

Flexible contracts to cope with uncertainty in public–private partnerships

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Abstract

Public private partnerships (PPP) are long lasting contracts, generally involving large sunk investments, and developed in contexts of great uncertainty. If uncertainty is taken as an assumption, rather as a threat, it could be used as an opportunity. This requires managerial flexibility. The paper addresses the concept of contract flexibility as well as the several possibilities for its incorporation into PPP development. Based upon existing classifications, the authors propose a double entry matrix as a new model for contract flexibility. A case study has been selected – a hospital – to assess and evaluate the benefits of developing a flexible contract, building a model based on the real options theory. The evidence supports the initial thesis that allowing the concessionaire to adapt, under certain boundaries, the infrastructure and services to changing conditions when new information is known, does increase the value of the project. Some policy implications are drawn.

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1. Introduction

The political, economic, social and environmental contexts of large-scale infrastructure are constantly changing. With an average life cycle above 30 or 40 years, in some cases even close to 100 years, investments in large-scale infrastructure face several challenges and are exposed to different types of risks (Kim, 2011; Lemos et al., 2004), with a direct impact on the concessions' economic performance.

PPP (public–private partnership) arrangements are based on contracts where a base-case scenario is drawn with pre-defined forecasts and assumptions on the main macro-economic variables (capital costs, inflation, etc.), leading to demand forecasts and cost estimates. Particularly regarding demand, forecasts have proven to be less than accurate (Flyvbjerg et al., 2003).

Even after important developments have taken place on improving forecasting models, today there is a general consensus

that no matter what computational improvements one might achieve, there will always be a great deal of unpredictability in estimations for periods over 10 years. The development of long lasting PPP projects implies a great deal of risk, arising mainly from uncertainty related to the macroeconomic scenario, technological changes, competition or emergence of substitute services, among other drivers of uncertainty (Shen et al., 2006).

Furthermore, a PPP contract generally involves large sunk investments in a specific project, vulnerable to opportunistic behaviours by the concessionaires (Hong and Shum, 2002; Ubbels and Verhoed, 2008; Williamson, 1976), but also by the public sector (Engel et al., 2006; Guasch and Straub, 2009). This can also be explained by the incomplete nature of contracts (Hart, 2003), reason why practitioners have placed enormous effort on “overwriting” contracts in order to decrease the number of unexpected situations (Marques and Berg, 2010).

According to Bettignies and Ross (2009), this contractual rigidity has been the denominator over the last years in PPP development, particularly contractual PPP with large infrastructure investments, although there can be a trade-off between capturing efficiency gains and contractual rigidity. By comprehensively describing the investment and operating plans and the type of services provided, among other aspects, the grantor is decreasing

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the managerial flexibility of the concessionaire, which might jeopardise the ability to adapt to changing circumstances. In some way, the fact that a PPP project can be seen as a relationship-specific investment, subject to bargaining and opportunistic behaviour, might justify the need for this type of contracts (Hart, 2003). Nevertheless, this has also been seen regarding the risk sharing between the two agents, and not so much concerning the value maximisation of the project (Chiara et al., 2007; Grimsey and Lewis, 2002; Lonsdale, 2005; Meda, 2007).

This paper will present a case study using a hospital PPP. Several PPP models have been developed for the provision of health care facilities. The first and most widely used model (e.g. the UK and Australia.) concerns typical design-build-operate (DBO) contracts for the infrastructure. This includes all infrastructure related activities like refurbishment works, energy systems, and some soft facilities like parking, cleaning or sterilisation. This model can also include the financing component, in a DBO (DFBO) model. The second model also includes the clinical services, meaning that the private partner is not only responsible for building but also for managing medical services and all the related activities, such as medical staff, medical equipment, etc. Revising the literature on transportation infrastructure (Gómez-Ibañez, 2003) regarding privatisation models, one of the main issues discussed is the problem of vertical unbundling. There is a trade-off between eliminating interface (infrastructure vs. operation) problems and allowing for a greater managerial efficiency (through vertical bundling) and, on the other hand, for more competition since vertical unbundling allows for specialised companies to bid for their area of expertise (e.g. construction companies just bid for the infrastructure, while operators bid for the operation). However, the paper is not intended to provide irrefutable evidence on the economic merit of each model, but to contribute to quantify how many synergies one can obtain from bundling clinical services and infrastructure planning and management, particularly accounting for flexibility in the expansion and in the allocation of space for the main production lines in the hospital. The rationale for this “bundling” is uncertainty in demand forecasting and the private sector capacity of innovation in building and managing (Bennett and Iossa, 2006). This research will focus on improving contract performance in uncertain environments. If uncertainty is taken as an assumption rather than as a threat, it could be used as an opportunity. But this requires managerial flexibility. Risks will be identified, and flexible options created, always under the principle of developing solutions with real practical application.

It is possible to find literature regarding risk exposure reduction, particularly, related to financing issues (Aldardice et al., 2001; Fowkes, 2000; Megginson, 2010; Shah and Thakor, 1987). This work will go a step further, first by identifying the possibilities for introducing flexibilities into a PPP contract, and second, by quantifying, through a case study, the economic gains of such a contract design model.

The hypothesis under analysis is that contractual flexibility may increase the project net present value (NPV). The methodology used is the financial modelling technique known as real options, to evaluate the impact on the NPV of incorporating a priori flexibilities in the contract.

Focusing on the real options concept, this paper aims at clarifying the degrees of freedom options when it comes to contract design. These options can be physical, financial or legal, and their main purpose is to increase the economic value of contracts by lowering risk exposure in the long-term. Some examples of these options might be a variable portfolio of services provided under private management to cope with changes in demand, or the use of available space inside the hospital perimeter, or the development of commercial spaces, or even a variable frontier in services provided by central versus local units, to use the health care case study. After this introduction, in Section 2 this paper will provide an overview on the main sources of risk and uncertainty in PPP projects, for which flexibility may provide a useful adaptation mechanism. Afterwards Section 3 will present the main types of flexibilities used in PPPs, based on a literature review and presenting a new framework for flexibility classification. Section 4 provides a case study (health care PPP) to analyse and economically evaluate the effects of developing flexible contracts. Section 5 draws the main conclusions of the research.

2. Uncertainty in PPPs

2.1. Types of uncertainty

PPP arrangements are particularly vulnerable to uncertainty. Several factors can explain the high level of uncertainty in these projects. Moses (2004) argues that the critical issues related to complex and large-scale systems (in which most PPP projects can be included) are what the author defines as “ilities”: flexibility, safety, sustainability, durability, reliability, scalability and robustness. Thunnissen (2003) states that there are several types of uncertainty. The same author proposes a four-category classification: ambiguity uncertainty (imprecision due to ambiguity in communication), epistemic uncertainty (lack of data or information to support the model), aleatory uncertainty (corresponds to the inherent variation in the variables of the system) and interaction uncertainty (arising from unknown outcomes of agents’ interaction). This categorisation is applicable to any type of model and/or system.

Lessard and Miller (2001) classify uncertainty according to five different levels: natural (geology or weather), market (interest rates, risk premium, exchange rates, etc.), country/fiscal (regulatory environment, contract enforcement, legal and political stability, terrorism, etc.), industry/competitive (demand, competition, etc.) and technical/project (construction, project management, etc.). Although this categorisation was not developed specifically to PPP projects, but to general technical systems, it provides a useful framework, even though one can argue that the first type (natural) is more closely connected to technical/project rather than to an independent sub-group. Regarding the specific case of PPP arrangements, there are intrinsic characteristics that make them particularly vulnerable to uncertainty, namely, i) large sunk investments, meaning large construction costs and large debts (public and/or private), ii) high sensitivity to demand variations/estimations, particularly, greenfield projects, iii) great exposure to financial markets (due to the large debts), iv) and vulnerability to political instability.

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