



**The Role of Private  
Investment in Transport  
Infrastructure**

# **The Role of Private Investment in Transport Infrastructure**

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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.

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## Executive summary

### What we did

This paper investigates the case for mobilising private investment for infrastructure. Does private investment lead to greater economic efficiency? Can it improve project selection? Will it help close the infrastructure gap? Does foreign private investment boost the economy? Private investment is a means to an end, rather than a goal in its own right. Understanding when private investment serves a purpose requires clarity about what it can and cannot achieve.

Four common propositions with regard to private infrastructure investment are investigated in this paper. First, that it leads to a greater economic efficiency. Second, that private infrastructure investment can improve project selection. Third, that it can help close the infrastructure gap or extend the public borrowing constraint. Fourth and finally, that foreign private investment in public infrastructure specifically will boost the local economy.

The analysis for this paper was carried out as part of the work of the International Transport Forum Working Group on Private Investment in Infrastructure.

### What we found

Private investment can result in efficiency gains and increased consumer welfare if appropriate organisational, institutional, and regulatory conditions are met. Evidence for this comes from sea ports and airports, which tend to face continuous competitive pressure, as well as from non-transport sectors, notably utilities.

Most private transport investment flows into road infrastructure projects. For this sector, practically no direct evidence exists that public-private partnerships (PPPs) have resulted in improved Value for Money. The same is true for railway infrastructure. This raises the concern that PPPs in sectors with little to no competition, such as road, rail or social infrastructure, may have difficulty ensuring value for money. The main reason for this appears to be various failures in risk pricing that are endemic to the PPP model.

It seems economically indefensible that PPPs can prevent “white elephant” projects by transferring demand risk on the merit of improving project selection.

Achieving such an outcome requires that at least four conditions are met. First, the commitment to a contract must be credible. Second, demand risk must be transferred on all projects of the same class (e.g. all motorways) - a government cannot have a discretionary right as to when the risk is transferred and when it is not. Third, demand risk must always be transferable on all projects, and private investors must have a stable appetite for accepting the risk. Fourth, the cost of transferring demand risk should not require unrealistically high rates of failures in the project selection by governments.

The evidence shows that it is unlikely the second and third conditions can be achieved. Additionally, the first and the fourth conditions may be at odds with each other. Countries with a high rate of project failure will generally have a weaker institutional structure and thus a lower propensity for credible

commitment to the contract. The transfer of demand risks leads to a significant increase in total project cost. It is unlikely that rates of project failure in developed countries would justify such a premium.

Private investment cannot close the infrastructure gap. A PPP is a financing vehicle (a way to borrow money) and an investment gap is a funding problem (the question who will repay what is borrowed). A financing solution cannot resolve a funding problem. If taxpayers can afford a new motorway, they will be able to pay for it regardless of whether the tolling is done by the state or a private company. Conversely, if the government cannot afford to finance the project from public funds, it will not be able to afford it as a PPP.

The reason why PPPs have a role as an instrument to overcome public funding constraints, and continues to be an incentive to use them, is a persistent reliance on accounting standards which do not transparently and fully represent the fiscal implications of PPPs. The upgrading of accounting standards to remove this bias is relatively easy, so the lack of progress in this area can be attributed to insufficient political will.

Allowing foreign private investment in infrastructure can positively influence competition for the PPP contract or bidding in the privatisation of regulated assets. As observed in other sectors, more distant direct and indirect effects of foreign direct investments, such as technology transfer and labour market impacts of Multi-National Enterprise investment, will apply as well.

## **What we recommend**

### **Pursue private infrastructure investment on the basis of efficiency**

There is no case for suggesting that private investment in infrastructure can close an infrastructure gap or improve project selection. Demand risk should only be transferred to the private partner where that risk is manageable and provides an incentive for greater efficiency and service quality in the performance of the private partner.

### **Collect and analyse the data necessary to determine when public-private partnerships lead to greater efficiency**

An oft given recommendation is that more data is needed on PPP performance to inform decision making. This would include information on cost and time variability, speed, end cost per physical unit, quality, etc. Without the data, no decision process or support tool can be reliable.

### **Upgrade accounting standards to offset any bias in favour of public-private partnerships**

The International Monetary Fund encourages a reassessment of accounting standards for PPPs. They have outlined their recommendations in the PPP Financial Risk Assessment Model. Countries have often cited “technical” barriers as the reason for not implementing the standards. In reality, there is no reason advanced economies could not put the measures into place. Not doing so shows a lack of political will.

### **Learn how to improve PPPs in general and when to replace them with alternative models**

There are several ways in which the performance of the PPP model could be improved. For example, better informed bidders facilitate more efficient risk pricing. Alternatively, the Regulatory Asset Based model could replace PPPs in many areas. These and other solutions are presented in the synthesis report and supporting papers of the ITF Working Group on Private Investment.



## Introduction

Private investment in infrastructure can have multiple impacts, positive and negative. Not all are well-understood, or systematically accounted for in literature. The resulting lack of clarity can present a challenge for policy makers. Pursuing private investment for the wrong reasons can lead to adverse outcomes. Being unable to explain to civil society how the right reasons work can also threaten policies. This paper aims at providing an overview of potential impacts of private investment by pulling together the evidence base available to date. It reviews four common propositions on the benefits of private investment in infrastructure.

The first proposition suggests that private investment in infrastructure can improve efficiency at firm level, (though not necessarily an individual project). In this case, private management of infrastructure procurement and operation can be more efficient than public management in managing existing assets or delivering new ones. There is a stock of evidence available for regulated utilities. This paper will assess what empirical evidence is available for the four modes of transport: road, rail, sea and airports.

The second proposition is that private investment can help improve efficiency of infrastructure investment in the context of project selection. This is the desired effect. Private investors need to ensure that a project can recover its cost. With their own money at risk they should be more diligent before accepting any investment proposal. In this context, private investment is supposed to guard against white elephant projects (Engel et al., 2011) or “bridges to nowhere”.

The third proposition claims that private finance can help close the infrastructure financing and investment gap. Numerous publications have proposed that an infrastructure investment gap exists across the world. During the recent global financial crisis this was a common view, as fiscal constraints were implemented under which investment was the first expense to be cut. A common narrative is that private finance, known as investment, can help resolve this conundrum (OECD, 2015; WEF, 2013; Schwartz, Ruiz-Nuñez and Chelsky, 2014). A number of multilateral development banks and other institutions now exist to help facilitate private investment, with the most recent notable addition being the Asian Infrastructure Investment Bank. In essence, this proposition suggests that private investment enables infrastructure investment that could not otherwise take place, instead of crowding out public initiatives.

The final proposition is that foreign private investment has a positive impact on local know-how and competition and other aspects, as well. This idea follows from the literature that focuses on international trade and foreign direct investments (FDI).

Each of the above propositions will be investigated in a dedicated section of this paper. As the first three propositions deal with different aspects of economic efficiency, those sections will begin by briefly reviewing economists’ concept of efficiency.

The analysis focuses on transport infrastructure, though references to other evidence are made when relevant. Transport infrastructure typically refers to large CAPEX assets such as bridges, roads, railways, air/sea port infrastructure. They have a long life, can have some public good characteristics<sup>1</sup>, create

externalities (e.g. noise, pollution, displacement of homeowners due to right of way) or other indirect effects (e.g. improved land value through better accessibility), and the costs of which are generally considered sunk<sup>2</sup>. Transport infrastructure is a separate concept from the operations that take place on it (road/rail/air/sea transport, including sea port terminal operations), though many infrastructure systems are integrated and operations cannot be easily disentangled.

Due to these characteristics private investment in infrastructure almost never takes place without some form of a regulatory framework. In essence, there are two such frameworks with many variations in practice. In competition for a contract (the concept at the heart of the PPP), the efficiency incentive is primarily determined through the competition in the tender process. In incentive regulation, the efficiency targets are set and reset periodically by the economic regulator, generally an independent agency. The latter approach is commonly applied to utilities and some transport cases, such as rail and airport infrastructure.

Because of the multiple meanings of the term “private investment”, this paper is interested in two contexts. One is where private investment leads to a change of ownership and/or management of existing assets (through privatisation or a PPP, although commonly the term “concession” is used, as well)<sup>3</sup> and the other where private investment leads to a delivery of a new asset or an upgrade<sup>4</sup>. In practice, there are overlaps between the two. Both privatisation and PPP can require the investor to accommodate an expansion or rehabilitation of existing assets.

## **Can private investment in transport infrastructure improve productive efficiency? The firm level**

Pursuing productive efficiency is one way of achieving Value for Money. This is a common consideration which governments are called on to demonstrate when pursuing private investment as an option.

A firm achieves productive efficiency when it produces a given quantity of output at minimum cost. However, any infrastructure system is a multi-input, multi-output environment. One cannot make any inferences by observing improvements in any one dimension of the system. For example, comparing the cost of maintenance of two railway infrastructure managers, without considering that one has inherited a much higher density of switches will not yield a fair comparison. The measurement of economic efficiency improvement requires that a comparison of the situation be made after a change to a counterfactual, ideally using econometrics. The counterfactual can be a system’s own past performance or another system.

In light of the challenges of achieving like for like comparisons, it is not easy to establish or measure which form of governance (and ownership) is better for cost efficiency. For competitive markets, it took economists several decades to agree (Megginson and Netter, 2001) that private ownership performs better than public governance.

Most infrastructure systems, however, do not exist in competitive markets. Road and railway networks have natural monopoly characteristics and in most<sup>5</sup> parts of the world they are a monopoly. Sea and airports may have fewer such characteristics and can be subject to continuous competitive pressure. All

four have substantial impacts in terms of their externalities<sup>6</sup>. All four also require some form of government regulation. Since infrastructure generally involves large capital outlays that are sunk once made, assurances are necessary from the government that private investors will not be explicitly or implicitly expropriated. Rules and supervision need to be put in place to prevent abuse of market power when the exploitation of a particular infrastructure asset is a monopoly. In short, one cannot generalise the findings on superior performance of private governance and ownership from a fully competitive market to the infrastructure context.

Governments also sought a change of governance and ownership in infrastructure sectors. In infrastructure procurement, cost overruns and delays were not uncommon. In infrastructure management, overemployment in passenger and freight operations and unsatisfactory service levels were associated with State Owned Enterprises. Makovšek and Veryard (2016) provide a review of concerns with regard to public infrastructure governance.

Aside from trying to improve public governance, governments sought to introduce market mechanisms and private interest. One part of that process was trying to separate operations from the infrastructure. The economic characteristics of operations (often lower capital requirements, sunk cost, etc.) can make them less restrictive to private involvement (and in consequence, market creation).

**Table 1. Infrastructure and operations in transport – an illustration**

Sector	Infrastructure	Operations	Operations in relation to infrastructure
Road	Roads, bridges, signaling/traffic control equipment	Freight/passenger road transport	Liberalised and separate from infrastructure management
Rail	Track, switches, bridges, signaling/traffic control equipment	Freight/passenger railway cars, locomotives, motor-rail cars	Diverse organisation models (Integrated and liberalised companies, separate infrastructure and liberalised freight and/or passenger companies, etc.)
Air	Airport building, runways, parking lots, signaling/traffic control equipment	Air carriers/planes	Liberalised and separate from infrastructure management
Sea	Pier substructure, break waters, basin...	Terminal operations (ship-to-shore cranes, straddle carriers, warehouse...)	Mostly separated (Farrell, 2012), competition for the contract
		Shipping	Liberalised

Source: Makovšek (2019).

Even when operations can be separated from infrastructure, the conditions may still not immediately allow the creation of a competitive market for operations on the infrastructure. The broad meaning of the two concepts and market types are illustrated in Table 1.

The interest of this paper is in private investment in transport infrastructure systems which have not been fully liberalised (are not competitive). Since these systems are subject to different types of organisation and forms of private investment, the evidence treating them often overlaps the subjects of infrastructure and operations. To not exclude such evidence, this paper treats both.

## Road infrastructure

In road infrastructure, the public-private partnership (PPP) model has been practically the exclusive vehicle for private investment. Several countries (e.g. Portugal, Spain, Italy, France<sup>7</sup>) entrusted large

shares of their motorway network to the private sector through PPP (concessions) and relied heavily on PPPs to create new connections. In Chile, the motorway network consists exclusively of PPPs. There is no compilation of the total value or share of private investment road infrastructure for developed countries.

Despite a rich history of experience, it is not yet clear whether the use of PPPs in motorway development has resulted in improved value for money with regard to existing or new assets delivery.

This is particularly striking since road PPPs are the most represented sector in terms of private investment value in transport infrastructure. In Europe, for example, the EPEC's PPP market reports traditionally cite transport as the number one sector in terms of value<sup>8</sup>. Since 1993, more than 1800 projects are listed in the World Bank Private Participation in Infrastructure database under transport infrastructure for developing countries. These involve more than USD 458 billion of private investment, with about half in road infrastructure<sup>9</sup>. No such compilation is available for developed countries, though it is generally considered that private investment represents only a small share when compared to the public. Many governments, including the members of G20, intend on mobilising more private investment in infrastructure, making the current lack of understanding of past performance, particularly in roads, all the more striking.

Although there are dozens of studies on the different aspects of road PPPs, a lack of data has inhibited a comprehensive analysis of cost efficiency. However, a recent study did make progress with regard to PPPs used in delivery of greenfield assets in developed countries (Makovšek and Moszoro, 2018). It suggested that risk pricing failures lead to higher financing and construction costs than in traditional procurement, without a change in quality<sup>10</sup>. This makes it less likely for a PPP to demonstrate Value for Money, but does not bring closure to the Value for Money debate. More evidence is needed to corroborate the work in the study and no evidence currently exists on performance during maintenance and operations, comparative service levels, or asset condition, when the contract expires. Clearly, an important factor is the extent of inefficiency on the public side. Significant differences may be expected between different countries, especially developed and developing.

## **Railway infrastructure and operations**

There exists a body of research on the cost efficiency of infrastructure management for railways, including that of passenger franchising operations. Evidence is very limited for railway infrastructure privatisations, however, as they are relatively infrequent. The most studied case of infrastructure privatisation is that of the formerly state-owned company British Rail in the United Kingdom. British Rail was vertically separated, with on-the-track competition established in the rail freight transport and for-the-track competition in passenger transport. After several difficult years for policy makers, the economic regulator and the private owners, the company went bankrupt and was eventually nationalised. Smith and Nash (2014) review the literature and show that railway infrastructure privatisation led to a major loss of efficiency in infrastructure management, which has not yet been recovered. There are multiple reasons for this result, an important one being insufficient preparation for the privatisation with the simultaneous introduction of incentive regulation (any organisation needs time to build capacity).

There have been a few other cases of railway infrastructure privatisation, but they are less well understood in terms of a comprehensive view on their performance/efficiency.

The Japanese National Railways were privatised in 1987, after a lengthy process of restructuring. Six regional integrated railway companies and a nationwide freight train operator were created. 77 000

employees – almost a third of the company’s staff – were shed during privatisation. Today, five out of six companies are profitable, with improved service levels and expanded commercial operations (though there is mounting pressure on rural operations due to declining population density). Thirty years later, the Japanese privatisation experience is generally considered a success.

Apart from the two major cases, there was a series of other international experiences where the privatisation of railway infrastructure in an incentive regulation context or via a PPP failed for different reasons. Estonia privatised its infrastructure and operations in 2001, but shortly thereafter the political climate changed and the private company was nationalised in 2007. The New Zealand railways were privatised in 1993 and renationalised in 2008. In the intervening period, private operators were unsuccessful in making the railway business financially viable. In Argentina, the national railways were privatised in 1993. After initial contraction of the service scale and improved performance, a series of events, political and other (including the 2001 economic crisis), led to gradual renationalisation in 2012.

Experiences with privatisation of railway infrastructure are infrequent and do not easily lead to broad conclusions. For railways, any inference on the impact of private investment into infrastructure is particularly difficult. The primary reason is that railways around the world operate in different policy narratives and serve different goals, making straightforward comparisons impossible (ITF, 2019). If privatisation is an important condition for performance improvement in railway infrastructure, it is not a sufficient one. This is also the message of the cumulative World Bank experience in railway reform (World Bank, 2011).

There is somewhat more evidence available with regard to passenger franchising, albeit limited to developed countries. Nash et al. (2016) provides a recent overview:

- Germany and Sweden: 20-30% cost savings (Alexanderson, 2009; Alexanderson and Hultén, 2007)
- Netherlands: 20-50% cost savings (Van Dijk, 2007)
- Rail franchising reforms in Britain: unit cost increased by 14% between 1997 and 2006 (Smith and Wheat, 2012).

Regardless of the cost increase in the last case, passenger demand grew and has continued to grow during the period of economic crisis, suggesting that private operators, at least in part, contribute to this trend. This, despite earlier suggestions (Wardman, 2006) that the UK trend is driven by other socio-economic reasons, including higher gas prices and greater congestion due to rising car ownership.

In summary, evidence from passenger rail franchising clearly shows efficiency gains in a point of departure from state ownership and management<sup>11</sup>.

## Seaports

Private investment in ports occurs primarily in two ways. Either the concession for an existing terminal infrastructure is awarded to a PPP, where the private party executes cargo handling operations; or a Build-Operate-Transfer (BOT) type project is commissioned. In the latter case, the private party builds the terminal superstructure and handles terminal operations on it and the state provides the infrastructure (as in Guasch, Suárez Alemán and Trujillo (2015), for example). The majority (88 out of 136 in 2008) of competitively tendered concessions were concessions of existing terminal infrastructure (Farrell, 2012).

In relation to different port management models around the world, private investment in the context of this paper only happens in the last two, as summarised in Table 2 below.

**Table 2. Basic port management systems**

Type	Infrastructure	Superstructure	Port Labour	Other functions
Public Service Port	Public	Public	Public	Majority public
Tool Port	Public	Public	Private	Public/Private
Landlord Port	Public	Private	Private	Public/Private
Private Service Port	Private	Private	Private	Majority private

Source: World Bank (2007), adjusted by ITF.

The concession process in ports started about thirty years ago with the majority of terminal operations now being private. Privately managed terminals account for 70% of operational container terminals and 78% of global container terminal throughput. Hence, the land-lord port is by far the most dominant form of port management systems (Farrell, 2012).

Despite being subject to a concession, the port operations can be competitive businesses. Although the competitiveness of the port is subject to many factors (location, maritime connectivity, hinterland transport connections, etc.), the service quality of the port and its commercial orientation (e.g. marketing) does enable some management of demand. In effect, different terminal operators and ports within the same catchment area can compete with each other. Competition, the ability to affect demand through service quality and limited sunk cost investment are contexts in which one would expect the private sector to outperform a state-owned enterprise.

Limited evidence exists of efficiency gains from private sector ownership and management. A few older papers suggest that ownership does not matter (Valentine and Gray, 2001; Notteboom, Coeck and Van Den Broeck, 2000). More recent papers find positive effects of private ownership on port efficiency (Cullinane and Song, 2003; Tongzon and Heng, 2005; Cullinane et al., 2006; Cheon, Dowall and Song, 2010). As Gong, Cullinane and Firth (2012) report, earlier work may have led to mixed results due to simplistic categorisation of port ownership and governance (i.e. state vs private rather than applying a matrix of who controls which port functions in line with Baird (1995)). Along with the importance of ownership, the port's organisation and how markets were (de)regulated also played a role.

The most positive impact comes from reorganisation. Reorganisation splits the function of the port infrastructure management from the terminal operations, which are a more attractive form for the private sector to invest in. For purely private ports, Baird (2000) argues that the outright sale of port land, combined with a transfer of operation and regulation functions to the private sector, will not automatically lead to increased productive efficiency and can be counterproductive. The reason is that port infrastructure is capital intensive and takes a long time to recover. Relying on the private sector to provide both port infrastructure and superstructure may result in significantly delayed investment in crucial operational facilities and equipment.

In a comprehensive review of research, Gong, Cullinane and Firth (2012) provided several caveats to the explanatory power of the evidence above. These are based on measurement and data problems as privatisation, regulatory and structural reforms were introduced simultaneously in most developing countries. The effects of these reforms are difficult to disentangle. There is also an unsettled theoretical debate regarding the costs and benefits of partial privatisation, possible implementation problems in privatisation, and the influence of political forces in privatisation (both pre- and post-privatisation).

More importantly, efficiency comparisons in most existing studies between private and public sector producers or service providers are only made on the basis of technical efficiency. If privatised ports have not been subject to significant competition for the same catchment areas, the result may have been abuse of market power, rather than improved technical and allocative efficiency.

In summary, there are, at the very least, indications that private investment could lead to improved economic efficiency provided it is executed in an adequate organisational setting and is subject to a market or regulatory setting to keep any abuse of market power in check.

## Airports

Traditionally, governments have been the main provider of air transport infrastructure. The very nature of such assets – the natural monopoly and their relative importance for governments’ national security agendas – provided the rationale for retaining such infrastructure under public ownership. However, for a number of reasons, airports are increasingly being transferred to the private sector. Similar to the sea port reorganisation, the unbundling of air transport infrastructure activities has allowed governments to retain control of key activities important for national security, e.g. air traffic control and safety and security services, while permitting the private sector to undertake the more commercial activities, notably the operation of airports and ground-handling services.

Increased private participation in the sector has generally taken place through PPPs for ground-services and airport management contracts to full divestiture. Concession agreements represent 41% of airports with private participation (ACI, 2016). An overview of what incentive regulation scheme was applied, if any, is not available. Over 40% of global traffic is currently being handled by non-public airports and that percentage is increasing.

The performance of airports has been influenced by a complicated nexus of changes in the governance model, increased private participation and commercialisation, and the liberalisation of air services. There is a vast literature covering these aspects. In this paper, these are only outlined to illustrate what is known about the impact of private investment in airport infrastructure.

The evidence on the relevance of ownership for airport efficiency is mixed. Several earlier studies failed to determine any impact of private ownership on airport efficiency (Parker, 1999; Oum, Yu and Fu, 2003; Vasigh and Gorjidoz, 2006; Lin and Hong, 2006). Others find a positive relationship (Yokomi, 2005; Vogel, 2006; Barros and Dieke, 2007; Oum, Alder and Yu, 2006; and Oum, Yan and Yu, 2008). Adler and Liebert (2014) demonstrate the importance of competition regardless of ownership and Bel and Fageda (2010) do the same for price regulation.

For much of this literature, the same considerations apply as raised by Gong, Cullinane and Firth (2012) on the challenges to disentangle the effects of organisation, competition and regulation, and ownership. A point that is less subject to challenge is that private ownership is better at extracting value from commercial operations. In airports, commercial revenues from non-aeronautical activities represent up to half of total revenue (Graham, 2009). According to ACI (2016), during times of economic distress, non-aeronautical revenues serve as a cushion between airports and their airline customers with respect to charges. How well this works, though, depends whether both streams of revenue are considered in airport infrastructure cost recovery (dual till) or only aeronautical revenues (single till).

## Privatisation impacts in other infrastructure sectors

When considering private investment in the context of privatisation or concessions it helps to look at other infrastructure systems, as well. Utilities, for example, have very similar, if not the same economic characteristics as road and rail networks.

Prior to the 1990s, only a few OECD countries undertook large scale privatisation programmes. Except for the United Kingdom, Germany and France in Europe and countries such as Chile, New Zealand, Mexico and Canada outside of Europe, the programmes were rudimentary and rather narrow in scope. In the United Kingdom, prior to the sale of British Telecom, a number of transactions were carried out. However, the sale of British Telecom in 1984 is considered the beginning of large-scale privatisations that continued well into the mid-1990s (OECD, 2003). Privatisation strategies in some jurisdictions lasted through the mid-2000s but can now be considered to have stalled (OECD, 2016).

There is no comprehensive overview available of private involvement in infrastructure. The sector which recorded the biggest private capital flows in the past was telecommunications (OECD, 2003). But inflows of private capital took place in other sectors as well, where next to divestitures, PPPs as a form of private investment proliferated. In both cases, countries such as the United Kingdom and Chile were among the first and went the furthest in this process by also privatising the utilities sector (water and sanitation, electricity production and distribution). The *ex post* evidence for the utility sector suggests that the privatisation process induced a reduction in workforce and increased the cost efficiency of the firms.

In the developed countries, one of the most well-documented examples of privatisation outcomes is the United Kingdom. Table 3 presents an overview for utilities.

**Table 3. Privatisation outcomes in selected utility industries in the United Kingdom**

Industry	Number of employees at privatisation/(year)	Number of employees after privatisation/(year)	Changes (real <sup>1</sup> ) in end user prices (time of study)
Electric power distribution	127 300 (1990/1991)	66 000 (1996/1997)	from -25 to -34% (1990-1999) <sup>2</sup>
Telecommunications (British Telecom)	238 000 (1979/1980)	124 700 (1999)	-48% (1984-1999) <sup>3</sup>
Gas distribution	92 000 (1986)	70 000 (1994)	-26% (1986-1997) <sup>4</sup>

Notes: (1) The figure is based on the general price level growth, which means that the nominal drop was even greater. (2) Measured in England and Wales. (3) In this case the decrease can also be attributed to technological progress and, indirectly, an increase in competition as a result of privatisation. (4) In the original text, "2.6% per year," which would amount to 26.6% in 11 years, rounded down.

Source: Parker (2004).

However, privatisation has not always translated into greater social welfare, nor gone smoothly<sup>12</sup>. In Chile, for example, the economic incentive regulation in utilities was successful in inducing productivity gains. It was less successful in diverting those gains from accumulating in the form of higher profits rather than lower prices or other benefits for the users (Engel et al., 2003).

In developing countries the experience and research by development banks yielded a substantial amount of evidence on the impacts of private investment in infrastructure. Performance improvements in telecommunications, electricity and water supply sectors have been reported.



Thillairajan, Mahalingam and Deep (2013) reviewed 424 pieces of evidence from 67 studies (including Gassner, Popov and Pushak, 2009). The analysis found that the incidents of positive evidence far outnumbered that of the negative evidence. The positive evidence was the strongest for those outcomes where there was a strong corresponding benefit to the private player. Where improvements would need higher levels of capital investment or the benefits to the private player would occur over a longer period, the evidence for positive impact was not as strong. In line with the above, telecommunications had the most positive outcomes as a sector, which also has the greatest scope for the introduction of competition of the three sectors analysed.

Gassner, Popov and Pushak (2009) show that not all countries and regions were equally successful in benefiting from private participation, at least not in terms of greater coverage and capacity. This was most notable in less competitive markets like electricity and water distribution. Even when the private sector has led to operational efficiency gains, these have not necessarily been translated into higher investment or lower prices. To some extent, the difference in results across sectors may reflect the varying degrees of price reforms implemented. Where reforms have allowed prices to recover the cost of operations and the initial investment into physical infrastructure, as often the case in electricity generation and telecommunications, private investment has more easily expanded and resulted in service expansion. In other network industries cases, aligning prices with the costs of services has proved more difficult (Foster and Yepes, 2006).

Overall, efficiency improvements alone may not have been large enough to compensate for limited price reforms (Gassner, Popov and Pushak, 2009). This may also explain the relatively lower levels of investment by public and private utilities in those sectors. A particular challenge for developing countries is that the introduction of private investment needs to be part of a broader reform. Private sector investment is not very effective in achieving the desired outcomes without corresponding changes in the market and in institutional and governance structures (Thillairajan, Mahalingam and Deep, 2013). Andres, Schwartz and Guasch (2013) focused on these broader conditions in the case of fixed telecommunications and utilities in Latin America and the Caribbean. They found that differences in ownership, regulatory governance and corporate governance of state-owned enterprises significantly explain some of the variance in the performance of infrastructure sectors in terms of output, efficiency, labour productivity, services quality, coverage and prices.

In the review of the evidence for transport and other sectors, a conservative assessment would be that private participation in infrastructure with private money at risk can matter, with the evidence being mixed. The impact depends on the appropriate organisational, institutional, and regulatory framework in which it is made. The relative importance of each particular ingredient remains an area of further investigation.

## Can private investment in transport infrastructure improve allocative efficiency? The project selection level

The previous section discussed productive efficiency in the context of the firm. The firms were infrastructure managers and/or providers of transport services and the question was whether ownership matters. Any consideration of investment in new infrastructure or its renewal was mainly done at an aggregate level, where one firm does not necessarily equal one project.

If the productive efficiency referred to the question “how”, then the remaining questions of efficiency are “what infrastructure” (which projects) and “how much of it”. Allocative efficiency<sup>13</sup> addressed the latter two questions. Allocative efficiency is achieved when firms expand production until the marginal benefit of an additional unit equals the (long-run) marginal cost. Allocative efficiency also involves the efficient pricing of the services the infrastructure provides, on a road network, for example. If pricing is optimal, benefit is maximised. This section focuses only on project selection and assumes pricing is implicitly efficient.

The consideration of allocative efficiency can also be showcased on a more granular level than a firm – a project. To maximise allocative efficiency and, thereby, social welfare, decision makers need to invest only in those projects that yield the highest net benefits. Cost Benefit Analysis (CBA) is the standard method to help them do that. As the costs and benefits are always estimates, the *ex post* outcomes will differ. This is not problematic if these estimates are on average correct. (Some investments turn out better, others worse, but on average the errors cancel out.) If the costs turn out to be deliberately underestimated or the benefits overestimated, the best investment options are not selected and social welfare is not maximised.

Systematic cost overruns or demand shortfalls have been empirically proven in many areas of public investment. The transport sector is the best represented in this literature. Since the seminal work of Flyvbjerg, Holm and Buhl (2002), there have been multiple studies on cost overruns (Makovšek and Moszoro (2018) provide an overview) and demand shortfalls (Flyvbjerg, Holm and Buhl, 2005; Bain, 2009) in the transport sector. Systematic evidence for other sectors is much more limited (Ansar et al. (2014) for hydro dams, Sovacool, Gilbert and Nugent (2014) for electricity transmission, Butts and Linton (2009) for defense and NASA). Flyvbjerg, Holm and Buhl (2005) contended that the main culprit for this was governance failure on the public side (deliberate misrepresentation), while more forgiving authors used the term “optimism bias”, as in the UK’s Green Book, for example (H.M. Treasury, 2014).

A common proposition with regard to PPPs was that private investors will be more diligent in project appraisal than the public sector. The construction and the demand risk were to be transferred to the private sector through PPPs and the private sector would accurately assess the risks and refuse execution if it sensed no full cost recovery was possible. This intuition was not confirmed by evidence and four elements make it difficult to defend, as explained below.

It is important to note that the below analysis is relevant primarily for the non-competitive infrastructure sectors, such as roads. Unlike others – sea or air ports in the same catchment area, for example – these are not subject to continuous competitive pressure. If a sector is competitive, demand becomes a manageable risk and the operator can pursue other actions to attract users, i.e. is not exclusively dependant on users’ price elasticity. It then makes sense for the private party to bear demand risk in part

or completely. The intricacies of how competitive a sector is and what extent of demand risk should be transferred are beyond the scope of this paper.

## Credible commitment to the contract is not always assured

For private investors to care about a particular risk, their money needs to be credibly at risk. If a contract stipulates that a contracting party must bear a risk if it materialises, that actually needs to happen when the risk does materialise. Were this not so, firms bidding for the contract would be able to renegotiate when things started going badly. Competition for the contract would lose its purpose.

Changes in contracts during their execution manifest in renegotiations. These are not an adverse element per se. Long-term contracts in particular cannot be complete and foresee every eventuality that may arise during their execution. Renegotiations may be necessary to accommodate unforeseen exogenous circumstances that would unduly threaten the viability of the contract. However, a lack of data availability makes it difficult to determine the real reasons behind each renegotiation.

The existing evidence across different countries shows that renegotiations are not infrequent (Table 4). This is not necessarily a problem as long as the value of the renegotiations is limited.

**Table 4. Renegotiations of PPPs in different regions**

Region / country	Sector	% of renegotiated contracts	Source
Latin America and Caribbean	Total	68%	Guasch et al. (2014)
	Electricity	41%	
	Transport	78%	
	Water	92%	
India	All sectors	0%	Guasch et al. (2014)
United States	Highways	40%	*Engel, Fischer and Galetovic (2011)
France	Highways	50%	Atthias and Saussier (2007)
	Parking	73%	Beuve, de Brux and Saussier (2014)
United Kingdom	All sectors	22%	*NAO (2003)
United Kingdom (Scotland)	All sectors	51%	*CEPA (2005)

\* These studies include samples, which may not be representative of the population at the time of sampling.

Source: ITF (2017).

In the United Kingdom, for example, the NAO's survey of 171 PFI projects (from all sectors) reports the monetary impact of changes to contracts for the year 2006 (NAO, 2008). 82% of changes involved GBP 5 000 or less. Nearly all changes originated with a request from the public sector, rather than the private sector contractor, or as a result of a change in law. Beyond this example, very public high-impact renegotiation cases exist, such as the Channel Tunnel Rail Link. Their very low incidence is not an indication of a credible commitment problem in the United Kingdom.

A high incidence, timing, and the financial impact of renegotiations do suggest a credible commitment problem. A more detailed overview of the characteristics of renegotiations in Chile, Peru, and Colombia

in Table 5 show that renegotiations are frequent, can start very early (in Chile and Peru they can begin as early as the first year or during construction), and have a significant impact on the taxpayer.

In the Chilean case, for example, Engel, Fischer and Galetovic (2014a) recount that the data is consistent with opportunistic behaviour by the government (and the contractors), where the government can use renegotiations to increase expenditure beyond agreed fiscal spending limits.

**Table 5. Summary statistics on renegotiations in Chile, Peru and Colombia, 1993-2010**

	Chile	Colombia	Peru
Total road concessions	21	25	19
Mean initial value of contract	246	263	166
Mean initial term (years)	25.2	16.7	22.1
Mean concession length (km)	114	195	383
Mean concession years elapsed	12.5	9.0	4.6
Renegotiated road concessions	18	21	11
Total number of renegotiations	60	430	53
Mean number of renegotiations per concession	3.3	20.5	4.8
Mean time of first renegotiation (years)	2.7	1.0	1.4
Mean fiscal cost of renegotiations *	47	266	28
Mean fiscal costs / initial value (percentage)	17	282	13
Mean added term (years)	0.9	6.3	0.8
Mean added length (km)	0	54.6	0
Number of renegotiations / concessions year elapsed	0.2	1.9	0.9

\* Constant USD Dec 2009, million.

Source: Bitran, Nieto-Parra and Robledo (2013).

Even where credible commitment to the contract is present on the public side, there may be opportunistic behaviour on the private side. Multiple examples exist where the private project developers misled private investors by misrepresenting project cost or expected demand. Notable examples are the Channel Tunnel Rail Link in Europe and several cases in Australia<sup>14</sup>. While these cases may not fall on the taxpayers' shoulders immediately, they may increase the cost of future projects when investors try to accommodate developer opportunism in their risk pricing or avoid taking demand risk altogether.

## **Demand risk must be systematically transferable**

To incentivise the private partner to filter out white elephants, demand risk must be transferred to projects systematically with other risks. For road projects, for example, the implication is then that demand risk transfer applies to projects on all roads of a particular class on the network (e.g. all motorways). If the private filter for the project pipeline is not systematic, the state could choose the projects to which it would transfer the demand risk and those to which it would not. Such a system would introduce a moral hazard problem, allowing the state not to transfer the demand risk for politically preferred projects where it suspected the private sector would reject them.

The previous paragraph assumes for the sake of argument that all projects can recover their cost financially. In practice, this is not so. Many projects cannot fully recover their cost financially but are built because they are economically justified (e.g. because they reduce negative externalities). These projects require subsidies. It is not only financial due diligence that determines whether such projects should be built, then, but economic analysis as well. If responsibility for the economic analysis is transferred to the private sector the onus is no longer on the financial cost recovery but on showing that the project is worthwhile and should be subsidised (since in the opposite case there would be no project). This would replace one moral hazard problem with another.

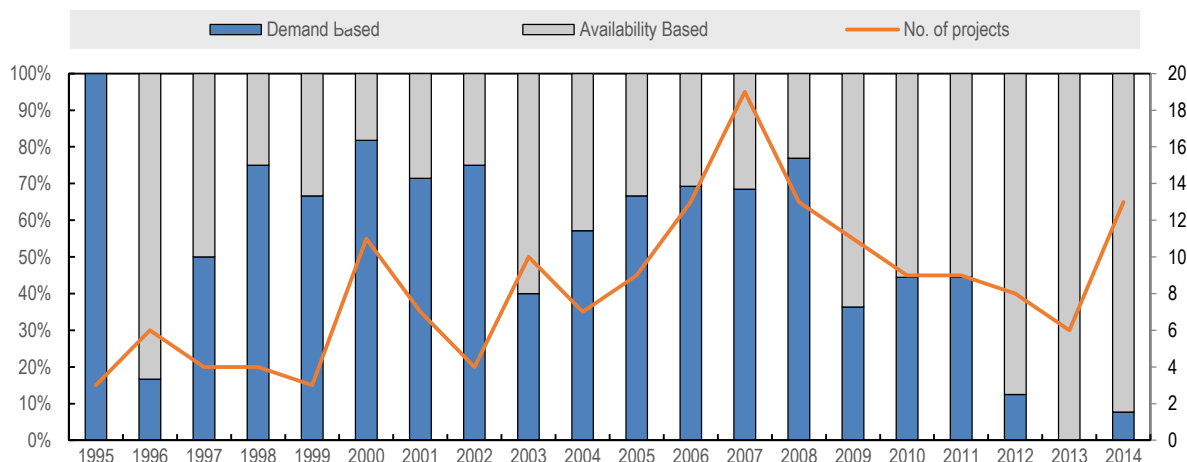
### An appetite for demand risk must always be present

If project selection would benefit from transferring demand risk to the private sector, then a stable appetite to accept demand risk should exist. Why? Firstly, it would be impractical for public decision-makers to rely on transferring demand risk for project selection if the private sector was unwilling to take any demand risk for long stretches of time. Secondly, decision-makers need to have confidence that projects are rejected because they are not financially viable and not due to other reasons that affect the performance of the investors or their risk perception.

Recent history has shown that the global financial and economic crisis substantially affected private investment in transport and other infrastructure. In the years that followed, a marked drop in demand-based contracts occurred. This is clearly visible on the types of road PPPs in the European Union in Figure 1. Any balance between demand-based and availability-based contracts that may have existed prior the crisis shifted almost exclusively to availability-based contracts.

Road projects are a typical example of a non-competitive sector where the demand risk is generally unmanageable (NAO, 1998; Roumboutsos and Pantelias, 2015)<sup>15</sup>. If the traffic forecast was overly optimistic, raising the tolls only accelerates the death spiral.

**Figure 1. The distribution of demand-based vs. availability-based contracts in private investment in roads, 1995 – 2014, European Union.**



Source: DEALOGIC database, BENEFIT4Transport project data.

This shift also occurred a few years after several pieces of research highlighted the *ex post* performance of traffic forecasting for publicly and privately sponsored projects. There is no evidence that private

sector involvement produces more accurate traffic forecasts on average<sup>16</sup>, as summarised in Box 1. Traffic forecasting is difficult and involves considerable uncertainty.

### Box 1. Traffic forecasting and *ex post* performance

Traffic forecasting is a scientific field in its own right. It is not an exact science, however, and systematic errors have been observed in traditionally procured projects and private toll concessions. Traffic risk must be assessed for each project specifically, using historical information and expected future developments. An investor or a lender cannot directly observe the riskiness of a project by comparing some of its characteristics to similar projects. But they may get a limited view by observing systematic errors in expectations for similar projects. This is the subject of *ex post* analysis. Related evidence is summarised below.

Bain (2009) presented evidence on 104 toll road concessions from around the globe to find that, on average, traffic demand is 23% overestimated. By contrast, in the sample of traditionally procured and predominantly European road projects, Flyvbjerg, Holm and Buhl (2005) and Næss, Flyvbjerg and Buhl (2006) found a systematic error in the opposite direction: actual traffic averaged 9.5% higher than forecasted traffic. Their data included cases over several decades and does not reveal how many were tolled or not. Button and Chen (2014) examine pure public and public–private US highway investment traffic demand forecasts to find no evidence that the latter are more accurate. In the case of rail, Julien Dehornoy (Finger and Messulam, 2015) has reviewed cases of PPPs with demand risk since the 1980s. Of the 14 projects reviewed, five were not yet developed enough to allow analysis; in the remaining nine the average ridership, assessed at different years of operation, was 63% below estimates. Flyvbjerg, Holm and Buhl (2006) report a –54% average error on 25 projects, though these may include many of the ones studied by Dehornoy (Finger and Messulam, 2015) (which the authors did not reveal).

Source: Makovšek and Moszoro (2018).

The growing awareness of uncertainty inherent to traffic forecasting in the investor community and the uncertainty brought about by the general economic crisis may have been two contributing factors in the shift from demand-based to availability-based contracts. The details are beyond the scope of this paper. The key point for this analysis is that the appetite to accept demand risk is not stable. Moreover, it may be subject to uncertainty aversion, meaning that investors (and consumers) are simply more careful about their bets and spending during a crisis. This would not be particular to infrastructure investment. Relying on the private sector to screen investments during a crisis could thus be paradoxical if the state wanted to jump-start the economy by increasing the spending.

## Asking investors to filter white elephants may not be justified by government failure rates

The transfer of demand risk to the private sector involves a considerable premium in terms of the required return. When demand is not manageable, transferring the demand risk to a private partner will produce a pure financing premium that cannot be offset by efficiency gains on the project itself. The efficiency gains would need to come from improved project selection entirely.

Take, for example, a situation where a country has decided to pursue a road PPP and is considering whether to choose an availability-based model or a demand-based model. In the first case, the responsibility for project selection rests entirely with the public side and in the second would be subject to private sector due diligence. Table 6 below illustrates a range of capital cost. The low end represents the availability-based PPPs and the high end demand-based PPPs. It is generally acknowledged that projects bearing demand risk should achieve margins above availability-based ones. However, no research is available to determine what the impact is for a particular demand risk transfer mechanism (all else being equal).

Following issues with pricing diversifiable risk in projects in line with Makovšek and Moszoro (2018) this paper also illustrates a case where the construction risk transfer to the PPP incurs an inefficient risk pricing premium. A premium in the order of EUR 10 million and EUR 20 million is added on the as built<sup>17</sup> construction cost.

**Table 6. Weighted average cost of capital and total financing cost illustration**

As built CAPEX (EUR million)	Capital cost				
	5% (base case)	6%	7%	8%	9%
100	171 112	184 021	197 258	210 801	224 630
110	188 224	202 423	216 983	231 881	247 094
120	205 335	220 826	236 709	252 961	269 557

Note: The simulation assumes a three-year construction and grace period. The loan amortisation is semi-annual. No refinancing is considered, loan approval cost fees are ignored and loan insurance costs are set at 1.2% per year. The loan tenure is 20 years.

For demand risk transfer to make sense, its added cost needs to be smaller than the damage from poor project selection. In the base case of Table 6 a project (a road, for example) with the investment of EUR 100 million is built as an availability-based PPP. At a cost of financing (WACC) of 5%<sup>18</sup>, EUR 171 million will need to be repaid over the life of the project. If the transfer of demand risk raises the cost of capital to 7%, an additional EUR 26 million (= 197 - 171) needs to be repaid over the life the project. All else being equal this amount enables an extra EUR 15-million-project to be built with the same financing conditions as the base case (i.e. with a 5% cost of financing). If demand risk transfer would be applied on a systemic level, it also means at least 15% of all projects selected by the public sector would need to be white elephants to justify demand risk transfer. Including CAPEX growth due to inefficient construction risk pricing, these numbers grow to 27% at EUR 110 million and 38% at EUR 120 million.

At face value these numbers suggest that the potential cost of transferring demand risk to the private sector very quickly requires high rates of government failure to be justified. Some economists would argue though that the marginal cost of public funding needs to be considered in the above interpretation<sup>19</sup>. As Box 2 explains, the argument is out of context and does not change the aforementioned conclusions.

### Box 2. Marginal cost of public funding and project selection

The question of marginal cost of public funding (MCPF) deals with the price distortions or inefficiencies caused by additional taxation. It would come into play if the state had no other options to cover projects' shortfalls than to increase taxes (e.g. if it exhausted options to cross fund profitable projects with lossmaking ones, extend the repayment period, etc.).

Additional taxation can negatively affect incentives to work, invest, stimulate tax evasion and have other impacts. A sizeable body of literature in the last decades has dealt with these issues (e.g. Feldstein, 1999; Chetty, Looney and Kroft, 2009; Chetty, 2009; Barrios, Pycroft and Saveyn, 2013) producing different ranges of estimates on how much additional cost an additional EUR 1 of taxation could incur. The inefficiency cost of additional taxation can be substantial and depends on multiple factors (the existing levels of taxation, tax type and others). In the European Union's CBA guidelines (Sartory et al., 2014) an MCPF of one is recommended, which means that every additional EUR of taxation causes an additional EUR 1 of income loss.

If, in the numerical example above (required project failure rate to offset the added cost of financing), one assumes that all traffic shortfalls would need to be recovered through general taxation at  $MCPF=1$ , the social cost of these shortfalls would be double their actual value. This is because economics distinguishes between users paying the tolls voluntarily and taxpayers, paying under threat of coercion. It would also substantially improve the rationale of transferring demand risk to the private sector (i.e. it would halve the numbers in the simulation above).

In this particular case, MCPF would imply that a cost overrun on a motorway project paid through a raise in taxes would have greater social cost than a cost overrun, which the private party has absorbed but which would then be repaid through higher tolls, assuming users perceive those differently than taxes. This comparison is, of course, inadequate. It ignores the difference between funding and financing (discussed in the next section). If there are users available to fund the project, the state can spread its higher cost over time, and toll them itself. If users are not an available option, the funding of the project comes through taxation anyway, regardless of whether the project is procured traditionally or through an availability-based PPP.

Because the problem of project selection to the private sector (as laid out in the sections above) is not transferable, the public sector remains responsible for whether a project will have a positive Net Present Value. The key question, then, is which procurement mode is more efficient, not where the funding will come from (taxation, user charges, or a combination), as it is known *ex ante*. In summary, the MCPF argument is not relevant to this analysis, i.e. is out of context.

There is little research available with insight on the systematic *ex post* Benefit-to-Cost ratios or achieved Internal Rates of Return. The first wave of the French TGV programme was entirely positive, despite systematic cost overruns (Crozet, 2016). In developing countries the evidence is limited as well, where high government failure may actually be the case. A rare example is a study by Ansar et al. (2016), which roughly<sup>20</sup> assessed the *ex post* Benefit-to-Cost ratio for 65 major Chinese transport projects. The study found that 55% probably did not achieve a positive Benefit-to-Cost ratio.

To summarise, four conditions need to be fulfilled for the transfer of the demand risk to the private sector in non-competitive infrastructure sectors to make sense. These are:

- Credible commitment to the contract



- Systematic transfer of demand risk to the private sector for a particular asset type
- Consistent transferability of demand risk to the private sector
- Rates of public project selection failure that are higher than the added cost of demand risk transfer.

Failure to meet any one of these conditions makes the proposition of demand risk transfer on the merit of improved project selection invalid. As demonstrated, the second and third conditions are unlikely to be achievable. No country systematically transferred demand risk on all projects of the same class. Demand risk is also not always transferrable. The appetite to accept the demand risk (or its uncertainty) may depend on other factors beyond the project itself, as well. Lastly, the potential cost of demand risk transfer requires very high levels of government failure in project selection. Based on the evidence from the People's Republic of China and Latin America, for example, one may conjecture that countries that likely have high rates of government failure in project selection are unfortunately also less likely to credibly commit to contracts.

The practical reality of decision-makers may also be that once a project is put to the market, it is difficult for governments to stop the process. Political expectations are built up when a project is put to the market. Governments, as well as parts of the public administration that have invested themselves in preparing the project, will seek to avoid the embarrassment of stopping a project at such a late stage. An additional challenge is that bidders would also incur a cost every time they discovered that a project could not be delivered. To conclude, project selection was and remains a challenge inherent to public governance.

## **Can private investment close the transport infrastructure investment gap?**

The consideration of how much to borrow and spend relates to the third and last dimension of efficiency: dynamic efficiency. Dynamic efficiency occurs when firms invest until the return of the marginal euro spent equals the opportunity cost of postponing consumption (i.e. the cost of raising the money). This extends the scope of allocative efficiency concept with the notion of limited resources and the need for prioritisation.

Government borrowing constraints determine how much the state can borrow and then spend (on investment as well), given a country's fiscal targets. In principle, the government should borrow and spend (on consumption and investment) as long as the benefits of this practice outweigh the cost. On one hand, government spending fosters economic growth. On the other, if debt is too high, governments have to raise taxes to fund the repayment of debt-interest and principals. These taxes are a drag on the economy (through disincentives to work or to invest).

The optimal level of public debt or when the government should start focussing on reducing debt is an evolving issue in macroeconomics<sup>21</sup>. Its details are beyond the scope of this paper. For the sake of discussion, this paper assumes the borrowing constraint is set at the optimal level, the last point where

the benefits of additional government spending still outweigh the cost of higher taxation. If the state wants to invest more, it must reallocate existing expenditures<sup>22</sup>.

What is the fiscal impact: when the government transfers investment (financing, delivery and operation) in infrastructure to the private sector? This question considers *the impact of private investment per se* (the “additional” finance) and is unrelated to the importance of private management/ownership, considered in the previous section. To simplify the argument it is useful to consider three cases where a project is financed either by the state or the private sector<sup>23</sup>. Following Funke, Irwin and Rial (2013), in an example where a project’s revenues exactly cover the expenditures, i.e. the net present value of cash flows is zero, the following occurs for project cash flows:

- Traditional procurement: If the state procures the project, it incurs an immediate cost during construction. Alternately, through borrowing, government can spread out its expenditures through time. The project then generates economic benefits and revenues collected through users or taxation over the project’s life time that exactly cover its cost. The fiscal impact will be neutral – zero.
- An availability-based PPP with government funding: The state can transfer the execution of the project to the private sector and pay annual payments for the availability of the infrastructure to the private operator of the infrastructure. As in the first case, the state will collect the revenues and the fiscal impact will be zero.
- An availability- or demand-based PPP with user funding: The state can transfer the execution and the revenue collection from users to the private sector. With the state avoiding the cost of construction it also forfeits the revenues from the project, the fiscal impact will again be zero.

In the simplified examples above the direct fiscal impact is the same. However, the accounting treatment of these examples in most countries today will not be. Depending on the accounting principle applied, PPPs will be classified on or off the balance sheet – i.e. they will or will not be reported in the public debt. Historically, developing projects and not showing the related liabilities in the public debt made PPPs especially attractive to governments. The downside of the accounting treatment element is that inadequate reporting creates a moral hazard:

- It creates an apparent impression that the government can actually spend more than it should.
- It can also stimulate the government to pursue PPPs on the merit of their accounting treatment regardless of their Value for Money characteristics or stimulate sacrificing Value for Money to achieve an off the balance sheet treatment.

The accounting aspects above are tightly related to the budgeting process. The government plans how much it can spend based on the medium-term economic growth forecasts. The budget takes into account revenues from current taxation and the extent to which the government can spread expenditure over time by borrowing. The budget is then allocated to individual departments (transport, health, defence...). While the government as a whole can spread its expenditure through time by taking public debt, the individual department cannot. It can do so indirectly by pursuing a PPP, effectively borrowing from the PPP partner. By borrowing, the department changes the timing of the cash flows.

By not transparently accounting for future liabilities from PPPs a government at the level of a department can effectively overdraw on the already set borrowing constraint. In the extreme case, a

department could fully commit a series of its future budgets to frontload the delivery of a long-term investment plan, losing all budget flexibility for years to come.

To control fiscal risks from PPP use, some governments have introduced prudential limits to the amount of their budgets that can be committed to service PPPs. In parallel, the International Monetary Fund (IMF) and the World Bank have developed the PPP Financial Risk Assessment Model (PFRAM)<sup>24</sup> as an aid to governments. It follows that an adequate public accounting framework would largely eliminate the need of current measures, like the PFRAM, and would hold in check the moral hazard.

There are two main public accounting concepts available to governments today: 1) the risk and reward criterion, and 2) the control or economic ownership criterion (Box 3 provides a brief overview). The latter removes the moral hazard aspect and is the basis for the IMF recommended IPSAS 32 standard. In advanced economies this standard is relatively easy to implement with regard to PPPs specifically and does not require the overhaul of the complete public accounting framework<sup>25</sup>.

### Box 3. PPP and accounting principles

With risk and reward criterion, the economic ownership of an asset lies with the party that possesses the asset and carries the majority of the risks, benefits and burdens in connection with the asset. Eurostat, for example, classifies risk into three major groups: construction, availability, and demand risk. At face value transferring two out of three risks would be sufficient to achieve off the balance sheet treatment.

With control criterion, the economic ownership of an asset lies with the government if it:

- (1) Controls or regulates what services the private partner must provide with the asset, to whom it must provide them, and at what price; and
- (2) Controls—through ownership, beneficial entitlement or otherwise—any significant residual interest in the asset at the end of the term of the arrangement.

For a whole-of-life asset, the first condition alone is sufficient. Both rules pursue the substance-over-form principle, i.e. it is not the legal ownership that determines the accounting treatment but the fulfilment of the above mentioned conditions.

Regardless of the public accounting treatment, the choice of financing option – the government borrowing directly or through the PPP – does not change the ability of the users or the general population to ultimately pay for the service. A similar argument to take account of the broader affordability of the project was also raised by earlier OECD work (Posner, Ryu and Tkachenko, 2009). In short, financing options cannot solve funding problems<sup>26</sup>. This is indirectly recognised in the OECD (2012)<sup>27</sup> PPP recommendations. That said, one must recognise that marginal cases also exist (see Box 4) with exceptions to the general rules above.

The discussion above still requires a slight extension with regard to the third, initially-presented case of a user-funded project. Regardless of the effective fiscal impact of a particular project the public debt for the moment remains one of the leading indicators for macroeconomists and politicians. In the day-to-day reality, ministries of finance can find themselves in a position where the public borrowing has been constrained, but there may still be project propositions available that can recover their cost themselves. The state will not want to do these projects if the current borrowing constraint has already been met.

Does this mean that using private investment is the only way to do these projects faster? The answer depends on the accounting principle applied.

#### **Box 4. When PPPs should extend the public borrowing constraint**

Several situations could be constructed where one could argue for the use of PPPs to actually extend the public borrowing constraint or, more accurately, to ignore it. For example:

- If a government would be imposing a sub-optimally restrictive fiscal policy<sup>28</sup>, then some off-the-balance sheet private financing could actually be useful. But this is not a very realistic case and involves a part of the public sector pursuing an autonomous policy that is not aligned with the top level of the government. Moreover, the realisation on the private side that the government is pursuing a PPP agenda to secure off-balance sheet treatment could lead to strategic behaviour/hold-up problem for the government, where the private parties would extort improved contractual conditions, knowing that the efficiency is not the primary target but rather the achievement of off-balance sheet treatment.
- A unique opportunity for a very beneficial new project might present itself, which will not wait and cannot be accommodated in the current budget of a department.
- A country's macroeconomic stability is impaired to such an extent that an international corporation may be able to borrow at a cheaper rate than the state.

The exceptions, such as in the case of the unique project, should be regarded as just that – as infrequent and exceptional. They should be treated on a case-by-case basis at a very high level of the government and not in the framework of some general guidelines that could give rise to moral hazard.

With the risk and reward principle the answer is no. The state can establish arm's-length infrastructure companies that borrow against their own balance sheet and in many cases spread user-/demand-risk across multiple assets. Examples include motorway companies (ASFINAG in Austria, DARS in Slovenia, NDS in Slovakia, etc.) or major project companies, such as the Sund and Baelte Holding AS in Denmark, which owns the project companies of three mega projects in Denmark (Stoerebelt, Oresundsbron and Fehmernbelt). Following the previous section it must be stressed that in either case (involving private investment or not) the responsibility for project selection remains with the state (and hence also the responsibility for the viability of such arm's-length entities).

Under the control criterion a user-funded PPP will be considered as a transfer of a right to collect the revenues. The asset and the related liabilities will be recognised as unearned revenues (debt). This liability would then decrease as the revenues materialise. Hence, the answer to the initial question is again no, but in the sense that a project would not be affordable neither under public provision or a PPP.

One alternative (in principle), is the regulated utility model, also addressed as RAB (Alchin, forthcoming; Makovšek and Veryard, 2016). Under this model, user-funded infrastructure would be off the balance sheet under both accounting principles; however, this is a comprehensive strategic approach (on a road network, for example, rather than individual sections as is customary for PPPs).

In summary, the ability to fund infrastructure ultimately lies with the taxpayers and users. Switching the source of financing from public borrowing to private borrowing does not change that. If the government cannot afford to finance the project traditionally it also cannot afford it as a PPP. Conversely, if the

government can afford the project as a PPP, it can also afford to finance it traditionally (Funke et al. 2013; Engel, Fischer and Galetovic, 2014b). Private investment *per se*, therefore, cannot close the infrastructure financing gap or the investment gap. If there is affordability to be tapped (users' willingness to pay), this can be done by the public sector as well. Only an efficiency differential can contribute to an increased fiscal space, which could be used to pursue more investment in the long run.

## Potential impacts of private investment on transport infrastructure

The first two sections of this paper examine what economic theory has to say about private ownership or investment and economic efficiency. No distinction was made with regard whether private investment was domestic or foreign. In many countries private investment in infrastructure is entirely domestic. This section provides only a high-level overview what the “foreign” could bring on top of “private”.

A substantial body of research exists with regard to investment of Multi-National Enterprises (MNEs). This section draws on the comprehensive literature review by Dunning and Lundan (2008). The literature on the effects of foreign investment distinguishes between direct and indirect effects (Box 5). These are primarily related to how an MNE presence will affect the different dimensions of the local markets. A key point is that most parent MNEs generally originate from the most industrially advanced economies<sup>29</sup>. Hence, the more distanced a country is from this level, the greater the potential benefits. Whether these benefits will materialise however, also depends on the institutional capacity of the host country to regulate market power, labour practices and other aspects.

The potential for MNE benefits is largely dependent on whether the MNE is allowed to operate in the host country. Many countries still include implicit restrictions that prohibit direct foreign investment even if, officially, such investment is welcome. If foreign competition is welcome to bid for a PPP contract or participate in a privatisation of a regulated infrastructure asset, the increased competition should already yield improved outcomes. Most of the direct and indirect effects of MNEs will only follow later. Australia, for example, is concerned with the capacity of the local market and is actively pursuing international competition in its PPP market<sup>30</sup> and in privatisations.

What is important in the context of privatising existing infrastructure assets is that the new owners might not necessarily bring with them the power to completely transform the infrastructure value chain themselves. In many cases ownership is taken by financial investors and not companies specialised in infrastructure construction or management. MNE presence in the upstream markets, in which the infrastructure management company buys its services, therefore matters as well. This pertains in particular to the construction and infrastructure maintenance market.

### Box 5. Direct and indirect investment effects of Multi-National Enterprises

#### Direct effects (through wholly owned affiliates)

Balance of payments effects: If an MNE establishes a manufacturing plant in a country, which involves different values or volumes of intermediate product imports and exports it will affect the balance of payments.

Competition: MNE activity can increase domestic industrial concentration and improve performance. In the absence of proper regulation it can lead to abuse of market power, reducing efficiency and consumer welfare. Similarly, FDI has sometimes broken up national or international cartels with beneficial effects; but at other times it has fragmented markets, created surplus capacity and fostered inefficient levels of production.

Labour market: MNEs can concentrate the best practices to stimulate employees and their productivity in any of its subsidiaries. They can also enforce greater power and flexibility in negotiating employment conditions with labour unions or governments, as they carry more sway than a local counterpart might. This may also affect government policies.

Technology transfer: Most technological capacity is concentrated in the wealthier industrial economies. Because R&D is costly and risky it tends to be concentrated in large or specialised enterprises, which have the necessary financial capacity. Beyond the already existing cross-border trade in technology, MNEs can foster the forward or reverse transfer of know-how.

Institutional transfer: A range of historical and contemporary examples exist where MNEs played a role in the transfer of formal (accounting practices) or informal practices (quality standards such as ISO, corporate governance, etc.).

#### Indirect effects

Linkages (through related local firms – joint ventures, suppliers/distributors): These are similar to direct effects, but depending on the relationship and motives of the MNE parent.

Spillovers (unrelated local firms): Labour market spillovers occur due to transfer of trained employees from MNEs to the local unaffiliated companies. The need of technologically more advanced MNEs may also lead to increased demand and supply of education, which may again positively affect the local economy.

Technological spillovers come from demonstration effects (e.g. imitation, reverse engineering by local firms).

Source: ITF, based on Dunning and Lundan (2008).

In summary, there is no immediate reason why the direct and indirect effects in the literature on MNEs would also not apply to private investment in infrastructure. The only exception is that, unlike in some other industries, MNEs cannot make the local infrastructure market grow. For example, in a liberalised telecommunications market MNEs may be more efficient in extending the service coverage faster than a state-owned operator. This cannot be the case in transport infrastructure, where the market context is completely different (the state adopts infrastructure plans, especially with regard to transport).

## Notes

1 Public good characteristics have to do with whether access to infrastructure (excludability) can be controlled and whether an extra user will reduce the availability of infrastructure to others if that infrastructure is not close to capacity.

2 This reflects the irreversibility of the investment decision. Once a transport asset is constructed, it cannot be moved, nor can the owner of the asset recover any significant value from it by scrapping it if there are a limited number of users that need it.

3 The terms PPPs and concessions are used interchangeably in the literature. This paper uses them as they are used in the literature for this particular sector. Two types of PPPs exist: those where demand risk is transferred to the private party and those which are availability-payment-based. Within these there are many combinations, whether the project cost is recovered directly from the users or not (e.g. by tolling on a road). Concessions generally refer to PPPs where demand risk is transferred and the project cost recovery is based on the user charges.

4 Other interpretations of private investment may also include private or state-owned enterprises borrowing on the capital market or a change in ownership of an already private company (mergers and acquisitions). From an efficiency perspective these are less relevant as they do not lead to shift from the public to the private management and ownership.

5 Railways in Canada, the United States and Mexico, for example, are vertically integrated companies managing infrastructure and operations. Although the market is liberalised, the companies are subject to *ex-post* economic regulation and some infrastructure sharing (through access charges) exists between them. These companies compete with each other, build their own infrastructure, and are primarily freight dedicated. Conversely, in the European Union a similar model is not possible for historical reasons (for example language barriers, interoperability issues). The approach chosen was access pricing (with desired vertical separation) and the liberalisation of freight and passenger transport services.

6 Large airports make vast claims in terms of land. Choosing their location can be a very long process, affecting many property owners and their rights. Similar issues are related to large sea ports and intermodal freight terminals when they are close to urban areas. Invariably, any investment decision that affects a large number of stakeholders and their rights becomes a political issue and can lead to very protracted project development periods. It is, therefore, common for the state to develop such infrastructure assets first with the private sector becoming interested to invest only after their development is finished and performance established.

7 About 80% of the French motorway network is managed by private concessionaires.

8 Their reports can be found on the EPEC's home page of the <http://www.eib.org/epec/>.

9 An unknown part of this sum was contributed by the public sector and international aid. Source: <https://ppi.worldbank.org>. Our query included the world, any projects that included fixed assets (build or rehabilitate) and excluded leases and management contracts. All values were in original price levels. The database does not enable distinguishing to what extent the PPPs involved investment in existing or new assets (the value of investment in fixed assets is stated but it is not clear when or to what extent existing assets were also brought under management). Private investment was calculated by multiplying private ownership share in the project with the value of total investment.

10 A higher infrastructure quality is an argument used to explain higher cost of infrastructure construction in PPPs. Higher quality of constructed asset is supposed to be a reflection of life cycle cost optimisation. If this is not the case, very high (perhaps unattainable) efficiency gains in the maintenance and operations phase are necessary to offset both the higher cost of financing and the larger principal to be repaid.

11 The first generations of franchising contracts capitalised on the "stored" efficiency reserves under state ownership. Many of the current contracts struggle financially and there is a lack of bidder interest to compete for new ones (Beck et al., 2018).

12 To some extent this is also true for the United Kingdom, though their experience is far from that of developing countries. One example was financial engineering in the utilities sector (Helm, 2009), leading to excess profits in some cases. Discussions about the recent and future challenges of economic regulation go well beyond the scope of this paper.

13 The terms productive and allocative efficiency are also commonly expressed in a single term -"economic efficiency".

14 For example, the CLEM7 tunnel in Brisbane (<https://www.wsj.com/articles/legal-wrangle-over-australia-toll-road-collapse-1392242857?tesla=y>).

15 Can be managed only through toll price elasticity.

16 As pointed out by Makovšek and Moszoro (2018) and the previous section, any evidence showing that PPPs have more accurate demand forecasts on average than the public projects would need to overcome a selection bias problem. It is unlikely that the authorities would try to force a demand-based PPP on a project they politically prefer *ex ante*.

17 These are end cost of construction. No more cost overruns are possible.

18 A 5% WACC for an availability-based PPP is a fairly optimistic illustration that would apply to a country like the United Kingdom (implying a strong institutional environment, mature capital market, equity competition, an accepted model, and recent record low risk free rate of around 1%). The author thanks Her Majesty's Treasury for providing this clarification.

19 The author is grateful to Douglas Southerland for pointing this out.

20 The study inflated (reduced) the initial project cost (demand performance) with the *ex post* percentage of cost overrun (demand shortfall). This ignores, for example, that demand represents about 70% of the total project benefits.

21 For example, as recent as in the last crisis the dominant belief was that governments should pursue a restrictive fiscal policy (not increase public debt and spending). It was recognised in the aftermath that this was a mistake. But when exactly should a country start consolidating and reduce borrowing remains a contested idea. High initial levels of public debt do negatively affect growth, though there are non-linearities (Woo and Kumar, 2015). Other work suggests that it is the debt growth trajectory that may matter, not so much the overall level of debt (Jorda et al., 2011; Pescatori et al., 2014). Spending a lot fast might be a sign of deeper economic health issues. On the other hand, restricting borrowing too soon may have cost, as well. The IMF, for example, suggested (Ostry et al., 2015) that the expected costs of the higher taxation are likely to outweigh the expected benefits (from the lower risk of a default in the event of a crisis) by about ten times. This is, “if” the country is not at risk of a fiscal crisis and “if” the benefits of investment outweigh their cost of financing. The corollary of this finding is that the focus on public debt reduction is only necessary when a country reaches levels close to default (the “upper limit” determined by the rating agencies).

22 Or shoulder the current and next generation of taxpayers with too much debt, reducing their welfare.

23 In reality there are multiple combinations of structures involving public and private finance, including state guarantees, which would complicate but not change the exposition of the basic logic.

24 <https://www.imf.org/external/np/fad/publicinvestment/pdf/PFRAM.pdf> (accessed on 20 September 2017).

25 The reason that this standard is not broadly implemented across countries is unrelated to the technical intricacies of implementation. Advanced economies could easily implement it, the only challenge pertaining to data collection on PPPs. (The author thanks the International Monetary Fund for providing this clarification.) The more likely reason is political willingness. In the European Union, the Eurostat’s ESA10, for example, still applies the risk and reward principle despite an attempt to reform it. A paper by EPEC (2010) at the early stages of the ESA reform noted, “It is clear that, without a revision of the Maastricht rules and a subsequent major change in the operation of the EDP, such a development would severely limit the growth of the PPP market.”

26 It is useful to add that many languages actually do not distinguish between funding and financing. There is a distinction in English, but it cannot be found in Merriam-Webster or Oxford English dictionaries. For the financial industry professionals “financing” pertains to who makes the initial stock of money available to execute an investment, e.g. build a road. Financing implies taking on debt. “Funding” pertains to who will repay it. Only two sources of funding exist – the user and the taxpayer.

27 The OECD recommendations stress that the choice for the PPP should be based on the merit of Value for Money and not accounting considerations. Some countries, such as the United Kingdom, have already made a step towards this by introducing accrual-based accounting and International Financial Reporting Standards. However, according to a recent report by the independent think-tank Institute for Government, the accounting treatment and budgeting determinations at the department level remain the defining driver of private financing decisions (Atkins et al., 2017).

28 A restrictive fiscal policy means a state is raising taxes or cutting spending to dampen GDP growth or to curb inflationary pressures. A “sub-optimally restrictive fiscal policy” would then be, when is the state too restrictive or restrictive at the wrong time. Arguably, a suboptimal restrictive fiscal policy was pursued during the recent global financial crisis in Europe. Under the generally uncertain growth prospects and when national economies were stagnating or contracting, the governments cut their spending to compensate the drop in tax revenues. Instead they should have increased their spending to jump-start the economy. Following the reasoning in Makovšek (2019), during the crisis governments were the only ones that could.

29 Some of the largest construction companies in the world are involved in PPP construction and investment (Vinci, Bechtel, Odebrecht, Ferrovial, China Communications Construction Group, etc.).

30 <http://infrastructureaustralia.gov.au/policy-publications/publications/Barriers-to-Competition-and-Efficiency.aspx> (accessed on 15 November 2017).



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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, A. 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

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

<i>What is the public sector organisational counterfactual on which private investment should seek to improve?</i>	Holm, K.V. and T.H. Nielsen (2018), “The Danish State Guarantee Model for Infrastructure Investment”, Working Group Paper, International Transport Forum, Paris.
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## Partial fixes to the Private-Public Partnership approach

<i>How would an organisational structure consisting of PPPs come close to a network-wide management approach? What benefits would it yield?</i>	Vassallo, J. (2019), “Public-Private Partnerships in Transport: Unbundling Prices from User Charges”, Working Group Paper, International Transport Forum, Paris.
<i>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?</i>	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

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

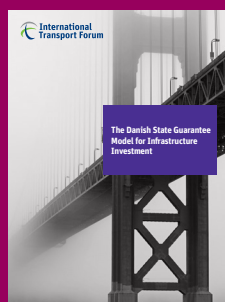
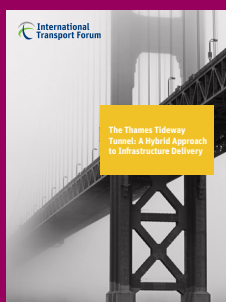
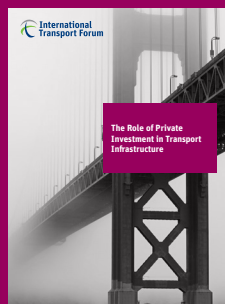
Makovšek, D. (2018), “Mobilising Private Investment in Infrastructure: Investment De-Risking and Uncertainty”, Working Group Paper, International Transport Forum, Paris.

### **Synthesis**

ITF (2018), *Private Investment in Transport Infrastructure: Dealing with Uncertainty in Contracts*, Research Report, International Transport Forum, Paris

# The Role of Private Investment in Transport Infrastructure

This paper investigates the case for mobilising private investment for infrastructure. Does private investment lead to greater economic efficiency? Can it improve project selection? Will it help close the infrastructure gap? Does foreign private investment boost the economy? 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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