Exploring the Link between Cohesion Funds and Tourism Attractiveness: Evidence from Italian Municipalities

Abstract

This study investigates the relationship between EU Cohesion Policy-funded tourism investments and the attractiveness of Italian municipalities. Utilizing data from OpenCoesione, the research classifies tourism projects to differentiate between various investment types and estimates their association with alternative tourism outcomes through spatial panel models. The findings reveal that Cohesion Policy funds are generally linked to higher tourism attractiveness, although the relationship varies depending on the type of investment. Investments for businesses demonstrate synergies with investments for transportation, while all categories show non-linear dynamics, with diminishing marginal returns at higher expenditure levels. These results underscore the intricate nature of tourism funding, providing valuable insights for policymakers aiming to optimize investment strategies.

Keywords: Tourism, territorial attractiveness, municipal analysis, Cohesion Policy, tourism investments, spatial analysis, Italy.

1. Introduction

Tourism is widely recognized as a key driver of economic growth (Liu & Wu, 2019; Khoshnevis Yazdi et al., 2017; Enilov & Wang, 2022; Alcalá-Ordóñez & Segarra, 2025), contributing to local development both directly and indirectly. Direct effects stem from tourist expenditures on accommodation, dining, transportation, and cultural and recreational activities, generating immediate revenue for local businesses and creating employment opportunities. Indirect effects, on the other hand, extend to related industries such as food production and local crafts, while investments in tourism infrastructure enhance accessibility and may benefit other sectors as well.

In Italy, the tourism sector is particularly relevant. It accounts for approximately 13% of GDP, with over 134 million arrivals and 451 million overnight stays recorded in 2023 (Italian National Institute of Statistics, 2024). In 2022, this industry employed about 1.4 million individuals across 33,000 hotels and 183,000 non-hotel accommodations. According to the latest Eurostat data (Eurostat, 2024), Italy ranked as the second most popular destination in Europe for international and total overnight stays in 2023 and fifth worldwide for international tourist arrivals (UNWTO, 2023). The country's tourism spending from abroad reached €51.6 billion in 2023. Furthermore, in 2024, Italy boasts the highest number (60) of UNESCO World Heritage sites globally (UNESCO, 2024). Before the Covid-19 outbreak, Italy’s tourism sector enjoyed steady growth, with arrivals and stays increasing annually. Between 2014 and 2019, tourist stays rose by 15.3% in Italy. This growth was even more pronounced in specific cities: Verona experienced a 63% increase in stays, Bologna 47%, and Rome 30%.

Tourism is inherently a local phenomenon and plays a crucial role in maintaining high living standards, particularly in mountainous areas where it serves as a key source of income (Sociometrica, 2023). Within the same region, municipalities can exhibit significant differences in tourism potential, infrastructure, economic development, and socio-demographic characteristics (Hernández-Martín, 2016). An analysis at the regional or provincial level may overlook this heterogeneity, whereas a municipal-level approach allows researchers to capture local variations and better understand tourism dynamics. granularity of policy implementation. Additionally, since tourism support programs and funding mechanisms are often designed and implemented at the local level, studying the outcomes associated with tourism investments at the municipal scale can provide a more precise and policy-relevant perspective, addressing an important gap in the literature.

The Italian government promotes tourism competitiveness through a variety of funding channels, including national budgets, regional development funds, and EU Cohesion Funds. The European Union Cohesion Policy (CP) is a comprehensive regulatory mechanism to support economic and social development and mitigate regional disparities within the Union's territories (Bachtler et al., 2017). This Policy allocated €11.9 billion to the thematic objective “Culture and Tourism” in Italy during the 2017-2013 and 2014-2020 programming cycles, including a wide variety of projects, from the renovation of cultural heritage to digital innovation in hotels, as well as the organization of events. Municipalities aiming to invest in tourism can access CP funds by applying for specific projects, through competitive calls for proposals managed by national or regional authorities. Private entities can also apply directly for these funds or partner with municipalities on joint projects.

This study aims to examine the interplay between tourism investments funded by the CP at the municipal level, offering a comprehensive analysis of both short- and medium-term relationships.

Notably, prior research has typically overlooked such granular analysis, often focusing on broader provincial, regional, or national scales (Fratesi & Perucca, 2019; Crescenzi & Giua, 2020; Arbolino & Boffardi, 2017). In contrast, this research examines 2,033 municipalities, allowing for a detailed exploration of how these investments relate to tourism dynamics and revealing variations that may be overlooked in more aggregated studies.

Based on the application of a rich set of spatial panels model, our findings indicate that funds from the CP are generally associated with improved tourism attractiveness; however, the relationships vary depending on the type of investment. Significantly, these associations are usually confined to the municipalities where the investments occur and do not extend to neighboring areas. Furthermore, the patterns display non-linear characteristics, suggesting that once a certain investment threshold is achieved, the marginal return on additional funding may diminish and could even correlate negatively with further growth in tourism indicators.

The remainder of this paper is structured as follows. Section 2 provides a review of the literature on CP and its impact on regional growth, with particular emphasis on tourism. Section 3 outlines the data utilized. Section 4 presents some descriptive statistics. Section 5 presents the empirical strategy adopted for the study. Section 6 presents a discussion of the results. Section 7 offers robustness checks. Section 8 concludes and provides policy recommendations, by highlighting limitations and areas for future research.

2. Literature review

Cohesion Policy has been widely explored by academic literature, with particular attention given to their socio-economic impacts, e.g. effects on employment, regional investment, per-capita income growth, and the number of plants (Bachtler et al., 2017). Most studies indicate a positive impact, although heterogeneous and conditioned to absorptive capacity, institutional quality, human capital and territorial assets (Albanese et al., 2021; Arbolino & Boffardi, 2017; Cristofoletti et al., 2024; Crescenzi and Giua, 2020; Di Caro & Fratesi, 2021; Fratesi & Perucca, 2019; Gagliardi & Percoco, 2016; Giua, 2017). A few studies do not find significant effect (Dall'Erba & Le Gallo, 2008) or even a negative impact on regional growth (Eggert et al., 2007; Breidenbach, 2019). These variations in outcomes may be attributed to the differing methodologies, variables, and datasets used, as well as the distinct time periods examined in the analyses (Pieńkowski, J., & Berkowitz, P., 2016).

Despite this attention given to CP socio-economic impact, only a few studies investigate how CP funds specifically influence the tourism sector and often address the issue in a mainly descriptive manner. Smarandake (2018 and 2020) posits that EU Structural Funds may be linked to tourism development in Romania, as evidenced by a rise in both visitor arrivals and accommodation facilities from 2007 to 2017. Valente & Medeiros (2022) employ a combination of qualitative methods (including interviews and a literature review) and quantitative data to assess the impact of CP funds on sustainable tourism in the Algarve. They conclude that the available funding was insufficient for fostering a systemic shift in the region toward a sustainable tourism model, although they did identify some positive effects.

To the best of our knowledge, only a limited number of studies employ econometric techniques to explore the effects of CP on the tourism sector. Brandano and Crociata (2023) utilize a Synthetic Control Method to analyze the effects of CP over the programming period from 2007 to 2013 at the NUTS2 level. In detail, they measure tourism through the number of nights stayed in the low

season and assess cultural involvement via ticket sales for theatrical and musical entertainment, focusing their analysis on the Convergence regions (Campania, Apulia, Calabria, and Sicily). Their results indicate a positive association between CP expenditures and the cultural sector; however, they find these expenditures have been largely ineffective on the tourism sector in most regions. In contrast, Colaizzo et al. (2018) examine the impacts of CP on tourist attractiveness within the Apulia region using a Generalized Propensity Score method at the municipality level for the period 2007-2015. Their findings reveal an overall positive causal relationship between per-capita investments and tourist arrivals. Bachtler et al. (2017) highlights the importance of conducting disaggregated analyses of the CP to gain a deeper understanding of its nuanced effects across different sectors; nevertheless, the specific effects of tourism-related investments, particularly at the municipal level, remain an underexplored area in existing literature. This research tackles this gap by exploring the outcomes associated with tourism investments funded by the CP at the municipal level, providing policymakers and stakeholders with substantial evidence on these dynamics at a specific geographical level and within a targeted sector.

3. Data

The analysis was carried out on the “Tourism Attractiveness” policy-focused dataset available on OpenCoesione—the national Cohesion Open Data Platform. This database includes more projects than the database for Thematic Objective 6 “Culture and Tourism”[1], and it covers various incentive measures within the sector—such as enterprise competitiveness, mobility, and environmental initiatives—that could significantly influence tourism development.

The analysis focuses on projects completed (or expected to be completed) between 2014 and 2019, regardless of their programming period, to account for the significant overlap between different budget cycles. This selection reduces the sample to 14,087 projects. Among these, 2,047 projects have missing or zero values for the variable “realized cost” and are therefore excluded. Furthermore, 1,494 projects are classified as having a national scope, lacking a specific location, or being carried out abroad. After these refinements, the final dataset consists of 7,210 projects with a valid expenditure amount, a reference year, and a municipal-level designation. Table 1 summarizes the projects by year and programming period. Nearly half of these projects are from the prior budgetary period (2007-2013). Excluding them would introduce bias, as it would overlook the potential role of projects completed during those years that, despite not being part of the 2014-2020 cycle, were associated with outcomes within this period.

Table 1 - Projects per completion year and programming period.

[Insert Table 1]

[1] The Thematic Objective 6 “Tourism and Culture” includes infrastructural interventions for the protection and conservation of cultural heritage. It also includes interventions aimed at improving tourism services and promoting and enhancing natural resources (source: https://opencoesione.gov.it/it/coesione/temi/cultura-e-turismo/).

4. Descriptive Statistics

Table 2 ranks regions based on the number of projects and total expenditure completed between 2014 and 2019, with Campania, Puglia, and Sicily emerging as the top performers. These three southern regions collectively account for 55% of the total expenditure, underscoring the Cohesion Policy's emphasis on supporting less developed areas by allocating a larger share of funds. In contrast, Table 3 highlights the top 20 municipalities ranked by project count and total expenditure during the same timeframe. Perugia leads in project count, while the southern capitals of Naples and Bari dominate the list for total tourism-related expenditure. Additionally, Livinallongo del Col di Lana, a small village of about 1,000 residents in northern Italy, stands out for its significant expenditure, having invested in a new ski lift for its ski area. Similarly, Castel di Sangro, a town of approximately 6,000 residents in Abruzzo, has made considerable investments, including the construction of two new ski lifts.

Table 2 - Ranking of the Italian regions per number of tourism projects (left) and total expenditure (right) between 2014 and 2019.

[Insert Table 2]

Table 3 - Ranking of the top 20 Italian municipalities per number of tourism projects (left) and total expenditure (right) between 2014 and 2019.

[Insert Table 3]

Although the database already classifies projects based on different variables, the available classification system is not aligned to the objectives of this study. First, projects are classified by the nature of expenditure rather than their functional purpose or sector of application. Furthermore, the administrative categories are highly heterogeneous and suffer from a significant number of missing values, complicating the identification of specific investment types. Given that different tourism interventions—such as infrastructure versus marketing—may have varying relationships with a municipality’s attractiveness (Nguyen, 2021), a precise distinction is crucial for the analysis.

To address these limitations, we developed a robust, multi-layered classification algorithm based on dictionary-based text mining and administrative data triangulation. This approach integrates information from three distinct fields in the database: the project title and summary, the official administrative category, and the beneficiary’s NACE economic activity code.

The re-categorization followed a hierarchical stepwise procedure designed to maximize accuracy. First, projects were assigned based on unambiguous NACE codes (e.g., I-55.1 for Hotels), which offer the highest reliability for business-related investments. Second, we reallocated projects with specific administrative labels (e.g., “summary theme”, “category description”, “type of expenditure”) into our target categories when the administrative intent was explicit. Third, we performed a semantic analysis of project titles and summaries using a comprehensive dictionary of over 100 keywords. In cases of ambiguity, priority was given to the semantic content of the project title, as it typically describes the specific output of the investment more accurately than broad administrative labels.

To ensure the reliability of this automated procedure, we conducted a manual validation on a random sample of approximately 300 projects. This manual audit yielded an accuracy rate of 95%. The full coding scheme, including the list of keywords and NACE codes used, is provided in Appendix A to facilitate replicability. This process resulted in the identification of six distinct investment categories, which are detailed in Table 4.

Table 5 shows the number of projects, the total expenditure, and the percentage of total expenditure per each of the obtained categories. The maps in Fig.1, instead, show the spatial distribution of the municipalities involved for each project category.

Table 4 - Description of the project categories obtained after the re-categorization.

[Insert Table 4]

Table 5 - Number of projects, total expenditure, and percentage of expenditure per investment category (2014-2019).

[Insert Table 5]

Figure 1 - Distribution of municipalities where at least one project was funded for each category (2014-2019). A) Accommodation facilities B) Cultural and Natural Heritage C) Transport and Mobility D) Festival and Events E) Tourism businesses F) Non-tourism businesses.

[Insert Figure 1]

Tables 6 and 7 show, respectively, the variables used in the analysis with source and description and some descriptive statistics. The range of values varies significantly across variables. To ensure comparability of coefficients and mitigate issues from differing scales, all variables have been z-score normalized, resulting in a mean of 0 and a standard deviation of 1. Tourism attractiveness is measured in terms of arrivals and stays (both Italian and foreign), serving as the dependent variables. The final dataset consists of a balanced panel of 2,033 municipalities observed over the 2014–2019 period. While this number represents about 26% of all Italian municipalities, it is crucial to note that ISTAT releases disaggregated data on arrivals and overnight stays for only approximately 3,000 municipalities, largely due to statistical confidentiality regulations that suppress data for areas with very few accommodation facilities. Moreover, our sample is highly representative of the country's demographic and economic structure, since it accounts for 63% of the total Italian population. Figure 2 illustrates the municipalities considered in the current analysis.

Table 6 - Variables description.

[Insert Table 6]

Table 7 - Descriptive statistics.

[Insert Table 7]

Figure 2 - Italian municipalities included in the analysis.

[Insert Figure 2]

The realized cost[2] for each investment category has been selected as independent variable. We do not use fund commitment to avoid potential measurement errors since commitments may not always be fully executed or may encounter delays in being drawn down, often due to issues like limited absorption capacity. The total realized cost is entirely allocated to the completion year of each project, except for those associated with events. While the outcome of structural and infrastructural projects, such as renovations, can only be evaluated upon completion, the potential influence of festivals or structured events that span multiple years is assessed throughout the entire duration, from the project's start date to its end date.

Following established literature, population, per capita income, and educational level are used as control variables. Larger municipalities are generally linked with better infrastructure and services, which can attract more tourists (Pompili et al., 2019; Khadaroo & Seetanah, 2008). Per capita income is included to account for living standards, drawing from Paci & Marrocu (2014); Patuelli et al. (2014); Romão & Nijkamp (2018); Zamparini et al. (2017), among others. Lastly, the number of graduates serves as an indicator of human capital, as higher education levels may indicate a skilled workforce capable of enhancing tourism services and products (Dettori et al., 2012). Additional factors influencing tourism demand include crime rates and environmental conditions, although data limitations prevent their inclusion in this analysis. To address these issues, municipality and time-fixed effects are employed to control for unobserved characteristics that vary across municipalities and over time.

5. Empirical Strategy

Compared to literature, our methodology presents some innovative elements that are partly determined by the availability and specificity of the data. Crescenzi and Giua (2016) classify methodologies into two approaches: (1) contextualization, which investigates the factors that influence policy effects through techniques such as fixed-effects panel models and spatial interaction effects (Sala-i-Martin, 1996; Boldrin & Canova, 2001; Coppola et al., 2018; Dall'Erba & Le Gallo, 2008; Destefanis & Di Giacinto, 2024; Fiaschi et al., 2018; Scotti et al., 2022), and (2) identification, which utilizes counterfactual methods like Propensity Score Matching, Difference-in-Differences (Accetturo & De Blasio, 2012; Andini & De Blasio, 2016), and the Synthetic Control Method (Brandano & Crociata, 2023).

However, identification methodologies are not suitable for this study for several reasons. First, to establish a reliable control group, it is essential to distinguish between ineligible entities, those eligible entities that do not apply (due to issues such as limited administrative capacity or lack of awareness), and those that applied but were unsuccessful (due to factors like project quality or

[2] The realized cost is the value of works and project activities actually completed as of the reporting date, even if not yet paid.

misalignment with policy objectives). Unfortunately, this information is unavailable in the dataset, which introduces endogeneity issues and selection bias. Additionally, municipalities that are not treated in the current programming period may have received funding in previous cycles, thus skewing the effect estimates. Furthermore, municipalities that heavily depend on tourism are more inclined to apply for funding, complicating the attribution of increased tourism appeal solely to the funding (leading to concerns about reverse causality). Lastly, counterfactual methods rely on the *Stable Unit Treatment Value Assumption*, which assumes that funding to one spatial unit does not influence the outcomes of neighboring units. This assumption is often unrealistic in real-world scenarios, particularly at the municipal level where spillover effects are prevalent, and when analyzing tourism projects, since tourists typically explore the surrounding areas.

In line with the approach proposed by Pienkowski and Berkowitz (2016) and Llorca-Rodríguez (2025), which emphasizes the use of spatial econometrics to evaluate the effects of CP, a fixed effects spatial panel model has been utilized. The presence of spatial correlation for the primary dependent variable—overnight stays—was assessed using the Moran test (see Table 8). The results reveal that Moran's I is statistically significant and positive for each year analyzed, indicating robust evidence of spatial autocorrelation. This suggests that municipalities with higher tourist stays tend to be located near other municipalities with similar patterns. Furthermore, the declining values of Moran's I from 2014 to 2019 imply a gradual lessening of this clustering effect, likely reflecting an evolution in tourist preferences. Over time, visitors may increasingly gravitate towards less central or alternative destinations, leading to a more dispersed distribution of tourism activities across municipalities.

Table 8 - Moran's I statistics.

[Insert Table 8]

Using data from 2014 to 2019, a Spatial Durbin Model (SDM) with two-way fixed effects is employed to account for spatial correlation. A comparison was made among the SDM, the Spatial Autoregressive model (SAR), and the Spatial Error model (SEM) across various specifications. According to the Akaike and Bayesian Information Criteria (AIC, BIC), the SDM emerged as the best-fitting model. The SDM introduces spatial lags of the independent variables in addition to the dependent variable, which allows us to capture both direct associations (within a municipality) and indirect spatial spillovers (from neighboring municipalities). The model specification is as follows:

$$y_{it}=\rho \sum_{j=1}^{N} w_{ij} y_{it} + \beta X_{it} + \lambda \sum_{j=1}^{N} w_{ij} X_{it} + \gamma C_{it} + \alpha_i + \theta_t + \epsilon_{it}$$

Where:

- y_{it} is a measure of tourism attractiveness, e.g., Italian, foreign and total arrivals and overnight stays in municipality *i* at time t.
- ρ is the spatial autoregressive coefficient. It captures the spatial dependence of tourism attractiveness in municipality *i* on tourism attractiveness in neighboring municipalities.

- The term $\sum_{j=1}^{N} w_{ij} y_{\mathrm{it}}$ represents the spatial lag of the dependent variable.
- w_{ij} is defined as an inverse distance spatial weight matrix with a cut-off of 70 km[3], representing the spatial relationship between municipalities i and j based on geographic proximity.
- X_{it} is a vector of independent variables, representing the total expenditure by municipality i in year t for various project categories, with β measuring their direct association with tourism attractiveness.
- The term $\sum_{j=1}^{N} w_{ij} X_{\mathrm{it}}$ represents the spatial lag of the independent variable. This captures how the expenditure per neighboring municipality *j* relates to the tourism attractiveness of municipality *i*. The coefficient λ measures this spatial spillover.
- $C_{\mathrm{it}}$is a vector of control variables including population, per capita income, and number of graduates and γ represents the association of these control variables.
- α_i represents the Municipality-Level Fixed Effects, which control for time-invariant characteristics of each municipality, such as historical, geographical, or institutional factors that might affect tourism attractiveness.
- θ_t represents the Time Fixed Effects, which account for time-specific factors that affect all municipalities, such as national economic trends.
- ϵ_{it} is the idiosyncratic error term.

Due to data constraints[4], the long-term association of these investments cannot be assessed. Nevertheless, it is possible to account for a delayed or gradual link over time using a lagged SDM that incorporates lagged independent variables. This allows for assessing the relationship one and two years after project completion. The implementation of different projects within the same area may enhance their overall synergy. For instance, the positive connection between a new transportation initiative and tourist attraction could be amplified if it coincides with the introduction of a new cultural attraction within the same municipality. Interaction terms are incorporated into the model to capture these combined dynamics in situations where different project categories are completed simultaneously within the same municipality. Given the original six categories, including all possible pairwise and three-way interactions would result in an overly complex model. To address this, the categories were regrouped into three broader groups: 1) Businesses, including accommodation facilities, non-accommodation tourist businesses, and non-tourist businesses; 2) Heritage, both tangible and intangible, includes projects related to natural and cultural heritage as well as events; and 3) Transportation, kept separate to reflect its distinct relationship. This approach allows us to manage interaction terms while still capturing key synergies across different investment types.

6. Findings and Discussion

6.1. Main results

[3] The choice of a distance matrix with a 70 km cutoff is justified by the fact that tourists typically travel within a one-hour drive (approximately 70 km) for excursions, attractions, or alternative accommodations. However, alternative spatial matrices and different cutoff distances have been tested, confirming the robustness of the results (see Robustness Checks).

[4] The dependent variables (arrivals and stays) are not available at a municipality level before 2014.

Table 9 presents the results of the panel fixed effects Spatial Durbin Model analyzing the interplay between different categories of tourism investments, on the number of Italian, foreign, and total stays and arrivals. The spatial dependence parameter, lambda, remains consistently significant, indicating the presence of spatial autocorrelation and justifying the use of a spatial model. Given that the variables have been normalized, the resulting coefficients can be interpreted as the change in the dependent variable associated with a standard deviation change in the independent variable.

Table 9 - Results of the panel fixed effects Spatial Durbin Model.

[Insert Table 9]

Consistent with the theoretical framework (Crouch & Ritchie, 1999), investments in accommodation facilities exhibit a positive and highly significant direct association across all specifications. By financing the renovation, expansion, or creation of structures, these funds effectively relax local capacity constraints, enabling destinations to absorb greater tourist flows. Quantitatively, a one standard deviation increase in accommodation investment is linked to a 0.002 to 0.004 standard deviation increase in stays and arrivals. However, the spatial lag for accommodation facilities is not statistically significant, indicating that the benefits of expanding capacity are confined to the municipality where the investment occurs. This result aligns with the theoretical characterization of accommodation as a site-specific asset: as noted by Marrocu and Paci (2013), an upgrade in hotel capacity in one municipality enhances its own attractiveness without necessarily generating spillover benefits for neighboring towns, as the consumption of the service is strictly tied to the location of the facility.

Investments in cultural and natural heritage show a positive and significant relationship across all specifications, particularly for foreign arrivals. This confirms the theoretical view that heritage assets act as primary “pull factor” in a destination's attribute bundle (Papatheodorou, 2001; Brida et al., 2013; Cerisola & Panzera, 2025) that not only attract visitors (arrivals) but, by increasing the volume of available activities, may also encourage longer durations of visit (stays). However, the spatial lags for these investments are not statistically significant. This finding should be interpreted with caution, as it likely reflects structural limitations in the data rather than a true absence of economic externalities. First, arrivals and stays are recorded solely based on the location of the accommodation, providing no insight into the municipalities tourists actually visit during their stay. Consequently, if a tourist sleeps in municipality i but travels to municipality j to visit a funded heritage site, the model fails to capture this interaction. Second, valid economic spillovers may remain undetected because official statistics do not account for flows from the shadow hospitality sector, such as Airbnb. If heritage investments stimulate demand that is absorbed by short-term rentals rather than traditional hotels, the spatial coefficients will be biased downward. Together, these data limitations suggest that the true cross-municipal impact of cultural investments is likely underestimated.

Theoretically, investments in transport infrastructure are linked to reduced travel costs and increased accessibility (Khadaroo & Seetanah, 2008), leading to an expectation that they will primarily drive tourist arrivals rather than duration of stay. Our empirical results strongly support this hypothesis: while transport investments exhibit a positive and significant relationship with both Italian and total arrivals, they show no significant association with stays in any specification. This contrast suggests that while improved accessibility facilitates the decision to travel to a destination,

it does not necessarily incentivize a longer duration of visit. These findings align with recent work by Scotti et al. (2024), who argue that transportation facilities increase the attractiveness of municipalities for same-day visits and arrivals, whereas overnight stays are driven by the availability of accommodation and cultural resources. Furthermore, the lack of a “stay” effect may also reflect the complexity of travel networks; as noted by Bergantino et al. (2023), enhancing a single type of infrastructure does not guarantee overall accessibility, as tourists rely on multimodal transport chains. Consequently, while these investments successfully lower the barrier to entry (arrivals), they do not independently generate the utility required to extend the stay.

Event-related investments, such as festivals, marketing actions, and tourist information projects, exhibit a positive and significant association with both stays and arrivals across all specifications. This confirms that “animating” a destination through festivals and promotional activities is effective in attracting a broad spectrum of both domestic and foreign tourists. These findings align with Getz (2008), who argues that event portfolios are essential for competitiveness and overcoming seasonality. Notably, the spatial lag for event investments is marginally significant for Italian stays. This suggests that domestic visitors may spill over into neighboring municipalities for accommodation, likely due to capacity constraints in the host municipality during peak event periods.

From a theoretical perspective, investments in both tourism and non-tourism businesses—such as restaurants, cafés, souvenir shops, and other complementary services—are expected to enhance the quality and efficiency of destination services, contributing to the overall visitor experience and, ultimately, to destination attractiveness (de Souza et al., 2020). Our empirical results strongly support this theoretical framework: investments in non-tourism businesses are positively associated with both stays and arrivals across all model specifications, while investments in tourism businesses other than accommodation facilities exhibit positive and statistically significant relationships with tourism performance in most specifications, with the exception of Italian stays. However, a distinct pattern emerges regarding spatial interactions: both tourism- and non-tourism businesses exhibit negative and statistically significant spatial lags. This indicates a potential competitive dynamic, which aligns theoretically with the “substitution effect” in spatial competition (Papatheodorou, 2001). When neighboring municipalities offer similar commercial amenities (e.g., restaurants, retail, or leisure services), they compete for the same pool of visitors. Consequently, an improvement in the business environment of one municipality increases its relative utility, functioning as a substitute for, rather than a complement to, neighboring areas. This suggests that while business-related investments are linked to higher local attractiveness, they may also generate a “market stealing” effect in the short term by diverting demand from surrounding municipalities.

6.2. Analysis with temporal lags

Table 10 presents the results of the lagged Spatial Panel Fixed Effects models at lags 1, and 2, which present the relationships one and two years after project completion, respectively. Investments in accommodation facilities are associated with arrivals both immediately and after two years. Cultural and natural heritage investments initially have a positive relationship (lags 0 and 1), but the coefficient becomes negative at lag 2, indicating that over time, the initial positive association may diminish or even reverse. Transport investments show a positive relationship with arrivals only at lag 0, while investments in events, non-tourism businesses, and tourism businesses (excluding accommodations) consistently show a strong positive link to arrivals over time. Spatial lag coefficients for heritage, transport, and events are generally insignificant over time. In contrast,

the spatial lags for non-tourism and tourism businesses show mixed results, shifting from negative to insignificant across different time lags.

Table 10- Estimates of the lagged Spatial panel fixed effects model for total arrivals.

[Insert Table 10]

6.3. Non-linear relationships

To capture potential non-linear effects of tourism investments on total stays and arrivals, the model incorporates squared independent variables. A Spatial Autoregressive (SAR) model was selected over a Spatial Durbin Model (SDM) to prioritize parsimony by excluding the spatial lags of independent variables, and investments were aggregated across all business types. Table 11 presents the results: all primary investment categories—Businesses, Heritage, Transport, and Events—exhibit positive and significant initial coefficients, while their squared terms are significantly negative. This indicates a non-linear, inverted U-shaped relationship where returns eventually diminish.

From an economic perspective, this implies that initial capital outlays effectively target critical bottlenecks, such as essential infrastructure upgrades or heritage restoration, thereby generating high marginal utility. However, once a certain investment threshold is surpassed, marginal returns decline as funds are diverted to lower-priority projects. This trajectory aligns with established literature on the non-linear dynamics of regional funding and points to absorption capacity constraints. As suggested by previous studies (Becker et al., 2012; Cerqua & Pellegrini, 2018; Colaizzo et al., 2018; Cristofoletti et al., 2024; Adedoyin et al., 2022), local administrations often face fixed technical and human capital endowments that make it difficult to manage large capital inflows efficiently. Consequently, excessive investment can trigger administrative congestion and delays, resulting in the observed decreasing marginal utility.

Table 11 - Results of the Spatial Autoregressive model to capture non-linear relationships.

[Insert Table 11]

The turning points where the diminishing returns become significant are computed for each investment category (Table 12)[5]. Investments in businesses and heritage show higher thresholds, meaning that up to approximately €504,000 and €434,000 per municipality, these categories maintain a positive relationship with tourism indicators. In contrast, transport and events have

[5] The turning points are obtained by calculating the first derivative of the model with respect to each variable.
Example: in the model with stays as a dependent variable, the coefficients for the category “Business” are $\beta_1 = 0.0180$ and $\beta_2 = -0.0104$.
Therefore, $\partial Y/\partial X = \beta_1 + 2\beta_2 X = 0$ $X = -(\beta_1 / 2\beta_2)$ $X = -[0.018 / 2 \times (-0.0104)] \approx 0.87$
Since all the variables have been z-score normalized, the obtained thresholds have been converted from standard deviation units into real terms (euros), to allow for interpretation, using the following expression: *Threshold (euros) = mean + (z-score threshold × standard deviation).*
X = 46,719.56 + (0.87 x 525,794.9) = 504,161.12

lower thresholds, indicating that diminishing returns set in at lower investment levels. It is crucial to consider that the expansion of platform-based lodging (e.g., Airbnb) may introduce a downward bias in the estimated turning points. Because excess demand is absorbed by the shadow hospitality sector, official data may signal that the threshold for diminishing returns has been reached at a lower level of investment than is actually the case for the total market.

Table 12 – Thresholds for each investment category (per municipality).

[Insert Table 12]

6.4. Synergistic relationships

To capture potential synergies among different types of investments, we include interaction terms between various investment categories. Table 13 presents the results of the Spatial Durbin models that incorporate these interaction terms, using total stays and total arrivals as dependent variables. The interaction of “Business – Heritage” demonstrates a negative relationship, likely reflecting misalignment in the objectives or target audiences of these investments. The interaction between Heritage and Transport is not statistically significant for stays, while it shows a negative yet marginally significant association with arrivals. In contrast, the interaction between Businesses and Transport is positive and highly significant for both stays and arrivals. This suggests that investments in transport infrastructure may complement business investments, correlating with higher tourist arrivals and longer stays. Finally, the triple interaction indicates a positive and significant coefficient solely on arrivals, suggesting that combining investments in business, heritage, and transport is linked to a synergistic dynamic associated with more tourists, although this is not reflected in longer stays. The spatial lags of all interaction terms are not statistically significant, indicating that the implications of these interactions do not extend to neighboring areas.

Table 13 - Results of the Spatial Durbin Model models including interaction terms.

[Insert Table 13]

7. Robustness checks

To ensure the robustness of these results under different assumptions about spatial dependence, a sensitivity analysis was conducted using various spatial matrices. Exponential matrices, which assign greater weight to closer neighbors, are particularly suitable for scenarios where spatial dependence is expected to decay gradually, as is often observed in regional economic interactions. K-nearest neighbor matrices ensure that each municipality interacts with its nearest neighbors, regardless of distance, while distance-based matrices provide a more nuanced view of spatial relationships. The results of the SDM were compared across several matrix specifications, including exponential matrices with exponents of 2 and 3, a K-nearest neighbors matrix with k=5, and a distance matrix with cut-offs ranging from 40 to 80 km. The findings from this sensitivity analysis are presented in Tables 14 and 15. The coefficients proved robust, retaining their significance and signs across all specifications, with only minor variations in magnitude.

Table 14 - Sensitivity analysis with different spatial weight matrices.

[Insert Table 14]

Table 15 - Sensitivity analysis with distances matrices at different cut-offs.

[Insert Table 15]

8. Conclusions and Policy Implications

This research fills a critical gap in the literature by analyzing the interplay between Cohesion Policy and tourism attractiveness at the municipal level across Italy. Despite the increasing global reach of the tourism industry, driven by the rise of major online booking and travel platforms, tourism remains inherently local, as visitors primarily consume goods and services in the places they visit. This underscores the need for a more granular, municipality-level analysis to better understand the sector's development. Moreover, analyzing tourism at the municipal level allows for a more precise assessment of local dynamics, as regional-level analyses may overlook critical differences between municipalities in terms of tourism attractiveness. Additionally, previous studies tend to overlook the diversity of investment types funded through CP, often focusing solely on total expenditure rather than examining how different types of investments influence tourism outcomes. This research addresses that limitation by systematically reclassifying projects into six distinct investment categories, moving beyond the broad and imprecise classifications of the OpenCoesione database.

Based on our findings, several policy implications arise for policymakers and local stakeholders seeking to improve public fund allocation and optimize investment strategies. First, the overall positive interplay between the CP and tourism attractiveness underscores the need for their sustained support. Policymakers should ensure that these funds remain a central component of regional development strategies, given their consistent positive association with tourism indicators across multiple investment categories. Second, this study reveals that different types of CP-funded investments exhibit distinct relationships with tourism attractiveness, highlighting the limitations of a one-size-fits-all approach and the need for targeted investment strategies. Based on our results, policymakers could prioritize investment categories that are most robustly linked to tourism attractiveness, such as projects that preserve cultural and natural heritage, support event promotion and organization, and strengthen tourism businesses. In addition, they could focus on those investments that are more coherent with the tourism strategy defined at the local level. For example, while investments in transport infrastructure are primarily associated with higher tourist arrivals, their relationship with the length of stays is less pronounced. In contrast, investments in cultural and natural heritage show a particularly strong correlation with foreign visitors. Therefore, these results give policymakers an instrument to support the alignment of investment strategies with local development objectives, whether the goal is to increase visitor numbers or improve the overall quality of the tourism experience.

Furthermore, considering the high granularity of this study, another valuable insight reveals that the positive outcomes associated with investment are largely confined to the municipalities where funds are allocated, indicating that these localized dynamics do not naturally ripple out to

neighboring areas. This general absence of spatial spillovers is a significant policy finding in itself, as it indicates administrative fragmentation and a lack of inter-municipal coordination. It suggests that municipalities often operate as “islands”, competing rather than cooperating to create integrated territorial destinations. Consequently, the potential for agglomeration economies—where a tourist visiting one town also spends time and money in neighboring ones—remains largely untapped due to a failure in designing cohesive territorial strategies.

The observed synergy between investments in business development and transport suggests that coordinated investment strategies can significantly enhance both tourist arrivals and total stays. To maximize the potential utility of public funding on tourism attractiveness, policymakers and stakeholders should prioritize integrated projects that leverage these complementarities, ensuring a more efficient and sustainable use of resources. Finally, the non-linear relationship between investment levels and tourism outcomes, with diminishing marginal returns at higher spending levels, likely indicates the presence of absorption capacity constraints. This suggests that local administrations may face difficulties in efficiently managing and deploying funds beyond a certain threshold. Therefore, monitoring marginal benefits and prioritizing administrative efficiency, rather than increasing expenditure indefinitely, is crucial for ensuring the cost-effective use of public resources.

While this study provides valuable insights, it is not without its limitations. The available data on stays and arrivals at the municipal level begins only in 2014 and is restricted to tourism-oriented areas as classified by the Italian National Institute of Statistics, excluding emerging destinations that may also be involved in CP initiatives. Additionally, official statistics fail to account for arrivals and stays from short-term rentals, such as those listed on Airbnb. This omission represents a significant constraint, as the sharing economy has become a structural component of Italian tourism. This data gap has two major implications for the interpretation of our results. First, it leads to an underestimation of the total volume of tourism demand generated by the investments. Second, it may bias the detection of spatial spillovers, since tourists attracted by an investment in one municipality might choose to stay in neighboring areas using peer-to-peer accommodation.

From the methodological perspective, we acknowledge a potential endogeneity issue arising from the self-selection of municipalities into CP projects. We posit that this likely results in an upward bias in our estimates. Municipalities with higher administrative capacity or a more established tourism sector—factors inherently correlated with positive tourism outcomes—are generally more successful in applying for competitive funds. Consequently, our estimates may capture not only the benefits of the investment but also the unobserved quality of the local administration. In light of this, our results should be interpreted as robust structural associations describing the positive link between investment intensity and tourism flows, rather than as causal effects isolated from local institutional characteristics. Unfortunately, this issue cannot be fully addressed because data on the criteria or processes guiding municipalities’ participation decisions are not available, preventing the implementation of quasi-experimental methods such as instrumental variables.

Future research could integrate novel data sources to enrich the measurement of tourism flows. Specifically, the use of Big Data such as mobile positioning data, credit card transaction logs, or social media footprints could solve the limitation of official statistics, which record only the “place of stay” (accommodation) but not the “place of visitation”. Tracking the actual mobility of visitors across municipal borders would provide a much more accurate picture of spatial interactions and allow researchers to better identify the spillover effects that traditional metrics fail to capture. Furthermore, future research could consider alternative indicators, such as web-scraped data on

short-term rentals (e.g., AirDNA or InsideAirbnb). Incorporating this “shadow” supply would offer a more comprehensive understanding of how CP funds influence the total tourism capacity and attractiveness of a territory, correcting for the potential substitution effects between traditional and platform-based accommodation.

Finally, the study does not consider certain local contextual factors, such as administrative capacity and the quality of municipal governance, due to the lack of granular data at the municipal level. Beyond implying a potential upward bias driven by administrative competence, this factor provides a compelling explanation for the lack of spatial spillovers: institutional fragmentation likely prevents municipalities from coordinating to generate positive externalities. Future research should unpack this heterogeneity using governance proxies, such as the European Quality of Government Index (EQI). Ultimately, our findings suggest that Cohesion Policy must couple financial transfers with targeted capacity building to foster the inter-municipal cooperation required for sustainable tourism development.

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