

# High Speed Rail vs. Other Factors Affecting the Tourism Market in Italy

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**Abstract**—The objective of this paper is to investigate the relationship between the increase of accessibility brought by high speed rail (HSR) systems and the tourism market in Italy. The impacts of HSR projects on tourism can be quantified in different ways. In this manuscript, an empirical analysis has been carried out with the aid of a dataset containing information both on tourism and transport for 99 Italian provinces during the 2006-2016 period. Panel data regression models have been considered, since they allow modelling a wide variety of correlation patterns. Results show that HSR has an impact on the choice of a given destination for Italian tourists while the presence of a second level hub mainly affects foreign tourists. Attraction variables are also significant for both categories and the variables concerning security, such as number of crimes registered in a given destination, have a negative impact on the choice of a destination.

**Keywords**—Tourists, overnights, high speed rail, attractions, security.

## I. INTRODUCTION

THE analysis of the factors having an impact on destination image has been the subject of several papers in the international literature providing a significant contribution to the understanding of tourists' behaviour. The pioneer was Hunt in 1975 [1], who demonstrated the importance of this study for the understanding of tourists' preferences.

A tourist destination may be viewed as a complex product of the tourism market consisting of natural resources, infrastructure, services, distinctive local features and cultural attributes [2]-[4]. A tourism product can be analyzed in terms of attractiveness, facilities and accessibility [5], [6], with the objective of finding out its attractiveness. Attractions are the major factors, generating tourist flow to a given location. The tourist facilities are those elements which do not normally provide the motivation for tourist flows. However, the absence of these facilities may deter the tourists from travelling to enjoy the attractions. Accessibility relates to the transport modes alternatives to reach the given destination chosen by the tourists [7].

In the paper by Cracolici and Nijkamp [8], a tourist destination is seen as a supplier of spatial tourist attractiveness, i.e. a producer region, which has to manage its resources according to its tourist potential. Tourists will

benefit from this potential with an impact on their well-being. The latter include structural (e.g. natural resources, cultural resources, etc.) and non-structural characteristics (e.g. human resources, perceptions, etc.) associated with a given destination, as well as tourist characteristics such as social status, previous holiday experiences, expectations, etc.

In the recent paper by Brondoni [9], it is highlighted the importance of security and safety issues in global tourism, represented by a wide range of components including consumer protection, legal protection of tourists, environmental security, personal safety in communication, quality assurance of services, etc.

The travel and visitor industry has always had a love-hate relationship with security. On one hand, travel and tourist professionals realize that tourism cannot prosper if there are well-publicized acts of violence. On the other hand, people within the tourism industry often are stuck in the belief that tourists/visitors are afraid of security. In reality, it is not tourism security, but rather tourism surety, which Brondoni [9] defined "*as the point where security, industry economic viability and safety meet*". Therefore, surety touches several areas such as protection of the visitor/tourist from locals and other visitors; protecting the tourism environment; protecting the destination's reputation and protecting a destination from the risk and from the possible litigation.

The book of Tarlow [10] is prototypical in this respect since he addressed a range of key issues in tourism safety and security. Topics include the relationship between tourism security and the economy, hotel security, risk and crisis management, public places and legal issues.

Accessibility to a given tourist destination through an efficient transportation system is also a component of successful tourism development [11]. Indeed, a tourist, when choosing a destination, looks for a transport mode which is safe, comfortable, compatible with his/her budget and fast. Khadarooa and Seetanah [12] agree with the principle that

"provision of suitable transport has transformed dead centers of tourist interest into active and prosperous places attracting multitudes of people".

The Wayfarer project, launched in the UK in 1980, represents such an example. The principal aim was to investigate ways of fostering tourist access to the countryside by public transport. One of the initiatives was the introduction of a multi-modal ticket in 1983, known as Wayfarer, to encourage a day excursion market from urban centers to the countryside, and in particular to the Peak District National Park [13].

During the centuries, the transport modes have been

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changing according to the development of technology and the revolution in the transportation industry has been represented by HSR. The latter has recently experienced significant expansion and new projects all around the world are in the pipeline. Considering that Europe is among the most visited continents in the world, HSR is likely to induce changes in tourist behaviour. Indeed, there is a growing literature concerning the link between HSR and the tourism market in many countries [14]-[18]. A transport innovation such as a HSR service modifies the link between tourists and accessibility because a decrease of travelling time can be considered as a decrease of distance. As travel time is one of the items of total costs assumed by tourists, HSR can therefore decrease the generalized transport costs. Consequently, HSR can affect the utility of tourists and the competition between destinations, since the market area can be enlarged [19]-[21].

International air transport facilities have no competing transport alternatives on overseas-destinations. Indeed, over half of international tourists travel to their destination by air. Air transport is the main form of transport to many tourist destinations and, in some cases it represents up to 100% of the international tourism arrivals. The availability of cheap air transport can also be considered as one of the driving forces in international tourism growth. Indeed as demonstrated by [22], there is a strong correlation between the number of air travels and the international arrivals of tourists.

One limit found in this analysis of this international literature is represented by the scales defining the factors influencing the choice of a given tourist destination. Specifically, a lack of homogeneity with respect to the attributes describing individuals' perceptions has been highlighted [23], [24].

Beerli and Martin [25] proposed a framework incorporating every aspect of a destination which could potentially be used as an instrument of measurement in order to find a universally accepted, valid, and reliable scale for the measurement of the destination image attributes.

The objective of this manuscript is to investigate the factors affecting tourists' choices for the case study of Italy. Specifically, a given destination is a product made up of attractiveness, security and transportation systems factors. The paper is organized as follows. In section II, the case study together with the methodology is described, while section III deals with the results. Conclusions and further perspectives are presented in section IV.

## II. THE METHODOLOGY

In this manuscript, an empirical analysis has been carried out with the aid of a dataset containing information both on tourism and transport for 99 Italian provinces, during the 2006-2016 period (see Fig. 1). In Figs. 2 and 3, the population and the GDP of the 99 provinces considered for this analysis are reported in order to give an idea of their main socio-economic characteristics. From Figs. 2 and 3, it is possible to deduce that the provinces with the highest GDP and population are those of Milan and Rome.



Fig. 1 Italian provinces under study

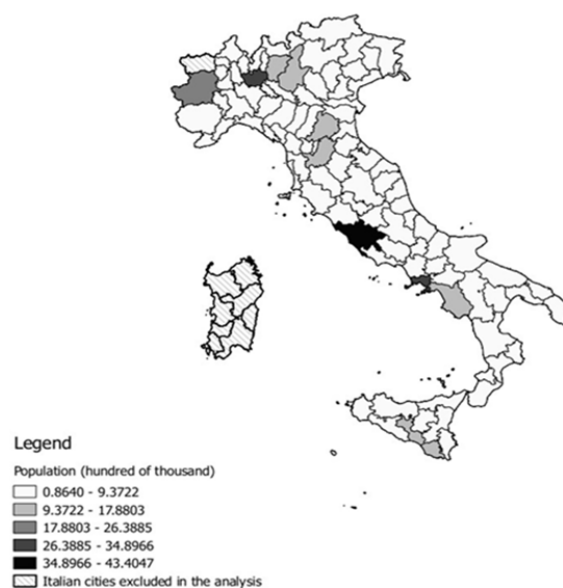


Fig. 2 Population of Italian provinces

The first line of the high speed/high capacity (HS/HC) rail project in Italy was inaugurated in 1992 between Firenze and Roma with the so called "Direttissima". The latter allowed trains to run at 230 km/h covering the 254 km between Roma and Firenze in about two hours [26]. The new generation of HSR (i.e. with trains running at 300 km/h) started in December 2005 between Roma and Napoli and Milano and Bologna. Later, in December 2009, the project was extended with the Milano-Torino and the Bologna-Firenze lines. In 2010 the Italian HSR network was operational and other developments are still a work in progress. The network, shown in Fig. 1 serves only main cities and therefore the accessibility to them is very low for users living in more peripheral areas. In addition to the HSR lines, there are also the high capacity

(HC) rail lines, consisting in speeding up and increasing the capacity of the existing rail lines between Firenze and Roma.

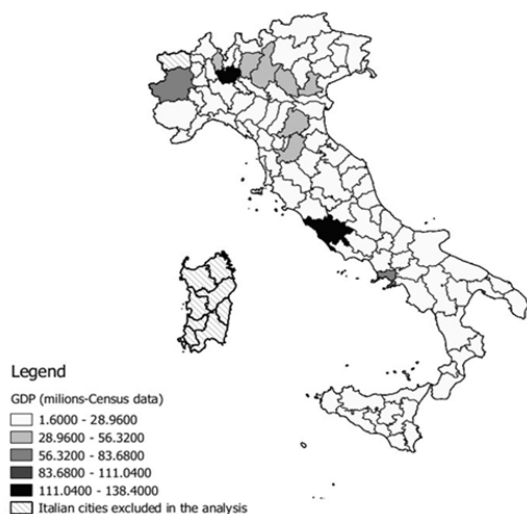


Fig. 3 GDP of Italian provinces

The dataset is represented by 1089 observations (99 provinces x 11 years). The variables considered are listed as the following:

The dependent variables are:

- *IT-Tourists*: number of Italian tourists (visitors-hundreds of thousands - Census data).
- *Foreign-Tourists*: number of foreign tourists (visitors-hundreds of thousands - Census data).
- *IT-Overnights*: nights spent in tourist installations by Italian tourists (nights-hundreds of thousands - Census data).
- *Foreign-Overnights*: nights spent in tourist installations by foreign tourists (nights-hundreds of thousands - Census data).

The independent variables are:

Transportation systems variables

- *HSR*: is a binary variable taking value 1 if HSR is available, 0 otherwise;
- *HUB2*: is a binary variable taking value 1 if the airport is a second level hub of a network carrier; 0 otherwise;
- *LOW-COST*: is a variable taking into account the number of operating bases of low-cost airlines.

Attractiveness variables

- *GDP*: is the Gross Domestic Product (millions- Census data);
- *Attraction*: is the number of activities attracting tourists in a given destination (e.g. sum of museums, historical sites, etc.);
- *SEA*: is a dummy variable equal to 1 if the destination is on the sea; 0 otherwise;
- *Hotel*: is the number of hotels in a given destination.

Security variables

- *Robbery*: is the number of robberies registered in a given

destination (information collected by the local police);

- *Crime*: is the number of crimes reported in a given destination (information collected by the local police).

The dependent variables take only non-negative integer values. Count data have been modeled through the Poisson distribution, where the probability of a given province  $i$  having  $y_{it}$  number of tourist per year is given by [27], [28]:

$$P(y_i) = \frac{\lambda_i^{y_i} e^{-\lambda_i}}{y_i!} \quad (1)$$

where  $P(y_i)$  is the probability of province  $i$  having  $y_i$  tourist per year and  $\lambda_i$  is the Poisson parameter for province  $i$ , which is equal to the expected number of tourist per year at province  $i$ ,  $E[y_i]$ .

Here, generalized linear models (GLMs) are considered the most suitable to determine the relationship between count data and the dependent variables [29]. The data considered involve measurements over time for the same cities, to avoid serial correlation, the panel data regression models have been considered, since they allow modelling a wide variety of correlation patterns.

To take into account these possible unknown correlations, an extension of GLMs has been considered, i.e. generalized estimating equations (GEEs) [30].

The significance of each variable has been tested with the t-student statistic; therefore, a coefficient is significant when t is greater than 1.96.

The model goodness of fit is measured by a simple extension of  $R^2$  statistics for GEE models, namely  $R^2_{\text{marginal}}$  [31].

III. RESULTS AND DISCUSSION

Considering Italian and foreign tourists, the different behaviors are reported in Table I. Concerning the transportation systems variables, *HSR* has an impact on Italian tourists, while the presence of a second level hub affects both the Italian and foreign tourists. The *Low-cost* variable is significant and positive only for foreign tourists, whose trips are encouraged also by the presence of a number of operating bases of low-cost airlines in a given destination.

As for the "attractiveness" of a given tourist destination, for both categories examined, the *GDP* (representing how rich is a destination), the presence of attractions, like museums, and of the sea have an effect on the choice of a tourist destination.

The security variables, like *Crime*, are negative and significant in both models, meaning that tourists are discouraged by the idea of visiting a destination having a bad reputation. Moreover, for foreign tourists, the number of robberies also has an effect since it prevents them from choosing that destination.

The number of overnight stays spent by Italian and foreign tourists is characterized by almost the same behaviour of the corresponding tourists' categories with respect to the transportation systems variables (see Table II). As for the attractiveness variables, their behavior differs only with regard to the *GDP* and *Attraction* variables having an impact on the

number of overnights spent by foreign tourists, while the presence of the *Sea* and of a *Hotel* at a destination affects both behaviors.

Concerning the security variables, the number of reported crimes and robberies has an impact.

TABLE I  
 FACTORS INFLUENCING TOURISTS' CHOICES

Variable	Italian tourists (t-student)	Foreign tourists (t-student)
HSR	0.0281 (2.98)	-
HUB2	0.8558 (17.09)	1.4209 (22.63)
LOW-COST	-	0.0024 (2.59)
GDP	0.0031 (4.56)	0.0050 (7.74)
ATTRACTION	0.0006 (10.07)	0.0013 (22.22)
SEA	0.2277 (4.88)	0.3389 (7.05)
CRIME	-1.5760 (-3.74)	-2.1553 (-4.28)
ROBBERY	-	-0.0041 (-6.03)
Const	1.9994 (38.26)	1.3122 (20.92)
R <sup>2</sup>	0.32	0.48

Source: Authors' elaborations based on STATA

TABLE II  
 FACTORS INFLUENCING THE NUMBER OF OVERNIGHTS

Variable	Italian Tourists (t-student)	Foreign tourists (t-student)
HSR	0.1172 (19.94)	-
HUB2	0.6834 (26.12)	1.2185 (35.29)
LOW-COST	-	0.0026 (9.25)
GDP	-	0.0044 (23.22)
ATTRACTION	-	0.0006 (18.89)
SEA	0.0639 (2.86)	0.4931 (19.45)
HOTEL	0.0017 (64.33)	0.0015 (40.64)
CRIME	-1.9598 (-9.14)	-2.2195 (-8.36)
ROBBERY	-0.0022 (-7.22)	-0.0044 (-13.01)
Const	3.6145 (158.15)	2.9553 (92.06)
R <sup>2</sup>	0.7	0.61

Source: Authors' elaborations based on STATA

#### IV. CONCLUSIONS AND FURTHER PERSPECTIVES

This paper serves to support providers and intermediaries who sell tourist products, as well as public institutions promoting destinations. Indeed, the results reported in this manuscript may be used for developing tourism-related policies.

This study also provides information useful for tourism-related businesses and public institutions attempting to reach tourist consumers and for the design and planning of their promotion strategies.

Indeed, starting with the new transport infrastructures, such as the HSR systems in this paper, they have proved to have positive impacts on the tourist areas they serve, thanks to the increased accessibility. This paper has found consistent evidence in favor of a positive relationship between HSR and tourist outcomes. Moreover, the presence of airport hubs is another important transport component having impacts on tourists' choices. Further research is required on the use of HSR variables; specifically, these variables should be introduced to describe the connectivity and territorial distribution of the HSR network, and the service conditions offered by the operating companies (e.g. fares, timetables and frequency).

Attractions variables also have an impact on tourists' choices. They represent the main reason of a trip for the tourism purpose together with the presence of the sea. Indeed, it is common wisdom to consider Italy a sunny country. Moreover, the intention of tourists to visit a given destination is influenced by their perceptions or knowledge of the destination itself. Risk perceptions, although situation specific, have an impact on travel behaviour. The findings show that crimes and robberies negatively affect the choice of a given destination. Local administrations should work for reducing this effect in order to attract more tourists.

A further perspective will consider, with the same data set, a more detailed analysis with the specification of geographically weighted regression techniques, which estimate regression coefficients locally using spatially dependent weights [32]. These models have shown the benefits of going beyond the global modelling framework.

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