

Flexible v/s Rigid : Public Private Partnership Contracts

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1 Abstract

Public Private Partnership defines long term relationships between public and private parties for public good provision. Major challenge faced by PPP contracts is to be cost efficient alongside ensuring maximum benefit for the society, under continuously changing circumstances. PPP contracts are typically long term which makes it almost impossible to design a complete contract which anticipates all possible future scenarios. This requires the contract to be able to deal with changing circumstances by allowing for flexibility in terms of the contract. PPP contracts have traditionally been excessively rigid leading to situations wherein the contractor faces losses and in extreme cases might even abandon the project. The purpose of the paper is to show that providing flexibility in contract will increase overall social welfare in the face of uncertain macroeconomic (good/bad) environment. Also, it highlights how institutional framework might have a bearing on the choice of contract. The paper mainly compares the two types of contracts (rigid v/s flexible) using their associated costs and benefits and analyzes the efficient level of investment chosen in each case.

2 Introduction

The several advantages of PPPs over traditional contracts have made them a popular choice across the globe in provision of public goods. This increasing popularity has been accompanied by some negative feedback. This has led to the emergence of a key concern with long-term PPP contracts, namely, the level of flexibility that they offer to the contracting parties to make post contractual changes in the face of risk and uncertainty. Significant concerns have also been raised regarding the high incidence of renegotiation in such contracts. According to a World Bank report on private participation in infrastructure, private participation in 2011 was highly concentrated in just one country - India. The report ranks India as the largest market for PPP in

the developing world. India alone accounted for over half of the total investments in new PPP projects in

developing countries in 2011, when it implemented 43 projects which attracted total investment of \$20 billion.

The country has now entered an inflexion point in PPP where it is moving from asset creation to operation of projects. However the inherent nature of uncertainty in such contracts and the absence of an adequate institutional mechanism to deal with renegotiations, is creating problems in realising their true potential. There is evidence of a large number of projects that have been either stalled or have come up for renegotiations. For instance, GMR and GVK have walked out of recently-won mega-highway projects; the Gurgaon Expressway faced similar trouble. This list of stalled and off-track PPP projects is ever expanding.

In the Indian context, it has been seen that contractors often take up PPP projects but later abandon them as the project turns out to be financially unviable due to delays in land acquisition and other bureaucratic clearances – that lead to major cost overruns. The main reasons for the failure of PPP projects in India have been cited to be ranging from poor preparations, flawed risk-sharing, inappropriate business models, fiscal uncertainties, red-tapism and power struggle between different agencies as well as between the private sector and the government.

The paper at hand tries to encapsulate all such aspects of uncertainty and issues in the form of the macroeconomic state (which can either be good or bad). Thus, it wouldn't be wrong to say that the macroeconomic state plays an instrumental role in determining the success or failure of a PPP project. In this paper, we address this issue by highlighting how the choice of the type of project can help in dealing with and mitigating the costs imposed on the society by these unobservable characteristics of the economy.

3 Literature Review

PPP contracts have been lauded as the optimal structure of procurement contracts between public and private sectors, primarily owing to the bundling effects of PPP which creates considerable efficiency gains as compared to traditional procurement contracts. However, recent literature has shifted focus to the welfare losses that occur as a result of incomplete contract designs within PPP that do not take into account future uncertainties. Critics of the PPP model

have pointed to such potential problems with this mode of public sector procurement. Researchers and scholars have listed several sources and reasons for uncertainty facing a PPP project. **Koppinen and Rosqvist** (2010) for example, grouped uncertainties into four broad categories: (1) Market oriented changes;

(2) Technological changes; (3) Changes in networks; and (4) Societal changes. **Hsieh et al.** (2004) distinguish between two main dimensions, namely technical and administrative. The technical dimension refers to planning and design, underground conditions, safety considerations and natural incidents; while the administrative dimension relates to changes of work rules/regulations, changes of decision-making authority, special requirements for project commissioning and ownership transfer, and neighbourhood pleading. These uncertainties create a need for renegotiation in the contracts in later stages. **N. Srinivasa Reddy and Pankaj Sharma** (2017), in their paper on the risks associated with PPP contracts, analyse the reasons behind the fact that over the last few years many of the awarded road projects through PPP model have been stalled. The paper looks at toll operated road projects through case studies and suggested corrective measures like shadow tolling and hybrid models for restoration of PPP.

Domingues and Zlatkovic (2014) study how and why renegotiations occur in long lasting PPP projects and what are the pros and cons of the renegotiation. Their paper reinforces the idea of contractual flexibility as a tool that allows adapting to uncertainty. **Athias and Saussier** (2010) draw evidence from infrastructure concession contracts to throw light on the challenge of including the "appropriate" level of flexibility : too much, and undesirable opportunistic renegotiations are likely to be necessary, too little, and opportunities for welfare-enhancing renegotiations will be lost. They have proposed a simple model that combines incomplete contract theory (Hart (1995)) and transaction cost theory (Williamson (1985)). They further argue that a more complete contract is not always more secure against renegotiation.

Ross and Yan (2013) have considered the loss of flexibility that comes with the long-lived contractual obligations that must be respected when changing circumstances may require significant changes in the way the public service is provided. They highlight the trade - off between efficiency and flexibility while choosing the type of contract. **Demirel et al** (2017) analyse the case study of a Design, Build, Finance and Maintain (DBFM) project in the Netherlands and find that the timely and accurate recognition of potential changes, combined with the availability of flexible coping mechanisms, provide the stakeholders with a better understanding of the challenges they face in realizing their aims in the pre-contract phase of projects. This understanding helps to better prepare a PPP contract for potential changes.

There can be various dimensions of flexibility of PPP contract as has been brought forth by various authors. **De Neufville and Scholtes** (2011) have tackled flexibility from a technical point of view regarding the design of projects detailing why flexibility in design – and subsequently in the contract – are needed, in order to deliver significantly increased value. **Domingues et al.** (2014) examined contractual flexibility in infrastructure PPPs and found that flexibility is more likely to contribute to the project's success when implemented in the contract design.

4 Examples in Indian Context

1. One of the most notable examples of failure of PPP contract is of the pull- out of Reliance Infrastructure-led concessionaire from the Airport Express Line of Delhi Metro. Main issues surrounding the Airport Express Line offers an understanding of the problems with India's 15 year-old PPP ex-perience. One of the main factors for the failure of the Express Line PPP is an inflated traffic projection made in the beginning. While DAMEPL expected daily footfall to exceed 40,000, the actual footfall never crossed 20,000 per day. Even before DMRC took over the line, the ridership was less than 11,000 per day. This skewed the projections of financial viability for the operator.
2. Among the awarded PPP highway projects, noteworthy mega projects where the concessionaire had withdrawn citing the problems of land ac- quisition and other reasons, of GMR and GVK are worth Rs 10,700 crore.
3. The Vadodara-Halol Toll project suffered due to mistaken traffic projec- tions, due to which proposed government incentives were stripped off from the project, thereby raising both policy and revenue risks for the involved parties.
4. The Delhi-Gurgaon expressway was a victim of mammoth red-tapism where the lack of coordination of more than 15 civic bodies whose ap- provals were necessary came out in the open in the shabbiest manner possible.
5. In the same lines, the Karnataka Urban Water Supply Improvements project suffered due to continued lack of proper coordination between three bodies associated with the project.

5 Model

Timeline

$t = 0$

Contract is by designed by taking decisions regarding the following feature 1.

Rigid Vs Flexible 2. High Capacity Vs Low Capacity

$t = 1$

The actual macroeconomic state is realised i.e whether the true demand is of the high type or the low type.

$t = 2$

If ex-ante expectations are realised, the contractor undertakes the optimal level of investment, exactly as mentioned in the contract, and the contract is completed. If ex-ante expectations are not realised, in case of a rigid contract, the contractor might renegotiate and adapt to the actual demand. Whereas, in case of a flexible contract, the contractor can simply adapt without renegotiating with the government.

The model assumes that the macroeconomic state can be High (H) or Low (L). Consider the example wherein the government decides to give out a contract to construct a bridge. The capacity of the bridge is determined on the basis of expected macroeconomic state. Thus, if the forecasted demand for the bridge is high, then the government decides to build a high capacity bridge. Whereas if the expected demand is low, then a low capacity bridge is to be constructed. The contract is based on the expected/ forecasted demand for the bridge, which may or may not be realized exactly in the future.

The PPP contract can be one of the two types - rigid or flexible. A flexible contract is one which allows the parties to adapt and change the terms of the contract according to the actual macroeconomic state/demand, which is realized after the contract has been finalized. The contractor has to incur a certain cost in case he decides to change the contract term which is called adaptation cost. On the other hand a rigid contract does not allow for such adaptation without the approval of the government. In such a scenario, either the contractor has to continue

with the initially decided investment level which would be sub-optimal or he could renegotiate the terms of the contract in which case he would incur a renegotiation cost in addition to the adaptation cost.

The source of uncertainty in the economy arises from the fact that none of the parties know for sure which of the two states will be actually realized.

Cost Side

$C = C_o + C(i)$ where $C'(i) > 0$ and $C''(i) >= 0$

C_o is the fixed cost on account of taking up the project, it is the cost that the private firm has to incur in order to set a basic structure of the project at hand.

$C(i)$ is the cost due to investment level i where i is the additional quality enhancing investment done by the private firm.

In case the ex-ante expectations are not met, the contractor decides to adapt to the optimal level and he incurs $C = C_o + C(i) + A$ where A is the adaptation cost.

But in case of rigid contracts the private firm needs to renegotiate the terms of the contract in order to adapt and hence it incurs cost, $C = C_o + C(i) + A + r$ where r is the associated legal cost of renegotiation.

Benefit Side

The net social benefit accruing to the public good is not just a function of the level of quality enhancing investment but also depends upon the macroeconomic state. In case of High state, $B = B_H(i)$ and in case of Low state, $B = B_L(i)$ where $B^j(i) > 0$ where $j = H, L$

$B_H(i) > B_L(i)$ thus a higher net social benefit is realized in case of high macroeconomic state vis-a-vis a low one for a given level of investment.

Also, $B^H(i) > B^L(i)$ i.e. every additional unit of investment will bring about

H L
a higher social benefit in the high state

In either case, the revenue earned by the private firm is a fraction of the social benefit and is given by

$$R = \beta B \text{ where } 0 < \beta < 1$$

High Capacity Initial Contract

The government forecasts the macroeconomic state to be of the high type at $t = 0$. In this case, the optimal investment expected from the firm is given by solving the following optimization problem:

$$Max \Pi(i) = R - C = \beta B_H(i) - C_o - C(i)$$

$$\delta \Pi / \delta i = \beta B^t(i) - C^t(i) = 0 \text{ -eq1}$$

The optimal investment level in this problem is given as i_H^* .

(A) High State Realized at $t = 1$

As expectations are exactly realized, there is no need for renegotiation or adaptation. Therefore, it doesn't make a difference whether the contract is Rigid or Flexible.

Contractor's optimization problem is $Max \Pi(i) = R - C$ Thus, as given above i_H^* is the investment chosen.

$$\text{The equilibrium profit of the firm is: } \Pi = \beta B_H(i_H^*) - C_o - C(i_H^*)$$

(B) Low State realized at $t = 1$

1. Flexible Contract

The firm can simply adapt to the low demand by incurring an adaptation cost. The optimization problem is given by:

$$Max \Pi = \beta B_L(i) - C_o - C(i) - A$$

$$\delta \Pi / \delta i = \beta B^t(i) - C^t(i) = 0 \text{ -eq2}$$

This gives the optimal investment level i_L^* .

Comparing eq1 and eq2, since by assumption $B^t_H(i) > B^t_L(i)$, $i_H^* < i_L^*$

$$H \qquad \qquad \qquad L \quad L \quad H$$

$$\text{The contractor's equilibrium profit is given by } \Pi = \beta B_L(i_L^*) - C_o - C(i_L^*) - A$$

2. Rigid Contract

If the firm decides not to renegotiate, he would have to implement the contract as decided at $t = 0$ and invest i_H^* , although the optimal investment level is i_L^* which is obtained by maximizing:

$$Max \Pi = \beta B_L(i) - C_o - C(i) - A$$

Thus, the actual profits earned are $\Pi_1 = \beta B_L(i_H) - C_o - C(i_H)$

If the firm decides to renegotiate the contract, it can optimally invest i_L and its profits are given by

$$\Pi_2 = \beta B_L(i_L) - C_o - C(i_L) - A - r$$

Even though $\beta B_L(i_H) - C_o - C(i_H) < \beta B_L(i_L) - C_o - C(i_L)$

always holds, if renegotiation cost (r) is very high, it might be that $\Pi_2 < \Pi_1$ and the contractor chooses not to renegotiate, thereby undertaking a sub-optimal level of investment i_H even in the case of low actual demand.

In this case, it might further happen that $\Pi_1 < 0$ and the firm decides to abandon the contract. Thus, the only way to implement the project would be to design a flexible contract.

Rigid Vs Flexible

As seen from the analysis above, flexibility of the contract allows the firm to invest optimally, irrespective of the whether expectations are realized or not.

On the other hand, rigidity of contract creates losses in social benefits on two accounts:

1. When the contractor fails to renegotiate, the investment undertaken is sub-optimal
2. Even if the contractor is able to renegotiate the terms,

$$\beta B_L(i_L) - C_o - C(i_L) - A - r < \beta B_L(i_H) - C_o - C(i_H) - A$$

i.e. profits are lower in case of rigid contract, ceteris paribus, due to the legal cost which acts as additional burden on the society. Hence, it can be concluded that Social Welfare would be less in case of Rigid Contracts.

Low Capacity Initial Contract

The government forecasts the macroeconomic state to be of the Low type at $t = 0$.

In this case, the optimal investment expected from the firm is given by solving the following optimisation problem:

$$Max \Pi(i) = R - C = \beta B_L(i) - C_o - C(i)$$

$$\delta \Pi / \delta i = \beta B^i(i) - C^i(i) = 0 \quad \text{--- (3)}$$

The optimal investment level in this problem is given as i_L .

(A) Low State Realized at $t = 1$

As explained in the previous case, it doesn't make a difference whether the contract is Rigid or Flexible.

Contractor's optimization problem is $Max \Pi(i) = R - C$

Thus, as given above i_L^* is the investment chosen.

The equilibrium profit of the firm is: $\Pi = \beta B_L(i_L^*) - C_o - C(i_L^*)$

(B) High State realized at $t = 1$

1. Flexible Contract

The firm can simply adapt to the high demand by incurring an adaptation cost. The optimization problem is given by:

$$Max \Pi = \beta B_H(i) - C_o - C(i) - A$$

$$\delta \Pi / \delta i = \beta B^t(i) - C^t(i) = 0$$

This gives the optimal investment level i_H^* .

The contractor's equilibrium profit is given by $\Pi = \beta B_H(i_H^*) - C_o - C(i_H^*) - A$

2. Rigid Contract

If the firm decides not to renegotiate, he would have to implement the contract as decided at $t = 0$ and invest i_L^* , although the optimal investment is i_H^* obtained by maximizing:

$$Max \Pi = \beta B_H(i) - C_o - C(i) - A$$

If the firm continues to build Low capacity bridge, due to excess demand the social benefits are further reduced owing to the congestion cost incurred by the users.

Thus, the actual profits earned are $\Pi_1 = \beta [B_H(i_L^*) - \Delta] - C_o - C(i_L^*)$ where Δ is the congestion cost faced by the users.

If the firm decides to renegotiate the contract, it can optimally invest i_H^* and its profits are given by

$$\Pi_2 = \beta B_H(i_H^*) - C_o - C(i_H^*) - A - r$$

Again, whether the firm will opt for renegotiation depends on renegotiation and adaptation cost. In case of very high renegotiation cost, the firm ends up undertaking sub-optimal level of investment, in addition, an extra congestion cost is imposed on the society leading to further loss

in welfare.

On the other hand if the firm decides to renegotiate,

$$\beta B_H(i_H^*) < C_0 - C(i_H^*) - A \quad r < \beta B_H(i_H^*) - C_0 - C(i_H^*) - A$$

profits are lower in case of rigid contract, ceteris paribus, due to the legal cost which acts as additional burden on the society.

Thus, it can be clearly seen that under uncertainty regarding the macroeconomic environment, there is always the possibility of forecasting error. If the government is unable to correctly estimate the demand for a particular project, the society might incur efficiency losses. To account for this, a PPP contract should allow for flexibility in order to enable the engaging parties to optimally adapt to the actual demand conditions, leading to an efficient outcome.

6 Conclusion

The paper uses a simple theoretical model to explain how the welfare implications of a PPP contract vary with the choice of the type of the contract i.e whether rigid or flexible. The model suggests that the higher the renegotiation costs, the stronger is the welfare argument in favour of flexible contracts. The renegotiation cost depends on the differences in the contracting parties' characteristics as well as differences in institutional environments. In fact, the costs of renegotiation are a function of the willingness (or lack thereof) of the contracting parties to enter into conflict, haggling and friction. Thus, when parties decide to devise a rigid contract, they must account for the likely behavior of the other contracting party. Furthermore, differences in political ideology (e.g. left- or right-leaning public authorities) may affect the contractual choices made. Left-leaning public authorities are generally more skeptical than right-leaning ones about the delegation of public services to private operators, and hence may behave less cooperatively which will increase the renegotiation cost. Also, the institutional framework may affect the renegotiation costs. The existence of weak institutional frameworks would increase r that will more likely lead to more welfare loss in case of rigid contracts and in extreme cases, abandoning of the project. Thus, the best way to provide a public good in the most cost efficient manner is via a flexible contract.