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# Does high-speed rail generate spillovers on local budgets?☆

Aday Hernández [a,1], Juan Luis Jiménez [b,*]

[a] Departamento de Análisis Económico Aplicado, Facultad de Economía, Empresa y Turismo, Universidad de Las Palmas de Gran Canaria, Despacho D, 2-14, Campus de Tafira, 35017 Las Palmas, Spain
[b] Departamento de Análisis Económico Aplicado. Facultad de Economía, Empresa y Turismo, Universidad de Las Palmas de Gran Canaria, Despacho D, 2-12, Campus de Tafira, 35017 Las Palmas, Spain

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ABSTRACT

High-Speed Rail (HSR) infrastructure is costly and requires high investment during the construction and operation periods, which is mainly financed with public funds. This economic effort is seldom set off, which leads to subsidies with the money collected from public debt growth or tax pressure increases. The question that immediately emerges is whether the entrance of this new infrastructure generates economic spillovers at the local level and, consequently, improves local public budgets. To solve this question we use local data on economic activity, municipalities' characteristics and local financial data in Spain for the past decade (2001–2010). Our estimations by difference-in-difference analysis and using spatial data yield a general conclusion: when HSR comes to town, both local revenues and the local fiscal gap improve by mean 10% and 16%, respectively. These improvements primarily affect municipalities located within 5 km of an HSR station.



## 1. Introduction

High-speed rail (HSR) has become an alternative to mass transport around the world and countries such as China (13,000 km planned what represents approximately 64% of under construction lines), Spain, Japan and France have boosted its development (Scandinavian countries have delayed their programmes). This type of infrastructure requires high investment costs and high maintenance and operation costs, which are mostly financed with public funds.

This investment should be compensated by the positive economic effects (e.g. time-savings, reduction of externalities, wider economic effects) that the provision of the infrastructure may generate. However, Albalate and Bel (2012) review the main international experiences to highlight the huge costs associated with the infrastructure (See de Rus (2012), for the case of Spain). Under this scenario, the public funds required for the construction of HSR lines are not going to be recovered, which may lead to public debt growth or tax pressure increases.

Specifically, in Spain, HSR lines are mostly financed by the central government, and cofinanced with European funds, while most of the economic effects occur at the regional or local level. Therefore, a controversial relation may arise in the long run between these two government levels. The local government claims to have an infrastructure that it does not finance entirely, wondering about the future positive effects that may not always happen.

Those economic effects are certainly related to the creation of employment. Several studies find that overall employment is positively and significantly related to the stock of infrastructure (Lombard et al., 1992; Dalenberg et al., 1998), or government expenditure in transport (Carroll and Wasylenko, 1994; Islam, 2003). There are also positive effects on poverty and equality as Kantor (2008) states in his economic appraisal of the California HSR in the Sacramento/Central Valley Area, considering second-order benefits from increases in the state's general revenues. However a 'tunnel effect' may also exist, improving the accessibility of the connected cities, and isolating the space between them (Gutiérrez Puebla, 2005).

Consequently, local governments and mayors attempt to get an HSR station, as if this would spontaneously generate economic benefits for their voters. In particular, mayors considered that investment in HSR infrastructure might partly solve local problems

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* Corresponding author. Tel.: +34 928 458 191.
*E-mail addresses:* ahernandez@acciones.ulpgc.es (A. Hernández), juanluis.jimenez@ulpgc.es (J.L. Jiménez).
[1] Tel.: +34 928 458 208.

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by improving local economic activity.[2] However, local governments have to face the extra expenses and increases in public services, which may or may not be compensated by the potential economic activity generated by the infrastructure.

The main goal of our paper is to shed light on how the construction of new HSR lines affects local finance considering the main variables of local budgets. Despite the extensive literature regarding the relationship between infrastructure and the impact of public expense (Solé-Ollé, 2006), previous authors, to our knowledge, have not explored the impact of the infrastructure on local budgets at the local level.

In order to analyse this relationship, we build a local database for the past decade (2001–2010) that includes variables that capture not only local economic activity and public budgets, but also the spatial information used to detail potential spillover effects. The investment of HSR may generate positive externalities of economic activity over the surroundings of the station, and the spatial perspective of the analysis allows us to isolate this impact. Moreover, we have a detailed database of the different items of public budgets what allows us to estimate the potential spillovers in detail. In fact, our estimations support the fact that HSR improves both local revenues and local budgets after HSR entrance.

Section 2 presents the literature review on HSR effects and local budget analysis. Section 3 provides some facts about HSR projects in Spain, while the database and considered covariates are explained in Section 4. Section 5 develops the empirical strategy and estimations and, lastly, Section 6 gives some transport policy implications.

## 2. Literature review

As mentioned above, public investment, particularly transport infrastructure investment, is a powerful mechanism for enhancing economic growth and employment in the short run. Aschauer (1989) was the first to assess the role of public investment in economic growth and productivity improvements.

Consequently, the spatial analysis is a cornerstone to appraise the construction of a new infrastructure and a relevant question is whether the infrastructure performs better in the region where it is built or plays in favour of adjacent regions. This is mainly dependent on the local conditions, existent transport modes and infrastructure provision in other regions, among others (Vickerman, 1991).

The role of the spatial dimension is widely justified because the infrastructure interacts with the space and the location of the economic activity.[3] Usually, these effects arise from individual decisions and take place at a disaggregate dimension (local level) of the economic activity (Graham, 2006). In this sense, two properties of the analysis are desirable: (i) avoiding predefined units such as administrative areas and (ii) emphasising distance or density in order to include a transport dimension that determines the spatial behaviour of the impacts (see further explanation in Section 3).

From the previous discussion, it is clear that public transport investment affects the revenues of administrative entities if the potential positive benefits of the investment capitalises in the region generating additional economic activity. These are especially relevant when we consider urban areas that benefit from significant improvements in accessibility when a new high speed rail (HSR) project is built.

Garmendia et al. (2012) review recent research and developments on HSR considering the differents urban and territorial approach, emphasising the impact of HSR on the spatial distribution of the economic activity over the world. They examine the wider spatial implications related to short distance relationship considering that there is a risk in Europe of polarisation between HSR cities and non HSR cities because the former attract economic activity to the detriment of the latter.

Monzón et al. (2013) supports this idea and shows that urban areas benefits from increases of the accessibility when there is a new HSR station. They show that, in the Spanish case, the HSR extensions contribute to territorial equity, improving the economic performance via accessibility of previously isolated regions.

Moreover, there may be some of the second-order effects on directly linked sectors such as tourism or hospitality because business tourism and conferences benefit from new HSR services. Masson and Petiot (2009) examines the relation between tourism destination development and the construction of a high speed railway. They do a prospective analysis investigating the case of the forthcoming South European HSR lines between Perpignan and Barcelona shows that the resulting increased spatial competition may reinforce the phenomenon of the tourism activities agglomeration around Barcelona.

In depth, Albalate and Bel (2012) review the experiences of HSR around the world and literature related to regional effects, reporting that regions whose economic conditions compare unfavourably with those of their neighbours, a new HSR infrastructure may even result an overall negative impact (Thompson, 1995; Van den Berg and Pol 1998; Givoni 2006).

Consequently, the construction of transport infrastructures has impact on economic activity that clearly affects the public budgets. Therefore, the financing mechanism, the public taxes and the tax structure need to be considered. Moreover, there is no always a direct correspondence between expenses and collected taxes, encouraging regions to exaggerate their needs for funds; but there is a direct impact of the tax rate on economic growth, as Engen and Skinner (1996) show.

For this reason, we consider variables that capture the local environment. Thus, we focus on the academic literature on local fiscal budgets and the related literature on Spanish municipalities. Zafra-Gómez et al. (2009) focus on identifying the key determinants of local financial performance: income, unemployment and population, among others. Other references are linked to the identification of the determinants of local deficits or tax burdens, as in Lago-Peñas (2004) for the region of Galicia and Solé-Ollé (2006), Fluvià et al. (2008), Bastida et al. (2009) and Benito et al. (2010) for Spanish-wide samples.

The covariate population allows us to test for scale economies in the provision of public services at a local level (see Allers et al., 2001; Pettersson-Lidborn, 2001; Castells et al., 2004; Fluvià et al., 2008, among others). Other important variables are the proportion of elderly ( $>65$) and young ( $<20$) residents and the immigration rate (e.g. Zafra-Gómez et al., 2009; Voltes-Dorta et al., 2014). These age groups are key drivers of demand for municipal services, such as employment, health and education, while a significant proportion of senior citizens may lead to a decrease in demand for other services such as sports facilities (Zárate and Vallés, 2012).

Lastly, income per capita and the unemployment rate are economic indicators that also affect local budgets (Bastida et al., 2009; Benito et al., 2010). The effect of tourism on local budgets

[2] One recent example is the mayor of Vigo (A north Spain city) and his defence of the HSR investment for his region. A long version of the interview can be found here: 〈http://www.atlantico.net/noticia/255439/caballero/vigo/recuperacion/economica/〉

[3] The mechanisms that produce changes in the spatial dimension of the economic activity such as agglomeration economics arise from technological spillovers, consumer concentration or improvements in the labour market (see Rosenthal and Strange, 2001 for a further explanation).