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Risk Pricing Inefficiency in Public-Private Partnerships

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Abstract

There is a drive towards delivering and operating public infrastructure through public-private partnership rather than traditional public procurement. The assessment of the value for money achieved by the two alternative approaches rests in the cost of financing and their efficiency in delivery and operation. This paper focuses on the cost of financing, in particular the cost associated with transferring risk from the public to private sphere. If capital markets were efficient and complete, the cost of public (government) and private financing should be the same, with the relative delivery and operational efficiency remaining as the primary determinant of value for money. Evidence suggests, however, that the risk transfer to a public-private partnership entails an inefficient risk pricing premium which goes beyond the direct cost of financing. We argue that a high price for public-private partnerships results from large risk transfers, risk treatment within the private sector, and uncertainty around the past and future performance of public-private consortia. The corollary is that the efficiency gains from a public-private partnership must be much higher than commonly expected to deliver a greater value for the money than under a traditional approach.

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1 Introduction

Many countries have identified substantial infrastructure investment needs, particularly in the transport sector.[1] Initiatives to increase the volume of available finance, including the promotion of private participation in infrastructure through public-private partnerships (PPPs),[2] have been advanced to address these needs.

Against this trend, there is still an on-going debate on the relative cost of public and private finance (Green, Koller, and Palter 2015). A recent IMF literature review on PPPs (Arezki, Bolton, Peters, Samama, and Stiglitz 2016) found striking how the little attention the economics literature has devoted to the fundamental question of how to structure financing of investments under PPPs, how much should come from private sources and in what form, and how much should come from public sources.

The economic literature on PPPs focuses on a dynamic bilateral principal-agent framework.[3] An optimal contract between a principal and an agent involves a trade-off between risk and incentives (Mirrlees 1999; Holmström 1979). It is not clear how much insurance should be offered and what types of risk should be insured. Ultimately, this question is about who should bear what risks (Carbonara, Costantino, Gunnigan, and Pellegrino 2015) and how that determination is affected by the cost of risk bearing (Soliño and Gago de Santos 2010; Fernandes, Ferreira, and Moura 2016).

With regard to who should bear what risk, the PPP literature mainly focuses on the nature of the broad risk categories (construction, availability, and demand), which party is best placed to manage them, and what mechanisms exist to manage the risk (particularly demand risk) (Roumboutsos and Pantelias 2015; Roumboutsos and Anagnostopoulos 2008; Chung, Hensher, and Rose 2010; Ke, Wang, and Chan 2010; Ng and Loosemore 2007; Vassallo 2006, e.g.,). This literature generally takes no account of how these choices of risk allocation might affect risk pricing or how they can in turn be informed by it.

With regard to the cost of the risk bearing, the primary PPP textbook expositions[4]

[1] The U.S. Department of Treasury has recently voiced this concern. See, e.g., Buckberg (2015) and Buckberg, Kearney, and Stolleman (2015).

[2] PPP covers a variety of arrangements, from management concessions of existing infrastructure to project finance contracts for the delivery and operation of new infrastructure. This paper treats the latter.

[3] See Iossa and Martimort (2015) for an overview of this literature.

[4] See, e.g., Engel, Fischer, and Galetovic (2014).

remain theoretical and do not treat the issues of risk pricing with regard to PPP in great detail.

At the core, the issues above are a question about the relative cost of public and private finance in the context of PPPs.Various countries have attempted to determine when a PPP would be expected to offer a better value for money than traditional infrastructure procurement (World Bank 2013). The relative cost of public capital versus the cost of private capital is one of the essential components of these assessments.

At face value,[5] it appears that private financing always requires a higher cost of capital than public borrowing, which would make a value-for-money comparison difficult. However, this is at least partly due to the way that risks and their costs are expressed in each case (Klein 1997). For publicly financed investments, borrowing is at an *ex ante* low risk-free rate, yet the taxpayer implicitly bears much of the *ex post* risk (e.g., covering cost overruns). For the private sector, there is no "*ex post* taxpayer" option, so the risk must be expressed *ex ante*. Since the true risks and costs of government borrowing are partly obscured, they cannot be directly compared to those of the private sector, which are clearly expressed in the required rate of return.

One solution to the challenge of incomparability of costs of capital is to argue that the Efficient Markets Hypothesis (EMH) holds in the market for PPPs. If the relevant capital markets are competitive and complete (i.e., all risks can be traded), the private cost of finance will represent the *efficient* cost of the risks involved in the project—the financing costs of the public and private approaches would be equivalent (Brealey, Cooper, and Habib 1997). Under this approach, value-for-money assessments would depend solely on the efficiency differential between public and private ownership and management.

Empirical evidence suggests that because the EMH does not adequately describe PPP-related capital markets, the cost of capital question cannot so easily be swept away. Specifically, the evidence suggests that investors in PPPs have made abnormal returns, PPP bidders demand excessive risk premiums, and there is insufficient competition for contracts. This paper provides a narrative—a hypothesis to connect the scattered empirical evidence that

[5] We acknowledge that in practice some international corporations may have larger balance sheets than some states and lower cost of financing as well.

governments pay a high price for public-private partnerships primarily due to large risk transfers, risk treatment within the private sector, and uncertainty. The analysis in this paper focuses on risk pricing efficiency in capital-intensive project finance PPPs in public transport infrastructure - specifically road and rail in developed economies. Further explanations, why we have adopted these limitations are provided in the section which describes our analytical approach.

We stress that the objective of this paper is not to determine, whether PPPs are Value for Money, but only whether the pricing of risk is efficient (the cost of risk transfer at face value). To be able to take a view on Value for Money, we would also have to know, what the systematic efficiency gains in PPPs are. To date, such evidence has not been available.

Section 2 sets out the theoretical background on risk pricing efficiency, including some conventional challenges to the EMH. Section 3 presents the subject of our analysis—capital-intensive project finance PPPs and develops our analytical approach, which looks at some PPP-specific challenges to the EMH. Section 4 presents the implications of uncertainty on the *ex ante* versus *ex post* risk performance of PPPs and reviews the evidence on competition in PPPs. Sections 5 discusses implications of the findings and section 6 concludes.

2 "Efficient" Pricing of Risk

In standard finance theory, investors in any project face two types of risk: systematic and non-systematic risk. Systematic risk relates to the risk that is not diversifiable; non-systematic risk relates to idiosyncratic project characteristics, such as geology, complexity of construction, country or counter-party risk, and is diversifiable. The private sector's standard tool for pricing risk within a portfolio of assets is the Capital Asset Pricing Model—CAPM (Markowitz 1952). In CAPM, the required rate of return on a risky asset is derived from (i) the risk-free rate, (ii) the market-risk premium, and (iii) the correlation between the asset and the market ("beta")[6] alone. Non-systematic risk is not relevant for pricing, as it can be diversified away

[6] Beta is the (weighted) covariance between the return on the asset and the return on the equity market. A beta of one signifies the asset is perfectly correlated with the market (e.g. the traffic demand for a road project is strongly dependent on the state of the national economy, so will have a beta close to one). The equilibrium return on the asset in this case is the return on the market portfolio. A beta with the value of zero implies no correlation between the asset and the market, hence the equilibrium return is the risk-free rate of return. In theory investors should demand the equilibrium expected return to be compensated for "receiving"

by including other assets in the portfolio.

In practice, sophisticated investors use multi-factor models, rather than CAPM. Regardless of the tool used they do not blindly follow modeling outputs when setting required rates of return, but instead apply minimum "hurdle" rates of return or include a mark-up for non-systematic risks (Jensen and Meckling 1976; Mehra and Prescott 1985; Fama and French 1992; Tan 2007). From the perspective of an individual manager's career and income, the variance of returns on a single investment may be important. The manager may, therefore, apply a mark-up as a premium for the non-systematic risk even if this risk is not a material concern to shareholders.

Debt pricing relies on credit risk scoring methodologies, which assesses the probability of credit default by scoring the characteristics of a project and loan structure, based on the risks that are borne by the lender and risks that come from relations with counter-parties. This process is flawed with regard to PPPs in at least three ways:[7]

(a) Regarding relative risk ratings, credit risk agencies' (CRAs) benchmark PPP projects—usually organized as SPVs with no track record and limited recourse to the sponsors' parental companies—to commercial investment. Each PPP project, however, have idiosyncratic attributes which make it dissimilar to commercial investments;

(b) CRAs base absolute risk ratings on discretionary decisions of rating committees composed of experts, whose expertise may be irrelevant or obsolete to the project at hand; and

(c) Project ratings are not issued *ex officio* by CRAs, but should be solicited (and paid) by interested sponsors, which limits the number—and possibly biases the selection—of rated projects.

Against the argument of return mark-ups is the possibility that competition between investors may be sufficient for any extraordinary profits to be eroded in the long-run. In this case, the estimated prices for risk can (eventually) be considered as *efficient*—i.e., the market will be efficient if the conditions for the EMH hold, including that prices reflect all available information.

Depending on the definition of "all available information," financial theory distinguishes

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or "holding" the risk.

[7] See, e.g., Roumboutsos, Pantelias, and Sfakianakis (2015).

between three versions of the EMH. The version closest to reality and generally accepted by financial economics is the weak version (Doran, Peterson, and Wright 2010). It assumes prices incorporate information on past prices and will change only when new information becomes available.

The applicability of the EMH to asset markets has been questioned on methodological grounds (e.g., Mandelbrot and Hudson 2004 criticize the inadequacy of the random walk assumption), as well as on a more fundamental level for assuming rational behavior by investors (Thaler and Sunstein 2008). Numerous relevant biases of human decision making under uncertainty have been documented, including overconfidence (Fischhoff and Slovic 1980; Barber and Odean 2001; Gervais and Odean 2001), overreaction (De Bondt and Thaler 1990), herding (Huberman and Regev 2001), psychological accounting (Tversky and Kahneman 1981), miscalibration of probabilities (Lichtenstein, Fischhoff, and Phillips 1982), hyperbolic discounting (Laibson 1997), regret (Bell 1983; Clarke, Krase, and Statman 1994), and loss aversion (Kahneman and Tversky 1979; Shefrin and Statman 1985; Odean 1998).

In response to criticisms, EMH proponents insist that the effects of the biases are temporary so that the market will eventually bring the prices to rational levels (Lo 2004). Several studies attempt to demonstrate that markets in developing and developed economies asymptotically approach efficiency, although the issue remains contested (Hull and McGroarty 2014; Alvarez-Ramirez, Rodriguez, and Espinosa-Paredes 2012). This interpretation of the EMH assumes all uncertainty will ultimately become quantifiable as a distribution of probabilities. Unknowable (Knightian) uncertainty,[8] if present, is eventually resolved.

We need to stress that short-term deviations, like the financial crisis, do not in themselves undermine the proposition of efficient risk pricing. What matters is, if the market is able

[8] Knight (1921, 233) defined risk as the situation in which the distribution of the outcome in a group of instances is known and uncertainty, when it is "impossible to form a group of instances, because the situation dealt with is in a high degree unique." Later, Ramsey in England and De Finetti in Italy independently developed methods of measurement and handling of subjective probabilities (Gillies 2003). In effect, when there is no historical data (and are subject to uncertainty, in line with Knight), one can derive a subjective probability by asking the investors or groups of investors on the bets they would be willing to place. To the extent that the individual facing the lack of historical statistical data, to inform her decision and doubts her own subjective bet against uncertainty, she may assume that the rest of the world is perhaps better informed. Effectively, the individual becomes influenced or follows the behavior of the majority or the average. This situation is referred to as intersubjective probability. Both the subjective or intersubjective probabilities are in line with Keynes (1936, 161–162), subject to his "animal spirits," the fluctuations in the investors disposition, optimism or pessimism.

at all to achieve such an efficiency in "normal" conditions and over a certain time period (and much of our evidence, in particular with regard to demand risk, predates the current economic crisis).

In the context of infrastructure financing and PPPs, the debate between conventional financial and welfare economics took account of issues above, but focused on how these affect the systematic risk premium and assumed that both public and private sector can diversify non-systematic risk well.[9]

3 Methodology

Project financing of an infrastructure investment is based on a financial structure where investors and lenders are repaid from the cash flows generated from the project once it is operational, and where lenders have limited or no recourse to the investors.

From the organizational perspective, several general characteristics distinguish PPPs from traditional infrastructure procurement (Yescombe 2011, 2014):

(a) Normally, a project-dedicated company is created, called the Special Purpose Vehicle (SPV), which enters the contractual relationship with the public sector.

(b) High leverage is characteristic for the SPV (e.g., a 90:10 debt to equity ratio).

(c) A public-private agreement defines an output specification, i.e., what the project is meant to achieve, as opposed to what the project is (the input).

(d) There is a bundling of all procurement phases, from design to operations, in one long-term contract (e.g., Design-Build-Finance-Operate-Maintain, or DBFOM, contract).

(e) PPPs commit the public sector to paying an agreed-to income to the SPV, provided the required service delivery and quality criteria are met. Alternatively the public sector can grant the SPV the right to collect revenues from the use of the infrastructure.

(f) Lenders generally require that risk be transferred from the SPV to other parties, to the extent possible to reduce the risk exposure for the SPV.

[9] Systematic risk is not the focus of this paper and was already treated extensively. Spackman (2004) provided a rigorous treatment of the question and demonstrated that the private equity risk premium (historically around 6%) is not relevant for the taxpayer although the systematic risk premium concept is sound. He estimated the systematic risk premium for the taxpayer at 0.1%. When also accounting for long-term climate change considerations Dietz, Gollier, and Kessler (2015) a 0.6% risk premium can be considered.

With regard to the last point in PPPs, and project finance in general, risk is managed through a network of contracts (Gatti 2013). For example, fixed-price and date-certain turnkey contracts[10] are required to transfer construction risk.

The current debate on risk pricing efficiency largely ignores the complexity of risk treatment and allocation within a PPP contract. To date, the debate over the applicability of the EMH has generally taken place in the context of homogeneous risky assets such as equities, where deep historical datasets are available. Little current research has accounted for the specific context of PPPs and infrastructure, and past information on asset performance is difficult to access or compare.

The efficiency of risk pricing in the case of PPPs primarily depends on two related components: (i) the degree of competition for contracts and (ii) the way in which investors and lenders understand and price risk. Competition for the contract is the more straightforward element to assess. Reasonable data is available on the number of PPP consortiums bidding for the contract. The second component (which also influences the first) is more difficult to assess due to the complexity and diversity of the risk transfer contracts within each PPP consortium.

Our approach to the second component—individual risk pricing—is to look for direct evidence of abnormal profits earned by private parties in PPPs and for indirect evidence of a lack of information prohibiting efficient risk pricing under the EMH. This approach holistically considers the contract structure. The assessment of risk pricing efficiency in a PPP must consider the total "volume" of the transferred risk—the risk share at the level of the SPV and the risk transferred to related parties out of the SPV. Each part of the total risk, assigned to different parties within the PPP contract structure, should be assessed separately.

If data on many operational SPVs were available, risk pricing efficiency performance would be easy to assess at the SPV level because market indices would reflect and benchmark the performance of SPVs. For risks that are transferred out of the SPV, this would be more difficult. In construction companies, for example, the outcomes of specific PPP projects

[10] Alternatively, in cases where the construction companies are financially unable to accept the construction risk (e.g., construction companies in developing countries), the construction budget of the SPV includes a sizable contingency. Clearly though in this case the incentive for the construction company to efficiency manage risk will be much reduced and an important part of the PPP rationale is lost.

will be private information held within the cash flows of numerous other activities that a construction company may pursue. In these cases, we attempt to indirectly assess the risk performance by measuring systematic project performance in terms of major project risks, such as construction or operations risk. A materialized (*ex post*) risk systematically undershooting the expected (*ex ante*) risk could indicate abnormal profits, and that one or both of the conditions for efficient pricing is not met.

We review existing empirical studies that use large samples to tackle the following questions:

(a) Direct observation of PPP risk pricing efficiency: Is a homogenous market index of PPP risk performance available? Can systematic abnormal returns be observed in PPPs?

(b) Indirect observation of PPP risk pricing efficiency: Can the risk performance of PPPs be indirectly inferred through *ex post* outcomes of the main building blocks of risk and return in a PPP—demand, construction risk, and operations risk?

(c) What is the level of competition for the contract in PPPs that would work towards reducing the risk premium?

The existing pool of evidence that pertains to transport infrastructure only is limited. Additional evidence however exists for other sectors. In the subsection below we develop a rationale, which other evidence might be useful for the purpose of this study and apply to the context of transport as well.

3.1 Evidence

The commonly proposed basic incentives that come from bundling of project phases (such as the importance to deliver on budget and on time so that revenues can begin to be generated; the incentive to consider life-cycle cost), are the same in all PPPs that involve infrastructure and its operation, regardless of the sector. The main differences between PPPs arise with regard to revenue generation/control possibilities and exposure to incentives for efficiency, beyond the initial competition for the contract.

A clear distinction can be drawn between sectors, where competition in the market is possible and where that is not the case. Airport and sea port PPPs can exist in context of a

competitive market, i.e., do not have a monopolistic grip on their catchment area.[11] When they bear demand risk there is continuous pressure from the market to be efficient and at the same time rent extraction is kept in check. In addition, as opposed to most rail and road PPPs, multiple channels exists to generate revenue in the context of Ports and Airports. The difference in business models and levels of exclusivity is captured by Roumboutsos and Pantelias (2015) as well. The evidence on airports and ports with regard to our questions is however extremely limited and may present additional complexities in their interpretation.

Availability based contracts on the other hand bear no demand risk. They are considered more simple and less risky. Their use was common in transport before the crisis and they have become almost the exclusive form to deliver road and rail projects with the onset of the financial and economic crisis.[12] More importantly though, they cannot have the benefit of continuous competitive pressure in the market and the efficiency incentive is determined exclusively at the competition for the contract. This is especially the case in road and rail projects (even when they bear demand risk), both being network facilities, where competition in the market is generally[13] not possible (e.g. through duplication of the network). With regard to the incentives coming from project phase bundling, the incentives in these contracts will be essentially the same, whether it is a rail, road, hospital or school, i.e. it is the contract design the drives the outcomes for the PPP consortium, not the sector *per se*.

For construction risk for example, there is direct evidence to support such a proposition. Blanc-Brude and Makovšek (2013) find construction risk (excellent on-time and on-budget construction of infrastructure under project finance) is successfully transferred from the project company to the construction contractor regardless of the project sector, geography, or time.[14]

[11] For example, in a recent study by the OECD/ITF (2015) a price elasticity of -1 was measured for a sea port.

[12] The loss of appetite for demand risk has also led institutions like the EIB to build a series of instruments for "de-risking" such as the project bond initiative and others.

[13] We note that for rail this claim is especially true for Europe. In some locations the historical conditions and the purpose of rail has evolved in a different way. In the US for example, dedicated freight railway operators are integrated with the infrastructure managers. They build their infrastructure themselves and operate in a fully private and competitive market.

[14] We note that the particular relation is how well the lenders/investors are protected from construction risk that was absorbed. This does not mean that a project as a whole cannot have delays or cost overruns that would happen due to misspecifications, changes of scope or other reasons that were the responsibility of the procurement authority (and would be a source of extra revenue for the PPP consortium).

Thus, to take advantage of a larger pool of available and relevant evidence, we also draw in large sample studies on social infrastructure in relation to the questions of abnormal returns, construction quality, and competition.

Lastly, in our search for evidence we try to focus on developed economies with mature institutions and markets. Evidence from developing economies would bring in a range of additional complexities and greatly complicate the interpretation of results.[15]

4 Risk Pricing Inefficiency in a PPP

Several decades after the roll-out of the PPP model in the UK and the model's proliferation to other countries, there is still a dearth of information on the financial performance of such projects.[16] Nevertheless, a coherent picture is beginning to emerge, based on the partial information available.

The following sections follow the design of the analytical approach outlined above. It needs to be stressed at the outset of this section that, in terms of the indirect risk pricing efficiency, we were only able to explore demand and construction risk. A lack of available data prevented the exploration of infrastructure operation and maintenance risk pricing performance.

4.1 Availability of Risk Performance Information at the SPV Level

Currently, there are no consolidated and homogeneous data sources on the risk exposure of investors. A recent review of literature concluded that all existing papers or indices on infrastructure suffer from a study design problem, as they aggregate financial instruments that are labeled as "infrastructure" based on industrial categories and without attempting to isolate methodically the contractual and regulatory characteristics (Blanc-Brude 2014). The performance and risk profile of a regulated utility will be substantially different from a PPP, and the pooling of such information is not very useful. A related challenge is that much of the

[15] It is widely known that PPPs in developing environments face a series of additional challenges related to institutional capacity, maturity, and general market conditions. These issues are manifested for example in massive and early PPP contract renegotiations (e.g., Guasch 2004; Bitran, Nieto-Parra, and Robledo 2013), showcasing the inability to credibly commit to the contract by one or both parties. These issues also complicate making any inferences, based on initial contract commitments.

[16] Chen, Daito, and Gifford (2016) provide a comprehensive literature review on the general lack of project level data (beyond financial performance).

investment performance information is private and thus not publicly available (Blanc-Brude 2014).

The lack of information on the infrastructure investment performance directly contradicts the "full information" requirement for the EMH to hold, suggesting that any quantitative testing for EMH is pointless. This gap has also prompted several initiatives to collect the relevant data.[17]

For the lenders, some data is available through the rating agencies.[18] As this information is not publicly accessible, we do not treat it in further detail.[19]

4.2 Are Abnormal Returns Possible for PPPs?

To observe abnormal returns, a view on "normal" returns is necessary. Not having a homogenous market index makes it impossible to directly establish this view empirically. Nevertheless, certain studies indirectly indicate abnormal returns by observing a systematic differential between expected returns at financial close (when the financing of the project was secured and contracts were signed) and ex-post returns. While this will not reveal the full range of potential abnormal returns (as they may have already existed at the financial close), it will provide some indication of the range between expected risk exposure and materialized risk.

The National Audit Office—NAO (2012)[20] and Vecchi, Hellowell, and Gatti (2013) used an alternative approach to the classic financial assessment of risk and return (e.g., Sharpe ratio). They compared expected *ex ante* returns at financial close and actual *ex post* returns. NAO (2012) analyzed 118 projects: in 84 cases expected returns were equaled or exceeded, while in the remaining 34 cases the returns were lower than expected. NAO (2012) noted that the projects were still in operation and had not yet reached the stage where significant refurbishment might be needed. Thus, their conclusions, which were based on the realization

[17] See, e.g.: EDHEC Risk Institute http://www.edhec-risk.com/multistyle_multiclass/Meridiam_Infrastructure_and_Campbell_Lutyens_Research_Chair, OECD http://www.oecd.org/finance/private-pensions/ institutionalinvestorsandlong-terminvestment.htm, and FSB http://www.financialstabilityboard.org/wp-content/uploads/r_140916.pdf.

[18] For example, a Moody's study (Davidson, Kelhofer, and Keisman 2013) of 954 PPPs notes, that "the 10-year cumulative default rate is 3.9%, which is consistent with 10-year cumulative default rates for corporate issuers in the Baa ratings category."

[19] This is indicative that the lenders have limited information; see section 4.4.1.

[20] It should be noted that this particular study captures projects from diverse sectors (including defense), but excludes transport altogether. These projects are, however, all PFI type (i.e., availability-based PPPs) and follow our logic of using all relevant evidence as set out in section 3.1.

of costs, could change.

Vecchi, Hellowell, and Gatti (2013) used a similar, but more elaborate, approach than NAO on a sample of 77 UK availability-based PPP hospital projects, and showed that the *ex post* returns to investors were substantially above expected *ex ante* returns at the financial close. The average blended equity IRR[21] was 9.3% (with a range of 4.5% to 17.4%) above average expected financing cost at financial close.

Based on seven shadow toll roads in Portugal, Fernandes, Ferreira, and Moura (2016) reported that the financing cost of PPP's were, on average, 370 basis points higher than public procurement, with differences ranging from 300 to 433 basis points, substantially higher than expected 200–300 basis points according to Yescombe (2011, 18). When the financial models were adjusted to reflect the explicit costs and all cash distribution traps, the shareholders' IRR increased from 10.8% to 17.1%. Assuming that explicit transaction costs represent expenses (truly) incurred, the potential (hidden) IRR could go up to 15.5%, depending on the ability of the sponsors to accelerate dividends and repayments (Fernandes, Ferreira, and Moura 2016).

Thus, the available evidence suggests that the distribution of PPP returns is systematically and substantially above expected returns. This is also the case in the availability-based PPPs, where the real risk exposure is limited to infrastructure operation and maintenance (and potential contractor default), with other risks being negligible:

(a) Regulatory and political risk are not a serious issue in the UK, as a survey of 171 PFI projects from all sectors showed that changes in the contracts amounted to a mere 1.1% of the annual service payments from the state to the private provider (unitary charges) for projects in question (NAO 2008) and the majority of changes (82%) involved values of £5,000 or less, and almost all originated from the public-sector requests (there is no evidence available to corroborate the same for the Portuguese example);

(b) There is no demand-based risk in the samples considered; and

[21] The equity stakes plus the subordinated portion of debt in the SPV end up in each sponsor's balance sheet (i.e., the blended equity). The remuneration for these investments is represented by the blended IRR of the SPV. Sponsors need to be able to see whether the project will increase the wealth of their shareholders and will compare the blended equity IRR with their respective WACC. If this difference is positive, the project is economically attractive for each of the sponsors (Vecchi, Hellowell, and Gatti 2013, 248), with the expected earnings above average.

(c) Construction risk is fully transferred to the company with the construction contract (NAO 2012).

The pricing of the maintenance and operations risk could play an important role in explaining a part of the abnormal returns. Empirical evidence on pricing accuracy for this risk is not available. Adequate pricing of this risk at the bidding stage would require information on historical performance of similar assets. It also requires information about future utilization (e.g., traffic) and how that will interact with the wear and tear and ensuing cost. Ultimately, in the absence of good information substantial contingencies may have been built in these estimates. Beyond a lack of information to enable efficient risk pricing, more direct evidence is not available.

These findings apply primarily to availability based contracts and contracts in which the PPP consortium faces no continuous competitive pressure that continuously provide efficiency incentives and hold the rent extraction in check. Hence, in line with the explanations provided in the section 3, we conjecture that these findings apply primarily to rail and road PPPs, but may differ for sea and airports in competitive markets.

4.3 Indirect Inference on Risk Performance—Demand Risk

Demand risk performance relates to whether actual (*ex post*) demand undershot, met, or overshot expected (*ex ante*) demand. If the pricing for this risk were efficient, then, on average over many projects, risk performance should not exhibit a significant systematic error. Put simply, systematic demand shortfalls should not exist, since this would imply lenders/investors are, on average, losing money. Conversely, a small systematic excess of actual demand (as opposed to expectations) would be acceptable as a reflection of the risk aversion of investors. A large systematic excess of actual demand, on the other hand, would signal that either the lenders/investors have a poor idea about the actual risks, which manifests in large risk aversion, or that there is insufficient competition, or both.

Most evidence of ex-post analysis comes from toll roads and rail and concerns only risk exposure, without a view on returns. Demand risk in this case cannot be managed and relates to traffic forecasting. This is not an exact science 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. Traffic forecasting is a scientific field in its own right. An investor or a lender cannot directly observe the riskiness of the project by comparing some of its characteristics to similar projects. But she 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 summarized 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. 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, Dehornoy (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) reports a –54% average error on 25 projects, though these may include many of the ones studied by Dehornoy (2015) (which the authors did not reveal).

The demand forecasting errors in PPPs noted above should not, however, be simply interpreted as losses to investors. Contract renegotiation experiences from around the world show that many PPPs are subject to strategic behavior from the public and the private sector, although this challenge appears to be greater in developing, rather than developed, countries (Guasch, Laffont, and Straub 2008).

There are cases, nonetheless, where systematic errors do translate to investor/lender losses. A report by Oxera Consulting (2012) shows that in Australia all seven toll road projects have underperformed since 2005, and argues that this is the result of deliberate overestimation by (private) project sponsors to attract investors.[22]

Recently, the European PPP Expertise Centre (2015) reported that in 2013, over 90% of

[22] The private sponsors of the failed projects have become the subject of class action law suits, as in the case of CLEM7 tunnel in Brisbane (http://www.wsj.com/articles/SB10001424052702304434104579379351959645932).

PPP transactions[23] closed were without demand risk. It is plausible to assume that given the considerable uncertainty of demand investors (and lenders) have learned to avoid its transfer.

The focus herein is on whether or how accurate the information on this particular risk is (as that is an essential ingredient in achieving risk pricing efficiency). Overall, there is no indication, that the private sector is better than the public one in forecasting demand risk. Considerable uncertainty is inherent to traffic demand forecasting.

Beyond our discussion on whether or not sufficient risk related information is available to anyone, the transfer of demand risk is commonly advocated on the grounds of project selection. If PPPs were on average better in forecasting demand, they could serve to prevent white elephant projects (as proposed by Engel, Fischer, and Galetovic 2014).

The white elephant prevention argument is difficult to defend though, even if it could be proven that PPPs are better at forecasting demand.[24] It is generally accepted that the demand risk in road and (vertically unbundled) rail infrastructure cannot be managed well. In this sense, there are no efficiency gains to be made and if the risk pricing is inefficient, transferring unmanageable risk to the private sector will merely incur a (financing cost) premium. This begs a question whether the benefits of such prevention offset the systemically higher cost and if this is the only and most cost efficient way to achieve an improvement in project selection.

4.4 Indirect Inference on Risk Performance—Construction Risk

Construction risk relates to cost and schedule overruns against the contract or estimates at financial close.[25] The logic here is slightly different than in the case of demand risk because the construction risk performance of the construction contractor in a PPP is private information embedded within the fixed price charged for the project. How this is approached at the level of the construction contractor is further explained below. Construction risk, however, has an

[23] Transport accounts for the majority of the PPP volume on the market in Europe (over two thirds), with road projects typically dominant.

[24] Any such evidence showing that PPPs have more accurate demand forecasts would need to overcome a selection bias problem—i.e., it is unlikely that the authorities would try to force a demand based PPP on a project they politically prefer ex-ante.

[25] Another definition of construction risk measures ex-post costs against those at the formal decision to build (i.e., well before the contract letting and financial close). This definition is, however, more relevant to the process of investment appraisal and investment selection, such as in the research by Flyvbjerg, Holm, and Buhl (2005, 2006).

impact at both the SPV level and the construction-contractor level.

4.4.1 Construction Risk at the SPV Level

Lenders and investors generally seek to transfer the construction risk to the party best able to manage it, namely the construction contractor.

Yet construction risk also has an impact at the SPV level. Blanc-Brude and Makovšek (2013) found that risk transfer from the SPV to the construction contractor is fully successful, with a median cost overrun of zero across 75 large project-finance infrastructure projects worldwide. This implies that, for the investors in the SPV (including lenders), construction risk is fully diversifiable, and hence should not be relevant to the cost of financing (save for the transaction cost of its diversification).

Historical analysis has shown that this was not the case and that the required return of the projects declined sharply after the construction phase was finished (Blanc-Brude and Ismail 2013). Accordingly, refinancing is common after the completion of the construction phase, suggesting that lenders applied a premium to the construction phase of the project, in spite of the risk being fully diversifiable. This is indicative of abnormal returns at the SPV level and may reflect lacking information on true risk exposure or insufficient portfolio size of lenders that constrains them from diversifying their risk.

4.4.2 Construction Risk and the Construction Contractor

For the construction company the relevant measure of risk exposure is a risk contingency, which is an amount added to a central estimate of cost to cover future cost overruns that are realized. A range of techniques for quantifying construction risk have been propounded in academic construction literature, including deterministic methods, probabilistic methods, and fuzzy-logic (Baccarini 2006). There is, however, inherent complexity and a lack of historical information that restrain construction companies from applying these methods to major infrastructure construction projects. Accordingly, construction risk (and the resulting contingency amount) is normally estimated subjectively through risk workshops: i.e., experts scrutinize the design and assign probabilities and impacts of various events (Infrastructure Risk Group 2013). Though such exercises are invaluable in terms of due diligence, there is no empirical research available on their ex-post accuracy, making it difficult to form a view

on the accuracy of contractors' perceptions of risk.

De Silva, Dunne, Kankanamge, and Kosmopoulou (2008) confirmed that private sector assessments of risk for complex projects are rough. The study treated traditional highway procurement, where the risk exposure of the construction company is lower than in PPP projects. Oklahoma's Department of Transportation changed its procurement policy to publicize the state's internal cost estimates during tendering. After this information was released, winning bids were reduced by an average of 11% for more risky and complex projects (e.g., a bridge construction), but were unaffected for low-risk projects (e.g., asphalt pouring). The authors applied a difference-in-difference approach, observing thousands of bids over multiple years. In general, the availability of the state's estimates improved bidders' willingness to reduce their contingencies.

Ideally, we would directly assess expected and ex-post outcomes for the construction contractor; however, this private information is unavailable. Instead, we must make observations at the level of the overall PPP contract between the SPV and the state. Here, we attempt to match the probability of risk transferred from the state, with the cost it paid for it. This requires two pieces of information:

(a) The extent of the construction risk transferred from the state to the PPP (and from the SPV to the construction contractor); and

(b) The cost of infrastructure when built by the state (traditional procurement) and the cost of infrastructure when built by the PPP.

The extent of construction risk transferred from the state to the PPP can be inferred from the comparative performance of traditional procurement and PPPs. The previous subsection highlighted that construction risk appears to be fully transferred from the state to the SPV and from the SPV to the construction contractor in PPP contracts: the median and average cost overruns were zero and 2.3%, respectively, for a large sample of projects (Blanc-Brude and Makovšek 2013). In contrast, for traditionally procured road projects, the state absorbed significant cost overruns. These cost overruns (measured against the detailed design or contract value, which is comparable to Blanc-Brude and Makovšek 2013) reached, on average, 9% over large samples in different studies.

Table 1 presents a summary of existing studies of construction cost overruns in traditional

procurement.[26]

Whether the project is delivered using traditional procurement or a PPP, the primary cause of cost overruns is scope creep, at least in the case of transport infrastructure (Makovšek 2013). Under the terms of either contract, it is the responsibility of the procuring authority to define what it wants to build. Thus, in either case, the cost overrun is not necessarily a risk to the construction company or the SPV, as the additional cost can be passed back to the procuring authority. To the extent that much of the 9% mentioned above would reflect the responsibility of the procurement authority in defining the scope, the actual risk to be managed in a PPP would be smaller.

Despite the relatively small amount of risk transferred to PPPs, there is clear evidence that the cost of infrastructure is higher when built via a PPP than when it is built traditionally via the state. Blanc-Brude, Goldsmith, and Välilä (2009) observed *ex ante* construction cost (contract prices) in 162 traditionally procured and 65 PPP road projects in Western Europe: PPPs were found to be 24% more costly on average than the equivalent traditionally procured projects. Given the low average cost overruns at the contract-close phase in traditional procurement, PPPs are still substantially more costly even after the expected cost overruns risk in traditional procurement is accounted for, i.e., around 14–19% (Makovšek 2013). Figure 1 conceptually illustrates construction cost at contract signature and cost overrun for traditional procurement compared to PPP.

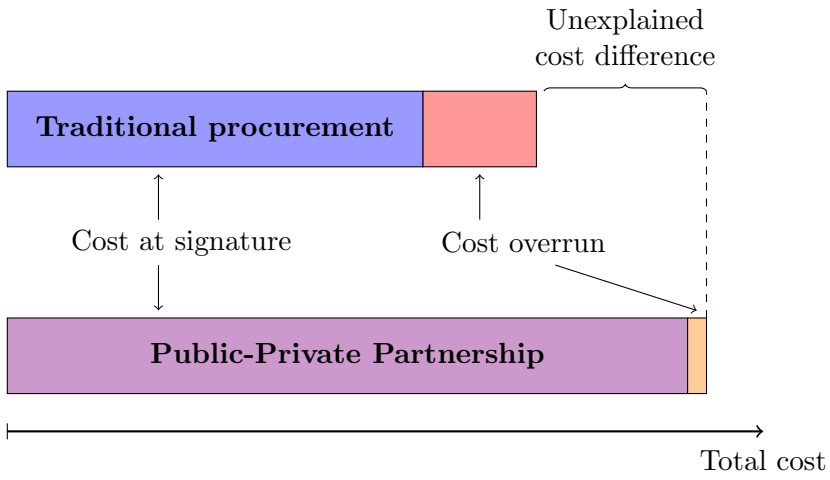
Taken together, these strands of evidence suggest that the cost to governments of transferring risk to the private party in a PPP is significantly above the efficient price (i.e., the unexplained cost difference in Figure 1 above).

While it could be contended that the provided comparison is speculative, it is also obvious that there is an order of magnitude difference between the risk of cost overruns in comparable studies of traditional procurement and additional construction cost of PPPs.

Two further arguments may compound this finding. First, lenders and investors may avoid the riskiest of projects, suggesting the portfolio of projects delivered as PPPs is actually

[26] We have included also studies that deal with construction cost performance at earlier stages of project/design development to avoid a common confusion between studies that deal with cost overruns at a project selection stage and studies that deal with project performance at the stage, when the traditionally procured contract is signed/detailed design exists.

Figure 1: This figure illustrates a comparison of construction cost at contract signature and cost overrun for traditional procurement and public-private partnership.



lower risk than the traditionally procured one. Second, traditional procurement mainly relies on cost-plus contracts, which provide fewer incentives to efficiently manage risk, while the PPP model relies on fixed-price turn-key contracts. Effectively better management of risks is expected, which reduces their impact and/or probability. Interestingly, practitioners report that the use of a lump-sum turnkey construction contract generally involves a premium of 20% against a less restrictive contract types, such as design-bid-build, regardless of whether it is part of a PPP or not (Yescombe 2014).

An argument against the conclusion that these outcomes are a source of inefficient risk pricing or extraordinary profits in PPP projects is that higher quality infrastructure is built to optimize the life-cycle cost of infrastructure management (Soliño and Gago de Santos 2010). This should be true for capital-intensive PPPs in any sector. There is, however, little evidence that this is the case or that in all traditionally procured projects the opposite is true. On a declarative level, there is a widespread embrace of life-cycle cost (LCC) optimization principles in PPPs in the UK, but there are practical obstacles to its execution(Meng and Harshaw 2013).[27]

[27] The study inferred the critical success factors for achieving LCC from a survey with 52 responses: (1) contractual obligation and client driven optimization; (2) good awareness and understanding of LCC; (3) encouragement of LCC through competitive bidding; (4) integration of all key stakeholders into LCC; (5) early

There is evidence to support this proposition. An available study on social infrastructure by NAO (2007)—a construction review of PPP hospitals in the UK—found that these were not built to a higher standard of quality than traditionally procured hospitals. A report by the Bundesrechnungshof (German Court of Audit, 2014) in review of seven German PPP motorways comes to the same conclusion, albeit in the context of investigating innovation. PPP motorways were built to the same standard as traditionally procured ones. The primary reasons cited were two: First, even though contracts were output-based, building to a different standard is difficult due to strict technical rules and regulations.[28] Second, as lenders are risk averse, they may prefer tried and tested methods rather than experimentation.

Even though the evidence presented is limited it does suggest that expected benefits of PPPs that would come from project phase bundling cannot be taken for granted. Restrictions and counterincentives exist as well.

4.5 Competition for the Contract

Competition is one of the key conditions for the EMH to hold. It is generally accepted that transferring risk to a risk-averse private party will incur a risk premium, with the size of such premium depending on the level of risk aversion and the degree of competition.

Empirical data on competition for PPP contracts is currently limited to the UK, though this evidence consistently suggests that competition is limited because of complexity and transaction requirements (House of Commons Treasury Committee 2012). For example:

(a) The NAO (2007) found that one third of PFI projects attracted one or two bidders between 2004 and 2006, mainly because of a lack of bidder interest since only a handful of firms have the economies of scale and asset base to absorb the exposure and high bid costs.

(b) Zitron (2006) reported that on average there were three bidders for each SPV contract in

involvement of construction and financial management teams in the design process; (6) well-established procedures and methodologies; (7) reliability and accuracy of data; and (8) regular monitoring the implementation of LCC. In the study lack of data and contractual incentives were also often cited as a cause for the failure of the LCC.

[28] This situation is not particular to Germany. Motorway construction has a long tradition, which spawned a range of technical requirements and safety standards in different countries and regions (e.g., UK, Netherlands, Belgium). These define the main road features as a product (e.g., the width of the drive lanes, shoulders, etc.). There is, however, more room for process innovation, which should make the construction more efficient.

his sample of 86 PPPs in the UK, and in a quarter of them there were fewer than three bidders.

(c) Hellowell and Vecchi (2012) found that from 1997 to 2010 the market for private finance of PPP hospitals was an oligopoly with a very limited number of firms, and that churn and market penetration rates are extremely low. In addition, they find no improvement over time.

(d) Blanc-Brude (2013) suggested that the transfer of risk deters smaller firms unable to absorb or manage it from bidding. He finds evidence that in the UK PFI school market the distribution of bidding firms is skewed towards the largest firms (which also have the most capacity to absorb major risk transfers through fixed-price/fixed-date contracts).

5 Discussion

Economic theory assumes both public and the private sectors can diversify non-systematic risk well. It disagrees about whether the systematic risk equity market premium is relevant to the taxpayer. Given the review of the available evidence for PPPs, the current perspective of economic theory appears to be too narrow and possibly focused at the wrong end of the problem.

EMH in economic theory assumes that non-systematic risk is quantifiable and can be eliminated by diversification of a portfolio. There is evidence that a weak form of the EMH applies for homogeneous assets, such as equities or commodities. We have significant doubts, however, about the applicability of the EMH to infrastructure assets, particularly to project finance PPPs.

A central challenge to the applicability of the EMH in PPPs is the difficulty in quantifying risk. The heterogeneity of contracts and project scopes means that the pricing performance history that could enable modeling and quantification of risks has not been available to bidders or governments. If risks cannot be clearly identified or quantified, it is implausible that market actors will be able to eliminate non-systematic risk of an infrastructure asset through careful diversification since they will not be able to identify those assets with imperfectly correlated returns.

Should infrastructure become an asset class, this would only resolve the risk pricing issues

at the level of investors and lenders. Construction contractors and other private participants accept the risks transferred to them as part of the PPP contract at a premium. They lack the data to support the quantification of these risks, but also the opportunities to adequately diversify their portfolio. Therefore, the premium they charge is likely to be above the efficient level that might be predicted by the EMH.

Evidence examined in this paper provides some support for this position. Construction costs for equivalent infrastructure were found to be higher under PPPs than traditional procurement. This difference is not explained simply by SPVs having incentives to minimize the whole of life costing through the upfront construction of better assets. Instead, it is more likely attributable to the inability to quantify risk and the PPP risk transfer, both deterring competition in the bidding and attracting high-risk premiums among those consortiums who do bid. Within the PPP contract structure, the construction company carrying the construction cost risks is likely to embed a relatively large risk contingency in its cost estimate.

The considerations provided apply to non-systematic risk. Overall, the premiums arising from transferring non-systematic risk to the private sector seem to be by far a more important issue than discussions about the systematic risk premium for the taxpayer arising from a functional relationship between project outcomes and the national income (as noted at the end of the second section the base premium is well below 1%, and would have an even smaller impact, when beta will be less than 1).

Beyond systematic risk, the risk premiums for non-systematic risk, embedded by parties within the PPP structure (such as construction cost contingencies) will drive costs above those charged to a government when it is relying on other procurement modes. There are three reasons to expect this: First, in contrast to the private parties in a PPP, the state is reasonably well placed to diversify risks due to its large balance sheet and varied set of risks to its outlays and revenues (Samuelson 1964; Vickrey 1964); second, the state can face the lack of information with risk neutrality when the taxpayer base is large and the project does not constitute a substantial part of the economy as a whole (Arrow and Lind 1970); and third, the state can draw on taxpayers *ex post* to pay any shortfalls.[29]

[29] A given overspend has the same direct social cost with either public or private financing (the risk of

This does not imply the state should not care about risk or that it should not try to assess it and use it in decision making. It means that the taxpayers in traditional procurement pay a price that is closer to the actual cost of risk than they would under a PPP.

6 Conclusion

This paper contributes to the long debate on the comparative cost of public and private financing in traditional procurement and project finance PPPs.

As presented in the first and second section, economists have already come to the conclusion that the representation of risk in the public and private sector is different (ex post vs ex ante perspective). Simply comparing the public cost of borrowing with the private cost of finance is inadequate. They also concluded that the capital markets are not perfect, i.e. fully efficient. Applying that insight, they found that what private capital markets charge for systematic risk, is greater than what is relevant for taxpayers. Economists however assumed that both the private and public sector can diversify non-systematic risk well. This paper investigated this issue further in the context of infrastructure projects with focus on non-systematic risk.

In an interdisciplinary effort, we have explored if the assumptions of a weak definition of market efficiency (the EMH) fit with the practice of risk transfer to PPPs and its allocation within a PPP. Our aim was to pool available empirical evidence and to propose a narrative (a hypothesis) to adequately explain it.

Our findings suggest that defining infrastructure as an asset class (and distinct types of PPPs as relevant subclasses) will be insufficient to achieve efficient risk pricing for PPPs when considered holistically. Much of the risk is transferred off the SPV as well. These risks will still be difficult to identify and quantify. Defining the infrastructure as an asset class means that at some point (e.g., through international research efforts) the EMH becomes valid for the risks that remain at the SPV level (those that cannot be passed on to third parties).

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such an overspend will be reflected in private financing costs and *ex post* also in public financing costs). The private contractor and private shareholders may be more averse than the government to such risks, because of the possible subsequent collapse of the contractor and serious personal or reputational loss to the financiers. But if the cost falls on taxpayers, there will be no further costs or this kind as the financial loss is widely spread. In short, the taxpayer will pay exactly for the cost of the overspend and no more.

In effect, the direct cost of financing for PPPs would be lowered and brought closer to the true (*ex-post*) cost of public finance. This would do nothing, however, for risks transferred to third parties.

Evidence on construction risk suggests that a lack of information about risk, combined with large risk transfers through high powered fixed-price/fixed-date contracts, yields high-risk premiums and inherently reduces competition. These contracts reduce the risk exposure for the lenders (and the cost of financing they offer) at the level of the SPV, but in turn increase the principal that has to be financed since the suppliers in a PPP consortium (in our example, the construction company will charge a high contingency value). Similar issues might arise with other suppliers/insurance options in PPPs, though we do not treat those as no data is available.

In this way, it can be argued that the state has an advantage in the cost of financing against infrastructure PPPs. This holds even after considering the difference in how risk is represented in the public and private sector. The state is better able to spread diversifiable project risk and has the ability to approach the lack of information about diversifiable risk in a risk-neutral manner, paying for any shortfalls if and when they occur.

A basic corollary to our findings is that the efficiency gains from a project finance PPP would need to be much higher than previously understood to be preferred over the traditional approach. In the past, mainly the cost differential in financing between the public and private sector, transaction cost, and the public cost overruns were considered in Value-for-Money discussions. On-time and on-budget delivery in PPPs, for example, were assumed at no extra cost to the public (NAO 2013; Hellowell 2010). Future research would benefit from more data on project performance in diverse sectors.

Two basic recommendations follow from our analysis. First, greater detail in understanding which risk items are manageable is needed. This would give us a better picture of which risks should remain with the state or be shared with the private sector.[30] Moreover, contract design and risk transfer should also consider an offsetting effect on competition. Some efforts in that direction have been made as well (Bridge and Bianchi 2014). In sum-

[30] High level attempts, like Carbonara, Costantino, Gunnigan, and Pellegrino (2015), have already been made.

mary, there is a need for an empirically informed procurement design guidance, that takes the above mentioned dimensions on board.

Second, the incentives and efficiency outcomes in both PPPs and other options for private participation in infrastructure need to be better understood. Reducing risk exposure of the private sector may help addressing the risk pricing inefficiency problem, but it will also reduce the incentives for efficiency. Hence, the issue is not only related to shifting risks to one or the other party (following the initial question of Arezki, Bolton, Peters, Samama, and Stiglitz 2016), but also what is the fundamental approach in which they are treated. It is a question whether the PPP concept is the best approach to involve private investment in non-competitive infrastructure markets and what alternatives we have.

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Table 1: This table presents a summary of existing studies of construction cost overruns in traditional procurement.

Construction Cost Overruns in Traditional Procurement

Source	Reference Estimate	Project Type	Time Period	Observations	Average Cost Overrun (%)	Area
Cantarelli, Flyvbjerg, and Buhl (2012), Flyvbjerg, Holm, and Buhl (2003)	Decision to build	Roads	1927-	278	21.2	NW Europe
		Bridges, tunnels		39	25.3	
Cantarelli, Molin, Van Wee, and Flyvbjerg (2012)	Decision to build	Roads	1980-	37	18.9	Netherlands
Makovšek, Tominc, and Logožar (2012)	Decision to build	Roads	1995-2007	36	19.19	Slovenia
Lundberg, Jenpanitsub, and Pyddoke (2011)	Decision to build	Roads	1997-2009	102	21.2	Sweden
Lee (2008)	Decision to build	Roads	1985-2005	138	11	South Korea
Ellis Jr, Pyeon, Herbsman, Minchin, and Molenaar (2007)	Detailed design	Roads, bridges	1998-2006	1847	–13.4	USA
Odeck (2004)	Detailed design	Roads	1992-1995	620	7.88	Norway
Cantarelli, Van Wee, Molin, and Flyvbjerg (2012)	Detailed design	Roads	1980-	23	–2.9	Netherlands
Ellis Jr, Pyeon, Herbsman, Minchin, and Molenaar (2007)	Contract value	Roads, bridges	1998-2006	1908	9.36	USA
Bordat, McCullouch, and Sinha (2004)	Contract value	Roads	1996-2001	599	5.6	USA
Hinze and Selstead (1991)	Contract value	Roads	1985-1989	110	9.2	USA