Centralized vs Decentralized Tourism Policies: a Spatial Interaction Model Framework

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Abstract

The choice of centralizing tourism policies at the national level or, on the contrary, of decentralizing them at the local level is widely discussed in the literature, which highlights the related pros and cons. In fact, the simultaneous role of originator and attractor of tourism of each spatial unit may imply a range of complex and competing interests at various geographical scales. In particular, in a framework of regional competition, a central (national) policy may be necessary to offset or coordinate the clashing regional interests. We stress that more profound insights into the problems and challenges of (de)centralized tourism policies can be gained by examining the national-regional choice, and in particular by using as a modelling framework, the "normative" spatial interaction model.

Keywords: centralized and decentralized tourism governance; tourism policies; spatial interaction model; regional spillovers.
JEL codes: P48; L83; R12; R58; Z10.

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1. Introduction

The choice of centralizing tourism policies at the national level or, on the contrary, of decentralizing them at the local level is widely discussed in the literature, which highlights the related pros and cons (see, e.g., Tosun and Jenkins 1996; Dredge and Jenkins 2003; Yüksel et al. 2005; Pforr 2006). At any time, organizations at the national, regional and local level are actively engaged in promoting tourism destinations. Nevertheless, the simultaneous role of originator and attractor of tourism of each spatial unit, as well as potential competition/complementarity between the regions on the basis of their attractivity factors, may imply a range of complex and competing interests at various geographical scales. In particular, in a framework of regional competition, a central (national) policy may be necessary to offset or coordinate the clashing regional interests.

This paper focuses on the choice between implementing tourism governance and policymaking at the central (national) or local (regional) level. The issue is raised by the following possible scenario: (i) regional endowments (i.e., attractivity factors) may positively influence arrivals to tourism destinations, providing a justification for local policies; (ii) however, regional competition for tourists may reduce the positive direct effect, so that it may be necessary the intervention of the central policymaker to offset or coordinate regional policies.

This research question may be restated in a framework of regional spillover effects: (i) regions could use their attractivity factors to gain a competitive advantage over the others, but (ii) at the same time they risk damaging the national interest to attract tourists in case the aggregate effect of regional policies is suboptimal . It is therefore critical to correctly balance and coordinate tourism policies between the national and regional levels in order to effectively manage regional endowments and spillover effects to cater towards tourism demand.

Ultimately, in this paper a well-known issue is dealt with, that is the management of regional spillover effects, by using as modeling framework the “normative” spatial interaction model. The methodology used is based on three main points: i) the spatial interaction model, where push, pull and deterrence variables interact, which is applied to the tourism sector in a normative economics perspective; ii) the tourism Keynesian multiplier, which measures the economic impact of tourism policies; iii) a framework of regional economics, where the main issue is the management of regional spillover effects.

Finally, the results of the model are empirically tested by investigating a specific case study for Italian domestic tourism. The choice of the Italian domestic tourism as a case study, is due to several reasons: (i) tourism is a leading sector of the Italian economy (UNWTO 2011); (ii) domestic tourism in Italy represents the greatest share (up to 88 and 90 per cent of arrivals and overnight stays, respectively) of the entire sector (Massidda and Etzo 2012); (iii) in Italy, regions take an active role in promoting tourism.

The paper is organized as follows. Section 2 presents the intuition for applying the spatial interaction model to the tourism sector in a normative economics perspective, as well as the underlying research question. Section 3 briefly presents the methodology used (the spatial interaction model) in a framework of regional spillover effects. Section 4 describes the first stage of the model solution, in the case where only one region is specialized as a tourism destination, while Section 5 describes the second stage of the model solution, in a framework of multilateral interactions between regions which are at the same time origins and destinations of tourism flows. Section 6 presents the empirical test of the model, by describing data set, variables and estimation strategy used, and then presenting the empirical findings and their interpretation within the theoretical model outlined. Section 7 provides concluding remarks and future research directions.

2. The Normative Spatial Interaction Model Framework

In applied economics, the spatial interaction model is a modelling framework that has been commonly linked to the theory of gravitation, so that it is often named gravity model (for an overview, see Haynes and Fotheringham 1984; Sen and Smith 1995) although over the years it has been given several theoretical bases in the social sciences. Surprisingly, to the best of our knowledge, so far it has not been applied in a normative economics perspective. The spatial interaction model aims to explain the observed flows (T) between origin and destination regions as a function of the product of their attributes ($O > 0$ and $D > 0$) and as an inverse function of deterrence factors such as their distance (d), so that a generic formulation can be described by the formula: $T = OD/f(d)$. While this model typology has been applied in spatial economics since the 1960s for analysing bilateral trade flows between origin and destination regions, a normative economics policy program should explicitly point out the policymakers' choice variables which can affect the trade flows.

In this paper, we apply the spatial interaction model to the study of tourism flows between regions. This has been widely done in the empirical literature (see, e.g., Uysal and Crompton 1985; Witt and Witt 1995; Khadaroo and Seetanah 2008), but never in a normative perspective. The policy analysis we provide aims to compare the efficiency of centralized and decentralized tourism policies and is concerned with the application of the *principle of subsidiarity*[1].

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[1] Subsidiarity is an organizing principle of decentralization, stating that a matter ought to be handled by the smallest, lowest, or least centralized authority capable of addressing that matter effectively, while the central authority should

The spatial interaction model is applied in a theoretical framework in which the local policymakers can affect tourism flows (decentralized or “subsidiary” policies) and a hierarchically superior central policymaker can intervene to change the “economic distance” (i.e., generalized interaction costs) between the regions and/or directly affect the tourism flows themselves (centralized policies). The central policy goal is to offset or coordinate the local policies in case they have an aggregate suboptimal effect, e.g. they modify the existing equilibrium (*status quo*) or walk off the desired equilibrium. Moreover, we assume that among the local policymakers there is no form of *ex ante* collaboration or communication, nor any possible announcement or cheap talk.

3. The Model: Regional Spillover Effects and Tourism flows

Let us define T_{ij} as the flow of tourists moving from an origin region i towards a destination region j, and let us assume that these flows yield a change in regional income (and hence in national income) as a consequence of the application of tourism multipliers (Candela and Figini 2012) to net tourism flows $\Delta_i = (T_{ji} - T_{ij})$ and $\Delta_j = -\Delta_i$, that is, the differences between regional incoming and outgoing flows (used as a proxy for tourism expenditures)[2]. Furthermore, let us define m_i and m_j as the tourism multipliers of regions i and j, respectively, so that the effects of tourism flows on the corresponding regional income (e.g., regional tourism GDP) can be represented by:

$$Y_i = m_i \Delta_i ; \tag{1}$$

$$Y_j = m_j \Delta_j . \tag{2}$$

Tourism flows depend on spatial interaction between the regions, that is, they are described by the spatial interaction model as a function of repulsive forces (push factors) at origin region i (O_i), attractive forces (pull factors) at destination region j (D_i), and deterrence forces such as an inverse function of the distance between the regions i and j (d_{ij}):

$$T_{ij} = O_i^{\alpha} D_j^{\beta} d_{ij}^{-\gamma} , \tag{3}$$

have a subsidiary function, performing only those tasks which cannot be performed effectively at a more immediate or local level.

[2] We are assuming here the same average expenditure for incoming tourists and the residents.

where α, β and γ are the specific exponents (estimated as elasticities) of the aforementioned factors. More specifically, in the tourism context, repulsive forces/push factors are associated with leaving the origin region (tourism outflows), while attractive forces/pull factors are related to going to the destination region (tourism inflows).

The two regions can affect their tourism flows by managing a set of unilateral or bilateral variables. Past applications of the spatial interaction model to tourism most often focus on international tourism (see, e.g., Armstrong 1972; Crampon and Tan 1973; Malamud 1973; McAllister and Klett 1976; Swart et al. 1978; Saunders et al. 1981) and typically express bilateral tourism flows (T_{ij}) as a function of bilateral variables indicating the characteristics of regions/countries i and j (factors that augment or distort tourism flows) and of distance, which acts as a proxy for transportation and opportunity costs. Let us define x and y as the values of a tourism policy instrument (choice variable) enforced by the policymakers of regions i and j, respectively, while α and β give the extent of the push and pull factors effects, respectively. In this way, the local normative policy functions, as origins and destinations, can be represented by $O(x) = x^{\alpha}$ and $D(x) = x^{\beta}$, respectively, for region i, and by $O(y) = y^{\alpha}$ and $D(y) = y^{\beta}$ for region j. Thus, the corresponding spatial interaction equations are $T_{ij} = x^{\alpha} y^{\beta} d^{-\gamma}$ and $T_{ji} = y^{\alpha} x^{\beta} d^{-\gamma} = x^{\beta} y^{\alpha} d^{-\gamma}$, which represent tourism flows from region i towards region j, and vice versa.

4. One Region as a Specialized Tourism Destination (no regional interaction)

In order to solve the model, we assume in a first stage, that only region i is specialized as a tourism destination, while region j does not have any tourism attraction and hence does not receive tourism inflows (i.e., it is specialized in a different economic sector). Under this assumption, there are no tourism flows from region i to region j ($T_{ij} = 0$) and, consequently, the tourism impact of region j is null. Therefore, Equations (1) and (2) become:

$$Y_i = m_i T_{ji}; \tag{4}$$

$$Y_j = 0. \tag{5}$$

Within this framework, we first assume that the central policymaker's goal is to maintain steady tourism flows from j to i, according to a simple rule of thumb: the main policy goal of a country with a dichotomous economy is the *status quo*[3]. For the sake of simplicity, let us also assume that the central policymaker can only modify the "economic distance"[4] (d), while the regional policymakers can only intervene on their policy instruments (x and y). Hence, the central policy goal is to stabilize region i's income:

$$Y_i^*(x, y, d | \alpha, \beta) = m_i T_{ji}^* = m_i (x^\beta y^\alpha d^{-\gamma}) . \tag{6}$$

The possible combination of central and local policies, within the policy goal of stabilization (i.e., the *status quo*), is described by the following total differential:

$$dY_i / Y_i = Y^\circ = \beta x^\circ + \alpha y^\circ - \gamma d^\circ = 0 , \tag{7}$$

where the superscript ° stands for the rate of change of variables (i.e., for a generic variable z, $z^\circ = dz/z$).

In the case the local policymakers' choices autonomously ensure the *status quo* ($\beta x^\circ + \alpha y^\circ = 0$), the intervention of the central policymaker is not necessary ($d^\circ = 0$), otherwise a central policy regarding the "economic distance" can be justified, by following the rule:

$$\beta x^\circ + \alpha y^\circ = \gamma d^\circ . \tag{8}$$

This modelling framework entails a normative economics perspective insofar as it gives hints regarding "what ought to do" the central or local policymakers. In fact, it is now possible to define the effectiveness of local policies (or, in terms of regional economics, to effectively manage the regional spillover effects) and, accordingly, the need to implement a central policy, by just focusing on the values of the parameters α and β: i) if $\alpha = \beta = 0$, there is complete lack of regional spillover effects, so that regional policies are ineffective and regions are independent; ii) if $\alpha = 0$ or $\beta = 0$, only one region has spillover effects, which means that there is unilateral interaction between the regions; iii) if $\alpha \neq 0$ and $\beta \neq 0$, both regions have spillover effects, implying that regional policies can be effective and there is multilateral interaction between the regions; iv) if

[3] In other words, we assume a fixed policy goal for the central policymaker. In the following stage of the model solution, this assumption will be removed by introducing flexible policy goals.
[4] In this framework, distance is defined in economic terms, and can be modified by the central planner in terms of costs (e.g., new travelling tariffs) or time (e.g., new high-speed train lines). Furthermore, the central policymaker can also change such distance by making appropriate public investments, even if only in the long-term.

$\alpha = \beta \neq 0$, regional spillovers have the same intensity, so that equal regional policies will compensate each other.

In the case regions are independent ($\alpha = \beta = 0$) neither an information system between the regions nor the intervention of the central policymaker are necessary. This conclusion is clearly a tautology, but implies that policy decentralization is possible if the local policymakers' choices are independent (i.e., there is complete lack of regional spillover effects), so that they cannot change the aggregate *status quo*.

The model results become more interesting if at least one region generates spillover effects ($\alpha \neq 0$ and/or $\beta \neq 0$), so that regional policies can be effective. For the sake of simplicity, we assume only strictly non-negative changes in policy variables ($x^\circ, y^\circ \geq 0$), although our conclusions are confirmed also in the case of non-positive changes, given the necessary modifications. This is the most interesting case, and can be divided into the following sub-cases. If only one local policy can be effective ($\alpha \neq 0$ or $\beta \neq 0$), a *compensation central policy* is always necessary to maintain the *status quo*. If instead the effects of local policies have the same sign ($\alpha, \beta > 0$ or $\alpha, \beta < 0$), that is, local policies have similar effects, the intervention of the central authority is necessary to coordinate or offset the local policies (*coordination central policy*). On the contrary, if the effects have different signs ($\alpha > 0$ and $\beta < 0$, or $\alpha < 0$ and $\beta > 0$), that is, local policies have opposite effects, the intervention may consist of a *discretionary central policy*, which depends on the casual condition $\beta x^\circ + \alpha y^\circ = 0$. If this condition holds, a central policy is not necessary, while if it does not, a central policy is necessary. In any case, a monitoring activity at the national level will be necessary to verify the condition $\beta x^\circ + \alpha y^\circ = 0$.

In summary, there are two cases in which a central policy is not necessary: i) in general if $\alpha = \beta = 0$, and ii) specifically if $\beta x^\circ + \alpha y^\circ = 0$. On the contrary, there are three cases in which a central policy is necessary: i) $\alpha \neq 0$ or $\beta \neq 0$, ii) $\alpha, \beta \neq 0$ and having the same sign, and iii) $\alpha, \beta \neq 0$ and having opposite signs, besides $\beta x^\circ + \alpha y^\circ \neq 0$. Overall, the possible central policies are: (i) no policy, (ii) compensation policy, (iii) coordination policy, and (iv) discretionary policy. Table 1 shows all possible combinations of local and central policies for the different values of α and β.[5]

[5] A similar table can be obtained in the case of non-positive changes in the policy variables ($x^\circ, y^\circ \leq 0$).

Table 1. Possible combinations of local and central policies (for $x^\circ, y^\circ \geq 0$)

	$\beta = 0$	$\beta > 0$	$\beta < 0$
$\alpha = 0$	Regions are independent (no central policy)	Compensation central policy ($\beta x^\circ = \gamma d^\circ$)	Compensation central policy ($\beta x^\circ = -\gamma d^\circ$)
$\alpha > 0$	Compensation central policy ($\alpha y^\circ = \gamma d^\circ$)	Coordination central policy (since $\beta x^\circ + \alpha y^\circ > 0$)	Discretionary central policy (if and only if $\beta x^\circ + \alpha y^\circ \neq 0$)
$\alpha < 0$	Compensation central policy ($\alpha y^\circ = -\gamma d^\circ$)	Discretionary central policy (if and only if $\beta x^\circ + \alpha y^\circ \neq 0$)	Coordination central policy (since $\beta x^\circ + \alpha y^\circ < 0$)

In conclusion, *the application of the spatial interaction model in a normative economics perspective enables us to understand and solve the issue of the choice between centralizing or decentralizing tourism policies. Hence, we are able to endogenously define the boundaries of regional decentralization and the application of the principle of subsidiarity.*

These results represent a confirmation of the literature on regional policies (see, e.g., Seabright 1996, Faguet 2004, Rubinchik-Pessach 2005, Lockwood 2006, Barankay and Lockwood 2007, Enikolopov and Zhuravskaya 2007, Feiock 2007, Cheikbossian 2008, Faguet 2014), but are achieved within a different, multidimensional theoretical framework such as the spatial interaction model. Moreover, we identified a new case, the discretionary central policy, where an active intervention is not always required, but which requires a monitoring activity by the central policymaker. The multiplicative nature of the spatial interaction model is therefore very useful to discuss aspects of central/local economic policy planning. In addition, thanks to its empirical application it is possible to measure the potential policy effects, and to analyse the strategic interdependence between local policymakers and between local and central policymakers through the estimation of the parameters α and β (see Section 6).

After having presented the first stage of the model solution, where only one region is a specialized tourism destination, we now consider the spatial interaction model in its most general version.

5. Regional Interaction and Tourism Flows

In the second stage of the model solution, we assume regional bilateral tourism flows, that is, a framework in which each region is at the same time an origin and a destination. Furthermore, instead of setting a fixed *status quo* objective, we assume flexible policy goals consisting in regional and national income maximization for the regional and central policymakers, respectively. Since the spatial interaction model is a symmetric and multiplicative model, where policy goals are expressed in terms of pseudo-linear monotonic (increasing or decreasing) functions, it is solved by means of a bang-bang approach (corner solutions). As a result, the optimal policies are always restricted to be at the minimum or maximum values (exogenous bounds) of the choice variables (Sonneborn and Van Vleck 1965).

By applying the parameters α and β of Equation (3) for both regions i and j, the expected outcomes of the spatial interaction model become (see Section 3):

$$T_{ij}(x, y, d|\alpha, \beta) = x^{\alpha} y^{\beta} d^{-\gamma} \geq 0 ; \tag{9}$$

$$T_{ji}(x, y, d|\alpha, \beta) = y^{\alpha} x^{\beta} d^{-\gamma} = x^{\beta} y^{\alpha} d^{-\gamma} \geq 0 , \tag{10}$$

where the parameters α and β, as above, can be positive, negative or null. Equations (9) and (10) have the following analytical properties[6]:

$$\partial T_{ij} / \partial x = \alpha T_{ij} / x \; ; \; \partial T_{ij} / \partial y = \beta T_{ij} / y ; \tag{11}$$

$$\partial T_{ji} / \partial x = \beta T_{ji} / x \; ; \; \partial T_{ji} / \partial y = \alpha T_{ji} / y . \tag{12}$$

According to Equations (9)-(12), it is easy to verify that: i) in the case regions are independent ($\alpha = \beta = 0$), only the distance between the regions affects tourism flows; ii) in the case of unilateral interaction between the regions ($\alpha = 0$ or $\beta = 0$), the gradient of tourism flows (log-linearly) depends only on the signs of the parameters α and β, that is, on the effectiveness of regional policies; iii) in the case of multilateral interactions ($\alpha \neq 0$ and $\beta \neq 0$), the effectiveness of each regional policy instrument depends on all the model parameters.

Finally, we assume that policy variables have upper and lower bounds for both regions i and j: $x_{\min} \leq x \leq x_{\max}$ and $y_{\min} \leq y \leq y_{\max}$. With this simple (log-linear) monotonic formulation of the spatial interaction model, the regional incomes defined in Equations (1) and (2) become:

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[6] For a detailed analysis of their analytical properties, see Appendix, A.

$$Y_i = m_i d^{-\gamma}\Delta_i\,; \tag{13}$$

$$Y_j = m_j d^{-\gamma}\Delta_j\,, \tag{14}$$

where net tourism flows are $\Delta_i = (x^{\beta}y^{\alpha} - x^{\alpha}y^{\beta})$ and once again $\Delta_j = -\Delta_i$. Note that in both cases of unilateral and multilateral interactions, net tourism flows depend on both α and β. Moreover, when regions are independent, net tourism flows become $\Delta_i = \Delta_j = 0$.

Since the model in Equations (13)-(14) is solvable by means of a bang-bang approach, according to which the monotonic policy goals are defined on a limited set of possibilities, the optimal local policies are always restricted to be corner solutions: $x_{\min}$ or $x_{\max}$ and $y_{\min}$ or $y_{\max}$. Furthermore, the optimal policy is a function of both the tourism multipliers signs, which are positive by assumption ($m_i > 0$ and $m_j > 0$), since both regions have tourism attractions, and the gradients of Equations (13) and (14), which can be directly derived from Equations (11) and (12):

$$\partial\Delta_i/\partial x = (\beta T_{ji} - \alpha T_{ij})/x \text{ and } \partial\Delta_j/\partial x = -\partial\Delta_i/\partial x\,; \tag{15}$$

$$\partial\Delta_j/\partial y = (\alpha T_{ji} - \beta T_{ij})/y \text{ and } \partial\Delta_i/\partial y = -\partial\Delta_j/\partial y\,. \tag{16}$$

These gradients can be positive or negative depending on the values of $(\beta T_{ji} - \alpha T_{ij})$ and $(\alpha T_{ji} - \beta T_{ij})$, that is, on the relative importance and effectiveness of push and pull factors.

In general, the signs of Equations (13) and (14) are univocally defined only if $\alpha = 0$ or $\beta = 0$. Moreover, local policy instruments x and y are completely ineffective when regions are independent ($\alpha = \beta = 0$), since net tourism flows become $\Delta_i = \Delta_j = 0$, while they are locally ineffective, in the case of multilateral interactions between the regions ($\alpha \neq 0$ and $\beta \neq 0$), if and only if $\Delta_i = \Delta_j = 0$. Starting from these analytical properties of Equations (13) and (14), we can now analyse the issue of the optimal choice between centralizing or decentralizing tourism policies.

The analysis is carried out from the point of view of region *i*, but it can be replicated for region *j*, given the necessary modifications. Furthermore, the model is solved in sequential steps, by developing three different theoretical scenarios:

1. *unconditional optimal regional policies*, where by assumption each region can choose its own optimal policy and express a preference for other regions' policies, so that it can pursue its own interest; this is only a hypothetical scenario, but it represents a necessary step to understand and solve the model (see Lemma 1);

2. *conditional optimal regional policies*, where each region chooses only its own optimal policy, given the policies chosen by other regions, that is, a framework of administrative decentralization (see Theorem 1);
3. *optimal national policy*, where the central policymaker enforces a national policy in view of the national interest (maximization of national income), independently from the regional distribution of income (see Theorem 2).

Lemma 1 (unconditional optimal regional policies). *In a scenario of bilateral interaction between two regions, and where each region has the opportunity to choose its own optimal policy without any constraint, each region puts its own interest first, and prefers for the other region to implement an opposite regional policy. The multilateral interaction between the regions results in clashing regional interests.*

In a spatial interaction model with two regions having bilateral interactions (so that $\Delta_i = x^\beta y^\alpha - x^\alpha y^\beta \neq 0$), if region i can choose the value of both its own policy variable (x) and the other region's one (y), the global maximum will be the solution of the following maximization program:

$$\max_{x,y} \; Y_i = m_i d^{-\gamma}(x^\beta y^\alpha - x^\alpha y^\beta) = m_i d^{-\gamma}\Delta_i \,, \tag{17}$$

where $m_i > 0$ and $d^{-\gamma} > 0$ by assumption.

Proof. See Appendix, B. ■

It is possible to perform a simulation of Lemma 1, conditionally to the signs of the coefficients α and β, so that the optimal regional strategies for region i correspond to the policy mix shown in Table 2. The same happens, given the necessary modifications, for region *j*: once it has defined its own optimal policy, the region prefers for the other region to implement an opposite regional policy.

Table 2. Unconditional optimal regional policies, for region i ($\Delta_i \neq 0$ and $\beta \geq \alpha$)

	$\beta = 0$	$\beta > 0$	$\beta < 0$
$\alpha = 0$	Ineffective policies	$x_{\max}; y_{\min}$	–

$\alpha > 0$	$-$	$x_{\max}; y_{\min}$	$-$
$\alpha < 0$	$x_{\max}; y_{\min}$	$x_{\max}; y_{\min}$	$x_{\max}; y_{\min}$

According to Lemma 1, regions have clashing interests. However, in real administrative decentralized scenarios each region chooses only its own optimal regional policy, but cannot condition the other policies: its policy is chosen given the behaviour of other regions. This second scenario, named *conditional optimal regional policies*, is analysed as a Cournot-Nash equilibrium.

Theorem 1 (**conditional optimal regional policies**). *In a spatial interaction model with bilateral interactions between two regions, and where each region chooses its own optimal policy in order to maximize its regional income, given the policy chosen by the other region, the interrelation of their individual choices yields equal regional policies.*

If net tourism flows are $\Delta_i \neq 0$, region i's policy goal will be to maximize function (13):

$$\max_x \; Y_i = m_i d^{-\gamma} \Delta_i \quad \text{s.t.} \quad x_{\min} \leq x \leq x_{\max} \text{ and given } y, \tag{18}$$

and correspondingly, region j's policy goal will be to maximize function (14):

$$\max_y \; Y_j = m_j d^{-\gamma} \Delta_j \quad \text{s.t.} \quad y_{\min} \leq y \leq y_{\max} \text{ and given } x. \tag{19}$$

Proof. See Appendix, C. ■

A simulation of Theorem 1, conditional to the signs of the parameters α and β, shows that the optimal regional strategies lead to the policy mix shown in Table 3: both regions want to implement the same regional policies, if they choose on the basis of their own interest.

Table 3. Conditional optimal regional policies, for both regions ($\Delta_i \neq 0$ and $\beta \geq \alpha$)

	$\beta = 0$	$\beta > 0$	$\beta < 0$
$\alpha = 0$	Ineffective policies	$x_{\max}; y_{\max}$	$-$
$\alpha > 0$	$-$	$x_{\max}; y_{\max}$	$-$
$\alpha < 0$	$x_{\max}; y_{\max}$	$x_{\max}; y_{\max}$	$x_{\max}; y_{\max}$

As seen in Section 4, the main issue is now to verify if this decentralized conditional equilibrium is consistent with the national policymaker's goal. Let us focus then on the *optimal national policy*, where the central policymaker pursues the national interest of maximizing national income, regardless of its geographical distribution, even if the possibility of an ex-post regional redistribution based on equality (through compensatory regional transfers) is not excluded. Within the model, the national income is defined as the sum of regional incomes:[7]

$$W = Y_i + Y_j = m_i d^{-\gamma}\Delta_i + m_j d^{-\gamma}\Delta_j \,. \tag{20}$$

Recalling that $\Delta_i = -\Delta_j$, the national policymaker's objective function (20) can be formulated so that the multiplicative coefficient given by the difference between the regional multipliers is positive:

$$\text{if} \quad m_i > m_j \quad \text{then} \quad W = (m_i - m_j) d^{-\gamma}\Delta_i \,; \tag{21}$$

$$\text{if} \quad m_i < m_j \quad \text{then} \quad W = (m_j - m_i) d^{-\gamma}\Delta_j \,. \tag{22}$$

According to Equations (21) and (22), it is possible to conclude that the national interest directly overlaps with the interest of the region with the greater tourism multiplier, so that, for the central policymaker, it is optimal to promote tourism in that region[8].

Theorem 2 (optimal national policy). *In a spatial interaction model with bilateral interactions between two regions, the national interest, defined as the sum of regional incomes, always overlaps with the optimization program of the most favoured region (in terms of tourism multiplier). As a result, the national interest requires the enforcement of opposite regional policies.*

Considering the case of Equation (21)[9], the national policymaker's optimization program matches region i 's optimization program:

$$\max_{x,y} \; W = (m_i - m_j) d^{-\gamma}\Delta_i \approx \max_{x,y} \; Y_i = m_i d^{-\gamma}\Delta_i \,, \tag{23}$$

which is the same maximization program (17) of Lemma 1.

[7] If the central policymaker were to be interested also in the geographical distribution of income, it would be sufficient to introduce exogenous weights for regional incomes, depending on regional redistribution choices. The model, however, would remain substantially confirmed.

[8] It may be interesting to point out that there are analogies between this result and some key aspects of the economic theory of physiocracy (Candela and Palazzi 1979; Steiner 2003).

[9] The national policymaker's optimization program for Equation (22), can be defined in a similar way, given the necessary modifications.

Proof. See Appendix, D. ■

According to Theorem 2, the optimal national policy depends on the difference between the regional tourism multipliers, since the national interest overlaps with the one of the region with the greater multiplier, and as a result it requires the enforcement of opposite regional policies. Nevertheless, in a decentralized governance scenario, where each region can choose its own optimal policy but cannot condition the other regions, every region would implement the same regional policies (Theorem 1). This strategy would clash with both the other regions' interests (Lemma 1) and the national interest (Theorem 2), so that a central (national) policy to coordinate or offset the regional policies is necessary in order to obtain the final result of opposite regional policies.

A simulation of Theorem 2, conditional to the signs of the parameters α and β, shows that the national interest requires the enforcement of opposite regional policies. The optimal national policy in the case of $m_i > m_j$ (region i's multiplier higher than region j's one) is shown in Table 4, while the case $m_i < m_j$ is shown in Table 5.

Table 4. Optimal national policy, in the case $m_i > m_j$ ($\Delta_i \neq 0$ and $\beta \geq \alpha$)

	$\beta = 0$	$\beta > 0$	$\beta < 0$
$\alpha = 0$	Ineffective policies	$x_{\max}; y_{\min}$	–
$\alpha > 0$	–	$x_{\max}; y_{\min}$	–
$\alpha < 0$	$x_{\max}; y_{\min}$	$x_{\max}; y_{\min}$	$x_{\max}; y_{\min}$

Table 5. Optimal national policy, in the case $m_i < m_j$ ($\Delta_i \neq 0$ and $\beta \geq \alpha$)

	$\beta = 0$	$\beta > 0$	$\beta < 0$
$\alpha = 0$	Ineffective policies	$x_{\min}; y_{\max}$	–
$\alpha > 0$	–	$x_{\min}; y_{\max}$	–
$\alpha < 0$	$x_{\min}; y_{\max}$	$x_{\min}; y_{\max}$	$x_{\min}; y_{\max}$

A comparison of Tables 4 or 5 with Table 3 shows that a decentralized tourism policy always overlaps with the central policy only if $\alpha = \beta = 0$, that is, when there is complete lack of regional spillover effects. On the contrary, in all other cases there cannot be perfect overlapping between centralized and decentralized tourism policies because of regional spillover effects. It follows that if there is unilateral or multilateral interaction between the regions, a coordination of regional policies at the national level is necessary: if each region pursues its own interest, this would damage the national one.

Let us now see some particular but interesting cases. Centralized and decentralized policies can overlap if and only if $\Delta_i = (x^\beta y^\alpha - x^\alpha y^\beta) = 0$, which is the parametric value set implying $T_{ij} \equiv T_{ji}$. This is a very rare condition, which is verified if two regions have similar tourism economic development (and ultimately are one unique tourism destination). Moreover, the condition $\Delta_i = 0$ is always implied if regions are characterized by similar regional spillover effects ($\alpha \approx \beta$). In fact, in this case the effects of equal regional policies will compensate and neutralize each other in aggregate terms.

In other words, in all cases in which $\alpha \neq \beta$, the mismatch between Tables 3, 4 and 5 and the differences between Theorems 1 and 2 represent the rationale on which the central policymaker's intervention ought to be based, with the goal to coordinate the clashing regional policies. The underlying political choice between the national and regional interests and the resulting choice between centralizing or decentralizing tourism policies represent an application of the principle of subsidiarity.

The only remaining case left to discuss is the special case in which $m_i = m_j$, that is, when regions have the same tourism multiplier. This condition implies that regional policies have the same effects on national income, such that the national policymaker becomes altogether uninterested in the regional policies $\forall \alpha, \beta$, and decentralizing tourism policies can thus be more efficient. Anyway, this again represents an unlikely case, which can happen either by chance or because the two regions belong to a single tourism destination.

Finally, the possibility by the national policymaker of modifying the economic distance between the regions has been ignored up to now. However, the introduction of such possibility would not change the general results of coordination, compensation or discretionary central policies.

In summary, the application of the spatial interaction model in a normative economics perspective enables us to endogenously define the choice between implementing tourism governance and policymaking at the central or local level, and hence to obtain an optimal definition of regional borders (Tosun and Jenkins 1996; Yüksel et al. 2005), in the following ways.

a) *Centralized policies* are more efficient every time $\alpha \neq \beta$ (multilateral spillover effects) in order to coordinate clashing regional policies in view of the national interest. More precisely: i) if $\alpha = 0$ or $\beta = 0$, only one region has spillover effects, and there is unilateral interaction; ii) if $\alpha \neq 0$ and $\beta \neq 0$, both regions have spillover effects, and there is multilateral interaction between them.

b) *Decentralized policies* are more efficient in the cases: i) if $\alpha \approx \beta$ (same regional spillover effects), since equal regional policies compensate each other, although the central policymaker will still need to monitor the time consistency of that condition; ii) if $m_i = m_j$ (same tourism multiplier), since regional policies have the same effects on national income.

c) *Neither central nor local policies are effective* if $\alpha = \beta = 0$ (no regional spillover effects).

In next Section we propose an application of our model to an empirical framework where all theoretical assumptions are verified: the Italian domestic tourism case study.

6. Empirical Analysis: the Case Study of Italian Domestic Tourism

We test the theoretical results of our model by investigating the case study of Italian domestic tourism on a 12-year panel (years 1998–2009) of domestic tourism flows (measured as arrivals) between the 20 Italian regions. By relying on the empirical framework and data set of Patuelli et al.'s (2013), the spatial interaction model has been tested by choosing some variables commonly used as push and pull factors (see, e.g., Sheldon and Var 1985, Lim 1997), such as regional GDP, population, price indices, crime indices, tourism specialization and deseasonalization.

In particular, to test our national-regional hypothesis, elasticities for the following policy variables (which are expected to affect tourism flows) have been estimated: i) endowment in *UNESCO's World Heritage Sites (WHS)* regional, which in Italy represents an important element of the regions' cultural offer; ii) *public spending in recreational, cultural and religious activities*, representing the investment of the regions towards attracting tourists; iii) *tourism specialization* (share of value added by accommodation and restaurants, transports and communication, commerce, repairs), in order to account for the different tourism 'vocation' of the regions, and their reliance on this sector; iv) *state museum quality* (number of visitors to state antiquities and arts museums per institute), used as a proxy for the quality of the local museums; v) *diffusion of cultural and recreational events* (number of tickets sold per inhabitant for theatrical and musical events), accounting for the quality of the regional cultural offer; vi) *off-season tourism* (overnight stays in off-season months per inhabitant), which accounts for the regions' success in extending their period of touristic consumption, for example by diversifying their offer; vii) *price index for hotels and restaurants* which is used to control for price dynamics in the origin and destination regions; viii) *small and violent crime* indices, to account for the tourists' possible safety concerns.

The dependent variable is given by the arrivals in hotels and other accommodation outlets, from and to all Italian regions for the period 1998–2009, whose data are provided by the Italian Statistical

Agency (ISTAT) in its publication *Statistiche del Turismo*, and collected through the accommodation structures survey. The number of regional UNESCO sites is obtained directly from UNESCO's World Heritage Convention website (http://whc.unesco.org/), while all further explanatory variables are obtained by ISTAT, and are published in: *Conti Economici Regionali*, *Prezzi al Consumo* and *Banca Dati Territoriale per le Politiche di Sviluppo*.

The empirical estimation is carried out through the equation:

$$T_{ijt} = \exp(\mu_{ij} + \delta year_t + \alpha X_{it} + \beta Y_{jt}) + \varepsilon_{ijt}, \tag{24}$$

where T_{ijt} is the flow of tourists from region i to region j at time t, X_{it} and Y_{jt} are the origin and destination-related variables, μ_{ij} are individual fixed effects, and $year_t$ are time fixed effects, while the distance variable d_{ij} drops because of the fixed effects. For further details on the empirical estimation method, and the complete list of explanatory variables, see Patuelli et al. (2013).

Our goal is to estimate the values of the coefficients α and β of Equation (24), corresponding to the parameters of Equations (9) and (10), in order to identify the optimal regional or national policies for each of the policy variables presented above. Then, we perform an equality test for the case $\alpha = \beta$, in the form of a chi-squared test against $\mathrm{H}_0 : \alpha = \beta$. The empirical estimates of α and β, the equality test for the case $\alpha = \beta$, and the corresponding optimal tourism policies, are provided in Table 6.

In order to identify the optimal tourism policies according to these empirical estimates, let us recall our conclusions regarding the interpretation of the parameters α and β (Tables 3, 4 and 5): i) a *national policy* is optimal when $\alpha \neq \beta$ (multilateral spillover effects), in order to coordinate the (opposite) regional policies, and the specific optimal policies to be implemented for each pair of regions depend both on α and β, and on regional tourism multipliers, under condition that $m_i \neq m_j$; ii) a *regional policy* is optimal when $\alpha \approx \beta$ (same regional spillover effects), since equal regional policies compensate each other, so that it is not necessary a national intervention; iii) both *national and regional policies are ineffective* when $\alpha = \beta = 0$ (no regional spillover effects).

Table 6. Empirical estimates for Italian domestic tourism and optimal tourism policies

Variables	Coefficients	$\alpha = \beta$ test	Tourism Policies
1. UNESCO World Heritage Sites (WHS)	$\alpha < 0$* and $\beta > 0$	No	National
2. Public spending in recreational, cultural and religious activities	α and $\beta = 0$	**Yes**	Ineffective policies
3. Tourism specialization	$\alpha > 0$ and $\beta > 0$*	**Yes**	Regional
4. Museum quality	$\alpha < 0$* and $\beta > 0$	No	National
5. Diffusion of cultural and recreational events	$\alpha = 0$ and $\beta > 0$	**Yes**	Regional
6. Off-season tourism	$\alpha = 0$ and $\beta > 0$	No	National
7. Prices of hotels and restaurants	$\alpha = 0$ and $\beta < 0$	No	National
8. Small crimes	$\alpha > 0$ and $\beta = 0$	No	National
9. Violent crimes	$\alpha > 0$* and $\beta = 0$	**Yes**	Regional
* = marginally significant			

From the empirical estimate carried out it is possible to conclude that, with regard to Italian domestic tourism, the optimal governance and policymaking levels should be as follows: i) national tourism policies are more efficient to manage UNESCO sites, museum quality, off-season tourism, prices of hotels and restaurants and small crimes; ii) regional tourism policies are more efficient for the policies regarding tourism specialization, diffusion of cultural and recreational events and violent crimes; iii) all tourism policies are ineffective for public spending in recreational, cultural and religious activities.

Let us see a possible interpretation of one case for which the national policy is optimal, that is, the number of UNESCO sites. An increasingly important force of attraction for tourists is cultural offer. For this reason, national and regional governments make efforts to implement cultural tourism policies, for example to obtain an official certification of their historical/cultural attractions, like UNESCO's World Heritage Sites (WHS) list. Since in our empirical estimation we find that $\alpha < 0$ and $\beta > 0$, UNESCO sites do appear to influence arrivals to tourism destinations for Italian domestic tourism. Therefore, if on the one hand the local policymakers' lobbying towards the national government for obtaining UNESCO candidatures would appear to be justified, on the other hand regional policies are best coordinated at the national level. This result is consistent with

Patuelli et al. (2013), who found that a central policy for UNESCO sites is necessary in order to avoid the aggregate negative effect (at the national level) due to the regional spatial competition effect.

7. Conclusions

The application of the spatial interaction model in a normative economics perspective, within the tourism sector and in a framework of regional spillover effects, proved to be a useful approach in order to endogenously define the choice between implementing tourism governance and policymaking at the central (national) or at the local (regional) level.

In particular, decentralization of tourism governance is more efficient when regions have similar regional spillover effects, so that regional policies may compensate each other, or when they have similar tourism multipliers, so that regional policies may have the same effects on national income. On the contrary, all policy variables that cause multilateral spillovers should remain in the domain of national policies, in order to coordinate the clashing regional policies in view of the national interest.

The novel methodology used in this study enables us to provide two major contributions to the literature on tourism governance and policymaking: i) an explanation of the role of decentralized tourism policies and the principle of subsidiarity; ii) an endogenous definition of the optimal centralized and decentralized tourism policies.

Future extensions of this work may consist in evaluating the potential spatial competition or spatial complementarity between regions in terms of their attractivity factors. Moreover, it would be interesting to perform the empirical analysis also for different nations and for international tourism, and to apply the same modeling framework not only to tourism policies, but also to other spatial interaction contexts involving flows of goods or people.

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Appendix

A. ***Analytical properties of Equations* (9) *and* (10)**

Equations (9) and (10) have the following properties:

$$T_{ij}(.|0,\beta) = y^{\beta} d^{-\gamma} \;;\; T_{ij}(.|\alpha,0) = x^{\alpha} d^{-\gamma} \;;\; T_{ij}(.|0,0) = d^{-\gamma}; \tag{25}$$

$$T_{ji}(.|0,\beta) = x^{\beta} d^{-\gamma} \;;\; T_{ji}(.|\alpha,0) = y^{\alpha} d^{-\gamma} \;;\; T_{ji}(.|0,0) = d^{-\gamma}, \tag{26}$$

so that in the case of unilateral interaction between the regions ($\alpha = 0$ or $\beta = 0$) the gradient of tourism flows depends only on the signs of parameters α and β:

$$\partial T_{ij}(.|0,\beta)/\partial x = 0\,; \partial T_{ij}(.|0,\beta)/\partial y = \beta y^{\beta-1} d^{-\gamma}\,; \partial T_{ij}(.|\alpha,0)/\partial x = \alpha x^{\alpha-1} d^{-\gamma}\,; \partial T_{ij}(.|\alpha,0)/\partial y = 0\,; \tag{27}$$

$$\partial T_{ji}(.|0,\beta)/\partial x = \beta x^{\beta-1} d^{-\gamma}\,; \partial T_{ji}(.|0,\beta)/\partial y = 0\,; \partial T_{ji}(.|\alpha,0)/\partial x = 0\,; \partial T_{ji}(.|\alpha,0)/\partial y = \alpha y^{\alpha-1} d^{-\gamma}. \tag{28}$$

Furthermore, in the case regions are independent ($\alpha = \beta = 0$), only the distance between the regions affects tourism flows, while in the more complex case of multilateral interactions ($\alpha \neq 0$ and $\beta \neq 0$) the analytical properties of tourism flows are reported in Equations (11) and (12).

B. ***Proof of Lemma* 1**

The first order conditions (FOCs) of maximization program (17) are:

$$\partial Y_i/\partial x = \beta x^{\beta-1} y^{\alpha} - \alpha x^{\alpha-1} y^{\beta} = 0\,; \tag{29}$$

$$\partial Y_i/\partial y = \alpha x^{\beta} y^{\alpha-1} - \beta x^{\alpha} y^{\beta-1} = 0\,. \tag{30}$$

Since $x, y > 0$, we can divide Equation (29) by $x^{\beta-1} y^{\beta}$ and Equation (30) by $x^{\beta} y^{\beta-1}$ in order to obtain:

$$\beta x^{\alpha-\beta} - \alpha x^{\alpha-\beta} = \varphi(x, y|\alpha,\beta) = 0\,; \tag{31}$$

$$\alpha y^{\alpha-\beta} - \beta y^{\alpha-\beta} = \phi(x, y|\alpha,\beta) = 0\,. \tag{32}$$

These FOCs have opposite sign, $\varphi = -\phi$, so that the function Y_i is monotonic both in x and y but with opposite gradients. As a result, the optimal values of the bounded policy variables correspond to opposite regional policies (minimum and maximum values of policy variables). At the optimal minimum value $x_{\min}$ corresponds the preferred maximum value $y_{\max}$, while at the optimal maximum value $x_{\max}$ corresponds the preferred minimum value $y_{\min}$.

In other words, the optimal policy for the region i is defined by choosing its own policy variable (x) and by stating a preference on the other region's one (y), conditional to the signs of α and β. Table 2 shows the corresponding policy mix.

The same happens, given the necessary modifications, for region *j*: once defined its own optimal policy, the region prefers for the other region to implement an opposite regional policy.

C. *Proof of Theorem* 1

Recalling that $\Delta_i = -\Delta_j$, optimization program (19) becomes:

$$\max_y \; Y_j = m_j d^{-\gamma} \Delta_j = \max_y \; m_j d^{-\gamma} (-\Delta_i) \cong \min_y \; m_j d^{-\gamma} \Delta_i \,. \tag{33}$$

The FOCs of optimization programs (18) and (33) are respectively:

$$\beta x^{\beta-1} y^{\alpha} - \alpha x^{\alpha-1} y^{\beta} = 0 \,; \tag{34}$$

$$\alpha y^{\alpha-1} x^{\beta} - \beta y^{\beta-1} x^{\alpha} = 0 \,, \tag{35}$$

which can be simplified as:

$$\beta y^{\alpha-\beta} - \alpha x^{\alpha-\beta} = 0 \,; \tag{36}$$

$$\alpha y^{\alpha-\beta} - \beta x^{\alpha-\beta} = 0 \,. \tag{37}$$

Dividing both Equations (36) and (37) by $y^{\alpha-\beta}$, they are equal under the following condition:

$$\beta - \alpha (x/y)^{\alpha-\beta} = \alpha - \beta (x/y)^{\alpha-\beta} \,; \tag{38}$$

$$-(x/y)^{\alpha-\beta} (\alpha - \beta) = \alpha - \beta \,; \tag{39}$$

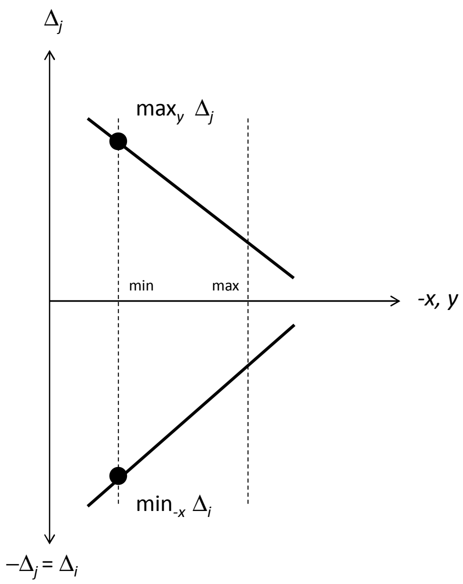
$$(x/y)^{\alpha-\beta} = -1 \quad \text{or} \quad y = -x \,. \tag{40}$$

It is then straightforward that policy variables x and y have opposite sign, so that optimization program (33) becomes:

$$\min_y \; m_j d^{-\gamma} \Delta_i \cong \min_{-x} \; m_j d^{-\gamma} \Delta_i \,. \tag{41}$$

Figure 1 shows that $\min_{-x} \; m_j d^{-\gamma} \Delta_i \cong \max_{y} \; m_i d^{-\gamma} \Delta_j$, that is, optimization programs (18) and (19) are equivalent and have the same solution. Figure 1 shows that the optimization programs of regions i and j have the same solution: either $(x_{\min}; y_{\min})$ or $(x_{\max}; y_{\max})$, depending on the gradient of the function $\Delta_i = -\Delta_j$, that is, on the values of parameters α and β. In conclusion, the two regions' optimization programs yield equal policies in a typical Cournot-Nash equilibrium.

Figure 1. Cournot-Nash equilibrium (Theorem 1)



D. *Proof of Theorem* 2

The proof is straightforward, since the national policymaker's optimization program (23) is the same maximization program (17) of Lemma 1.

Given that by assumption $m_i > 0$ and $d^{-\gamma} > 0$, and by construction $m_i > m_j$, the result is the same of Lemma 1: the optimal national policy consists of opposite regional policies, and precisely the policy mix preferred by the region with the greater tourism multiplier.

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