The Relationship between High-Speed Rail Accessibility and Tourism Demand

The Case Study of Italy

Mario Tartaglia[(1)], *Ilaria Lopresti*[(1)]

[(1)]Ferrovie dello Stato Italiane

13th September 2023

FERROVIE DELLO STATO ITALIANE

FS Research Centre
Il Centro Studi di Ferrovie dello Stato Italiane

The aim of the study

- Quantitative studies on the impact of high-speed rail on tourism demand have focused on the availability of high speed railway stations, including sometimes the frequency of the service or the number of destinations accessible from HSR.
- Such studies do not take into account directly the effect of the modified accessibility introduced by High-Speed.
- This study investigates the relationship between High-Speed rail and domestic / inbound tourism in **Italy** by means of a measure of accessibility in a 2009-2019 “before and after” comparison, to verify the role of the reduction in travel times induced by High-Speed rail. The study uses both official statistic data and rail market data.

Literature review

Main findings

«Transport is the cause and the effect of the growth of tourism» Rodrigue, J.P. (2020)

01 The introduction of HSR increases accessibility to destinations through the decrease in time to reach the destination, which is one of the most notable traveller constraints (Masson and Petiot, 2009).

02 HSR has several impacts on tourism such as the opening to new tourist markets, the increase in the number of tourists, the decrease in the length of stay and the increase in urban and business tourism (Bazin, Beckerich and Delaplace, 2011; Albalate and Bel, 2012).

03 The conditions that enable HSR to have impacts on tourism are:
the existence of strong local potentialities, the existence of local strategies around the HSR service and the development of specific tourism sector (Masson and Petiot, 2009; Bazin et al. 2011).

04 The effect of HSR to tourism growth appears to be dependent also on the city size, being higher for larger cities with pre-existing tourist attractions (Delaplace, 2012; Bazin, Beckerich and Delaplace, 2013).

The case study

Italy's High Speed Rail evolution

High-speed services:

Trenitalia main pre-existing fast service — EUROSTAR ITALIA — **1997**

Trenitalia HS Brands — FRECCIAROSSA, FRECCIARGENTO, FRECCIABIANCA — **2009**

Entry of .italo — **2012**

End of EUROSTAR ITALIA — **2012**

time

1992 Firenze - Roma

2005 Dec Roma - Napoli

2006 Feb Torino - Novara

2007 Mar Padova - Mestre

2008 Jun Napoli - Salerno

2008 Dec Milano - Bologna

2009 Dec Bologna - Firenze

2009 Dec Torino - Milano

2009 Dec Roma - Napoli completion

2016 Dec Milano - Brescia

Operational HS network by 2019. *Source: author's processing; data from RFI website*

Methodology and data

Variables: data source and elaboration

Tourism demand

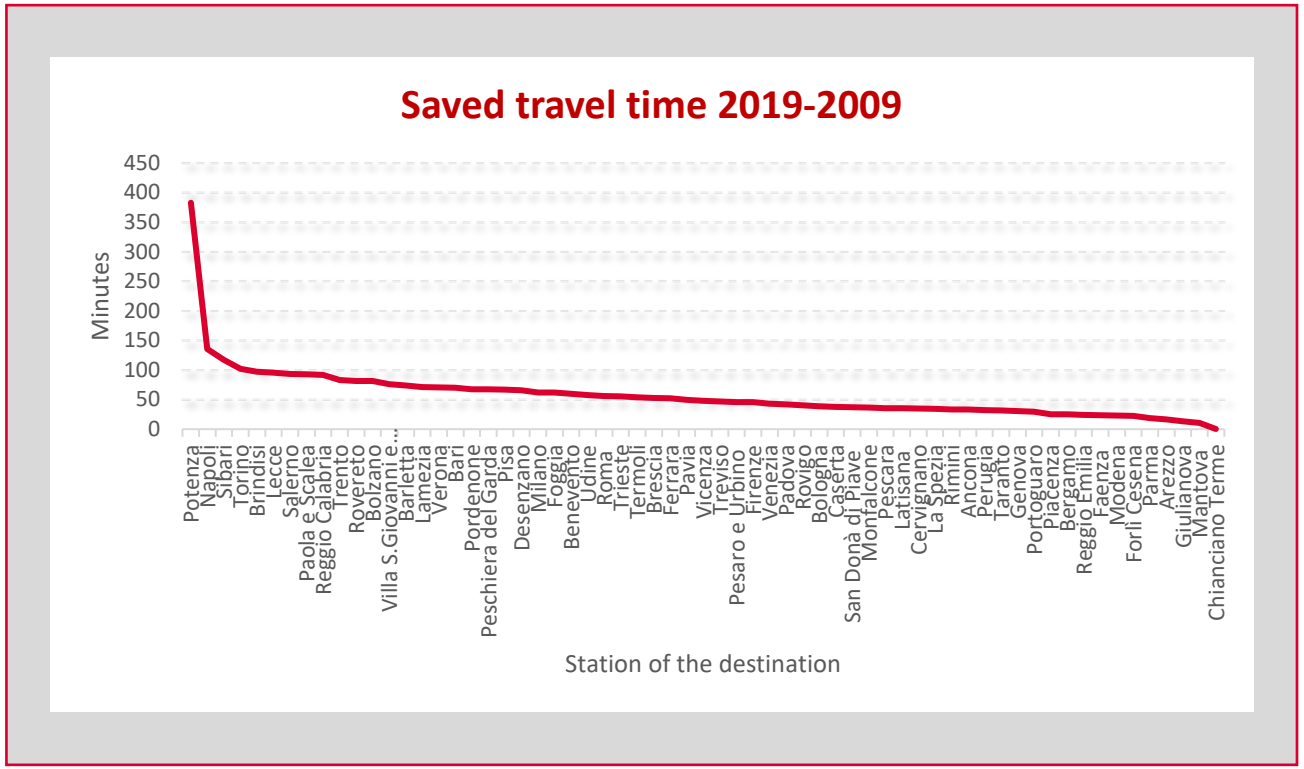
Attractiveness

HSR

Variable	Data source	Unit of analysis	Details	Elaboration
Arrivals / overnight stays	ISTAT - Occupancy in collective tourist accommodation	Turistical area	The variables refer to Italian and foreign tourists separately, in hotel and non-hotel facilities	Selection of the turistical areas of interest (it is a municipalities' classification adopted by ISTAT from 2009 to 2013 for tourism flows data)
Number of beds	ISTAT - Capacity of collective accommodation	Municipality	Number of beds of hotel and non-hotel facilities	Aggregation of municipal data in accordance with the turistical area classification
Travel times/ Dummy HSR	Timetable (2008); GTFS + Timetable (2019)	HSR stations	Transportation assignment by PTV-VISUM for long distance daily trains (Tartaglia, M., Vannacci, L., and Farsi, M,. 2022)	From travel times, an accessibility indicator has been developed

HSR stations are assumed to be the central point for reaching the associated turistical area

The results of the Transportation Assignment Model: Travel Times



- 63 Transport Analysis Zones where at least one

FRECCIAROSSA
FRECCIARGENTO
.italo

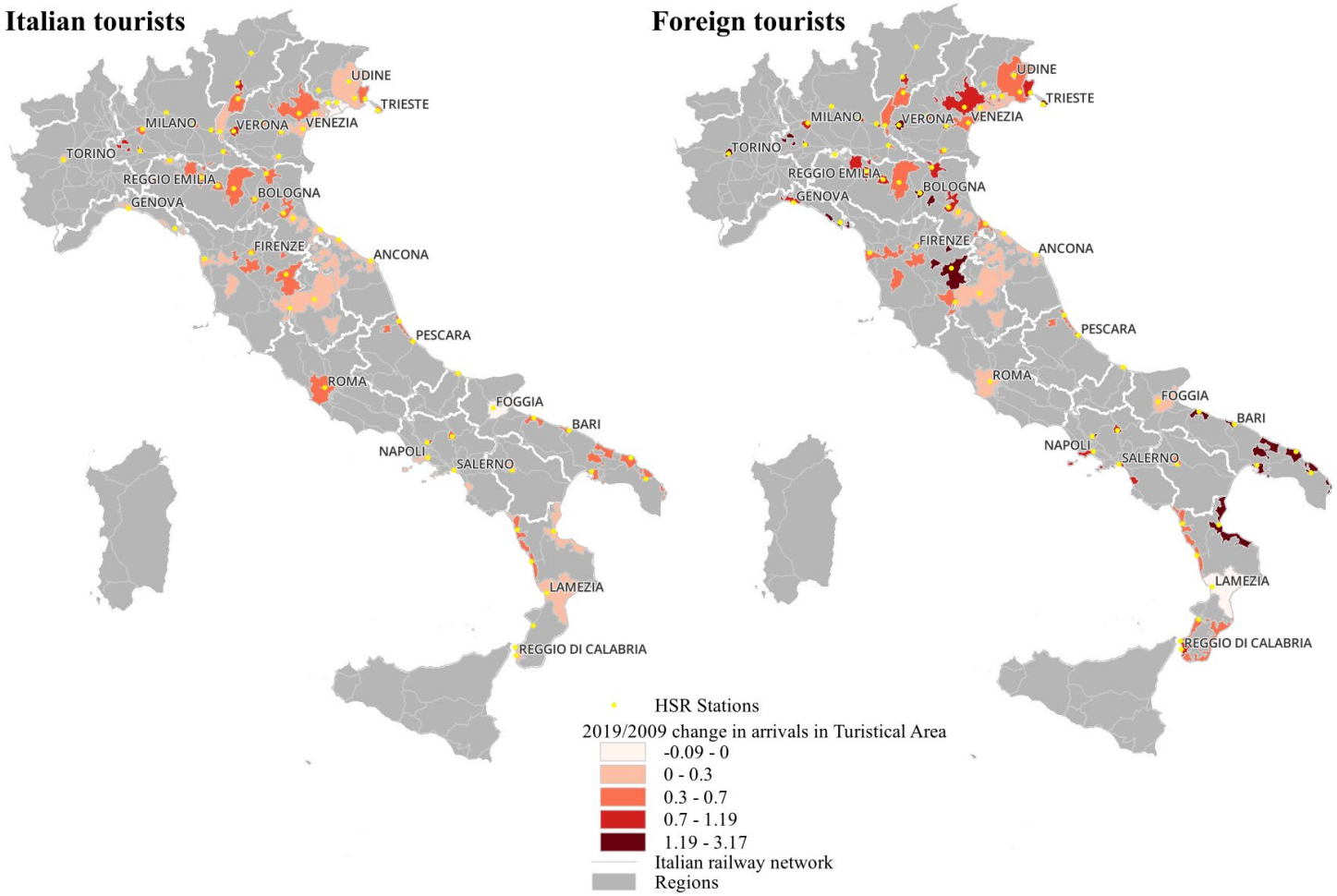
stopped in **2019**

- parameter settings allowed the model to select the long haul services truly available to the users

Average time saving is around **57 minutes**, the **14% less** respect 2009

Methodology and data

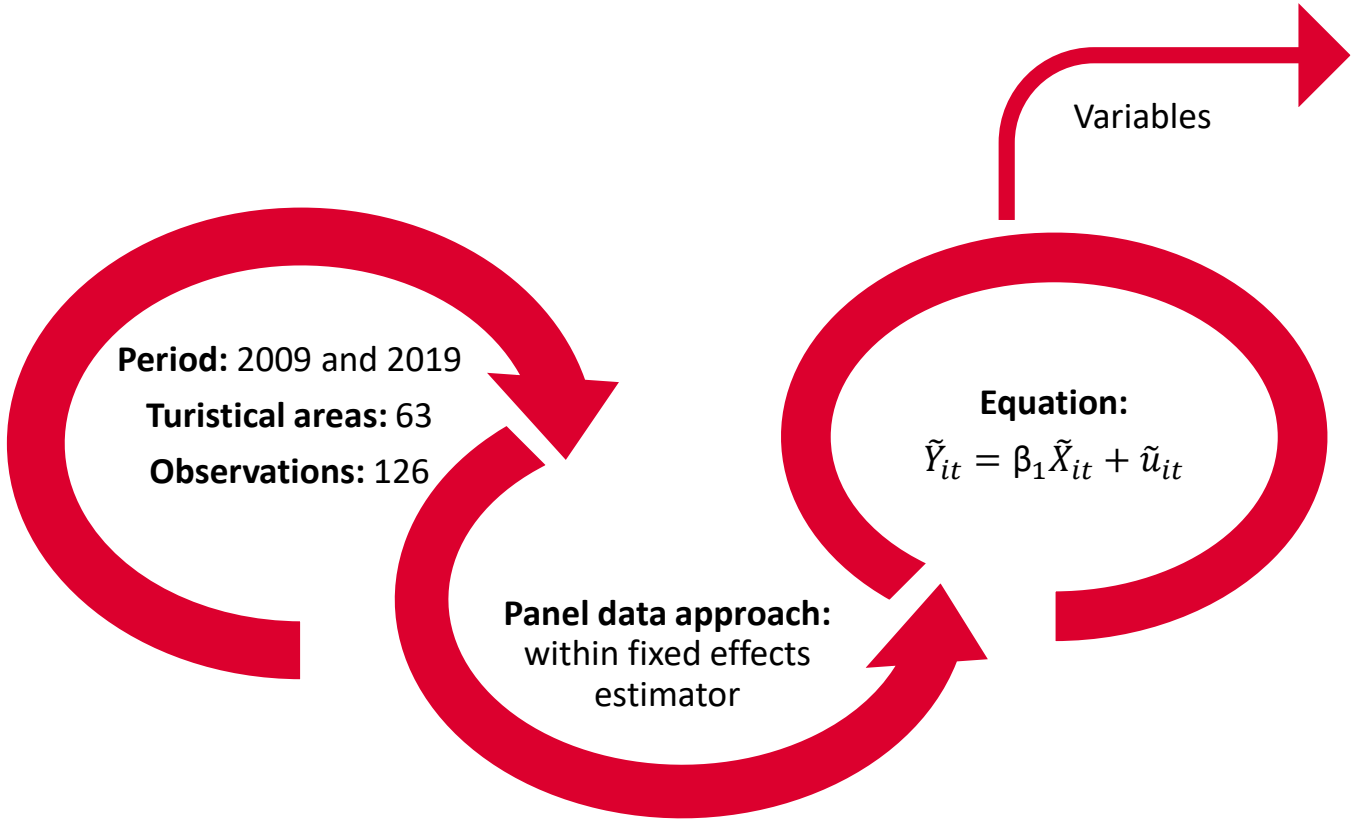
The Turistical Areas and HSR stops



- The map shows 2019/2009 **relative variations** in Italian and foreign **arrivals** for each selected tourist area served by **High-Speed train** in 2019 (FR, FA and Italo)
- For many tourist areas, Italian arrivals have risen in the period 2019/2009 by 20/50%
- Higher growth rates are experienced by foreign tourists, which have **more than doubled** in several tourist areas

Methodology and data

Model



Dependent variable = number of Italian and foreign arrivals/overnights;

Independent variables:

Beds: number of beds;

Dummy_hsr: 1 in presence of HSR service, 0 otherwise;

Access_index: $\mathbf{A}_j = \sum_{i=1}^{n} \frac{1}{Tt_{ij}}$;

where Tt_{ij} is the travel time from station *i* to station of destination *j*.

Results

Domestic tourism

- HSR has a statistically significant impact on **Italian arrivals** and **nights**

The positive and significant impact on the **number of arrivals** is counterbalanced by the negative effect on the **length of stay,** lowering the impact on nights

- The accessibility index shows **higher coefficients** with respect to considering the presence of HSR station.

	Dependent variable:			
	log(arrivals_ita)		log(nights_ita)	
	(1)	(2)	(3)	(4)
log(beds)	0.795***	0.659***	0.638***	0.513***
	(0.073)	(0.086)	(0.096)	(0.073)
Dummy.hsr	0.174***		-0.002	
	(0.063)		(0.066)	
log(access_index)		0.726***		0.532***
		(0.209)		(0.191)
Observations	126	126	126	126
R^2	0.607	0.614	0.422	0.462
R^2 adjusted	0.594	0.601	0.402	0.445
F Statistic (df = 2; 61)	47.112***	48.511***	22.258***	26.241***
Note:				*p<0.1; **p<0.05; ***p<0.01
				HAC Standard Errors in parenthesis

Results

Inbound tourism

- For foreign visitors, HSR has a strong positive effect on the **number of arrivals** and **nights**, even if the length of stay is affected negatively
- The effect is great considering the accessibility index
- The measures of **attractiveness** and **accessibility** are higher than for domestic tourism

	Dependent variable:			
	log(arrivals_foreign)		log(nights_foreign)	
	(1)	(2)	(3)	(4)
log(beds)	1.504***	1.032***	1.367***	1.014***
	(0.172)	(0.162)	(0.155)	(0.165)
Dummy.hsr	0.319***		0.231***	
	(0.077)		(0.074)	
log(access_index)		2.279***		1.696***
		(0.412)		(0.456)
Observations	126	126	126	126
R^2	0.593	0.705	0.556	0.631
R^2 adjusted	0.580	0.695	0.541	0.619
F Statistic (df = 2; 61)	44.441***	72.821***	38.154***	52.147***
Note:				*p<0.1; **p<0.05; ***p<0.01
				HAC Standard Errors in parenthesis

Concluding remarks and further research

- As expected, an **increase in accessibility**, in terms of **reduced travel times** in long haul train services, has a **significative and positive effect** on **tourism demand**;
- This effect is higher than considering only the **presence** of HS service, stressing the role of travel times, one of the most important factors affecting the relationship between High Speed rail and tourism;
- The inclusion of all the destinations connected by HS trains helps focusing on a **comprehensive appraisal of the HSR service**, which modifies long-haul travel times, number of services, and number of transfers;
- The availability of rail data for only two years limited the regression analysis, **further research** should involve more years and/or more disaggregated data for the origin tourism demand to open the analysis to more variables and models. In such scenario, also accessibility indicator could be improved.

Bibliography:

The Geography of Transport Systems – *Rodrigue, J.P. (2020)*

Can the high speed rail reinforce tourism attractiveness? The case of the high speed rail between Perpignan (France) and Barcelona (Spain) – *Masson, S., Petiot, R. (2009)*

High speed railway, service innovations and urban and business tourisms development – *Bazin, S., Beckerich, C., & Delaplace, M. (2011)*

High-Speed Rail: Lessons for Policy Makers from Experiences Abroad – *Albalate, D., & Bel, G. (2012)*

Développement local et taille des villes: Une analyse en termes d'innovation de services – *Delaplace, M. (2012)*

Desserte TGV et villes petites et moyennes, Une illustration par le cas du tourisme à Arras, Auray, Charleville- Mézières et Saverne – *Bazin, S., Beckerich, C., Delaplace, M. (2013)*

High speed rail and tourism: Empirical evidence from Spain – *Albalate, D., Fageda, X. (2016)*

Exploring the interdependences between High Speed Rail systems and tourism: Some evidence from Italy – *Pagliara, F., Mauriello, F., & Garofalo, A. (2017)*

Analyzing the Impact of High-Speed Rail on Tourism with Parametric and Non-Parametric Methods: The Case Study of China – *Pagliara, F., Mauriello, F., Ping, Y. (2021)*

The accessibility impact of High Speed Rail in Italy: a user-based approach – *Tartaglia, M., Vannacci, L., & Farsi, M. (2022)*

FERROVIE DELLO STATO ITALIANE

FS Research Centre
Il Centro Studi di Ferrovie dello Stato Italiane

Thanks for your attention!

FERROVIE DELLO STATO ITALIANE

FS Research Centre
Il Centro Studi di Ferrovie dello Stato Italiane