International Transport Forum

Public-Private Partnerships in Transport: Unbundling Prices from User Charges

Public-Private Partnerships in Transport: Unbundling Prices from User Charges

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Foreword

Transport infrastructure is a major enabler of economic development. In the drive to refurbish or build, governments worldwide have turned to the private capital market for financing. The primary narrative behind this push is the huge stocks of private capital that are available, while public financing capabilities are said to be limited and insufficient.

The almost exclusive vehicle of private investment in transport infrastructure, including social infrastructure, is Public-Private Partnerships (PPPs). In the context of PPPs, two important aspects have received little attention.

First, sufficient attention has not been given to the role of suppliers. The focus of governments and Intergovernmental Organisations has been on resolving the challenges to private investment from the viewpoint of investors: reducing the uncertainty they face and enabling them to price risk more efficiently by establishing infrastructure as an asset class.

However, looking only at investors gives an incomplete view of the total cost of the risk transferred from the public to the private sphere. In PPPs, investors transfer some of the major risks they are not comfortable bearing to design, construction, maintenance, and operations contractors.

Suppliers, too, face uncertainties and are unable to efficiently evaluate price risk. In such cases, the base cost of the initial investment – and of subsequent services – may be much higher than they might have been, and not just the cost of their financing.

Uncertainty arises from the difficulties to accurately estimate the cost of construction, maintenance, operations, and financing. But it also stems from "unknown unknowns" (the so-called Knightian uncertainty). For instance, changes in weather patterns or paradigmatic technological shifts, the timing and impact of which are unclear, will influence what infrastructure is needed and where.

So what can policy makers do to reduce the cost of inefficient risk pricing of suppliers? Where does this put PPPs? How can public decision makers reconcile long-term uncertainty with private investment in infrastructure? Who should bear long-term uncertainty in projects: the public or the private sector?

These were some of the guiding questions for a Working Group of 33 international experts convened by the International Transport Forum (ITF) In September 2016. The group, which assembled renowned practitioners and academics from areas including private infrastructure finance, incentive regulation, civil engineering, project management and transport policy, examined how to address the problem of uncertainty in contracts with a view to mobilise more private investment in transport infrastructure. As uncertainty matters for all contracts, not only those in the context of private investment in transport infrastructure, the Working Group's findings are relevant for public procurement in general.

The synthesis report of the Working Group was published in June 2018. The report is complemented by a series of 19 topical papers that provide a more in-depth analysis of the issues. A full list of the Working Group's research questions and outputs is available in Appendix 1.

Acknowledgements

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Executive summary

What we did

This paper explores the possibility of unbundling user charges from contractor charges in Public-Private Partnership (PPP) contracts. It analyses the benefits and problems of such an approach based on the theory of infrastructure economics and defines a potential governance structure to put the model into effect. It also reviews the infrastructure sectors where its implementation may be particularly advantageous.

In many PPP contracts, user charges and PPP charges coincide. This causes problems as prices cannot be used as a means to optimise allocative efficiency and transferring demand risk to PPP contractors creates wrong incentives with regard to value for money. This paper seeks to identify a way to guarantee that prices for users are set according to allocative efficiency principles aimed at maximising social welfare, while contractor charges are set in order to maximise value for money.

What we found

Implementing a model that unbundles user charges from PPP charges is one way to improve the performance of traditional PPP approaches. User price is the fare that is charged to the final client of the infrastructure. PPP charges are the fees set to remunerate the PPP contractor. In an availability payment approach, for instance, the revenue received by the contractor will depend on how the availability indicators and the payments associated with them are established in the contracts.

Such a model is based on two economic principles. Firstly, pricing users is crucial beyond raising money to fund infrastructure. Its role is also to influence user behaviour in a way that leads to internalise externalities and promote social and distributional policies. Secondly, the charging approach set in the PPP contract determines the revenues of the PPP contractor and therefore has a great influence on incentives and risk allocation, and ultimately on value for money.

Unbundling user charges from PPP charges allows more flexibility in setting user charges over the life of the contract. At the same time, the private sector will be allocated those risks that it can manage, thus fostering value for money outcomes. This, in turn, will reduce opportunistic renegotiations and optimism bias in demand forecasting.

By addressing the issue of unbundling pricing policy from cost recovery, it also addresses uncertainty and other issues on the demand side. Challenges on the cost side are not attended to, however, as the life-cycle cost continues to be determined through a single competition for the contract. In that sense, as a solution to the challenges of the PPP model, the unbundling model could be considered as situated half-way between the PPP and a fully-fledged Regulated Asset Base (RAB) model.

What we recommend

Create an infrastructure fund to ensure that revenues are used correctly when implementing the model

The funds collected from user charges and other sources should be pooled in an infrastructure fund. The use of the fund's resources should be defined by law. Ideally, the revenue from user charges should be enough to fund all the projects in a particular area of infrastructure (e.g. a motorway network) without the need for government subsidies. In some cases, subsidies may be necessary, however, because efficient user charges are not enough to fund the whole system. Another reason might be if the government decides to implement lower prices for political reasons.

Manage individual Public-Private Partnership projects through a specialised agency

Projects within a specific pool should be managed by private sector companies through individual PPP agreements. The contracting party on behalf of the government should be a specialised PPP agency. This might either be in charge of a specific type of projects or oversee all types of PPP projects in a country or region. For each individual contract, its separate PPP agreement will specify the payment mechanism (PPP charge) necessary for the contractor to recover costs. This charge should be set so as to incentivise the private partner to optimise value for money. PPP charges will depend mostly on performance, availability and the marginal cost of usage.

Be thoughtful in implementing the unbundling of user charges from PPP charges

The unbundling model has advantages, but also some downsides that need to be mitigated. Its model assumes that the government will set the right user prices from an allocative efficiency viewpoint. Yet the experience demonstrates that governments' motivation to set user charges is often driven more by political than efficiency considerations. Moreover, changes of government may prompt legal amendments aimed at reducing user charges or devote resources managed by the infrastructure fund to other goals. This may indirectly affect PPP contractors, insofar as the viability of the ultimate source guaranteeing the payment of the PPP fee charges agreed in the contract is crucial for them.

Use the unbundling model for sectors with the right characteristics

The value of the unbundling model depends very much on the specific characteristics of the industry. It will provide more value to projects with high externalities and where congestion is caused by their utilisation. It will also be beneficial where the government wants to set homogenous prices across the territory for infrastructure use and projects where the private sector has little influence over demand estimation and attraction. Finally, unbundling makes sense for infrastructure facilities within a network where demand flows are complementary or substitutes and which therefore lends itself to an integrated pricing policy. The management of the urban transport system within a metropolitan area seems to be especially suitable.

Introduction

The relationship between infrastructure and economic development is well established and shows that infrastructure may positively contribute to economic growth and productivity (Egert, 2015; Estache and Garsous, 2012; Garsous, 2012). Public-private partnership (PPP) is an acknowledged model to deliver privately financed infrastructure, and encourage private sector technology and innovation to improve public services' efficiency and quality.

There is no single internationally accepted definition of public-private partnership. Bovaird (2004) defines PPPs in a broader sense as "working arrangements based on a mutual commitment (over and above that implied in any contract) between a public sector organisation with any organisation outside of the public sector". Klijn and Teisman (2003), in turn, define PPPs in a more specific way as "co-operation between public and private actors with a durable character in which actors develop mutual products and/or services and in which risks, costs and benefits are shared". A recent update of the Public Private Partnership Reference Guide conducted by the World Bank (2017) defines PPPs as: "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".

One of the crucial challenges of PPP nowadays is to assess its effectiveness compared to alternative procurement methods (Debadutta, 2016). In this respect Hart (2003), Nobel Prize laureate, suggests that the choice of PPPs depends on whether the outcome is observable and enforceable. PPPs will definitely be an advantageous option when they produce a synergy value greater than the value that any party — public or private — can provide alone (Weihe, 2008). As a consequence of that, over the last few decades, PPPs have gained popularity for delivering infrastructure in many countries under the expectation of producing greater value for money than traditional procurement approaches.

There are several reasons why PPPs may be beneficial for the government: the fact of being a competitive and cost-attractive alternative to traditional public procurement (value for money creation); the fact that they bring in proven project management expertise that frees up time and resources of public authorities that may concentrate on more pressing policy issues; and, given the lack of transparency of public accounting, the fact that it facilitates the public sector to undertake projects without increasing government debt or triggering the need for tax increases (Nisar, 20017; Lawther, 2000; Osborne, 2000).

Many countries and regions, especially those subjected to large budget constraints, have relied on PPPs to circumvent budgetary constraints. However, the incentives to produce value for money by the private sector through the management of the whole life-cycle is often mentioned by many authors as the most important benefit of PPPs (Nisar, 2007; Morallos et al., 2009). Value for money is expected to happen insofar as risks are allocated to the party best able to manage and price them, which means that this party needs to have a certain ability to quantify, influence and mitigate these risks. However, some authors, such as Hodge and Greve (2007), question that PPPs are always more effective than other conventional procurement approaches, and draw attention to the need of strengthening ex-post evaluations.

In this respect, a set of common shortcomings is found in the literature on PPPs such as opportunistic behaviour leading to high levels of renegotiations; unprotected public interest; asymmetries of information that might lead the PPP contractor to capture the procuring authority; biased traffic

forecasts; rigidity of the contractual framework — in particular in the setting of prices — which hinders the possibility of managing demand; and the incentive to over-committing budgetary resources for future generations when PPPs are treated off balance of the government budget.

Different PPP approaches have been implemented around the world to build/upgrade, maintain, operate, and finance new or existing infrastructure facilities. These PPP approaches can be classified in many ways. One of them is according to where the revenue comes from: either from fares to the users, from budgetary resources or a combination of both. In the budget-payment PPP model, taxpayers instead of users are the ultimate infrastructure payers. In this case the PPP contractor may be remunerated either in terms of demand (shadow-fares or tolls) or performance (lane availability, state of the pavement, and so on).

The aim of this paper is to contribute to the body of knowledge with the definition of a new PPP approach that proposes to unbundle the pricing policy to the users from the charges that PPP contractors receive for managing a certain infrastructure over its life cycle. The idea behind this approach is to guarantee that the pricing policy to the users is set according to allocative efficiency principles aimed at maximising social welfare, while contractor charges are set in order to maximise value for money. For the purpose of this paper, user price is defined as the fare that is charged to the final client of the infrastructure (a single person, a vehicle, a group of people or a company, etc.) for the service provided to utilise the facility. Contractor charge, however, is defined as the fee set to remunerate the PPP contractor for the service rendered by it according to a set of pre-established terms. For instance, in an availability payment approach the revenue received by the contractor will depend on how the availability indicators and the prices associated to it are established in the contracts.

This paper explores the possibility of implementing a new model based on unbundling user charges from contractor charges in PPP contracts, analyses the benefits and problems of the model on the basis of the theory of infrastructure economics, defines a potential governance structure to put the model into effect, and studies the infrastructure sectors where its implementation may be more advantageous.

PPP models according to the source of revenues

According to where the revenues of the PPP contractor come from and how they are established in the contract, PPPs can be classified in the following categories:

- User-payment PPP models: In this approach the bulk of the revenues comes from fares charged to the users, even though additional revenues may be produced from other sources — such as, for instance, value capture rents or other business opportunities linked to the infrastructure (commercial areas and so on). In many cases the use of this model presupposes that the project will be viable without any kind of subsidy.
- Budget-payment PPP models: In this approach the users are not charged, at least directly, for the service that the PPP contractor provides to them. Instead, the bulk of the revenue comes from subsidies that are paid by the government in terms of:

    - Demand: In this model the contractor will be paid according to the volume of users. This approach is usually known as shadow-toll or shadow-fare model.
    - Availability or performance: In this approach, the contractor will be paid in terms of a set of performance indicators related to the service provided.
    - A combination of demand and performance.
- Hybrid-payment PPP models: In this model the revenue will come partly from the users and partly from government subsidies. The subsidies may be provided in different ways such as: upfront lump sums, contributions per level of utilisation, contributions in terms of the fulfilment of a set of performance indicators, etc.

The specific characteristics of these approaches are analysed in greater detail below.

User-payment PPP models

According to Yescombe (2007) PPP programmes in different countries have usually begun with toll-road concession models. The self-financing nature of such models makes them immediately attractive for governments in comparison to other models as a mechanism to circumvent budgetary constraints. In these types of contracts, which in many places are known as concession agreements, user fares are set as a means for private contractors to raise resources to recoup construction, repair, maintenance and operation costs during the lifespan of the contract. User charges, in this model, are usually set and regulated by the contracts through price caps that are updated on a yearly basis depending on inflation and productivity indexes. This fact makes the pricing structure approach rather inflexible, which limits the possibility of using prices for behavioural purposes.

Demand risk is often allocated to the contractor in this model, even though in some cases the contracts include approaches to share this risk with either the government or future users (Vassallo, 2006). According to Evenhuis and Vickerman (2010), though transferring demand risk provides an incentive for the private party to encourage service to attract demand, the allocation of demand risk on the private party side is only reasonable if the PPP contractor is able to have a positive influence on demand through the quality of service provided, the management of prices and publicity. However, the ability of a PPP contractor to attract demand varies a lot depending on the characteristics of the infrastructure. The larger the rigidity of prices, and the lower the perception that users have of the quality of service the lower the ability of the private sector to influence demand.

Budget-payment PPP models

Unlike user payment models, in budget-payment PPP models the revenue comes from the general budget of the government, thus the infrastructure is not ultimately funded by users but rather by taxpayers. The private contractor is entrusted with the design, construction, maintenance and operation of a certain infrastructure for a period of time while the government commits itself to pay a regular fee to the PPP contractor according to what the contract stipulates.

Budget-payment PPP models allow governments to defer payments forward into the future. This strategy has been used by some governments to increase their investment capacity in the short term at the expense of committing future budgetary resources in the long term. This fact became problematic in countries such as Spain and Portugal where, because of the economic recession, the macroeconomic

scenario turned out to be much worse than originally expected and governments experienced serious problems to afford their pre-established commitments (Ortega, Baeza and Vassallo, 2016).

These models have other weaknesses. The main one is that pricing can no longer be used as a mechanism to influence demand and internalise externalities. For example, in the case of roads, overcapacity cannot be managed via tolls which usually lead to an un-optimal welfare distribution. Moreover, under purely budget-payment PPP models, taxpayers are less aware than users are of changes in the contract — such us fare increases or terms extensions — so the government and the PPP contractor can easily agree on contract renegotiation that are not noticeable by the users of the infrastructure.

As it was previously advanced, budget-payment PPPs are usually classified into two groups: shadow-fare models and performance-based models (usually known as availability-payment models). Under the shadow-fare approach, payments are made by the government to the PPP contractor in terms of demand. Like user-payment PPP models, demand risk is mostly transferred to the PPP contractor, even though it is usually mitigated through a set of toll bands defined in the contract in such a way that lower bands are associated to greater fares and vice versa.

In the performance-based approach demand risk is not transferred to the PPP contractor, who is paid instead on the basis of a set of performance-based indicators established in the contract. These indicators intend to measure the availability of the infrastructure and the service quality provided by the private developer to the user and the society. Under this approach, the PPP contractor is encouraged to provide an uninterrupted service with high quality standards and maintain complete availability of the infrastructure.

Under availability approaches, if the service is not provided according to the stated quality standards, penalties are usually applied. Bonus payments may apply if quality standards surpass the reference threshold.

Hybrid-payment PPP models

In hybrid models, the payment to the PPP contractor depends on the service provided, the availability and the usage of the infrastructure (Aziz, 2007). There are several types of hybrid models. In some of them the government set charges to the users, and pays the PPP contractor on the basis of a combination of demand and availability. In others, users are not charged, but the government still pays on the basis of demand and availability relaying on the future budget. In others, the PPP contractor charges prices to the users and receives additional subsidies based on availability.

Statement of the problem

As previously mentioned, most of the PPP approaches developed to date either set prices to the users in the contract as the main source of revenue for the PPP contractor, or are based on direct payments from

the government to the PPP contractor in such a way that the user does not have to pay, at least directly, for the service provided.

These approaches face several limitations in trying to maximise efficiency. On the one hand, prices are a key factor to influence the behaviour of the users to internalise externalities and manage demand. On the other hand, it is not clear that demand provides the right incentive to the PPP contractor to manage the infrastructure in the right way. The objective of the PPP operator is to optimise its revenue, which can be at odds with the efficient use of infrastructure. This section outlines the statement of the problem that justifies the adoption of a new model.

Pricing as a means to reaching allocative efficiency

The academic literature about pricing and welfare is vast and diverse. After years of research, pricing has been recognised as an effective mechanism to influence the behaviour of users with the aim of internalising externalities and making a most rational use of infrastructure facilities and the services associated to them (Chung and Recker, 2012). One of the main conclusions in the literature is that the first-best solution, known as the one that maximises welfare, does not necessarily produce enough resource to finance all infrastructure costs (Hau, 1992). To solve this problem authors such as Ramsey (1928) have proposed second-best solutions incorporating a self-financing constraint in the objective function.

In the last few years, research about optimal infrastructure pricing has become much more complex and sophisticated. Even though most of the contributions come from research applied to road infrastructure, the main conclusions may be easily generalised to any type of infrastructure. Overall the main results from the body of knowledge are that optimal pricing depends on many aspects such as: the characteristics of the network and how competing alternatives are priced (Verhoef, 2002; Verhoef, Koh and Shepherd, 2010; Xu, Ordóñez and Dessouky, 2015), the characteristics of the users (Ferrari, 2005; Verhoef and Small 2004), the constraints set in the objective function (Yang and Zhang, 2003; Yin and Yang, 2004); income heterogeneity of the users (Ortega, Vassallo and Pérez, 2018), quantification and valuation of welfare and externalities (Mayet and Hansen, 2000).

Apart from efficiency, user pricing has also faced a serious problem of acceptability (Dieplinger and Fürst, 2014). High prices could harm low-income people in such a way that their opportunity to participate in the society might be diminished (Kenyon et al., 2003). Even though there may be relatively simple ways to compensate the less wealthy community (e.g. tax breaks), pricing is still an unpopular measure because people believe they already pay enough taxes. Such reasons explain why many governments have been reluctant to price infrastructure and hence, in the last few years, budget-PPP models have flourished (EPEC, 2016).

From this analysis several ideas arose. First, refusing setting prices for the usage of infrastructure may, if the government is not responsible, impose long-term commitments to future governments that may not have the financial capacity to comply with them. Vassallo and Pérez de Villar (2010) show how budget-payment PPP approaches and lack of transparency in public debt accounting can promote overinvestment in the present at the expense of constraining the government ability to invest in the future.

A second idea coming out from this analysis is that optimal prices experience a great variation over time due to changes in the perception of externalities, new competing alternatives, etc. As a consequence of

that, from the standpoint of allocative efficiency, it would be desirable that prices could be much more flexible over time in order to adjust to the shifting perception of externalities.

In this respect Clifton and Duffield (2006) showed their concerns about the fact that the rigidity of PFI/PPP contracts may hinder long-term service changes without risking the integrity established during the bidding process. It is acknowledged that PPP contracts are incomplete and their renegotiations are subject to multiple challenges (ITF, 2017). One of the main problems of PPP models nowadays is the limitation that the rigidity of contracts makes on the necessity to be flexible to adapt infrastructure management to the evolving needs of society.

The long-term nature of PPPs, and the need to regulate the monopolistic power of the PPP contractor after the contract has been awarded, requires setting up rigid contracts with fixing price caps and indexing toll prices to inflation. Consequently, the contract itself sets up prices that will not necessarily be optimal in the future because user perceptions and externality values may vary over the years. Kaplow and Shavell (1999) argued that it is complicated to define contract agreements to regulate fares for such a long period of time.

Some issues of demand risk allocation in PPP models

Demand risk allocation is another issue that has to be reconsidered according to past experiences with current PPP models. Requiring the private party to bear the demand risk, in most cases, does not promote additional value for money, but instead leads to higher financial costs due to the need for compensation of increased risks (Evenhuis and Vickerman, 2010) and inefficient risk pricing (Makovšek and Moszoro, 2017). Moreover, for many types of projects the private sector does not have enough ability to rightly estimate traffic evolution over time, neither does it have much capacity to attract users by rightly managing the project. Chung (2009) mentions that the effort by governments to entice the private sector has led to consistent erroneous traffic forecasts across projects. Bain (2009) cited studies in different countries with traffic deviations over 30% of the traffic expected. Vassallo et al. (2011) point out that allocating the bulk of traffic risk to the concessionaire, without implementing any traffic risk mitigation mechanisms, has been one of the main causes that has led to the bail out of concession projects in Spain.

PPP projects where demand risk has been fully transferred to the private sector seem to be renegotiated more often than other types of PPP approaches. Baeza and Vassallo (2010) provide evidence of frequent renegotiations in concession contracts in Spain where demand was fully allocated to the private contractor. According to Guasch et al. (2007; 2008) the high rates of contract renegotiation have raised serious questions about the viability of the PPP model to attract private participation for financing infrastructure in developing countries. According to de Brux (2010), there is evidence in the literature that suggests that parties in a PPP contract are often looking for individual and short-run benefits when they renegotiate PPP agreements, and in most of them, some social surplus may be destroyed. Unfortunately, decisions are often taken at the expense of users or taxpayers who usually end up bearing the burden of these kinds of inefficiencies.

Another problem of demand-risk allocation is the scarce influence that the private sector has to manage usage due to the fact that, for many types of infrastructure facilities, the volume of utilisation is highly correlated to aggregated macroeconomic variables and the completion with other infrastructure. Those are factors over which the contractor has no influence. As a consequence of that, the private operator may experience windfall benefits or unfair losses that have little to do with its effort to provide a good service to the user. Instead, performance-based PPP contracts, as long as the indicators and incentives

are correctly defined, seem to be much more suitable to encourage the contractor to address its effort to provide a good service to the user thereby increasing value for money.

Objective of the paper

The issues pointed out above show that there may be room for a new model where, on the one hand, pricing policy to the users is defined according to social objectives; and, on the other hand, charges to the users are set according to principles aimed at maximising value for money.

The theoretical analysis of this model and its implementation in practice have been scarce. Sierra, Baeza and Vassallo (2014) studied the theoretical advantages of unbundling tolls from contracts for the case of road networks. Regarding practical implementation there are some punctual projects where a similar model has been implemented. This is the case, for instance, of the Express Lanes project on the I-595 highway in Florida consisting of improving the capacity and operations of the corridor by providing three additional at-grade lanes in the median of the corridor. To maximise the operational efficiency, the lanes have tolls at varying rates throughout the day to optimise traffic flow. Florida Department of Transportation retains control of the toll revenue and toll rates, and pays the contractor a fee in terms of availability and performance.

Unbundling prices to users from PPP charges

Based on the problems identified above this section outlines in detail a new infrastructure PPP proposal founded on the fact that user charges are unbundled from PPP charges.

Definition of the proposal

The model proposed is founded on a set of key principles aimed at circumventing the shortcomings identified above. The ideas are the following:

- User charges should be set according to allocative efficiency principles and, as a consequence, are to be flexible over time. Unlike demand-based PPPs, in the new model, user charges will not be regulated by contracts, but rather will be periodically updated by the government or the entity designated by it. This way, user charges will be changed over time to improve allocative efficiency and promote sustainability.
- Despite the flexibility previously mentioned, user charges should be easy to understand by users and the society as a whole. Prices have to be defined homogeneously across similar projects. Similar conditions should be priced in a similar way.
- Differences in prices across similar projects will only be justified for reasons of positive discrimination. For instance, setting lower prices in regions that are clearly poorer than the country average will be justifiable according to this principle.

- As a consequence of the two previous statements, cross-subsidies among different PPP projects may occur. For instance, according to this model, a busy road in a wealthy area may cross-subsidise an unoccupied road in a poor area.
- PPP fee charges that determine the contractor's revenue, and the risk associated to them, have to be designed to incentivise the contractor to achieve the highest value for money. As a consequence of this principle, allocating demand risk to the PPP contractor when it has no control over the use of the infrastructure would make little sense. In this case, it may be much more reasonable to tie PPP charges to performance-based indicators.
- The private sector should never bear risks where there is a conflict of interest between private incentives and social goals. For example, from the social standpoint it will be a reasonable measure charging a lower toll to less polluting vehicles. However, if the private sector bears this risk, it will have the incentive to ignore pollution in favour of more traffic to increase its profit, which is clearly against social interests.

The proposal of this paper consists of unbundling the charges determining the payment mechanisms to the PPP contractors from user charges, which will be set by the government to optimise allocative efficiency. Similar projects will be grouped in a pool in order that the resources collected in a particular project will not be necessarily allocated to fund this project. For the sake of homogenisation and coherence, user charges in new projects requiring large investment amounts will be similar to the ones in those projects already constructed that require just minor capital investment costs. Each individual project will be managed through a single public private partnerships awarded to the private operator that wins each specific tender. This cross-funding approach already occurs in several cases, where a government-owned company manages the motorway network (e.g. ASfiNAG in Austria, DARS in Slovenia, NDS in Slovakia), but they do not necessarily use the PPP approach to manage stretches of the network.

This model requires at least a preliminary definition of the governance structure necessary to put in place the ideas outlined in this subsection. A more detailed definition of the governance structure is explained below.

Governance structure to manage our proposal

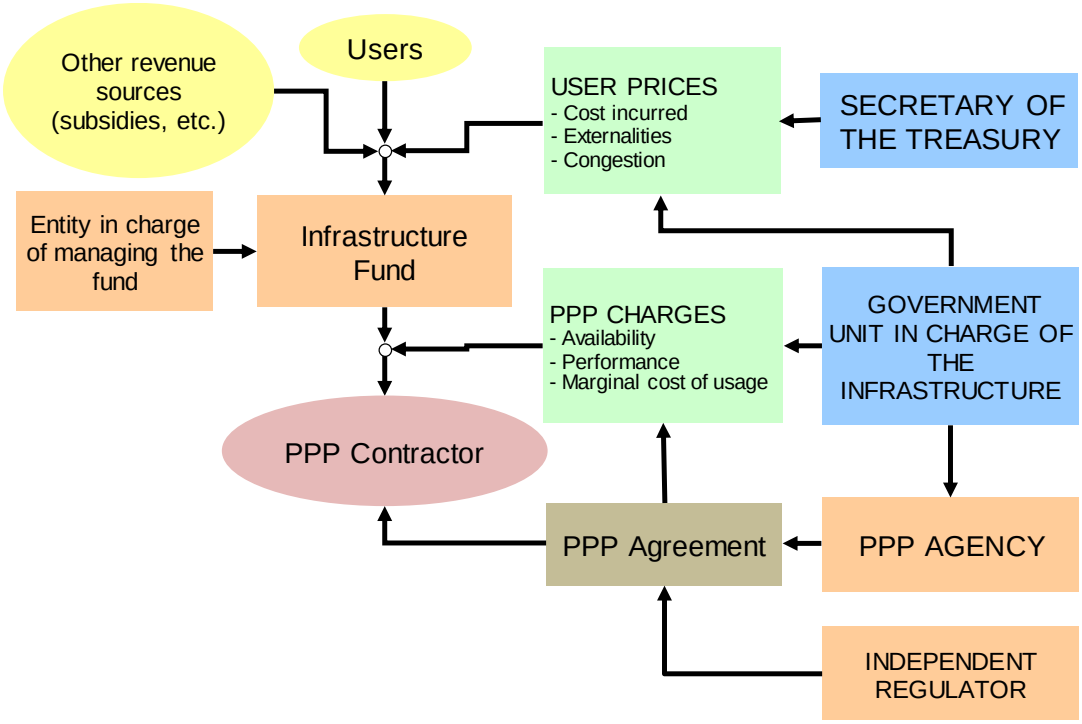
The institutional framework and relationships among different stakeholders in this new model is described in Figure 1. The different colours of the figure have different meanings: The blue boxes represent administrative units of the government. The orange boxes represent the specific entities, either government-owned or private, necessary to build the institutional framework described in this paper. The red circle represents the private contractor that was awarded a specific PPP contract. The yellow circles show funding sources that include user charges and other potential sources such as government subsidies, value capture rents, and commercial revenue. Finally, the green boxes describe the criteria used to set prices and PPP charges.

According to the principles pointed out in the previous section, maximum prices will be periodically established according to a set of rules proposed by the governmental unit in charge of the infrastructure facilities and approved by the Ministry of Finance and submitted to the supervision of an independent regulator. The criteria to set user charges include:

- higher prices for higher externalities produced
- higher prices for using the facility when it is congested

- higher prices to compensate the marginal costs of usage
- flat rates may be set to encourage the use of infrastructure in periods of overcapacity. This is intended to encourage a more balanced use of the infrastructure network over time.

Figure 1. Description of the new model



Prices may be collected by the government, by a public authority, or through a franchise with a private company. Another alternative may be to entrust to each PPP contractor the task of revenue collection. The decision will depend on the specific characteristics of each project.

The funds collected from user charges plus other additional sources (subsidies, etc.) will be allocated to an infrastructure fund. The use of the resources of the fund will be approved by the law. Ideally, the revenue from user charges should be enough to fund all the projects of the pool without the need of government subsidies. However, in some cases subsidies may be necessary because efficient user charges are not enough to fund the whole system, or because the government decides to implement lower prices for political reasons.

If the government decides a full cost recovery strategy, a rate would first be set for the projects in the portfolio. The base average would then be adjusted on individual sections following efficient pricing principles to the extent where these do not blow the global revenue constraint of the portfolio. The infrastructure fund will be a special purpose vehicle with the goal of safeguarding the revenue coming from user charges and other sources, and disbursing resources to make payments to PPP contractors. The use of the resources of the fund will be approved by the law. However, they will be primarily utilised for paying PPP contractors and promoting measures that contribute to minimising the environmental effects caused by those projects. The infrastructure fund will be administrated by a management entity that will be supervised by the Ministry of Finance. This company will be entrusted with the management and administration of the infrastructure fund in accordance with the law. The management entity cannot decide on the resources allocation policy of the infrastructure fund. Nevertheless, it may conduct

financial operations such as revenue securitisation, etc., although these operations will require approval by the Ministry of Finance. The fact that cost recovery of the private operators will happen through an intermediate fund rather than directly from the users should, in the long run, have little impact on the cost of private financing (Francis and Elliot, 2018).

Both new and existing projects within the pool will be managed by private sector companies through individual PPP agreements. The contracting party on behalf of the government will be a specialised PPP agency, which can be in-charge of a specific type of projects or of all types of PPP projects promoted in a country or region. For each individual contract, its specific PPP agreement will specify the payment mechanism (PPP fee charge) necessary for the PPP contractor to recoup its costs. The PPP fee charge should incentivise the private sector to optimise value for money. The revenue received by the PPP contractor through contractual charges will not have to be necessarily related to the revenue collected from the use of this specific project. PPP fee charges will depend mostly on performance, availability and the marginal cost of usage. The latter point intends to make sure that the PPP contractor has a positive incentive to attract more demand to the infrastructure it manages. Other aspects such as the public perception of users, collected through regularly conducted surveys, could be also incorporated within the PPP charging approach.

The infrastructure PPP agency will be a government-owned company monitored by the unit or units in charge of the types of infrastructure entrusted to it. This entity will be assigned, in strong co-operation with the government unit in charge of the infrastructure, the preparation of the feasibility study of the PPP project, the definition of the bidding terms, the technical and economic supervision of the PPP agreements, the promotion of the project to the private sector, the measurement of performance-based indicators, the collection and publication of statistics, and the overseeing of the PPP agreements. This agency should have a team specialised in contracting, finance, procurement and so on. The support on technical aspects and operation will be provided by the government unit in charge of the infrastructure.

The governance of this model also includes an independent regulator in charge of representing the users and the society in the case that the government and the PPP contractor agree to a change in the contract terms. The regulator may also inform the definition of user charges. This entity will be created as a public body with its own legal independence and full capacity to act, endowed with its own assets and governed by the secretary responsible for social policies and consumption. The role of this independent regulator will be limited to ensuring transparency about PPPs to the users and the society. Within its remit, it shall also inform of changes to be conducted to PPP agreements that may affect users or taxpayers. The PPP regulator does not necessarily have to play the role of incentive regulation as in the RAB model. The infrastructure PPP agency shall be required to inform the independent regulator of all possible contract modifications or renegotiations that may have influence on the interests of users or taxpayers.

Economic foundations that justify our proposal

The new model is based on two fundamental principles of infrastructure economics. First, pricing users is crucial not just to raise money to fund infrastructure, but also to influence users' behaviour to internalise externalities, and promote social and distributional policies. And, second, the charging approach set in the PPP contract, which determines the revenues of the PPP contractor, has a great influence on incentives and risk allocation and henceforth on value for money. Unfortunately, in many PPP contracts developed as of today, user charges and PPP charges have been the same. This fact has caused problems derived from the impossibility of using prices as a means to optimise allocative efficiency, and from the

wrong incentives that transferring demand risk to PPP contractors has on value for money. In this section, we explain PPP problems identified by the economic theory that may be partially or totally solved with the use of this model.

Unbundling user charges from charges in PPP contracts will definitively favour pricing flexibility since user charges will be set apart of PPP fees. The government will be able to vary prices over the life of the contract in order to foster allocative efficiency, and promote behavioural measures to mitigate externalities. PPP contractors will not see their finances being disrupted by user price changes because the revenue obtained by them will be mostly based on performance and availability, which is strongly related to their effort to manage the contract in the right way.

According to the model defined in this paper, demand will no longer be the main revenue driver for the PPP contractor. Consequently, the optimism demand bias is expected to diminish substantially because inflating predictions will no longer be used by bidders to justify aggressive offers.

As it was shown before, one of the most controversial issues of PPPs is opportunistic renegotiation, which is directly linked to three aspects: allocation of non-manageable risks to the private sector; design of incomplete PPP contracts that leave many unresolved situations to be dealt with in the future; and, lack of oversight of eventual renegotiations between the government and the PPP contractor. The model presented here is expected to reduce opportunistic behaviour in several ways. First, the bulk of the contractor's revenue will be mostly tied to performance indicators that depend on the effort and managerial ability of the private sector. Second, demand risk will only be allocated to the PPP contractor in a very limited way. And third, the independent regulator will be in charge of making sure that eventual renegotiations will not harm the interests of users and taxpayers.

Future budget commitments for the government will be reduced with this model because, unlike most of the availability payment approaches already in place, the revenues to fund the system will ultimately rely on real user charges rather than on the government budget. Subsidies will only be necessary as long as prices are not enough to recoup infrastructure costs. However, these subsidies will ultimately depend on decisions adopted by the government. For instance, if the government decides to set lower user charges, it will have to offset the deficit of the infrastructure fund with greater subsidies. Similarly, if the government develops a white elephant producing little revenue, it will have to contribute with greater subsidies to the fund.

Potential issues of our proposal

Despite the advantages previously outlined, this proposal has also some issues that are worth mentioning. The model is assuming that the government will set the right prices to the users from the point of view of allocative efficiency. However, the experience demonstrates that the reasons that move governments to set user charges are more political than efficiency-driven. On the one hand, the government may experience real public opposition to price infrastructure projects that were previously free, or may be subjected to social pressure to reduce user charges for political or electoral reasons. Moreover, changes in the political parties governing the country may also prompt legal changes aimed at reducing user charges, or devote the resources managed by the infrastructure fund to other social goals. This fact may indirectly affect the PPP contractors insofar as the viability of the ultimate source guaranteeing the payment of the PPP charges agreed in the contract is crucial for them. In a traditional user-payment agreement, the government has the prerogative to change the terms of the contract to promote the public interest, but the legislation usually set measures to balance the economics of the contract to compensate for the impact of these changes.

Some measures may help to mitigate these problems. The most difficult aspect to control is somehow making sure that the government sets efficient user charges. A mechanism to mitigate this issue may be to pass a legal provision requiring that new user pricing schemes have to be validated, or at least informed, by the independent regulator or by an independent panel of experts with a long track record in the field. Moreover, the legislation has to establish clearly that if the government decides to reduce user charges, it will be responsible to endow the infrastructure fund with the necessary resources to comply with its obligations with the PPP contractors.

Another issue is that even though this approach helps introduce flexibility in the pricing scheme, some other aspects that may be subjected to uncertainty in the future still remain rigid. For instance, the revenue of the PPP contractor depends on performance indicators, but the validity of these performance indicators may be limited since the requirements of the users and the technology may substantially vary over a long period of time (Winston and Mannering, 2014).

A final issue with these types of agreements is the way in which user charges are set may have unexpected economic consequences in favour or against the interests of PPP contractors. For instance, if the government decides to reduce user charges significantly, demand will tend to rise thereby increasing the cost that the PPP contractor has to incur to comply with the performance indicators. This issue may be mitigated through a good allocation of these risks in the contract provisions.[1]

In which economic sectors could our approach be used?

A few final questions arise concerning this model: Is this recommendable for all the infrastructure sectors? Or, looking at this from a different point of view, which are the specific characteristics of certain infrastructure sectors that may make this model more suitable for them? Starting with the latter question, one could claim that this approach is expected to be more attractive to infrastructure projects complying with the following characteristics:

- Projects with high externalities and congestion caused by their utilisation. In this case, user charges are definitively a key factor to optimise social welfare.
- Infrastructure facilities where the government is interested in setting up homogenous prices across the territory so cross-subsidies among different projects may be necessary.
- Projects where the private sector has little influence over demand estimation and attraction.
- Infrastructure facilities within a network where demand flows are complementary or substitute, so a common and integrated pricing policy makes sense. This includes projects where competition from other projects within the network may have a large impact on demand.

Thinking of different types of projects, it seems that this approach may work well for surface transport projects such as rail and road networks because of their large externalities, potential congestion and their network component. The model will be suitable for projects where demand is difficult to predict by the private sector and is subjected to potential competition with infrastructure belonging to the network. The management of the urban transport system within a metropolitan area seems to be especially adequate for this model since an integrated fare policy makes sense, and there are large cross-externalities across different modes of transport.

This approach may also be interesting for utility projects such as water and sanitation ones, where the government is interested in setting up homogenous prices across the territory and the facilities may be

integrated in a single network. Similarly, the model may be implemented successfully for electricity and, where the market is not already liberalised, telecom transport networks.

The model does not make sense for PPPs such as prisons, courts, etc.; which by its own nature does not set prices to final users. It is also not appropriate for PPP projects, such as stadiums, where the effort of the contractor has great influence on demand. The same goes for other infrastructure facilities that are not integrated in a network, such as airports and ports, when these exist in a competitive market. The model may only make sense for these facilities in cases where a competitive market cannot be established and it is in the public interest to establish a homogenous or integrated pricing policy to a group of facilities.

Summary and future research

Increasing budgetary constraints for delivering infrastructure along with the need to reach greater efficiency have prompted the boom of different PPP models around the world. Some countries adopted user-payment PPP models whereby revenues to fund the infrastructure came mostly from users. Other countries however decided to implement budget-payment PPP models such as shadow-fare or availability payment approaches. Budget-payment PPPs agreements, especially availability-payment ones, seem to have worked better in terms of incentives, but they do not include pricing as a means to rationally manage the use of the infrastructure.

One way to improve the present performance of the traditional PPP approaches in order to overcome most of the identified shortcomings may be through implementing a new model, applicable to a pool of interrelated projects. This new model would unbundle user charges from PPP fee charges, which will be mostly based on performance, while keeping the revenue collected as the main source for funding PPP agreements through an infrastructure fund.

Unbundling user charges from PPP contract fees will allow more flexibility in setting user charges while the private sector will be allocated the risks that it can manage better, thus fostering value for money. This will reduce opportunistic renegotiations and optimism bias in demand forecasting. The model addresses the issue of unbundling pricing policy from cost recovery and in that way addresses uncertainty and other issues on the demand side. It does not yet however address challenges on the cost side (life-cycle cost continue to be determined through a single competition for the contract). In that sense it could be considered half-way to a fully-fledged RAB model.

The current paper is just a first definition of the model, so there are still plenty of detailed issues left for future research. In this respect, it may be interesting to develop a tool to quantify the social welfare gained by this approach. A lot of research may also be conducted on mechanisms to guarantee the rationality of political decisions in setting user charges. Finally, it might be interesting to study other means of making PPP contracts more flexible in other areas such as the definition over time of performance-based indicators.

Notes

1 These issues are resolved through periodic resets of the efficiency targets and a duty to ensure cost recovery in the fully-regulated model. Three papers prepared for the same working group address related issues. Engel, Fischer and Galetovic (forthcoming) discuss the issue of who should bear the cost of long-term uncertainty. Makovšek and Veryard (2016) explain how the RAB model deals with these long-term rigidities and Alchin (forthcoming) how the RAB model could be applied to the Australian motorway network.

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Appendix 1. Research questions and outputs of the Working Group on Private Investment in Infrastructure

Introduction: Getting the basics right

What are the economic characteristics of infrastructure? What is infrastructure and what are operations? What are the models of private participation in infrastructure and through which significant private investment actually takes place?	Makovšek, D. (2019), "What is Private Investment in Transport Infrastructure and Why is it Difficult?", Working Group Paper, International Transport Forum, Paris.
Can private investment improve productive efficiency? Improve project selection? Close the infrastructure funding gap? Have other positive effects when it is private?	Makovšek, D. (2019), "The Role of Private Investment in Transport Infrastructure", Working Group Paper, International Transport Forum, Paris.
What have the private investment trends in transport infrastructure been over the last 20 years? How much of that was foreign private investment?	Mistura, F. (2019), "Quantifying Private and Foreign Investment in Transport Infrastructure", Working Group Paper, International Transport Forum, Paris.

Defining the challenge: How uncertainty in contracts matters

How does uncertainty affect risk pricing? Beyond investors, do suppliers in PPPs also have issues with risk pricing? How does its transfer to the private sector affect competition? What does uncertainty mean for the public vs. private cost of financing?	Makovšek, D. and Moszoro, M. (2018), "Risk pricing inefficiency in public–private partnerships", *Transport Reviews*, *38*(3), 298-321.
Is uncertainty also an issue in long-term services/operations contracts?	Beck et al. (2019), "Uncertainty in Long-term Service Contracts: Franchising Rail Transport Operations", Working Group Paper, International Transport Forum, Paris.
What is the competition for large transport infrastructure projects in the EU Market? Is there a difference between traditional procurement and PPPs?	Roumboutsos, A. (forthcoming),"Competition for Infrastructure Projects: Traditional Procurement and PPPs in Europe", Working Group Paper, International Transport Forum, Paris.

Addressing uncertainty for suppliers: the construction phase as example

Adversarial vs. collaborative procurement – is collaborative contracting the future?	Eriksson et al. (forthcoming), "Collaborative Infrastructure Procurement in Sweden and the Netherlands", Working Group Paper, International Transport Forum, Paris.
What lessons in dealing with risk and uncertainty were learnt in Danish mega projects from Storebaelt to Femernbaelt?	Vincentsen, L. and K. S. Andersson (2018), "Risk Allocation in Mega-Projects in Denmark", Working Group Paper, International Transport Forum, Paris.
What can governments do in the short run to reduce inefficient pricing of risk by construction contractors?	Kennedy et al. (2018), "Risk Pricing in Infrastructure Delivery: Making Procurement Less Costly", Working Group Paper, International Transport Forum, Paris.

Addressing uncertainty in long-term contracts in the absence of continuous pressure for efficiency

What is the public sector organisational counterfactual on which private investment should seek to improve?	Holm, K.V. and T.H. Nielsen (2018), "The Danish State Guarantee Model for Infrastructure Investment", Working Group Paper, International Transport Forum, Paris.

Partial fixes to the Private-Public Partnership approach

How would an organisational structure consisting of PPPs come close to a network-wide management approach? What benefits would it yield?	Vassallo, J. (2019), "Public-Private Partnerships in Transport: Unbundling Prices from User Charges", Working Group Paper, International Transport Forum, Paris.
Should the public or the private side bear the cost of long-term uncertainty? How could we design a PPP contract to avoid hold-up due to incomplete contracts?	Engel et al., (forthcoming), "Dealing with the Obsolescence of Transport Infrastructure in Public-Private Partnerships", Working Group Paper, International Transport Forum, Paris.

Long-term strategic approach

How do the PPP and regulated utility model (RAB) compare in terms of efficiency incentives?	Makovšek, D. and D. Veryard (2016), "The Regulatory Asset Base and Project Finance Models", International Transport Forum Discussion Papers, No. 2016/01, Paris.

What basic considerations underlie the choice between a PPP and RAB approach?	Hasselgren, B. (forthcoming), "Risk allocation in Public-Private Partnerships and the Regulatory Asset Base Model", Working Group Paper, International Transport Forum, Paris.
Which are the preconditions a country would need to take to establish a RAB model on a motorway network? Is user-charging a must?	Alchin, S. (forthcoming), "A Corporatised Delivery Model for the Australian Road Network", Working Group Paper, International Transport Forum, Paris.
From the investors' point of view, does a RAB need to be fully reliant on user-charging?	Francis, R. and D. Elliot (2019), "Infrastructure Funding: Does it Matter Where the Money Comes From?", Working Group Paper, International Transport Forum, Paris.
Incentive regulation can also yield perverse incentives. Can the capex bias be managed?	Smith, A. et al. (2019), "Capex Bias and Adverse Incentives in Incentive Regulation: Issues and Solutions", Working Group Paper, International Transport Forum, Paris.
Does it make sense to pursue hybrid solutions between PPP and RAB?	Zhivov, N. (2018), "The Thames Tideway Tunnel: A Hybrid Approach to Infrastructure Delivery", Working Group Paper, International Transport Forum, Paris.
Uncertainty and private investment mobilisation in transport infrastructure	
What lessons can we draw from recent attempts to mobilise private investment in infrastructure in the aftermath of the global financial crisis?	Makovšek, D. (2018), "Mobilising Private Investment in Infrastructure: Investment De-Risking and Uncertainty", Working Group Paper, International Transport Forum, Paris.
Synthesis	ITF (2018), *Private Investment in Transport Infrastructure: Dealing with Uncertainty in Contracts*, Research Report, International Transport Forum, Paris

Public-Private Partnerships in Transport: Unbundling Prices from User Charges

This paper presents a model intended to address certain downsides of Public-Private Partnerships (PPPs). It focuses on cases where demand risk should not be transferred to the private party. It argues that user charging should remain the responsibility of the public authorities and proposes to organise the funding of PPPs via an infrastructure fund. The paper is part of a series of 19 papers and a synthesis report produced by the International Transport Forum's Working Group on Private Investment in Transport Infrastructure.

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