EX-POST EVALUATION OF GOVERNMENT LOANS PROVIDED TO SHADOW TOLL MOTORWAYS IN SPAIN

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ABSTRACT

Budgetary constraints are prompting many governments to encourage private financing of transportation infrastructure through Public-Private Partnerships (PPPs). Fiscal support measures have been often used to improve the financial feasibility of these projects, but also to rebalance the economics of the contracts to compensate for changes imposed by the government. This paper analyses the awarding of subordinated public participation loans (SPPLs) to ten brownfield shadow-toll motorway PPPs in Spain after additional works were imposed by the government. SPPLs are government loans, subordinated to the senior debt, that were intended to facilitate the PPP contractors the financing of the aforementioned works. This paper evaluates the financial and social impacts of the awarding of these loans to three of these projects. To that end, the SPPL repayment capacity of the PPPs and the social benefits derived from the improvement in road safety are estimated to evaluate whether the government's decision to support these projects was justified from a social perspective. The results show that, although the government's decision was reasonable, the design of the SPPL and its awarding conditions should be improved to guarantee the public interest.

1. INTRODUCTION

Over the last few decades, budgetary constraints have led many governments to implement new mechanisms to encourage private sector participation in the financing of infrastructure (OECD, 2008). In this respect, Public-Private Partnerships (PPPs) and concession approaches have acquired a special prominence, particularly regarding the construction and operation of transport facilities. Through these schemes, the private sector finances, builds, maintains, and operates the infrastructure in exchange for a fee linked to either demand or availability for a period of time contractually agreed in advance (Yescombe, 2007). Fiscal support measures have often been used to improve the financial feasibility of these projects (Vassallo and Sánchez-Soliño, 2007), but also to rebalance the economics of contracts to compensate for changes imposed by the government.

However, this form of government intervention may impose greater risk on the government and even threaten the financial sustainability of the public sector.

This paper evaluates the awarding of subordinated public participation loans (SPPLs) to ten brownfield motorway PPPs in Spain (known as first-generation motorways) as a means to rebalance their economics after the government imposed additional works not included in the original contracts. These government loans, subordinated to the senior debt, were intended to facilitate the PPP contractors the financing of the aforementioned works. On the one hand, the upgrading of these motorways, built in the 1980s, was deemed necessary by the government given the large increase in traffic volumes and accident rates. On the other hand, the conditions of these loans were very advantageous for the PPP contractors, to the point that could be considered insufficient to guarantee the interest of the State against that of the shareholders. The objective of this research is to evaluate whether the government's decision to support these projects was justified from a sustainability standpoint, taking into account the social benefits, the financial feasibility of the loan and the public interest. To that end, an *ex-post* evaluation of the financial and social impacts of the awarding of the SPPLs to three of the ten PPP contracts of the first-generation motorways is carried out.

The paper is organised as follows. After the Introduction, Section 2 focuses on the Spanish PPP context and describes how SPPLs are implemented to support infrastructure PPPs. Section 3 describes the case study, particularly regarding the context and conditions under which the SPPLs were awarded. Section 4 outlines the methodology adopted to evaluate the SPPLs performance from the sustainability point of view and the suitability of the government's decision to support the projects. Section 5 presents the results of our analysis. Section 6 discusses the results and sets out the most relevant implications arising from the case study analysed. Finally, Section 7 presents the main conclusions and highlights further research questions.

2. SPANISH SUPPORT TO PPP PROJECTS

Spain has extensive experience in promoting toll motorways through concession contracts. Since the late 1960s, 54 concessions totalling 3,307 km have been awarded, of which 2,759 km are State motorways (Ministerio de Fomento, 2018). Since the late 1990s, the country has gained significant experience in shadow toll road projects. At the regional level, 26 shadow toll projects totalling around 1,200 km (Acerete et al., 2018) have been awarded so far. For its part, the Central government has tendered and awarded 10 projects based on a combination of shadow toll and availability payment approaches, and one project that relies entirely on availability payments, totalling 1,042 km altogether.

Although these schemes have allowed the construction and update of an extensive network of high-quality privately financing motorways, they have prevented neither overcapacity nor frequent recourse to contract renegotiation, with consequent changes in initial terms, prices, and recourse to public aid (Engel et al., 2015). In this respect, Spanish law obliges the government to restore the economic balance of the contract, to the benefit of the relevant party as it corresponds, in the following cases: (i) when the government modifies, for reasons of public interest, the contractual terms originally agreed; (ii) when circumstances of force majeure or actions undertaken by the government lead directly to the substantial disruption of the economics of the contract; and (iii) when the assumptions established in the contract itself for its revision occur. However, the Spanish Government has gone beyond these causes to avoid the bankruptcy of road concessions. This way of acting has been highly motivated by the effects of a legal provision (known as the State's Financial Liability) included in the public contracts law that regulates the compensation to the PPP contractor in case of early termination of the contract. This clause commits the government to compensate the private sponsors for the works that have been built and not yet depreciated in case that the early termination of the contract has not been caused by their negligence. It is worth noting that, until the amendment of the public contracts law in 2015 (Law 40/2015), bankruptcy caused by low traffic levels was not considered negligence by the private sector so it prompted this compensation. This situation encouraged the government not to let concessionaires go bankrupt and, consequently, to assist them when they experienced financial difficulties (Baeza and Vassallo, 2011).

As a result, a large number of concessions have had their economic balance restored so far (Acerete et al., 2018; Baeza and Vassallo, 2011) at the expense of the user, the taxpayer or both. Mechanisms often used to adjust the economic balance of contracts include contract term extensions, fare increases, *ex-post* introduction of revenue mitigation mechanisms, and the awarding of cash subsidies or SPPLs. These government loans are presently the most important public instrument for supporting PPP contracts in Spain since they allow to improve the financial feasibility of projects without increasing the national public deficit, but also establish a fairer means of sharing profits between the private sector and the government (Vassallo and Sánchez-Soliño, 2007).

2.1 SPPL's Regulation

SPPLs are currently regulated by Royal Decree-Law 7/1996, which defines them as a subordinated financial instrument whose main characteristic is that the lender would receive a variable interest depending on the evolution of the outcomes of the borrowing company's activity. The criteria to determine such evolution may be either profit, revenues, sales or any other variable demanded by the government or freely agreed by the contracting parties. The characteristics of these loans can be freely designed by the government as long as they comply with three rules (Vassallo and Sánchez-Soliño, 2007):

- SPPLs must always be subordinated to other senior debt. Therefore, SPPL holders (the government in this case), will be repaid only after the PPP contractor has met its obligations to the senior lenders.
- The expected return of SPPLs must be related to the economic performance of the PPP contract. The idea behind this approach is that the government partially shares the project's profits and losses with private sponsors.
- The expected yield of SPPLs should be market–based, otherwise the government could use SPPLs to provide hidden subsidies that should be accounted for in the public deficit.

Likewise, the PPP contractor may not amortise the borrowed capital in advance, unless the early amortization implies payment of the net present value of the expected future benefits according to the economic-financial plan approved by the competent government body at the time of the return of the capital.

Although this mechanism has important advantages compared to other means of fiscal support, it also has some issues (Vassallo and Sánchez-Soliño, 2007). One of the problems is that the government could misuse this mechanism as an implicit subsidy by providing loans that the PPP contractor will ultimately not be able to repay. Also, this mechanism turns the government into a borrower of the project. Therefore, if the project does not perform as expected, the annual interests incurred will significantly decrease while the risk that the loan is not repaid will increase. Finally, if the supported project cannot turn its financial position around and goes bankrupt, the contract must be liquidated with the consequent activation of the State's Financial Liability. In that case, the government —and ultimately the taxpayer— will bear both the costs associated with assuming responsibility for the infrastructure and the non-repayment of the SPPL and its interests until the end of the contract.

2.2 Practical implementation of SPPLs in motorway concessions and PPPs in Spain

SPPLs have been implemented by the Spanish government either as an *ex-ante* support mechanism or as an *ex-post* means to rebalance the economics of concession and PPP contracts. Regarding the first case, bidders have been offered the possibility of requesting SPPLs at an early stage of the procurement process to strengthen the economic feasibility of the project and, consequently, encourage private participation in the tender. This approach was used, for example, in 2004 in the procurement of the *Cartagena-Vera*, the *Madrid-Toledo*, and the *Ocaña-La Roda* motorways and the Alicante's ring road; and, two years later, in the procurement of the *Málaga-Alto de las Pedrizas* motorway (Vassallo and Sánchez-Soliño, 2007).

However, SPPLs have also been granted to already awarded PPPs to compensate the contractor for amendments to contracts or changes made by the government on the grounds of promoting the public interest; or to improve the viability of PPPs in the event of poor economic performance or even on the brink of bankruptcy. The suburban toll motorway concessions around Madrid (R-2, R-3, R-4 and R-5) represent a good example of the use of this instrument by the government in a failed attempt to avoid those concessions going bankrupt. The economic performance of these concessions was pretty damaged by traffic shortfalls caused by the economic recession (and an overly optimistic estimate of traffic demand), and large cost overruns in the expropriation process. In this context, the government granted SPPLs to help them pay the additional costs incurred when acquiring the right-of-way and to provide liquidity because of the revenue shortfall (Baeza and Vassallo, 2011; Vassallo et al., 2012). However, despite the regulatory and financial aid, estimated at around €600 million, all concessionaires eventually went bankrupted (Bel et al., 2017).

Another example of the use of SPPLs to rebalance the economics of the contract to compensate PPP contracts for a discretionary change in the initial contractual conditions by the government is the present case study. As will be later explained, PPP contractors of the first-generation motorways received SPPLs as compensation for the government's imposition of additional works not foreseen in the original projects.

3. CONTRACT ANALYSIS OF THE FIRST-GENERATION MOTORWAY PPPS

3.1 Main characteristics
In 2006, the Spanish Ministry of Transportation (MT) launched the First-Generation Motorways Plan (hereinafter the Plan). Its purpose was to improve the alignment standards, quality and safety levels of a set of important motorways in Spain that were built in the early 1980s with quality standards far below those of motorways designed and built years later, making these roads much less safe than the rest of the network. Given the government's budgetary constraints and the need to improve the roads as soon as possible, the government decided to procure them as PPPs. Thus, the MT tendered the upgrading, maintenance and operation of eleven brownfield sections, totalling 993 km, which were finally awarded during 2007.

The contracts included three types of works: (i) initial works to adjust the motorway design to the current technical and functional standards required; (ii) major repairs to guarantee a proper level of service; and (iii) routine maintenance activities throughout the life of the contract. The private sector was entrusted with the design, financing, construction and operation of the infrastructure for a period of 19 years.

The government decided to keep the motorways free of charge by using a combination of shadow toll and availability payment approaches, committing itself to pay a fee to the PPP contractor based on both traffic demand and a set of performance indicators during the life of the contract. The "demand fee" is calculated monthly according to (i) the type of vehicle (light or heavy); (ii) the number of vehicles-kilometres of each type circulating on the motorway; (iii) the fare applicable to each type of vehicle per kilometre travelled; (iv) until the completion of the initial works, the percentage of motorway section in service at the end of the previous year; and (v) the correction factor, upwards or downwards, depending on a set of performance indicators stated in the contract that measure the condition of the road and the quality of service provided.

3.2 Amendments to the contracts

The financial crisis, which began shortly after the contracts were awarded, had a great impact on the actual traffic volumes on the motorways. This situation was exacerbated by the government's reluctance to approve the definitive designs provided by the PPP contractors, which caused important delays in the beginning of works. In these circumstances, the feasibility of the contracts was at risk, and with it the possibility of improving the motorways and, henceforth, their safety rates. For this reason, in 2010 the government prompted an overall change in the contract terms aimed at both including additional works and imposing stricter requirements considered indispensable to provide the right service.

According to Spanish law, the government has the right to change the terms of the contract to bring it closely into line with the public interest. If this change affects the economic balance of the contract, the initial conditions can be modified in favour of the private contractor or the government to compensate for this change (Vassallo et al., 2012). The main measures established for restoring the economic balance of the PPP contracts included: (i) the increase in the fares originally approved to compensate for additional works; and (ii) the possibility of granting SPPLs to PPP contractors to finance these additional works. The criterion established to calculate the new fare was to preserve the Internal Rate of Return (IRR) before taxes of the projects. The PPP contractors submitted new Economic-Financial Plans (EFPs) that included the additional investment and the new fares and, once approved by the government, became part of the contract documents. This rebalancing meant an increase in fares ranging from 21% to 67% over those initially approved, and an average increase in the price of the contracts for the government of around 37%. In addition, the value of the SPPLs granted to PPP contractors reached almost €400 million.

3.3 Granting of SPPLs

The PPP contractors were also granted SPPLs as compensation for the government's requirement of additional works not foreseen in the original contracts. The selection of this mechanism was motivated by two main reasons: (i) to facilitate the PPP contractors the financing of additional works at a time when the country was going through a deep financial crisis, and (ii) to avoid incurring a greater public deficit, since the Euro Pact required Spain to adopt strict control over national public accounts.

The conditions of the SPPLs were very advantageous for PPP contractors. First, the debt to the State was classified as subordinated debt, which allowed contractors to reduce pressure on equity, improve the risk profile of the senior debt and mitigate the liquidity risks of the project. Secondly, the repayment of the principal was set to take place six months before the end of the contract through a single payment. These repayment conditions allowed them to benefit from the entire loan during the whole contract period. Thirdly, a three-year grace period was established for the payment of the loan interests. The interests accrued in this period are to be capitalised together with the loan principal. This allowed the private sponsors not to pay interests during the most sensitive stage of the project, the construction phase. Finally, interest rates were, at least initially, below those of the market since the government would receive as remuneration from the loan the higher of the following amounts: (i) the amount resulting from applying a fixed interest rate of 175 basis points on the outstanding SPPL, or (ii) the amount resulting from applying equation (1).

$$R = 0.5 \times I \times \frac{RaDf}{MaDf} \times PL \tag{1}$$

where R is the annual remuneration; I, the project IRR before taxes; RaDf, the actual annual demand fee; MaDf, the maximum annual demand fee; and PL, the outstanding amount of the participation loan.

4. METHODOLOGY USED IN THE CASE STUDY

This section undertakes an *ex-post* evaluation of the impacts of the SPPLs awarded by the government to the PPP contractors of the first-generation motorways. These projects have exceeded half of their contract period, which is a reasonable time to conduct the analysis proposed. Specifically, three of the ten sections are analysed: (i) *Autovía del Arlanzón* (A1-T2), the project with the best economic performance among the first-generation PPPs so far; (ii) *Autovía Medinaceli-Calatayud (Aumecsa)* (A2-T3), the worst economic-performing project within the sample; and (iii) *Autovía de los Llanos (Aullasa)* (A31-T1), which has shown an average economic performance compared to the rest of the first-generation motorways. The analysis is aimed at evaluating the positive and negative impacts of the government's decision to support these projects from the financial and social perspectives. The methodology used comprised 3 main steps that are summarised below.

4.1. Selection of a set of performance indicators

The first step consists of the selection of a set of indicators to assess the actual performance of the selected PPP projects from 2010 to 2015. Two different types of indicators are selected: financial and social. On the one hand, the evolution of the financial indicators will later be compared with that foreseen in the EFPs approved after the economic rebalancing of the contracts. This comparison will allow us to evaluate whether the projects are performing as expected from the financial standpoint and, consequently, if they will be able to face the payback of the SPPLs principal. On the other hand, the social indicators are intended to evaluate the benefits arising from the projects themselves to evaluate their social feasibility. The financial indicators selected are investment, income, and dividends; and the social indicators: accident rates and anticipation in the commissioning of the works.

4.2 Analysis of the financial sustainability for the government

The second step consists of analysing the financial impact of awarding the SPPLs for the government. To that end, the capacity of the PPP contractors to repay the principal of the loan together with the capitalization of the interests accrued during the three-year grace period is assessed. Since the reimbursement of the SPPL will take place six months before the end of the PPP contract, the last year's free cash flow (FCF) (2026) for each PPP is estimated. It is considered that, as there is no mandatory imposition of creating a reserve account, the SPPL repayment will be borne with last year FCF. This is a crucial variable to evaluate the capacity of the PPP sponsors to repay the SPPLs, given that other senior loans should have been previously repaid, as is usual in project finance.

For its calculation, the evolution of the main variables affecting the PPP cash flow in the period 2017-2026 is estimated by assuming the elasticities to socioeconomic variables calculated by previous research studies for the case of Spain (Gomez et al., 2015; Gomez and Vassallo, 2016). According to the aforementioned authors, there is a marked and stable correlation between the variation in GDP per capita and the evolution of light vehicle traffic; and between the variation of industrial GDP and the evolution of heavy vehicle traffic. In order to allow for uncertainty in the evolution of the economy, we have defined three potential scenarios based on the forecasts of Spanish GDP growth from different agencies: a base scenario, an optimistic scenario, and a pessimistic scenario. Then, the simplified FCF estimate is made for each project and scenario by calculating the difference between income and expenditure. Finally, we estimate whether the government is running a risk of not being repaid by contractors by comparing the expected FCF in 2026 with the SPPL commitments to be reimbursed by contractors that year.

4.3 *Ex-post* evaluation of the social impacts of the SPPLs

The last step of the methodology consists of assessing whether the government's decision to support these projects was justified from a social perspective. To that end, an estimate of the social gains of the projects in terms of improved road safety is used as a proxy of the social impact derived from the awarding of the loans. The estimation has been carried out following the methodology developed by Pérez de Villar (2015), whereby the annual social benefit derived from improving road safety on a certain motorway is calculated according to equation (2):

$$SB_{annual} = PIA \ x \ V_{PIA} = (PIA_{ex} - PIA_r) x \ V_{PIA} \tag{2}$$

Where: PIA is the number of accidents with victims avoided as a result of the execution of a certain measure, which is calculated as the number of accidents expected on the motorway according to the general trend (PIA_{ex}) minus the real number of accidents that occurred in the motorway (PIA_r). Since PIA_{ex} is a highly uncertain value, Pérez de Villar (2015) recommends using as an approximation of the average value corresponding to roads with similar characteristics. V_{PIA} is the average statistical value of avoiding a victim in a traffic accident on roads with characteristics similar to that analysed, which is calculated according to equation (3).

$$V_{PIA} = \frac{\sum_{sr} FAT \ x \ V_{FAT} + \sum_{sr} SEI \ x \ V_{SEI} + \sum_{sr} SLI \ x \ V_{SLI}}{\sum_{sr} PIA} \tag{3}$$

Where: $\sum_{sr} FAT$, $\sum_{sr} SEI$, $\sum_{sr} SLI$ are the total number of fatalities, seriously and slightly injured on roads with similar characteristics. V_{FAT}, V_{SEI} and V_{SLI} are the value of avoiding a fatality, a seriously injured and a slightly injured. $\sum_{sr} PIA$ is the total number of victims on roads with similar characteristics.

Finally, we compare the estimated social benefit produced by road safety improvements until the end of the PPP contracts (2026) with (i) the additional investment made with respect to a scenario 0 in which the government has not supported the projects and, therefore, the existing roads have not been upgraded, and (ii) the potential financial loss estimated for the government in the pessimistic scenario. These comparisons allow us to evaluate the social feasibility of the projects and the extent to which the risk borne by the government in providing SPPLs to the projects was offset by the social benefits. It is worth noting that the evaluation of social benefits is very conservative for two reasons. On the one hand, society will keep on benefiting from accident rates reduction beyond 2026. On the other hand, other social gains (such as travel time savings, comfort improvement, fuel savings or reduced air pollution emissions) are not taken into account in this estimate.

5. RESULTS

This section summarises the main findings of the three selected PPP projects of the Plan. First, it shows the actual performance of the projects compared to the new EFPs approved. Then, the SPPL repayment capacity of PPP contractors is calculated for different scenarios in order to estimate its potential impact on the public budget. Finally, social gains derived from the improvement in road safety are estimated to assess whether the government did it right when deciding to grant SPPLs to support the projects.

5.1 Financial performance and social benefits
5.1.1 Capital and O&M costs

Regarding the capital cost of the initial works, all PPPs managed to adjust very well to the estimates conducted in their EFPs. As can be seen in Table 1, two of the three projects analysed incurred lower costs than expected. In contrast, there has been significant under-investment in major repairs and rehabilitation actions compared to the original estimates.

In this regard, only A2-T3 and A31-T1 carried out rehabilitation works worth, in both cases, far less than expected. Finally, PPP contractors incurred higher O&M costs than originally planned. This was likely caused by the incentives provided by the contracts to achieve better maintenance and operational performance through service indicators.

Section	Construction costs	Rehabilitation costs*	O&M costs*
A1-T2	-2.69%	-100%	17.36%
A2-T3	-7.94%	-74.13%	4.27%
A31-T1	1.18%	-88.30%	54.52%

 * In the period 2009-2015

Table 1 - Deviation of the main costs from EFP's estimation

5.1.2 Income

Table 2 shows the evolution of the deviation of current revenues —both from traffic and availability— from those foreseen by the EFPs, which considered no income from availability payments. It can be observed that all PPPs, especially A2-T3, obtained less income than originally expected, especially during the first years of operation. In the last years analysed, due to the improvement of the Spanish economy and the availability bonuses, the total revenue obtained almost coincides with the original estimates.

Section	2009	2010	2011	2012	2013	2014	2015	2016
A1-T2	-	-	-29,7%	-17,3%	-1,5%	7,2%	1,4%	-6,3%
A2-T3	-	-15,6%	-67,0%	-48,9%	-31,9%	-2,7%	-12,2%	-3,5%
A31-T1	-1,7%	-33,6%	-2,8%	-17,5%	-5,0%	-6,5%	10,4%	-4,1%

Table 2 - Income deviation from EFP's estimation in the period 2009-2016

The actual dividend distribution to project shareholders for two of the PPPs analysed has substantially differed from that envisaged in the EFPs. In the case of A1-T2, dividends began to be distributed in 2013, one year later than planned. However, the accumulated amount distributed till 2016 was 37% higher than initially envisaged, with an over-distribution of €3.03 million. In the case of A31-T1, dividends began to be paid in 2014, four years ahead of schedule, with €4.24 million being over-distributed. Finally, as of 2016, A2-T3 had not yet distributed dividends, following the schedule established in the EFP, with dividends to be distributed from 2018 on. This PPP has obtained lower economic results than expected so far and has been incurring losses despite the additional income from indicators, obtaining the worst economic performance of the PPPs under study.

5.1.3 Accident rates

Table 3 shows the evolution of the hazard (HI) and mortality (MI) indexes. An important decrease in their values can be observed comparing the situation before the projects were awarded (2006 and 2007) and after works were completed (2014 and 2015).

Quantitatively, the HI on the motorways analysed with respect to the starting situation has improved between 78 and 90%, while the MI has fallen by 29% on average. As can be observed in the same table, two of the three motorways are significantly safer than the rest of the State roads with similar characteristics in terms of traffic levels (AADT) and road type (urban or interurban).

Section	Before works				*Works in progress*	After works				Equivalent roads
	2006		2007		*2008-2013*	2014		2015		2015
	HI	MI	HI	MI		HI	MI	HI	MI	Average HI
A1 - T2	18.64	0.46	15.48	0.17		3.63	0.27	3.37	0.27	6.06
A2 -T3	19.25	0.94	27.89	1.75		6.26	0.45	4.22	0.21	3.97
A31 - T1	14.7	0.22	17.82	0.84		2.07	0.13	1.86	0.37	6.06

Table 3 - Evolution of hazard and mortality indexes of the PPPs analyzed before and after the completion of works and average hazard index of equivalent roads for 2015

5.1.4 Anticipation in the commissioning of the works

One of the main reasons why these projects were undertaken under the PPP approach was the urgency of the Plan and the insufficient resources to undertake these actions through conventional budgetary approaches within a reasonable period of time. In that respect, the Strategic Plan of Infrastructure and Transport (PEIT) estimated that it would take about eight years to meet all investment needs if they were to be built with budgetary resources (Ministerio de Fomento, 2005). This estimation was, however, based on an economic growth scenario that did not occur given the economic downturn that soon after affected the country and resulted in continued budget reductions for the road infrastructure program since 2009. The PPPs analysed were completed within 1.5 (A31-T1) to 3.5 years (A2-T3).

Therefore, the implementation of the actions was anticipated in a range between 6.5 and 4.5 years with respect to the option of undertaking the actions through the conventional procedure estimated by the MT. As a result, society has been reaping the benefits of the positive savings and externalities derived from the works in advance.

5.2 Estimates of the debt repayment capacity of the PPP contracts

In order to estimate the repayment capacity of the SPPL, according to the methodology previously defined, we have estimated the FCF in the last year of the contract (2026). To that end, we estimated: (i) traffic revenues; (ii) availability payments; (iii) O&M costs; (iv) capital costs in major repairs and rehabilitation projects, and (v) corporate taxes. The hypotheses and the procedure adopted for their calculation are summarised below.

- Annual traffic revenues are calculated as the product of the volume of traffic on the road section (in vehicles x km) each year and the fare (excluding VAT) applied in the same period, differentiating between traffic and fares for light and heavy vehicles. The evolution of light and heavy traffic over time has been obtained, for each scenario, by applying the elasticities estimated by Gomez et al. (2015) and Gomez and Vassallo (2016) to the socioeconomic variables of each scenario (GDP per capita and industrial GDP). For its part, the fare is updated yearly according to the variation of the national Consumer Price Index (CPI) by using the Spanish CPI forecasts for the period 2017-2026 from the International Monetary Fund (IMF).
- Annual availability revenues in the period 2017-2026 are assumed to be a constant percentage of total revenues consistent with previous years.
- Annual O&M costs in the period 2017-2026 have been calculated based on those of the previous years, assuming that the only increase they will experience in the future will be caused by inflation.
- Given the difficulty of estimating future investments in road rehabilitation, the values foreseen for this purpose in the EFPs delivered by the PPP contractors have been adopted in the analysis.

- The corporate tax is calculated as the legal rate (25%) times the Profit Before Taxes (PBT). The PBT has been annually calculated for each of the proposed scenarios as annual revenues minus O&M costs, depreciation of the assets, and financial expenses.

After obtaining the expected FCF in 2026, the last step of the analysis consisted of estimating whether they are enough to cover the repayment of the principal of the SPPL including the capitalization of interests accrued during the three-year grace period. Table 4 shows that the amount that PPP contractors have to return to the government the last year of the contract is, for all scenarios, higher than the expected FCF generated. Thus, according to the principles of project finance, whereby lenders should only rely on project cash flows for debt repayment, PPP contractors will not be able to repay the full amount of the loan in the last year of the contract.

Section	SPPL principal + 3-year interests	Scenarios	Last year FCF (M€)	Difference with respect to the scenario (M€)
A1-T2	49.56	Optimistic scenario	43.37	-6.19
		Base scenario	*40.98*	*-8.58*
		Pessimistic scenario	38.33	-11.23
A2-T3	51.30	Optimistic scenario	28.16	-23.14
		Base scenario	*26.66*	*-24.64*
		Pessimistic scenario	26.15	-25.15
A31-T1	20.58	Optimistic scenario	18.77	-1.81
		Base scenario	*17.51*	*-3.07*
		Pessimistic scenario	16.24	-4.34

Table 4. Amount to be returned by each PPP contractor to the government in the last year of the contract, estimated free cash flow (FCF) available that year for that purpose and estimated amount that would not be returned in each scenario

5.3 Estimate of the social benefits of the PPP projects

In order to obtain an approximation of the social gains derived from the projects, a conservative estimate of the social benefit derived from the improvement in road safety since the commissioning of the first section (A31-T1) until the end of the PPP contracts (2026) is made according to the methodology previously explained (Pérez de Villar, 2015).

To that end, it has been assumed that if these motorways had not been upgraded, the evolution of the accident rates —measured through the HI— of the first-generation motorways under study would have followed the same trend of the rest of the Spanish roads with similar characteristics.

The annual social benefit (SB_{annual}) is calculated following equation (2) as the product of the number of victims avoided on the motorway sections analysed with respect to the hypothetical scenario where no upgrading actions are undertaken, and the value of preventing a victim calculated according to equation (3) with the monetary values provided by the Handbook on External Costs of Transport (DG MOVE, 2014).

From the analysis conducted, we estimated that the social benefit derived from the reduction of accident and mortality rates on the three motorways in the 2011-2026 period totalled €363.82 million actualised to 2007 prices. On the other hand, the total investment related to the establishment and upgrading of the motorways, including additional works approved in 2010, updated to 2007 amounted to €360.91 million. This estimate shows that the social benefit derived from the reduction of the accident rate exceeds the total investment made for the establishment and upgrading of the three sections, which endorses the social feasibility of the projects. Finally, the potential financial loss estimated for the government in the pessimistic scenario, actualised to 2007 prices with the same discount rate used for the social benefit, amounts to €16.8 million, which is negligible compared to the social benefits of the motorways.

6. DISCUSSION OF THE RESULTS AND POLICY IMPLICATIONS

The *ex-post* evaluation enabled us to evaluate whether the government's decision to support the PPPs analysed was socially justified. The SPPLs, together with the rest of measures agreed when restoring the economic balance of the contracts, allowed the government to push ahead with the projects and undertake the works it deemed necessary to improve road safety on the motorways. The analysis shows that these projects have proven to be extremely successful in decreasing accidents rates, thereby producing high social benefits that greatly exceed the potential financial loss estimated for the government in the pessimistic scenario analysed. Moreover, both users and society have been enjoying these benefits well in advance thanks to the government's decision to support the PPP contracts. Finally, if the government had chosen not to do so, the contracts would have likely been early terminated, thereby entailing important costs for society (termination payments to contractors, additional cost to re-tender the contracts, etc.) and the benefits arising from the projects would have been delayed.

The case study analysed also provides future lessons for governments that need to make prompt decisions responding to sudden PPP problems. The first lesson is that a right *ex-ante* design of the contract substantially contributes to reducing problems once the contract is awarded. In the case shown in this paper, the government's reluctance to approve the final designs provided by PPP contractors, even though they met the minimum requirements, delayed the financial close of the projects and, subsequently, the beginning of the works.

This fact, along with traffic shortfalls caused by the economic recession, were the main causes that threatened the projects' viability.

Thus, if the government had included in the projects' tendering specifications the technical requirements and all the works deemed necessary, the problems would have been much limited.

The second lesson is that support mechanisms must be properly designed so that the government does not take a higher risk than the shareholders. In the present case study, the conditions under which the SPPLs were awarded did not set sufficient measures to guarantee the public interest against that of the shareholders. The results show that, if no action is taken in this regard, there is a significant risk that PPP contractors will not be able to repay the principal of the loans even though the PPP projects are performing well and, in two of the cases, distributing more dividends than expected. In this respect, some of the issues identified might have been avoided if the government had set some provisions to safeguard the SPPL seniority to the shareholders. For example, the government could allow for a more flexible amortization approach of the SPPL, or require PPP contractors to set up a SPPL service reserve account at the end of the grace period for its provision.

The third lesson is that the level of risk actually borne when providing support mechanisms to PPPs should be assessed and if possible quantified. SPPLs may involve contingent liabilities with a significant impact on the future public budget, but they were not assessed before being awarded. The fourth lesson from this paper is that an independent entity, rather than the MT, should be in charge of measuring the contingent liabilities arising from these loans. These contingent liabilities, once estimated for all the projects, should be accounted for within the national budget at the time the loan is granted. This way, governments will have the correct incentive to provide SPPLs at the right price, and only when they add value.

7. CONCLUSIONS

This paper is a good example of the complexity of managing PPPs due to the incompleteness inherent to these contracts. The case study sheds some light on key aspects to respond to government decisions about providing support to PPPs in trouble with potential high benefits for the society. It also shows how taking drastic decisions in that respect, such as forcing the termination of the contracts, may not be the best solution from the social point of view. This case study proves how governments often try to solve problems as quickly as possible without conducting the right analysis to measure the impact, both social and fiscal, in the medium and long term.

The main conclusions from the paper are two. The first one is that a good governance approach along with the right *ex-ante* design of the contract will mitigate the impact of future unexpected problems.

The second conclusion is that the best way to deal with problems over the life of the contract is to define the right procedure to address them. In this respect, a proper design of the support measure and assessing the consequent government exposure to risk is necessary to ensure the financial sustainability of the public sector when adjusting the contracts to unexpected events.

Future research should focus on using more quantitative approaches to find an optimal equilibrium between commitment and flexibility in PPPs to ensure that decisions are taken to maximise sustainability. This analysis should value the impact on different stakeholders.

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