run coefficients calculated as a weighted average of the coefficient of the independent variables. The weight is given by the coefficient of the dynamic dependent variable. The parameter $\phi_i = -(1-\lambda_i)$ is the EC speed of adjustment, whose estimate has to be significant and included in the interval (−1, 0).

The values of ϑ for the long-run, β, γ, and δ for the short-run and ϕ for the speed of adjustment are the relevant parameters in the model. They are estimated to support the hypothesis of a direct link between the dependent and the explanatory variables in the long run. The choice to adopt the dynamic panel empirical model described above depends on its technical properties or on its ability to provide reliable estimates for nonstationary variables and heterogeneous panels in presence of a reduced number of explanatory variables affected by endogeneity issues. Therefore, it supports to the hypothesis of the existence of a stable relationship between regional per capita GDP on the one side and touristic arrivals and alternative measures of congestion on the other.

3.3 | Results

The first step of the empirical analysis consists of investigating the properties of the data set. As previously stated, if variables are nonstationary in level, while stationary at first differences and cointegrated, PMG estimation results are reinforced and considered to be valid even in the presence of a reduced number of explanatory variables, because they support the existence of the long-run relationship under investigation. However, to choose the appropriate methodology for stationarity and cointegration analysis, the presence of cross-sectional dependence (CD) should be tested. In the presence of such a feature, second-generation panel unit root tests should be applied to the data set. The Pesaran (2004) CD test, performed on our data after a simple panel regression with fixed effects, reveals that the null hypothesis of cross-sectional independence should be rejected (71.142***).

The cross-sectional dependence in series suggests using the so-called "second generation" test to investigate the presence of a unit root in each series or the cross sectional augmented Dickey–Fuller (CADF) panel unit root test (Pesaran, 2007). If the null hypothesis is rejected, the series are stationary. Panel A in Table 1 presents the unit root test results. The tests are performed both for individual effects and for individual effects and trend: the null hypothesis of no stationarity is accepted for the variables in their level, while rejected when considering the variables at first differences. Therefore, it is possible to support the conclusion that variables measuring regional per capita GDP, tourist arrivals, arrivals per square kilometer, and its square values are integrated of order one, I(1).

To verify the presence of a long-run relation among the variables considered, the Westerlund (2007) "second generation" cointegration test accounting for cross-sectional dependence is performed. Panel B in Table 1 reports the corresponding results. The null hypothesis of no cointegration for all panels is accepted when including only the constant option, while it is rejected when including a trend.

The presence of cointegration gives strong support to the estimation of the dynamic panel model and suggests the inclusion of a trend in the estimates. Results are presented in Table 2. The first outcome to emphasize is the goodness of the methodology, as the estimate for the parameter ϕ results highly statistically significant and equal to −0.164, satisfying the condition $-1 < \phi < 0$.

In the long run the regional per capita GDP is positively affected by tourist arrivals when considered in their pure value (6.237***). The positive sign is still maintained when considering the linear measure of congestion even if the coefficient is much lower and less significant (0.511**).

TABLE 1 Unit root and cointegration tests for PC_GDP, ARR, TTP, and TTP^2

Panel (A)	Unit root tests (CADF) Level	
Variable	***Constant***	***Constant and trend***
PC_GDP	−1.524	−2.414
ARR	−1.981	−2.084
TTP	−1.914	−1.990
TTP^2	−1.732	−1.859
	First differences	
ΔPC_GDP	−3.318 ***	−3.329***
ΔARR	−3.134***	−3.678***
ΔTTP	−3.084***	−3.626***
ΔTTP^2	−2.937***	−3.471***
Panel (B)	Westerlund cointegration test (all variables)	
	Constant	*Trend*
Variance ratio	−0.8952	3.2642***

Note: ***, **, and * reject the null at 1%, 5%, and 10%, respectively. PC_GDP is per capita GDP; ARR is the number of arrivals, TTP is the ratio between the number of arrivals and the inhabitants per square kilometer, and TTP^2 is the same variable considered in its square value.

TABLE 2 Regional per capita GDP, tourist arrivals, and measures of touristic congestion in 21 Italian territorial units (1995–2018): PMG estimation results

Long run: Equation (1)	
Dependent variable GDP_PC	
ARR	6.237*** (1.886)
TTP	0.511** (0.221)
TTP^2	−4.541*** (0.741)
Short-run: Equation (2)	
ϕ_i: speed of adjustment	−0.164*** (0.042)
ΔARR	0.969 (1.001)
ΔTTP	0.489* (0.288)
ΔTTP^2	−25.694 (25.586)
Intercept	11,784.48** (6070.686)
Trend	−37.809** (19.477)

Note: ***, **, and * reject the null at 1%, 5%, and 10%, respectively. Standard errors in parentheses.PC_GDP is per capita GDP; ARR is the number of arrivals, TTP is the ratio between the number of arrivals and the inhabitants per square kilometer, and TTP^2 is the same variable considered in its square value.

The impact of congestion reverts when introducing a nonlinear effect, as the coefficient of the square measure of sustainability has a high negative impact on per capita GDP (−4.541***).

In the short run, that is, when considering variables in their changes, the outcomes are different. In particular, the sole variable that seems to be significant is the simple TTP index, with a coefficient similar to that of the long-run (0.489*). This is due to different processes of adjustments occurring in each region that, however, do not compromise the results of the long-run relationship. Finally, as predicted by the cointegration test results, the trend introduced in the estimates is significant and negative, registering that the variable tourist arrivals is one of the multiple determinants of regional per capita GDP.

3.4 | Robustness check

The previous estimates are based on the premise that variables are nonstationary in their level and affected by spatial and temporal dependence. Taking into account the features of the dataset, we apply the Driscoll and Kraay (1998) alternative methodology to replicate and validate the results obtained in the main estimates. According to this empirical technique, the error structure is assumed to be heteroskedastic, autocorrelated, and correlated between panel members. Therefore, the standard errors are robust to every general form of spatial and temporal dependence. It has the advantage of allowing for consistent estimates in presence of the valid hypothesis of a close geographical interconnection between the Italian regions. The Driscoll–Kraay methodology requires variables stationarity, therefore, consistently with the unit roots' results (Table 1), and we are allowed to use variables in their difference. The estimated equation is the following:

$$\Delta PC\_GDP_{i,t} = \alpha_i + \beta_{i,1}\Delta ARR_{i,t} + \gamma_{i,1}\Delta TTP_{i,t} + \delta_{i,1}\Delta TTP^2_{i,t} + \varepsilon_{i,t}. \quad (3)$$

Furthermore, since the long run approach adopted for the main estimates is valid in the presence of unobservable common shocks and prevents the introduction of dummy variables, we applied the Driscoll and Kraay (1998) methodology to a further equation, modified with the explicit inclusion of dummy variables to account for the macroeconomic shocks occurred in the period under investigation:

$$\Delta PC\_GDP_{i,t} = \alpha_i + \beta_{i,1}\Delta ARR_{i,t} + \gamma_{i,1}\Delta TTP_{i,t} + \delta_{i,1}\Delta TTP^2_{i,t} + D_{2001} + D_{2012} + \varepsilon_{i,t}. \quad (4)$$

Equation (3) presents the connection of the previous estimates using variables transformed to respect the stationarity condition, while Equation (4) adds to Equation (3) two dummy variables to account for the transformation occurred during the time span considered. In detail, D_{2001} accounts for the adoption of the common currency by assuming the value of one in 2001 and 2002 and zero otherwise; D_{2012}, instead, considers the common shock of the sovereign bond crisis that occurred in Italy as a whole after the year 2011.

Results of the Driscoll–Kraay estimation of Equation (3), presented in Table 3 (panel A), are consistent with those obtained through the PMG estimation approach. Actually, a positive change in arrivals appears to generate a positive change in per capita GDP so as a positive change in the TTP index does. The presence of a nonlinearity effect on GDP of tourism congestion is also confirmed, as the variable ΔTTP^2 is negative and statistically significant. When accounting for external shocks hitting the whole country, by the inclusion of the two dummy variables D_{2001} and D_{2012}, the estimation results presented in Table 3 (panel B) show a similar outcome for the coefficients of the main variables. In addition, the dummy variable considering the adoption of the common currency is significant and positive, whereas the shock caused by the sovereign bond crisis had a significant detrimental effect on regional per capita income.

4 | CONCLUSIONS

This article focuses on long-run co-movement between tourism inflows and per capita GDP growth in Italy with the aim of evaluating the contribution of tourism to regional income and verifying whether an excessive increase of inflows may be detrimental to regional economic development. The natural environmental heritage present in

TABLE 3 Regional per capita GDP, tourist arrivals, and measures of touristic congestion in 21 Italian territorial units (1995–2018): Driscoll–Kraay estimation results

Panel (A) Equation (3)	
Dependent variable ΔGDP_PC	
ΔARR	0.426*** (0.114)
ΔTTP	0.123*** (0.029)
ΔTTP^2	−9.260*** (1.780)
Intercept	341.404** (161.550)
Panel (B) Equation (4)	
ΔARR	0.502*** (0.102)
ΔTTP	0.101*** (0.031)
ΔTTP^2	−5.370** (2.030)
D_{2001}	254.779** (94.429)
D_{2012}	−420.593*** (120.762)
Intercept	425.814*** (131.682)

Note: ***, **, and * reject the null at 1%, 5%, and 10%, respectively. Standard errors in parentheses.ΔPC_GDP is the change in per capita GDP; ΔARR is the change in the number of arrivals, ΔTTP is the change in the ratio between the number of arrivals and the inhabitants per square kilometer, and ΔTTP^2 is the change in the same variable considered in its square value.

the country has an incredible development potential and continues to exercise, together with the historical and cultural heritages, an unequaled attractive power in the world tourism sector. However, this enormous positive potential could turn to be negative if not correctly managed. In fact, the empirical results show a stable and converging long-run relationship between the tourism and per capita GDP. Nevertheless, a nonlinear effect of congestion is strongly significant and detrimental for growth in Italian regions.

These outcomes—that can be used as reference for other advanced economies with natural and cultural endowments—reveal that sustainability is not just a matter of trade-off between the present use of touristic resources and their availability for future generations, but rather it is a matter to be evaluated also in the present. The objective of the expansion of the tourism sector aimed at a sustainable growth should be pursued reconciling the ability to produce income and to ensure a good quality of life as the incorrect and excessive exploitation of environment and territory can compromise the enhancement of economic results.

To this extent, to account not only for the benefits (higher income, jobs and revenues for taxes, lower poverty, support for development) but also for the downsides of an increasing tourism inflow to the point of overcrowding, policy makers should take into account the real pressure exerted by the tourism sector development on a destination. There is a limit above which the territory cannot afford the excessive inflow of arrivals and, therefore, to enjoy the benefits of increasing tourism demand, it is necessary to take into account both the physical limit imposed by the territory and the social, environmental and economic interactions between tourists and the local population.

As observable from Figure 1, Italian regions are not all the same in terms of sensibility to overtourism as some of them are more affected then others. Tourism should be encouraged in those regions where the ratio between arrivals and the population per square kilometer is lower, therefore serving as an instrument of catching up and convergence toward a uniform rate of growth. Promotion of tourism policies should be implemented especially in those regions where GDP per capita is lower than the average national value. In particular, Southern regions, despite endowed with an extraordinary amount of cultural and natural resources, suffer from lack of transport infrastructures and tourism support services that could facilitate the increase of tourism and strengthen its contribution to GDP.

On contrary, a careful management of tourism inflow is suggested for Tuscany, Emilia Romagna, Veneto, and the two autonomous provinces of Trento and Bolzano for which the ratio of arrivals in respect to the population density is very high. This careful management should involve all the stakeholders through a committed participation with the aim of reducing the detrimental effect caused by the excessive pressure on the territory.

The participation of the local population, institutions, and stakeholders could help to better manage or avoid congestion by a careful planning of arrivals within the limits of the capacity and specificities of a destination. Indeed, if managed properly, tourism activities can help to preserve and even strengthen local communities, while satisfying and ensuring a great experience for tourists and sustainability for the destination.

However, our analysis adopts a macroeconomic perspective that limits the interpretive power of the estimates. As overtourism is a phenomenon highly affected by local features, a further and more detailed investigation should be implemented to find specific policy suggestions for coastal areas or mountain zone as well as for cities and territories endowed with UNESCO heritage sites. Our contribution is to detect a phenomenon that should be deepened at NUTS-3 level and metropolitan areas taking into account the recent occurrences of—for example—low-cost transports proliferation and the wide range of accommodation facilities.

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