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Effectiveness of safety-based incentives in Public Private Partnerships: Evidence from the case of Spain

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ABSTRACT

Many countries around the world are implementing Public–Private–Partnership (PPP) contacts to manage road infrastructure. In some of these contracts the public sector introduces economic incentives to the private operator to foster the accomplishment of social goals. One of the incentives that have been introduced in some PPP contracts is related to safety in such a way that the better the safety outcome the greater will be the economic reward to the contractor. The aim of this paper is at identify whether the incentives to improve road safety in highway PPPs are ultimately effective in improving safety ratios. To this end Poisson and negative binomial regression models have been applied using information from highway sections in Spain. The findings indicate that even though road safety is highly influenced by variables that are not much controllable by the contractor such as the Average Annual Daily Traffic and the percentage of heavy vehicles, the implementation of safety incentives in PPPs has a positive influence in the reduction of fatalities, injuries and accidents.

1. Introduction

Many countries around the world are seeking new means to involve the private sector in managing and financing infrastructure through Public Private Partnerships (PPPs). Three reasons lay behind this trend: the growing budgetary constraints, the search for greater productivity efficiency, and the improvement of quality through a better allocation of risks and incentives (OECD, 2008). One of the most common ways of implementing PPPs in managing infrastructure is through the concession approach, which consists basically in transferring final design, construction, maintenance, and operation of the infrastructure to a private consortium, in exchange for the right to charge a fee to the user or to the government on behalf of the user, for a period of time contractually agreed in advance (Vassallo and Gallego, 2005).

Concession contracts should include the necessary provisions in order that the relationship between the public and the private sector work at their best throughout the life of the contract. To this end, the bidding terms and contracts should comply with two requirements: first, ensuring that the most efficient bidder in terms of price and quality will be granted the contract; and second, providing incentives to the contractor to render the highest quality level compatible with a reasonable cost.

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One of the key aspects of PPPs is precisely to encourage the private sector to manage and operate the infrastructure in the best way. To this end, in recent years, PPPs have been evolving from mere demand-based contracts to service-based contracts that refer to different aspects such as availability, congestion, state of the pavement, safety, and so on. Consequently, the revenues for the contractor tend to depend more and more on performance-based standards rather than on traffic demand (Harding et al., 2010).

Two reasons lie behind this trend. First, PPP contractors can manage better the service performance they offer than the ultimate traffic flows on the infrastructure. And second, by encouraging the PPP contractors to provide a better service, by aligning the social with the private benefits, they will end up producing a more efficient outcome for society.

The aim of this paper is to identify whether incentives to improve road safety in PPPs, by controlling other variables that may influence road safety, are ultimately effective at improving safety ratios. We propose a methodology, to analyze the effect of safety incentives on road safety in highway PPPs. The results showed that there are more fatalities, injuries and accidents on road segments without incentives when they are compared with other segments with incentives.

Apart from the introduction, the paper contains six additional sections. In Section 2, right after the introduction, we describe the practical experience in the introduction of safety incentives in highway PPPs. In Section 3, we give a literature review of the models explaining the variables influencing road safety ratios. In Section 4, we define the methodology we have implemented in this research and the data sources used for the empirical analysis. In Section 5, we show the main results of the model together with our comments. In the sixth and last section, we list our main conclusions and approach further research.

2. Road Public Private Partnerships in Spain

Spain turns out to be a good example for this research because both public and private highways coexist in the network. The highway capacity network has been developed on the basis of either public highways or private highways—most of them toll concessions—depending on the government in office.

The first interurban highways in Spain were developed on the basis of toll concessions funded solely by the private sector. Between 1967 and 1975, the Spanish government granted 2042 km of toll highway concessions. The results of the implementation of concession contracts in Spain during this period were rather controversial. On the one hand, toll highway concessions achieved the goal of providing the country with a modern highway network at a time when the public budget of Spain was not sufficient to afford such a huge cost. On the other hand, the guarantees made by the government to concession funding over time became very costly for the country (Izquierdo and Vassallo, 2004).

From 1976 to 2005 no highway concession was awarded in Spain. There were several reasons for this. First, the two oil crises in the 1970s destabilized the Spanish economy. Second, after Franco's death, the political atmosphere in Spain was uncertain. Third, and most important, the Socialist government, which took office in 1982 and remained until 1996, was politically opposed to promoting private concessions as a means of financing highways.

The socialist government continued expanding the highway network by building free highways on the basis of conventional public procurement. These free publicly built highways were called in Spain *autovías.* This term has been used in Spain since then on as a means to label free highways and distinguish them from toll highways (*autopistas*). The *autovías* are built, funded and managed by the Spanish government. None of the public highways (*autovías*) have economic incentives to improve road safety though the government is committed to building and maintaining them according to the standard procedures approved by the Ministry of Public Works.

The first *autovías* in Spain were built by doubling lanes out of single carriageways. The characteristics of these highways (known as first generation *autovías*) have alignment standards below those of toll highways. From 2000, the alignment standards of new *autovías* were improved notably to make them comparable with toll highways. These are called second generation *autovías*. This is the reason why we distinguish first generation *autovías* from second generation *autovías* in the road operation RO variable.

Consequently, we distinguished toll highways and second generation *autovías,* which have similar alignment design standards from first generation *autovías*.

In 1996, the conservative People's Party took office in Spain. The need to contain Spain's public deficit was the most difficult challenge facing the new government. This was the main reason why the new government decided to implement once again the policy of offering concessions to encourage the participation of the private sector in financing new transportation infrastructures. From 1996 until the time of writing, 1003 km of new toll highways concessions have been awarded by the central government of Spain through this approach.

From 1996 to the present, the government has promoted both free public highways (*autovías*) and toll highway concessions. Toll highway concessions are usually implemented in richer regions of the country where the possibility of raising revenue to make the business viable for the public sector is greater.

3. Safety-based incentives in Public Private Partnerships

The revenues obtained by private contractors managing PPP contracts have been traditionally linked to the level of traffic rather than to performance-based requirements. However, in the last few years most PPP contracts have been used to promote and introduce incentives tied to bonuses and penalties to foster the contractor to provide the optimal quality levels in