Incentives in infinitely repeated contracts

Outsourcing a publicly financed task

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Outline

- I. Infinitely repeated contract
- II. The model
- III. The role of the probability of a new contract
- IV. Conclusions

Direct and indirect contracts

- Direct contract - occurs when the state agency deals directly with the firm through personal communication without any tender
- Indirect contract – this is a tender.

Thoughts in favour of competitive tenders

- Alam and Pacher (2000); Vincent-Jones (2005); Armstrong (1998); Ferlie (1996)

Doubts about the efficiency of ubiquitous competitive tendering.

- Armstrong (1998); Hansen (2010); Cox (2003); Ingraham (1997); Boyne (1998); Hansen (2010)

Incomplete contracts

This theory could give an acceptable explanation why in some cases public procurement does work well and why in others it does not.

- Hart (1995); Hart and Moore (1990); Hart et al. (1997); Halonen (2002)

The main sources of incompleteness in contracts

There are two main sources for normal contracts not to be complete:

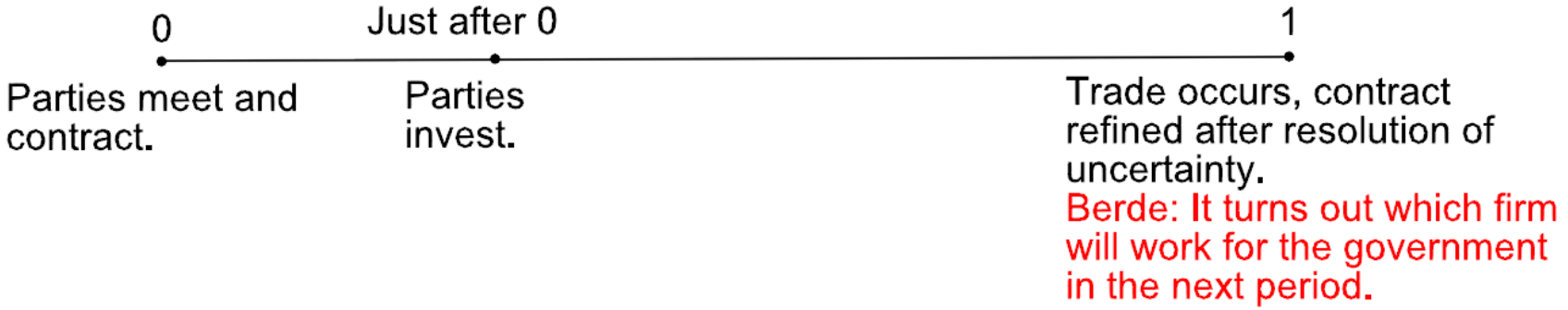
- It is hard (impossible) for people to think very far ahead and to plan for all various contingencies that may arise. They are not able to ensure that an outside authority could enforce the plan
- Costs of relation specific investment would become sunk by the time the revenue of investment is obtained

However in infinitely repeated contracts due to reputation concerns in some cases hold-up problems can be avoided.

Prisoner’s dilemma

Timing of the stage game

Halonen (2002)



Halonen's main question: Which types of property rights ensure the best possible level of investment?

My main question: Using this theory what can we prove about allocating investment and influencing the probability of re-newing the contract so that joint surplus is maximised. I assume that both the firm and the government are risk neutral.

The stage game

The joint optimum: $v_i - c(v_i) \underset{v_i}{\rightarrow} max$

Which means $1 - c'(v_i^*) = 0$, where $i = f, g$

v_i^* denotes the first best value of investment.

The real profitmaximisation problem is:

$\frac{v_i}{2} + \frac{v_j}{2} - c(v_i) \underset{v_i}{\rightarrow} max$

From which $\frac{1}{2} - c'(v_i^p) = 0$, i and $j = f, g$ $v_i^* > v_i^p$

$\pi \cdot v_i^p$ is used in the given stage; π is the known probability of the new contract.

The hold-up problem

$$v_i^* > v_i^p$$

Repeated game and a trigger strategy

1. In period one, choose v_i^* and follow (P_f^*, P_g^*). Payoffs (P_f^*, P_g^*) are prescribed from outside.

2. If in $1, 2, \ldots, t-1$ payoffs were (P_f^*, P_g^*) and $v_j = v_j^*$ choose v_i^* and folow (P_f^*, P_g^*).

3. If either $v_j \neq v_j^*$ in t, or not (P_f^*, P_g^*) in $t-1$ then in $t, t+1, \ldots$ choose v_i^N and follow (P_f^N, P_g^N) P_f^N and P_g^N refers the Nash-equilibrium payoffs of static game and v_i^N refers to Nash-equilibrium investment value.

Payoffs

The optimal payoffs in trigger strategy are:

$$(P_f^*, P_g^*) = [(T^* - c(v_f^*)), (\pi v_f^* + \pi v_g^* - T^* - c(v_g^*)]$$

Where

$$T^* = \frac{(P_g^d - P_g^p)[P_f^d + c(v_f^*)] + (P_f^d - P_f^p)[\pi v_f^* + \pi v_g^* - P_g^d - c(v_g^*)]}{(P_f^d - P_f^p) + (P_g^d - P_g^p)}$$

Notations: d upper index means the deviation payoffs, and p upper index means punishment payoffs in the trigger strategy. The trigger strategy results in the first best investments as an equilibrium, if:

Discount factors

$$\delta \geq \frac{P_f^d - T^* + c(v_f^*)}{P_f^d - P_f^p} \text{ and}$$

$$\delta \geq \frac{P_g^d - \pi v_f^* - \pi v_g^* + T^* + c(v_g^*)}{P_g^d - P_g^p}$$

The optimal T gives the firm and the government balanced incentives to cooperate, and is equal to T^*.

The role of the probability of receiving a new contract

Simplification: The circumstances of the firm and the state are symmetrical:

$c_f(.) = c_g(.) = c(.)$.

First best investment of the firm and the government: v^*.

Deviation payoffs when π is the probability that the firm receives a further contract from the state are: P_π^d.

Punishment payoffs are in the same case: P_π^p.

Discount factor is decreasing in the probability

Due to the symmetrical assumption:

$$\delta = \frac{P_{\pi}^{d} - \pi v^{*} + c(v^{*})}{P_{\pi}^{d} - P_{\pi}^{p}}$$

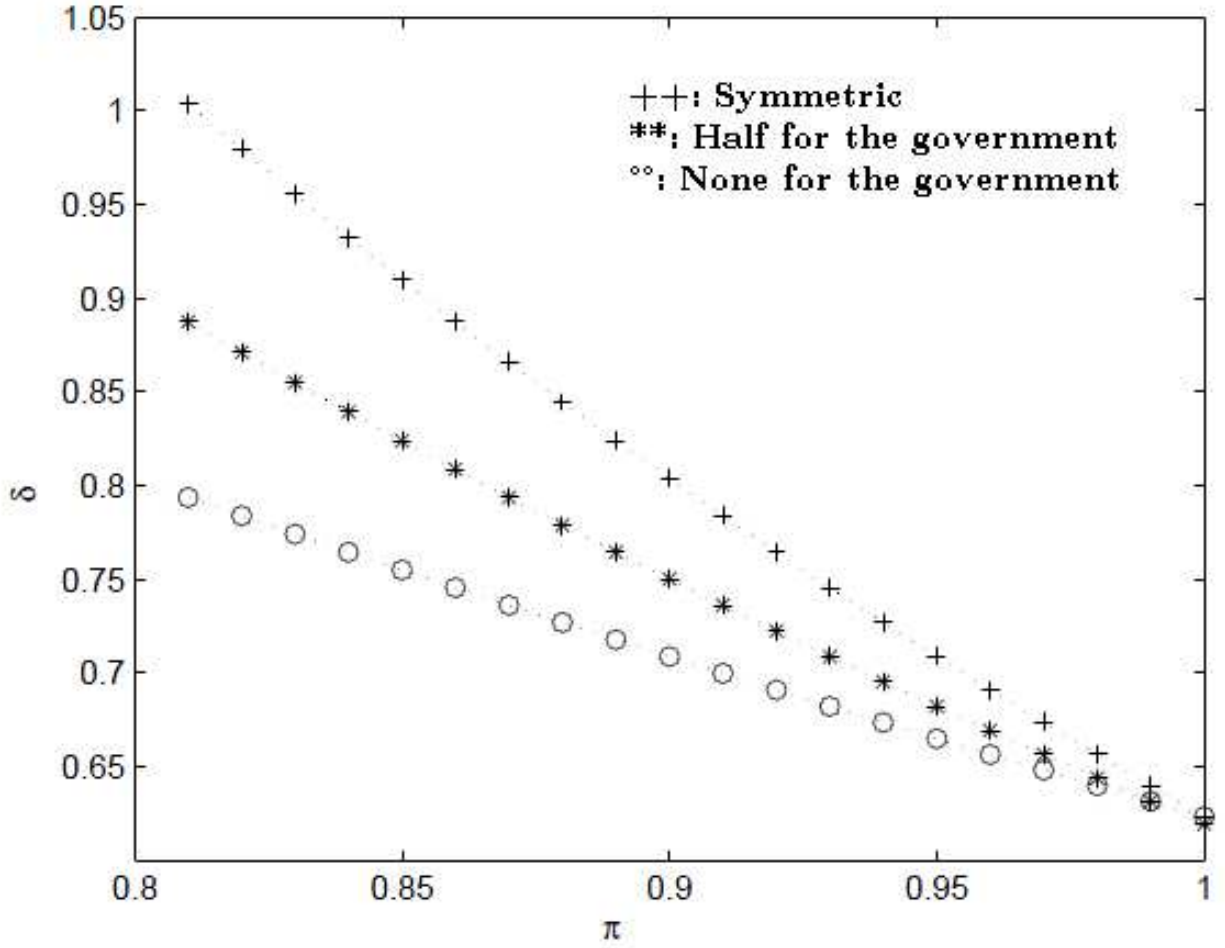
Rearranging the above equation:

$$\delta = -1 + 2\frac{c(v^{*}) - c(v)}{\pi \cdot (v^{*} - v)}$$

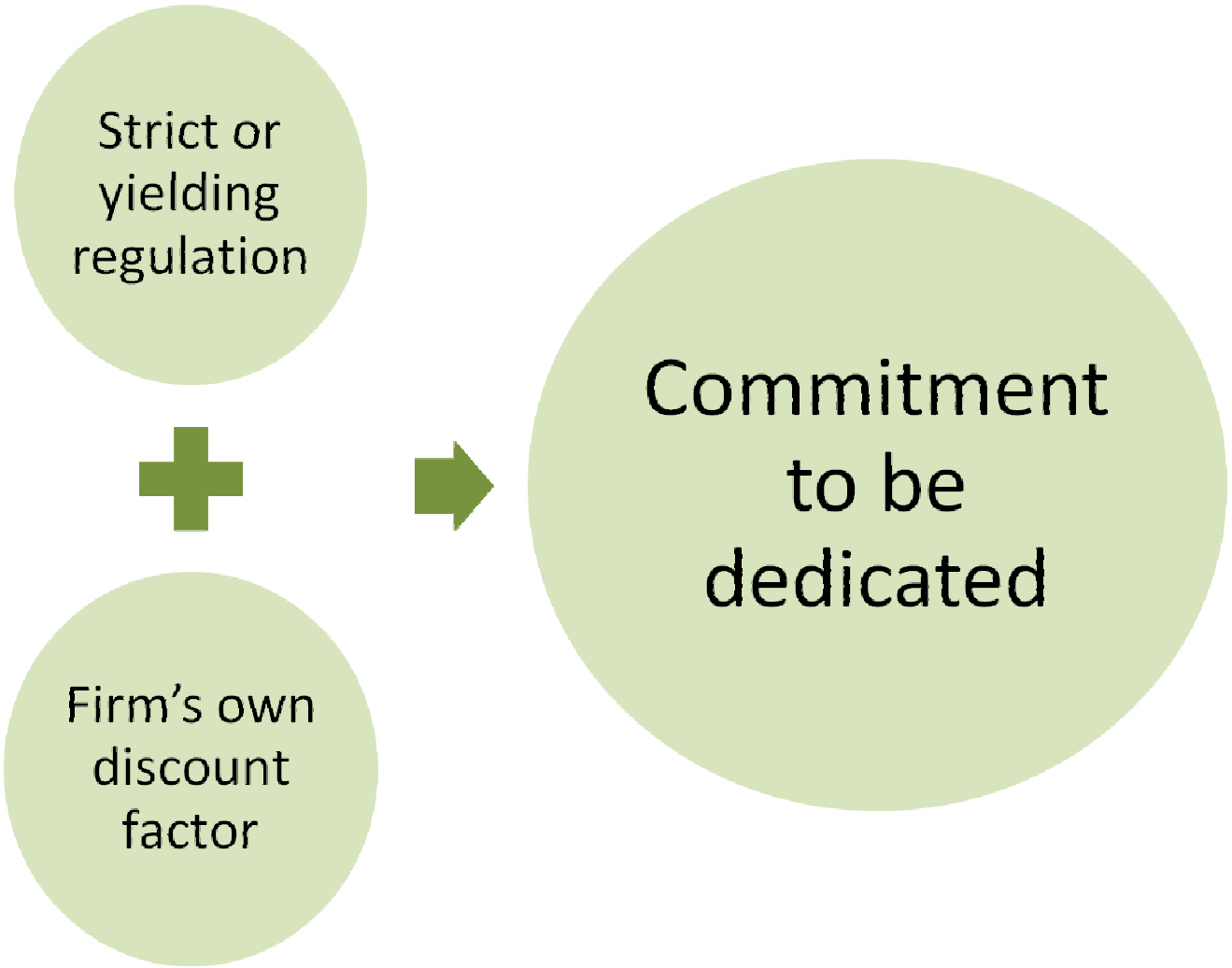
The greater the π the smaller the δ is required to be to obtain the first best investment level.

Example

$c=v^k$; k=1.3



Role of the regulator in determining incentives



V. Conclusions

- I have proved theoretically – as many case based studies have done – that in special circumstances direct agreement with the private firm can have better results than competitive tendering.
- Devotedness depends in many aspects on regulation. If the regulation allows the government to not use competitive tendering when the nature of the service requires direct negotiation, then mutual trust emerges between the state agency and the firm.
- In the same way as criminals in the infinitely repeated prisoner's dilemma, the firm can always be devoted and the state agency can always use a directly-signed contract, and accordingly effective cooperation between the state agency and the firm can lead to the best possible long term result.

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Thank you for your attention!