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COMBINING CAPITAL GRANT AND AVAILABILITY PAYMENT TO KEEP TOLL RATES AFFORDABLE

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Abstract

In several countries public budgets cannot provide all the funds needed to build priority transport and other infrastructure projects that are economically justified and environmentally and socially sound. Under certain circumstances, projects meeting such conditions can be implemented by involving private financing, through public-private partnerships (PPP), which is a means to get projects completed by leveraging scarce public resources. Priority highway PPP projects may require toll rates above the affordability level of road users, particularly when construction costs are relatively high and traffic volumes are relatively low. The provision of capital grants and/or availability payments to the concessionaire (i.e., the private partner) by the government (i.e., the public partner) would reduce the toll rate required to attract private investors for the project. Such projects, where the sources of revenue to the private partner (or concessionaire) include both the users of the facility and the government, are usually called hybrid PPPs. A key step in assuring that a proposed PPP highway project would attract private investors is to determine whether financial public support would be required, and if so, how much. To this endeavor, this paper reviews and applies a hybrid PPP financial model for highways that facilitates carrying out projects' financial viability by decision makers and practitioners. A numerical case study is used to illustrate applications of the model to conditions deemed representative of Southeastern European countries. The main outputs generated by the model include the project's internal rate of return, equity internal rate of return, annual debt service coverage ratio, and the present value of the government's cash flow. A sensitivity analysis carried out shows the impact of key input parameters on the main outputs. While the financial model discussed has been developed for roads, it can also be adapted to other forms of transport infrastructure, such as rail.

Keywords: public-private partnership, capital grant, availability payment, toll rate

1 Introduction

Public-private partnership (PPP) is a long-term contract between a private party and a government entity for providing a public asset or service, in which the private party bears significant risk and management responsibility, and remuneration is linked to performance [1]. There has been a substantial contribution of the private sector to finance roads and other forms of transport infrastructure across the world. In 2019, private investment commitments in energy, transport, information and communications technology (ICT) backbone, water, and municipal solid waste (MSW) infrastructure in low- and middle-income countries totaled US$96.7 billion across 409 projects in 62 countries [2].

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Private investment in sustainable, quality infrastructure is critical to boost economic growth and promote resilience – resilience against the current public health crisis and climate-related risks, as well as future global and national shocks [3]. Attracting more private financing to road projects in Southeastern European countries would be a means toward greater investments to keep road infrastructure in acceptable condition and carry out required expansions in a context of public budget constraints. When arrangements for private participation or, more generally, public-private partnerships (PPP) are designed well, they can lead to [4]:

1. Greater financial efficiency, by leveraging public money through the mobilization of private capital, reducing the impact of investments in infrastructure on the fiscal budget, and creating fiscal space to expand public service delivery in other sectors;
2. Better distribution of risks, by transferring design, construction, and performance risks to the private sector, which is best able to manage such risks; and
3. Better governance, by increasing the accountability of the service provider through competitive bidding, disclosure policies, and public reporting.

Government support to potential PPP road projects is justified when an economically feasible project does not offer, without such support, the financial benefits required to attract private concessionaires. The mixing of public and private funding to get projects completed is a way to leverage scarce public resources. Combining Capital Grant and Availability Payment to Keep Toll Rates Affordable. This paper analyzes the combination of capital grants (or construction subsidies) and availability payments to attract private partners to a PPP road project, keeping toll rates at an affordable level.

2 Sources of revenue to PPP road projects

In a PPP road project, the sources of revenue to the private partner (or concessionaire) may include:

- the road users, through tolling,
- the government (through, for example, availability payments, capital grants, or shadow tolls),
- both road users and government, which is usually called a hybrid concession.

When traffic levels are relatively low and/or construction costs are relatively high, it is likely that a proposed motorway or expressway will require government support (e.g., capital grants and/or availability payments) to complement toll collection in order to generate enough revenues to attract private partners to compete for such PPP road project. A national (or international) electronic road tolling collection (ETC) system would reduce toll collection costs and, consequently, facilitate the implementation of such projects.

3 Open and competitive bidding procedure

Measures to increase competition may include improved contract design (e.g., avoiding too big or too small contract size), wider advertisement of the bidding, clarification of issues raised by potential bidders, and providing enough time for bidders to prepare their bids (usually a minimum of 90 days is required).

Assuming a good degree of competition in the selection of the concessionaire, an open and competitive bidding procedure would minimize the amount of the availability payment to be paid to the concessionaire, by the government agency, during the O&M phase of the contract, when this is the key financial criterion to select the successful bidder.

Another related option, which may be available to decision-makers, would consider the toll rate as a constant (for example, based on the maximum affordable toll rate), but establish as

the financial criterion, to select the successful bidder, the sum of the capital grant and the availability payment to be paid to the concessionaire. This approach would have as a drawback the risk that some bidders may "frontload" their financial proposal, that is, exaggerate the proposed capital grant and minimize the availability payment. Such risk, however, could be minimized by specifying a maximum limit for the capital grant (for example, 60 % of the total construction cost). Case study: A numerical example of the interrelationship between capital grant, availability payments, and toll rates

The previous paragraphs described, in general terms, options to implement PPP in the road sector. To provide a quantitative assessment of potential PPP projects, in light of future investments and funding sustainability, the next paragraphs discuss a numerical example to illustrate, for a hypothetical proposed motorway, the combination of availability payments and capital grants to keep the toll rates at an affordable level. We will assume four scenarios (i.e., low, medium, high and very high cost) for the total construction cost (including design) and the related annual O&M cost to be:

a. Construction cost: €100 million; annual O&M cost: €5 million;
b. Construction cost: €200 million; annual O&M cost: €10 million; and
c. Construction cost: €300 million; annual O&M cost: €15 million.
d. Construction cost: €400 million; annual O&M cost: €20 million.

A World Bank governance study [5] showed an average cost increase in road works contracts (i.e., cost overrun) of 18 % in Southeast Europe, based on a two-country sample (namely Albania and North Macedonia). Assuming the same cost overrun would occur in a traditional road works if the proposed project would not be implemented as a PPP, it would seem fair to expect the construction cost to be inflated by 18 %. If implemented as a PPP project (where there is no provision for variation orders), the above construction costs would prevail. However, if implemented as a traditional bill-of-quantities (BOQ) contract, it is likely that the ultimate construction costs would be (i) €118 million, (ii) €236 million, (iii) €354 million, and (iv) €472 million, respectively. Consequently, implementation of the project as a PPP might save the relevant country about €72 million, in the case of the highest construction cost scenario. We will carry out the financial analysis using the originally assumed construction costs.

In the case of an actual proposed road concession, a feasibility (or pre-feasibility) study would need to be carried out and relatively precise estimates would be done for all key parameters of proposed project. In our particular case, the following project related data will be assumed for the analysis of the three hypothetical scenarios:

- Concession life: 30 years
- A range of construction cost during the 3-year investment phase of the contract: €100 million; €200 million; €300 million; and €400 million
- Annual O&M cost in subsequent years of the contract: €5 million; €10 million; €15 million; and €20 million. Such values are expressed in terms of present values and would be adjusted for inflation in subsequent years
- Road length: 40 km
- Annual average daily traffic (AADT): 8,000 vpd (80 % cars, 2 % buses, and 18 % trucks)
- Annual traffic growth: 3.0 %
- Capital structure: Debt/Equity ratio, 75/25; Assumed construction subsides: 0 %, 30 %, and 60 % of the capital investments
- Assumed availability payments: 0; €20 million/year; €40 million/year; and €60 million/year
- Nominal interest rate: 8 % per year
- Loan grace period: 3 years
- Debt maturity: 15 years (loan repayment period of 12 years)
- State discount rate (in nominal terms): 10 %

- Inflation: 4 % per year
- Tax rates: (a) Value added tax (VAT): 20 %; (b) Corporate tax: 15 %
- Amortization period: 27 years

It is also assumed that the following targets (or constraints) will have to be met for the project to be able to attract private investors (i.e., parameters deemed applicable to the country and project under consideration):
- Equity Internal Rate of Return (or Return on Equity): ROE ≥ 12 % (in real terms)
- Annual Debt Service Cover Ratio: ADSCR ≥ 1.15

A financial model will be required to analyze the above data. Financial models are analytical tools that allow the user to assess the financial robustness of a project by representing its expected financial performance, including cash flows and returns [6].
There are several toolkits, including financial models, available for the analysis and ex-ante assessment of highway PPP projects [7]. The Government of India [8] released a web-based toolkit for the improvement of the decision-making process in PPP arrangements for the delivery of infrastructure projects. The toolkit can be used for the assessment of highway projects, which is one of five sectors covered.
In 2013, the Federal Highway Administration's (FHWA) Office of Innovative Program Delivery launched a new toolkit, P3-Value, Public-Private Partnership Value-for-Money Analysis for Learning and Understanding Evaluation [9]. Although the main purpose of the toolkit is to help decision makers in the "value-for-money" analysis, it covers other important aspects of PPPs such as risk evaluation and financial feasibility.
Subsequently, the US Department of Transportation [10] published a related Guidebook on Financing of Highway Public-Private Partnership Projects. The World Bank, supported by the Public-Private Infrastructure Advisory Facility (PPIAF), developed a Toolkit for Public-Private Partnership in Roads and Highways [11] to assist policy makers in implementing procedures to promote private sector participation and financing in roads. The Toolkit includes financial models (in graphical and numerical formats) that can be used for the financial assessment of PPP toll roads.
Based on the World Bank/PPIAF Toolkit toll road graphical financial model, a model was developed to assess the financial feasibility of hybrid PPP projects, that is, projects involving both tolling and availability payments [12]. Because of its relevant features, in particular the combination of tolling, availability payments, and construction subsidies, such model was selected for using in this paper.
Using the input data discussed above, the hybrid financial model was deployed to estimate the minimum required availability payment and/or construction subsidy to attract private investors, while keeping the toll rate at an affordable level. As a first step, we will assume an availability payment and construction subsidy equal to zero and estimate the required toll rate.
Application of the model to the four assumed construction (and O&M) cost scenarios shows that the following weighted average toll rate (WATR) would be required:
a. Low construction cost scenario: WATR = €7.0/vehicle;
b. Medium construction cost scenario: WATR = €13.9/vehicle;
c. High construction cost scenario: WATR = €20.8/vehicle, and
d. Very high construction cost scenario: WATR = €27.7/vehicle.

In case there are uncertainties regarding the parameters used to derive such toll rate, the financial model can be easily rerun to carry out a sensitivity analysis [12].
Toll affordability levels are usually expressed in terms of the maximum toll rate that passenger car drivers are willing and able to pay, expressed in €/car-km. In the absence of specific

studies and surveys for the proposed toll road (e.g., motorway), such as willingness to pay study, we will assume the following range of maximum affordable unit toll rates: (i) €0.03/car-km; (ii) €0.05/car-km; and (iii) €0.07/car-km.
The relationship between the weighted average toll rate and the toll rate for cars, trucks and buses can be written as [13]:

$$WATR=(PC\ TRc+PB\ TRb+PT\ TRt)/100 \quad (1)$$

where:
WATR is the weighted average toll rate per vehicle;
PC, PB and PT are the percentages of cars, buses and trucks in the traffic flow;
TRc, TRb and TRt are the toll rates for cars, buses and trucks.

Usually, the toll rate for a commercial vehicle is equal to the toll rate for cars times the vehicle's number of axles. Based on the above and the estimated traffic composition, the following relationships between toll rates for different types of vehicles will be assumed as representative of the proposed motorway:
• Average bus toll rate = 2 x car toll rate
• Average truck toll rate = 3 x car toll rate

The average traffic flow composition on the proposed motorway, as indicated above, will be assumed as: PC, 80 %; PB, 2 %; and PT, 18 %. Accordingly, Equation (1) can be re-written as:

$$WATR=(80TRc+2\ 2\ TRc+18\ 3\ TRc)/100$$

or

$$TRc=WATR/1.38 \quad (2)$$

WATR was computed by the model for the four investment scenarios, as €7.0/vehicle, €13,9/vehicle, €20.8/vehicle, and €27.7/vehicle, respectively for the low, medium, high, and very high-construction cost scenarios. Consequently, for the proposed road concession, the required toll rate per car, for each investment scenario, using Equation (2), would be:
a. Low construction cost scenario: TRc = €5.1/car;
b. Medium construction cost scenario: TRc = €10.1/car;
c. High construction cost scenario: TRc = €15.1/car; and
d. Very high construction cost scenario: TRc = €20.1/car.

As the total length of the proposed motorway section is 40 km, as indicated before, the unit toll rates, in Euro per car-km, will be:
a. Low construction cost scenario: Unit TRc = €0.13/car-km;
b. Medium construction cost scenario: Unit TRc = €0.25/car-km;
c. High construction cost scenario: Unit TRc = €0.38/car-km; and
d. Very high construction cost scenario: Unit TRc = €0.50/car-km.

If a required unit toll rate is higher than the maximum affordable toll rate, there is a need for an availability payment and/or construction subsidy to make such project financially viable. As indicated above, we are assuming three levels of maximum affordable unit toll rates, representing, respectively, a pessimistic, most likely, and optimistic scenario:
• €0.03/car-km;
• €0.05/car-km; and
• €0.07/car-km.

When the required toll rate is higher than the maximum affordable toll rate, there is an affordability gap. For example, if the required toll rate is €0.08/car-km and the maximum affordable toll rate is €0.05/car-km, the affordability gap would be €0.08/car-km minus €0.05/car-km or €0.03/car-km. We will now discuss how affordability gaps can be bridged with a combination of availability payment and construction subsidy.
We can use the available hybrid financial model (previously discussed) to estimate how much availability payment and/or construction subsidy would be required to meet the financial constraints adopted, i.e., a minimum ROE of 12 % and a minimum ADSCR of 1.15.
Table 1 shows the required car toll rate for availability payments varying from zero to €60 million/year and construction subsidies varying from 0 to 60 % of the total construction cost. For example, for an availability payment of €20 million and a construction subsidy of 30 %, the minimum required toll rate would be €0.06/car-km for the medium construction cost scenario.

Table 1 Estimated relationship between availability payment, construction subsidy, and the required toll rate (€/car-km) for the proposed motorway project

Construction cost scenario	Construction subsidy (%)	Availability Payment (€ million/year)			
		0	20	40	60
Low (€100 million; annual O&M cost: €5 million)	0	0.127	0.002		
	30	0.091			
	60	0.065			
Medium (€200 million; annual O&M cost: €10 million)	0	0.252	0.127	0.004	
	30	0.181	0.060		
	60	0.130	0.031		
High (€300 million; annual O&M cost: €15 million)	0	0.377	0.254	0.129	0.005
	30	0.272	0.147	0.040	
	60	0.194	0.096		
Very high (€400 million; annual O&M cost: €20 million)	0	0.502	0.379	0.254	0.130
	30	0.361	0.237	0.120	0.020
	60	0.259	0.159	0.062	
Required Unit Toll Rate per Car (€/car-km)					

Once the affordable toll rate has been established for a proposed motorway project, the road agency has a choice regarding the level of construction subsidy it can offer. For example, in case the agency can count on a loan from an international finance institution (IFI), the construction subsidy could be established based on the amount of the expected loan (i.e., the road agency could use the loan to pay for the construction subsidy) and let the bidders compete on the required level of annual availability payment.
PPP is a more market-oriented project delivery structure, compared to traditional public road construction contracts, with greater private sector involvement, whose preparation usually takes longer than traditional projects. Nevertheless, the preparation time could be shortened with a dedicated and well-prepared team taking the lead role in all the required preparatory steps. This would be particularly relevant when the acute phase of the Covid-19 crisis is over, and more infrastructure, including road works, will be needed for economic recovery.

4 Conclusions

Attracting private financing to road projects, through some form of public-private partnership (PPP), would be a means toward greater investments to keep road infrastructure in acceptable condition and carry out required expansions in a context of public budget constraints. In Southeast Europe there is an average cost increase in traditional road works contracts (i.e., cost overrun) of about 18 %. Assuming such cost overrun would occur in a traditional road works contract, it seems fair to assume that the construction of a motorway section would cost, if implemented as a PPP project (where there is no provision for variation orders), about 15 % less than if implemented by the traditional bill of quantities approach.
Moreover, additional benefits may be introduced by private sector efficiency gains. It is recommended that countries select road sections most likely to be adequate for implementation as PPP and carry out a preliminary financial assessment to identify a potential PPP pipeline. Because of relatively low traffic levels on some proposed motorways and expressways, it is anticipated that a combination of government support (e.g., capital grants and/or availability payments) and toll collection would be required to generate enough revenues to attract private partners to compete for such PPP projects.
The quantitative financial assessment of a hypothetical PPP project, with a range of estimated construction costs, shows that the project could attract private investors with a combination of availability payments and construction subsidies to keep the toll rates at affordable levels.

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