# Formal or informal agreements: Revisiting relational contracting in public-private partnerships.

Claudine Desrieux<sup>\*</sup>

Very preliminary version Please do not quote

This paper proposes to consider contracts to provide public services as possible relational contracts: if so, enforcement of contracts is observed through conventions derived from the social network in which they are embedded. The originality of this approach is to consider through a simple model that informal agreements are possible in a static framework, contrary to Baker et. alii. [2002, 2005]. We then try to determine whether such social ties between contractors lead to achieve a better contractual efficiency. Results show that when both contractors are involved in a common social network, they are able to establish conventions leading to first-best levels of investments. This helps to understand why different organizational choices are observed around the world with comparable efficiency: identities of parties matter in the contractual performance that cannot then be replicated only through the transfer of the written contractual formula.

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<sup>\*</sup>ADIS, Faculté Jean Monnet, 54 Boulevard Desgranges, 92331 Sceaux Cedex, France & ATOM, Université de Paris I, 106-112 Boulevard de l'Hôpital 75013 Paris Cedex, France, e-mail: claudine.desrieux@free.fr, Phone: +33(0)144078321, Fax:+33(0)144078320.

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# 1 Introduction

The problem of organizational choice to provide public services has attracted much attention in the economic literature as in political debates. Controversies keep on raising about the role of private sector in such provisions, and about the optimal degree of private involvement in contracts of public-private partnerships.

Many contributions have then tried to clear-cut the debate by analyzing contractual efficiency. Organizational structures are then mainly perceived through written contracts. Most of the time, the characteristics of services seem to induce the optimal organizational choice. The seminal work of Hart, Shleifer, Vishny (HSV) [1997] shows for instance how the choice between in-house provision and privatization depends on the types and levels of anticipated uncontractible investments: Private provision is generally superior to public one, except when cost-reducing innovations are likely to entail strong adverse effects on quality. In spite of its rigorous approach, this study does not allow to understand why a great diversity of public-private partnerships is still observed for similar services between and within countries. If there exists one superior organizational form for a given service, why public authorities do not converge to such a choice?

This paper aims to shed a new light on the question of efficiency in the provision of public services by renewing the vision of contracts. In previous studies (HSV [1997], Hart [2003], Boycko *et. alii.* [1996], Shleifer [1998]), contracts are regarded as formal agreements, allowing to completely characterize relationships between parties. Yet, in various other fields, researchers think that there is more in a contract that the contract itself. In other words, some contracts can link parties beyond the formal written, and then become "relational contracts". Recent works on theories of the firm have stressed the role of such informal agreements between contractors, and define those contracts as "selfenforcing agreements that are too rooted in the parties' particular circumstances to be enforced by a court, but that can be enforced by the parties' concerns for their reputations" (Baker *et. alii.* [2004]). As such a vision considers that relational contracts are mainly sustained by the value of future dealings, models of repeated games allow to determine the conditions under which such informal agreements become self-enforcing. There is then no difference between reputation and application of informal behavior: informal dealings are similar to inter-temporal self-interest.

This is yet not what many sociologists think when they refer to informal behavior of actors. To this subject, the analysis of human behavior given by Granovetter [1985] seems helpful. His "embeddedness" argument stresses the role of concrete personal relations and structures (or "networks") in generating trust and discouraging malfeasance. "Rational in-

dividuals are less interested in general reputations than in whether a particular other may be expected to deal honestly with them- mainly a function of whether they or their own contacts have had satisfactory past dealings with the other. It seems that social relations rather than institutional arrangements or generalized morality, are mainly responsible for the production of trust in economic life."

Actors are then not self-interested individuals affected minimally by social relations as described by the utilitarian tradition, nor obedient people with automatic behavior internalized through socialization. "Actors do not behave or decide as atoms outside a social context, nor do they adhere slavishly to a script written for them by the particular intersection of social categories that they happen to occupy. Their attempts at purposive action are instead embedded in concrete, ongoing systems of social relations" (Granovetter [1985]). In other words, reputation matters less than the flows of information actors can receive from their contacts. Credible opinions or past experiences with others are as important as future agreements between the same parties to develop relational contracts.

The consecutive idea according to which firms as actors act in reference to the network in which they are embedded has been frequently explored in sociology<sup>1</sup> but has been few analyzed in economics. This paper tries to fill this gap by proposing a renewal conception of contracts with a public authority, based on "embeddedness". As the adoption of informal behavior is independent from reputation, a "relational contract" can be sustainable even if parties meet only one time. Such an implication particulary fits to the study of contracts of public private partnerships, as they are most of the time concluded for a very long term (20 or even 30 years in water production for example). It is then quite rare that the same actors, *i.e.* an elected representative and a private manager, contract repeatedly in similar conditions that would lead to the same anticipated gains.

The existence of a social network between parties is supposed to influence the efficiency of public-private contracts, by generating trust, information sharing and "conventions" among the parties, *i.e.* "a pattern of behavior that is customary, expected, and self-enforcing" (Young [1996]).

Economic literature traditionally associates these networks to the notion of "common knowledge" : members of the network know that the other members know that they know... and so an ad infinitum. Chwe [2000] shows for instance in a coordination game that social structure is the communication network by which people tell each other their willingness to participate and thus creates common knowledge.

The importance of common knowledge in social interactions has been stressed for a long time. David Hume [1740] was perhaps the first to make explicit reference to the role of

<sup>&</sup>lt;sup>1</sup> Recall here that the study of Rooks *et. al.* [2000] showing "How inter-firm cooperation depends on social embeddedness", or R. Gulati & M. Garigiulo [1999] that analyze the way partnerships depend on networks in which firms are embedded.

mutual knowledge in coordination. In his account of convention in A Treatise of Human Nature, Hume argued that a necessary condition for coordinated activity was that agents all know what behavior to expect from one another. Without the requisite mutual knowledge, Hume maintained, mutually beneficial social conventions would disappear. Much later, Thomas Schelling<sup>2</sup> [1960] and John Harsanyi [1967] argued that something like common knowledge is needed to explain certain inferences people make about each other. David Lewis [1969] was the first to give an explicit analysis of common knowledge in the monograph *Convention*: Parties conform to the social norm of the group and expect everyone to conform, and everyone has good reason to conform because conforming is in each person's best interest when everyone else plans to conform. Such common expectations are called "conventions". They entail trust, defined as "the confidence that others will do the right thing despite a clear balance of incentives to the contrary" (Granovetter, [2005]).

To sum up, this paper proposes to consider contracts to provide public services as possible relational contracts: if so, contractors apply conventions derived from the social network in which they are embedded. The originality of this approach is to show through a simple model that informal agreements are enforceable in a static framework. The simple hypothesis of common knowledge is sufficient to generate relational contracts.

We then try to determine whether such social ties between contractors lead to achieve a better contractual efficiency. Results show that when both contractors are involved in a common social network, they are able to establish conventions leading to first-best levels of investments. This helps to understand why different organizational choices are observed around the world with comparable efficiency: identities of parties matter in the contractual performance that cannot then be replicated only through the transfer of the written contractual formula.

In the following section, a model based on the framework of HSV [1997] presents the various incentives that can be achieved through contracts, considered as strict written agreements and then as relational contracts. The choice of contractors to engage in informal dealings is then analyzed, not through a repeated game, but by introducing trust and common knowledge as key characteristics of relational contracting. It is then shown that such informal enforcement of contracts can lead to achieve the first-best social surplus. Section III illustrates such results through the French and American cases. Section IV concludes.

<sup>&</sup>lt;sup>2</sup>The well-known experience of Schelling [1960] aims to ask two individuals unable to communicate with each other to choose some place in New York to which to go in the hope of meeting the other. Any location is as good as any other, provided both choose it. The coordination first seems very difficult, as many places can be given as answers. Yet, the majority of Schelling's respondents chose the same place, Grand central Station. This place has some properties of salience and thus appears as a focal point: everyone expects that everyone chooses this place.

# 2 The model

## 2.1 The framework

We consider a public authority, denoted G, having in charge the provision of a public service, noted F. The manager of the facility or the service is noted M, whether public or private. G and M are able to write a long term contract specifying some aspects of the good or service to be provided. Although G and M can specify some aspects of the good or service in advance, we suppose some others cannot be specified as all contingencies cannot be anticipated ex ante. Observable but unverifiable investments researching innovative approaches to perform tasks in excess of the basic standards specified in the initial contract can thus be made, as well as observable but unverifiable cost-reducing investments. We assume that an innovation, if implemented, has an effect both on social benefits generated by the public service, and on the profits.

The benefit to society is noted B and costs the manager C to produce. Both variables can be represented by a dollar amount. We suppose that a cost innovation leads to a reduction in costs C but is typically accompanied by a reduction in quality. Similarly, a quality innovation leads to an increase in quality, but is typically accompanied by an increase in costs.

Consequently, we write the benefit to society  $B = B0 - b(e) + \beta(i)$ , and the cost reducing innovation is C = C0 - c(e), where e and i denote respectively effort devoted to the cost innovation and quality innovation;  $c(e) \ge 0$  is the reduction in cost corresponding to the cost innovation and  $b(e) \ge 0$  is the reduction in quality corresponding to the cost innovation.<sup>3</sup>  $\beta(i)$  represents the level of increase in social benefit due to investments of type "i". B0 represents the initial level of benefit, independent from the investments, and C0 represents the amount of initial cost independently of the level invested.

Standard assumptions about the convexity, concavity, and monotonicity of b, c and  $\beta$  are made such as:  $b(0) = 0, b' \ge 0, b'' \ge 0, c(0) = 0, c'(0) = \infty, c' > 0, c'' < 0, c'(\infty) = 0, \beta(0) = 0, \beta'(0) = \infty, \beta' > 0, \beta'' < 0$  et  $\beta'(\infty) = 0, c' - b' > 0$ .

The assumption c' - b' > 0 and  $\beta' > 0$  say that the quality reduction from a cost innovation does not affect the cost reduction from a cost innovation, and the cost increase from a quality innovation does not offset the quality increase. This is a strong hypothesis formulated in HSV [1997], as it implies that the net effect of cost reducing investment

 $<sup>^{3}</sup>$  The function b plays a key role in the model, as it measures how much noncontractible quality fails because of a noncontractible cost cut, and hence serves as the variable that critics of privatization focus on.

is always positive. We then focus on particular types of public services, for which costreducing investments may provoke damages on quality that are inferior or equal to the gains they entail. Similarly, we need to keep track of the separate cost and quality components of the cost innovation (c and b), but not of the quality innovation, considered as a net effect. The investments considered are for the main part human capital investments. In accordance with Hart-Shleifer-Vishny [1997], we assume consequently that i, e, b and c are observable to both G and M, but are not verifiable to outsiders and hence cannot be part of an enforceable contract.

To focus on the problem of enforcement, we retain here only two types of contracts, namely private and public provision, as it is the case in HSV [1997], even if a great variety of contracts involving private partners at various degrees exist and may lead to different incentives to invest. Consequently we keep the framework of the property-rights literature: contracts are considered incomplete and residual control rights determine agents' incentives in unforeseen contingencies, allowing observable but unverifiable investments described above.

G and M are supposed to be partially locked into each other once their relationship is under way. Specifically, there is no facility available other than F that can supply society, and there is no other potential customer for the service apart from G. However, M's labor services may be partially substitutable. We also assume that G and M are risk-neutral, and that there are no wealth constraints.

During the execution of contracts, unforeseen events may appear, as the possibilities of quality and cost-reducing innovations described previously. Facing such opportunities, actors can adopt two types of behaviors:

- First, contractors act as self-interested individuals. They share no informal ties between them and renegotiations take place under Nash-equilibrium principles. In accordance with property-rights literature, the parties renegotiate the contract, once the potential nature of quality improvement or cost reduction is known.
- Second, parties do not renegotiate contracts when possibilities of innovations appear, but apply an informal rule - a convention- that creates incentives to invest. This implies trust among the parties that loyally manage the potential gains of innovations. In other words, the contract is "relational" and then informally enforced.

The model presented here determines the optimal levels of investments, *i.e.* the firstbest amount of investments maximizing the total surplus, and then determines the levels of investments that can be hoped in both types of enforcement.

## 2.2 The First Best

Consider a benchmark situation where e and i are contractible. Their levels are chosen to maximize the total net surplus from their trading relationship, and divide the surplus between them using lump-sum transfers. That is, in the first best, G and M solve:

$$MaxB0 - b(e) + \beta(i) - C0 + c(e) - e - i$$

There is a unique solution (i<sup>\*</sup>,e<sup>\*</sup>) characterized by first-order conditions:

$$-b'(e*) + c'(e*) = 1$$
 and  $\beta'(i*) = 1$ 

At the social optimum, the marginal social benefit of spending extra effort to reduce costs, measured to take account of marginal quality deterioration, must equal the marginal cost of that extra effort, which equals one. Similarly, the marginal social benefit of spending extra effort to improve quality must equal the marginal cost of that extra effort, which again equals one.

Let's call  $S^*$  the first-best social surplus:

$$S* = B0 - C0 - b(e^*) + c(e^*) + \beta(i^*) - e^* - i^*$$

## 2.3 Determination of the levels of investments in case of selfinterested behaviors

Relationships between parties are first assumed to be reduced to formal contracts. If innovations appear during the execution of these contracts, renegotiation occurs. Such a situation is presented in HSV [1997].

The sequences of the game are then as follows:

First, M and G write contract and choose ownership structure, either private or public, M chooses i and e

Renegotiations occur, once the parties learn the nature of the potential innovations.

G and M divide the gains from renegotiation according to Nash bargaining, *i.e.* they split the surplus 50:50. This means that the parties' default payoffs influence final payoffs.

Any cost or quality innovation requires the agreement of the owner of the facility F, since implementing these innovations involves a change in the way F is used. Only the owner, the possessor of the residual control rights, has the right to approve such a change.

#### 2.3.1 Equilibrium under private ownership

In the first case under study, we suppose that M owns F. The private constructor has the residual control rights over the asset, and hence does not need to get government approval for a cost reduction. At the same time, if he wants to improve quality and get a higher price, he needs to renegotiate with the government since the government is the buyer of the service. The gains from renegotiation are  $\beta(i)$  split 50:50 in a Nash bargaining.

The parties' payoffs are then:

• for the public authority:

$$UE_N = -P0 + B0 - b(e) + \frac{1}{2}\beta(i)$$

• and for the private manager:

$$UM_N = P0 - C0 + C(e) + \frac{1}{2}\beta(i) - e - i$$

Since the parties are assumed to have rational expectations, M chooses e and i to maximize  $UM_N$ , that is, to solve:

Max 
$$UM_N = P0 - C0 + C(e) + \frac{1}{2}\beta(i) - e - i$$

Consequently, there is a unique solution and the first-order conditions are:

$$c'(e_N) = 1$$
 and  $\frac{1}{2}\beta'(i_N) = 1$ 

A first conclusion can be drawn. Indeed,  $\forall i, 1/2\beta'(i) < \beta'(i)$ , *i.e.*, the level of "i" is lower under private ownership than its level of first best. But M ignores the deterioration of quality resulting from a cost reduction, and hence, exaggerates the social benefit of cost reduction. We have:  $\forall e, c'(e) > c'(e) - b'(e)$ : the amount of investments in cost reduction is higher than in first best.

The total surplus  $S_{1N}$  under private ownership is then given by:

$$S_{1N} = B0 - C0 - b(e_{1N}) + c(e_{1N}) + \beta(i_{1N}) - e_{1N} - i_{1N}$$

Let's now turn to the case of public provision.

#### 2.3.2 Equilibrium under public ownership

In this case, G owns F. As mentioned previously, M's efforts e and i are embodied in M's human capital. Suppose that if M has an idea about how to reduce costs or increase quality then a fraction of the benefit of this idea requires M's participation, but the remainder can be realized without M because some aspects of M's ideas become public knowledge (at least within the organization). G can realize a fraction  $0 \le \lambda \le 1$  of the net social gains  $-b(e) + c(e) + \beta(i)$  from innovating without M by hiring a different manager and paying him at cost. If F is private, G can obtain none of these benefits since M has the residual control rights and can prevent any innovation. In the case  $\lambda=1$ , the public employee is irreplaceable, and hence can command the same share of the total rents in the negotiation with G as private manager.

The renegotiation then takes over the fraction  $\lambda$  of both the cost and quality innovations that the public authority cannot appropriate, i.e.  $\lambda(\beta(i) + c(e) - b(e))$ . The gains are split 50:50, and so the parties' payoffs are:

$$UE = -P0 + B0 + (1 - \frac{1}{2}\lambda)(\beta(i) + c(e) - b(e)) \text{ and}$$
$$UM = P0 + \frac{1}{2}\lambda(\beta(i) + c(e) - b(e)) - e - i - C0$$

M chooses e and i to maximize  $\frac{1}{2}\lambda(\beta(i) + c(e) - b(e)) - e - i$ . The unique solution given by the first-order conditions is given by  $(\frac{1}{2}\lambda)(-b'(e_{2N}) + c'(e_{2N})) = 1$  and  $(\frac{1}{2}\lambda)\beta'(i_{2N}) = 1$ 

As the public authority has here the residual control rights, M needs to negotiate the cost reduction and takes into account the quality reductions that may result from costcutting innovations. However, there are new distortions in the case of public ownership. First, for both quality and cost innovation, the public manager needs the approval of the public authority and surrenders half the gains from trade. Second, if  $\lambda < 1$ , the public manager can be replaced, and hence has even weaker incentives to innovate.

The total surplus under public ownership is given by:

$$S_{2N} = B0 - C0 - b(e_{2N}) + c(e_{2N}) + b(i_{2N}) - e_{2N} - i_{2N}$$

As it is argued in HSV [1997], such results imply that the optimal governance structure is dependent from the characteristics of the potential innovations in a service. By ranging the incentives to invest, we indeed obtain:  $i_{2N} \leq i_{1N} < i*$  and  $e_{1N} > e* > e_{2N}$ . In-house provision is to be recommended when cost-reduction investments have strong adverse effects on quality, and quality innovations are unimportant.

Yet, such an analysis implicitly postulate that all innovations are managed through formal renegotiations based on self-interest. There is no place for informal adjustments during the execution of contracts. Such an hypothesis can be easily criticized: Since Macaulay [1963], it is indeed widely admitted that execution of contracts is based for a great part on informal dealings. As BGM [2002] put it, business relationships are riddled with relational contracts: "Informal agreements and unwritten codes of conduct powerfully affect the behaviors of individuals within firms ". Contractual relationships are then larger than simple written manuscripts and informal agreements "can be based on outcomes that are observed by only the contracting parties ex post, and also on outcomes that are prohibitively costly to specify ex ante (...) [it] allows the parties to utilize their detailed knowledge of their specific situation and to adapt to new information as it becomes available" (BGM [2002]).

In the following paragraph, the model is enriched with "relational contracts" but without introducing repeated games. Informal behaviors of actors are not a calculated intertemporal arbitration, but are derived from the network in which they are embedded.

Let's now turn to such informal execution of contracts to see its consequences on incentives to invest.

## 2.4 Equilibriums under relational contracts

Suppose now that the contract is initially chosen by the public authority in accordance with the network in which it is embedded. This means that it is "common knowledge" that the contract is "relational", and there is no doubt about the willingness of the co-contractor to adopt an informal convention when innovations appear.

#### 2.4.1 Equilibrium under informal private provision

As just mentioned, contractors apply tacit conventions in case of unforeseen events. Such a convention is the agreement on a proportion  $0 \le \alpha \le 1$  of gains from innovations for the public authority taken into account by the manager when implementing innovations. In exchange, the public authority engages to transfer this corresponding levels of innovations<sup>4</sup> to the manager once payoffs are realized.

Timing of the game then becomes as follows:



#### 2.4.2 Equilibrium under informal private provision

As in our first case under study, a private manager has to furnish the public service. Yet, when unforeseen contingencies appear, an informal sharing rule is applied between parties. The manager implements innovations by taking into account the impacts on the payoffs of the public authority in a proportion  $0 \le \alpha \le 1$ .

Once payoffs are realized, the public authority transfers the corresponding amounts to the manager.

The payoffs of the parties then become as follows:

- $UE_{1\alpha} = B0 + (1 \alpha)(\beta(i_{1,\alpha}) b(e_{1,\alpha}))$
- $UM_{1,\alpha} = -C0 + c(e_{1,\alpha}) + \alpha(\beta(i_{1,\alpha}) b(e_{1,\alpha})) e_{1,\alpha} i_{1,\alpha}$

The maximization of the utility function of the manager thus leads to the following levels of investments:  $e_{1,\alpha}$  such as  $c'(e_{1,\alpha}) - \alpha b'(e_{1,\alpha}) = 1$  and  $i_{1,\alpha}$  such as  $\alpha \beta'(i_{1,\alpha}) = 1$ .

The surplus that is thus achieved is:

$$S_{1,\alpha} = UE_{1,\alpha} + UM_{1,\alpha} = B0 + \beta(i_{1,\alpha}) + c(e_{1,\alpha}) - b(e_{1,\alpha}) - C0 - e_{1,\alpha} - i_{1,\alpha}$$

 $<sup>{}^{4}</sup>$ This transfer can be realized through various forms such as subsidies, perks, ...

#### 2.4.3 Equilibrium under informal public governance

Informal sharing rules can also be agreed between a public manager and the public authority. The proportion  $\alpha$  of investments taking into account by the public manager is relative to the innovations embodied in his human capital.

The parties' payoffs then become:

• 
$$UE_{2,\alpha} = B0 + (1-\lambda) \left(\beta(i_{2,\alpha}) + c(e_{2,\alpha}) - b(e_{2,\alpha}) + \lambda(1-\alpha) \left(\beta(i_{2,\alpha}) + c(e_{2,\alpha}) - b(e_{2,\alpha})\right)\right)$$
  
•  $UM_{2,\alpha} = C0 + \lambda\alpha(\beta(i_{2,\alpha}) + c(e_{2,\alpha}) - b(e_{2,\alpha})) - e_{2,\alpha} - i_{2,\alpha}$ 

Incentives to invest are thus dependent from the share that the public manager receives from the realized surplus, such as:

$$\lambda \alpha(c'(e_{2,\alpha}) - b'(e_{2,\alpha})) = 1$$

and  $\lambda \alpha \beta'(i_{2,\alpha}) = 1$ .

The surplus that is thus achieved is:

$$S_{2,\alpha} = UE_{2,\alpha} + UM_{2,\alpha} = B0 + \beta(i_{2,\alpha}) + c(e_{2,\alpha}) - b(e_{2,\alpha}) - C0.$$

## 2.5 Analysis of the results

The following table sums up the results of both formal and informal agreements.

Contracts	Formal agreements	Informal agreements
Private provision	$c'(e_{1N}) = 1$	$c'(e_{1,\alpha}) - \alpha b'(e_{1,\alpha}) = 1$
	$\frac{1}{2}\beta'(i_{1N}) = 1$	$\alpha\beta'(i_{1,\alpha}) = 1$
Public provision	$\frac{1}{2} \lambda \left( c'(e_{2N}) - b'(e_{2N}) \right) =$	$\lambda \alpha \ (c'(e_{2,\alpha}) - b'(e_{2,\alpha})) = 1$
	1	
	$\frac{1}{2}\lambda \left(\beta'(i_{2N})\right) = 1$	$\lambda \alpha \ \beta'(i_{2,\alpha}) = 1$
First Best	$c'(e^*)-b'(e^*)=1$	
	$eta^{\prime}(i*){=}1$	

If results obtained in Nash bargaining are precise, incentives derived from informal dealings mainly depend on the parameter  $\alpha$ . It is thus impossible to see at this stage

whether the applications of informal enforcement of contracts allow to improve the total surplus.

Indeed, in private provision of services, when  $\alpha \to 0$ , incentives to invest in costreducing investments under informal renegotiations tend to the levels obtained under Nash bargaining rules. To the contrary, when  $\alpha \to 1$ , first-best levels are achieved.

As for quality innovations, whenever  $\alpha > \frac{1}{2}$  incentives are closer to the first-best, such as  $i^* \ge i_{1,\alpha} > i_{1N}$  but if  $\alpha < \frac{1}{2}$ , incentives are lower than in nash-bargaining solutions:  $i^* > i_{1N} > i_{1,\alpha}$ 

Such a situation is represented in the graphes that follow:



Similar ambiguous effects are noted in public provision. The levels of incentives become all the more undetermined, as they then depend both on the proportion  $\lambda$  of innovations that cannot be implemented without the participation of the manager and on the share  $\alpha$  corresponding to the informal sharing rule agreed by the parties.

The incentives are illustrated in the graphes that follow:



As incentives are undetermined, the outcomes for each contractor is uncertain, and payoffs can be ameliorated as well as deteriorated.

For instance, let's assume that  $\alpha = \frac{3}{4}$ . In case of private provision, payoffs are:

$$UE_{1,\alpha} = B0 + (1 - \frac{3}{4})(\beta(i_{1,\alpha}) - b(e_{1,\alpha}))$$

$$UM_{1,\alpha} = -C0 + c(e_{1,\frac{3}{4}}) + \frac{3}{4}(\beta(i_{1,\alpha}) - b(e_{1,\alpha}) - e_{1,\alpha} - i_{1,\alpha})$$

and incentives become:

$$e_{1,\alpha} \text{ such as } c'(e_{1,\alpha}) - \frac{3}{4}b'(e_{1,\alpha}) = 1$$
  
and  $i_{1,\alpha}$  such as  $\frac{3}{4}\beta'(i_{1,\alpha}) = 1$ .  
as  $e_{1N}$  is defined by  $c'(e_{1N}) = 1$  and  $i_{1N}$  by  $\frac{1}{2}\beta'(i_{1,\alpha})$ , for  $\alpha = \frac{3}{4}$   
$$\begin{cases} e_{1N} > e_{1,\alpha} \\ i_{1N} < i_{1,\alpha} \end{cases}$$

There is no clear conclusion about whether the levels of payoffs are improved or deteriorated because of tacit agreements.

Indeed, when decomposing the payoffs of the manager, the following inequations are observed:

$$\begin{array}{rcl} c(e_{1,\alpha}) - \frac{3}{4}b(e_{1,\alpha}) &< & c(e_{1N}) \\ + \frac{3}{4}\beta(i_{1,\alpha}) &> & + \frac{1}{2}\beta(i_{1,\alpha}) \\ -e_{1,\alpha} &> & -e_{1N} \\ \hline -i_{1,\alpha} &< & -i_{1N} \\ \hline c(e_{1,\alpha}) + \frac{3}{4}(\beta(i_{1,\alpha} - b(e_{1,\alpha})) - e_{1,\alpha} - i_{1,\alpha} &? & c(e_{1N}) + \frac{1}{2}\beta(i_{1N}) - e_{1N} - i_{1N} \\ \hline i.e. \ UM_{1,\alpha} &? & UM_{1N} \end{array}$$

The same applies to the payoffs of the public authority:

$$\frac{\frac{1}{4}\beta(i_{1,\alpha}) < \frac{1}{2}\beta(i_{1N}) < -\frac{1}{4}b(e_{1,\alpha}) > -b(e_{1N}) \\
\frac{1}{4}(\beta(i_{1,\alpha}) - b(e_{1,\alpha})) & ? -b(e) + \frac{1}{2}\beta(i) \\
i.e. UE_{1,\alpha} & ? UE_N$$

The final effects on payoffs depend both on the convention defining  $\alpha$  and on the impacts of investments on the social benefit and the cost reduction.

## 2.6 The decision of contractual enforcement

As shown in the previous paragraph, informal agreements appear as risky decisions, as their final effects on incentives and payoffs are undetermined. The application of relational contracting depends on the structure of information shared by the contractors. Even if symmetric information is still postulated, there are several levels of symmetry that can be observed:

(1) each contractor can have no more information than is delivered in the formal contract,

(2) they can have mutual knowledge on their ability to implement conventions

(3) finally, common knowledge as for informal conventions among the parties can be observed.

Let's now analyze in which cases both parties consider the contract as relational or not.

#### 2.6.1 Decisions with no information about the co-contractors

When possibilities of innovations appear, the manager has two possibilities: either he directly implements innovations following a tacit rule that he supposes to be shared with the public authority, (*i.e.* he considers the contract as relational) or he engages into renegotiation following a Nash bargaining process to defend his own interests.

Firstly, by assuming that the relationships of the parties is reduced to the contract, there is no chance to see informal sharing rules to be implemented.

Indeed, as the game is static and parties do not expect to meet each other in the future, informal agreement is not sustainable. As it is tacitly agreed and cannot then be enforced by courts, deviation of the co-contractor appears as the rational strategy. Indeed, by accepting the informal sharing rules, and then cheating, one of the contractor can take advantage of the efforts done by its partner without respecting its own commitment. Such a strategy is unlikely to be punished by courts as the agreement is informal.

This situation can be formalized through a game similar to prisoner's dilemma in a static game:

 $\forall j \in \{M; E\}, Uj(N)$  represents the payoffs obtained in a nash bargaining process,  $Uj_{\alpha}(+)$  represents the pareto-improving payoffs obtained if both parties agree and respect the convention,  $Uj_{\alpha}(++)$  represents a higher payoff expected if actor j deviates from the informal contract to take advantage of it, and  $Uj_{\alpha}(-)$  then represents the lower payoffs of his co-contractor in this case.

h and d represent two strategies among which each contractor has to choose, *i.e.* honest or dishonest. The following matrix is thus observed:

Contractor 2  
d h  
Contrac d 
$$U1(N);U2(N)$$
  $U1_{\alpha}(++), U2_{\alpha}(-)$   
tor 1 h  $U1_{\alpha}(-), U2_{\alpha}(++)$   $U1_{\alpha}(+); U2_{\alpha}(+)$ 

As is traditional from such forms of the game, equilibrium appears as the choice (d,d), *i.e.* both contractors anticipate that the other is dishonest. Both then choose formal renegotiation when innovations appear.

Such a situation supposes that individuals act as self-interested individuals and have no guarantee of the strategy of their co-contractor.

More generally, before acting, individuals refer to the amount of information they have at disposal. As it has just been shown, without any information on their co-contractors, no "relational" contract can be implemented. But more surprisingly, mutual knowledge of the willingness of the co-contractors to respect conventions is also not enough to sustain "relational contract".

#### 2.6.2 Decisions with mutual knowledge about the co-contractors

Indeed, even if information is symmetric (as postulated in the incomplete contract theory framework), the mutual knowledge is not sufficient to implement conventions.

The public authority can know that the firm is ready to apply informal conventions that could ameliorate both payoffs, and the firm can also have the same opinion about the public authority, it is not enough for informal behaviors to be implemented.

Let's note  $\rightarrow$  the representation of knowledge about the other's willingness to apply informal behavior.

The public authority  $\rightarrow$  The manager

The public authority  $\leftarrow$  The manager

Indeed, the public authority can be ready to apply honestly tacit conventions and knows that the manager is honest, informal enforcement of the contract is not observed. The public authority does not know that the manager know that it knows. Consequently, the public authority thinks the manager doubts about the strategy of the public authority. Facing such a doubt and a risk, the rational strategy is not to apply conventions as demonstrated above in the game. The public authority anticipates such a reasoning of the manager and thus concludes that the manager will not respect the informal agreement. As a consequence, it refuses to respect conventions. (The same applies when the manager does not know that the public authority know that he knows...).

Let's now turn to the case where common knowledge is observed among the parties.

#### 2.6.3 Decisions with common knowledge between parties

Suppose now that contractors belong to the same social network. As social networks are characterized by information sharing, it is then common knowledge that actors are honest and convention can be followed by the members.

The public authority  $\Leftrightarrow$  The manager

No anticipated calculation is needed to wonder whether the co-contractor will be honest or not: if a partner belongs to the same social network, everyone knows that the others know that each of them is ready to accept and respect the shared conventions of the group.<sup>5</sup>

When members belong to the same social network, it is then common knowledge that innovations are tacitly managed to improve the results obtained in formal renegotiations. Each contractor will then informally behave to maximize its own payoffs by taking into account the impact on its partner in a proportion  $\alpha$ .

The manager chooses  $\alpha$  to maximize his own utility compared to the self-interested renegotiation:

$$\max_{\alpha}(\max_{i,e} UM_{\alpha}) \ge UM_N$$

and the public authority behave similarly:

$$\max_{\alpha}(\max_{i,e} UE_{\alpha}) \ge UE_N$$

This leads to the implementation of pareto-increasing sharing rules that improve the social total surplus. Indeed by summing the previous equations, we obtain:

$$\max_{\alpha}(\max_{i,e} S_{\alpha}) \ge S_N$$

Let's now see whose value of  $\alpha$  is tacitly chosen by the contractors. The implemented decision rule is then the one that maximizes the total surplus, *i.e.*:

$$\max_{\alpha} [\max_{e,i} S_{\alpha} = B0 + \alpha\beta(i) + c(e) - \alpha b(e) - (1 - \alpha)b(e) - C0 + (1 - \alpha)\beta(i) - i - e]$$

<sup>&</sup>lt;sup>5</sup>Dishonest behavior is also the will to make the others believe that I am member of the network for the others to trust me and to better cheat them. Such a behavior is avoided.

$$\max_{\alpha} [S_{\alpha} = \max_{e,i} B0 + \beta(i) + c(e) - b(e) - i - e]$$

i.e:

$$\max_{\alpha}[S_{\alpha} = S*]$$

as  $S^* = \max_{e,i} B0 + \beta(i) + c(e) - b(e) - i - e$ 

As S<sup>\*</sup> is defined by  $\beta'(i) = 1$  and c'(e) - b'(e) = 1.

Consequently, 
$$\alpha$$
 resolves: 
$$\begin{cases} \alpha\beta(i) = \beta(i) \\ c(e) - \alpha b(e) = c(e) - b(e) \end{cases}$$

Then,  $\alpha = 1$ .

Incentives correspond then to the first-best levels.

In case of public provision, the tacit sharing rule corresponds to the following parameters:

$$\max_{\alpha} [\max_{e,i} S_{\alpha} = B0 + \alpha \lambda(\beta(i) + c(e) - b(e)) + (1 - \alpha)\lambda(\beta(i) + c(e) - b(e)) + (1 - \lambda)(\beta(i) + c(e) - b(e)) - i - e]$$
$$\max_{\alpha} [S_{\alpha} = \max_{e,i} B0 + (\beta(i) + c(e) - b(e)) - C0 - i - e]$$
$$\max_{\alpha} [S_{\alpha} = S*]$$

S<sup>\*</sup> is achieved for  $\beta'(i) = 1$  and c'(e) - b'(e) = 1.

 $[S_{\alpha} = S^*]$  then implies that

$$\alpha \lambda \beta'(i) = \beta'(i) = 1$$
 and  $\alpha \lambda (c'(e) - b'(e)) = (c'(e) - b'(e)) = 1$ ,

*i.e.*  $\alpha \lambda = 1 : \alpha = \frac{1}{\lambda}$ 

In case of public provision, public authorities and public managers agree on the tacit rule allowing to achieve the first-best surplus.

Results of the model then shows that if public authorities and managers -either public or private- are related through a social network with common knowledge, they are able to define tacit sharing rules that enable to reach first-best levels of investments.

The following scheme sums up the comparison between the study of contracts as it is possible by incomplete contract theory, and that obtained by applying conventions.



## 3 Illustrations

The previous model shows why in some cases characteristics of public services to be provided are insufficient to determine optimal organizational choices. Beyond formal agreements, informal practices allow to ameliorate or deteriorate incentives to invest. Organizational structures still matter but have to be understood as a whole entity, made up of both written contracts and informal ties between parties. Such a theoretical analysis may shed a new light on facts that economic theories fail to explain. These results are now illustrated with the American and French experiences of provision of public services.

### **3.1** Striking facts

At first glance, similar organizational choices should be observed in both countries, as their economic and legal frameworks are very close.

In spite of what is generally thought about the legal frameworks of public-private partnerships, differences between common law and civil law countries are indeed not so important.<sup>6</sup> This prevents an approach of efficiency based on legal differences, as it is the case for corporate valuation for instance (La Porta *et al.* [2002]).

In both countries, public contracts have indeed a special status and specific powers are

 $<sup>^{6}</sup>$  Recall here that the *Common law* constitutes the basis of the legal systems of many English-speaking countries, such as England, Wales, Ireland, the United States, Australia, Singapore, and other Common-wealth countries. The main alternative to the common law system is the *Civil law* system, which is used in Continental Europe.

attributed to the public authority. Conditions for unilateral contractual modifications are codified through similar principles: French "*Fait du prince*" -when the public authority unilaterally impose contractual modifications that increase costs- or "*Imprévision*" that make the contract more specific about what to do when the concessionaire faces severe but temporary difficulties (Auby [1997]) are close from particular rules, mentioned in the *Federal Acquisition Regulation* (FAR).<sup>7</sup> There is no arbitrary choice of private operator when public-private partnerships are decided: the selection process has to be organized under conditions specified in the law in both countries.

With similar services to provide such as water distribution, garbage collection, school restaurant or public transport, and close legal frameworks, it is quite surprising to see that both countries have radical different choices: Public provision is far more frequent in the U.S. than in France, where private involvement is traditionally important. The following table illustrates such diverging choices.

Local public services	Share of pub-	Share of Public
	lic provision in	provision in the
	France	U.S.
Water	28%	77 %
Sewage	37~%	58 %
Garbage collection	51%	57%
Garbage treatment	16%	19%
Urban transport	14,5 %	
School restaurants	47%	62%

Figure 1: Types of management in French local public services Source: Rapport Babusiaux, Institut de la gestion déléguée, 2005 Levin & Tadelis, Employment versus Contracting in Procurement, unpublished paper

Moreover, case studies or interviews show that people are rather satisfied with the provision of such services, in France as in the U.S. In 2004, 83% of the people polled in France were very or rather satisfied with the provision of local public services<sup>8</sup> and a similar survey of Chicago residents' satisfaction shows that such levels were observed in 70% of the cases.<sup>9</sup>

<sup>&</sup>lt;sup>7</sup>Its part 30 codifies the conditions for contract unilateral modifications (*change orders*) as well as the rights and obligations for the private partner. Part 43 also mentions the rules to apply in case of unilateral *termination of contract*, whether it is due to the contractor's fault or to the will of the public authority. It seems that many states inspire from these regulations for their own procurement contracts at the local level. For instance, the Californian Public Code mentions similarly a unilateral modification power for the public authority: http://law.justia.us/california/codes/pcc.html

<sup>&</sup>lt;sup>8</sup>Poll from BVA-IGD, "Baromètre sur les services publics locaux et la gestion déléguée", with 984 people polled.

<sup>&</sup>lt;sup>9</sup>Survey, carried out by the Northwestern University Survey Laboratory in late January and early February 1994, *quoted in* "Does satisfaction with Local Public Services Affect Complaints (Voice) and

If such diverging choices lead to similar satisfaction, works that links the efficient organizational form with the characteristics of services seem invalid.

Let's now analyze whether such paradoxical situation can be explained with the previous model.

## 3.2 The American Case

American cities can be governed through two different structures: They can either be managed by Mayors, *i.e.* an elected representant, or by managers, if the City council decides to delegate executives powers to a manager that is a bureaucrat. Strong theoretical (Maskin and Tirole [2004]; Alesina and Tabellini, [2005]) and empirical (Fields et alii, [1997]; Besley and Coate, [2003]) arguments show that this difference plays an important role in determining the incentives of public officials and, thus, the policies that they pursue. Career of elected public officials is more directly related to popular support than that of appointed public officials. One implication of this is that elected politicians pursue policies that appeal to the general public, whereas bureaucrats are more influenced by special interests or intrinsic motivations. According to this view, the only situation in which elected public officials are more likely to pursue inefficient policies is if general population for some reason favors such policies. The importance of popular support during elections makes directly elected public officials more likely to pursue inefficient policies aimed at vote-buying, as political patronage. Sustaining excessive public employment is an example of an inefficient policy that is used to redistribute rents and increase chances of reelection. To this subject, Enikolopov [2006] uses panel data on variations in the form of local governments in the U.S. to show that elected public officials are more likely to be involved in vote-buying activities than their appointed counterparts.

Keeping public services under in-house provision is thus a way for elected representatives to have at disposal public employment opportunities to offer on the "rent market" (Olson [1965]).

Moreover, public managers represent an important pressure group "that has delivered some of the most vocal opposition to government contracting" (HSV [1997]). Because of voting interests, elected officials are unlikely to suppress such jobs to promote private management of services. A similar conclusion is drawn in Lopez de Silanes [1997], according to which "local politicians might prefer in-house provision for they derive political benefits, including the supports of local public-sector unions, the opportunity to purchase

Geographic Mobility (exit)?", Devereux P.J., & Weisbrod B.A., [2006], Public Finance Review, vol. 34 n°2.

supplies from political allies, the ability to hire relatives and campaign activists".

It then seems as if a tacit convention linked politicians at the head of cities and public managers. They thus agree to manage services by taking into account each other's interest: the public authority chooses a public manager to provide the services, even if private management could be a priori more efficient. In exchange, the public manager accept to develop innovations, even if he first lacks of incentives. Both agree on this informal dealing that allow to ameliorate their payoffs.

Public provision is finally not an inefficient choice as both contractors have agreed on more than the pure formal contract that allow to reach better incentives, and even first-best ones according to the previous model.

## 3.3 The French Case

As the previous table shows, private involvement in public services is quite frequent in France, such as it is often told about a "French model of delegated management". It is worth recalling that the two main companies<sup>10</sup> delivering public services are French ones. A manager of one of these firms has recently declared that delegated management represents around 70% of organizational forms to provide public services in France, whereas it reaches about 7% to 8% in other countries.<sup>11</sup>

Can such choices be explained by the previous model? If political patronage can also be doubted in France, the social structure of this country is quite particular and mainly derived from its educational system.

High-level managers, either public or private, are for the main part alumni of Schools dedicated to public services, such as  $E.N.A^{12}$  or *Ecole Polytechnique*, *i.e.* schools demanding high selection and educating high civil servants. By observing the board of one of the main private firm of public services, 9 out of 14 members are alumni of such schools. Sociological literature (Bourdieu [1989], Thelot [1982]) is quite prolix about this theme, showing how such alumni can control essential economic and social interests of French society. They thus emerge as a "cast" (Bourdieu [1989]). Such a criticism may sound exaggerated, but deserves to stress the creation of a network between the managers coming from these schools.

 $<sup>^{10}\</sup>mathrm{Veolia}$  and  $\mathrm{Suez}$ 

<sup>&</sup>lt;sup>11</sup>Interview in special supplementary issue of *Le Nouvel Economiste*, n°1351, 22-28 June 2006, p. 3.

<sup>&</sup>lt;sup>12</sup>Ecole Nationale de l'Administration

With such a background, the upper ranks of the main municipal service companies in France appear indeed as strongly linked with the central government and as having broader public interest - some would say State interest- concerns.<sup>13</sup>

Furthermore, these managers are most of the time former high civil servants or government advisors<sup>14</sup>: more than a half of the observed Boards' members of the two main private companies delivering public services have already worked in the public spheres, or even occupied political positions.

Finally, participation of private administrators in partially public-owned companies is quite frequent, such as airlines' companies or national electric firms. Common educational backgrounds, professional experiences mixing public and private jobs, and participation of many private managers or administrators in partially public-owned companies then give some evidence of the existence of a true public-private network in France.

Such a tight network between private managers and public authorities then leads to implicit conventions and agreements. Informal renegotiations between public and private parties are not seldom. A proof is given by the recent report of the French organism in charge of public funds'control, *Cour des Comptes*, underlining the importance of the informal adaptations of the contracts with private partners involved in the management of services to prisons. Final managements can then be very different in spite of similar initial contracts, because of these informal agreements.<sup>15</sup>

# 4 Conclusion

This model explores "relational contracts" as informal agreements embedded in the social structure of individuals. The methodological treatment of such dealings is renewed compared to the traditional repeated games that amalgamate concerns for reputation and the adoption of informal behavior. It is indeed believed here that people, when they decide to informally enforce a contract or not, evaluate information at disposal, that is for the main

<sup>&</sup>lt;sup>13</sup>The recent intervention of the French Government to prevent the private company "Suez" to be bought by its Italian competitor by unifying its capital with the public company "GDF" is also a proof of common concerns and ties between private and public spheres.

<sup>&</sup>lt;sup>14</sup> We can here refer to several cases among history: Albert Petsche, President of Lyonnaise des Eaux in 1896 after a career in the national civil service, Ernest Mercier who worked with the Naval Ministry before managing the same company in 1933, and more recently Jean Marie Messier, President of Vivendi from the mid 1990s to 2003 and former high-level civil servant in the Ministry of Finance and member of Prime Minister Balladur Cabinet, or the present president of Suez, G. Mestrallet, graduated from Polytechnique and ENA, two French Schools dedicated to high civil service and former economic adviser of Finance Minister J. Delors.

<sup>&</sup>lt;sup>15</sup>http://www.cour-des-comptes/publications/rapports/gestion-prisons/rapport-gestion-prisons.pdf.

part related to the social network in which they are embedded. Without rejecting the hypothesis of symmetry of information, relational contracts are then implemented when common knowledge is observed by the parties. This unique assumption reveals to be sufficient to consider sustainable informal agreements. Moreover, it also leads to select the optimal levels of investments, as the will of both contractors to maximize their own utility is also common knowledge. Such an analysis can help to understand why various contracts are implemented to manage similar services with no significant difference of performance.

Such an analysis has many implications. It suggest that policy decision makers cannot recommend a type of provision in the name of its success in another institutional framework. Transfers of contractual formula have then to be cautiously done. Moreover, it could also imply that networks have to be encouraged to promote efficiency. The legal tool is not the unique means to make public-private partnerships realizable: actions on information or "relational" structures have to be implemented in parallel, such as common formations, promotion of organisms and dialogues between public and private spheres. Yet, creating social networks between individuals has to be severely nuanced: the model assumes here that public authority acts in the name of public interest. The modification of this hypothesis enlarges the analysis by introducing risks of corruption. There is then a need to pursuit this work to determine in which cases social networking can improve the total surplus or can be deviated towards corruption, as it seems to be the case in some

developing countries, for instance in Africa.

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