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Research Note

High Speed Rail: Fast tracking tourism in the EU?

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Tourism plays an important role in economic growth (Castro-Nuño, Molina-Toucedo, & Pablo-Romero, 2013), especially in medium and high-income countries (De Vita & Kyaw, 2016), with a strong correlation with the transport sector and for High Speed Rail (HSR) in particular (Guirao & Campa, 2015).

Furthermore, provision of appropriate transport facilities is a key condition for the development of any tourist destination, especially for air transport (Graham, Papatheodorou, & Forsyth, 2008). Regarding the HSR-tourism relationship, the literature can be divided into three groups: studies from an ex-ante perspective, leading to the forecast that, a priori, the advent of HSR lines could increase tourism demand by improving cities' tourist appeal (Chen & Haynes, 2015); ex-post evaluations about that this positive influence seems to be temporary if no further policies are implemented (Albalate & Fageda, 2016); and, last, other studies that examine the substitution/complementary relationship between HSR and air transport (Pagliara, La Pietra, Gomez, & Vassallo, 2015).

However, these analyses are for concrete countries and cities. This research note seeks to cover this gap with the fullest assess of the correlation between tourism activity and HSR to date, focusing on these tourism outcome variables: the total number of tourists (divided into domestic tourists and foreign tourists) and the mean duration of their stays (number of overnight stays by domestic and foreign tourists). The analysis covers the 28 EU countries for the period 1996–2014. HSR network has been expanding in the European Union (EU) for three decades, although the economic viability of HSR construction is currently being questioned (Castillo-Manzano, Pozo-Barajas, & Pedregal, 2016; Castillo-Manzano, Pozo-Barajas, & Trapero, 2015).

The model specification is:

$$Y_{ct}^{i} = X_{ct}\beta + Z_{ct}\delta + W_c + T_t + \epsilon_{ct}$$

where Y_{ct}^{i} is each dependent variable in turn (i = 1,2,...,6, in country c and year t), X_{ct} contains all the time varying control variables, Z_{ct} includes all the dummy-type variables, W_c and T_t are a set of country-specific and time-specific fixed effects, respectively, and ϵ_{ct} is

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Table 1
Variables.

Variables	Description (units)	Source	Mean	Standard Deviation
Endogenous variables				
TT	Total number of tourists (millions)	EUROSTAT	26.33	36.78
DT	Domestic tourists (millions)	EUROSTAT	17.07	26.62
FT	Foreign tourists (millions)	EUROSTAT	9.08	11.83
TO	Total overnights (millions)	EUROSTAT	80.34	111.18
DO	Domestic overnight stays (millions)	EUROSTAT	47.07	73.12
FO	Foreign overnight stays (millions)	EUROSTAT	33.15	47.46
Explanatory variables				
HSR	High Speed Rail (billion passengers per km)	STATISTICAL POCKETBOOK EU	2.39	7.91
AIR	Air passengers carried (millions)	EUROSTAT	40.62	53.26
Population	Population (millions)	EUROSTAT	28.76	12.43
GDP	Per capita Gross Domestic Product (US dollars, at 2010 prices and PPPs)	UNECE	14.74	24.32
WASP	Weighted harmonized index of accommodation services prices	EUROSTAT	84.63	19.26

a zero-mean random error.

Table 1 provides information about all variables.

Table 2 shows the findings for each of the endogenous variables. Firstly, EU countries with higher GDP emit more domestic tourists while those with lower GDP attract more foreign tourists, supporting the so-called '*economic-driven domestic tourism growth hypothesis*' (Antonakakis, Dragouni, & Filis, 2015). This result is strengthened by the significant negative correlation between the price of accommodation services and foreign tourism.

Secondly, results in Table 2 show that the two types of transportation, air transport and HSR, both have clear relationships with tourist activity. However, it cannot be deduced that the two relationships are homogeneous.

HSR seems to affect total tourism more than air transport. Specifically, when the number of domestic tourists or domestic overnights are the endogenous variables, the HSR effect is greater than air transportation, perhaps due to attraction by congresses & business tourism (Ureña, Menerault, & Garmendia, 2009). When the number of foreign tourists and foreign overnights are taken as the endogenous variables, air transport impact is much greater than HSR, as Albalate and Fageda (2016) suggest.

Considering the positive correlation between overall tourism endogenous variables and both the HSR and air transport variables, our main new contribution is a complementary effect between these transport modes in the EU (HSR for domestic tourism, air transport for foreign tourism), especially for short and medium-haul routes.

In short, the obtained results show a geographic specialization for each of the transport modes within the tourism sector, albeit with air transport showing greater flexibility.

Table 2
Estimates for the double fixed effects equation.

Independent variables	Model I. Dependent variable: TT	Model II. Dependent variable: DT	Model III. Dependent variable: FT	Model IV. Dependent variable: TO	Model V. Dependent variable: DO	Model VI. Dependent variable: FO
HSR	1.225	1.186	0.033	2.628	2.752	−0.115
	(0.130)***	(0.102)***	(0.059)	(0.465)***	(0.319)***	(0.268)
AIR	0.301	0.146	0.155	0.683	0.116	0.567
	(0.027)***	(0.021)***	(0.012)***	(0.096)***	(0.066)*	(0.055)***
Population	−0.238	−0.190	0.064	4.622	2.394	2.076
	(0.341)	(0.262)	(0.157)	(1.219)***	(0.823)***	(0.703)***
GDP	0.049	0.355	−0.291	0.266	0.908	−0.677
	(0.165)	(0.128)***	(0.076)***	(0.569)	(0.388)**	(0.328)**
WASP	−0.032	0.009	−0.030	−0.169	−0.035	−0.134
	(0.038)	(0.003)	(0.014)**	(0.135)	(0.092)	(0.076)*
Intercept	24.355	−1.807	24.439	44.133	−23.150	69.576
	(6.981)***	(5.373)	(3.160)***	(24.24)*	(16.46)	(13.950)***
R^2	0.992	0.990	0.983	0.988	0.987	0.980
Test joint significance	476.7***	378.2***	311.3***	289.5***	188.1***	239.7***
AR(1) test	11.66***	8.927***	21.74***	19.49***	19.43***	20.44***
No. observations	376	381	380	383	389	384
HSR does not Granger cause Dependent	9.540***	6.757***	1.384	3.944***	5.170***	1.933*
	(2.2×10^{-16})	(2.2×10^{-11})	(0.166)	(8.02×10^{-5})	(2.3×10^{-7})	(0.053)
Dependent variable does not Granger cause HSR	1.434	1.111	1.045	1.166	1.190	1.509
	(0.152)	(0.266)	(0.296)	(0.244)	(0.234)	(0.131)

Note: Standard errors in brackets. Statistical significance at 1% (***), 5% (**), 10% (*).

It can be deduced from Models II and V that HSR services may be a real factor in boosting domestic tourism, especially in favorable internal economic circumstances. Although positive, the role played by air transportation in this market niche is clearly less important than that of HSR, and this constitutes an empirical test of the hypothesis of HSR's '*predatory role*' vis-à-vis air transport addressed by Albalate and Fageda (2016).

On the other hand, Model III and VI results show that air transport seems to be crucial for attracting foreign visitors to EU countries. The role played by HSR in this market niche is negligible. It is also apparent that tourist appeal within Europe is greater in countries with lower income and a lower priced hospitality industry. In short, the demand for international tourism services is much more price sensitive than that of domestic tourism services.

All of this suggests a complementary relationship between the two transportation modes as far as the tourist sector is concerned, and highlights the need for improved collaborative strategies to promote intermodality.

Given that the countries with the most extensive HSR networks (Spain, France and Italy) were more attractive to tourists even before the building of HSR, a causal relationship may be found in the opposite direction to that assumed in this paper. To test for this hypothesis, the last two rows of Table 2 show the evidence regarding Granger causality in both directions according to the Dumitrescu and Hurlin (2012) test. The results are reinforced, since all the tests assuming causation from HSR to each of the dependent variables are highly significant (except for FT and FO), implying that the assumed causation is correct. But most importantly, the absence of causation in the opposite direction, i.e. from each dependent variable to HSR cannot be rejected due (see the last row in Table 2).

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