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INVESTMENT ANALYSIS IN PUBLIC-PRIVATE-PARTNERSHIP PROJECTS: ANY COMMON GROUND FOR PUBLIC AND PRIVATE INVESTORS?

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ABSTRACT

Purpose (mandatory): *The purpose of this paper is to show analytically that cash flow – based project analysis of private investors and cost-benefit analysis of the public sector conflict in many points in public-private partnership projects.*
Design/methodology/approach (mandatory): *The method of analysis is based on cash flow accounting and cost benefit analysis. A single-project company is used as a demonstrating case. The flows of cash (private investors) and flows of costs and benefits (public investors) are integrated in a single analytical framework.*
Findings (mandatory): *The findings show that the investors' (public vs. private) social, economic and financial targets are not necessarily coinciding. Prospecting of common ground and win-win situations becomes a crucial success factor for any public-private partnership project.*
Research limitations/implications (if applicable): *The current research on public-private partnerships is much focused on project delivery methods, contractual issues and discussion on the need of public-financed comparator. This paper will clarify the real problems faced.*
Practical implications (if applicable): *The paper will set some guidelines how to find the common ground for successful PPPs. It also points out potential conflict areas.*
Social implications (if applicable): *The paper in itself contains an element of socio-economic appraisal of projects that will increase the wealth and well-being of people.*
Originality/value (mandatory): *The originality of the paper lies on its generic approach to single-project valuation problem, combining the both sides of valuation aspects: private and public investors.*

Keywords: public-private partnerships, investment, project, cost-benefit, finance

INTRODUCTION, SCOPE AND OBJECTIVES

To overcome the problems of funding capital investments for example in transport, energy, and utilities sector, a number of solutions concerning capital provision, contractual arrangements, off-balance sheet financing (from the viewpoint of the state), among other means, have been introduced. For road transport projects, where the users are mostly individual drivers, tolling of road use is perhaps the most common manner of capital finance. Analogically, electricity customers pay the capital investments through their electricity bills. The capital investment recovery can be arranged in many other ways too: for example, through availability payments, shadow tolls, grants, exclusive monopoly positions, etc. Typical for these alternative arrangements, or arrangements that one way or the other supplement end users payments, is the public intervention in guaranteeing the revenues for the investors that provide the initial capital outlay to build the physical facility offering the service in question.

The approach of introducing private investors to finance, build and operate a major facility on behalf of the state, city, municipality or some other public entity is globally termed as public-private partnerships (PPP or 3P). The partnership is built on long-term contracts, concessions or leases to enable private investors to construct the facility and provide services to the public according to agreed – and in most cases very complex and extensive – contracts. The contractual side of PPPs is well covered in the management literature of infrastructure, transport, energy, finance, public economy, for instance, and good overviews are provided e.g. by European Investment Bank (Uppenberg *et al*., 2011), the World Bank (Estache *et al*. 2007 for transport; Marin, 2009, for water supply in developing countries, Cuttatree and Mandri-Perrott, 2011) and Organisation for Economic Co-operation and Development (OECD, 2008; Araújo and Sutherland, 2010).

Another feature that is quite common, though not exhaustive, for major PPPs is the project financing nature of investment and the whole life cycle of the effort. A project company is built up by the investors and the project company starts to prepare for the capital investment and finally for the operating phase of the investment. The reasons for setting up a separate project company are at least two-folded. First, the risks of the investment, of which the investors and the public side of the partnership could have an incomplete and uncertain picture, are isolated hence into a single-project entity and the investors are liable just to the extent of their invested capital to the project company. Secondly, for the public partners the single-project company represents a more transparent entity which is easier to monitor in terms of performance, service quality and finance than a larger and multi-business-segment entity, where the "project" represents just one among many.

The principle features of project financing are as follows (Brealey *et al.*, 1996, p. 25):

- The project is established as a separate company which operates under a long-term contract (a concession) obtained from the host government.
- A major proportion of the equity capital of the project company is provided by the project manager or sponsor, tying the provision of finance to the management of the project.
- The project company establishes comprehensive contractual relationships between the suppliers, customers and host government organizations.
- The project company is highly leveraged financially.

The project cash flows are divided by equity investors, debt investors, contractors and suppliers and users that receive the service. Equity investors are often the founders of the project company (i.e. contractors, developers, public authorities) and financial institutions that seek long-term investment opportunities, such as pension funds and insurance companies. Even individual persons can be equity investors if share issues are made public. Debt investors are usually banks, investment funds, and etc. that operate in the financial market routinely.

This paper forms a holistic and generic cash flow model on a single-project company and applies it in a framework where also the public benefits are included. Thus the model creates an analytical frame where each stakeholder's economic and financial positions can be pointed and studied. The model enables empirical data to be fed in in order to research real world examples and hence it provides a platform for further empirical analysis. The model has been already successfully applied to the first Finnish PPP road project, the E4 between Helsinki and Lahti (Leviäkangas, 2007).

This paper is furthermore a theoretical analysis more than an empirical one, but the model provided is relatively simple and allows first meta-analysis of large projects. However, the model is unable to capture contractual finesses which could have a radical impact on project outcomes from the viewpoint of stakeholders and project partners. (Leviäkangas *et al*., 2013) Methodologically, this paper falls in the cross-section of cost-benefit and cash flow analysis, bearing therefore an emphasis on investment theory, but both from the economic and corporate finance angles. This attempt to combine the public side's cost benefit analysis (CBA) and private side's financial analysis is the added value to the body of knowledge.

MOTIVATION FOR PPP: LITERATURE

The European Investment Bank approximated that on average about 3.9 percent of GDP was invested in infrastructure projects – including transport, health, education and utilities (electricity, gas, water supply) – in the European Union by old member states and about 5.1 percent by the new member states for 2006 – 2009 (Wagenvoort *et al*., 2010). These figures show how significant amounts are at stake.

Investors have been keen on infrastructure assets, but distinctive differences are within different classes of infrastructures (Inderst, 2010) as well as there are differences between investing in infrastructure funds and direct investing in specific projects (Bitsch *et al*., 2010). This paper deals with the latter alternative, i.e. direct investment in a single-project company.

PPPs have been endorsed owing much to their ability to clean governments' balance sheets. However, the new rules set in Europe by Eurostat in 2004 have taken partly away this advantage: any public sector commitments made towards PPP projects are now accounted as public obligation and recorded in national accounts accordingly, but yet depending on the level of risks borne by the private sector investors (Posner *et al*., 2009). The situation is not necessarily the same across the globe, though, and in some countries PPPs probably continue to work as an effective off-balance sheet financing tool for the national and/or local government.

PPPs are seen as a key to increase efficiency in service delivery, due to the hypothesis that private sector is more efficient in providing services for consumers or citizens than the public sector (see e.g. UNESCAP, 2011; Alfen *et al*., 2009), although truly empirical findings are scarcer – and some early experiences are controversial and the final truth seems to be highly contextual (Burger and Hawkesworth, 2011). Engel *et al*. (2010) argue that higher costs often encountered in PPP projects is not as such an argument in favour of public provision as these costs could imply deficient contract design rather than high costs *per se*.

SINGLE-PROJECT COMPANY – ANALYTICS OF CASH FLOWS AND BENEFIT GENERATION

The single-project company is shown in Figure 1. Its stakeholders include the aforementioned investors (debt and equity), the state, users, and suppliers and service providers. There are real cash flows between the project and its stakeholders and then there are less tangible benefits for the users, which do not necessarily account for cash flows but are nevertheless significant with regard to project's socio-economic appraisal. For example, transport projects' safety and travel comfort do not in all cases transfer to cash flows, but are still relevant criteria for the project to be accepted by the political machinery and general public.

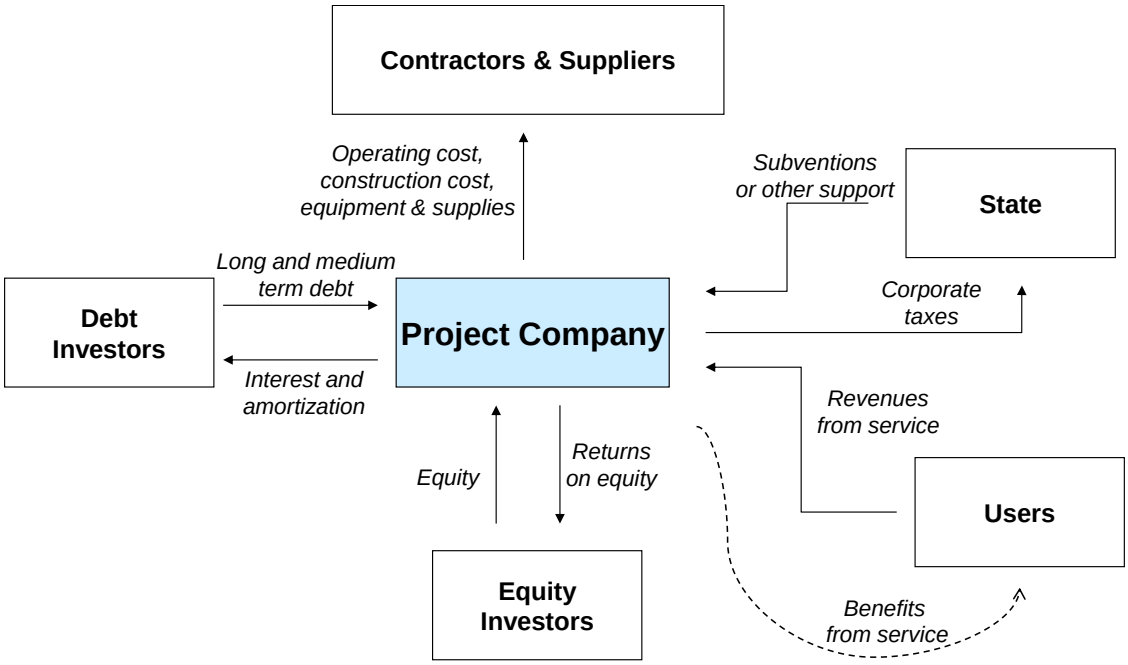

Figure 1. Single-project company (modified from Leviäkangas, 2007)

The above conceptual model can be translated into an analytical one. To start with, the following symbols are used:

Rev = revenues of the project company; the revenues are divided into revenues from users and revenues from the state: $Rev = Rev_U + Rev_S$

Ope = operating expenses of the project company; these are mainly all-year-round road maintenance and operating costs

ES = equipment and supplies costs needed for the build-up of the facility; running costs of materials etc. are included in operating costs *Ope*

Con = construction cost, i.e. the expenses of constructing the facility
C = total life-cycle monetary before-tax costs for the project company; $C = Con + ES + Ope$
Tax = corporate taxes paid by the project company
E = equity capital invested in the project company
D = debt capital raised by the project company
iD = interest on debt capital
A = amortisation of debt
Dep = depreciation of the project company's assets
T_c = corporate tax rate
Ben = benefits accrued to the users in socio-economic cost-benefit analysis (CBA)
Ext = external costs related to the project, included in CBA.

Only corporate tax is assumed, and any other taxes excluded, such as taxes of bondholders and equity holders. It is further assumed that the project company distributes immediately all the net cash flow earned to shareholders as dividends. This is a reasonable assumption since the whole idea of the project is to generate adequate and as-early-as-possible cash stream to investors. This at least partly removes the need for other tax considerations, as it is assumed that investors' net cash flows are treated according to other tax regimes, i.e. as personal income or corporate taxes of other owner entities. All cash and other monetary flows are shown in present value form, discounted by the rate that each actor prefers. Thus the same flow, e.g. outflow of the state and inflow of the project company are not of same present value to these stakeholders.

The free cash flow to investors (*FCF*) is the measure of wealth increase for them. This surplus is available for investors after their initial capital outlays (*E, D*). The free cash flow for shareholders which is after-tax net cash flow plus tax advantages from depreciation and interest payments

$$FCF = (1 - T_c)(Rev - Con - ES - Ope) + T_c Dep + T_c iD$$
$$= Rev - Con - ES - Ope - T_c(Rev - Con - ES - Ope - Dep - iD) = Rev - C - Tax$$

because taxes paid by project company must be

$$Tax = T_c(Rev - Con - ES - Ope - Dep - iD)$$

Since the calculus is done in present value terms it can be assumed that costs of construction, equipment and materials, *Con* and *ES*, equal *Dep* and should not be double-counted, we can simplify, because *Con*, *ES* and *Dep* occur in different accounting periods but must approximately at the end of the day equal to each other, and since operating expenses are as well tax deductible:

$$Tax = T_c(Rev - C - iD)$$

The total cash flows to single project company equity holders are defined as after-tax net revenues minus costs and expenses less the initial equity outlay, deducted further by debt service payments (amortization and interest)

$$TCF_E = (Rev - C - Tax - iD - A) - E$$

and the total cash flows to debt holders is the debt raised by the project company from the debtors plus the received debt service payments

$$TCF_D = (iD + A) - D$$

Summing these two form the total cash flows of the single-project company

$$TCF_E + TCF_D = Rev - C - Tax - (E + D) = FCF - (E + D)$$

which states that the incremental value produced by the single-project company to its owners is the free cash flow minus the initial capital outlays of equity and debt – as should be. The sum of owners' cash flows represent the project investors' investment's net present value followed when their invested capital is subtracted from present value of project company's cash flows.
The market value of the project company is the present value of free cash flows, i.e. the initial capital outlays plus the incremental value:

$$V_p = FCF = E + D + TCF_E + TCF_D$$

Depending on the leverage ratio of the project company the market value is different for the equity and debt. The market value of debt is the initial debt outlay plus the incremental available to debt holders

$$D_m = D + TCF_D = D + (iD + A) - D = iD + A$$

The market value of equity is the initial equity outlay plus the incremental available to equity holders

$$E_m = E + TCF_E = E + (Rev - C - Tax - iD - A) - E = FCF - iD - A = FCF - D_m$$

The market value of the single-project company may then be written as

$$V_p = E + D + TCF_E + TCF_D = (E_m - TCF_E) + (D_m - TCF_D) + (TCF_E + TCF_D) = E_m + D_m$$

STAKEHOLDERS' ECONOMIC AND FINANCIAL POSITIONING

1. Financial and economic flow matrix

Table 1 shows the flows of cash between stakeholders. The cash flow matrix indicates that it is fairly straightforward to calculate each stakeholder's net cash position, column by column. The non-cash items, i.e. the benefits and external costs generated by the project can usually be monetized according to standard cost-benefit analysis. The problem in many countries is that the standard does not exist, whereas for instance in the Nordic countries CBA is well standardized e.g. for transport infrastructure development projects. For many other marginal system improvements the situation is not necessarily so, even in Nordic countries. For example, the meteorological services are regarded highly beneficial for the society and users

of services, including both private citizens and organizations, but their benefits are studied seriously only recently (see e.g. Leviäkangas, 2009; Leviäkangas and Hautala, 2009). The benefits of any service provided by PPP projects, be they financial (cash) or otherwise monetized (non-cash), are highly dependent on not only their recognition but also on the valuation techniques applied (Leviäkangas, 2009).

Benefits that are usually non-cash but still paramount as socio-economic gains vary according to project type:

- transport infrastructure projects: typically accident cost savings, time cost savings
- water supply projects: health impacts
- energy projects: economy-wide external benefits.

Table 1. Cash flows, costs and benefits of PPP project (modified from Leviäkangas, 2007).

Equity investors	**Debt investors**	**Project company**	**Users**	**The state**	**Contractors & suppliers**	**Notes & explanations**
$-E$		$+E$				Equity investors invest E in the project company
	$-D$	$+D$				Debt investors invest D
		$-Con$			$+Con$	Project company constructs at expense C
		$+ Rev_U + Rev_S$	$- Rev_U$	$-Rev_S$		Project company receives revenues from the state
		$-Ope - ES$			$+Ope + ES$	Project company pays contractors for the operating (e.g. maintenance)
	$+iD$	$-iD$				Project company pays interest on debt
	$+A$	$-A$				Project company amortizes the debt
		$-Tax$		$+Tax = T_c(Rev - C - Dep - iD)$		Corporate taxes after expenses, depreciation* and interest
$+[(1 - T_c)(Rev - C) + T_cDep + T_ciD]$		$-[(1 - T_c)(Rev - C) + T_cDep + T_ciD]$				The surplus cash flow available for shareholders, paid by the project company**
			$+ Ben$ $- Ext$			The state accounts for benefits of users and third parties, i.e.

Equity investors	Debt investors	Project company	Users	The state	Contractors & suppliers	Notes & explanations
						the external benefits, as well as external costs

[*] Depreciation (*Dep*) equals the cost of depreciated assets (*C*); it is a matter of depreciation technique, existing accounting regulations and practices and, to certain extent, managerial choice how much of the incurred construction expenses are activated immediately in the income statement and how much are kept in the balance sheet as deferred expenses to be activated later as depreciation; at the end of the day, *C* must equal *Dep* and they must be accounted only once per accounting period.

[**] The available surplus for investors after interest and taxes = $(1 - T_c)(Rev - Con - ES - Ope - Dep - iD) = Rev - C - Ope - Tax$ = Free cash flow (*FCF*).

What is furthermore typical for these types of PPP projects is that some of them involve the direct collection of revenues based from the users of the service and possibly also from the public client - here it is referred to as "the state" but it could be any public agent working on behalf of the community and/or society. It is an inescapable fact that without these revenues any PPP is impossible to implement and the business case for private investment is missing.

The rules to satisfy different stakeholders' economic rationale are as follows. The shareholders of the project company must receive enough cash flow in order to cover their initial equity capital investment plus the interest they have placed on their equity:

$$(1 - T_c)(Rev - C) + T_cDep + T_ciD - E > 1 \Leftrightarrow (1 - T_c)(Rev - C) + T_cDep + T_ciD > E \Leftrightarrow FCF > E$$

stating simply that after-tax net cash in present value terms (discounted by required return on equity) after all costs in the project, and after interest and depreciation tax benefits (because these are tax deductible) must be greater than the initial equity placement.

In fixed period concessions, the project company is left in the end with empty pockets and liquidated after it has fulfilled its task of delivering the service. When the project company is expected to continue its existence over an indefinite period of time, the shareholders must consider the liquidity position of the company and other long-term obligations, such as pensions and re-investments.

For debt investors the rule is equally simple: the debt allowed to the project company must be paid back in full with required interest. Hence the interest and amortization cash flow in present value terms, discounted with required return of the debt holders, must exceed initial debt outlay:

$$iD + A - D > 0 \Leftrightarrow iD + A > D$$

For suppliers and subcontractors the case of project's profitability is of secondary importance as long as their contracts with the project company are economically worthwhile.

2. Cost-benefit rule

And it is now when the picture becomes more blurred: the net benefits that are received by the users and society (or community) as a whole must exceed the payments made to the project company, i.e.

$$Ben - Ext > Rev_U + Rev_S - Tax$$

which is in fact the comparison of benefits and costs of the project, and the aggregate benefit cost ratio is then simply

$$(Ben + Tax) / (Rev_U + Rev_S + Ext)$$

If we assume that the project is equally beneficial as PPP or as traditional public financed project (i.e. benefits remain constant), the comparison between PPP and traditional procurement (from the viewpoint of the state) must be done between revenues paid by the state and users and costs of the project. Would the costs be greater with traditional model than the revenues paid to the project company? Again, the comparison itself is rather straightforward and it brings forth the potential efficiency of the private sector, which on the other side is offset by the higher returns of the private investors.

Since many of the benefits received by the users or by the public can be non-cash, and sometimes very difficult to monetize, there is always room for speculation about the socio-economic profitability of the project. The more there are non-financial benefits to be considered, the more complex, blurry and debatable the picture gets. There is also the question of direct user financing and state (public) support and how these are divided between users and the state. For example, in shadow toll roads, where the state covers the "tolls" directly from its budget on behalf of road users, there is a justified argument that the rest of the tax payers are paying the road on ultimate beneficiaries' behalf. The same argument applies to state subsidies, be they in the form of grants or tax reliefs – the large crowd of tax payers is supporting a project that benefits perhaps only a local community, some restricted area of the country or a specific user group. A perhaps unlikely, but not totally unknown scenario of PPPs is encountered when the state decides on purely user financed projects just to be able to collect more tax revenues.

From users' point of view, there is a crucial difference how large the public intervention is, since it reduces their own payments for the service. The more direct are the user benefits, the more willingness to pay there is from the side of users. So, on one hand, for example, the private health care services have always been well-off even in countries where public health care is of wide coverage. The basic human need dictates a good business case for such services. On the other hand, it is difficult to picture an entirely privatized health sector that would not lead to severe social problems.

When user benefits are not that directly related to individuals' consumption power or well-being, the willingness to pay is reduced: the willingness to pay for safer travel is probably not significantly higher than willingness to pay for the mobility service in general. These social benefits sometimes represent a significant sum of the benefits of projects. For example, the

Finnish road projects' benefits are dominated by time savings and accident cost savings. The latter item represents on average more than one third of the total benefits of average road investments (Tervonen *et al*., 2010).

3. Uncertainty and risk

When decision making concerning investments is risk-neutral, the expected values of discounted cash flows and benefits may be used. The problem usually arises when in practice the public sector does not adjust their analysis (CBA) for risk whereas private sector does it with great piety. One place where this makes the difference is the discounting rate different parties use. The risk-adjusted rates of returns for private investors are by and large higher than those set by public investors. (However, this difference has been narrowing to almost non-existing in Europe, where some governments' credit ratings have been in fact riskier than private companies').

Private investors are not risk-neutral but risk-averse - no investor wants to take any more risks than necessary. This in turn means that the expected positive cash flows will have less present value than in risk-neutral case, and their value relative to investment outlay that occurs in the front end of the project will decrease.

DISCUSSION

A good project is a good project. Using different financing mechanisms does not change the nature of the project itself. It is a recognised fact that many countries have used PPPs to leverage their infrastructure and expanding it beyond true needs and hence including projects in their investment programs that would not have been financed via conventional routes, e.g. through state budget. In these cases these investments have led to excessive infrastructure with poor returns in the end. For instance, a significant share of Portugal's main road investments were carried out as shadow toll PPPs, which resulted in a severe financial distress of the state (Cruz and Marques, 2011). Later, many of these projects were changed into conventional toll roads, where users pay for real. In addition, PPPs have been used as an emergency exit from unsustainable public budget deficit leading to overinvestment or long-term commitments to pay off the private investments that put the state in even tighter position after state's payments for the service are due.

Another example comes from Finland. The first PPP project in the country was an upgrading of semi-motorway E4 between Helsinki and Lahti to a full motorway, meaning in essence the building of the second carriageway next to existing motorway and constructing new bridges and levelled intersections. Again, the shadow tolling was used as a financing method so that the state paid "tolls" for each vehicle kilometre travelled on the road. The project was analysed in detail to the extent that public documents allowed and it was reported that the state paid more for the road in the long run than it would cost using traditional public project procurement. (Leviäkangas, 2007) On the other hand, the project was built well ahead of planned schedule and has served the road using public in an impeccable manner.

The above arguments lead to the conclusion that direct user financing is most likely to be a more sustainable financing mechanism than such where the state or some other public intervention is stronger. Projects that often offer the possibility of direct user finance are such

where the service is tangible and there is a tradition of paying for it. Electricity, heating, public transport, water, etc. are the kind of services where users already are accustomed to pay, and hence these types of projects are easier to justify and there needs to be less government intervention. Some of these projects can rely on business customers: airports are in the end paid by airlines and ports by shipping lines, because visiting the service (i.e. infrastructure) is not free of charge. Thus there is a strong link between customers' willingness (and note, *tradition*) to pay and provide real cash in return of the service. This conclusion was also reached in Leviäkangas *et al.*, (2011) when investigating the returns of Finland's infrastructures (roads, rails, ports, airports, water, energy). Especially basic need satisfying services, such as water and energy, proved to be very profitable.

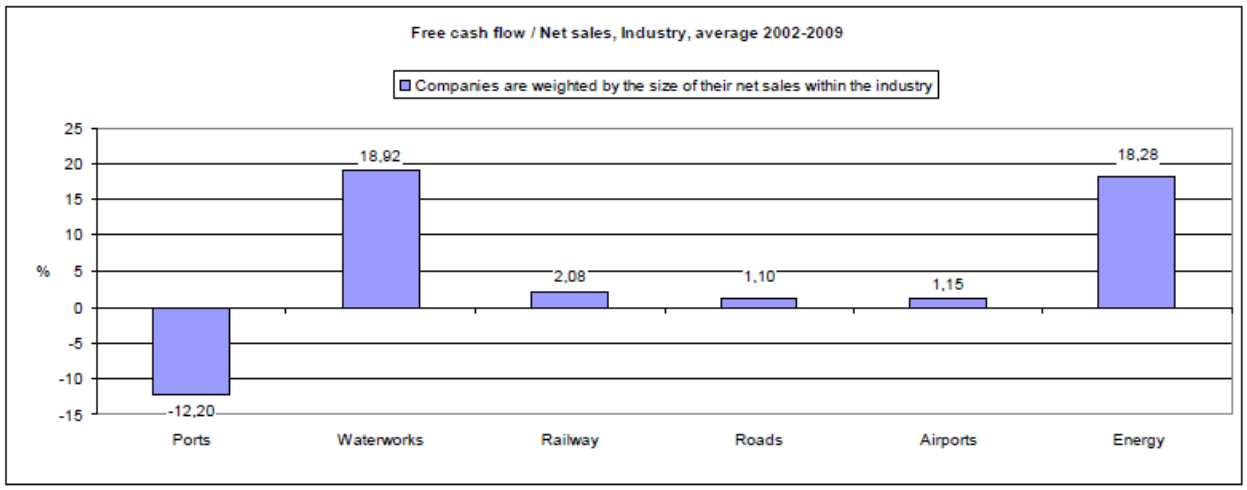

Figure 2. Free cash flows provided by infrastructures to their owners; the sample includes both public and private infrastructures (source Nokkala et al., 2011).

Since it is the after-tax net cash flow that dictates the project's financial viability to its owners, and since these revenues must come from the users or the state or both, it is the revenues and generated benefits that dictate almost the whole framework of PPPs, whether they are economically and financially sustainable in the eyes of investors and greater public. Benefits must exceed the revenues (as in our equation earlier) and revenues must exceed all costs and capital repayments. The more there are non-cash benefits, e.g. socio-economic returns, the more likely is the state or some other public financing called for, whereas when users receive tangible benefits directly, like water and electricity, the less likely is the need for public intervention.

Benefits such as safety or reliability belong to the category for which the real market-based willingness-to-pay is highly uncertain. Quite often research is carried out to point out the willingness-to-pay but these are typically stated preferences and not truly market tested. Willingness-to-pay is ultimately always tested by the market and if it remains untested, relying on it may be over-optimistic.

In sum, the analytical model points to the direction of prior studies. Private investors must rely on real cash flows and this may be ensured best by putting the service provision under market test and building on direct payments from the users. From the private investor point of view, the difference between state-paid and user-paid revenues is insignificant and if there is

a difference, it is likely to be in favour of the state. A state is, in most cases, less volatile customer than the consumers – provided of course that the government and political context can be regarded as stable. This is also something for the state and governments of recognize: involving themselves in the revenue logic of PPP projects they should be aware that they lower the risks of investment perhaps considerably. And this of course should be reflected to the returns paid to the investors.

For private finance policy the aforementioned reasoning seems to imply that only truly good projects with real, tangible service provision, should be considered to be implemented as PPPs. Poor projects that do not survive administrations' internal competition are not the best projects for PPPs, but vice versa. Also projects that must rely on market demand are probably the most suitable PPPs. Since PPPs have been applied to hospitals and schools in addition to traditional infrastructure projects, we should carefully distinguish who ends up paying for the project. A hospital may be a good thing, but unless it is completely private from the very start, the full amount of required revenues cannot essentially come from "customers", i.e. the patients, and the public sector must step forward to cover the investment amortization and running costs using tax payers' money.

Finally, we should perhaps detach ourselves from infrastructure –related thinking because infrastructures are highly capital intensive projects where revenues must be substantial in order to cover all costs and returns. Service sector is something where PPPs have been applied much less and where there could be in fact an even greater potential. Services are usually less capital intensive and moreover, usually more interfaced with direct customers.

Quite a bit has been discussed about public sector comparators. These are project models that are used in conjunction with PPP projects in order to be able to compare which financing alternative would be better from the public sector's viewpoint. This framework that was prepared for this paper shows that the comparator is perhaps not that necessary, or that at least it is not as difficult to construct as sometimes feared. Yes, there can and must be consideration whether the project is PPP or conventional, but in the end only the benefits against costs matters. If public sector can provide the same project effortlessly through its budget and in particular if the project generates a great deal of socio-economic benefits, there are few arguments for PPP. And on the other hand, if the project is relying on market demand and real cash flows, where is the case for public investment or intervention?

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