International Transport Forum

Mobilising Private Investment in Infrastructure: Investment De-Risking and Uncertainty

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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 are 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 3.

Acknowledgements

The author is grateful to Alexander Galetovic, Fernando Mistura and Daniel Alberto Benitez for comments on earlier versions of this paper. Iza Lejarraga deserves credit for challenging the author to write the paper. Finally, the ITF's colleagues, Ana Cuzovic, Cecilia Paymon and Michael Kloth were responsible for the look and feel of this report.

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Executive summary

What we did

Substantial efforts have been made in the past to identify barriers to private investment in infrastructure. Data availability and quality have limited our understanding of the impact on mobilisation a particular obstacle actually has. We know, for example, that institutional stability, rule of law, corruption and other factors are relevant, but issues such as these take years to rectify. A policymaker, however, may find it more practical to understand the more immediate constraints.

A recent policy puzzle has been the evolution of private investment in transport infrastructure in Europe before and after the 2008 financial crisis. Investment contracted in the wake of the crisis, and this coincided with the then reduced ability of traditional lenders (i.e. banks) to support long-term infrastructure projects. Since then the credit market for infrastructure has recovered, additional financing channels have become available, and interest rates have remained at historical lows. The EU provided substantial de-risking support (e.g. the European Fund for Strategic Investment) to further offset risk and uncertainty private investors may have perceived. A major mobilisation of private investment still did not occur.

Using limited available data, we developed a hypothesis to explain why the policy approach above appeared ineffective. Our focus is on the seven EU countries in which more than 80% of all private investment in transport infrastructure takes place.

What we found

Projects that are perceived as too risky compared to their expected revenues will be avoided by private investors. Using a set of risk mitigation instruments that can be collectively described as public financial support (i.e. investment de-risking), the state can try to offset the risk on projects. This may bring them closer to the risk/return profile investors find acceptable.

The support ranges from softer instruments such as guarantees to outright funding support such as grants. At the extreme end are capital grants and the state can also retain demand risk and pursue availability-based Public Private Partnerships (PPPs).

In theory, if investors have lending capacity available and the state is willing to provide sufficient de-risking support, private investment should flow. An implicit assumption here, though, is that funding is not an issue. We have identified at least three factors that possibly inhibited such an outcome.

The government's capacity to fund and de-risk was limited

Using different data sources we determined that in the wake of the crisis from 2009 the volume of public investment in road and rail infrastructure dropped by about a fifth in real terms. The drop in private investment was comparable. In absolute terms, however, the drop in public investment was an order of magnitude larger since projects involving private investment only represented at most 10% of total

investment volume. Maintenance expenditures were also reduced. Overall, less money was available for transport infrastructure.

The macroeconomic situation increased the sensitivity of investors to risk

Because of the general uncertainty during or in the aftermath of an economic crisis, one can expect an increased sensitivity of investors to uncertainty. A highly illustrative proxy for the change in sentiments was an almost complete loss of appetite on the part of investors to get involved in demand-based road PPPs. The link between traffic intensity and economic cycles is well established. If economic growth prospects are uncertain, this will also impinge on traffic forecasts. In such circumstances, there was an increased need for de-risking.

The governments faced uncertainty with regard to the public debt impact of PPPs

One of the reasons why governments pursue PPPs is to avoid recording the investment in public debt – one of the lead indicators of a country's economic health. When the financial crisis set in the accounting rules in the EU were reformed to allow for greater transparency. Ultimately, the treatment of PPPs remained more or less the same, but the new rules only came into effect in 2013, with further clarifications issued later. During this period, it is likely governments could not be sure what the expected impact of potential PPPs could be on public debt.

User-funded proposals are likely to be very limited

The assumption that there is a large stock of user-funded projects available that only need their risk profile reduced is unlikely to be the case. Introducing user charging was and remains a major political challenge.

Our hypothesis is that the crisis increased the investors' sensitivity to uncertainty. Where users could fund the project, this required more de-risking, for which the governments didn't have sufficient resources. In addition, one of the main short-term motives (the accounting treatment) for pursuing PPPs may have been offset. More broadly, the implicit assumption that there is a large stock of transport infrastructure projects available that could be funded by users is questionable.

What we recommend

Investment de-risking will be ineffective when the fundamental constraint is funding and not financing

If user funding is not an option, de-risking cannot address the fact that there may simply be no money to pay for the project.

Investment de-risking should be used in a targeted fashion to not undermine the objective of private investment

Pursuing private investment as an objective in its own right or for accounting reasons may undermine the objective of value for money.

De-risking should be applied without an ex ante commitment to private investment

If there is a clear public sector commitment to pursue private investment for budgetary/accounting reasons (as opposed to value for money), then the private sector might create an excessive expectation for public de-risking support even when it is not warranted. The only remedy is competition between bidders. This was considered a problem area before the crisis and remains one today.

A crisis may not be the best time to increase the mobilisation of private investment

During an economic crisis or in its aftermath private investors may express an increased sensitivity to risk. More extensive de-risking support from the government may adversely affect value for money.

A lack of data continues to inhibit understanding how de-risking might affect project performance

Our understanding how different procurement models perform, including PPPs, is limited. Consequently, even less can be said about how de-risking and different levels of it affect project performance. Ex post analysis and the collection of project performance data has been and remains an unfulfilled objective for governments.

Introduction

Increasing private investment in infrastructure is high on the political agenda. Multiple large-scale efforts by international organisations are underway to collect data on investment performance (risk and return properties) and barriers to investment. Two examples are the LTI project at the OECD and the European Commission's investigation into investment challenges in member countries (European Commission, 2015a).[1] In its Infrastructure Investment Policy Blueprint the WEF calls for "[policy] recommendations to focus on attracting capital by undertaking thoughtful risk allocation and mitigation, enhancing understanding of counter-party needs, enabling an efficient and transparent transaction environment and developing a credible infrastructure pipeline" (WEF, 2014). These initiatives are important, but there is insufficient clarity on the impact any particular obstacle actually has on mobilisation.

The absence of data on projects' characteristics and outcomes has inhibited more evidence-based and informed policymaking to assist in this respect. The few recent attempts to discern what factors and policies can positively influence private investment in (transport) infrastructure (e.g. Moszoro et al., 2014; Araya et al., 2013; Sutherland et al., 2011; Hammami et al., 2006) provide some relevant guidance for policymakers but remain to some extent limited to generally broad recommendations on institutional or other long-term policy issues, such as institutional capacity, stability, corruption and other general economic conditions. From a policymaker's perspective, however, there remains the need to understand what are the more immediate constraints that can influence private investments in infrastructure and how they interact. Despite clear declarative political commitment, the mobilisation of private investment in transport infrastructure remains a challenge for governments.

A recent policy puzzle has been the evolution of private investment in transport infrastructure in Europe before and after the 2008 financial crisis. Investment contracted in the wake of the crisis. This coincided with the reduction of the private sector's capacity to finance projects due to the overall crisis itself, the BASEL III international regulatory accord, the collapse of monoline insurance companies, etc. In the past few years, financing has no longer been considered the defining inhibiting issue (Blundell-Wignall and Roulet, 2013), and large infrastructure projects have gained traction with other financing channels as well (Gatti, 2014). The cost of financing PPPs, which spiked from 2010 to 2012, began returning to normal levels as of 2013 (Revoltella et al., 2016). Nevertheless, there were no signs of private investment recovering between 2013 and 2015.

The EU has identified a lack of a strong pipeline of projects structured in a suitable way to attract private investors. The uncertainty related to the macroeconomic environment and regulatory stability with regards banking regulations are significant constraints on infrastructure finance.

In response to the challenges identified, the EU embarked on a path of regulatory reforms, technical support in better project preparation and provided additional de-risking support through the European Fund for Strategic Investment. Albeit some of these measures will be slow to show effect, the investment environment has been improving. Why then is private investment in transport infrastructure not recovering? Do we even have a good grasp of what the trend is?

Data challenges prohibit a broad empirical investigation of what factors could best explain the puzzle above. Instead, the strategy of this paper is to investigate the narrative around a single policy factor for private investment mobilisation. We also focus on countries, which traditionally had a strong private investment record, hence the argument of limited capacity to prepare well-structured projects would be less relevant.

De-risking or risk-mitigation support is the most immediate tool available for countries wishing to crowd-in private investments into infrastructure. It can take many forms, from financial guarantees to availability payments, influencing the risk profile of the project and therefore making it more or less attractive for the private investor or lender.

This paper advances the hypothesis that the lack of recovery in private investment in infrastructure in the EU is the result of four factors:

Adverse economic conditions increased the sensitivity of private investors to risk, effectively requiring more public de-risking support.

The fiscal constraints reduced the willingness and/or capacity of governments to provide de-risking support.

Regardless of the point above, governments also pursue PPPs to avoid recording the related obligations on the public balance-sheet. This trend would also have been hampered by government fiscal constraints and an attempt to reform the EU's public accounting rules around the same time.

A de-risking policy assumes there is a stock of user-funded projects waiting to be executed; this may not necessarily be true.

To inform our discussion, we gather evidence on the trends of public and private investment in transport infrastructure. Even a broad view of the respective shares of public and private investment in transport infrastructure in countries which engage with private investors in Europe is still unavailable. We also generate new indicative evidence on the change in private infrastructure investors' risk appetite as reflected in the risk profiles of projects reaching financial closure before and after the crisis.

The term private investment in this paper refers to investment through PPPs. As determined in Makovšek (2018), this format captures almost all private investment in transport infrastructure.

The paper is organised as follows. The second section more fully explains the meaning and importance of investment de-risking. Sections three to six follow the propositions in the four bullet points above. The last section includes a discussion of policy implications.

What investment de-risking is and why it matters

Once a sound project proposal reaches the tendering phase, in principle all aspects/risks of the enabling environment for investment will be reflected in the cost of financing of a particular project. Table 1 below provides an overview of risks a project might face (a description of each is provided in Annex 1).

Table 1. Classification of risks for infrastructure projects

<table>
<tr><th>Risk categories</th><th>Development phase</th><th>Construction phase</th><th>Operation phase</th><th>Termination phase</th></tr>
<tr><td rowspan="7">Political and regulatory</td><td>Environmental review</td><td>Cancellation of permits</td><td rowspan="3">Change in tariff regulation</td><td>Contract duration</td></tr>
<tr><td rowspan="2">Rise in pre-construction costs (longer permitting process)</td><td rowspan="2">Contract renegotiation</td><td>Decommission</td></tr>
<tr><td>Asset transfer</td></tr>
<tr><td colspan="3">Currency convertibility</td></tr>
<tr><td colspan="4">Change in taxation</td></tr>
<tr><td colspan="4">Social acceptance</td></tr>
<tr><td colspan="4">Change in regulatory or legal environment</td></tr>
<tr><td colspan="4">Enforceability of contracts, collateral and security</td></tr>
<tr><td rowspan="6">Macroeconomic and business</td><td>Prefunding</td><td colspan="3">Default of counterparty</td></tr>
<tr><td colspan="2" rowspan="3">Financing availability</td><td colspan="2">Refinancing risk</td></tr>
<tr><td colspan="2">Liquidity</td></tr>
<tr><td colspan="2">Volatility of demand/market risk</td></tr>
<tr><td colspan="4">Inflation</td></tr>
<tr><td colspan="4">Real interest rates</td></tr>
<tr><td colspan="4">Exchange rate fluctuation</td></tr>
<tr><td rowspan="6">Technical</td><td colspan="3">Governance and management of the project</td><td rowspan="4">Termination value different from expected</td></tr>
<tr><td colspan="3">Environmental</td></tr>
<tr><td rowspan="2">Project feasibility</td><td rowspan="2">Construction delays and cost overruns</td><td rowspan="2">Qualitative deficit of the physical structure/ service</td></tr>
<tr><td>Archaeological</td></tr>
<tr><td colspan="3">Technology and obsolescence</td><td rowspan="2"></td></tr>
<tr><td colspan="4">Force majeure</td></tr>
</table>

Source: OECD (2015).

The literature generally recommends the risks should be allocated to the party best able to bear them (OECD, 2012). Apart from the general recommendation in the literature that as the only party that can actually manage the risk the state should be responsible and bear political and regulatory risks (Yescombe, 2013; OECD, 2015; Arezki et al., 2016), it is less straightforward who should bear what share of the macroeconomic/business or technical risks, as this would to a great extent depend on the particular project proposal.[2]

When the general risk allocation is adequate and the macroeconomic environment is stable, a project may still not be financially viable. This may be due to two cases. In the first scenario, it may be clear the project is unable to generate sufficient revenues to recoup its costs and requires subsidies (e.g. when providing a public transport service to remote areas or for particular groups of users). No risk or uncertainty exists in this calculation. In the second case, the expected revenues of the project do not offset the expected risks. When this happens the state can provide support to reduce the project risk.[3] The risks an investor faces in developed countries mainly revolve around project-specific or business risks (demand).[4]

Project risk can be real or perceived. This distinction stems from the fact that a risk assessment of an infrastructure project is a structured process but cannot be a fully scientific one due to data limitations (Makovšek and Moszoro, 2018). Hence, a risk profile of an investment is known to be dependent not

only on data but also subjective perceptions. Behavioural aspects play a significant role in market attitudes towards risk. A potentially sound project can also be perceived to be financially unviable because the market is not capable of recognising it as sound.

The de-risking support of the state can have multiple forms and is generally part of the contract's provisions with the private party. Table 2 below summarises the main elements.

Table 2. Forms of financial/project-specific risk mitigation.

Type of measure	Instrument
1. Guarantees, realised directly by government or by its own controlled agency or development bank	1. Minimum payment, paid by contracting authority
	2. Guarantee in case of default
	3. Guarantee in case of refinancing
	4. Exchange rate guarantees
2. Insurance (private sector)	1. Wrap insurance, technology guarantees, warranties, commercial and political risk insurance
3. Hedging (private sector)	1. Derivatives contracts such as swaps, forwards, options etc.
4. Contract design, paid by contracting authority	1. Availability payment mechanisms[5]
	2. Offtake contracts
5. Provision of capital, realised directly by government or by its own controlled agency or development bank	1. Subordinated (junior) debt
	2. Debt: 2.1 at market condition 2.2 at lower interest rate
	3. Equity: 3.1 at market conditions 3.2 at more advantageous conditions
6. Grants, generally delivered by contracting authority, even if some dedicated fund at national level may exist; tax incentives can be delivered by national or local authorities	1. Lump sum capital grant
	2. Revenue grant: 2.1 Periodic fixed amount (mitigating the demand risk) 2.2 Revenue integration (leaving the demand risk on the private player)
	3. Grant on debt interests
	4. Favourable taxation schemes for SPV
	5. Favourable taxation schemes for equity investors

Source: OECD (2015).

In addition to the points above, a major recommendation by the ITF Working Group on Private Investment involves a host of measures governments can undertake to reduce contractor exposure to technical risk (Kennedy et al., 2018). These have mainly to do with the public client investing effort in creating information about project-related unknowns that each bidder would otherwise have to pursue individually.

Assuming the contract with the state is credible, the risk profile the private investor is subject to is ultimately derived from the contract. This means that regardless what the underlying project characteristics may be the provisions of the contract ultimately determine how much risk the private investor will take on.[6] It is mainly the state that has the tools to shape the project's risk profile, as per Table 2. These can come in the form of contingent liabilities (guarantees), current expenditures (grants, availability payments/contract design) or foregone revenues (tax subsidies). These tools are not necessarily always applied only by the state directly but can take other forms as well (Box 1 provides an example).

Box 1. An example of a supranational risk-mitigation mechanism – the European Fund for Strategic Investment (EFSI)

The support can have a national or supranational character. A substantial part of the financial support can also come from intergovernmental organisations, such as the World Bank. In Europe, the European Investment Bank (EIB) has developed a range of instruments to help de-risk projects for private investors in different development phases. A specific and particular example of supranational funding is the EFSI, part of the Juncker plan.[7] This major initiative in the EU is aimed at mobilising private investment in infrastructure (among other areas). The fund gives the EIB additional risk-bearing capacity (i.e. a first-loss guarantee) so it can invest in projects with a higher risk profile without losing its triple-A rating.[8] In effect, the bank could take some of the risk burden from the private sector by taking on the riskier tranches of a project's lending structure. The EFSI will, however, not give grants and subsidies, i.e. it will not improve the project funding outline through providing grants.

The next sections introduce the relevance of the four arguments, which constitute our hypothesis why an investment de-risking policy in the EU in recent years has had limited effectiveness in mobilising private investment.

Demonstrating the shift in the risk appetite

It is well established that even when investment is only partially irreversible (i.e. the cost of the investment can only be partially recouped and is not sunk) firms invest more cautiously in periods of increased uncertainty (Caballero and Pindyck, 1996; Bloom, Bond and Van Reenen, 2007; Bachman, Elstner and Sims, 2013).[9] A firm's response to uncertainty is wait-and-see. In other words, firms hold off on projects until their perceived risk profile becomes acceptable.

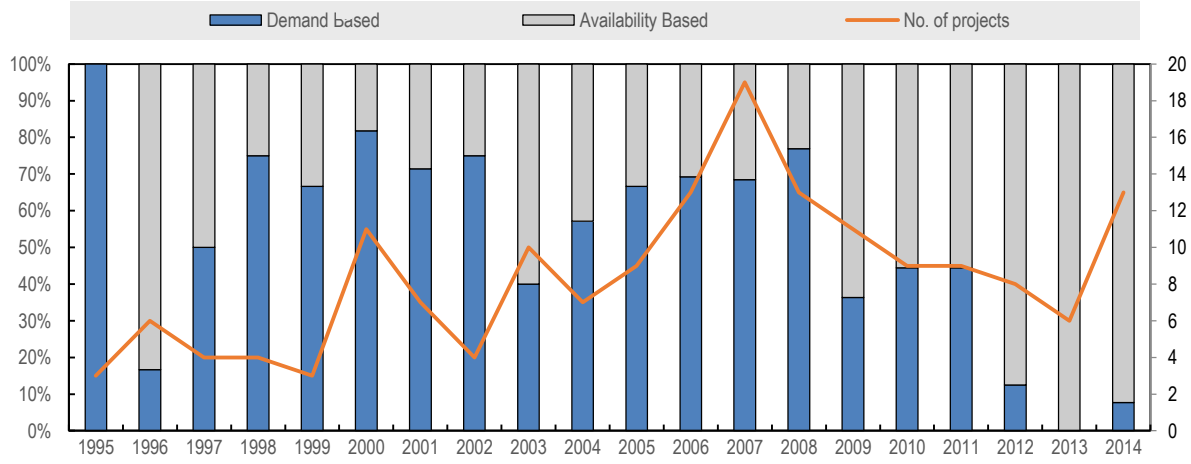
In our case quantitative analysis, we would ideally use information on the types and extent of government support at a project level while controlling for the political/regulatory and macroeconomic environment. Data on the flow of private investment would need to be available to estimate how the variations in public financial support affect the mobilisation of private investment across countries. Furthermore, we would need to have an overview of what share of transport investment propositions by governments was expected to be funded by users. Most of these inputs are unavailable. In the absence of the relevant data, we limit our efforts to a search for signs of increased risk aversion on the part of investors in transport infrastructure.

One indirect sign was the movement of credit spreads for PPP debt finance over Libor/Euribor. The financial crisis tripled the spreads from 80 in 2007 to 250 basis points in 2010. The growth continued until 2012, with a decline starting in 2013 (Revoltella et al., 2016). The fact lending was constrained by the collapse of monoline insurance companies in 2008 and additional bank regulations regarding their exposure to risk, however, adds to the generally uncertain macroeconomic prospects.

Of the many types of de-risking support available (Table 2) data on contract design is the most accessible. Contract design is the most straightforward form of public financial support because in the availability-based contract the state retains the demand risk and pays for the availability of the infrastructure. This seriously reduces private investors' risk exposure and the financing cost of the project. In short, contract design is (also) a proxy for investors' risk appetite and may imply increased risk aversion beyond demand risk. Nevertheless, it likely suffers from the same confounding problem as looking at credit spreads alone does.

With the assistance of parallel work in the BENEFIT4Transport[10] EU research project, we were able to determine the demand/availability-based contract split for road projects. Insufficient information was available for railway projects.[11] Figure 1 represents the shift in the type of contract, suggesting that potentially the appetite of the private sector to accept demand risk has gone down. Though the current example refers to a particular sector and a particular risk, demand risk is linked to macroeconomic conditions and thus may be reflective of broader risk attitudes of private investors.[12]

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



Source: DEALOGIC database; BENEFIT4Transport project data.

A more detailed analysis of road projects in the DEALOGIC database within the BENEFIT project revealed more precisely that the shift does not come directly from the change of preference within the countries. The shift appears to be the result of new entrants in the PPP market relying on availability-based contracts and older mature economies, which have traditionally relied on demand-based contracts (e.g. Spain), reducing their activity in demand-based projects.[13] Nevertheless, compared to past development, the general disposition appears to reflect a change in risk appetites of the private sector.[14]

Lastly, as will be evident from the next section, the upswing in the number of projects in 2014 does not really signal an increased mobilisation of private investment. The value of projects with private investment was more or less stagnant or declining after 2010. Accordingly, there may have been more projects, but they were smaller in size.

Demonstrating the scarcity of de-risking resources

This section aims to demonstrate the reduced capacity of governments to fund and provide de-risking support to private investment in transport infrastructure.

Proposing that governments face fiscal constraints during an economic crisis seems self-evident, but it is not necessarily sufficient to claim the constraints have equally affected all sectors.

Hence, our objective here is simply to demonstrate that the total amount of investment in transport infrastructure has decreased substantially and that the reduction was not offset by private investment, which incidentally was arguably supported through de-risking, suggesting the presence and effectiveness of such a policy.

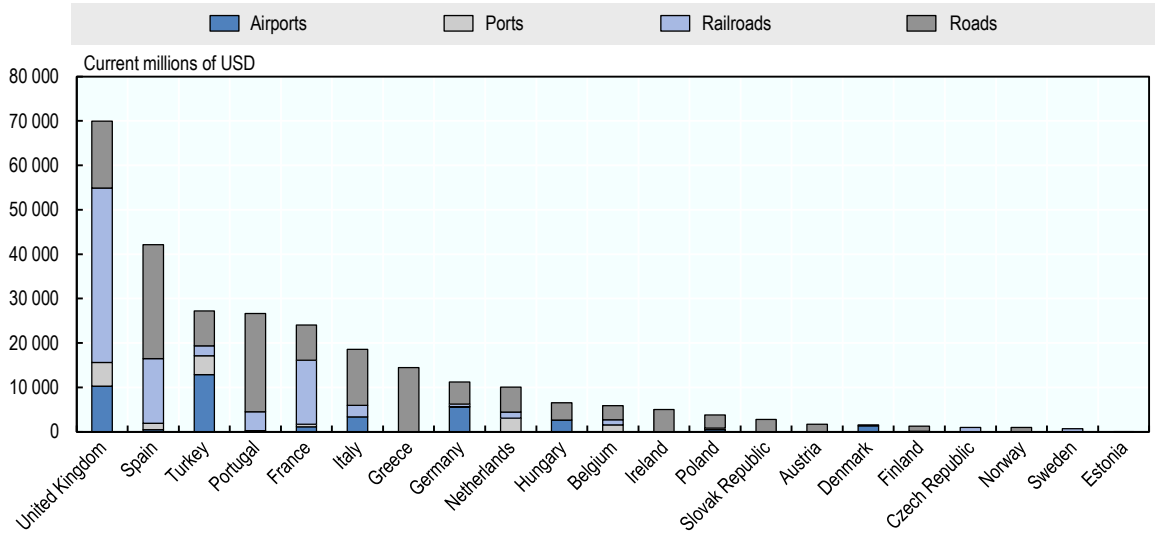
As stressed in the previous section, data on the details of de-risking support in a particular sector is unavailable. The same is true for a seemingly basic measure of comparing resources governments invest in transport infrastructure compared to the contribution of private investment. How can we then determine that governments had less money to spend on transport infrastructure if we don't know what part is public and what private?[15]

Given the available data sources, our demonstration has to proceed in an indirect fashion. The OECD/ITF collects data on the total investment in public and private transport infrastructure. Using a separate source of data on private investment in infrastructure from Mistura (2018), we combine the two to receive an order of magnitude of the trends of public and private investment. Because the data on ports and airports is particularly sketchy, we focus on the road and rail sector only. We begin by treating private investment through PPPs first.

The project finance market in Europe has been traditionally the largest in the World (IJGlobal, 2015). This is true for the transport sector as well (Mistura, forthcoming). From 1995-2015, the 22 European OECD countries represented almost 40% of the total global private investment in transport through project finance. Transport infrastructure projects tend to be large relative to the other sectors and also represent the majority of the value invested. In 2014, in terms of the share of transactions in the EU, transport represented 28% of the total (23 out of 82), while in terms of the value, transport accounted for 63% of total project finance investment in Europe (EUR 11.8 billion out of EUR 18.7 billion) (EPEC, 2015a).

Not all countries in Europe have pursued private investment in infrastructure (and operations) through project finance. Figure 2 shows that of the 22 countries observed, nine account for 90% of all private investment, UK being the largest with a 25% share. According to the database, there were no project finance PPPs in Slovenia and Estonia. As shown in Annex 2, the country ranking does not substantially change over the first or second decade of the observed period. Apart from one exception in the second decade, all countries continue to represent the majority of private investment. In further analysis, due to lack of other complementary data we only address seven countries, hereinafter referred to as OECD7 countries (the United Kingdom, Spain, Portugal, France, Turkey, Italy and Germany). These represent more than 80% of all project finance volume in transport in Europe. It should be noted that these private investment numbers cannot necessarily be considered as highly precise, but they should be accurate enough to determine the broad trend and the order of magnitude between private and public investment.

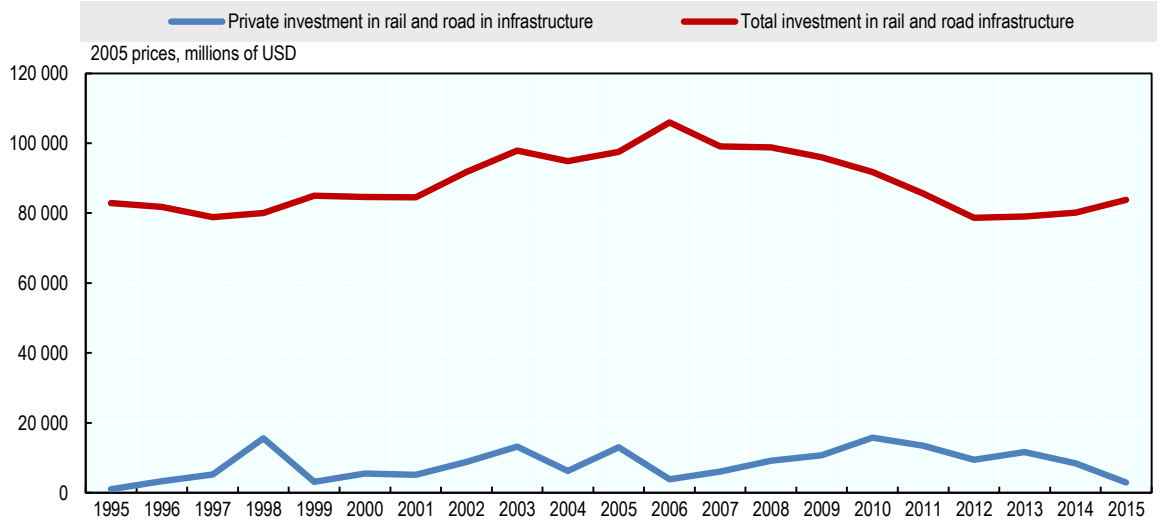
Figure 2. Cumulative private investment in transport infrastructure per European OECD country and mode, 1995-2016, millions of USD



Source: Dealogic Projectware database.

With the newly available data above and OECD/ITF transport investment statistics, a first insight is possible into the share of private funds in total investment and trends on a subsector level (Figure 3).

Figure 3. Private and total investment in road and rail infrastructure in OECD7* countries, 1995-2015, millions of USD, 2005 prices



* Due to incomplete data on total investment, Greece was excluded from this overview.

Source: Dealogic Projectware database, OECD/ITF statistics.

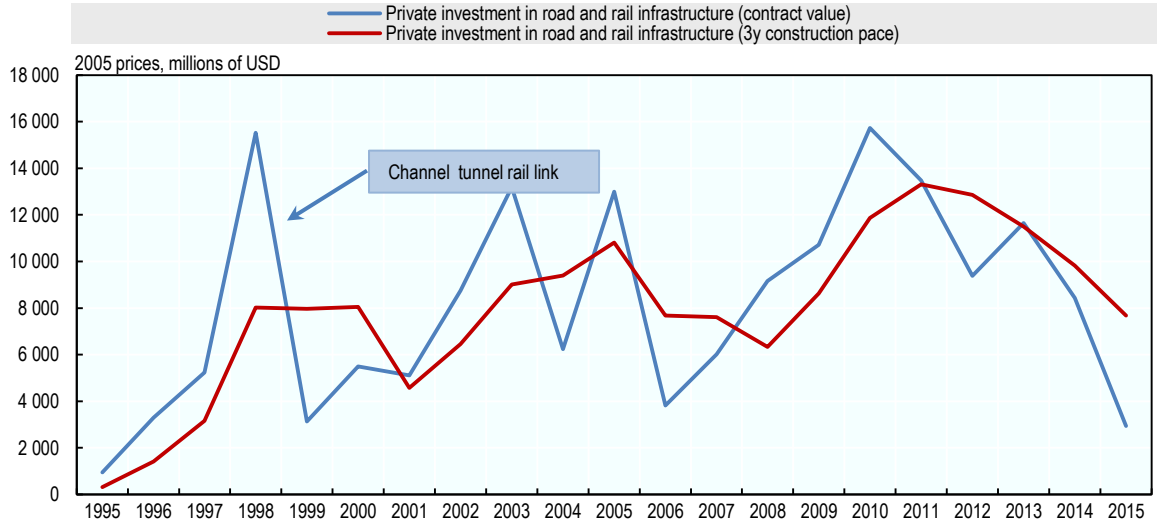
Comparisons between total public and private investments are subject to an important caveat. There is a fundamental difference between the DEALOGIC project finance database and OECD/ITF data, which

follow national accounts principles. The project finance database pertains to total project values at the financial close of the year the project was secured, while the OECD/ITF data reflects the current expenditures per year and, consequently, the pace of construction progress and expenditures. In effect, the project finance database reflects expenditures that would need to be spread out over several years and hence would affect total infrastructure investment with a lag.

To assist in the interpretation of the two streams of data, Figure 4 provides an illustration of the construction pace, the assumption being each project finance deal took three years to construct. If that is the case, the red line denotes how expenditures would be recorded in the OECD/ITF (or SNA) data on investment in infrastructure. Figure 3 also more readily reveals the trend of private investment in real terms. If we omit a major railway project in the UK in 1998 (the Channel Tunnel Rail Link, also known as HS1), private investment in the European OECD countries in road and rail infrastructure could be described as growing until 2010.

Taking the clarifications above into account, a sharp drop in both public and private investment is evident, though public investment started falling much earlier. Figure 3 also establishes the comparative size of total public and private investment in the OECD7 countries. Given the DEALOGIC database has not been vetted, the relationship has to be treated with caution, though it may adequately reflect the order of magnitude between total and private investment, and the trend. Projects involving private investment represent at best about 10% of total investment, public investment representing the rest.

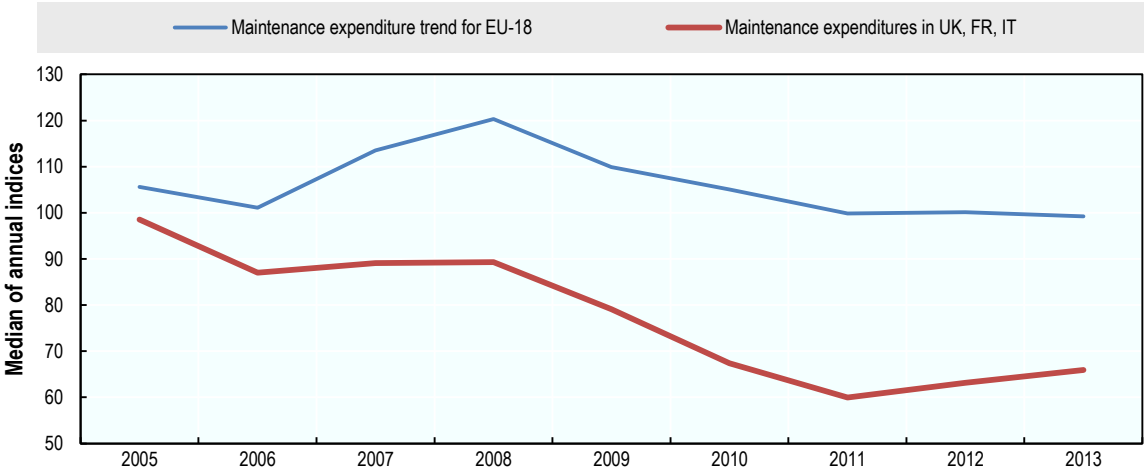
Figure 4. Private investment in road and rail infrastructure in OECD7 countries, contract value vs. construction pace, 1995-2014, millions of USD, 2005 prices



Source: Dealogic Projectware database.

An additional indicator of resource constraints for transport infrastructure is evident from road maintenance expenditures. Despite public investment growth declining – but not ceasing – maintenance expenditures fell disproportionally. The reduction of investment growth in Figure 3 implies the infrastructure stock grew at a slower pace. From a technical perspective, maintenance should follow the growth of the stock of infrastructure. Maintenance expenditure trends in Figure 5 for state-owned entities only suggest that governments deferred maintenance activity due to constrained budgets. Data on private maintenance dynamics was not available.

Figure 5. Road maintenance trends in selected countries, 2005-2014 (2005=100).



Note: Data was only available for three of the OECD7 countries. Available data for other countries (Austria, Belgium, Croatia, the Czech Republic, Denmark, Spain, Finland, Iceland, Ireland, Italy, Lithuania, Liechtenstein, Luxembourg, Norway, Poland, Slovakia, Slovenia and Sweden) was included to illustrate the trend is not particular to the UK, Italy and France.

Source: OECD/ITF statistics.

In summary, less money was available for public transport infrastructure investment. Judging from the stagnant and small private investment share, significant public funding also did not flow into private investment, which would have been almost exclusively availability-based PPPs.

If potential user-funded projects were waiting to be financed, the governments would still have a relatively strong motive to prefer the private investment option. This would be related to the public debt accounting framework in the EU, which allows them to procure infrastructure through PPPs, without recording the related obligations on the public balance sheets or in the public debt. Both of these assumptions, though, were less clear-cut than the two we have presented so far.

The lack of user-funded transport infrastructure

Transport infrastructure can be funded from dedicated taxes (e.g. fuel or vehicle registration taxes), user charges (e.g. tolls) and other commercial revenues (e.g. revenue from renting commercial space).

Many transport infrastructure systems cannot fully recover their cost. This can be because there is an insufficient number of users and their willingness to pay is too low or because user charging is strongly politically opposed. In these cases, the funding needs to come from the general government budget, competing with other expenditure needs.

We provide a brief snapshot of the road and rail sector, which represent the biggest part of the private investment trend showcased in the past 20 years. Port and airport investments are generally few and far in between and therefore not part of our analysis.

In the EU road sector, few countries have introduced user charging on their full motorway network (Table 3). On average only 55% of the motorway network is tolled. The motorway system generally represents only a smaller portion of a national road network (in France, for example, the motorways represent about 10% of the national road network).[16] While some countries also extend user charging to parts of the remaining network for heavy goods vehicles only, a significant participation of public budgets (state, regional or local) is generally required. Figure 5, which shows maintenance expenditure dependence on economic cycles, seems to confirm this.

A study for the European Commission also noted that most member states do not recover full infrastructure costs from road charging due to a lack of methods to relate charges to costs or charges being set by political decisions. Germany, and Austria to some extent, were the only two countries that are currently reflecting charges to recover investment and operating costs across the national motorway network (European Commission, 2014).

Table 3. Share of tolled motorways in total motorway network

Full members	Tolled network length [km]	Tolled network/ total national motorway network (%)
Austria	2 177	100
Croatia	1 289	100
Denmark	34	3
France	9 048	78
Greece	1 659	87
Hungary	1 145	74
Ireland	337	37
Italy	5 814	86
The Netherlands	20	1
Norway	911	NA
Poland	468	34
Portugal	2 943	98
Serbia	603	100
Slovenia	607	79
Spain	3 404	23
United Kingdom	42	1
Total	**30 501**	**55**

Source: PWC (2014).

Historically, one of the major obstacles to a wider introduction of user charging on road networks was technology. With the advent of satellite-based charging, which avoids the need for toll stations or portals, the potential cost of the system per user has been reduced. The obstacles to user charging are less and less those of technology but rather of political transition.

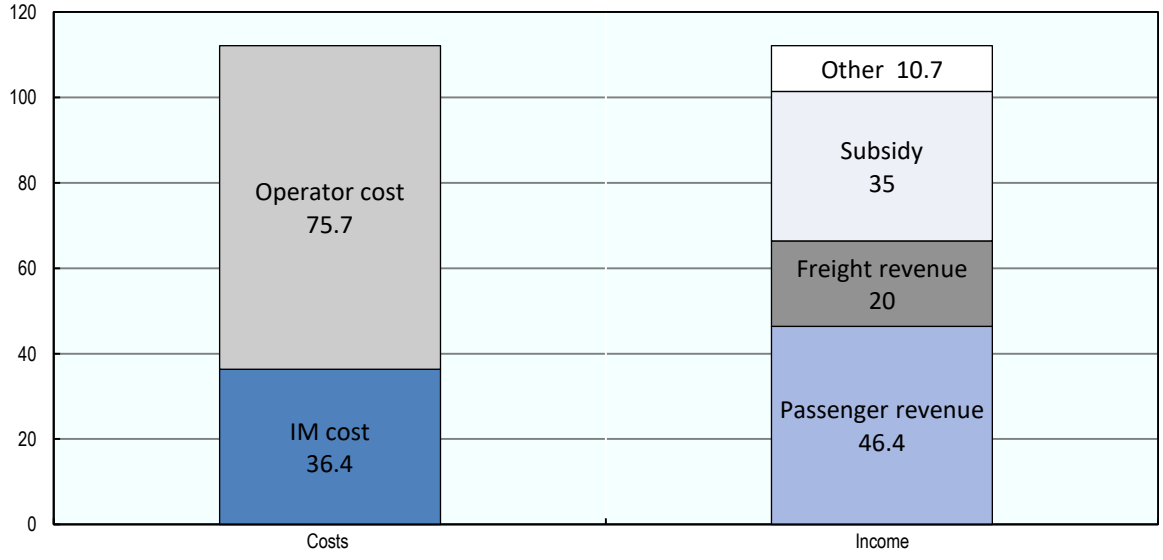
In the UK, for example, the experts have supported the introduction of user charging on motorways for years (Eddington, 2006), but this has remained a challenging objective, which despite repeated attempts by different governments has not yet materialised. Another example was the attempt to introduce heavy goods vehicle charging (the "ecotaxe" initiative) on 15 000 km of national roads in France in addition to the motorway. The initiative was abandoned in 2014 after heavy conflicts with protesters when the tolling gantries were erected. The compensation to the private partner responsible for the installation of the system exceeded EUR 1 billion (Cour des Comptes, 2017).

According to Casullo (2017), the situation of railway infrastructure with regard to funding in Europe is no less challenging. Most railway systems in Europe have difficulties achieving full cost recovery, with subsidies on average achieving 31 % (Figure 6).

According to Dehornoy (2015), with the exception of airport links, the availability-based PPP model has been the exclusive form of private investment in railways post 2000.

A somewhat anecdotal piece of additional evidence was the repeated lamentation of the investment community on the insufficient supply of bankable projects (OECD and Euromoney, 2015), i.e. less experienced governments kept proposing projects without a full realisation private investment equals private financing and the money invested must be recovered.

Figure 6. Rail industry costs and income in the EU28 in 2012
(billions of EUR, 2010 prices, excluding off-balance sheet items)



Source: European Commission (2015b).

Overall, despite the unavailability of a detailed overview with regard to road and rail infrastructure funding in Europe, a suggestion there may be a significant stock of transport infrastructure of potentially user-funded infrastructure appears not to have much support. An order of magnitude leap in the volumes of investment in transport infrastructure may therefore simply not be possible. The basic reason is that most infrastructure depends at least in part on government funding. Where user charging on roads was politically acceptable, its introduction over the past 20 years has been a slow process and mainly affected the motorway networks. In some cases, it remains a difficult political challenge. For railway infrastructure, a strong dependence on public budgets has been characteristic.

Public policy makers too faced uncertainty with regard to private investment

Proposing that private investment has not recovered due to lack of public de-risking support may appear counterintuitive due to perverse incentives in the national accounting for public debt in the EU and elsewhere. It is well established that members of the EU are subject to the ESA 2010 public debt accounting principles, which allow them to classify availability-based PPPs off the public balance sheet. In simplified terms, the governments may borrow through the PPP to procure infrastructure improvements, without recording those liabilities in public debt. In effect, countries can temporarily and virtually extend their borrowing constraints. This incentive is particularly tempting for EU countries, which are subject to Maastricht criteria that limit them to keeping public debt at a maximum of 60% of GDP. In essence, the countries promote private investment in infrastructure, pay for it, all the while not recording these expenditures in public debt.

Box 1. PPP accounting treatment and the new European System of Accounts (ESA) 2010 accounting framework

Due to the change in accounting standards in both the public and private sectors, it has been considered in the past whether the EUROSTAT should adjust its rules to promote greater transparency. One possibility was to harmonise accounting and statistical treatments, whereby the EUROSTAT would move to a control test for statistical treatment of PPPs. Under the control criterion, the economic ownership of an asset lies with the party that 1) controls what services the non-government partner must provide and 2) has control over the residual value of the asset in case of early termination of the PPP contract. Under the risk and reward criterion, the economic ownership of an asset lies with the party that possesses the asset and carries the risks, benefits and burden in connection with the asset.

As the European PPP Expertise Centre (EPEC) wrote in 2010, "should Eurostat change its rules in favour of a control approach, the solution will almost certainly require modification to the excessive deficit procedure if worthwhile PPPs are not to be lost. A carve-out from the application of the excessive deficit procedure (EDP) for long-term infrastructure investment is one option, albeit one that could be both politically controversial and complex to implement." In short, a change to the control approach would push a great majority of PPPs onto the balance sheet of the governments.

Ultimately, the ESA2010 still relies on the risk and reward criterion but focuses more strictly on how government financing, government guarantees (e.g. debt, demand, revenue), contract termination provisions and revenue streams from the asset are affecting the risk/reward balance. The exact interpretation of this however was not yet fully settled, and a further revision of the standard was expected in 2016 (EPEC, 2015b).

Note: EUROSTAT's definition of PPPs would be aligned with an availability-based project as described in this report. Projects which recover their cost through users are treated as concessions.

The concern with regard to accounting treatment is countries will pursue PPPs for budgetary instead of value for money reasons. This motive has been widely dismissed, and the OECD in its 2012 PPP principles recommends grounding the choice for PPPs in value for money. If the incentive of keeping debt off the

books had prevailed, we could expect private investment to start increasing towards the end of the period our data cover (when financing was no longer considered an issue), contrary to the trend recorded.

A potential explanation for the absence of the accounting treatment influence may be that a change in the EUROSTAT accounting rules had been considered for some time and was introduced in 2013 (the ESA 2010 rules). In the process and after, uncertainty was introduced with regard to potential accounting treatment of PPPs (see Box 1) for national decision makers (not private investors directly).

There is insufficient data available, and it is well beyond the scope of this paper to analyse the details of why the accounting treatment motive did not prevail. It may be that the regulatory uncertainty as to whether governments will be able to treat new PPP projects as off the balance sheet has compressed the project pipeline to those where the governments truly is certain they represent better value for money than public investment.

The EU provided the member states with an additional de-risking tool – the EFSI, which started operating in 2015.[17] It provides a way out for the countries with respect to the projects' accounting treatment. The support provided by the EIB does not affect the accounting treatment of a particular project, and the government's contributions to the EFSI are treated as off the balance sheet as well.[18] The distinct feature of this mechanism though is that the appropriateness of the project for such support will be determined through an established approval process at the EIB and not at the country level.[19]

It should be noted that user-funded PPPs would in principle also be exposed to this type of rule change since under the control approach the project-related liabilities (albeit in the form of unearned revenues due to a transfer of the right to collect them) would need to be accounted for on the public balance sheet.

Discussion and policy implications

In the context of this paper, the policy makers attempted to mobilise more private investment into transport infrastructure through resolving what they thought was a financing problem. The general lack of relevant data did not make their job easy.

The private investment trend stagnated after the onset of the global financial crisis and its aftermath. One could argue that the de-risking prevented, or could have prevented, a further decline in private investment. If the objective was, however, to increase the volume of total investment in infrastructure substantially, then the policy fell far short of its objective.

Private sector transport infrastructure investment does not occur by itself in a competitive market. Investment opportunities are provided by the state, which does the planning and project selection. If the private sector did not face financing constraints then a natural conclusion would be either one of the following:

The state did not provide project opportunities because it could not fund them.

The risk profile of the projects was unacceptable to the private investors because the project proposals were bad or because the state was unable or unwilling to provide sufficient de-risking support.

Our hypothesis was that there are four reasons why the de-risking approach would be ineffective that covers both outcomes above:

The economic crisis led to a heightened sensitivity to macroeconomic and business risk and, ultimately, uncertainty. Consequently, the private investors required more de-risking support.

The capacity of the state to provide the support was limited. We can't say to what extent this was true for contingent liabilities (e.g. guarantees). With regard to any kind of funding support, the data do show much less money was available for transport infrastructure investment and maintenance.

The state may have been unwilling to provide support because it was uncertain whether it would be possible to treat them off the balance sheet.

The implicit assumption that there is a stock of potentially user-funded projects available was unlikely to have been met.

If the hypothesis is sound, then additional de-risking assistance such as EFSI will have a limited impact for infrastructure facing funding constraints.[20] It will reinforce the incentive to pursue government-funded PPPs without their respective liabilities being recorded on the government balance sheet. As already mentioned, EFSI could therefore be considered a bypass to the self-imposed Maastricht criteria in the EU, which limit governments' debt and budget deficit flexibility to 60% and 3% respectively.

In short, private investment does not generate new funding. It also does not extend the real government borrowing (i.e. financing) constraint, though it may create the appearance through self-imposed restrictions and the solutions to bypass them. This is explained in greater detail in other work of the ITF Working Group on Private Investment in Transport Infrastructure (Funke, Irwin and Rial, 2013; Makovšek, 2018). A sustainable approach to private investment is to pursue it on the merits of increased efficiency.

Pursuing private investment on the merit of the project's accounting treatment is risky both in the sense of reduced transparency of governments' obligations and because it could adversely impact project selection. Perhaps an added comfort of EFSI in that sense is that its involvement in a project also implies a project soundness check by the EIB. However, a clear primary objective of the Juncker plan was to mobilise private investment into infrastructure.

Even if project selection issues can be reduced, an equally relevant concern is the potential impact of de-risking on efficiency incentives in projects. Value for money in private investment should not be taken for granted.

A reduction of the risk burden of the private investor can be beneficial when it affects risks they can't manage and should not bear anyway.[21] It may however, negatively affect the efficiency incentives if de-risking inadequately/excessively affects the risks that come from insufficient monitoring/control of suppliers. In the context of an infrastructure project, there is no research and data whatsoever available investigating how risk more or less affects project outcomes on a systematic level. How de-risking measures exactly affect value for money in infrastructure projects is not at all well understood given that even the basic ex post performance data are not available, such as the impact of different contract types on project end-cost (e.g. see Kennedy et al., 2018; Makovšek and Moszoro, 2018).

A related but additional moral hazard is that public de-risking support might stimulate strategic behaviour on the side of private investors. A clear public sector commitment to pursue private

investment for budgetary reasons – as opposed to value for money – might create an excessive expectation of public de-risking support even when it is not warranted. The only remedy is competition among bidders. Studies made before the crisis revealed competition as a problem area, with the average number of bidders only around two or three (Makovšek and Moszoro (2018) include a review of PPP competition studies). Roumboutsos (forthcoming) demonstrates in the case of the EU that the area of major transport infrastructure procurement in general is dominated by an oligopoly of about eight companies.

In summary, promoting investment is an accepted mechanism of anti-cyclical economic policy. It is also accepted that the private sector has an increased sensitivity to risk during and in the wake of a crisis. A de-risking approach may help overcome some of the uncertainty aversion, however we don't know how such a policy will affect project outcomes. If private investment should be pursued on the merit of improved efficiency, is a crisis the right time to pursue a private investment mobilisation in the first place?

Given the issues with data reported in our analysis and gaps in data that could inform a more complete quantitative analysis, our conclusions have to be seen as tentative. They may serve to inform future research in better understanding the interactions between the behaviour of investors and governments in different macroeconomic conditions.

Notes

1 See http://www.oecd.org/finance/private-pensions/institutionalinvestorsandlong-terminvestment.htm.

2 Makovšek (2018) provides an overview of the rationale for demand risk transfer in different contexts.

3 In developing countries, subject to substantial social and/or political instability even public support might be insufficient. In these cases projects might be supported by specific guarantees by international organisation, such as MIGA by the World Bank.

4 An example where the private sector was not fully able to absorb the construction risk could be the recent Thames Tideway Tunnel project that is in development. The purpose of the tunnel was to prevent discharge of excess sewer water from London in the Thames river. But at the projected cost of GBP 4.2 billion, the risk involved in the tunnelling was prohibitive for a full risk transfer, and government guarantees were used to make the project viable (Zhivov, 2018).

5 There is also an alternative to address the demand risk apart from availability based structures. Demand risk could also be offset by least present value concessions (Engel et al., 2014), which are represented (e.g Saussier, 2013) but are not considered to be common in Europe (Albalate, 2014; Beria, Ramella and Laurino, 2015).

6 Issues around credible commitment to the contract substantially complicate the investor environment and can also undermine the purpose of competition for the contract (i.e. achieving better value for money). Multiple experiences around the world in this regard were treated in an international expert roundtable on PPP renegotiations by the ITF in 2017.

7 According to some, the EFSI can also be used to help mitigate country risk (http://europa.eu/rapid/press-release_MEMO-15-3223_en.htm).

8 The creation of this mechanism was one of the reasons why Standard & Poor's decided to change the rating outlook for the EU (supranational) from AA+/stable to AA+/negative (there is a greater than one-in-three chance its rating will be reduced over the next two years).

9 Irreversible investments are those which have little or no value unless used in production. Investments in transport infrastructure are considered irreversible. If a road is built and nobody uses it, very little value if any could be recovered. The only residual value would be the land, but the road would need to be removed first.

10 The BENEFIT4Transport project is an EU-funded research consortium of multiple universities in Europe. It focuses on identifying value propositions which make PPP projects in transport financially viable (www.benefit4transport.eu).

11 With the exception of railway links to major airports, railway projects in Europe will in general be subject to availability payments or other forms of public financial support. These are preconditioned with the nature of railway sector in Europe where the infrastructure manager may not be able to recover the cost of infrastructure through user charges alone (Thompson, 2008). In addition, Dehornoy (2015), who assembled data on most EU PPP railway projects by 2011, reports that railway projects in general started preferring availability schemes after 2000.

12 It is broadly accepted that at least as far freight transportation is concerned there is a strong link to economic activity, i.e. GDP (see, for instance, Kveiborg and Fosgerau, 2007; Marazzo et al., 2010; Tapio, 2005).

13 The choice of an availability scheme in countries may depend on other factors as well.

14 One might also argue that the market responded to the evidence on systematic errors in traffic forecasting (Flyvbjerg, Holm and Buhl, 2002; Standard & Poor's, 2005; Bain, 2009). The first studies were, however, available years before the actual change in demand risk appetite was recorded, which appears to coincide with the emergence of the global financial crisis.

15 Data on public investment into specific infrastructure subsectors cannot be easily distilled from gross fixed capital formation accounts (see Mistura, forthcoming).

16 See https://www.loc.gov/law/help/infrastructure-funding/france.php.

17 According to when the first projects received support, listed on http://www.eib.org/efsi/efsi-projects/index.htm.

18 The EIB is treated as a non-government entity (email from Eurostat, dated 19 February 2016).

19 This could potentially be seen as an improvement to project selection practices in some EU countries, but it does not guarantee that projects which score badly in a cost-benefit assessment will not be pursued anyway.

20 Given the temporal distance from the financial crisis, when EFSI started operating it was difficult to ascertain what exactly would the contribution of this programme be and how much any change in investment mobilisation would be due to the recovering macroeconomic conditions and concomitant improving government budgets and private risk appetites.

21 For the same unit of risk/uncertainty, the ultimate cost of financing is higher for the private sector than the public one. Thus risks than can't be managed should not be transferred to the private sector as no efficiency gains can be made, and only a higher cost will be incurred. Makovšek and Moszoro (2018) provide a more detailed discussion on the relative cost of public and private finance in the case of project finance PPPs.

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Appendix 1. Description of risk linked to infrastructure assets

Political and regulatory risks

Procurement of permits (land, construction, environmental): Obtaining the necessary land, construction or environmental permits might prove costlier or take longer than expected, thus increasing costs.

Cancellation of permits: The risk of a public authority cancelling the necessary permits.

Contract renegotiation: The risk of a public authority forcing renegotiation of contracts, thereby changing the financial arrangements of the original project.

Change in tariff regulation: The risk of a price change in regulated markets due to a political decision.

Contract duration: The length of the contact is appropriately matched to the length of the useful lifespan of the asset.

Decommission: Risk related to the disposal of the asset at the end of the contract agreement or the useful life of the asset. This risk is especially related to large assets that may generate toxic wastes or environmental risks that need to be cleaned up before the asset may be retired.

Asset transfer: The feasibility and cost of transfer of the asset at the end of the contract agreement. The risk that an asset could become "stranded" due to changing government regulation or policy.

Enforceability of contracts, collateral and security: This risk is closely related to the legal environment that is associated with infrastructure finance such as PPP frameworks and the enforceability of leases, concessions and other contracted payment schemes.

Changes in the wider regulatory or legal environment: Any modification of the regulatory or legal environment can have widespread consequences on affected companies. This risk can be differentiated through the range of affected entities. A general change in law applies to all businesses in the country, a specific change in law to a defined industry, and a discriminatory change in law singles out one company. The ability to cope with or even anticipate such changes can be important for the continued economic viability of a project.

Changes in taxation: Changes in taxation of company or project revenues, output delivered by the project, financial transactions or any other element of the project structure, including taxation levied on investors themselves. Changes might be categorised similarly to changes in the regulatory or legal environment.

Currency convertibility: Sufficient amounts of requested foreign currencies are available at the time needed to repay foreign debt or repatriate dividends and principal. This risk generally does not apply to developed economies with stable and developed foreign-exchange markets.

Social acceptance: This risk applies specifically to large-scale public infrastructure projects and is when the general population does not support the project. Consequences can impact all phases of the project. Protest might lead to a delay in construction or hamper proper operation, leading to a loss of revenue; official bodies supporting the project might come under pressure from public opinion translating into political action.

Macroeconomic and business risks

Default of counterparty: Default of any party involved in the project agreement, including government, suppliers, lenders and insurers.

Availability of prefunding: The availability of funds to perform viability and feasibility studies. Prefunding is a sunk cost, thus making it difficult to raise money from private sources before commercial viability can be established.

Exchange rate fluctuation: If liabilities and revenues are in different currencies from one another, project participants can be exposed to exchange rate risk due to the volatility of exchange rates over time.

Liquidity risk: The risk that assets won't generate enough cash flow to service debt payments and any other obligation. Also, the risk associated with pricing assets where market prices are not observable.

Refinancing risk: If a project is initially financed via agreements with shorter duration than the project life itself, there is a risk of an inability to refinance loans at maturity due to performance issues or unfavourable market conditions (liquidity, interest rates).

Inflation risk: The risk that aggregate prices increase in an economy and the asset is exposed to rising prices in a detrimental manner. The risk that the replacement cost of the asset increases over time. Interest rates tend to be correlated with inflation, thus inflation risk can be thought of as interest rate risk.

Real interest rate risk: A component of nominal interest rates, an increase in real interest rates translates to an increase in the real cost of finance, which can strongly affect profitability.

Volatility of demand/revenue risk: The risk that the project company might fail to generate sufficient demand (usage of facilities or service) at the projected price of usage, ultimately leading to a lower level of revenue than projected. Profitability can also be affected by an unforeseen increase in costs.

Technical risks

Archaeological: Additional costs might arise if archaeological discoveries (e.g. historical sites, fossils, etc.) are discovered on the land intended for construction.

Obsolescence: The technology might become outdated and lose its economic appeal or become the subject of constraining regulation rendering it uncompetitive in the market. This is true for established technologies but is also applicable to new technologies where unintended consequences might lead to higher costs or removal from the market.

Technology risk: A (new) technology might not perform as projected or have unforeseen consequences, for example, on the environment. Lenders are more reluctant to lend against a project using novel technologies due to a lack of performance benchmarks and increased uncertainty of risks. Yescombe (2013) notes that project finance is more suitable for projects using established technologies.

Governance and management of the project: Failure to deliver and operate the project to the standards agreed due to poor management or poor risk control procedures.

Reliability of forecasts for construction costs and delivery time: The risk the construction authority fails to deliver the project on time and on budget. The reasons can be due to a performance deficit of the construction contractor, unexpected events leading to a longer construction period or the failure of third parties to provide auxiliary services necessary for operation. The consequences could be a rise in financing costs, including interest payments during a prolonged construction period, loss or deference of project revenue, as well as financial penalties payable to the contracting authority. A delay in construction, therefore, very often leads to the need for additional funding, the responsibilities for which should be allocated in the contract signed between the relevant parties.

Qualitative deficit of physical structure/service: The risk that the project might not deliver the agreed output at agreed conditions.

Force majeure: Risk of forces outside the control of any project participant and affecting the proper delivery, operation and termination of the project. This includes direct (physical damage) and economic (loss of revenue) consequences from natural disasters, as well as economic and political developments such as strikes and armed conflicts. Force Majeure events might be defined in insurance or risk-transfer agreements.

Environmental risk: A project's impact on the environment does not only have significant financial implications but is also an increasingly important factor for potential investors operating under ESG guidelines. The direct quantifiable impact on the environment, such as the production of waste and carbon emissions, may be reflected in the form of permits or additional taxes, thus creating a cost factor which needs to be estimated and managed. Indirect risks stemming from a project's impact on the environment include public opposition to construction or operation, as well as negative image effects for involved sponsors or lenders. Legislation and regulation defining environmental requirements and standards might substantially change, in extremis rendering a technology obsolete. New technologies might have unintended negative consequences on the environment, exposing projects to a possible surge in costs and endangering the business model. Since infrastructure assets are built for long operation phases, this risk is especially relevant for them. An environmental impact assessment might help quantifying the exposure to environmental risk and establish compliance with current laws, but it does not protect from unforeseen events. On the financing side, environmental factors become increasingly important to potential investors, illustrated by the spread of guidelines and principles they are adhering to.

Termination value: Since infrastructure assets are long-lived, any issues with forecasting, particularly related to salvage values and depreciation of assets over time, can affect the expected termination value of an investment. For PPP contracts where the terminal value is zero, this is less of an issue. This risk can be greater for owners of direct equity, such as corporations or direct equity sponsors.

Source: OECD (2015).

Appendix 2. Private investment in transport infrastructure through project finance

Investment in 1995-2014 (total project value, Million USD)	**Country rank**	**Investment in 1995-2004 (Million USD)**	**Country rank**	**Investment in 2005-2014 (Million USD)**	**Country rank**
57 190	United Kingdom	27 080	United Kingdom	30 550	Spain
39 326	Spain	9 919	Portugal	30 110	United Kingdom
26 109	Portugal	8 776	Spain	21 219	France
22 384	France	2 979	Greece	16 190	Portugal
16 649	Turkey	1 518	Netherlands	15 465	Turkey
15 212	Italy	1 441	Germany	13 902	Italy
13 513	Greece	1 310	Italy	10 534	Greece
9 706	Germany	1 255	Hungary	8 265	Germany
7 310	Netherlands	1 184	Turkey	5 792	Netherlands
5 605	Belgium	1 165	France	5 605	Belgium
4 468	Ireland	930	Czech Republic	3 879	Ireland
3 866	Hungary	772	Poland	3 005	Poland
3 777	Poland	672	Sweden	2 611	Hungary
1 690	Austria	590	Ireland	1 664	Slovak Republic
1 664	Slovak Republic	412	Norway	1 344	Austria
998	Czech Republic	346	Austria	849	Finland
963	Norway	109	Finland	550	Norway
957	Finland	0	Belgium	221	Denmark
672	Sweden	0	Slovak Republic	68	Czech Republic
221	Denmark	0	Denmark	0	Sweden
0	Slovenia	0	Slovenia	0	Slovenia
0	Estonia	0	Estonia	0	Estonia

Note: Countries are ranked by total project value (public funds and private investment). This paper analyses the countries who received most of the private financing between 1995 and 2014. They are marked in red.

Source: Dealogic database.

Appendix 3. 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. (forthcoming), "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. (forthcoming), "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. (forthcoming), "Quantifying Private and Foreign Investment in Transport Infrastructure", Working Group Paper, International Transport Forum, Paris.

Defining the challenge: How uncertainty in contracts matters

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

Addressing uncertainty for suppliers: the construction phase as example

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

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

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

Partial fixes to the Private-Public Partnership approach

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

Long-term strategic approach

How do the PPP and regulated utility model (RAB) compare in terms of efficiency incentives?	Makovšek, D. and D. Veryard (2016), "The Regulatory Asset Base and Project Finance Models", International Transport Forum Discussion Papers, No. 2016/01, Paris.
What basic considerations underlie the choice between a PPP and RAB approach?	Hasselgren, B. (forthcoming), "Risk allocation in Public-Private Partnerships and the Regulatory Asset Base Model", Working Group Paper, International Transport Forum, Paris.
Which are the preconditions a country would need to take to establish a RAB model on a motorway network? Is user-charging a must?	Alchin, S. (forthcoming), "A Corporatised Delivery Model for the Australian Road Network", Working Group Paper, International Transport Forum, Paris.
From the investors' point of view, does a RAB need to be fully reliant on user-charging?	Francis, R. and Elliot, D. (forthcoming), "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 et al. (forthcoming), "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

Mobilising Private Investment in Infrastructure

Investment De-Risking and Uncertainty

Public investment in infrastructure was the first to be cut by fiscally constrained governments during the recent economic crisis. Recognising the value of infrastructure investment as a counter cyclical measure, policy makers turned to private finance. This report examines why this strategy was not effective. 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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