Contractual Issues in Public Private Partnerships

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BACKGROUND

PPP: contract between public and private sector to Build and Operate infrastructure for public service provision

Trend towards increasing use of PPPs for: public housing, hospitals, schools, prisons, roads, bridges, leisure centres, museums, urban refurbishment, waste management

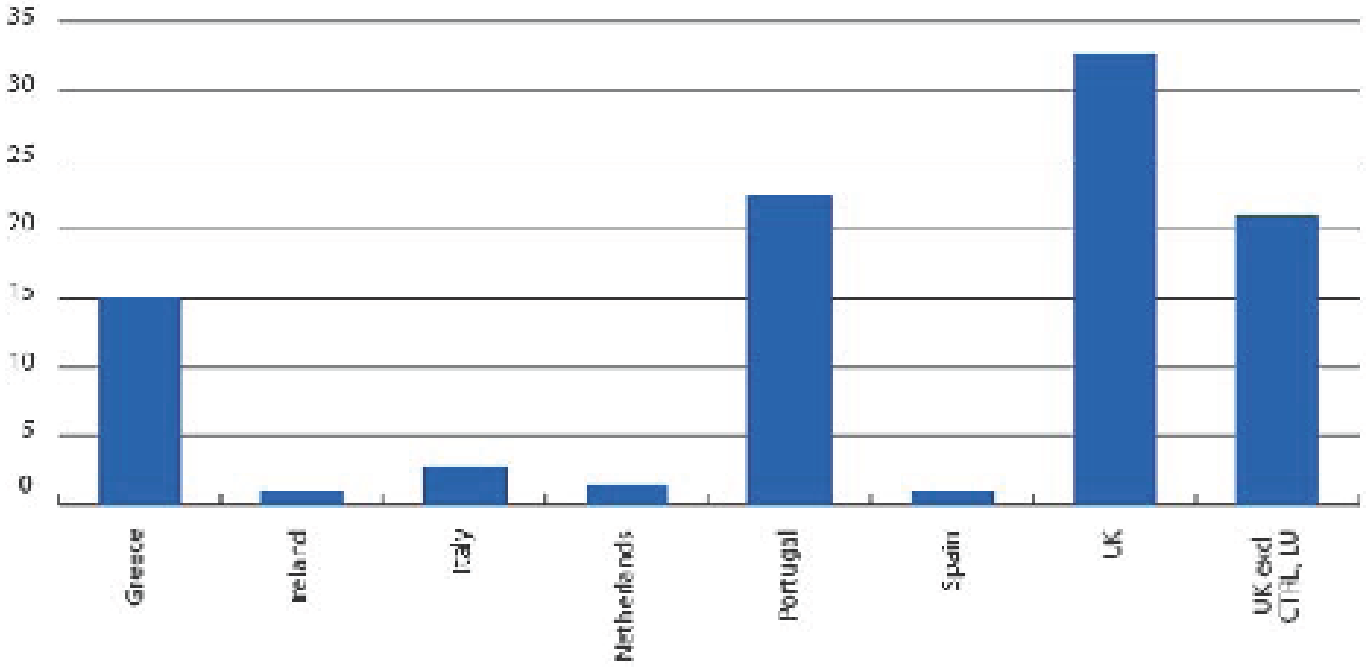
Leading example in Europe: PFI in the UK since 1992

(HM Treasury 2006): By March 2006, 700 PFI projects signed

Capital value: £47b

10-15% of total investment in public services

Figure 17. Signed value of PPP contracts, in % of public investment (average 1995-2003).



Sources: ProjectWare; HM Treasury; New Cronos; European PPP Report 2004; European Investment Fund.

BASIC PRINCIPLES OF PPP

- Bundling of project phases: DBFO, BOT models
- High risk transfer/ Control rights to private partner
- Long-term contract 25-30 years (no service: no fee)

(...and off-balance sheet)

Types of PPP/PFI projects:

1. Public sector as client (Schools, Hospitals, Prisons)
2. Financially free-standing, with users' fees (bridges, roads, leisure centres)

UK, NAO (2003):

22% of PFI projects over budget, whilst 73% under TP

24% of PFI projects delayed completion , whilst 70% under TP

PFI: Positive evidence for roads, bridges, prisons

Negative evidence for IT and soft services

Mixed evidence for hospitals, schools

Questions here:

When do the main characteristics of PPPs work well and why?

- What is the effect of bundling?
- Who should be the owner of the facility?
- What's the optimal risk transfer and CRR?
- When and why should we use long-term contracts?

The basic model

G (risk neutral) and $F1$, $F2$ (risk averse)

a: quality-improving effort by $F1$

e : cost-reducing effort by $F2$

$\varphi(a) = \frac{a^2}{2}$; $\psi(e) = \frac{e^2}{2}$ costs of efforts

social benefit: $b(a)$

costs of operation C

$$C = \theta_0 - e - \delta a + \varepsilon$$

only C contractible

$\delta > 0$ *(positive externality)*

$\delta < 0$ *(negative externality)*

Benchmark:

$$b'^{FB} + \delta = a^{FB}$$

$$1 = e^{FB}$$

- a^{FB} : internalize effect on social benefit and cost at operation stage
- e^{FB} : internalize effect on cost at operation stage

Unbundling

F1 and F2 are separate

F1: get a fixed fee and bears no risk

F2: gets cost-reimbursement rule $t(c) = \alpha - \beta c$

$\beta = 0$ (cost plus)

$\beta = 1$ (fixed price)

β : power of incentive scheme

and may bear risk

risk premium $\frac{r\sigma^2}{2}\beta^2$, increasing in β

Building stage: F1 chooses

$$\hat{a} = 0$$

underinvestment problem since F1 has no incentives to take into account effect of building quality a on social benefit $b(a)$ and *operational cost C*

Operational stage: F2 chooses

$$\hat{e} = \arg\max_{e} \quad \alpha - \beta(\theta_0 - \delta\hat{a} - e) - \frac{e^2}{2} - \frac{r\sigma^2}{2}\beta^2.$$

implying

$$\hat{e} = \beta$$

cost-reducing effort increases in power of incentive scheme, β

Then:

↑ power of incentive scheme $\beta \Rightarrow$ ↑ incentives for cost reduction

but

↑ power of incentive scheme $\beta \Rightarrow$ ↑ risk transfer to F, for which F must be compensated

$$\Downarrow$$

$$\max_{\hat{e}} \quad b_0 + \hat{e} - \frac{(1 + r\sigma^2)}{2}\hat{e}^2.$$

and yields

$$\hat{e} < e^{FB}$$

underinvestment arises since transferring risk to provide incentives is costly

Bundling (PPP)

Let $\delta > 0$, now F chooses

$$(e^*, a^*) = \arg\max_{(e,a)} \alpha - \beta(\theta_0 - e - \delta a) - \frac{a^2}{2} - \frac{e^2}{2} - \frac{r\sigma^2}{2}\beta^2$$

$\Rightarrow$ as before

$$\tilde{e} = \beta$$

but now F internalize effect of a on cost at operational stage

$$\beta\delta = \tilde{a}$$

Bundling induces F to internalize the effect of his quality-enhancing investment a on the fraction of cost in operational stage

An increase in the power of the incentive scheme β now raises both types of efforts a and $e \Rightarrow$ risk transfer more effective on incentives

Bundling increases BOTH efforts:

$$\hat{a} < \tilde{a} < a^{FB} \text{ and } \hat{e} < \tilde{e} < e^{FB}$$

- PPPs are associated with higher powered incentives:

$$\tilde{\beta} > \hat{\beta}$$

- PPPs are characterized by a greater risk transfer
- Welfare is higher under PPP than under traditional procurement

$$\widetilde{W} > \widehat{W}$$

and difference increases in δ.

Results generally consistent with existing evidence on benefits from whole-life approach (*a*)

• Enterprise LSE: Sample of PFI project: cost saving 17%

• NAO (97,03): innovative design on prisons →cost saving 30% (80% prisons costs are staff costs)

• HM Treasury (04) for highway projects: use of high modulus roadbases and stone mastic asphalt reduces maintenance costs and noise

If $\delta < 0$ (negative externality) we have

$$\tilde{a} \leq \hat{a} < a^{FB} \text{ and } \tilde{e} \leq \hat{e} < e^{FB}$$

- Optimal NOT to internalize externality for it would exacerbate underinvestment problem due to $b(a)$ never internalized

Results generally consistent with existing evidence (Audit Commission 04): little design innovation in schools, where also poor acoustic, air quality and noise

Ownership

Generic facilities (leisure centres, accommodation, housing)

Specific facilities (hospitals, prisons, schools)

Two issues: ownership *during* the contract and ownership *at the end* of the contract

Two approaches: complete-contract and incomplete contract

- Private ownership helps incentives of *F*:
  - BUT careful if separated provision of core and ancillary services: example hospitals/schools
  - BUT need for service continuation often⇒ automatic transfer back to G
  - Priv. ownership more helpful if low specificity of facility for public service provision

- PPPs for building infrastructure are more desirable than PPP for renewing existing facilities

■ This is due to private information of G on value asset θ_0 $\Rightarrow$ more difficult to achieve risk transfer since G gains from overreporting quality $\Rightarrow$ lower β will be chosen

LONG-TERM CONTRACTS

Effect of contract length:

▲ (+) Help to recoup initial investment

▲ (+) More incentives to invest in building quality / more gain from whole life cost approach/Remedy short-termism and help to protect investor from his investment being expropriated by G

▲ (-) Lack of flexibility and high cost of renegotiating contract terms, reduces incentives of G to invest in new services

▲ (-) Lack of flexibility if circumstances and users' needs change call for lower powered incentive scheme to reduce cost of renegotiation

(NAO (2003): 55%PFI contracts changed after signed; and IT example)

Given length, consider a twice-repeated version of our basic procurement model.

$$C_1 = \theta_0 - e_1 + a + \varepsilon_1 \quad \text{and} \quad C_2 = \theta_0 - e_2 - d(a) + \varepsilon_2$$

Assuming full commitment, the optimal long-term contract entails:

(i) low-powered incentives in the first-period:

$$e_1^* < \hat{e};$$

(ii) high-powered incentives in the second-period:

$$e_2^* > \hat{e}$$

To induce non-verifiable investment, G must let F bear less of its costs and enjoy most of its benefits. This is best achieved by offering cost-plus contracts in the earlier periods and fixed-price contracts in the sequel.

Regulatory Risk

Often political environment is unstable; and G has limited commitment power

Q: How does political/regulatory risk affect PPP?

New G does not take into account impact of contract on incentives to invest in period 1

$\Rightarrow$ Period 2 contract is lowered powered $\Rightarrow$ G $\downarrow$ risk transfer $\Rightarrow \downarrow \alpha$

$$\Downarrow$$

Incentives to invest are lower

$$a^0 < a^*$$

Regulatory risk reduces the gain from using PPP

Example: refinancing gains in UK

Implications for PPP in less developed countries

Demand and Cost Risks

Often demand for public service is uncertain and it is affected by contractor's action (a)

Q: How should demand risk be allocated between G and F?

Suppose user fees are allowed.

Assume demand for service is inelastic for $P \leq \bar{P}$ and given by:

$$D = a + \eta,$$

Social benefit:

$$B = \bar{P}(a + \eta).$$

and contract is $\{P, \alpha, \beta\}$ and firm max:

$$\alpha - \beta(\theta_0 - e - \delta a) + Pa - \frac{a^2}{2} - \frac{e^2}{2} - \frac{r\sigma^2}{2}\beta^2 - \frac{r\sigma_\eta^2}{2}P^2.$$

leading to IC:

$$\begin{cases} \beta = e^* \\ P + \beta\delta = a^*. \end{cases}$$

- Offering a fixed-price contract (β large) improves the firm's effort in enhancing demand and may help G to reduce users fee (P reduced)
- When demand is affected by the contractor's effort, transferring risk to the contractor helps incentives
- In practice, with financially free-standing PPPs, contractor's effort has significant impact on demand ⇒Demand risk generally lies with F
- With non-financially freestanding project, contractor's effort has little impact on demand ⇒ PPP consortia are paid unitary charges whilst G retains the demand risk

Concluding: **PPP more likely to be preferred**:

- the higher value of whole-life cost approach
- the stronger the effect building innovation on social benefit
- the lower the specificity of facility for public service (generic facilities)
- the lower regulatory risk (stable institutions)
- the less uncertain users' demand (stable users' needs)
- the less risk averse the firm (large firms/projects ?)
- the greater the scope for cost reduction