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- Substantive areas such as government procurement laws and regulations, procurement economics and politics, and procurement ethics; and
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PUBLIC PROCUREMENT MECHANISMS FOR PUBLIC-PRIVATE PARTNERSHIPS

Dmitri Vinogradov, Elena Shadrina, and Larissa Kokareva*

ABSTRACT. Why do some countries (often developing and emerging economies) adopt special laws on PPP, whilst in others PPPs are governed by the legislation on public procurement and related bylaws? This paper explains the above global discrepancies from an institutional perspective. In a contract-theoretical framework we demonstrate how PPPs can enable projects that are not feasible through standard public procurement arrangements. Incentives for private partners are created through extra benefits (often non-contractible) from their collaboration with the government (e.g. risk reduction, reputational gains, access to additional resources, lower bureaucratic burden, etc.). In a well-developed institutional environment these benefits are implicitly guaranteed, suggesting no need in a specialized PPP-enabling legislation. Otherwise, a PPP law should establish an institutional architecture to provide the above benefits.

INTRODUCTION

Public-private partnerships (PPP) enable projects that (a) cannot be implemented by the private sector alone, for example, due to their low profitability, (b) cannot be effectively performed by the public sector, for example, due to the high costs to the society, and (c) are desirable from the standpoint of their social significance. Various

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definitions of public-private partnerships are in use; to quote just a few of them, a PPP arises as:

- i. "agreement between the public sector and the private sector company to provide an asset or public service, which would traditionally be provided by the public sector, but as part of a PPP project by the private sector or jointly" (Hurst & Reeves, 2004, p.380);
- ii. "partnership between the public sector and the private sector for the purpose of delivering a project or a service traditionally provided by the public sector. PPPs recognize that both parties have certain advantages relative to the other in the performance of specific tasks" (European Commission, 2003, p.16);
- iii. "co-operation of some sort of durability between public and private actors in which they jointly develop products and services and share risks, costs, and resources which are connected with these products" (Van Ham & Koppenjan, 2001, p.598);
- iv. "institutional and contractual partnership arrangement between government and a private sector operator to deliver a good or service to the public, with a distinctive elements (a) a true partnership relationship and (b) a sufficient amount of risk transfer to the private operator" (Fourie & Burger, 2001, p.149);
- v. "financial models that enable the public sector to make use of private finance capital in a way that enhances the possibilities of both the elected government and the private company" (Hodge & Greve, 2007, p.546);
- vi. "long-term contractual arrangement [of a government agency] with a private supplier for the delivery of some services. The supplier takes responsibility for building infrastructure, financing the investment and then managing and maintaining this facility" (Iossa & Martimort, 2008, p.2);
- vii. "arrangements, often a legally-binding contract, that will bring benefits to both sectors. The private sector needs to earn a return on its ability to invest and perform. The public sector

wants to deliver services to the standard specified and to make the best use of public resources" (Nisar, 2007, p.148);

- viii. "a form of procurement involving the use of private sector capital to wholly or partly fund an asset that would have otherwise been purchased directly by the public sector and which is used to deliver public sector outcomes" (Australian Government, 2006, p.70).

This brief but representative list of definitions demonstrates the existing disagreement in the literature on the nature of PPP, yet agrees on some form of collaboration between the state and the private sector in one project with mutual benefits for both parties. Most definitions stress the role of contractual agreements in the formation of PPPs, culminating in the last one, by the Australian Government, that explicitly views PPP as a form of public procurement. What makes a difference between the standard contractual relationships and a "true" Public-Private Partnership? If these relationships can be governed by public procurement legislations why is there a need in special PPP laws that are becoming common in many countries? And finally, why experiences from the adoption of PPPs are so different across nations? In this paper we aim to provide an answer to these questions.

If we consider PPP-enabling legislations across the world, we come to a seemingly strange observation: laws on PPP are being actively adopted in developing and transition economies, whilst developed countries often lack them. For example, in July 2013 Ghana¹ announced the start of the works to develop and adopt the Law on PPP and in May of the same year the Law on PPP has been enacted in Thailand²; in Kenya³ the Law on PPP has been adopted in March 2013. This list can be continued. Along with that there is no Law on PPP in the UK, where it is replaced by recommendations of the Ministry of Finance on how to apply public procurement legislation. In the U.S. there is no federal Law on PPP, though public procurement is regulated at the federal level, yet 32 states have passed their own PPP-enabling legislations by 2012 (see Geddes and Wagner, 2013). The European Commission clarifies how to apply the laws on public procurement and concessions in application to public-private partnerships (CEC, 2008).

Where such laws exist, they do not necessarily promote efficiency. The report of the European Bank for Reconstruction and

Development (EBRD, 2012) on the effectiveness of PPP-enabling legislations in 34 transition economies indicates that 17 of them demonstrate high compliance with international standards – in these countries a special Law on PPP has been already adopted, and only in seven countries the compliance with international standards is low – these are the countries where the special law on PPP or the law on concessions have not been adopted.⁴ At the same time, the adoption of such a law and its high compliance with international legal standards does not guarantee its efficiency: the EBRD indicates low efficiency in most cases⁵ and notes that in 27 of the 34 cases the institutional environment (i.e., the availability of special centers/agencies to facilitate the work of PPP) did not reach even a moderate level of development. In particular, the report concludes that: "without having in place the necessary support of the state the probability to have a large number of PPP projects emerged would be low; thus, the law would apply only to the small number of exceptional projects, supported by the state for one or another reason" (EBRD, 2012, p. 16).

Empirical evidence does not make it clear whether a law on PPP is expedient or not. Moreover, the lack of a direct link between the very existence of such a law and efficiently functioning partnerships is worrisome. The literature provides plenty of arguments both pro and contra PPP. We suggest that this diversity in approaches and opinions is explained by the institutional context.

Our key findings are as follows. Public-private partnerships are justified when the private business is unable to deliver the project without extra benefits arising from and typical solely to such a partnership, usually unavailable through standard contracts. For example, running a project jointly with the state may offer a reduction in bureaucratic obstacles which can be efficiently dealt with by the contracting authority. In this case, the private sector has more incentives to get engaged into such a project, compared to the standard outsourcing. Reputation acquisition improves long-term profit opportunities and thus allows private businesses to bear some short-term losses, to be recovered in the future. The guarantees by the state partner may open an access to the previously unavailable sources of finance, especially when it comes to infrastructure projects for which funding of the World Bank and of the EBRD are exclusively available to public borrowers. Finally, co-production may improve

transparency between the partners, thus reducing verification and reporting costs.

The above benefits largely depend on the institutional environment. For example, a PPP development agency (similar to *Partnerships UK* in the UK or *Central PPP Policy Unit* in Ireland) can help reduce the start-up costs for a joint venture of the private business and the state. The availability of state guarantees on loans extended to deliver PPP projects, reduces the costs of funding. Simplified reporting requirements reduce verification costs, etc. If the extant institutional environment provides for this (for example, the costs of setting-up the business are low, bureaucratic obstacles are minimal, reporting has been simplified and loans are available at low interest rates), then there is little need in a special PPP enabling legislation (or, more precisely, special provisions *on the institutional environment to ensure benefits for PPP*). This explains the three puzzles in the beginning of this section: (1) developing countries are more likely to adopt a PPP law than developed ones, (2) there is no agreement on whether or not PPP are a form of public procurement, and (3) experiences with PPP differ across countries. First, PPP-enabling legislations are potentially more relevant for developing and emerging countries because they might lack institutional environments to implicitly guarantee [some of] the required extra benefits; such an institutional (including cultural and historical) environment is often present in the developed economies. Second, given the presence of this environment, a standard public procurement contract can effectively turn into a PPP, thus making a distinction between the two redundant. Finally, an analysis of positive and negative experiences from PPPs should necessarily take into account the institutional environment, which, as demonstrated in the EBRD (2012) report is more crucial for efficiency than the legislation itself.

METHODS

This paper employs a contract-theoretical framework. In line with the above definitions, we consider PPP as a consolidated enterprise run by the government and a private business, based on a partnership principle: each party has incentives to contribute to the success of the counterpart. As we will show later, such a contribution is not always contractible, yet distinguishes a true partnership from a

standard public procurement contract. Our main assumption is on the consolidation of resources and efforts: the project is delivered collaboratively and cannot be efficiently split into sub-projects independently delivered either by the state or by the private firm. We also assume that the private party maximizes profit (this excludes altruistic private contributions to social welfare) and that the public party maximizes social welfare (and therefore aims at a delivery of socially important projects whilst minimizing the cost of delivery). There are no additional assumptions on the type of contracts between the government and the private business, to be used as a basis for a PPP.

To setup the theoretical framework we describe in this section the main building blocks of the model: the project to be implemented, the counterparts, and the issues that make contracting non-trivial. Within this framework we then discuss optimal contracts for collaborative projects. We show that under certain conditions even optimal contracts may fail to ensure the implementation of socially important projects. We call these projects infeasible. Some of the infeasible projects can however be implemented through a PPP. This endogenously delivers the differences between a procurement contract and a PPP, and thus formalizes the partnership principle.

Model Setup: The Project

Typically, public-private partnerships are analyzed in the context of long-term large-scale complex projects. By assumption they are public goods, which justifies why a government wishes to deliver them. By a separate (often implicit) assumption, the private sector has comparative advantages in delivering certain components of this public good (otherwise the state delivers it on its own, which reduces social costs and maximizes social welfare).

If such a complex project consists of separate tasks, then the government can deliver the public good by delegating some (or all) of the separable tasks to the private sector. For example, an infrastructure project can be split in a construction and maintenance phases, which can be delivered separately both in terms of timing and resources used. Each resulting "sub-project" is then subject to a contract that is optimal specifically for this particular task.

This approach ("splitting") is used, among others, in Bennett and Iossa (2006), Martimort and Pouyet (2008) and Maskin and Tirole

(2008). However, such a splitting is not always feasible; in particular, each resulting sub-project is by definition indivisible. Knowledge-intensive tasks (e.g. construction design) cannot be performed without a proper involvement of the end user (thus the term co-production, see e.g. Doroshenko, Shadrina, & Vinogradov, 2013, and references therein). Moreover, splitting neglects the synergy effect, such as a possible surge in efficiency through shared knowledge and skills between the parties that work together to accomplish one task.

In the current paper we apply an alternative approach and view a PPP as a collaborative task: both the public and the private sector simultaneously contribute to the success of the project, which cannot be split into smaller independent subprojects. Similarly to Bettignies and Ross (2009) and Hoppe and Schmitz (2009) the crucial question is, what is the optimal way to produce such a public good: public, private or mixed one?

After we derive the conditions under which the mixed form is optimal, we will apply the theory of contracts for collaborative projects suggested by Roels, Karmarkar, and Carr (2010). In particular, they show that not all projects can be performed within standard cost- and performance-based contracts. This failure is due to low profitability and high information costs of these projects, which make them unattractive for a private party.

Model Setup: Counterparts and Comparative Advantages

A project participant has **comparative (relative) advantages** in terms of supply of resources (human, capital, financial or intangible resources), if (s)he can deliver them at a lower cost than (any) other partner. From the costs perspective, *if one of the project participants has comparative advantages in terms of all resources, then co-production is not profitable*, because the implementation of the project only by one of the partners minimizes the costs.⁶ Therefore, a joint project of the state and the private sector may become optimal (socially desirable) only when both the state and the private sector have comparative advantages with regards to certain resources. Moreover, each party shall supply only those resources in which it has comparative advantages and reduce the provision of other resources to the minimum.⁷

This point is reflected in definition (ii) in the Introduction: “PPPs recognize that both parties have certain advantages relative to the

other in the performance of specific tasks. By allowing each sector to do what it does best, public services and infrastructure can be provided in the most economically efficient manner" (European Commission, 2003, p.16). Furthermore, the same source defines: *"The overall aim of PPPs is therefore to structure the relationship between the parties, so that risks are borne by those best able to control them and increased value is achieved through the exploitation of private sector skills and competencies"* (p.17). Our task is to understand what does this "structuring" consists of.

The private business decides whether to join the partnership by comparing the benefits it gets from participating in the proposed project and the benefits it gets from alternative projects (or "benefits" of non-participation). One can define a participation threshold as the minimum benefit that makes the private party willing to participate in the project. If the income that the private party draws from a collaboration with the state is below this threshold, then the joint project is *infeasible*.⁸ The threshold is the sum of sunk costs (expenditures to start a joint business), a compensation for the resources supplied (including human and intellectual resources) and a premium requested by the private party for the participation in the joint project. For example, sunk costs will include business startup costs, filing fees, costs of overcoming bureaucratic barriers (red tape), etc. (corruption costs can also be included, but we ignore them as our goal is to justify PPP even under conditions of an ideal non-corrupt government). The premium is a compensation for the potential inconvenience brought by the participation in the joint project, for example, due to internal inefficiencies of the public partner, delays in decision-making and the need to follow the variety of regulations and "the code of best practices". When the project involves funding from the state (federal) budget it is often considered a high-risk factor in countries with unstable budgetary commitments. This risk and the other associated costs are also included by the private business in the premium. An opportunity to participate in alternative projects that are beyond governmental influence is reflected in the premium and sunk costs, which can be influenced by the state as shown below.

Some of the projects that the private sector is reluctant to implement independently can be implemented together with the state by reducing costs and exploiting the comparative advantages of the state. Traditionally the advantages of the private sector are in their

specialized knowledge, technological expertise, effective management, etc. Discussions of comparative advantages of the state would be less common and deserve some attention. First of all, these are formal and bureaucratic services (checking for compliance with standards, accreditation, approval of project documentation and so on), which are usually included in the cost item under the scenario of a separate project run by the private sector only. The most common related concepts are *compliance cost* (costs incurred to bring compliance with the formal legal requirements) and *red tape* (the set of bureaucratic procedures associated with the implementation of the project). Bureaucratic services, introduced here, are associated with these concepts and put emphasis on the fact that the authorities have the specialized knowledge in terms of bringing the project in compliance with the formal requirements.

Second, the public partner may have specialized knowledge that is important to implement a specific project, such as the expertise of the state architectural bodies to implement architectural projects, research and exploratory resources, archival resources and so on. In Besley and Ghatak (2001) the focus is on human capital (knowledge). Mahalingam, Devkar, and Kalidindi (2011) show that the administrative experience and skills, especially in the structuring of the project and submission of applications to the tender, are integral to the success of the enterprise.

Consolidation of resources, based on the principle of comparative advantages, reduces the total costs of the project and helps to attract the private partner to implement it, if, for example, the state takes bureaucratic functions upon itself. This makes it possible to implement a number of projects, which would not be feasible with the state acting as a "passive client" and the private partner facing bureaucratic problems on his/her own. Yet, the principle of comparative advantages does not allow reducing costs arising due to the asymmetry of information between the parties.

Model Setup: Asymmetric Information and Types of Contracts

The contributions of the parties are specified in a contractual agreement. Under perfect informational transparency the actual contribution of each party is known with certainty. Based on this perfect knowledge, the parties are paid according to their contributions, once the project is implemented. In this case, the

simplest contract suffices to optimally run a joint public-private project: the contract only needs to define the contribution of the state, the contribution of the private party and the payoff by the state to the private partner at each implementation stage. In fact, with perfect information there is no need to pay to the private party in sequential instalments as each action is fully observable and once the private party fails to deliver according to the contract, this is perfectly and costlessly verifiable. A punishment for the breach of the contract is chosen sufficiently high to make the breach unprofitable.

The situation changes dramatically once information is asymmetric. In this case the contribution of one of the parties is not perfectly known to the other party, yet can be obtained at additional cost of verification (inspection, audit, reporting). Optimal contract uses incentive mechanisms to ensure the maximum fulfilment of the contract terms by each party. The optimal contract between the two parties of the collaborative project is of one of the following types (see Roels, Karmarkar, & Carr, 2010):⁹

- *Input-contingent contract* (hereinafter IC): upon the completion of the project (with corresponding costs) the input/contribution of the private partner is verified and if the terms of the contract are met, then the agreed compensation is paid;
- *Output-contingent contract* (hereinafter OC): if the project is fully completed as agreed, the compensation is paid to the private partner in the specified amount; if the project is not complete, the public partner provides evidence (reports) on meeting its contractual obligations (at corresponding verification costs). Depending on this evidence, if the failure is due to the private partner, the latter is required to pay a penalty; otherwise it is paid in full and the penalty is on the public partner.
- *Performance-based contract* (hereinafter PB): no verification of the parties' contributions is conducted, instead a bonus and a share of revenues generated by the project is paid to the private partner upon completion.

In the performance-based contract, the private partner may be allowed to operate the created object with the right to retain the (part of) revenues or to receive other benefits from the implementation of the project within the stipulated period of time. This is typical for infrastructure projects implemented under concessions. Alternatively,

the state may take commitments to make payments to the private partner within a certain period of time, depending on the effective performance of the created object. For example, if the road section is built as part of the project, the public partner can either allow to use it on a fee basis (charges are paid to the private partner) or takes obligations to pay to the private partner certain amount, depending on the operating conditions of the road (capacity, security conditions, repair needs, etc.). Both cases are in line with the performance-based contract.

With asymmetric information the timing of payments is important: the payment after the delivery is preferable to the prepayment as it reduces the danger of opportunistic behavior of the partner. Contracts with input verification (IC and OC) are optimal if verification costs are relatively low. The verification costs cover inspection activities to check either the true contribution of the private partner or the input of the public partner, who also has to prove the fulfilment of contractual obligations. In the latter case, the completion of the project and full fulfilment of contractual obligations by the public partner mean that contractual obligations have been met by the private partner as well. Penalty sanctions provide an incentive and motivate to fulfil obligations under the contracts that verify information. If the verification costs are high, the optimal contract would be the bonus payment with a share of future revenues: the participation in future revenues provides incentives to avoid or minimize the undersupply of resources.

Each of the above types of contracts is optimal in the sense that it ensures the implementation of the project and includes the system of checks to prevent a misconduct of partners. However, as noted above, the project has to generate revenue above the participation threshold in order to be attractive for the private partner. Thus, out of the three potentially optimal contracts one is to choose the one that generates the highest profit. If the latter is above the participation threshold, the project is feasible, i.e. there exists a private partner that is prepared to take part in the project.

RESULTS

Now that the model setup is complete, we will characterize projects that are or are not feasible under each contract type, and derive the role for public-private partnerships in this framework.

Project Feasibility under Standard Contracts

Joint projects are characterized by costs associated with the supply of resources, and by "manufacturing technologies", which determine the dependence of the output on the contribution of each party. To have a formal definition of the manufacturing technology it makes sense to define the output as the cumulative social benefit generated by the project. In this case, even a minor undersupply of resources may affect the result. For example, infrastructure projects may have one object of the agreement such as a bridge, a road section or another structure. Social benefits of the project are determined by the quality of its performance, delivery time and other details, including the method of construction waste disposal and obstacles created by the construction works. Shortage of resources will not affect the number of infrastructure objects to be put into operation (it is one object as it is stipulated in the contract), but it will affect the satisfaction of the consumers. Sensitivity of results to the undersupply of resources plays a key role in the selection of the optimal contract.

The choice between the IC and OC contracts is determined by the verification costs relative to the costs of material resources. Using the *relative information cost* reflects the fact that \$1 million spent on the information verification (reporting and inspection) may be too high for a project, costing \$1 million in material resources, or it could be quite appropriate for a project, costing \$1 billion. The second parameter that describes the project and plays an important role in selecting the optimal contract is the *sensitivity* of the project to the contribution of each party, which shows how the result will change when the contribution of one of the parties increases/decreases by 1%. Similarly to Roels, Karmarkar, and Carr (2010), one can formally show that if the cost associated with the verification of the contribution of the private party is relatively small, the input-contingent (IC) contract is optimal: verifying the contribution of the private partner reduces the total cost. If this verification cost is high, an output-contingent (OC) contract performs better in terms of cost minimization. If there was no information asymmetry, the IC and OC contracts would be identical: in both cases the contribution of both partners is precisely known and verification costs play no role.

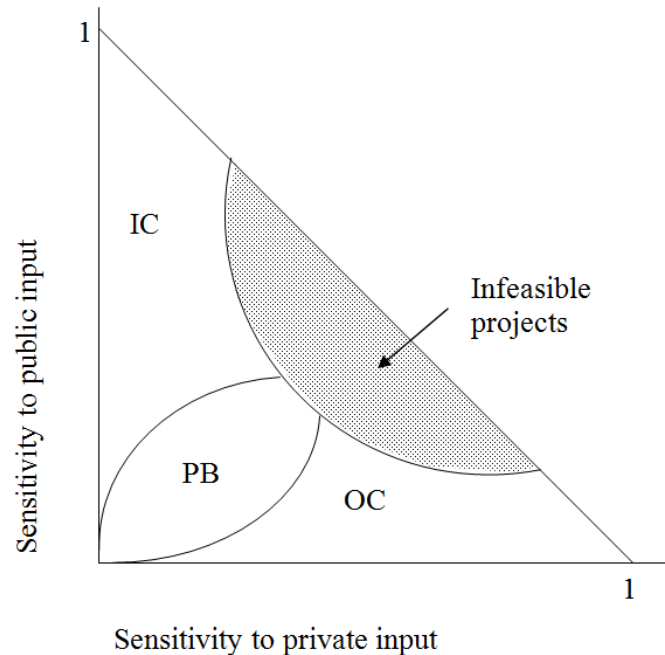
If the information barrier is present and information verification is costly then IC and OC contracts are not equivalent anymore even if

information costs are the same both for the private and the public partner. The choice between IC and OC depends on the sensitivity of the output to the contributions of the parties. If the project is more sensitive to the contribution of the private partner, it makes sense to fix the result and to disburse payments only when the result is achieved, which corresponds to the OC contract under which the public partner shall prove that it has fulfilled the obligations of the contract. If the project is more sensitive to the contribution of the public partner, the payment to the private partner should depend only on his/her own contribution and the corresponding information verification shall be conducted as stipulated in the IC contract.

IC and OC contracts presume fixed payments: the amount of compensation is exactly defined at the contracting stage. Performance-based (PB) contract suggests a variable amount of compensation, depending on the social value generated by the project. It is optimal in those cases, when it allows achieving greater social benefits than the best contract with fixed payments. It can be shown that this condition is met for projects with approximately equal and relatively low sensitivity to both public and private contributions: in these joint ventures it is more profitable to neglect the verification of the contribution of the parties and rely on the incentives, created by the payment terms. Even if one of the parties will supply resources in a smaller volume than is stipulated by the contract, the project will not suffer much (low sensitivity to the result), but through savings on the verification activities greater benefits can be achieved than under a contract with input verification.

The above arguments determine the optimality of contracts, depending on the sensitivity of the project to the contribution of public and private partners, as presented in Figure 1. The figure also highlights the area of infeasible projects: for them even the optimal contract fails to provide enough social benefits to cover the participation threshold. These projects are characterized by a relatively high sensitivity to the contributions of each party. In this case, it is impossible to neglect input verification, even if the verification costs are high as the sensitivity of the project to an even small undersupply is too high. This need in the input verification imposes the costs that drive social benefits below the participation threshold.

FIGURE 1
Optimal Contracts for Projects with Different Sensitivities to the
Inputs by Private and Public Parties



Project Feasibility with Public-Private Partnerships

As the discussion above shows, standard contracts (input-contingent, output-contingent and performance-based) are well suitable for joint projects between the state and the private sector. If partnership is any different from mere collaboration (consolidation of resources), it should provide an improvement as compared with the outcome achievable through standard contracts. Such an improvement can be seen in the reduction of the set of infeasible contracts (grey area in Figure 1).

The set of infeasible projects (potentially feasible through a PPP) is characterized by two important properties. First, it shrinks with the reduction of the relative verification costs: reduced verification costs raise the benefit from the project realization and as soon as it exceeds the participation threshold the project becomes feasible.

Second, the number of infeasible projects gets reduced with the decrease in the participation threshold: in this case even the low profit generated by the joint project may become sufficient to attract a private partner and to implement the project. The participation threshold can be lowered either by reducing the sunk costs (startup costs to launch a joint venture) or by reducing the premium requested by the private partner. These two properties of the set of infeasible projects help explain the role of public-private partnerships in terms of improvement of the social welfare.

This suggests a formalization of the partnership principle, which seems to be the only significant difference between public-private partnerships and consolidated public-private enterprises. As mentioned in the introduction, the partnership principle manifests that both parties must be interested in the success of the joint project. The system of incentives, provided by the optimal contract, pursues the same goal. Clearly, we need to define the difference between the partnership and the system of incentives, which would help answer the question: why "collaboration" is distinct from "partnership"?

The system of incentives present in contractual agreements consists of penalties to be imposed on the parties when they deviate from the contract terms (in IC and OC contracts) and the future benefit-sharing rate (in PB contracts). The partnership principle arises in this framework in two ways. First, the discussion of the information verification stage above assumed that the public and the private partners' responsibilities are symmetrical: (1) it might be necessary to verify the input of the public partner (this happens in the OC contract), and (2) the public partner can be penalized if not meeting the agreement. This equal responsibility of the parties is consonant with the partnership principle and ensures that both parties are equally interested in the success of the joint enterprise. It does provide an improvement compared to contractual agreements that do not presume any public responsibility, or in institutional environments where "the state is always right" and therefore effectively only IC and PB contracts are in use. An introduction of OC contracts with an improved accountability of the public partner provides an improvement for projects with higher sensitivity to the private party's input (the OC-area in Figure 1): conditioning the payment on the input, as in IC contracts, can lead to a crucial undersupply of public

goods. A similar improvement can be achieved in output-contingent contracts that would require verification of the input of the private partner, on top of being conditioned on the output. Although this creates a double burden on the private partner and can be seen as unfair, technically this type of contracts provides exactly the same improvement as the above partnership-style OC contract. Hence one cannot claim that a partnership provides an improvement compared to other types of contracts, without resorting to the fairness argument.

A second way, in which a partnership can create an improvement is by going beyond the system of contractible incentives: the partnership principle refers to incentives and/or constraints that are difficult or impossible to be formally written in a contract. Any penalty or other incentive that can be formally written in a contract is by definition a part of the contract, and hence reflected in the set of feasible projects in Figure 1.

Here are a few examples. State guarantees can allow the private partner to obtain funding. Provision of explicit guarantees is generally not possible, unless foreseen legislatively; this includes the right of the state to have responsibility for obligations arising from these guarantees. Apart from the explicit guarantees, the cooperation with the government gives an implicit signal to the financial sector. If the state declares the project to have a priority and announces that it will be supported up to its successful completion, the probability of repayments on investments in such a project increases, offering the private partner more attractive terms of borrowing in the financial market. This position of the state cannot be reflected in the contract between the state and the private partner, but it will have a positive effect on the outcome. Of course, notions as "priority" and "support" also require legislative recognition and funding sources have to be defined. We should also mention funding from international financial institutions, which is available only to the public side, but produces beneficial effect to all partners involved in a PPP.

Guarantees are not the only channel to create benefits for potential partners in a PPP. In 2000, the UK Treasury jointly with the private sector established *Partnerships UK*, a PPP project itself (51 % of state shares), aimed at the provision of advisory services to create public-private partnerships. In 2011 some functions of this organization were delegated to a special unit within the Treasury

(*Infrastructure UK*), whilst others went to a new PPP (*Local Partnerships*) providing assistance in organization of PPPs with local authorities. Such assistance makes PPPs more attractive to the private sector. Similar organizations exist in Denmark, Ireland and the Netherlands, just to mention a few, though in a different form.

An additional advantage of a partnership could be seen in a reduction in information costs through simplified reporting (as compared to the procedures adopted in the public procurement system). Again, these provisions cannot be fixed by the contract between the state and the private business, unless this is authorized by the legislation. Reduction in information costs becomes possible mainly thanks to co-production, in the process of which private and public partners conduct parallel and implicit monitoring of each other's performance. Empirical evidence on public procurement of knowledge-intensive services suggests that public bodies are involved in the co-production to a lesser extent than private companies (Doroshenko, Shadrina, & Vinogradov, 2013). The reason for this is in the peculiarities of public procurement, the regulatory framework for which does not contain enough incentives for active co-production.

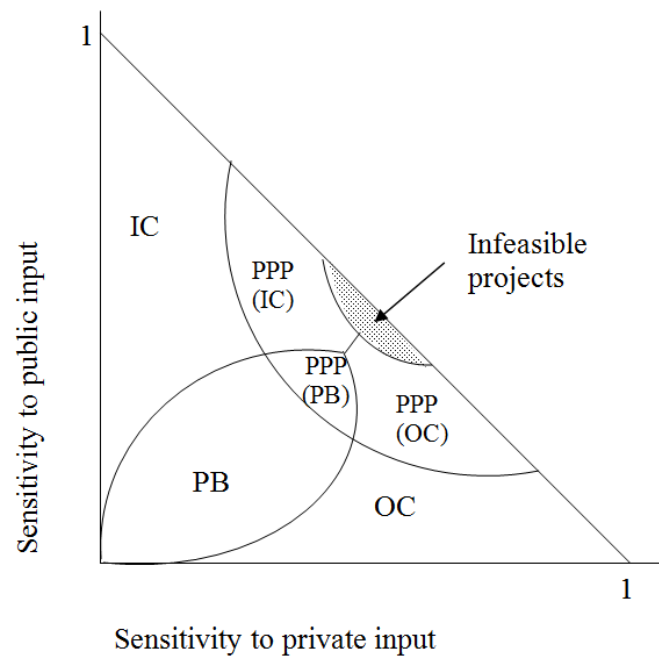
It is logical to expect that the "true partnership" will reduce information costs, including improvement of information exchange. Generally, intensive co-production can be expected in all consolidated projects. A distinctive feature of the partnership with regards to the information costs is the opportunity to reduce costs by simplifying and reducing reporting. In addition, a partnership helps reduce the participation threshold by providing the benefits to the private sector that are not available through standard contracts. The participation threshold depends on the sunk costs and the premium. The above examples of agencies that promote PPPs, demonstrate how the state can reduce the sunk costs. At the same time an ability of the state to provide guarantees (i.e. to take over some risks) and potential reputational gains for the private partner, can reduce the premium component of the participation threshold.

Therefore, in contrast to the system of incentives provided by the standard contracts (penalties and bonuses) and designed to incentivize participants to stick to the terms of the contract, the partnership principle generates extra benefits for the private sector (which lower participation threshold), as well as for society as a whole

(previously infeasible projects can now be implemented at reduced cost).

The improved feasibility of projects under PPP is shown in Figure 2. Public-private partnerships are organized within the same collaboration contracts as above. An important addition to them is the partnership principle, which is ensured rather by institutional environment than specific provisions of individual contracts. We cannot claim that PPPs allow the implementation of *all* projects, since the reduction in the participation premium and sunk costs may be insufficient to ensure profitability of some projects. However, any reduction in the participation threshold will result in the reduction of the set of infeasible projects, thus, improving the social welfare.

FIGURE 2
Implementation of Projects through Public-Private Partnerships



DISCUSSION

The institutional environment plays an important role in our analysis. It consists of the three types of contracts available to the parties, as well as of the special legislation on PPP (if any), supporting organizations and historically developed cultural and business traditions.¹⁰ We do not focus on any political components of the institutional environment as our objective was to evaluate the optimality of PPP in idealized conditions of rational choice without political pressure (although Geddes and Wagner, 2013, show that political motives play a role in the adoption of laws on PPP). In this section we show that our analysis does not place restrictions on the system of contracts (and contractual arrangements discussed here, are used in practice), and as a result, the feasibility of PPP depends on more general business conditions.

Contracts

Three types of contracts described above (input-contingent, output-contingent and performance-based) cover most contracts, used in practice. Typical contracts will fix (a) the list of parties that enter into the agreement, (b) the obligations of the parties, (c) the compensation (payoffs) to the parties and (d) the responsibility of the parties. All of these elements are present in the contracts considered above.

The parties that enter into an agreement are public and private partners. The contracts with a larger number of parties can be considered as well, in which case the considerations virtually remain the same since it is only the sensitivity of the output to the contribution of each party and the information verification costs that play a role. We can expect that a larger number of parties would reduce the information transparency and as a result the bonus contract will dominate over the contracts with fixed payments. However, this does not affect our conclusion that PPP projects can reduce the set of infeasible projects. For complex projects with a large number of partners the set of infeasible projects will grow as compared to bilateral projects, and therefore we expect an increased effect from the partnership principle. This is in line with the widely accepted view that PPPs are used primarily for complex and long-term projects.

The commitments of the parties are given by their contributions to the project. An important assumption of the analysis is that the state also makes a valuable input, thus, which explains our focus on consolidated public-private projects. Can the partnership principle be applied to projects with no consolidation of resources? These projects are equivalent to a joint project with a minimal or even zero sensitivity to the contribution of the state. In Figures 1 and 2 they are located along the horizontal axis, and therefore it makes sense to implement these projects through an IC contract. However, if the public party does not contribute, the input of the private partner will be fully determined by the output, therefore IC and OC contracts are effectively equivalent. De facto, in this case we are dealing with a standard supply contract: the payment is made based on the satisfactory completion of the project. An application of the partnership principle to these contracts is sensible only in the sense of potential cost reduction, yet this immediately brings us back to the framework of collaboration, in which it is the input of the public partner that reduces the costs.

Contracts with fixed payments (input- and output-contingent) are quite common. For example, in the Netherlands public-private partnerships are based on contracts with payments conditioned on the delivery of services (see: CMS PPP Guide¹¹). Examples include the renovation of the building of the Ministry of Finance in the Hague, the new buildings of the Penal Institution in Zaanstad, the military museum in Susterberg, Tax Administration in Groningen, the Supreme Court of Netherlands, etc.

Performance-based (bonus) contracts correspond to projects in which the private party holds the right to use the asset within a specified period of time upon completion of the work and to operate it for profit (e.g., under a concession agreement). A good example is the construction of highways E75 and E18 in Finland (see CEDR, 2009), implemented via a concession contract: the private party receives a fixed fraction of fees charged for using these roads. Similar agreements, used in the United States, are known as Build-Own-Operate contracts.

These two examples are indicative in terms of the selection of the optimal contract. The construction of a building is a localized project, which requires meeting specific customer requirements with a high degree of co-production at every stage, and even the frequent

presence of the representatives of the customer at the object. Roads are standardized to a much greater extent and every mile of the road length is built with the same standard construction methods as every other mile. Moreover, the physical presence of the customer is often impossible due to the length or remoteness of the roads. Unit costs of a building construction are higher than the unit costs of a road construction (for example, in terms of the construction area), whilst information costs, associated with road construction are higher than those for a building due to lack of co-production and on-site presence. As a result, *the relative information costs* of a building are lower. Our analysis predicts the optimality of a fixed payment contract – either IC or OC type. Due to the high sensitivity of the output to the contribution of the private partner, an output-contingent contract is optimal for a building construction. For the roads, however, a performance based contract seems more optimal due to high information costs and similar sensitivity of the output to inputs of both parties; this corresponds to a concession.

Legislative Provisions

Should there be a law on PPP and what should this law govern? The need in such a law arises when the prevailing business conditions (the system of supporting organizations and business traditions) do not provide sufficient benefits for the private sector to work together with the government to overcome the participation threshold. The law should therefore create special conditions to overcome this problem.

Lowering the participation threshold can be achieved in two ways: by reducing the sunk costs and by lowering the premiums. The first depends on how easy it is to start a joint business with the state, and the second depends on reputational and other gains from collaboration. The burden of starting-up the business can be facilitated by the supportive organizations. Such an agency could take on advisory functions to simplify the participation of the private sector in the projects of the state. Reduction of the premiums requires a clear legislative view on obligations that can or cannot be taken over by the public body involved in a PPP. Lack of clarity and certainty in this issue adds some diffidence to the final result in terms of the participation of the private sector in the public project, and as a consequence, the private business would prefer a joint project with other private businesses whose obligations are clearer.

The same applies to penalties to be imposed on the government as one of the equal sides of project (that is how the partnership is often seen). Until business practices establish and secure an unconditional reputation of the state as an absolutely reliable partner, such provisions are needed to reduce the risks (explicit or perceived) of private sector's involvement in public projects.

The law (in the absence of other elements of the institutional environment that can address these issues) should regulate the informational component of the public-private relations in a joint project. This applies to the simplification of the interaction between the public and private partners, the intensification of co-production and improvement in the exchange of information. The law should provide incentives for this and ensure the possibility to use simplified procedures. Supporting organizations may and should play their role in this. Examples and the analysis of the functions of such organizations can be found in Stadtler and Probst (2012) who review the work of brokers involved in the search for PPP partners. In particular, the authors show that along with the search for the "best fit", brokers also act as "mediators" to facilitate communication and "interpreters from Public to Private", adjusting discrepancies and helping future partners get to know and to understand each other.

The fact that the project is referred to the category of PPP should itself be a "quality signal" for private businesses. This does not mean, however, that the state should create favorable terms and step away from performance criteria laid down in the legislation on public procurement. Our analysis suggests no rivalry between (potential) legislation on PPP and public procurement legislation. In contrast, the PPP can be implemented under the same contracts, which are used for public procurement. The selection of the PPP partner can and should be made on the basis of competition principles, applied to the selection of a supplier under public procurement procedures. Rejection of the principle of competitive selection leads to a negative effect: comparing the PPP in the U.S. and the UK, Forrer, Kee, and Zhang (2002) indicate that many PPPs in the United States were concluded by circumventing competitive procedures and have become a mechanism to transform investment risks from the private sector to the public partner. Bloomfield (2006) shows that despite the fact that the exemption of PPP from the rules of competitive selection is often motivated by "innovative and efficient approach and

manifestation of confidence to the private partner by the state", it becomes apparent that the contracts are awarded to the companies "with connections", which ultimately leads to unnecessarily high costs for project implementation and increases the risk of reduced performance quality. The problem here also lies in the fact that the optimal contracts that we determined, involve well specified and objectively justifiable responsibilities of the parties, while under non-competitive selection there are increased risks to weaken contractual requirements in favor of the private party.

Thus, the simplification discussed above, relates, first of all, to administrative and bureaucratic efficiency, rather than to economic issues. Provisions of the legislation on public procurement, particularly of UNCITRAL Model Law (UNCITRAL, 2011) are aimed at improving economic efficiency; and the principle of competitive selection is one of the mechanisms for achieving this. Without going into a detailed analysis of this legislation, which goes beyond the scope of this paper, we would like to stress that the law on PPP should be consistent with and complementary to the legislation on public procurement, and shall not substitute its provisions.

In our view, PPPs are explicitly beneficial to the society, because they allow implementation of projects that are not feasible through standard contracts. However, the advantages of PPP are based on the peculiarities of the institutional environment; therefore the concept of PPP cannot be limited to the scope of any particular type of contract. Analyses of advantages and disadvantages of PPP often attribute disadvantages to the institutional environment. Similar conclusions are in the EBRD's (2012) report on economies in transition. It is instructive to compare the EBRD (2012) results on PPP legislation with the monitoring of public procurement regulation conducted by Crown Agents for EBRD (2013). For Armenia, the first one indicates low compliance of PPP legislation with international standards, and a poor institutional environment; the second one reports that the public procurement legislation generally complies with UNCITRAL standards yet the institutional environment (information provision, procurement planning, reporting, etc.) is weak. As our analysis indicates, one could expect efficiently working PPPs if the country's public procurement legislation is well designed, yet it is the underdevelopment of the institutional environment that precludes well-functioning PPPs. For Kyrgyzstan, EBRD (2012) reports average

level of compliance of the PPP legislation with international standards, yet insufficient development of the institutional environment. Similarly, EBRD (2013) finds that the legislation on public procurement is at a satisfactory level, whilst the institutional environment is assessed as weakly developed. Again, this is in line with our prediction that even satisfactory legislations cannot promote PPP without properly developed institutions. In Tadjikistan and Azerbaidjan, both EBRD (2012) and EBRD (2013) reveal low levels of development of PPP and public procurement legislations respectively, as well as extremely poor institutional environment, and as a result no PPP projects. The only country that is judged highly complying with international standards both in PPP and procurement legislation, is Mongolia. Its institutional environment both for PPP and public procurement is well developed and in line with our predictions EBRD (2012) reports efficiently functioning PPP projects in this country. It should be noted though that often the level of the PPP-enabling legislation is judged upon the concession law, which effectively regulates a specific type of contracts (performance-based contracts in our framework). Therefore it is the combination of the PPP and public procurement legislation, together with the institutional environment, that is responsible for the Mongolian reported success with PPP projects.

The laws adopted in the United States at the state level (mainly with regards to PPP in the transport infrastructure system), also make an emphasis on the institutional environment: the laws determine how to proceed with initiative offers, whether to allow the participation of private parties in the future profit sharing, whether to move PPP out of the public procurement legislation domain, whether to grant tax exemptions, whether to allow the parties to get involved in competing projects, whether to introduce any restrictions on the public contribution to the project, whether PPP should be approved by local authorities, etc. (Geddes and Wagner, 2013). In terms of our paper some of these provisions regulate the set of available contracts (profit sharing, the federal/state contribution), and some of them affect the participation threshold (benefits, uncertainty reduction). While the restrictions on the types of used contracts may damage economic efficiency, taking control of the participation threshold is consistent with our conclusion on the need to create advantages for PPP over other forms of public-private cooperation.

NOTES

1. <http://www.ventures-africa.com/2013/07/ghana-drafts-law-on-public-private-partnership>.
2. <http://www.worldfinance.com/infrastructure-investment/ppps-in-the-pipeline-for-thailand>.
3. http://www.eversheds.com/global/en/what/articles/index.page?ArticleID=en/Africa_group/Kenya_new_PPP_law260313.
4. Full list of 34 countries with the degree of compliance: the best compliance with international standards was noted in Mongolia; high level of compliance - Albania, Bulgaria, Croatia, Egypt, Estonia, Hungary, Latvia, Lithuania, Moldova, Montenegro, Russian Federation, Serbia, Slovakia, Slovenia, Tunisia, Ukraine; average compliance - Bosnia and Herzegovina, Czech Republic, Jordan, Macedonia, Morocco, Poland, Kazakhstan, Kyrgyzstan, Romania, Turkey; low compliance - Armenia, Azerbaijan, Belarus, Georgia, Tajikistan, Turkmenistan, Uzbekistan.
5. Very high efficiency has not been observed anywhere, high level was noted only in Albania and Mongolia, as to the other countries it showed the average and below average levels.
6. This neglects the synergy effect, when co-production provides a new resource that is inaccessible to the parties in the split mode. We therefore assume that synergy benefits do not exceed the cost savings, associated with the supply of resources.
7. Theoretically, the contribution of resources of no comparative advantage, should be reduced to zero, but we cannot exclude that a complete neglect of them would be impossible. For example, one of the parties has specialization in shipping operations and can provide logistics services at a lower price, complete neglect of the second party to use the transport and to process shipment even of a minimal volume will entail increased coordination costs and ineffectiveness. Therefore, it may be advantageous to reserve some minimum transportation function for the second party, for example, the transportation of its experts to the site. Outsourcing, which is based on the principle of comparative advantages, is exclusively relevant to the contribution of the parties to the joint indivisible project. If the project can be carried out by stages, and the outcome of the actions of one of the

parties is a completed "subproject" by the time when the other party starts project operations, the minimization of costs imposes a "division" of complex projects into separately operated components which has been already noted in the introduction. Generally, the minimization of costs by itself does not assume divisibility of the project. Distribution of tasks, based on the principle of comparative advantages relates primarily to projects designed to have simultaneous contribution made by both parties.

8. The participation threshold for the state is assumed to be exceeded as soon as the implementation of project improves social welfare.
9. Roels, Karmarkar, and Carr (2010) consider a fundamentally different context: verification is possible with regards to the contribution of one or another partner, or none of them. The logic of our reasoning is different: if only three types of contracts are optimal, then which of them should be selected by the parties if they are free to choose, and which of the partners should (or should not) report on its contribution to the project or to be subject to verification. Implicitly, we assume that information about any of the partners can be obtained and verified (for example, through judicial and investigative procedures), but this process is costly.
10. Richard Foster, the founder of Foster Infrastructure, an Australian company that assists in PPP organization and operation, in his comments on our work indicated that *in Australia, the state enjoys such an unquestioned trust that it is able and willing to fulfill its obligations, that no laws are needed to create additional safeguards and, virtually, any work of private business with the state is a PPP*. The reputation of the state in this case refers to what we call the established traditions. Besides them in Australia there are such institutions as *Partnerships Victoria* and *Infrastructure Australia*, as well as private consulting companies as *Foster Infrastructure*, which we refer to as supporting organizations.
11. www.cms-hs.com/Documents/CMS_PPP_Guide_2010.pdf.

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