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RESEARCH NOTE

# An analysis of sub-national tourism in Japan: Tourist and economic spillovers and their determinants

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## Introduction

The rapid growth of the tourism sector creates an exceptional level of competition between locations (Romão, Guerreiro, & Rodrigues, 2017), as tourists can travel almost without restraint between territories, creating agglomeration phenomena beyond administrative borders ("*spillover effects*", Yang and Wong (2012)), which are able to strengthen the functional relationship between neighbors, resulting in tourism "*inter-regional clusters*" (Majewska, 2017).

As regional tourism demand is not homogeneous across space, different spatial patterns may exist (Yang & Wong, 2013), making necessary to study tourism activities to craft strategies for managing future flows (Kang, Kim, & Nicholls, 2014).

Despite the abundance of studies on national tourism development and competitiveness, comparative sub-national analyses within the same countries are scarce (Comerio & Strozzi, 2019; Pablo-Romero & Molina, 2013). Brenner (2009) called for such empirical analyses, highlighting how shifting emphases between successive administrations may have significant implications.

Among the open challenges in this field (e.g. Majewska, 2015; Romão & Nijkamp, 2018; Yang & Fik, 2014), a more precise quantification of the tourism spatial agglomeration phenomenon beyond administrative boundaries is the most predominant one (Majewska, 2017), especially through the study of two different spillovers: the "*economic spillover effects*" (ESE) driven by tourism development and the exploration of the determinants of "*tourist spillover effects*" (TSE).

These two spillovers are essential to accomplish the objectives set by governments to increase the overall economic growth through tourism sector: one of the most notable examples worldwide is Japan, where the reinforcement of tourism is currently one of the pillars of the *Abenomics*, aiming to transform it into the "*centerpiece of regional revitalization*" (The Government of Japan, 2017). Indeed, the country has been one of the fastest growing major destinations in the last decade, with 31.2 million overseas travelers in 2018, a rise of 8.7% from 2017, more than 300% since 2010 (JTB Corp., 2019).[1]

However, going beyond the sheer increase in the number of tourists, we aim to simultaneously identify the evolution of the tourism inter-regional clusters and to pinpoint the existence and the determinants of ESE and TSE between the 47 Japanese prefectures, by means of two methodologies: an explorative spatial data analysis (ESDA) and two spatial panel models, one with the Gross Prefectural Production (GPP) and the other with the number of overnight stays (OS) as dependent variables, characterizing respectively the regional dynamics of economic development and tourism growth.

By identifying the drivers of spillover effects, our work provides several implications which can assist policy makers intending to replicate similar initiatives in other contexts.

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[1] Compared to the +257% in Sri Lanka, +216% in Vietnam, +150% in Cambodia, +140% in Thailand and +127% in Laos.

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**Table 1**
Economic spillover model.

| Variable | Unit of measure | Coef. | Std. err. | Z-stat | p-Value |
|---|---|---|---|---|---|
| Dependent variable | | | | | |
| GPP growth | Annual percentage change | | | | |
| Main | | | | | |
| GPP lag | Logarithm | −0.437 | 0.046 | −9.41 | 0.000*** |
| GVA tourism | Logarithm | 0.151 | 0.015 | 10.20 | 0.000*** |
| OS | Logarithm | 0.023 | 0.010 | 2.23 | 0.026** |
| University graduates | Logarithm | 0.025 | 0.009 | 2.73 | 0.006*** |
| Natural parks | % of total surface | 0.151 | 0.087 | 1.73 | 0.083* |
| Spatial effects | | | | | |
| OS | Logarithm | 0.027 | 0.008 | 3.33 | 0.001*** |
| Natural parks | % of total surface | 0.168 | 0.101 | 1.66 | 0.096* |
| Spatial auto-correlation coefficient (ρ) | | 0.501 | 0.036 | 14.01 | 0.000*** |

*** Indicates significance at the 0.01 level.
** Indicates significance at the 0.05 level.
* Indicates significance at the 0.1 level.

**Table 2**
Tourism spillover model.

| Variable | Unit of measure | Coef. | Std. err. | Z-stat | p-Value |
|---|---|---|---|---|---|
| Dependent variable | | | | | |
| OS | Logarithm | | | | |
| Main | | | | | |
| GPP | Logarithm | 0.38 | 0.148 | 2.55 | 0.011** |
| Shinkansen stops | Number | 0.02 | 0.008 | 2.29 | 0.022* |
| Museums | Number | 0.01 | 0.004 | 1.74 | 0.082* |
| Conferences | Number | 0 | 0 | 3.93 | 0.000*** |
| Hotel | Logarithm | 0.37 | 0.181 | 2.03 | 0.042** |
| Spatial effects | | | | | |
| Spatial auto-correlation coefficient (ρ) | | 0.810 | 0.027 | 29.6 | 0.000*** |

*** Indicates significance at the 0.01 level.
** Indicates significance at the 0.05 level.
* Indicates significance at the 0.1 level.

## Data and methodologies

In the existing literature it is common to use the Local Moran's I, with the following formula (Kang et al., 2014):

$$I_i = \frac{x_i - \mu}{\left(\sum_i \frac{(x_i - \mu)^2}{N}\right)} \sum_j W_{ij}\,(x_j - \mu)$$

The $x_i$ and $x_j$ represent the OS values (and μ the average) between two spatially connected prefectures, as defined by the $W$ spatial weighting matrix, mandatory to estimate spatial effects: due to the Japan's shape we choose a second level rook contiguity matrix, enabling spillovers with neighbors and neighbors of neighbors sharing a common border. As in previous studies (Marrocu & Paci, 2013, Romão & Nijkamp, 2018), this allows us to consider spillovers from islands (Hokkaido and Okinawa), neglected with the other $W$ matrices.[2] Finally, N is the total number of prefectures.

This statistic allows us to identify the size of statistically significant clusters of a variable around particular locations: 0 indicates a random spatial pattern, positive (negative) values suggest the existence of a positive (negative) autocorrelation, called "High-High" and "Low-Low" ("High-Low" and "Low-High"). The most interesting ones are the "hotspots" (HH), having the potential to convey positive geographic spillovers, creating broader inter-regional tourism clusters.

To find out what drives these results, we deepen our analysis with two Spatial Durbin models, with the following general specification (Fischer & Getis, 2009):

[2] We tried other W matrices, i.e. inverse distance and different method of normalization, as in Romão and Saito (2017), obtaining qualitatively similar results. We omit them for sake of brevity, but these are readily available upon request.

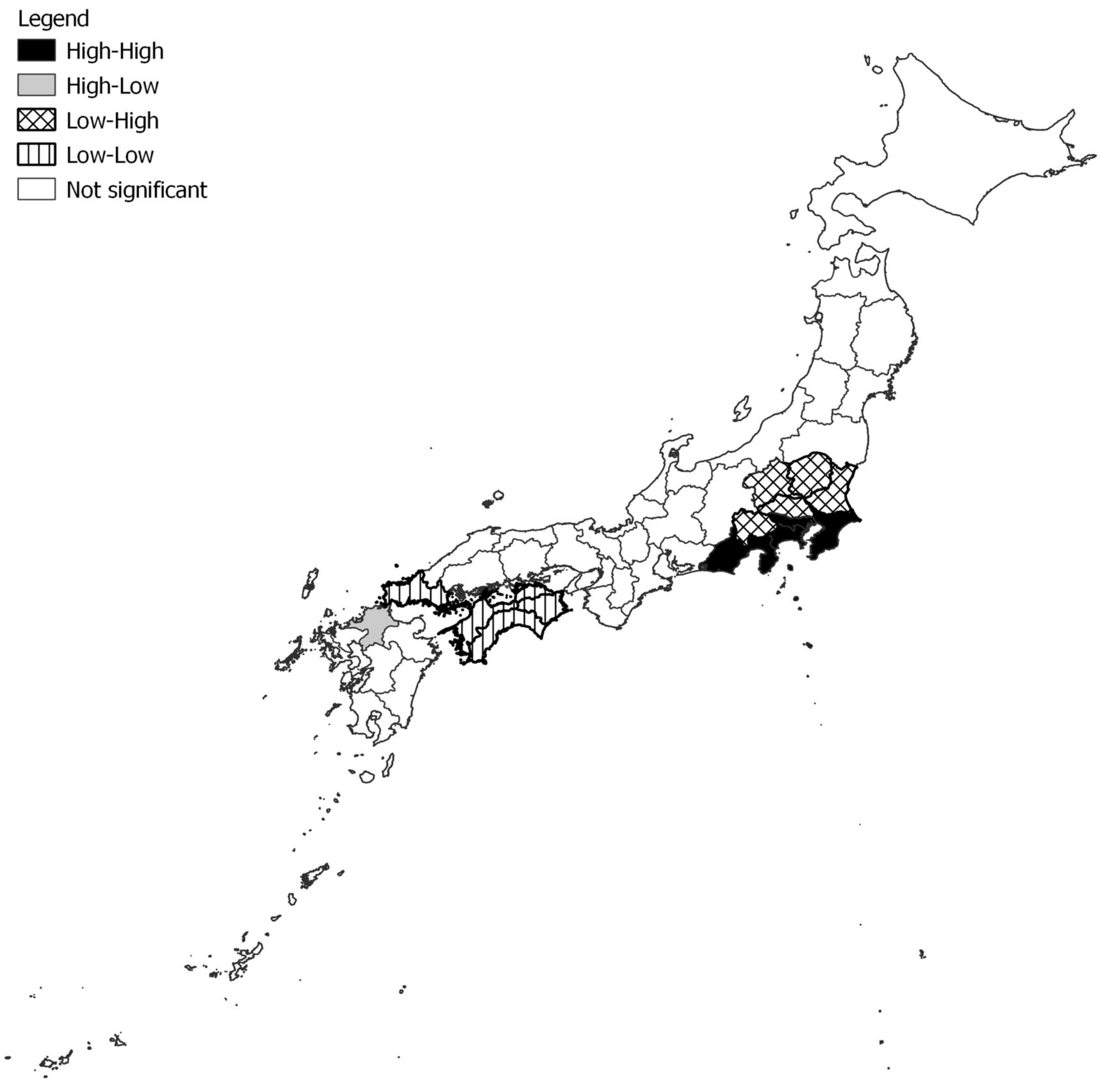


**Fig. 1.** Local Moran's I significance maps for OS in Japanese prefectures (2016).

$$Y_{it} = \rho \sum_{j=1}^{N} W_{ij} y_{jt} + X_{it}\beta + \gamma \sum_{i=1}^{N} W_{ij} X_{jt} + u_t + \varepsilon_{it}$$

*Yit* is the dependent variable for the *i-th* prefecture observed, *X* is a vector of independent variables, *ui* represents the individual fixed effects and $\varepsilon$ identifies the error term; ρ and γ are the weighted values of spatial auto-correlation and independent variables observed in neighbors, respectively, while *W* and *N* are the same as in the Moran's I.

Since we aim to identify two different kinds of spillovers, we avoid a simultaneous estimation preferring instead separated ones, as these allow for a more rigorous identification.

Both models started from the most comprehensive specifications, reducing the number of variables included based on their significance, as in Elhorst, Piras, and Arbia (2010): several variables (i.e. airports, price differentials between prefectures, USD exchange rate and UNESCO's sites) show a scarce time-variation, so we prefer to include fixed effects, also confirmed by a Hausman test.

Thus, final determinants for the GPP model are GPP value of the previous year, gross value added (GVA) of the tourism sector, OS, University graduates and natural parks (Table 1), while the OS model includes GPP, Shinkansen stops, museums, conferences and hotel facilities as independent variables (Table 2).

## Main findings

We find the existence of three main tourist clusters (Fig. 1): one "HH-LH" ("Kantō-Chūbu"), one "LL" ("Shikoku"), and one "HL-

LL" ("Fukuoka-Yamaguchi"). The first one deserves particular emphasis as it is expected to attract a huge flow of foreigners due to the Tokyo 2020 Summer Olympic Games. As in Romão and Saito (2017), this is coherent with OS, as visitors tend to spend a high number of nights in few prefectures, with Tōkyō towering.

Going further, the ESE model's results show that within and between prefectures OS and tourism prefectural GVA are positively correlated with GPP changes, influencing economic growth and suggesting the existence of positive ESE. The negative coefficient with GPP lag suggests the existence of a process of convergence between prefectures. Lastly, natural resources and immaterial aspects (number of university graduates) support economic development.

The TSE model's results reveal that the economic development has a positive influence on OS: a 1% GPP rise increases the guest nights by 0.378%; the spillover coefficient $\rho$ suggests that if OS of a neighboring prefecture (or neighbors of neighbors) increase by 1%, OS for the *i-th* prefecture increase by 0.81%. Lastly, medium/large conferences held in Japan, presence of museums and number of hotels are positively correlated to the number of OS.

## Discussion

Our findings provide several and important policy-making implications: positive economic and tourism spillover effects corroborate the importance of fostering inter-regional cooperation, as joint strategies can help in overcoming common problems and maximizing benefits of favorable dynamics (Romão & Nijkamp, 2018).

The positive influence of natural resources and tourist attractions, within and between prefectures, can play a central role in tourism market niches, similarly to international conferences, enhancing tourist flows, also in accordance with the goal set by the Japanese Government (The Government of Japan, 2013).

However, further analyses are needed to explore negative externalities of massive tourist arrivals, like over-exploitation of natural resources (e.g. Capo, Font, & Nadal, 2007), deindustrialization in other sectors (e.g. Song, Dwyer, Li, & Cao, 2012), increased cost of living and asset bubbles (e.g. Sheng, 2016b), environmental and social externalities (e.g. Saenz-de Miera & Rosselló, 2014; Sheng, 2016a): indeed, as in Romão and Nijkamp (2018), it is possible to observe positive and negative dynamics of impacts among neighbors.

Moreover, to identify "best practices" able to maximize benefits from tourism flows, a comparison with fast-growing neighboring countries in term of tourism (e.g. China, Indonesia, Thailand) is strongly suggested.

In conclusion, there is a need to develop new studies not only to explore spatial processes, but also to develop a more cohesive management of tourism destinations. A deeper scale of analysis (e.g. urban) can also provide useful insights, considering that regions, provinces and prefectures can include different destinations within the same territory.

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