

Building and Managing Facilities for Public Services

John Bennett and Elisabetta Iossa

Provision of public services

Recently: use of PPPs in North America, Europe, Developing Countries

Traditional procurement

G: finance and design

F build

F/G operate

PFI and PPP

DBFO model

Output Specification and control rights to F

Long-term contract

Private Finance

We examine: *desirability of PFI/PPP model:*

- 1** *Bundling of 'building' and 'management'*
- 2** *Allocation of control rights/ownership of facility*
- 3** *Role of residual value of facility*

- two specialized firms
- contractual incompleteness

Existing evidence (NAO, 2003)

- 22% price exceeds price agreed under PFI
- 73% price exceeds price agreed under TP

- 76% completed on time under PFI
- 30% completed on time under TP

- PFI positive evidence for roads, bridges, prisons
- PFI negative evidence for IT
- Hospitals, schools: mixed evidence

Related Literature

In house vs Contracting out:

Hart, Shleifer and Vishny (1997, QJE)

Besley and Ghatak (2001, QJE)

Bundling:

Bentz, Grout and Halonen (2001):

Hart (2003)

Results

- **Positive externality**

- 1) bundling (consortium) is optimal
- 2) ownership: consortium or government?

Consortium: good for residual value and cost minimization
but
bad for social benefits.

Government: vice versa

- **Negative externality**

unbundling may become optimal: no consortium

Ownership to F in the building stage or to the government.

- **Residual value facility**

PFI better if low specificity of facility for public service

PFI better if risk of low public value of facility

The Model

Firm 1 is specialized in building

Firm 2 is specialized in managing

‘Bundling’ if 1 and 2 form a consortium

‘Unbundling’ if 1 and 2 separate

Beginning of building stage: a

Beginning of management stage: e

a, e observable but unverifiable

Social benefits in management stage

$$B(a, e) = B_0 + u(a) + v(e)$$

Costs at the management stage

$$C(a, e) = C_0 - \gamma c(a) - d(e)$$

Residual value

$$R(a) = R_0 + t(a)$$

Two cases.

1) $\gamma = 1$ positive externality

2) $\gamma = -1$ negative externality

$R(\cdot)$, $B(\cdot)$, $C(\cdot)$, observable but unverifiable.

Implementation of innovation requires owner's approval

Private firms maximize profits

Government maximizes: $B(\cdot)$ - payments (+ residual value)

First-best

$$u'(a^*) + t'(a^*) + \gamma c'(a^*) = 1$$

$$v'(e^*) + d'(e^*) = 1$$

Timing

Period 0:

ownership, basic standards chosen

Period 1:

firm 1 chooses a

renegotiation to implement it

Period 2:

firm 2 chooses e

renegotiation to implement it

Period 3:

owner gets facility \Rightarrow

possible sale

Positive Externality: $\gamma = 1$

Private Ownership

Ownership to Firm 1

$$t'(a) = 1$$

$$\frac{1}{2}d'(e) = 1$$

underinvestment problem:

do not internalize effect of a on externality across stages $C()$ and on social benefits $B()$

do not internalize effect of e on social benefits $B()$

do not fully internalize effect of e on externality across stages $C()$

Ownership to Firm 2

$$\frac{1}{2} [t'(a) + \gamma c'(a)] = 1$$

$$d'(e) = 1$$

underinvestment problem:

do not fully internalize effect of a on residual value $R()$, costs $C()$

do not internalize effect of a and e on social benefit $B()$

Ownership to Consortium (PFI)

$$t'(a) + \gamma c'(a) = 1$$

$$d'(e) = 1$$

Consortium:

- 1) fully internalize effect of a on residual value $R()$,
- 2) fully internalize externality across stages $C()$
- 3) do not internalize effect of a and e on social benefit $B()$

→ *still underinvestment problem*

Public Ownership

Bundling

$$\frac{1}{2} [t'(a) + u'(a) + \gamma c'(a)] = 1$$
$$\frac{1}{2} [v'(e) + d'(e)] = 1.$$

under-investment still occurs

Consortium:

partially internalize effects of a and e on residual value $R()$, social benefits $B()$ and externality across stages $C()$

Unbundling

$$\frac{1}{2} [t'(a) + u'(a)] = 1$$

$$\frac{1}{2} [v'(e) + d'(e)] = 1$$

Neither government nor firm 1 is interested in the effect of a on the cost of managing the facility.

→ Externality $c'()$ not internalized

Effect of a on

$R(a, e) \rightarrow$ Firm 1 or Consortium Ownership

$B(a, e) \rightarrow$ Government Ownership

$C(a) \rightarrow$ Consortium Ownership

Effect of e on

$C(a, e) \rightarrow$ Firm 2 or Consortium Ownership

$B(a, e) \rightarrow$ Government Ownership

Positive externality

Prop. 1. Bundling is always optimal

underinvestment problem \Rightarrow internalization of positive externality is good

Prop. 2.

(i) if externality effect ($c'(\cdot)$) is high or if residual value effect ($t'(\cdot)$) is high then PFI

(ii) if social benefit effect ($u'(\cdot)$) is high then TP_{+} bundling

PFI

Consortium internalizes effect of e and a on residual value R , and on costs C ; but it disregards social benefits B

TP₊ bundling

Consortium partially internalizes effects on R , C , B

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
- NAO (03): IT projects; main innovation is through continuous adaptations (*e*); PFI not suitable

Negative Externality: $\gamma = -1$ (e as before)

Prop.3. If "weak" externality ($c'(a)$ small):

Optimal NOT to internalize externality \Rightarrow

- i) if private ownership: Firm 1 ownership
- ii) if public ownership: unbundling (TP)

Prop. 4. If effects of a on social benefit are large compared to effects on the residual value ($u'(a) > t'(a)$), public ownership with separation of firms (TP) is optimal for a

In the opposite case ($u'(a) < t'(a)$), Firm 1 ownership optimal for a

Results generally consistent with existing evidence:

Audit Commission (04): little design innovation in schools, where also poor acoustic, air quality and noise problems

ROLE OF RESIDUAL VALUE

Now suppose that public residual value is:

R w.p. p

0 w.p. $1 - p$

and private residual value is θR with $\theta < 1$

Recall that R favours PFI. Same true here and effect is greater

(c) the lower the specificity (high θ) of facility for public service

(d) the higher prob. facility not needed for public purposes (low p)

Conclusion and Policy Implications

If *positive externality*:

bundling is optimal

but private ownership (PFI) may or may not be optimal

If *negative externality*:

weaker case for bundling and PFI

In general, PFI is more likely to be preferred

(a) the more positive (or less negative) is the externality; (value of whole-life approach)

(b) the stronger the effects innovations have on the residual private value of facility

(c) the lower the specificity of facility for public service

(d) the higher prob. facility not needed for public purposes

(c) the weaker the effect of innovations on benefits from provision of public service