Université De Paris Sud XI

Allocation of Property Rights and Incomplete Contracting

The Economics of Local Public Services

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Abstract

This dissertation attempts to study organizational structures of local public services. Public authorities may generally provide many of these services in-house or may choose to contract them out. Such a trade-off is a complex decision, with many social and economic consequences. This work aims to provide decision-makers with some propositions to better apprehend contractual tools allowing private firms to be involved in the management of local public services.

The perspective that is adopted is that of the incomplete contracts (or "property rights theory") as developed by Grossman and Hart [1986], Hart and Moore [1990], and Hart [1995] (and called "GHM approach" hereafter). It offers a useful and rigorous theoretical framework to evaluate contractual arrangements, and their consequences on non-contractible investments. This approach may be applied to the management of public services, as the seminal paper of Hart, Shleifer, and Vishny [1997] shows. Yet, some refinements seem necessary to better understand what makes contracts of public-private partnerships different from other types of cooperation. More precisely, three features of these partnerships draw our attention, and suggest some refinements of the GHM approach. First, while the property rights literature has focused on the trade-off between public and private provision, observations show a large continuum of contractual arrangements between full public management and full privatization. Their evaluation calls for a

revision of the theoretical notion of "residual control rights" associated with ownership. Results of this first refinement show that there is always one type of contract with the private sector that allows to equal or outperform public provision.

Second, public-private partnerships are "legal tools" mainly shaped by the legal environment in which they are executed. For instance, in France, the legal framework grants public authorities with some special rights to unilaterally modify or even cancel contracts, in order to protect public interest. It is found in this dissertation that these specific rights are not neutral in the contractual performance. They induce new types of renegotiations, and may change bargaining conditions between partners, compared to what is generally admitted in the GHM approach. Effects of these legal rules on contractual efficiency depends on the anticipated use of these rights.

Last, observations of public-private contracts also show that public authorities tend to concentrate several services in the hands of one single private operator, which seems paradoxical as regards to *ex ante* competition. "Relational contracting" as developed by Baker, Gibbons, and Murphy [2002, 2004] may help to understand these observations. Through this notion, it is shown that "horizontal integration" may be a strategic choice to make informal dealings between partners about non-contractible investments more easily self-enforced. Then, these practices may increase quality at lower costs. Results of an empirical study on the French water sector are consistent with this proposition.

Keywords: Contractual incompleteness, relational contracting, property rights, local public services, public-private partnerships.

Résumé

L'objectif de cette thèse est d'étudier l'organisation des services publics locaux, et notamment d'éclairer le choix entre la gestion publique et la gestion privée de ces services. Cette décision résulte d'un arbitrage complexe, dont on ne peut omettre les conséquences économiques et sociales. Ainsi, notre travail tente d'établir des propositions permettant de mieux cerner les enjeux d'une participation du secteur privé dans la gestion contractuelle des services publics locaux.

La théorie des contrats incomplets (ou "théorie des droits de propriété") initiée par Grossman et Hart [1986], Hart et Moore [1990], et Hart [1995] fournit le cadre d'analyse de cette étude. Elle offre un cadre rigoureux pour analyser l'efficacité des contrats, et leurs conséquences sur les investissements "non contractuablisables". La contribution d'Hart-Shleifer-Vishny [1997] en représente une première application sur les services publics. Cependant, quelques raffinements de la théorie des contrats incomplets semblent nécessaires afin de mieux appréhender les spécificités des contrats établis entre secteur public et secteur privé. Cette thèse propose donc de rappeler les fondements de la théorie des contrats incomplets pour ensuite montrer en quoi l'étude des partenariats contractuels public-privé appelle des extensions théoriques de ce cadre. Dans ce but, trois caractéristiques de ces accords public-privé retiennent notre attention pour avoir peu été traitées dans la littérature économique jusqu'à présent.

Tout d'abord, alors que la théorie des droits de propriété a analysé l'arbitrage entre gestion publique et privatisation, on observe un large continuum de contrats entre ces deux modes d'organisation extrêmes. L'évaluation de ces dispositifs contractuels nécessite de revoir la notion de "droits résiduels de contrôle" associés à la propriété dans la théorie des contrats incomplets. Les résultats de ce premier raffinement théorique montrent qu'il existe toujours une catégorie de partenariats qui se révèle plus (ou autant) efficace que la gestion publique des services.
Le second trait des partenariats contractuels public-privé analysé dans cette thèse concerne leur environnement juridique. A l'instar du cas français, les pouvoirs publics peuvent bénéficier de droits juridiques exceptionnels lorsqu'ils établissent un contrat avec un opérateur privé. Ainsi, ils peuvent modifier les termes du contrat, voire l'annuler, si la défense de l'intérêt public l'exige. Ces prérogatives exceptionnelles ne sont pas neutres et nécessitent de revoir les conditions du jeu des acteurs lors des renégociations *ex post*, par rapport à ce que propose traditionnellement l'approche de Grossman, Hart et Moore. L' impact final de ces règles de droit dépend en grande partie des anticipations établies par les partenaires privés sur leur recours. Enfin, la troisième observation motivant cette étude concerne la concentration des services. Il semble qu'en cas d'appel à un opérateur privé, les responsables publics ont tendance à sélectionner régulièrement la même entreprise pour plusieurs de leurs services. Ceci peut paraître paradoxal au regard des procédures de sélection concurrentielles mises en oeuvre pour choisir un opérateur privé. Une explication de cette "intégration horizontale" des services est proposée en mobilisant la notion de "contrats relationnels" (Baker, Gibbons, and Murphy [2002, 2004]). Des accords informels peuvent en effet pallier l'incomplétude contractuelle. Le respect de ces derniers est facilité par la concentration des services dans les mains d'un même opérateur, ce qui permet de punir plus sévèrement toute déviation par rapport aux engagements tacites. Les résultats de l'étude économétrique proposée sur le secteur de l'eau en France apparaîssent cohérents avec cette proposition.

Mots clefs: Contrats incomplets, contrats relationnels, droits de propriété, services publics locaux, partenariats public-privé.

General Introduction

The question of the provision of public services is certainly one of the oldest in economics, since it was already under discussion in Adam Smith's classic book *An Inquiry into the Nature and Causes of the Wealth of Nations* (Smith [1776]). Indeed, Smith wrote that government's intervention should be limited, but well defined. Government should protect citizens from external and internal aggression and supply goods that the free market may not provide.
Examples of state intervention were national defense, the administration of justice, and public goods, such as roads, canals, bridges, and harbors. Strongly believing that these public works could and should be self-financing, Smith advocated tolls or other equivalents of user fees to finance their construction and operation.
Some centuries later, management of public services still raises tricky and complex questions. How to explain that economic researchers are still puzzled about them?

To understand this interest and motivate our work, it is worth recalling that public services have strong implications. This explains why their management draws so much attention.
First, public services aim to satisfy social and collective needs. Their provisions are regularly justified by "public interest", and then represent strong political concerns.

Second, the management of public services also constitutes a flourishing industrial sector, that generates huge amounts of revenues for firms that exploit them. For instance, statistics from French Ministry of Industry estimate turnovers in water sector to 11 400 million euros, 5 700 million euros in waste sector, and 20 000 million euros for electricity, gas, and urban warming (Direction des Affaires Economiques et Internationales [2004]).

Third, provision of public services represents a large part of budget for public authorities, whether national or local. To quote just one example, "local government spending equals about 5-6% of GDP in the United States, so there are potentially large gains to be realized from efficiency improvements" (Levin and Tadelis [2005]). This makes public services a strong topic of concern, as public authorities are more and more constrained by budget limitations and debt rates. Therefore, they are willing to find efficient ways to organize high-quality public services at low costs.

Fourth, macroeconomic implications of management of public services cannot be overlooked. Indeed, not only do public services represent social demands to satisfy, but they have also strong consequences on economic growth and development.

Quality of public infrastructures and services is considered today as a major factor to develop territorial attractiveness, and to draw foreign investments. Reasons can be found in the theoretical works on endogenous growth, especially Barro [1990]. Indeed, classic models of economic growth based on labor and capital have been questioned since Solow's growth model (Solow [1956]). To explain discrepancies in economic development between countries, factors such as education levels (Romer [1989], Lucas [1988, 1990])), innovations, RD investments and technology (Romer [1990, 1994], Barro and Sala-i Martin [1997]), but also quality of public infrastructures and services have been introduced (Barro and Sala-i Martin [1992]).

All these arguments explain why public authorities are willing to deliver high-quality public services at lower costs, and motivate concerns about their organizational structures.

In many cases, public decision-makers have to choose between several organizational structures to provide local public services, and wonder which of these structures is the most efficient. After having recalled the stakes of the provision

of efficient services, let us now precise the reasons why organizational structures matter.

Most of the time, public authorities are obliged to offer a range of services to the population, but can decide the means to provide them, *i.e.* they can directly manage these services or delegate them to a private operator, fully or partly. Private managers cannot be involved in all types of public services: when sovereignty is crucial such as in justice, tax collection or police security, services cannot be contracted out (Auby [1997]). However, there remains a large number of services that private firms may provide, especially at local level. This makes local public services an interesting perspective to study the trade-off between public and private provision. For instance, water management, waste collection and treatment, urban transport, urban warming or school catering can be delegated to private operators. In France, a report published in 2006 by the bank *Dexia Credit Local* and the *Fédération des Maires des Villes Moyennes* (FMVM), a french association for medium-sized cities, shows that more than 63% of water production and distribution were contracted out by municipalities, as well as 65% of sewage services, 58% of garbage treatment, and 84% of urban transport. The success of private participation in the management of local public services is explained as follows by the French association of mayors AMGVF (*Association des Maires des Grandes Villes de France*): " the new skills transferred under the decentralization laws and the need for a better balanced development of their territories have brought the municipalities to require much higher investments than they can systematically cover. Direct management can be inappropriate for managing certain public services that require higher investment and operating costs than can be handled by the municipality" (AMGVF [2004]:24).

Private provision of public services may then represent an interesting option. But the question of the right organizational structure to provide public service is a complex one: not only have public authorities to determine whether private firms have to be involved in the management of public services, but they have also to specify how these firms participate, *i.e.* whose functions and responsibilities have

to be delegated. Indeed, legislators have given public authorities many contractual tools, allowing different types of interventions. Private firms may be involved for a functional and operational support, or have full control over public facilities for a defined period of time. Such a diversity has lead to various contracts of "public-private partnerships". This calls for a better understanding of the ins-and-outs of each of these contracts. To illustrate this need, a recent report of the European Parliament (European Parliament [2006]) states that "in order to guarantee value for money, the relative strengths and weaknesses of each public-private partnership (PPP) scheme should be considered. Depending on the sector of application, some models are better suited than others in delivering targeted outputs and in ensuring accurate risk management. Choosing the wrong model or inaccurately evaluating the risk management capacities of each party may have extremely costly consequences and a negative impact on public accounts". To protect public interest, and lower risks when public authorities contract out some services, public authorities may have specific powers of unilateral contractual modification or cancelation, when public interest needs to be protected. This is for instance the case in France. But, in spite of this protection, the same report highlights that advantages and drawbacks of public-private partnerships have to be clearly assessed before choosing them. This calls for a careful use of these contracts, since "it is worth pointing out that PPPs are not always the best option, even if the benefits of private involvement in public assets provision are self-evident in many cases. PPP relationships are difficult to design, implement and operate."

All this proves the need of a rigorous analysis of the various contracts between public and private entities in the management of public services, especially at local level.

Last, the question of organizational structure also entails the selection of the private operators. To focus on the French case, following arguments of Demsetz [1968], *ex ante* competition is organized, when ex post competition on the market is not possible. Then, public authorities have theoretically a choice to do between various offers that compete each other.

This short review of the organizational problems public authorities face to man-

age public services explain why researchers have to elaborate some propositions to help public decision-makers to better organize the provision of services through contracts with the private sector, or through the choice of public provision.

Then, many works have been motivated by such a need in the economic literature. For instance, contributions from agency theory (Laffont and Tirole [1993, 1990, 1991a,b], Laffont, Rey, and Tirole [1997], Laffont [1994], Laffont and Pouyet [2004], Martimort and Pouyet [2006]) have mainly put the emphasis on informational problems in contractual relationships between public authorities and private firms. These works provide propositions about the optimal incentives contracts to elaborate, using ex ante asymmetric information coupled moral hazard. However, this literature mainly relies on a complete-contracting environment that may seem unadapted to fully capture the difference between public and private provision of services (Sappington and Stiglitz [1987], Malin and Martimort [2000]), as will be recalled in chapter 1 of this dissertation. As summed up by Hart, Shleifer, and Vishny [1997] (p.1128]), "from the traditional incentive viewpoint, motivating the contractors and public employees presents the same problem to the politician, even in the presence of moral hazard and adverse selection". Consequently, some other works have proposed a parallel with theories of the firm to study public-private agreements through the lens of contractual incompleteness. Indeed, public authorities have to choose between different organizational structures of public services. Most of the time, they have to decide whether public services have to be provided in-house, *i.e.* "to make" them, or have to be provided by the private sector, *i.e.* to "buy" them. Then, such a trade-off is close from the traditional "make or buy" question of theories of the firm. These theories propose some determinants of vertical integration, to know whether firms have to integrate new activities, or have better to "buy" them on the market. As a consequence, many works about organizational structures in public services have been inspired by transaction costs economics (Williamson [1991], Ménard and Saussier [2003], Chong, Huet, Saussier, and Steiner [2006b]).[1] Other contributions have used the property-rights litera-

[1]Briefly, this theoretical framework assumes that contracts are not comprehensive, mainly

ture, as developed by Grossman, Hart, and Moore, to elaborate some propositions about the participation of private firms in the management of public services or facilities (Hart, Shleifer, and Vishny [1997], Shleifer [1998], Hart [2003], Bennett and Iossa [2006] among others).

This dissertation will mainly deal with this last theoretical perspective. Chapter 1 justifies this choice and shows why the approach of Grossman, Hart and Moore is a useful theoretical framework to study contracts of public-private partnerships. Let us just note here that among the advantages of public-private partnerships, "there is the possibility to exploit the management qualifications and the efficiency of the private sector without giving up quality standards of outputs, thanks to appropriate control mechanisms from the public party" (European Parliament [2006]). However, this suggests to write in details output specifications, such as third parties can verify whether commitments are fulfilled or not. This is naturally not always the case. As a consequence, the approach developed by Grossman, Hart and Moore allows to give some tools to understand how partners manage unverifiable efforts, and the consequences on efficiency of the organizational structures. Indeed, the property-rights theory believes that all parameters contributing to performance cannot be verified by outsiders, such as courts. This makes contracts "incomplete", and the allocation of property rights aims to complete them. The owner has the "residual control rights", which allows him to decide what is not written ex ante in the contract, and most of the time to perceive residual benefits from the exploitation of the assets. Therefore, the property-rights approach proves to be useful to compare the consequences of the various allocations of property rights between public and private partners. Fruitful analyzes have thus been made, whose main results will be recalled in chapter 1. We do not provide further details at this step of the dissertation, and simply note that the seminal paper of Hart, Shleifer, and Vishny [1997] uses this approach to compare private and

because of bounded rationality. In such a context, costly contractual renegotiations are likely to occur, when parties make relation-specific investments, leading to some bilateral dependency. As agents are assumed to be opportunistic, they will try to appropriate "quasi-rents" created by this assets' specificity. Integration is to be preferred when such a specificity is high, to avoid costly haggling.

public provision of services. The authors show under some conditions that when cost-reducing investments are likely to cause high adverse effects on quality, public provision is to be preferred.

However, some questions have been left unanswered by this study, which suggests that the application of the incomplete contract theory to the management of public services needs further adaptations. More precisely, three questions derived from the previous description of contractual practices in local public services have been few explored up to now by the property-rights framework, and draw our attention, because they have strong consequences, both in theory and practice:

i) First, works using the property-rights approach mainly deal with the trade-off between public provision and private provision. But what about the various contractual tools that allow a gradual involvement of private managers in the management of public services, between full privatization and full public provision?

ii) Second, contracts between public and private entities are above all legal tools, and may be governed by specific rules compared to transactions between two private entities, in order to protect public interest. What are then the consequences of such a specific legal environment in which public-private partnerships are designed and executed?

iii) Last, how to explain that legislators - at least in France - are willing to give public authorities all the means to create competition between private firms, and that observations show that public authorities tend to choose the same private operator for the different services?

If our general concern is to determine how to best organize the management of local public services through contracts with the private sector, these three questions allow us to focus on precise and observed aspects of organizational problems in public-private partnerships. Therefore, the goal of this dissertation is to bring some answers to these three questions. To reach it, we propose some theoretical refinements of the property-rights approach using the seminal work of Hart, Shleifer, and Vishny [1997]. The contributions of this dissertation are then (1) to propose some theoretical changes of the incomplete contract theory - that is ini-

tially a theory of private contracting - to adapt this framework to the relationship between public and private partners, and (2) to propose an empirical test of our proposition about horizontal integration on an original database that is adapted. In what follows, we decline more precisely the questions to which this dissertation attempts to answer and we precise the methodological approach.

How to account for the various existing partnerships between public and private sectors?

As previously mentioned, public authorities do not face a trade-off between public provision and privatization, but face a continuum of solutions, allowing different types of private involvement in the management of public services. Chapter 2 explores these arrangements that constitute public-private partnerships. For instance, under concession contracts, the private operator is given responsibility "not only for the operation and maintenance of assets but also for financing and managing investment" (World Bank [2006a]). Then, he makes major residual decisions. In exchange, he directly collects fees from users. In contrast, under some management contracts, a private operator is paid a fixed fee for performing only managerial tasks. In all these structures, the public sector remains owner of the assets. Therefore, rights to make residual decisions or to get residual benefits do not seem always linked to ownership. This challenges the theoretical definition of property rights given in the approach of Grossman, Hart and Moore. Each type of contracts denominated as "public-private partnership" corresponds to a different allocation of rights to make residual decisions and to get residual benefits. Contrary to the model of Hart, Shleifer, and Vishny [1997], results of this chapter tend to prove that there is always a degree of private involvement that is socially optimal thanks to the many ways private partners can be involved.

What about the legal rules governing public-private partnerships?

In spite of the many works inspired by the property-rights approach, few connections have been established with institutions, and more precisely, with the legal framework in which such agreements are signed. This may sound quite surprising if

we think of the definition of institutions as "support of economic activity and economic transactions by protecting property rights, enforcing contracts, and taking collective action to provide the needed physical and organizational infrastructure" (Dixit [2006]).

Moreover, national and supra-national organizations are willing to insist on the role of a clear legal framework to make public-private partnerships successful (World Bank [2006a], European Commission [2004a], European Parliament [2006]). A green paper by the European Commission [2004a] has even launched "a wide-ranging debate among institutions and stakeholders, aimed at exploring the most challenging regulatory issues for PPPs in Europe" (European Parliament [2006]).

While many different works have been made on the impacts of institutions on economic activity (North [1987, 1990, 1991]; North, Wallis, and Weingast [2006], Greif [1993]; Greif, Milgrom, and Weingast [1994], Aoki [2001a,b, 2004], or Dixit [2004] from a theoretical perspective, and Acemoglu, Johnson, and Robinson [2001], Clague [1996], Keefer and Stasavage [2002] for empirical works), few has been done about the impacts of institutions on public-private agreements. The consequences of the legal frameworks, *i.e.* civil law or common law traditions (La Porta, Lopez de Silanes, Shleifer, and Vishny [1997, 1998, 1999]; Djankov, La Porta, Lopez de Silanes, and Shleifer [2005]) have been largely analyzed for private business, but, to our knowledge, no work wonders whether various rules governing public-private agreements similarly determines the efficiency of contractual outcomes.

To try to fill such a gap, chapter 3 of this dissertation is mainly interested with the consequences of observed rules governing public-private partnerships on achieved contractual efficiency. We do not compare civil and common law systems as regards to public-private partnerships, but focus on the effects of some specific rules that can be observed in some countries. Our results show that when public authorities have unilateral rights to modify or cancel contracts with private operators (as in France), some new renegotiations are likely to appear. They lead to lower incentives to invest in cost-reducing investments that damages quality. Then, this changes the conclusion of Hart, Shleifer, and Vishny [1997] about private provision. Yet, conditions of bargaining between contracts may also change. If public

authorities credibly threaten to cancel contracts, they may have a strong bargaining power during ex post renegotiations. Then, results depend on the expected use of these rights: if public authorities anticipate a misuse of them, they may refuse to do some non-contractible investments. To the contrary, if public authorities use their specific rights only to compensate social damages, contractual efficiency may be increased. Therefore, results of this chapter show that legal rules matter in contracts between public and private partners, and that specific legal powers granted to public authorities do not prevent private incentives to invest.

How to explain the choice of a unique private operator to manage different public services of a same municipality?

Surprisingly enough, observations of managerial practices detailed in chapters 1 and 4 show that public authorities regularly choose the same private firm to provide different services. Yet, as previously said, all legal conditions for competition and diversity of offers are given to public authorities, at least in France. Then, one may rightfully wonder whether there is some gains from "horizontal integration" of services, *i.e.* from the choice of a same private firm to manage different services that have been contracted out. To attempt to answer this question, we propose in chapter 4 a model with two services, and compare both situations: horizontal integration and disintegration. Our demonstration suggests that incentives to invest in non-contractible investments are likely to change in both configurations. To show this result, we rely on the notion of relational contracts developed by Baker, Gibbons, and Murphy [2002, 2004], *i.e.* informal agreements supported by concern for future business. We demonstrate that such informal agreements are more easily self-enforced when the public authority has contracted two different services to one private manager. Therefore, results of this chapter show that horizontal integration may be a means to increase contractual efficiency by making informal arrangements about non-contractible parameters more credible.

As suggested above, all these three chapters will have a common theoretical framework, that of Hart, Shleifer, and Vishny [1997] (HSV [1997] hereafter). Reasons for

such a choice will be given in chapter 1. It will be shown why this approach constitutes a useful framework to the study of public-private partnerships, but needs some refinements to have a better understanding of observed practices. Each of the subsequent chapters is dedicated to one of the question mentioned above. Our general conclusion is to show that there is no simple trade-off between public and private provision of public services. Contracts between public and private partners are complex arrangements, that ask for specific adaptations of the theoretical tools developed for the study of private contracting. This dissertation shows how the efficiency of these contracts depends on multiple criteria, such as allocations of residual rights between parties, legal framework and relational aspects.

The following table summarizes the contributions of the different chapters of this dissertation, by showing which type of refinement of the property rights literature is proposed to have a better understanding of public-private partnerships, and the main results that are obtained.

Table 1: Summary of chapters, goals and results

CHAPTER 1: **Incomplete Contract Theory and the Study of Public Services**
• **Question**: How to refine the incomplete contract theory (ICT) to account for the specificities of public-private contracts ? • **Methodology**: Theoretical analysis of ICT faced to stylized facts about public-private contracts • **Results**: Public-private contracts are characterized by diversity, legal environment and horizontal integration that call for some modifications to the ICT
CHAPTER 2: **Public-Private Partnerships and the Split of Property Rights**
• **Question**: How to account for the various types of private contractual participation? • **Methodology**: Distinction between decision rights, payoff rights and property rights • **Contribution**: Evaluation of the efficiency of various contracts between full privatization and full public provision • **Results**: There is always a degree of private participation that allows to outperform (or equal) public provision
CHAPTER 3: **The Legal Extra-powers of Public Authorities as Co-contractor**
• **Question**: Do specific rights granted to public authorities lower private incentives to invest? • **Methodology**: Introduction of other renegotiation games than the Nash Bargaining process • **Contribution**: Integration of the legal environment in contractual renegotiations • **Results**: Specific Rights granted to public authorities do not lower private investments
CHAPTER 4: **Horizontal Integration and Relational Contracting**
• **Question**: How to explain that public authorities choose the same private operator for various services? • **Methodology**: Relational contracting based on trigger strategy and econometric analysis • **Contribution**: Focus on horizontal integration in local public services • **Results**: Horizontal integration makes informal agreements more easily self-enforced

Part I

PROPERTY RIGHTS AND MANAGEMENT OF PUBLIC SERVICES

Chapter 1

Incomplete contracts theory (ICT) and the study of public services

" In spite of these differences, the issues of vertical integration and privatisation have much more in common than not. Both are concerned with whether it is better to regulate a relationship via an arms-length contract or via a transfer of ownership."

Hart [2003].

1.1 Introduction

The topic of property rights has not been discussed analytically by economists until very recently. "From Adam Smith and David Ricardo to Alfred Marshall and Leon Walras, economists directed their efforts toward understanding micro and macro operations of the price system (...) This theory, which at least in its micro aspects is a theory of price, takes the property right foundation of capitalism for granted. It does not investigate the role of property right arrangements" (Demsetz [1988]). Property rights began to be explicitly discussed in economic theory with

Alchian [1965], Demsetz [1967], and then Coase [1960].

The same could be said about the question of the boundaries of the firm, which is a relatively new topic of concern in economics. As noted by Coase [1992] himself, this seems quite surprising: " the firm in mainstream economic theory has often been described as a black box. And so it is. This is very extraordinary given that most resources in a modern economic system are employed within firms, with how this resources are used dependent on administrative decisions and not directly on the operation of markets. Consequently, the efficiency of the economic system depends to a very considerable extent on how these organizations conduct their affairs". Indeed, microeconomics has traditionally viewed the firm in technological terms, which proves to be insufficient to understand the determinants of the size of the firm.[1] Later on, notions such as asymmetric information, transaction costs, incomplete contracts, and opportunistic behavior have progressively provided foundations to different theories of the firm. All of them try "to define "integration" (i.e., whether a given transaction is within one firm or between two) and show why it matters (i.e., what tradeoff exists between integration and non-integration, so that the theory predicts integration for some transactions and non-integration for others)" (Gibbons [2005]).[2] Works of Grossman and Hart [1986] and Hart and Moore [1990] have investigated such a problem, and at the same time, they have put the emphasis on property rights. This notion has emerged in their works as the key variables allowing to determine costs and benefits of integration or of independent contracting, *i.e.* the "make or buy" decision.[3]

[1]For discussion about the insufficiency of economies of scale to determine integration, see Arrow, Levhari, and Sheshinski [1972], and Tirole [1988].

[2]Transaction costs theory is regularly ranged among the theories of the firm. (For its foundations, see Williamson [1971], Williamson [1975], Williamson [1985], Klein, Crawford, and Alchian [1978]). This theoretical framework postulates contractual incompleteness, but for different reasons than those of the GHM approach, namely bounded rationality, relationship-specific investments, and opportunistic behavior. Then, both theories of the firm propose different determinants for vertical integration (See footnote 13). Incentive theory (Hart and Holmström [1987], Holmström [1999], Holmström and Milgrom [1994], Holmström and Milgrom [1991], Holmström and Tirole [1991]) does not deal with the problem of integration in itself, but rather with the management of conflicting interests (Malin and Martimort [2000], Gibbons [2005]). See Gibbons [2005] for a more detailed presentation of these theories.

[3]Recall that this dissertation does not aim to propose a survey of the existing theories of the firm. This is done in Gibbons [2005], Garrouste and Saussier [2005], or in Hart [1995] for a

This approach has lead to a successful field of research, following the works of Grossman and Hart [1986], Hart and Moore [1990, 1988, 1999], Hart [1995], and is often referred as the "Grossman-Hart-Moore" approach ("GHM" approach hereafter) or "incomplete contract theory" ("ICT" hereafter). Beyond the question of vertical integration in (private) business, this framework is now frequently used to study organizational problems in public services (Boycko, Shleifer, and Vishny [1996], Hart, Shleifer, and Vishny [1997], Hart [2003], Bennett and Iossa [2006] among others). At first glance, whether public services have to be publicly or privately provided has little to do with the question of the size of a firm.
There is then a need to make the parallel more explicit: Why have "property rights" progressively appeared as a key notion to study organizational structures in public services? To what extent does their allocation between different partners matter to establish propositions about the management of public services?
This chapter aims to show that the property rights approach initiated by Grossman, Hart and Moore - and more precisely the model of Hart, Shleifer, and Vishny [1997]- is an appropriate methodological tool to study organizational problems in local public services, but needs some adaptations to better understand what makes public-private partnerships specific agreements.

To reach this goal, section 1.2 first shows to what extent the GHM approach offers an original contribution to the theories of the firm, with some applications to study organizational structures in public services. Indeed, such a theoretical framework initially proposes to evaluate costs and benefits of vertical integration, which is recalled in subsection 1.2.1. Owning a firm means to have residual control rights over its non-human assets. Since everything cannot be specified contractually ex ante in a way that can be enforced by a third (such as a court), the owner holds residual control, *i.e.* residual rights to decide and to get benefits. Therefore, different allocations of ownership leads to different ex post bargaining positions, and then different shares of the ex post surplus. Incentives of the partners to invest in

perspective with the GHM approach. My work mainly investigates the "property rights" approach and its application on public services, and the goal of this chapter is to justify the relevancy of this theoretical approach for the question of public services.

"uncontractible" investments are motivate by these shares, and then vary with the distributions of property rights. The efficient allocation appears as the one leading to the highest total surplus. Following this presentation of the GHM approach, subsection 1.2.2 shows why this framework offers a useful perspective to study local public services. In this sector, public authorities regularly face a dilemma close to the "make or buy" decision: they can either provide services in-house, *i.e.* "to make", or choose the market, *i.e.* "to buy", by contracting out services to private operators. Then, many public authorities wonder which type of provision -public or private- is the most efficient. It seems that the GHM approach represent an appropriate tool to give some parts of the answer to such a question. Indeed, there are several good reasons to believe that such contracts are incomplete: for instance, it is difficult for public authorities to find clear and verifiable parameters allowing to assess and evaluate all parameters of services, especially for quality. Moreover, today's management of public services implies to adapt to new technologies and to find innovative ways to deliver a better service at lower cost. As a consequence, the GHM approach can be applied to evaluate costs and benefits from contracting out public services. Following such an observation, section 1.3 briefly presents the main contribution of ICT to explain the trade-off between private and public provision of services, *i.e.* Hart, Shleifer, and Vishny [1997]. This contribution postulates two different types of "uncontractible' investments that a manager -either private or public- can do, namely cost-reducing and quality-enhancing investments. Cost reduction may create some adverse effects on quality. Results show that private provision is preferable when non-contractible cost reductions have weak adverse effects on quality, or when these effects can be controlled contractually or by competition, and when quality innovations are important. Public provision is to be preferred when effects of cost reduction on quality are large, and quality innovations are unimportant. Thus, this work has opened an original way to deal with organizational structures in public services, which is underlined in the following section (section 1.4). More precisely, subsection 1.4.1 introduces some extensions of the work of Hart, Shleifer, and Vishny [1997], that allow to better understand other aspects of public-private cooperation. For instance, the role of non-for-profit

organizations is discussed in Shleifer [1998], and in Besley and Ghatak [2001], while the question of bundling or unbundling of the different stages of a project (design, building, finance and operation) is to be found in Hart [2003] and Bennett and Iossa [2006]. These contributions represent significative works to better apprehend how public and private partners can collaborate in a more efficient way. However, subsection 1.4.2 shows that some other questions remain open. This justifies the perspective of the subsequent chapters of this dissertation. Among these questions, there is a need to clarify what the private provision of a public service means. It seems legitimate to wonder whether the conclusion established by Hart, Shleifer, and Vishny [1997] about public versus private provision applies to the different types of contracting out of public services that can be observed (concession contracts, lease contracts, management contracts, or service contracts for instance). Moreover, few has been done to understand the consequences of the legal environment on contractual efficiency. This raises many questions, as contractual tools are created by legislators, and different legal rules may apply. Last, it is worth recalling that everything is done to give public authorities all the means to create competition when they want to select a private operator, especially in Europe and in France. Yet, observations show that public authorities regularly concentrate their services in the hand of one single operator. This leads to wonder why public authorities are willing to foster such a concentration. Therefore, subsection 1.4.2 suggests that some refinements of the GHM approach may be introduced to have a full understanding of observed practices between public and private entities.

1.2 A rigorous theoretical framework to analyze public services

As just mentioned in the introduction, this section aims to show why incomplete contract theory (ICT) is a relevant framework to study organizational structures of public services. It is then worth recalling that this approach was first dedicated to study the boundaries of the firm (subsection 1.2.1). The description of this framework and its logical foundations will then lead to understand why ICT allows to evaluate the different organizational forms that exist to provide public services (subsection 1.2.2).

1.2.1 ICT as a theory of the firm

As previously recalled, the question of the boundaries of the firm has emerged only recently in the economic literature. Dealing with such a problem, works by Grossman and Hart [1986] and Hart and Moore [1990] have initiated a theoretical framework based on the idea that firm boundaries are chosen to allocate power optimally among the various parties to a transaction.

Firm and Ownership in the ICT

In the property-rights literature, the firm is identified with the physical assets it possesses. The decision to integer an activity is then assimilated to the will to acquire the non-human assets of another firm. This represents a source of value, as ownership conveys control over non-human assets. More precisely, "the owner has *residual control rights* over that asset: the right to decide all usages of the asset in any way not inconsistent with a prior contract, custom or law" (Hart [1995]:30). Then, two types of rights have to be distinguished: specific rights that can be specified in a contract and residual rights, whose contractual specification is too

costly, and that are hold by the owner of the asset (Grossman and Hart [1986]).[4] As noted by Hart [1995] (p.64), in many cases, the holder of the residual control rights has also the residual benefits: "residual income and residual control often go together".[5]

Let us now precise the reasons why such rights matter.

Contractual incompleteness

In a world of contractual completeness, contracts would include a detailed list of the way every asset should be used in all eventuality, *i.e.* all rights would be specific. Yet, Grossman and Hart [1986], Hart and Moore [1990], Hart [1995] show that some aspects of the uses of non human assets are too costly to be specified ex ante (at least in a way so that they can be verified by outsiders), hence the assumption of contractual incompleteness and the importance of ownership to fill such contractual gaps. For instance, during an economic relationship, agents can take actions today that affect their productivity or value tomorrow, such as investments in human capital, or participation in on-the-job training. The precise specification of such actions or of their results is too costly to be described in long-term contracts that are thus incomplete and may lead to renegotiations later on.[6] Let us precise that this does not mean that parties have bounded rationality. On the contrary, parties have rational expectations about the renegotiations that occur. Yet, they are "constrained in contracting only by the fact that complicated states of the world cannot be verified" (Hart and Moore [1999]:134), or because states are too expensive to describe ex ante.[7] "If the parties are boundedly ratio-

[4]Before putting further the analyze, it may be important to precise that the property rights literature mostly applies to owner-managed firms because of the definition of ownership: those who own an asset actually exercise residual control rights. This point will be discussed at the end of this subsection.

[5]This point will be discussed in chapter 2.

[6]As noted by Hart [1995], under some conditions, a possibility is to write an ex ante profit-sharing agreement if unforeseen payoffs are realized, but this is insufficient to create ex ante incentives. First, profits may not be verifiable. Moreover, the owner may threaten not to implement the rule, unless the other accepts to give up some of its profit shares.

[7]For instance, a trade of a good between a buyer and a seller can be imagined, but the exact nature of the good to be delivered is unknown when parties sign the contract. If the states of the world are very large, a contingent contract specifying exactly which good is to be delivered

nal, they may be unable to anticipate all eventuality, and may find it too difficult to decide (and reach agreement about) how to deal with all eventualities which they do foresee (...) Bounded rationality may also limit the types and complexity of revision games that the buyer and seller can conceive of. We ignore bounded rationality issue (...) because of the great difficulty of analyzing it formally. We also feel that at least in some situations, the parties to a contract may be sufficiently sophisticated to conceive the relevant states of the world and to consider the types of revision processes (...)" (Hart and Moore [1988]:757). Thus, there is no contradiction between unbounded rationality and contractual incompleteness: the parties cannot write a contract with a long list of details for every eventuality in such a manner that a court can enforce it, yet, they can figure out the utility consequences of such a situation.

Another important feature of incomplete contract theory is that there is *no asymmetry of information* between parties. Thus, it does not deal with problems, such as those where contingent statements are infeasible because the state of the world is not observed by all parties to the contract. This allows to specifically evaluate the precise consequences of unverifiable parameters in a contract.

With such definitions of firm, ownership and contractual incompleteness, what is to be gained in case of integration or of trade between independent contractors?

Costs and benefits of integration

From what is explained above, the decision of integration or non integration directly determines the allocation of property rights among economic agents, *i.e.* the rights of control over non-human assets.

Why is this repartition so crucial? because "control over nonhuman assets leads to control over human assets" (Hart [1995]:58).[8] Indeed, the owner of a firm has the

in each state would be prohibitively expensive. Parties may then prefer to write an incomplete contract and renegotiate, once the state of the world is realized and the kind of good they need is revealed.

[8]Indeed, to the opposite of Alchian and Demstez [1972], there is a real difference between authority observed in a firm and that observed in contractual agreements between independent partners: in case of conflicts and break in the relationships, the employer walks away with all

capacity to stop access of individuals to the firm's non-human assets, while this is not the case with independent contractors. "A firm's non human assets, then, simply represent the glue that keep the firm together, whatever this may be" (Hart [1995]:57).

Moreover, getting rights of control also means diminishing the right of the other party to have control. This leads to potential benefits and costs of removing control (*i.e.* ownership) (Grossman and Hart [1986]), as it will now be shown. For instance, when payoffs from actions that were not foreseen ex ante are realized, renegotiation occurs to share them. Then, the future return on an individual's current action will depend on his bargaining position at the moment of renegotiation. This position is determined by which assets an agent has access to and hence will be sensitive to the allocation of asset ownership. "As a result, an agent's action will depend not only on whether he owns a particular asset, but in the event that he does not own it, on who does" (Hart and Moore [1990]).
Efficient bargaining[9] is postulated in the property rights literature to share the surplus from the specific investments of parties. Each party's ex ante investment incentive is determined by its surplus share during renegotiation, as this share is perfectly anticipated. The owner is somewhat protected against the expropriation of specific investment, which increases their incentives to invest. Yet, during the renegotiation process, the share of the owner is limited if other parties are indispensable in the ex post production process. Therefore, parties can ask for a part of the ex post surplus either if they own the assets – because of the residual control right over these assets – or if they prove to be indispensable, for instance, because of their specific human capital that may be needed to develop some innovations over the asset. As a consequence, allocation of property rights and human capital play a significant role in the ex post sharing of surplus, and then on incentives to invest ex ante. In other words, "ownership serves to elicit appropriate ex ante

the nonhuman assets, whereas in the latter case each independent contractor walks away with some non human assets.

[9]Nash Bargaining games are often used in the property-rights literature, but Shapley value is also applied, for instance in Hart and Moore [1990]. See chapter 3 for more details.

investments, particularly those in human capital" (Hart [2003]:C70).
There is then a trade-off to determine the boundaries of a firm. On the one hand, owning more assets guarantees a bigger surplus share and so creates a stronger investment incentive for the owner. Yet, the cost of such an operation is that the acquired firm's incentive to make relationship-specific investments decreases since, given that it has fewer residual control rights, it will receive a smaller fraction of the incremental ex post surplus created by its own investments. This comes from the fact that " integration shifts the incentives for opportunistic and distortionary behavior, but it does not remove these incentives" (Grossman and Hart [1986]:716). As summed up by Gibbons [2005], "the cost of control is the loss of initiative".

The choice of ownership structure

Once incentives to develop non-contractible investments have been determined, total surpluses of each distribution of property rights are calculated, and the optimal choice is the closest from the surplus obtained in first-best, *i.e.* the surplus obtained when contracts are considered as complete.
Results of Hart and Moore [1990] and Hart [1995] show that assets that are highly complementary should be owned together, which is not necessarily the case if assets are independent.[10] Moreover, if one party is indispensable or if its investment is important to maximize, then that party should own the assets, whereas if the parties' investment incentives are both important, then dividing the assets between the parties is efficient. In the same way, concentrating assets in the hands of those who have strong human capital may create better incentives (Hart and Moore [1990]).

[10]Indeed, " clusters and splits of multiple decision rights are governed by incentive considerations (...) because such rights are valueless in isolation, splitting complementary assets protects no one against the expropriation of specific investments in ex post bargaining. Concentrating the rights in a single hand reduces the number of hold ups." (Tirole [1999]

Limits of the incomplete contracting approach

In spite of its rigorous evaluation of the costs and benefits of integration, some weaknesses of the GHM approach have been underlined.

First, if it deals rather well with the question of boundaries, the incomplete contract theory is rather silent on internal organization, delegation of authority and hierarchy (Aghion and Tirole [1997], Hart and Holmström [2002]). Even though Hart [1995] (p.62) mentions that the incomplete contracting framework is still relevant to study notions such as delegation of authority or mergers between large companies[11], few has been done to understand internal incentives and delegation of powers through hierarchy.

Second, the statute of manager raises some questions. As ownership conveys residual control rights, this theory seems quite adapted to owner-manager firm rather than large companies with board of directors and managers (Holmström [1999], Garrouste and Saussier [2005], Gibbons [2005]). "This is a theory of solo entrepreneurs (single actors who own entire asset combinations) and drone employees (who own nothing, and hence, in this model, face no incentives and so do nothing)" (Gibbons [2005]).

The association of ownership with residual control rights has also come under criticism by Demsetz [1998]. He argues that if an owner is only interested by the exploitation of a particular right, he can transfer all other residual control rights through a contract, provided he is able to specify the non-residual rights that are to be protected from "misuse" of the residual rights. As a consequence, he believes that "the firm acquiring the assets does so by buying them instead of renting them mainly because it desires to exercise the nonresidual rights in these assets for an indefinite time period" (Demsetz [1998]:451).

Later on, Maskin and Tirole have formulated an "irrelevance theorem", whereby indescribability would not be sufficient to entail contractual incompleteness. How-

[11]Indeed, mergers would correspond to the unification of residual control rights and their delegation to the board of the acquiring company. As for delegation of authority, there would be no sense to put someone in charge of an action, if all actions can be specified in a contract. Thus, Hart [1995] concludes that the incomplete contract framework is still appropriate.

ever, such a theorem needs strong assumptions to be applied.[12]

Fourth, contrary to the transaction cost literature, that is regularly considered as an alternative framework to study the boundaries of the firm[13], propositions derived from the ICT are difficult to test (Whinston [2003]). As for Williamson [2000] (p. 605), it mainly comes from the fact that" GHM vaporize ex post maladaptation by their assumption of common knowledge and costless ex post bargaining (...) this shift (...) matters. For one thing, GHM makes very limited contact with the data whereas TCE is an empirical success story". Recent developments proposed by Hart and Moore [2007a], Hart and Moore [2007b], and Hart [2007b] partly answer to such a problem. The authors depart from a world in which Coasian renegotiation always leads to ex-post efficiency. Instead, they propose to consider that trade is partly contractible ("perfunctory performance"), and partly non-contractible ("consummate performance"). A party will provide consummate performance if he feels that he is getting what he is entitled to, but will withhold some part of the consummate performance, if he feels shortchanged, which creates some "shading costs". Contract is then a "reference point" to the extent that a party's sense of entitlement is delimited by the contract he has written. The goal of this new approach is to develop "a tractable model of contracts and organizational form that exhibits ex post inefficiency, and that can explain simple contracts observed in reality, such as the employment contract. From this perspective the costs of flexibility that we focus on - shading costs - can be viewed as a short-hand for other kinds of transaction costs, such as rent-seeking, influence, and haggling costs" (Hart and Moore [2007a]).[14]

[12]These assumptions are (1) state independence of the ratios of marginal utilities of money and, (2) unidentifiability of effort. See Tirole [1999], p.757-758.

[13]As recalled in footnote 2, both ICT and transaction cost theory are theories of the firm, *i.e.* they try to explain the conditions under which integration is (or not) more efficient than independent contractors and why. ICT has thus been sometimes presented as the formalization of transaction cost theory (Williamson [1990] (p.16), Williamson [1996] (p.372-373), Fares and Saussier [2002]). Such a vision is yet misleading, and it is now commonly established that both theories constitute two different approaches of integration (Williamson [2000], Williamson [2002], Saussier [2000], Gibbons [2005], Garrouste and Saussier [2005]).

[14]Hart [2007a] also reckons another weakness of the property rights literature: as the transaction cost economics, it does not deal with payoff uncertainty, while it seems to be an important determinant of vertical integration, as shown in the recent empirical survey by Lafontaine and Slade [2007]. The introduction of behavioral assumptions in Hart and Moore [2007a] allows to take into account payoff uncertainty and the variability of quasi-rents with respect to the state

To sum up, this subsection has recalled how the GHM approach deals with the boundaries of the firm. It postulates contractual incompleteness, and precisely focuses on the consequences of firm boundaries on the incentives of parties to invest in what is non-contractible, such as investments in human capital. Let us now see to what extent this framework can also be useful and appropriate to study organizational structures of public services.

1.2.2 ICT and organization of local public services

This subsection aims to introduce the notion of local public services, and to show how parallels can be drawn with the ICT to determine the efficient organizational structures of these services.

Local Public Services

Public services traditionally gather services provided by public authorities and practiced under their control to satisfy public requirements. It thus concerns a wide range of services: some are delivered at national level (for example: justice, defense, security, education), others are provided at local level, such as civil status, water distribution, urban transport, urban warming, or garbage collection for instance. To focus on the French case, successive transfers of competencies towards local governments have happened for several decades.[15] At the municipal level, the town or its council can today intervene in the following areas[16] (AMGVF [2004]):

of the world as a determinant of vertical integration.

[15]The main decentralization laws were voted in 1982/1983 ("Deferre Law"), in 1992, in 1999, and a constitutional reform in 2003 allowed the vote of the "law governing local liberties and responsibilities" in 2004.

[16]In some cases, competencies are transferred to other structures. Indeed, since the late 19th Century, the French communes felt the need to work together on policies requiring high investments. This is referred to as associative inter-commune cooperation enabling communes to share the management of activities or public services. As a result, an increasing number of communes delegate today part of their responsibilities to ECPIs (*Etablissements Publics de Coopération Intercommunale* - Public Establishments for Inter-communal Cooperation). An EPCI is a legal entity with financial autonomy. (AMGVF [2004])

- Urbanism: town and country planning with implementation of the local urbanism plan, zoning, building permits, etc.
- Transportation management (car parks, collective transport, etc.)
- Environment: conveyance and distribution of drinking water, purification of liquid waste, collection and processing of household waste...
- Management of public interest services (electrification, thermal networks, telecommunications...)
- In social and health areas: communal social action centers (mandatory), rest homes for the aged, child care both pre-school and after-school, home help, recreational centers etc.
- Education: maintenance and use of nursery and primary schools, school buses, activities both during and after school.
- Culture: libraries, music schools, enhancement of communal sites, etc.
- Sport: construction of equipment, sporting activities, etc.

For many services, public authorities can choose to provide them in-house, or to contract them out to private firms.[17] Thus, a dilemma close from the "make or buy" decision in private business appears. The following paragraph comments such a parallel.

Organizational structures of public services

What does the economic literature tell us about organizational structures in public services? Because of public interest and market failures, Classics thought that only

[17]Only services with traditional sovereign activities such as civil status, organizing elections, administrative police work, activities which have involved the legislator (rescues, fires, ...) cannot be provided by private operators (Auby[1997]). In contrast, services such as water treatment, water distribution, garbage collection, garbage treatment, urban warming or urban transport can be contracted out.

activities considered as "the duties of the sovereign" has to be publicly provided. Market forces were supposed to ensure more efficiently the production of all other activities.

Far from being clear-cut, the question has become more and more complex out in time: even if a service has to satisfy some public requirements, public structure has been challenged. Centuries later, Coase [1960] proves that state intervention is not necessarily efficient to correct market failures, as in the absence of transaction costs, parties can bargain privately and reach efficient outcomes under any allocation of property rights. Each type of allocation – market, firm, administration – entails some transaction costs, and the best possible choice is the arrangement that supports the lowest costs. As a result, no organizational structure is *a priori* superior to the others, which especially means that there is no general superiority of public ones over private ones or vice-versa.

Moreover, Demsetz [1968] shows that some forms of competition are possible, even in presence of strong economies of scale and natural monopoly. When competition on the market is infeasible, competition for the market through franchise bidding allows to introduce ex ante competition. The bidder with the lowest bid price will be awarded the contract, and such a lowest bid price need not be a monopoly price (Demsetz [1968]). Even if delegation through franchise bidding is not without raising any problem (Williamson [1976], Goldberg [1976]), the contractual involvement of private firms in public services has today a growing success in many countries. This dissertation does not investigate the selection process (negotiation or franchise bidding)[18] but focuses on its result: public authorities – especially at local level – do not necessarily provide their services in-house. They can choose to have an arms-length contract with a private firm remaining independent (*i.e.* to "buy" the service), or they can provide them in-house, with the manager being a public employee (*i.e.* to "make" the service).[19]

Table 1.1 illustrates this "make or buy" trade-off in local public services through

[18]See Bajari, MacMillan, and Tadelis [2003] for a discussion on this theme.

[19]In France for instance, the decision as to whether public services are managed directly by the local authority or delegated lies solely with the municipal council, as per article 72 of the Constitution (AMGVF [2004]).

the choice between public provision, public procurement and contracting out to the private sector of some local public services. As mentioned in introduction, these data come from a survey from Dexia Credit Local and the *Fédération des Maires des Villes Moyennes* (FMVM), a french association for medium-sized cities. They have been collected from June to September 2005 in 125 French towns of medium size, *i.e.* between 20 000 and 100 000 inhabitants.[20]

Table 1.1: Organizational choices of public services in France

Public services	**Contracting out**	**Public procurement**	**Public provision**
Water Production and distribution	63%	3%	33%
Sewage	58%	7%	35%
Garbage collection	5%	28%	67%
Garbage treatment	16%	42%	41%
Urban transport	69%	15%	15%
School catering	23%	9%	65%
Parking	37%	5%	57%

Source: Report from DCL and FMVM, February 2006

Public provision refers to public management with or without financial autonomy. This can be assimilated to "integration" to the extent that public employees provide services, and public authorities do not resort to market forces. In contrast, *contracting out*[21] means that the local public authority has delegated the management of the service, with a private operator that directly collects fees on users. Last, *public procurement* "is the provision, by a public or private operator, of service to a local authority in return for payment by the authority of a contractually agreed amount" (AMGVF [2004]). Differences between these different types of private intervention will be detailed in the following chapter.

Another illustration is given by table 1.2 that shows some data extracted from Levin and Tadelis [2005] about the proportion of services that are contracted out by American cities.

[20]More precisely, data concern 91 cities and 82 inter-communal groups. In 56 cases, data were relative to the same territory.

[21]Many different types of contracts allow private firms to be involved at various degrees in the management of public services. Details are given in chapter 2.

Table 1.2: Organizational choices of public services in United States of America

Public services	**Cities providing**	**In-house Provision**	**Public Provision**	**Private Provision**
Water treatment	797	79%	14%	6%
Sewage collection and treatment	888	70%	21%	8%
Commercial Solid Waste Collection	569	34%	1%	44%
Residential Solid Waste Collection	764	49%	1%	34%
Operation/maintenance of recreation facilities	996	75%	6%	10%
Parks landscaping and maintenance	1018	71%	5%	18%
Solid waste disposal	574	34%	18%	37%

Source: Levin and Tadelis [2005], ICMA City Manager Survey

These data were collected by the International City/county Management Association (ICMA) in 1997 and 2002, through surveys sent to roughly 4 000 cities. After having combined the survey responses and eliminating responses that are substantially incomplete, the authors have a data on a total of 1068 cities.[22] *In-house provision* designs the provision of services directly by public authorities, whereas *public provision* means that the service is contracted out to another public governmental agency. *Private provision* means contracting out to a private sector firm.

The parallel with the theories of the firm now becomes more obvious. As shown earlier, such theories allow to determine whether a transaction is better conducted through a contract (*i.e.* to "buy" the transaction), or through vertical integration (*i.e.* to "make" the transaction). As noted by Hart [2003], "in spite of these differences, the issues of vertical integration and privatisation have much more in common than not. Both are concerned with whether it is better to regulate a relationship via an arms-length contract or via a transfer of ownership."
The justification of such a parallel is also to be found in Williamson [1999], who

[22]For cities that responded in both years, the more complete or recent responses have been used.

mentions that a comparative contractual approach could indeed help to determine how government should carry out its responsibilities. "The best way to think about the efficiency of a government agency is to ask whether we would be willing to have the same product or service delivered by a private firm" (Williamson [1999]:310). Thus, many works have been inspired by theories of the firm to establish some propositions about the organizational choices of public services (Williamson [1999], Ménard and Saussier [2003], Ménard and Yvrande [2004], Chong, Huet, Saussier, and Steiner [2006b] for the transaction cost framework; Hart, Shleifer, and Vishny [1997], Shleifer [1998], Boycko, Shleifer, and Vishny [1996], Hart [2003], Bennett and Iossa [2006] for the incomplete contracting approach).

This dissertation mainly deals with the ICT approach. The previous subsection highlights two main features of this theoretical framework:
(1) Contractual incompleteness caused by difficulties in writing everything in details in a way that can be enforced by courts.
(2) Some significant non-human assets that interfere in the economic relationships.
It then remains to justify why both features are relevant to analyze public services.

Contractual incompleteness in the provision of public services

A priori, many rules codify the provision of public services, and especially local public services. For instance, European directives have emerged to impose contractual obligations and controls. This implies that public services have to meet some criteria, that can be verifiable by outsiders, whether services are provided in-house or delegated.
Water distribution is a good case in point. European norms specify more than 60 verifiable parameters that are monitored by public agencies (Chong, Huet, Saussier, and Steiner [2006b]). The European directives 98/34 and 98/48 provide a procedure of information regarding norms and technical regulations to facilitate and accelerate normalization of water quality at the European level.[23] The same

[23]More precisely, in France, water is fit for "human consumption" if it replies to 63 main criteria that are separated into seven groups of parameters: organoleptic parameters, physical-

applies to waste management: European and national legislations have developed to control and provide technical norms about quality during the various steps of collection, recycling, and treatment.[24]

As a result, can contracts about the provision of public services be considered as complete, *i.e.* having verifiable and enforceable parameters allowing to specify the quantity and quality of service to be delivered at every time and in every eventuality?

First, in spite of verifiable – and then, contractible – criteria about quantity and quality, contracts remain silent or vague on some features. It is difficult to imagine a totally comprehensive contract that would include a detailed list of the way every asset should be used in every eventuality, all the more so as contracts are generally signed for several years – for instance, around 12 years for water distribution (Saussier, Huet, Staropoli, and Menard [2004]:39).

Second, even if criteria allowing to control quality exist in some public services, it may be very expensive to implement them and to verify their applications. Furthermore, total transparency allowing complete verifiability by the public authorities is difficult to reach, as mentioned in a recent report from the French national audit office ("Cour des comptes") about water and sewage services (Cour des Comptes [2003]).

Moreover, quality standards may change out in time and new verifiable criteria are permanently to be found.

Third, verifiable criteria do not exist for all public services, and quality remains often difficult to specify in many services. Thus, opponents to private contractors regularly fear that contracts cannot prevent quality damaging in the process of

chemical parameters, parameters concerning "undesirable" substances, parameters concerning toxic substances, microbiological parameters, parameters concerning pesticides and related products, parameters concerning water softened for human consumption. Details can be found at *http* : *//www.saur.fr/en/particular/groupe_saur/glossaire_eau.html*

[24]European waste legislation refers – among others– to Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste, Council Directive 91/683/EEC on hazardous waste, Decision 2000/532/EC establishing a list of waste, Council Regulation (EEC) n° 259/93 of 1 February 1993 on the supervision and control of shipments of waste within, into, and out of the EC. For national legislation, see mainly *Code de l'Environnement*, Book V, Title IV, chapter I and Book I, Title II, chapter IV; and *Code des Collectivités territoriales*, articles L 2313-1, L 2224-13 to L 2224-17 , L 2333-76 et L2333-78, modified by law n° 2004-1485 of 30 December 2004: articles 61,62,64, 66, 67, 68 et 69.

cutting cost. Some examples are given by Hart, Shleifer, and Vishny [1997]: private management of schools could lead to exclude children having some difficulties and that are expensive-to-educate, or to hire cheap teachers to reduce costs at the expense of quality if education. In the same way, private hospitals could refuse patients whose treatments are too expensive, and in the case of prisons, private managers could hire unqualified guards to save costs, thereby undermining safety and security of prisoners.

Finally, the provision of public services has to adapt to users' needs, which implies that the operator has to go beyond what is specified in the contract, if users' needs require to do so. In France, such an effort of adaptation is formally identified by one of the so-called "*lois de Rolland*", *i.e.* principles written by Professor Rolland in the twenties to describe features of public services. In addition to service continuity and equal access for everyone, flexibility[25] is required: general interests have to be "permanently satisfied, municipal services must follow the evolution of requirements and adapt as necessary to maintain constant efficiency" (AMGVF [2004]). Even if all users' needs cannot be described when parties sign contracts, there is then a clear will to make services evolutive. Implications of these legal requirements are given by a report of the World Bank [2006a] stating about French law that "the operator is deemed to assume duties relating to operating a public service, even **beyond** those included in the contract (such as investing to address increasing demand or **adapting to new technologies**)".

Such a will has been reaffirmed by the European Commission [2003a]: "the role of public authorities in the context of services of general interest is constantly adapting to economic, technological and social developments". Similar ideas can be found in the green paper of 2004 (European Commission [2004a]:15). All these statements prove the strong will to have services that adapt to technologies and users' needs, even if all contingencies cannot be described when contracts are signed.

[25]For an application of this principle (called "flexibility", "adaptability" or "mutability"), see legislation from French *Conseil d'Etat*: CE 10.1.1902, *Gaz de Deville-les-Rouen*, Leb. 5

To sum up, elaboration of complete contracts is a difficult task: "describability" and "verifiability" of all parameters relative to quality or quantity are not always possible and are costly processes. Moreover, comprehensive contracts are hard to elaborate for medium or long periods, and the necessity of permanent adaptation makes the task all the more difficult. What's more, public authorities insist on the need to adapt to technologies and unforeseen contingencies. Therefore, it seems that contracts do not describe all tasks to perform in a way that can be enforced by courts, as assumed by the GHM approach. Last but not least, human capital tends to play a key role in the management of local public services, which will be shown in the following paragraph. Since no innovation can be contracted upon ex ante, for it is not possible to specify in advance the delivery of a specific innovation, this gives some other arguments to justify contractual incompleteness, as suggested in the GHM approach.

Innovations and human capital in the provision of local public services

Public authorities are more and more willing to encourage innovations to enhance quality or reduce cost in the management of public services. Why does this trend appear today as crucial?

Delivering qualitative public services is today a requirement not only to satisfy legal requirements or social needs, but also to satisfy economic goals. Local public authorities are more and more willing to promote innovative public services to help the economic development of their territories and to attract firms and foreign investments. On this subject, developments in research on endogenous growth have shown how qualitative public infrastructures and services constitute a "public capital" that plays a key role for economic growth (Barro [1990]), and more generally, to attract foreign investments and firms. Poor services are often considered as a limit to competitiveness and productivity in other markets (Guasch [2004]). Moreover, the intensification of cross-border economic competition with new opportunities for growth contribute to the will to launch innovative programs to innovate to have higher-quality public services. Innovations are also justified to

face demographic and socio-economic changes, which implies to adapt to the way people live and then open up new ways of delivering public services (HM Treasury [2006]).

All these factors encourage managers of public services to find innovative ways to provide services with better quality at lowering cost. For public authorities, involving private firms often appear as a way to reach this goal[26] (Ministry of Municipal Affairs [1999], HM Treasury [2000]). A report by Ernst and Young [2006] also highlights that public-private partnerships are essential to promote innovations in the management of public services. Moreover, private firms are rather prompt to put emphasis on their capacity to innovate. The following quotation from the website[27] of one of these private company is quite representative of this new trend.

> SUEZ Environment has mobilized **a global research and innovation network to serve sustainable development and productivity**. Its multiple centers throughout the world work with more than 90 university and industrial research centers providing access to new technologies and methodologies and expanding existing research areas. The 2002 consolidation of Ondeo and SITA expertise and research under CIRSEE has combined their know-how in analysis, waste, sludge treatment and industrial computing.

A report edited by the same company in 2006 gives some examples of innovations – or research efforts – to enhance quality or productivity through cost reduction (Suez Environnement [2003]).

> A research action, financed in part by the EREF (Environment Research and Education Foundation in the USA)(...) has resulted in the

[26] For instance, the American Federal Highway Administration (FHWA) mentions project cost savings and improved quality and system performance from the use of innovative materials and management techniques as key benefits of PPPs ($http://www.fhwa.dot.gov/ppp/defined.htm$)

[27] Information delivered on Suez's website.

> development of a methodology for **the rational management** of green house gases the landfill sites. This work, resulting from the cooperation among all the Suez group companies, has allowed **the optimisation of the collection and of biogas producing energy value creation** by the sale of carbon credits generated.
>
> Suez Environment is currently developing services that are based on the molecular biology techniques (...) These techniques will be able to constitute the basis for a reinforced surveillance of the microbiological **quality of water**, whether directly destined for human consumption or for the supply of an industrial process **requiring a high level of quality** (...)/(...)

A similar will to innovate to increase quality and reduce cost is mentioned in a report edited by another private firm operating in local public services (Veolia Environnement [2006]):

> "Anticipate clients' needs Demographic growth and urban development require **new technical solutions** that are ever more efficient, reliable and widely available. Our first priority is to satisfy our clients – municipalities, industrial companies and individual customers – but we also want to make a real **contribution to progress in protecting the environment and public health**. Our research programs are defined in close collaboration with our operators. They aim to **optimize existing solutions** and develop **innovative new solutions** that form the basis for the products and services of the future. Guarantee safety and promote environmental health Veolia Environnement's **ongoing technological progress** helps its clients deal with the emergence of new health hazards (...)"

To sum up, this subsection aims to show that :
(1) For many services, public decision makers have to choose between in-house

provision and delegation to private operators, which can be assimilated to a "make or buy" decision

(2) It seems difficult – or at least too expensive – to foresee and to write in details and in a way that can be enforced, every eventuality that can occur, which justifies some contractual incompleteness.

(3) Unverifiable efforts to invest in human capital to find innovative solutions to enhance quality or reduce costs of public services are increasingly important.

As a consequence, ICT appears as a useful framework to determine the effects of allocation of property rights on these efforts.[28] Let us now recall one of the main contribution established in this field, whose goal is to determine the "proper scope of government".[29]

[28]This does not mean that other theoretical frameworks are inappropriate to study organizational choices in public services, as recalled in the general introduction. Many works based on Agency theory for instance establish useful propositions to manage information asymmetries, and have focused on adverse selection and moral hazard problems raised by contracting, See Laffont and Tirole [1993].

Other works are inspired by transaction cost theory (Chong, Huet, Saussier, and Steiner [2006b], Ménard and Saussier [2003]). Yet, as shown in this section, ICT allows to precisely focus on allocation of property rights and non-verifiability of investments, such as those in human capital.

[29]The emphasis is put on this work, which does not mean that there are no other previous works on the management of public goods, or on the effects of privatization, in the incomplete contract framework. For instance, Schmidt [1996] proposes to explain costs and benefits of privatization by a trade-off between a less efficient allocative efficiency, and better incentives for the manager to save costs (higher productive efficiency). This approach is based on informational losses from contracting, while Hart, Shleifer, and Vishny [1997] de-emphasize the role of incomplete information in contracting, and emphasize quality issues. Some other works will be mentioned in section 1.4.

1.3 The seminal work of Hart, Shleifer, Vishny [1997]

This section recalls the contribution of Hart, Shleifer, and Vishny [1997]. This theoretical framework is the basis of this dissertation, since each of the following chapters introduces a technical refinement on this model. Thus, we first present this work, before showing why some modifications are useful to better apprehend public-private partnerships.

1.3.1 The framework

Adopting an incomplete contract perspective, Hart, Shleifer, and Vishny [1997] consider that the fundamental difference between private and public ownership concerns the allocation of property rights – and then of residual control rights – rather than the degree of competition per se.

As mentioned in the previous subsection, managers of a public service –whether private or public – can do some efforts to find innovative ways to increase quality or to reduce cost. Both types of innovations are not contractible ex ante[30] and the cost reduction has an adverse effect on quality. As a consequence, it is difficult to know the incentives of the manager to work to find such innovations.

In accordance to what has been described about ICT, for innovations to be implemented, the approval of the owner is needed, *i.e.* that of the private manager in case of privatization and that of the public authority if the service is provided in-house. Moreover, managers may become irreplaceable when innovations are linked to the human capital.

[30]To understand costs and benefits of privatization and public provision, contractual incompleteness is postulated, so that allocation of residual control rights matters in uncontracted for circumstances, to determine agents'incentives. Indeed, "if the politician can sign a complete or comprehensive contract (with either employees or a contractor), he can achieve the same outcome in each case. From the traditional incentive viewpoint, motivating the contractors and the public employees presents the same problem to the politician even in the presence of moral hazard and adverse selection" (Hart, Shleifer, and Vishny [1997]). Subsection 1.2 gives reasons for contractual incompleteness, such as difficulties to fully specify quality of services, or innovations.

More formally, HSV [1997] consider a benevolent public authority[31], 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 can indeed decide to provide the service in-house, or to contract it out to a private manager. In each case, G and M are able to write a long term contract specifying some aspects of the good or service to be provided. The contract thus describes the provision of the service, and its price P0, which is the price paid to the private manager in case of private provision, or the wage M receives as a public employee in case of in-house provision. Although G and M can specify some aspects of the good or service in advance, we suppose some others cannot be specified: it may be too costly to anticipate all possible contingencies ex ante.

Indeed, observable but unverifiable investments researching innovative approaches to perform tasks in excess of the basic standards specified in the initial contract can 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 final benefit to society is noted B and costs the manager C to produce. Both variables can be represented by a dollar amount. The manager can manipulate B and C through prior effort choices. More precisely, M can devote effort to two types of "innovations" relative to the basic good: a cost innovation and a quality innovation. 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) ≥ 0 is the reduction in cost corresponding to the cost innovation and b(e) ≥ 0 is the reduction in quality

[31]Results obtained in the model can indeed be discussed if corruption is introduced. However, effects are undetermined, as corruption can either foster privatization (for instance, by allowing public authorities to extract a higher bribe) or public provision (through patronage for instance, as mentioned in Lopez de Silanes, Shleifer, and Vishny [1997]). See Hart, Shleifer, and Vishny [1997] pp. 1144 - 1147. Let us note that Shleifer [1998],Shleifer and Vishny [1994], Boycko, Shleifer, and Vishny [1996] suggest that corruption is easier to eradicate in privatization than in public provision of services.

corresponding to the cost innovation.[32] $\beta(i)$ 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 β are made such as: $b(0) = 0, b' \geq 0, b'' \geq 0, c(0) = 0, c'(0) = \infty, c' > 0, c'' < 0, c'(\infty) = 0, \beta(0) = 0, \beta'(0) = \infty, \beta' > 0, \beta'' < 0$ and $\beta'(\infty) = 0, c' - b' \geq 0$.

The assumptions $c' - b' \geq 0$ 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 assumption formulated in HSV [1997], as it implies that the net effect of cost reducing investment is always positive. We then focus on particular types of public services, for which cost-reducing 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, and 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.

As is usual in property-rights models, the parties want to renegotiate the contract at date 1 once they learn the nature of potential quality improvements and cost reductions. We also consider that G and M divide the gains from renegotiation according to a Nash bargaining, *i.e.* they split the surplus 50:50. The parties'defaults payoffs -that occur in the absence of renegotiation- thus influence final payoffs.[33]

[32]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.

[33]As in HSV [1997], the public authority does not maximize the global surplus during renegotiations: its utility function is given by the welfare of the rest of society, excluding M. Indeed, " The political process aligns G's and society's interests (since M has negligible voting power, his interests receive negligible weight). As will become clear, if G placed the same weight on M's utility as on the rest of society, the first-best could be achieved".

To sum up, the timing of the game is as follows:

- T=0: M and G write contract and choose ownership structure
- T= $\frac{1}{2}$: M chooses efforts e or i devoted to cost reduction or quality innovations
- T=1: If no renegotiation occurs, basic goods are supplied. However, renegotiation will occur.

Finally, 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. Let us now see how the authors determine the optimal ownership structure. To this end, first best levels of investments are first calculated, and then surplus obtained under private and public managements are determined.

1.3.2 Equilibria

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:

$$\max B0 - b(e) + \beta(i) - C0 + c(e) - e - i$$

There is a unique solution (i*,e*) characterized by first-order conditions:

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

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.

Equilibrium under private ownership

By considering that a private operator manages the service and owns the infrastructure, he benefits from residual control rights. As a result, he does not need to get government approval for a cost reduction. Then, in the absence of renegotiation, the cost innovation is implemented, but the quality innovation is not, since no payment from G will be forthcoming. Since the public authority is the buyer of the service, the private operator has to renegotiate with it to get a higher price. G and M divide the gains from renegotiation according to Nash bargaining, *i.e.* they split the surplus 50:50. (There is symmetric information about i). The payoffs of the parties are thus as follows:

$$U_G = \text{B0 -P0} + \tfrac{1}{2}\beta(i) - b(e) \text{ and}$$

$$U_M = \text{P0 - C0} + c(e) + \tfrac{1}{2}\beta(i) - e - i$$

The manager has rational expectations and the maximization of his utility function thus leads to the following levels of investments (where M stands for ownership by M): e_M such as

$$c'(e_M) = 1 \tag{1.1}$$

and i_M such as

$$\frac{1}{2}\beta'(i_M) = 1 \tag{1.2}$$

In other words, such a structure does not give optimal incentives to the private manager to ameliorate quality of the service through quality investments beyond those specified in the contract, as he gets only half of the benefits from a quality improvement. To the contrary, the incentives to invest in cost-reducing investments are over-optimal, as the damages it entails are not taken into account by the private manager.

The surplus[34] that is thus achieved is:

$$S_M = U_G + U_M = B0 + \beta(i_M) + c(e_M) - b(e_M) - C0 - e_M - i_M.$$

Equilibrium under public ownership

The public authority can still decide to provide public services in-house, *i.e.* a public employee manages the service. At first glance, this public manager has no incentive to invest as he does not benefit from the payoffs of new innovations. Yet, as proved in HSV [1997], he can force the public authority to renegotiate the contract since he may be irreplaceable for some innovations to be implemented. Indeed, if the public manager has an idea about how to reduce costs or increase quality then a fraction of the benefit of this idea requires his participation, but the remainder can be realized without him because some aspects of his ideas become public knowledge (at least within the organization).

In other words, the public authority can realize a fraction $0 \leq (1 - \lambda) \leq 1$ of the net social gains $-b(e) + c(e) + \beta(i)$ from innovating without the public manager by hiring a different manager and paying him at cost. In the case λ=1, the public employee is irreplaceable, and hence can command the same share of the total rents in the negotiation with a private manager.[35]

Renegotiation then takes over the fraction λ of both cost and quality innovations that the public authority cannot appropriate, *i.e.* $\lambda(\beta(i) + c(e) - b(e))$. The gains

[34]Recall that the choice of the price P0 is chosen to allocate this surplus between the parties according to their relative bargaining position at date 0. The formula for S_M reflects that the parties bargain efficiently ex post but there is a distortion in relationship-specific investments e and i.

[35]However, the scope for renegotiation has changed: since the public authority possesses the residual control rights, its approval is needed for both quality and cost-reducing innovations.

are split 50:50, and so the parties' payoffs are:

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

$$U_M = -C0 + P0 + \tfrac{\lambda}{2}(\beta(i) + c(e) - b(e)) - e - i$$

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

$$\frac{\lambda}{2}(\beta'(i_G)) = 1 \tag{1.3}$$

and

$$\frac{\lambda}{2}(c'(e_G) - b'(e_G)) = 1 \tag{1.4}$$

As $0 \leq \lambda \leq 1$, incentives are lower than in the other cases.
The surplus that is thus achieved is:

$$S_G = U_M + U_G = B0 + \beta(i_G) + c(e_G) - b(e_G) - C0 - e_G - i_G.$$

1.3.3 Analysis of the optimal ownership structures

The optimal ownership structure is the one generating the largest global surplus.[36] The propositions established by Hart, Shleifer, and Vishny [1997] are the following ones:

From first-order conditions and concavity of functions, e is inefficiently high and i is inefficiently low under private ownership, hence:

Proposition 1. $e_M > e^*$, $i_M < i^*$

Proof. See Hart, Shleifer, and Vishny [1997], p.1139 □

[36]Renegotiation under symmetric information ensures that all ownership structures yield an ex post efficient outcome. The only difference between ownership structures concerns the choice of the ex ante investments e and i.

In the same, i and e appear as inefficiently low under public ownership. Moreover, i is lower under public than under private ownership unless $\lambda = 1$, *i.e.* unless M is irreplaceable. It then follows:

Proposition 2. $e_G < e^*$, $i_G \leq i_M < i^*$

Proof. See Hart, Shleifer, and Vishny [1997], p.1139 □

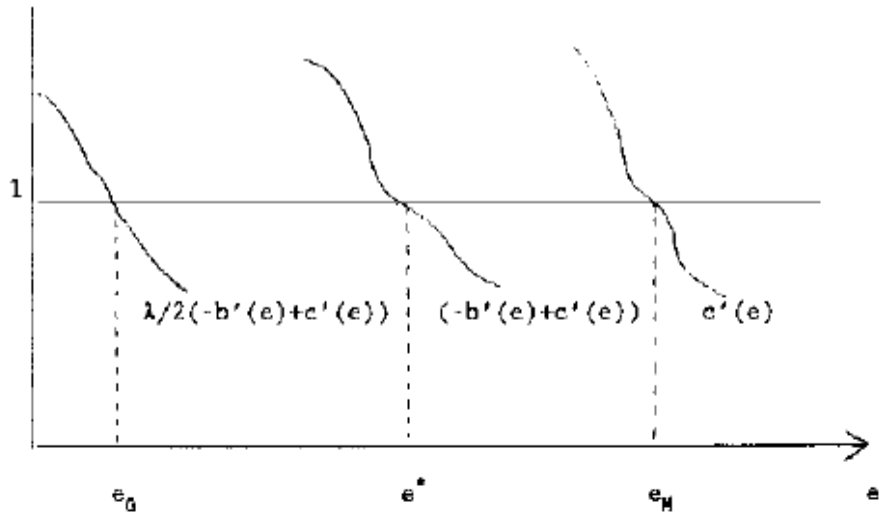
Public and private equilibriums are illustrated in Figure 1.1.

It then remains to determine under which conditions private or public ownership are preferable.

Proposition 3. *(1) Suppose that the function b(e) is replaced by $\theta b(e)$, where $\theta > 0$. Then for θ sufficiently small, private ownership is superior to public ownership. (2) Suppose that the function b(e) is replaced by $\theta b(e)$, and the function c(e) is replaced by $\phi c(e)$, where θ, $\phi > 0$. Then, for θ, ϕ sufficiently small and $\lambda < 1$, private ownership is superior to public ownership.*

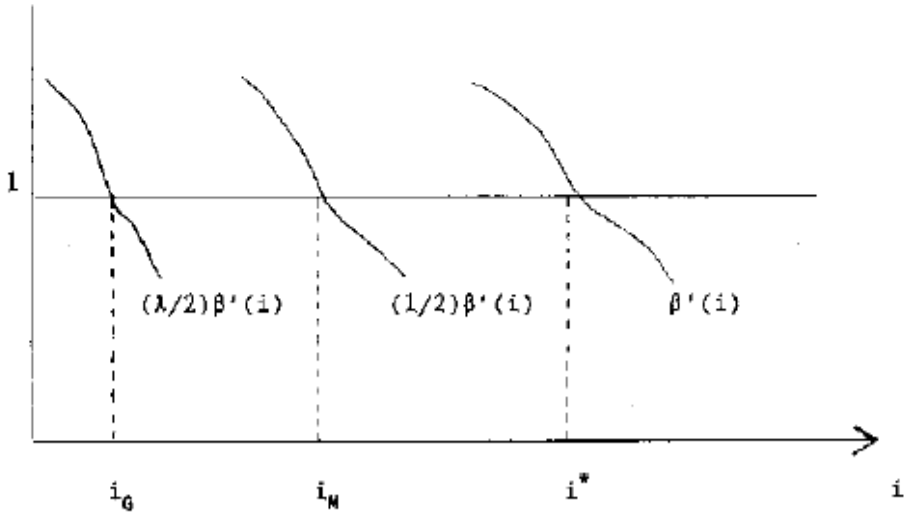
Proof. See Hart, Shleifer, and Vishny [1997], pp. 1141-1142. □

This means that private ownership is more efficient than public provision when the deterioration of quality from cost reduction is small, since the stronger incentives that a private contractor has to reduce costs and improve quality are both desirable.
Private ownership is also preferable when the opportunities for cost reduction (and hence the damage to quality as well) are small and the government employee has relative weak incentives (λ is small). Indeed, damaging cost reduction is unlikely to happen, and private management leads to stronger incentives in quality innovations.



Equilibrium Levels of e under Different

Ownership Structures



Equilibrium Levels of i under Different

Ownership Structures

Figure 1.1: Equilibrium levels in Hart, Shleifer, and Vishny [1997]

However, public provision appears as preferable in some cases.

Proposition 4. *(1) Suppose that b(e) ≡ c(e) - σd(e), where σ > 0. Then, for σ sufficiently small and λ sufficiently close to 1, public ownership is superior to private ownership.*
(2) Suppose that b(e) ≡ c(e) - σd(e), where σ > 0. Suppose also that the function β(i) is replaced by τβ(i), where τ > 0. Then for σ, τ sufficiently small, public ownership is superior to private ownership.

Proof. See Hart, Shleifer, and Vishny [1997], pp. 1142-1143.

□

In other words, public ownership is more likely to be efficient when cost reduction has large adverse effect on quality. This is all the more the case as quality innovations are likely to be unimportant, and public managers appear as irreplaceable ($\lambda \to 1$).
The last proposition established by Hart, Shleifer, and Vishny [1997] is about a cost/quality comparison between public and private ownership.

Proposition 5. *Costs (C0 - c(e)) are always lower under private ownership. Quality (B0 $-b(e) + \beta(i)$) may be higher or lower under private ownership*

Proposition 5 can be explained by the larger incentives to invest in cost-reducing innovations under private ownership. Incentives to ameliorate quality are also larger, but the final effect on social benefits depends on the adverse effect of cost reduction on quality, and the amount of investment done in this cost reduction.
The case where β is relatively small is close from the results obtained by Laffont and Tirole [1993] (chapter 4) who argued that higher powered incentives – which might be associated with private ownership – leads to both lower costs and quality. But the model of Hart, Shleifer, and Vishny [1997] shows that in some cases, private provision can lead both to higher quality and lower costs.

However, results have to be nuanced in two cases.

First, private operators may be dissuaded to invest in cost reduction when adverse effect on non-contractible quality is large, if consumers buy goods or services themselves and there is enough competition between suppliers that consumers have some choice. As summed up by Shleifer [1998], "choices between competitive suppliers radically weakens the case for government provision because it weakens the incentives for inefficient cost reduction, while keeping those for efficient cost and innovation strong".

Correlatively, when reputation plays an important role, private operators are less likely to reduce quality by cutting cost. The provision of schooling is a good case in point: as children and parents select schools, quality cannot be sacrificed by cutting cost since quality of education is the key argument in the ex post competition.

Moreover, results strongly depend on the assumption that the public authority acts on behalf of society and allow for him to be self-interested. However, as will be demonstrated in the following section, and as mentioned by Hart, Shleifer, and Vishny [1997] (see pages 1144-1147), corruption can take several forms, from patronage to campaign contributions or money extraction. These alternative characterizations of political behavior matter for the choice of the optimal delivery mode. Therefore, corruption can alternatively leads to an excessive tendency to privatize, or excessive in-house provision.

Let us now briefly recalled how Hart, Shleifer, and Vishny [1997] connect their propositions to observed management practices.

1.3.4 Illustrations

The main illustration given in Hart, Shleifer, and Vishny [1997] is that of management of prisons. In the United States, private prisons represent only 3 percent of the total prison population, but their cost per prisoner appears as 10% cheaper than public prisons, especially because of labor costs of public guards over pri-

vate guards.[37] In this service, quality seems quite "contractible": The American correctional association (ACA) edits 463 standards for adult correctional institutions covering such matters as administration and management of prisons (including personnel policies, staff training, and development bookkeeping, ...), physical plants (including building and safety codes, security, inmate housing, prison size, ...), operations (including rules and discipline, security procedures, inmates rights, ...), services (including inmate classification, food, hygiene, health care, social services,...) and inmate programs (work, education, recreation, visiting, ...). To get ACA accreditation, prisons should meet the 38 obligatory standards, and 90% of the nonmandatory standards.

However, some parameters, such as use of force and quality of personnel can hardly be specified in details through standards. As Hart, Shleifer, and Vishny [1997] report, "written policy, procedure, and practice restrict the use of physical force to instances of justifiable self-defense, protection of others, protection of property, and prevention of escapes, and then only as a last resort and in accordance with appropriate statutory authority (...) A separate but equally vague, mandatory standard governs the use of firearms."

As for quality of personnel, " correctional officers are required to receive 120 hours of training in their first years, and 40 hours in subsequent years. Little is said about the quality of the training or the quality of the officers (...) What is most interesting about these standards are how few there are, and how much discretion the contractor has in saving costs on personnel." (Hart, Shleifer, and Vishny [1997]:1151). Given such a lack of details about the use of force and the quality of personnel, prisons contracts appear as incomplete, and open the door to cost reduction with huge adverse effect on quality. For the authors, the opportunities for quality innovations are rather limited, and the consequences of quality deterioration caused by cost reduction can be important (so that b(e) and c(e) are comparable). As a consequence, and following proposition 4, public ownership seems more efficient than private management for prisons, especially in case of

[37]Private contractors do not pay the 15 percent wage premium for guards as in public structure, and hire lower quality workers.

dangerous prisoners.[38] Facts seem to valid such a theoretical proposition, since private management is mainly observed in prisons where violence problems are less serious, such as halfway houses or youth correctional facilities.

Some other examples illustrate the propositions derived from the model. For instance, adverse effects on quality due to cost reduction are rather weak in garbage collection, and there is a true ex post competition. This can justify why private operators perform better in this service (Donahue [1989])).

Private provision is also likely to be superior for weapons procurement: contracts can impose well-specified performance requirements that limit adverse effects of cost reduction on quality. In addition, quality innovations are important in weapons design, which makes private provision preferable, as pointed by Proposition 3.

As previously mentioned, schools can efficiently be provided by private managers, because of effective consumers'choices and ex post competition. Indeed, this significantly reduce the incentives to cut quality while cutting costs, as well as increase the incentives to innovate quality, hence the fact that competition between schools is associated with a higher quality of education.

This is not exactly the case for hospitals. Patients are not always able to assess the quality of health care they receive. Competition can then be questioned to the extent that it is hard for the consumers to say whether quality has been sacrificed to save costs or not, and to change suppliers in response to poor quality. Therefore, public provision proves to be more efficient than private management of hospitals.

Finally, police and armed forces cannot be privatized when one thinks to possible hold-ups caused by contractual incompleteness. For instance, private companies could threaten to use nuclear weapons against the country itself unless it receives a side-payment. In case of public control, the government can prevent a potential hold-up, for instance by firing generals suspected to be engaged in treason. If the service was privatized, the government would have to wait for the breach of the contract, which might be too late.

[38]This is confirmed by the fact that there is no real choice of consumers in this case, no ex post competition and no reputation-building. For details, see HSV [1997] pp. 1152 – 11154.

To sum up, the analysis of Hart, Shleifer, and Vishny [1997] allows to establish useful propositions about the opportunity to contract some services out, or to provide them in-house. The allocation of property rights plays a significant role in case of contractual incompleteness, and public provision seems to be preferable when non-contractible cost reductions have large deleterious effects on quality, and when quality innovations are unimportant.
This seminal work has raised many interests and has lead to fruitful extensions that come now under study.

1.4 Extensions and unanswered questions

1.4.1 Extensions of this work

As just shown, the work of Hart, Shleifer, and Vishny [1997] applies the incomplete contracting approach developed by Grossman and Hart [1986], and Hart and Moore [1990] to the question of organizational choices in public services. It allows to establish some propositions about the optimal organizational form of public services. However, many questions remain open, and some other works have proposed to discuss or extend their results, especially towards the "bundling" question. In this paragraph, we briefly mention some studies on PPPs inspired by the incomplete contract framework, and in connection with Hart, Shleifer, and Vishny [1997]. The goal is not to be exhaustive, nor to mention all works that extend the GHM approach, especially in case of private goods, but to focus on some theoretical developments about PPPs.[39]

[39]Moreover, many other studies explore some aspects of PPPs mentioned below in other theoretical perspectives (for instance, Bentz, Grout, and Halonen [2003] or Martimort and Pouyet [2006] for the bundling question).

1.4.1.1 Discussion about the results

Several comments about the results of the previous model are to be found in Shleifer [1998]. First, public provision can be recommended when the government does not know exactly what it wants, since it avoid public authorities to pay a contractor for changing the terms. This may justify nationalizations of industries during wars, or public provision of national defense even in peacetime. Secondly, the author discusses the conclusion of Hart, Shleifer, and Vishny [1997]: Non-for-profit organizations attenuate the incentives for quality-reducing cost-reduction, which leads to conclude that public provision is not necessarily the best option when cost reduction entails strong adverse effects on quality.
Role of non-governmental organizations is also discussed by Besley and Ghatak [2001]. The authors are inspired by the GHM approach and are willing to study ownership issues for public goods, and responsibilities of the state and the voluntary sector in providing inputs or finance to public projects. To this end, they propose a model of a government and a NGO, "each of whom can invest in a project that will increase the value of its service, which is a public good to the two parties". Because of non-contractible investments, hold-up problems appear, and results show that ownership should lie with the party that values more highly the benefit that the public good generates, whatever the importance of the investments or other aspects of the production technology.

1.4.1.2 The question of bundling/unbundling: Hart [2003]

While Hart, Shleifer, and Vishny [1997] focus on privatization and nationalization, the model of Hart [2003] deals with public-private partnerships (PPPs). For the authors, PPPs are structures allowing to bundle facility construction and service provision, "*i.e.* , in the case of a prison, the government contracts with a private party – henceforth known as the "builder" – to build and run the prison (the builder may subcontract with someone else to run the prison). In contrast, under

"conventional" provision, the government contracts with the builder to build the prison and then later on with another (private) party to run it" (Hart [2003]:C72). A PPP contract specifies the basic characteristics of the service provided, whereas in the case of conventional provision, the contract mainly focuses on characteristics of the infrastructure. In this contribution, investments are considered as never verifiable, so that renegotiation never takes place.[40] The builder can make two types of investments that could not be contracted on ex ante: investment of type i that is a productive investment that makes the prison more attractive and easier to run (*i.e.* enhance quality and reduce operating costs of the facility), and investment e that is an unproductive investment that reduces total costs and quality.
Results show that under unbundling, there is no incentive to invest in both types of investments: the right amount of the unproductive investment e is reached, but the level of i is under-optimal. Under bundling, both incentives are higher, *i.e.* over optimal for the unproductive investment, and higher but still under optimal for the investment of type i. As a consequence, unbundling is preferable if the quality of the building can be well specified, whereas the quality of the service cannot be. In contrast, " PPP is good if the quality of the service can be well specified in the initial contract (...), whereas the quality of the building cannot be. Under these conditions, underinvestment in i may be a serious issue, while overinvestment in e under PPP is not" (Hart [2003]: C74). With the growing success of PPPs allowing to bundle both construction and management, some other theoretical works have explored the question.

1.4.1.3 Bundling/Unbundling, Externalities and Residual value: Bennett and Iossa [2006]

The contribution of Bennett and Iossa [2006] also establishes some propositions about opportunities to bundle construction and management. The authors focus on *Private Finance Initiative* (PFI) that allow to bundle the design, building,

[40] As a consequence, timing of the game is as follows: the facility is built between dates 0 and 1, and and the prison is operated between dates 1 and 2.

finance, and operation of a project that is contracted out to a consortium of private firms.[41] In this case, the government leaves the consortium with control rights over how to deliver the service, and what types of innovative approaches to implement, provided the basic standards specified by the government are respected. At the end of the contract, assets may theoretically go back either to the consortium or to the public authority. In contrast, under traditional procurement, ownership of the assets remain public, and the different stages of an infrastructure project are contracted out separately to different private firms, with an input specification approach. As a consequence, the government contracts with two different firms, while a single contract is written in case of a PFI. The general framework is that of Hart, Shleifer, and Vishny [1997], with innovations that are non contractible ex ante but verifiable ex post, and allow to ameliorate the service delivery or reduce its costs. Yet, in departure from previous works, such innovations have not only consequences on social benefits and operational costs, but also on residual values of the facility. During the building stage, innovations aiming to increase social benefits from a project can either reduce cost at the management stage (*i.e.* the externality is positive), or increase these costs (*i.e.* the externality is negative). Three stages to the project are to be noted: the building of the facility, the management of public service provision using the facility, and finally what happens to ownership at the end of the contract period.

As a result, bundling allows to internalize externalities, and is then preferable if these externalities are positive. Whether public or private provision is optimal depends on relative marginal effects of investments made at the beginning of the building stage and of the management stage on social benefits, costs of operating the facility and residual values. [42]

[41] The consortium includes a construction company and a facility management company.

[42] Indeed, in case of PFI (ownership by the consortium of private firms), impact of the building innovation on social benefits is not taken into account. In contrast, in case of public ownership, the consortium shares all benefits from the innovations with the government, and loses half of the effects of the innovation on residual value and of the positive externality in the management stage, while it gains half of the effects on social benefits.
Moreover, when the effects of investments in management innovation on social benefits dominate those on costs, public ownership with bundling is preferred to private ownership with bundling.

With a (rather weak) negative externality, unbundling is preferable. The effect of the negative externality is ignored if the firm that builds the facility is the owner, and is partially internalized through a bargaining if the firm that manages the service owns the facility, which diminishes incentives to invest at the building stage. Similarly, the negative externality is internalized when the consortium owns the facility. Such an internalization occurs under public ownership only when the firms are in a consortium. Therefore, public ownership is preferable if the marginal effect of innovations (at the building stage) on residual value is inferior to that on social benefit. In the reverse case, ownership by the firm that builds the facility is more efficient. However, the longer the service is to be provided, the relative case for public, rather than private, ownership improves.
To sum up, "PFI is more likely to be preferred (a) the more positive (or less negative) is the externality, (b) the stronger the effects that innovations in building and management have on residual market value of facilities; and (c) the weaker the effect that innovations have on the benefit from provision of the public service. With a weak negative externality, if the period over which the service is to be provided is lengthened, public provision is favored relative to private provision" (Bennett and Iossa [2006]:2158-2159).

Such extensions from the work of Hart, Shleifer, and Vishny [1997] allow to better understand the growing phenomenon of public-private agreements. Yet, many questions remain open, and some of them come now under study.

1.4.2 Unanswered questions

The incomplete contracting approach has lead to fruitful analyzes that establish propositions on the costs and benefits of public and private provision of services. However, as shown in subsection 1.2. this theoretical framework has been first dedicated to study allocation of property rights between two private entities. Even if similarities are strong, some particularities of public-private agreements are over-

looked and deserve some attention to better capture ins-and-outs of organizational structures of public services.[43] Following subsections show to what extent observed practices lead to put further the analysis.[44]

1.4.2.1 A large continuum of public-private contracts

First, questions raised by public decision makers are seldom about choices between entirely public or entirely private structures. In many countries around the world, legislators have created various contractual tools allowing to include private sector participation at various degrees, as illustrated in figure 1.3.
Therefore, the very term "public-private partnerships" is misleading, since it gathers a great variety of organizational structures (European Parliament [2006]).

The Green Paper of the European commission in 2004 highlights this problem: "The term public-private partnership ("PPP") is not defined at Community level. In general, the term refers to forms of cooperation between public authorities and the world of business which aim to ensure the funding, construction, renovation, management or maintenance of an infrastructure or the provision of a service" (European Commission [2004a]). There is then a need to precisely characterize the various forms of public-private partnerships, to better understand them. Private firms can be enrolled in the management of public services for a functional support, or for the whole provision of services, with or without having in charge investments.[45] As a result, contractual arrangements differ according to the im-

[43] As summed up by Hart [2003], some modifications to the general framework of ICT have been made. More precisely, two main differences are to be noted in the above models: first, "only one party invests, but he makes two kinds of investments. Second, the contract between the government and the prison provider plays a crucial role: it defines the extent to which quality-shading can occur. In contrast, in the standard property rights model, long-term contracts are assumed to be sufficiently incomplete to be useless." However, adaptations that are suggested in this subsection are based on the institutional framework in which contracts between public authorities and private firms.

[44] This dissertation focuses on specific contracts of public-private partnerships that allow to manage pubic services. Few will be mentioned about the building of infrastructures, which eliminates the question of bundling/unbundling, that has been already explored in the contributions mentioned above.

[45] A description of these various types of agreements is to be found in chapter 2.

portance of the private firm's involvement in the service.

The graph below shows how private participation varies with the type of contract. It also introduces a difference between PPPs to build new facilities, and PPPs for existing services and facilities.

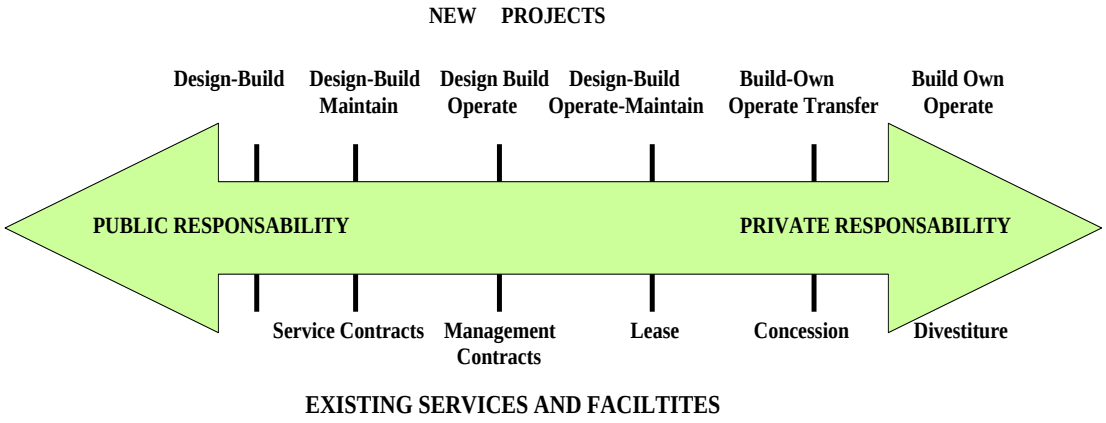


Figure 1.2: Public-private partnerships for new and existing projects (Deloitte [2006])

Our dissertation focuses on the contractual arrangements concluded for the management of existing facilities. We focus on local public services as described in section 1.2, and do not deal with specific problems of construction, design or financing of new infrastructures, such as bridges, roads, or airports. In local public services, public assets are generally provided to the private operator, but the transfer of responsibilities varies with the type of contract that is implemented.

Figure 1.3 proposes another illustration of the different types of public-private partnerships for local public services in France. In a "gérance" contract, the firm manages the service and is paid a fixed amount by the public authority, while in the "intermediary management" contract (in French, "régie intéressée"), a part of the firm's revenues depends on its performances. As for lease contracts ("affermage"), the firm exploits a public infrastructure, and directly collects the customer's bill. The same principle applies to concession contracts, but the firm has first to built the infrastructure. The investments made by the firm in a lease or concession

contract are transferred to the public authority at the end of the relationship. In all the described contractual arrangements, ownership of the assets remain public, but the responsibilities and the rights of the private partner differ. Public decision-makers have then to choose between these various alternatives, and the degree of private involvement they want.

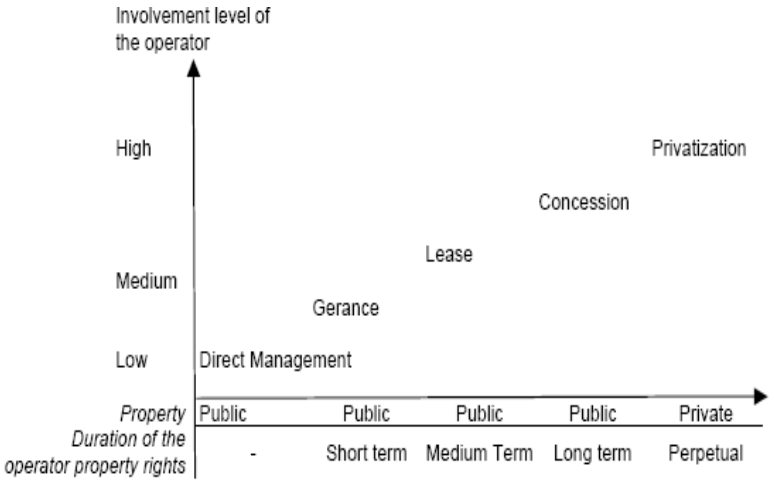


Figure 1.3: Contractual options for local public services in France (Huet and Saussier [2003])

More generally, advantages of private participation in public projects raise little discussion, but the ways contracts have to be written, whose functions have to be delegated and how responsibilities have to be shared, appear as the core of the debate (Resource Book on PPP Case Studies (European Commission [2004b], European Commission [2003b]). As a consequence, public authorities are rather wondering *how* to build efficient PPPS than *whether* private participation has a role to play. There is then a need to clarify the various interventions of private firms, to help public authorities to find the best contractual arrangement to provide services.

To reach this goal, the way incomplete contract theory – especially Hart, Shleifer, and Vishny [1997] – considers private provision has to be questioned. Indeed, private firms seldom own the assets as the graph 1.3 illustrates, but they may have

the right to decide whose innovations are to be implemented, and may – or not– directly collect fees from users, and thus have residual benefits. For instance, this is the case of concession contracts. Therefore, the variety and complexity of the different types of PPP questions the very notion of "residual control rights", as they have been described in subsection 1.2 of this chapter. Indeed, in PPPs, the owner of the assets does not necessarily benefit from the residual "decision rights" and has not necessarily the residual benefits, while ownership has been previously defined as the vector of residual control rights. Such questions and attempts of answers will be explored in chapter 2.
If legal frameworks allow various types of PPPs to be implemented, they may also impose other constraints as suggested in the following paragraph.

1.4.2.2 Public authority as a special contractor

As described in the second section of this chapter, ICT was first elaborated to study interfirm agreements, but seems quite appropriate to evaluate organizational choice in public services. Yet, relationships between two private entities are not governed by the same principles as relationships between public and private partners. Among these principles, the legal framework plays a key role (European Commission [2003b, 2004b], World Bank [2006a]). Impacts of legal regimes on economic efficiency in the private sphere have already been demonstrated, especially through works by La Porta (La Porta, Lopez de Silanes, Shleifer, and Vishny [1997, 1998, 1999]). These papers show that legal regimes are not neutral and have strong consequences on investor protection, corporate valuation, and capital market.
Can such results be extended to public-private transactions? Does the legislative framework influence efficiency of organizational choices of public services in a similar way?

A brief observation shows that in many countries, legal rules governing private

agreements and public-private ones differ (Auby [1997], European Commission [2004a], World Bank [2006a]). Moreover, influence of legal framework is regularly mentioned: "Contract law provides considerable flexibility, allowing the government to draft a document that is legally binding and that fits particular circumstances and objectives. But many countries have legal codes that govern private participation. These codes can have a major influence on the legal architecture of the arrangement" (World Bank [2006a]:154). "Political commitment and long-term engagement from government, supported by an appropriate legal framework, is essential to create favorable conditions for PPPs" (United Nations Economic and Social Council [2005]:16).

The correlation between successful public-private agreements and an effective legislative and control framework is reiterated both at the European level (European Commission [2003b]), and at the national level (Association des Maires de France [2004]).

What are then the main features of public law governing public-private transactions? Public contractors are usually subject to regimes of administrative law – especially in civil law countries but not exclusively – or to special laws or statutes. They may thus benefit from extra powers, such as rights of unilateral modifications or cancelations of contracts (Auby, Kirat, Marty, and Vidal [2005]). This has strong consequences on relationships and bargaining conditions, and none of the works presented in the previous sections discusses this question. To evaluate the consequences of such legal powers on contractual efficiency, some refinements of the GHM approach on the bargaining conditions have to be introduced. This will allow to determine whether specific powers of public authorities have to be fostered or not. Chapter 3 gives some indications about how to introduce such specific powers of public authorities in an incomplete contract model, and consequences on optimal organizational choices.

1.4.2.3 Horizontal integration and relational contracts

If we focus on public-private contracts in France, another important feature of the legal framework is to give public authorities all the means to create competition among the private firms. A series of laws and European communications[46] has then be implemented to foster competition, and encourage firms to propose offers. However, observations show that the same private operators are regularly chosen. It is then not seldom that a public authority contracts with the same private group to manage services such as water treatment, water collection, waste management or even urban transport, as shown in figure 1.4.

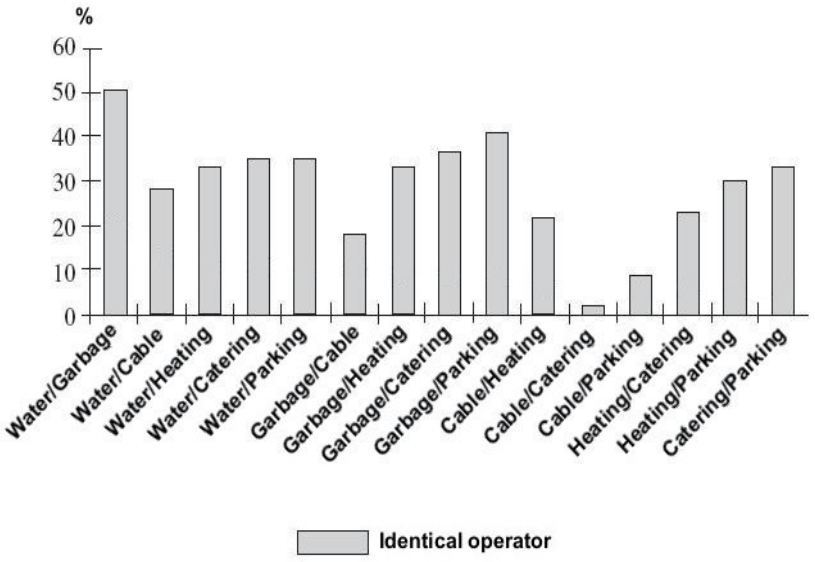


Figure 1.4: Concentration rates in local public services in France (Gence-Creux [2001]).

This graph illustrates the global trend towards such an horizontal integration of services. On the horizontal axis, we find couples of local public services, and on the vertical axis, the percentage of French municipalities that contract out these services to a same private operator in 2000. How then to explain such a paradox?

[46]Communications of 1996, 2000, 2001, article 86 (2) of the Treaty, and Green Papers of the European Commission (2003, 2004). Details are given in chapter 4.

On the one hand, legislators give French public authorities all the means to create competition, and on the other hand, observations show that these authorities prefer to concentrate services rather than take advantage of the diversity of offer. One part of the answer could lie in the fact that contracts are not exclusively economic and legal partnerships, but have also relational aspects.
Following the recent developments on relational contracting (Baker, Gibbons, and Murphy [2002], Baker, Gibbons, and Murphy [2004]), one could think that parties tacitly agree about the management of unverifiable parameters. The more contracts partners have together, the more interest they have to cooperate, and to respect their informal dealings. To rigorously analysis this intuition, there is a need to enlarge the work of Hart, Shleifer, and Vishny [1997] towards a dynamic perspective. For instance, the public authority may ask the private manager to do optimal unverifiable efforts, and gives a bonus in compensation. He can also threaten the partner not to be renew at next periods in case of deviation. The problem is that such implicit agreements cannot be enforced by courts. To become self-enforced, each partner has to prefer the "cooperation strategy", *i.e.* the respect of his informal dealing, than the deviation strategy, *i.e.* cheating. This is the case when the payoff stream from the cooperation is higher than the payoff stream under deviation. Since parties have concern for future business, they may prefer to cooperate than to deviate. As a result, one has to determine the right level of bonus that makes cooperation sustainable. A lower level of bonus is expected in case of horizontal integration of contracts, as the sanction is higher in case of deviation: it can bear on all the contracts parties share. Chapter 4 explores such an idea, and proposes a theoretical model, based on both incomplete contract theory and relational contracting. An econometric analysis on the French Water sector illustrates this analysis, and allows to see whether the results are consistent with observations.

To sum up, this subsection has mentioned three features of PPPs that suggest some technical refinements of the GHM approach, namely (1) the existence of various contracts in which rights are allocated differently to private firms, (2) the legal

power public authorities may have to protect public interest in contracts of PPPs, (3) the "paradoxical" concentration of services while everything is done to create competition among offers. Each of the following chapter of this dissertation will explore one of these observations.

1.5 Conclusion of chapter 1

This dissertation deals with organizational structures in the management of local public services. In this first chapter, the goal was to show why some refinements of the GHM approach are needed to better apprehend how these services are managed.

First, it has been shown that ICT proposes a rigorous analysis of the costs and benefits of integration and independent contracting (subsection 1.2.1). This theoretical framework postulates contractual incompleteness because of the incapacity of parties to precise all contingencies in a way that can be verified by outsiders, such as investments in human capital. The different allocation of property rights leads to various distributions of "residual control rights". Therefore, parties to a transaction have different ex post bargaining power, and then different shares of the ex post surplus, which leads to different incentives to invest in what is non contractible. The efficient allocation of property rights (*i.e.* the decision of integration) is the one which leads to the highest global surplus.

After this recall, a parallel has been drawn with the problem local public authorities face (subsection 1.2.2). In many cases, they can decide to contract out public services, *i.e.* "to buy them", or to provide them in-house, *i.e.* to "make" them. Moreover, there are several goods reasons to believe that contracts are incomplete as suggested in the GHM approach. Indeed, making all contingencies verifiable by an outsider is a difficult task, and managers are expected to find innovative way to increase quality and reduce costs of public services. All this helps to understand why the ICT has been regularly chosen to study organizational problems of public services. It allows to evaluate the costs and benefits of the allocation of

property rights between public and private partners, and the incentives to invest in what is non-contractible in each type of allocation. As a consequence, the seminal work of Hart, Shleifer, and Vishny [1997] uses this framework to determine the conditions under which public provision is to be preferred to private provision, as recalled in section 1.3. This contribution has been the starting point of various works, allowing to explore some other aspects of public-private cooperation. Some of these works are mentioned in section 1.4. Yet, it seems that observations of contracts between public and private entities raise some other unanswered questions. Three of them draw our attention: (1) there is a need to distinguish the various contracts, whereby a private firm can be involved in the management of a public service. Indeed, public authorities do not decide between public or private provision, but between a continuum of contracts, in which the degree of private participation varies. This calls for a refinement of the notion of "residual control rights", as their attributes are differently allocated with the type of contract that is chosen. Moreover (2), the impacts of the specific legal framework of PPPs deserves some attention, to understand to what extent it influences contractual efficiency. Contracts of public-private partnerships are above all legal tools, and may be governed by different rules than those of private business. This suggests a revision of the conditions under which the Nash bargaining process takes place. Finally (3), it is quite surprising to observe that public authorities often choose the same private operator for different services, while everything is done to create competition and a large diversity of offer. It remains to determine why horizontal integration represents an attractive option for public decision-makers.

To give parts of answers to these questions, it seems that some refinements to the GHM approach have to be introduced, as detailed in the last subsection. Each following chapter of this dissertation will explore one of these aspects.

Chapter 2

Public-private partnerships and the split of property rights*

"While there may also have been initial resistance to PPPs on concerns about privatisation, PPPs do not necessarily involve the private sector taking partial or total ownership of the projects."

Barrett [1999], *European Investment Bank.*

2.1 Introduction

The study of property rights is relatively recent in the economic analysis, while it has drawn much more interest from legal scholars, and has raised a vast amount of

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literature in this field. For instance, the French Code [1804] devotes two of its three books to property.[1] German, Spanish, Italian, or Dutch Civil codes devote at least one Book to property, with many other rules about property that can be found in other books (Mattei [1988]). This illustrates how complex definition, acquisition, and transfer of property are, and the need of a strong coherent framework.

This sharply contrasts with the simple definition of "property rights" used in the Grossman, Hart and Moore (GHM) approach. As recalled in chapter 1, this theoretical framework assumes that ownership conveys residual control and benefits. More precisely, the rights for the owner to make ex post decisions that were not contracted on ex ante is a clear assumption of this approach, while considering the owner as the residual claimant has been much more discussed. Indeed, Hart [1995] admits that "residual income and residual control do not have to be bundled together on a one-to-one basis", but highlights that in many cases they "should often go together" (p.64).

Contrary to this association, legal scholars recognize that ownership is composed of different rights, but they regularly mention that these rights are not necessarily hold by the same person.[2] For instance, the owner can delegate the right to perceive the benefits from the exploitation of an asset.

This distinction has been surprisingly few explored by the Grossman, Hart and Moore approach. However, when one wants to study contracts between public and private entities, observations show that the rights composing property may be allocated between different partners. This partly explains the different "types of PPP ranging from the least sophisticated modes of private sector involvement to the most complex forms of PPP implying greater risk transfers from the public to the private party" (European Parliament [2006]). Indeed, "public-private partnerships" is a misleading word to the extent that it covers a wide range of contractual forms, that attribute more or less decision rights, responsibilities, risks, and rights to the revenue to the private partner. In many cases, assets are owned by the public sector and go back to him at the end of the contract, but some kinds of

[1] Book 2 on property, Book 3 on the different ways of acquiring property.

[2] For the French case, see Articles 544, 577 and 578 of the French Civil Code.

decisions or benefits can be transferred to a private manager during the contract execution. This is especially true for the management of existing facilities. Thus, these observations raise some questions about how "property rights" are considered in the GHM approach. Indeed, many works deal with bipolar cases, *i.e.* either full privatization or full public provision, as in the model of Hart, Shleifer, and Vishny [1997], recalled in section 1.3 of chapter 1. How then to explain that the various types of public-private partnerships are not included in the analysis of the "proper scope of government" ? In the same way, the contribution of Boycko, Shleifer, and Vishny [1996] suggests an alternative between full private and full public management: privatization is regarded as a reallocation of control rights over employment from politicians to managers and an increase in cash flow ownership of managers and private investors. Ownership, rights to make residual decisions, and to get residual benefits are bundled, and allocated either to a private manager or to a public manager. Therefore, works that adopt the GHM approach cannot integrate organizational structures that dissociate residual rights to decide and to get residual benefits from ownership, which seem to exclude the various contracts of public-private partnerships.

Therefore, to better apprehend such contracts, this chapter proposes to introduce a technical refinement to the GHM approach that allows to separate the various rights linked to ownership. By distinguishing ownership of the facilities, rights to make ex post residual decisions and to get residual benefits, we propose to take further the analysis of Hart, Shleifer, and Vishny [1997].
More precisely, in departure from their work, we explore here the separation of these rights, and consider that an agent is not necessarily the holder of residual decision and payoff rights over the assets he owns.[3] For instance, assets may remain property of- and are transferred back to- the state at the end of the contract but, the rights to decide over these assets may be transferred to a private manager

[3]Such a distinction is also present in Baker, Gibbons, and Murphy [2004] and Gibbons [2005] that introduce the notion of "alienable" assets. Yet, their theoretical framework differs from the one presenting in this paper on several points, especially because of the absence of renegotiation mentioned in their works.

during the execution of the contract, as well as the right to keep the users' fees, and then gets residual benefits. This describes *concession contracts* for instance. In contrast, *lease contracts* allow to transfer payoff rights to a private party that keeps fees collected from users but decisions about major investments in the infrastructure are made by the public authority that remains owner of the assets. As for *management contracts*, they transfer the management of a utility to a private operator. With price cap clauses, the manager receives a fixed revenue and supports operational costs, while in a cost plus system, he is reimbursed from his operational costs.

Contrary to the GHM approach, all this shows that ownership is no longer sufficient to attribute full control over all aspects that have not been explicitly given away by contract. To implement new investments, what matters is the agreement of the holder of the decision rights, while the holder of the payoff rights gets residual benefits.

To sum up, the originality of our approach compared to the property-rights literature is to separate the right to make residual decisions and the right to receive residual benefits from ownership. But in accordance with GHM, we assume that renegotiation between parties can occur to achieve ex post efficiency. This assumption is supported by works demonstrating the importance of renegotiations in public-private contracts (Guasch, Laffont, and Straub [2006]). Consequently, the implementation of innovations needs the agreement of the holder of the decision rights, but this can be reached through renegotiation of the terms of the contract. *Therefore, the goal of this chapter is to propose a theoretical refinement mixing the split of property rights and pareto-improving renegotiations due to contractual incompleteness, in order to better apprehend observed public-private partnerships. We then wonder whether the results obtained in the seminal work of Hart, Shleifer, and Vishny [1997] about public and private provision of public services still apply.* In other words, are public services still to be provided in-house when cost-reducing investments induce strong adverse effects on quality and innovation is relatively unimportant?

To reach this goal, the following section of this chapter proposes to characterize the various organizational forms in which private partners can be involved in the management of existing facilities. This highlights why the notion of ownership developed by the GHM approach seems maladapted to have a full understanding of public-private partnerships. It follows a proposition to model the separation of the various rights composing property in section 2.2. More precisely, we consider that the provider of the service can invest his time to improve the quality of the service or to reduce its cost. As in HSV [1997], the cost reduction has an adverse effect on quality and neither innovation is contractible ex ante. We then show how the distinction between ownership, decision and payoff rights modifies results obtained by HSV [1997]. Residual control rights, that gather these different concepts, appear indeed as insufficient to apprehend private involvement in public services' management. It does not allow to go further than the dichotomy private vs. public ownership, saying no word about the large continuum of contracts, from full public to full private management, that makes private involvement a much more complex thing that the distinction between the "private solution" and the "public" one. Finally, the last section of this chapter comments some statistics in the lens of the propositions derived from the model.

Results of this chapter are the following ones: (1) it is shown that public-private partnerships represent various allocations of rights between public and private partners. This suggests some maladaptation of the definition of "ownership" described in the GHM approach (2), as the owner is not automatically the holder of the residual decision and payoff rights. As a consequence, the model proposed in section 2.3 proposes to separate such rights from ownership. It is demonstrated that, (3) contrary to the conclusions of HSV [1997], there is always a degree of private involvement that allows to outperform public provision of services for services whose marginal gain from cost reduction is higher than the marginal adverse effect caused on quality.

2.2 The various types of public-private partnerships

The growing intervention of private firms in the management of local public services rarely means full privatization. Public-private partnerships refer to contracts, thanks to which a public manager may be called upon to provide one or more functions, such as design, financing, construction, ownership, operation, maintenance and revenue collection. This leads to the establishment of more and more complex contracts, sharing differently rights and duties among public and private parties. As briefly mentioned in chapter 1, the following figure proposes to range these contracts, according to the types of infrastructure they allow to manage (existing facilities or new projects), and to the share of responsibility between public and private partners.

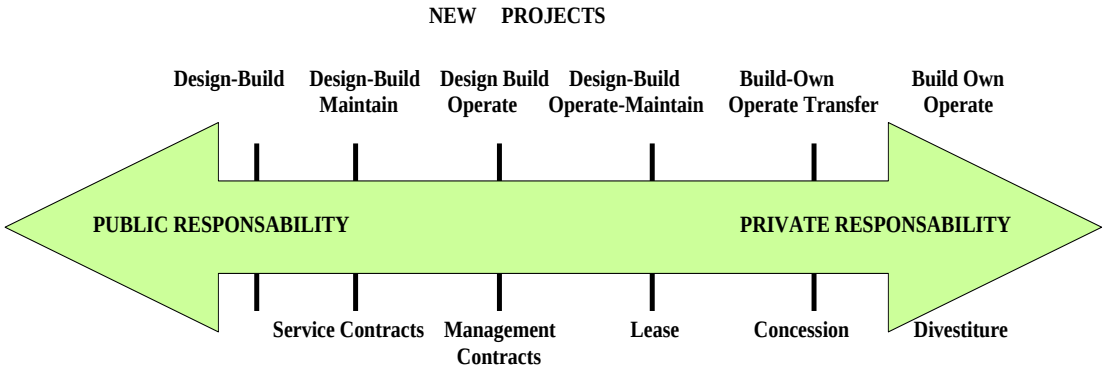


Figure 2.1: Public-private partnerships for new and existing projects (Deloitte [2006])

However, Hart, Shleifer, and Vishny [1997] in their study on the proper scope of government focus on bipolar cases, *i.e.* either public or private provision. As they put it, "one possibility is to contract out the provision of this good, e.g., the government can write a contract with a private company to run a prison for five years. A second possibility is to provide the good "in-house", e.g., the government can arrange for public employees to run the prison. The model is based on the idea that the crucial distinction between these arrangements concerns who has

the residual rights of control over the non-human assets to provide the service" (p. 1132). Thus, the various types of public-private partnerships are not included in their work. This mainly comes from the definition of property rights of the GHM approach, that seems rather maladapted for the study of public-private partnerships. In this section, we first recall this approach and then explain why the study of public-private partnerships calls for its refinement.

2.2.1 Ownership and contracts in the GHM approach

As mentioned in the first chapter, in the GHM approach, ownership allows to complete contracts, as it conveys residual control rights, *i.e.* rights to decide about missing usages.[4] There is then no distinction between ownership and control (Grossman and Hart [1986]). Such a view of ownership is explained to be consistent with the notion adopted by lawyers. Grossman and Hart [1986] (footnote 2, p.694) justifies such a viewpoint by referring to Richard Posner and quoting Holmes [1881]:

> "What are the rights of ownership? They are substantially the same as those incident to possession. Within the limits prescribed by policy, the owner is allowed to exercise his natural powers over the subject-matter uninterfered with, and is more or less protected in excluding other people from such interference. The owner is allowed to exclude all, and is accountable to no one."

Associating ownership to rights to decide over assets is not exclusive to the common law tradition. For instance, article 544 of the French Civil Code states that "Property is the right to use and control things in the most absolute manner provided this use and control are not prohibited by the law". This seems to justify

[4] Until the GHM approach, defining ownership by control was not so obvious. For instance, in Demsetz [1967], ownership and control are distinguished.

why ownership may be considered as holding residual control rights over an asset, *i.e.* as the right to decide all usages of the asset in any way not inconsistent with a prior contract, custom, law.

Therefore, as emphasized by Hart and Moore [1990] (p.1121, footnote3), the property rights approach " takes the point of view that the possession of control rights is crucial for the integration decision. That is, if firm 1 wants to acquire part of firm 2's (verifiable) profit stream, it can always do this by contract. Firm 1 needs to integrate only if it wants to acquire control over firm 2's assets." Such a statement also calls for a precision about ownership and residual benefits.

Profit-sharing contracts are indeed possible when profits are verifiable. However, if they are not verifiable, and not initially defined in a contract, their attribution is much more difficult. Therefore, has the owner to be considered as the residual claimant?

In some joint ventures, different shares with different voting rights can be observed, which is not consistent with this association. Yet, chapter 3 of Hart [1995] exposes the main reasons why income and residual control often go together. First, in case of separation, it may create an hold up problem. Indeed, income and control rights are highly complementary, so it makes sense to allocate them together: if the holder of control rights does not have residual income, then he has little incentives to find an idea or to do some efforts to raise the gains of someone else.

Second, it may not be possible to measure all aspects of an asset's return stream: there may be short term income and long term income, *i.e.* changes in the asset's value. Giving incentives to a worker with attribution of a short term income, may lead to a degradation of long term income. It is then more efficient to bundle control and income.

Third, it is not always feasible to separate residual income and residual control rights. Unbundling may even lead to some inefficiencies in the market for corporate control (chapter 8, Hart [1995]): When bargaining is impossible because of large numbers, and shareholders face free-rider and collective action problems, the linking of voting rights and income rights is optimal. Thus, "one share- one vote" represents the optimal choice of security-voting structure, and it seems consistent

to bundle ownership, income right and control right to study large companies.

It then remains to determine whether this bundling is relevant when studying public-private partnerships in the management of public services, by giving some precisions about these contractual arrangements.

2.2.2 Main PPP schemes

Establishing a clear typology of public-private agreements is a difficult task as many variants and denominations exist in each country. Yet, some broad categories of contracts can be distinguished. This subsection contains a short overview of the main types of PPP to manage existing facilities that are owned by the public party, namely service contracts, management contracts, lease and concession contracts. The goal is not to be exhaustive, but to show that private participation can be very different from one contractual relationships to another.

2.2.2.1 Service Contracts

Service contracts are agreements between a public authority and a private firm, for simple, short-term operational requirements. "It is a very limited form of PPP, where the private party procures, operates and maintains an asset for a short period of time. Management and investment responsibilities remain with the public sector, which bears the financial risk and residual value risk, but benefits from the technical expertise of the private operator and obtains some cost savings, without transferring control over the quality of outputs" (European Parliament [2006]). These tasks could include areas such as toll collection, the installation, maintenance and reading of meters in the water sector, waste collection or the provision and maintenance of vehicles or other technical systems (European Commission [2003b]).

2.2.2.2 Management contracts

Management contracts transfer responsibility for the operation and maintenance of government-owned businesses to the private sector.[5] These agreements involve both service and management aspects and are often useful in encouraging enhanced efficiencies and technological sophistication. Management contracts tend to be short term, but often extend for longer periods than service agreements. Nonetheless, responsibility for **investment decisions remains with the public authority** (European Commission [2003b]).

Powers of the operator over employment change with the type of arrangements that is signed between parties (World Bank [2006a]). The simplest consists in paying a private firm a fixed fee for performing managerial tasks. More sophisticated management contracts can introduce greater incentives for efficiency, by defining performance targets and basing remuneration at least in part on their fulfilment. But it is often difficult to find appropriate indicators, directly connected to the private operator's performance.[6] Contrary to this price-cap system where the private operator receives a pre-specified price for completing the project, other management contract have cost plus schemes: the public authority does not specify a price, but rather reimburses the contractor for costs plus a stipulated fee.[7] Studies on the management of urban transport (Gagnepain and Ivaldi [2002], Yvrande-Billon and Roy [2007]) mention both types of remuneration for private operators in this sector. Over the period 1995-2002, around 20 % of the French urban transport networks were managed through contracts with cost plus schemes (Yvrande-Billon

[5] As mentioned earlier, denominations can change from one country to another. For instance, principles of management contracts are close from those of *Régie Intéressée* (Intermediary Management) in France.

[6] An example about water sector is given by the World Bank (World Bank [1997]): "unaccounted-for water is a good indicator of a system's efficiency, but it can be hard to measure-especially if metering is inadequate-making it difficult to establish a meaningful base for evaluating the operator's performance. And the operator's ability to reduce unaccounted-for water may depend not only on its efforts to reduce leaks but also on the resources that the government makes available for rehabilitating pipelines. There is often a fine dividing line between operations and maintenance expenditures, for which the private operator is responsible, and capital investment, for which the government is responsible-and both will affect the operator's performance."

[7] See Bajari and Tadelis [2001] for a comparison between price cap and cost plus schemes.

and Roy [2007]), *i.e.* the remuneration of the manager of the transport was independent from his achievements, while 78% of contracts were variants of fixed-price contracts. Cost plus (or "rate-of-return") and price cap schemes are also to be found in the management of water utilities (See Aubert and Reynaud [2005] about Water Utilitiese in Wisconsin).

2.2.2.3 Lease contracts

The term "affermage-lease" is used here for a class of arrangements under which an operator is responsible for operating and maintaining the business, but not for financing investment. The difference between contracts of "affermage" and leases is technical: "under a lease, the operator retains revenue collected from customers and makes a specified lease payment to the contracting authority, which the authority can use to pay for investment. Under an affermage, the operator and contracting authority share revenue from customers. The operator pays the contracting authority an affermage fee, which varies according to demand and customer tariffs, and retains the remaining revenue. Under both affermages and leases, the operator's profits depend on the utility's sales and costs, which typically gives the operator incentive to improve operating efficiency and increase sales" (World Bank [2006a]).

As management contracts, the responsibility for capital improvements and network expansion remains with the public sector owner, even if some specified types of repairs can be under the lessor's responsibility. However, responsibility for planning and financing overall investment and expansion programs remains with the public sector owner.

Moreover, under such types of agreements, commercial risk is transferred to the private partner, as **the lessor's ability to derive a profit is linked with its ability to reduce operating costs**, while still meeting designated service levels. Indeed, the lessor directly collects fees from users. "Lease agreements can be expected to extend for a period of five to fifteen years. They are suitable only for infrastruc-

ture systems that generate independent revenue streams, and are often used in the public transport and water sectors. **Ownership of assets remains with the public body** and the private sector is responsible only for well-defined tasks adopting limited responsibility" (European Commission [2003b]). So if major new investments are needed, the government must raise the finance and coordinate its investment program with the operator's operational and commercial program. The private manager can then decide investments for operational tasks, but needs the agreement of the public authority for innovations relative to the infrastructure. Lease contracts are widely used in France and Spain: for example, 56,82% of water production and distribution services are managed in France through "Affermages " (Chong, Huet, and Saussier [2006a]).

2.2.2.4 Concession contracts

These agreements enable a private investment partner to finance, construct, and operate a revenue generating infrastructure improvement in exchange for the right to collect the associated revenues for a specified period of time. Concessions can be awarded for the construction of a new asset or for the modernization, upgrade, or expansion of an existing facility.

"**Asset ownership typically rests with the government** from a legal perspective, (...) and rights to all the assets, including those created by the operator, typically revert to the government when the arrangement ends (often after 25 or 30 years), and are awarded under competitive bidding conditions"[8] (World Bank [2006a])

Unlike what occurs in other types of PPP, the **public party relinquishes its control** on important phases of the life-cycle of the asset. Since the ownership of the asset generally remains with the public party[9], the specification of quality outputs is essential for achieving the desired results (European Parliament [2006]). This

[8]Like a concession, a divestiture gives the private operator full responsibility for operations, maintenance, and investment. But unlike a concession, the private operator is the legal owner of the assets.

[9]This is not necessarily the case in some variants of concession contracts (*e.g.* BOO), as will be explained later.

model is particularly suited for roads, water and waste projects and generally for services where user charges can be applied.
According to the World Bank private participation in infrastructure database, between 1990 and 2000, overall 65% of the projects in Latin America and the Caribbean were adjudicated as concessions. It was 3% for telecommunications, 54% for energy, 89% for water and sanitation, and 98% for transportation (Guasch, Laffont, and Straub [2006]).

Table 2.1 sums up the various allocations of responsibilities in each different contracts allowing public and private partners to work together.

Table 2.1: Allocation of key responsibilities under the main private sector participation options

Options	Asset Ownership	Operation and Maintenance	Capital Investment	Commercial Risk	Duration
Service contracts	Public	Public - Private	Public	Public	1-2 years
Management Contracts	Public	Private	Public	Public	3-5 years
Lease Contracts	Public	Private	Public	Shared	8-15 years
Concession Contracts	Public	Private	Private	Private	25-30 years

Source: Toolkit for Private Participation in Water and Sanitation, Toolkit 1, The World Bank, 1997.

2.2.2.5 Other contractual arrangements for new projects

Many other variants of public-private partnerships exist, as shown in Figure 1.2. When an infrastructure has to be built, the private sector may have to design and build it. In the same way, operation and maintenance may be -or not- bundled with the construction. Yet, the private is generally the owner of the asset during the execution of the contract. For instance, under "Private Finance Initiative"

contracts[10], "the public sector does not own an asset, such as a hospital or school but pays the PFI contractor a stream of committed revenue payments for the use of the facilities over the contract period. Once the contract has expired, ownership of the asset either remains with the private sector contractor, or is returned to the public sector, depending on the terms of the original contract" (UK Parliament [2001]).

The following table summarizes some variants of public-private partnerships.[11]

Schemes	**Leasing-type contracts**	**Build-Operate-Transfer (BOT)**	**Design-Build-Finance-Operate (DBFO)**
Variants	Buy-Build-Operate (BBO), Lease-Develop-Operate (LDO), Wrap-Around addition (WAA)	Build Own Operate Transfer (BOOT), Build-Rent-Own-Transfer (BROT), Build-Lease-Operate-Transfer (BLOT), Build-Transfer-Operate (BTO)	Build-Own-Operate (BOO), Build-Develop-Operate (BD0), Design-Construct-Manage-Finance (DCMF)
Modalities	The private sector buys or leases existing assets from the government, renovates, modernizes and/or expands it, and then operates the asset, again with no obligation to transfer ownership back to the government	The private sector designs and builds an asset, operates it, and then transfers it to the government when the operating contract ends, or at some other pre-specified time. The private partner may subsequently rent or lease the asset from the government	The private sector designs, builds, owns, develops, operates and manages an asset with no obligation to transfer ownership to the government. These are variants of design-build-finance-operate (DBFO) schemes

Table 2.2: Public-private partnerships and variants (European Parliament [2006])

This subsection has then shown how different contracts of public-private part-

[10]The PFI program has been launched in 1992 in the United Kingdom, and has inspired many European countries. For instance, new French "contrats de partenariat" (2004) are arrangements close from PFI.

[11]Some other variants exist and are to be found in different classifications: See International Monetary Fund [2004] or European Parliament [2006] for more details.

nerships may be empirically. The subsequent subsection proposes to draw the consequences from a theoretical viewpoint.

2.2.3 Theoretical consequences

After having recalled the large diversity of public-private agreements, we now draw a parallel with the theoretical framework described in chapter 1. More precisely, the idea is to highlight that observed practices of public-private partnerships do not correspond to what the GHM approach describes about ownership, control and rights to residual benefits. Yet, this framework is a rigorous perspective for the study of public services, as recalled in chapter 1, hence the need of a refinement.

2.2.3.1 Ownership, control and residual benefits in public-private partnerships

From what has been previously described, the large diversity of public-private partnerships may be explained by the following choices:

- *The choice of the functions to contract out*: this may be one or several of these functions: design, building, operation or maintenance, hence the various denominations of contracts in figure 2.1 and table 2.2.
- *The choice of the remuneration schemes*: In some arrangements as service contracts, the private party is remunerated on a fixed fee basis. In management contracts, performance targets may be added, and "cost plus" or "price cap" clauses are also observed, as described in the previous paragraph. Last, when it is possible, the private party may purchase the income streams generated by the exploitation of the assets, as in leasing agreements or concession-type arrangements for instance.
- *The allocation of the rights to decide new investments*: there are many differences in this field: the private operator may have to follow the requirements

of the public party, without true rights to decide on its own (which is the case in many service and management contracts), while in other contractual agreements as in leasing-type contracts, decisions about operation and maintenance are made by the private operator, but network expansion, capital improvements and financing are borne by the public party. On the contrary, in concession-type contracts, the public party relinquishes importantly its control over the assets (European Parliament [2006]) during the contract duration.

- *The ownership of the assets*: For the management of existing facilities, assets are generally owned by the public sector. When the facility has to be built, the private firm may be the owner as previously described, and whether assets remain privately owned at the end of the contract depends on the terms of the arrangement.

From all this description, what appears as the most surprising is that ownership does not necessarily conveys residual control and rights to get residual benefits. This is especially true for the management of existing facilities: in some management contracts, leasing-type and concession-type arrangements, assets may remain publicly-owned, but the private operator may get residual benefits and may decide the implementation of new investments. This seems consistent with the vision of ownership delivered by the Roman Law tradition – from which French law is derived – and that distinguishes three features defining ownership:

- *Usus*: the right to use an asset,
- *Usus Fructus*: the right to enjoy an income flow generated by the asset,
- *Abusus*: the right to change an asset's form and substance.

Yet these three features can be separate, and the owner does not necessarily hold these three rights.

All this leads to think that control and residual income rights – defined as the ability to decide the implementation of new innovations – is not always bundled to ownership of the assets. Furthermore, to better apprehend contracts of public-private partnerships , it seems that this distinction matters.

As a consequence, we propose in the following subsection an extension of the model of Hart, Shleifer, and Vishny [1997] that integrates the continuum of public-private agreements. In departure from the theoretical position of GHM, we consider here that an agent is not necessarily the holder of decision and payoff rights over the assets he owns.[12] In other words, for each type of organizational structure, a distinction has to be made between the owner, the "holder of decision rights", and the "holder of payoff rights".

[12]Such a distinction is also present in Baker, Gibbons, and Murphy [2004] and Gibbons [2005] that introduce the notion of "alienable" assets. Yet, their theoretical framework differs from the one presenting in this paper on several points, especially because of the absence of renegotiation mentioned in their works.

2.3 Owner or Holder?

To determine whether the separation of "decision rights", "payoff rights" and ownership allows to develop a better understanding of observed public-private partnerships, we focus in this section on three different types of public-private partnerships. In each case, assets are owned by the public party, but rights to make ex-post decisions and to get residual benefits change with the arrangement. What motivates our study is to see the consequences of these various allocations when assets are publicly owned.[13]

To implement new innovations, the agreement of the holder of the **decision rights** is indispensable.[14] Benefits from unforeseen cost reductions go to the holder of residual **payoff rights**.

Thus, table 2.3 tries to propose three simplified contractual schemes, where the holders of decision and payoff rights are either public or private, while assets are publicly owned.

In "type 1" contracts, the manager get residual benefits, and make major ex post decisions, such as those to implement new innovations. For instance, this is the case of concession contracts described in section 1.2, where the private manager is entitled to the payoff stream from the exploitation of the assets, and then benefits from any cost reduction.

In "type 2" contracts, the private operator holds payoff rights, and then gets the benefits from cost reduction, but does not hold rights to decide. This is partly the case of lease-contracts, as the manager may decide over maintenance operations,

[13]Therefore, we focus on cases where the owner does not always hold residual rights to decide and to get benefits. For instance, we do not include "Private Finance Initiative" contracts (PFI), because the private entity owns the assets during the contract, even if these assets may be transferred to the public sector at the end, according to the terms of the contract. As a consequence, the private operator has residual decision and payoff rights during the execution of the contracts, but this is consistent with the "privatization" case of Hart, Shleifer, and Vishny [1997], as the operator owns the assets. In other words, in PFI, ownership, residual rights to decide and to get benefits are bundled.

[14]Decision rights can be allocated differently for innovations concerning operational tasks and innovations relative to the infrastructure. Consequences of such a choice will be explained in the following paragraphs.

but not over the facility. Therefore, innovations to expand the network, or deeply modify the assets need the approval of the public party. This may be also the case of management contracts with "price cap" schemes, as described in the previous section. The manager gets residual benefits as he is paid a fixed revenue and supports operational costs. If an innovation allows to reduce these costs, he benefits from these gains. Yet, in many cases, he has to perform tasks decided by the public authority.

In "type 3" contracts, the private operator manages the service, but holds neither payoff rights nor decision rights. An example is given by service or management contracts (with cost plus schemes): the private operator is reimbursed from his operational costs, and any cost reduction benefits to the public party. Moreover, the manager has generally to perform some tasks that are defined and decided by the public authority, and he has no right to make residual decisions.[15]

Table 2.3: *Allocations of decision and payoff rights*

Contracts	**Payoff rights**		**Decision rights**		Examples
	Public Party	Private Party	Public Party	Private Party	
Type 1		X		X	Concession contracts, Lease Contracts (for operational decisions)
Type 2		X	X		Lease Contracts (for decisions about the facility), Management contracts with Price Cap
Type 3	X		X		Service contracts, Management contracts (Cost Plus)

In accordance with this table, the following model tries to integrate the separation of the owner's attributes in the model of Hart, Shleifer, and Vishny [1997]. As previously mentioned, in departure from the property-rights literature, decisions to implement new innovations require here the approval of the holder of the decision

[15]Let us precise that in management contracts, the private operator has responsibilities over operation and maintenance. According to the terms of the contract, he may decide over some tasks, but major decisions of investments are made by the public authority. For simplicity's sake, we focus on innovations relative to the facility, and then, we consider here that the manager does not hold residual decision rights.

rights, who is not necessarily the owner of the facility. Indeed, assets involved in the public service are "alienable", *i.e.* characterized by the possible separation of ownership, decision and payoff rights.
The contract thus specifies the allocation of the decision rights, but also of the payoff rights, *i.e.* which partner benefit from the non-contractible gains linked to cost reduction.[16]

The timing of the game is the same as in Hart, Shleifer, and Vishny [1997], except that the decision to implement innovations depend on the holder of decision rights, and not of the owner. Therefore, the timing becomes as follows:

- T=0: A public authority chooses a contract sharing rights to decide in case of unforeseen events, and rights to benefit from residual benefits.
- T= $\frac{1}{2}$: M chooses efforts e or i devoted to cost reduction or quality innovations
- T=1: If no renegotiation occurs, basic goods are supplied. However, renegotiation will occur to reach the agreement of the holder of the decision rights.

As a consequence, when public provision is added, four different situations can be observed:

(A) In "type-1" contracts, such as concession contracts, the private manager holds both payoff and decision rights over maintenance, operation, construction and renovation. Therefore, this case "bundles" these rights, even if they are not associated with ownership. Resolution then corresponds to the privatization case described in Hart, Shleifer, and Vishny [1997] as the private manager decides innovation to implement and collect residual benefits. Consequently, the manager benefits from the receipts of the exploitation of the service c(e) without suffering from the

[16]In other words, decision rights are contractible ex ante but not decisions themselves. In the same way, payoff rights are thus contractible ex ante, even if payoffs themselves cannot be exactly foreseen ex ante, as they depend on non contractible investments.

adverse effect b(e), and then implements cost-reducing innovations whenever possible. However, it is yet in his interest to implement quality innovations without the approval of the public authority, as no payment is foreseen ex ante in the contract. He then asks for renegotiation, that occurs under nash bargaining procedure, and leads to a split 50:50 of the gains $\beta(i)$.

(B) In "type 2" contracts, such as lease-contracts or management contracts with price cap schemes, the private operator can decide to implement innovations relative to operational tasks, but not those relative to the infrastructure, as the public authority holds the decision right over these assets. The private manager benefits from cost reduction as holder of the payoff right, and then asks for renegotiation of the contract, whenever cost reduction innovations are feasible, so that to reach the approval of the decision holder. Following nash bargaining procedure, the net payoff of the cooperation, *i.e.* (c(e)-b(e)) is shared 50:50, which creates some incentives for the public authority to accept the implementations of new innovations. As for quality innovations, the situation is similar to the previous case: if the manager can ameliorate the quality, he asks for renegotiation to receive a part of the corresponding gains, as no payment is foreseen ex ante.

(C) As described in table 2.3, in service or managements contracts with cost plus schemes, the private operator has neither decision right nor payoff right. He then cannot decide on its own new investments, and is paid a fixed revenue. As a consequence, gains from cost reduction first benefit to the public authority, as it does not change the stream of revenue that is foreseen for the private operator. If the manager has an idea to improve the management of the assets, he then has to ask for renegotiation to be allowed to implement these innovations, and to bargain one part of the gains. Nash bargaining takes place on the whole surplus generated by these innovations, *i.e.* $(\beta(i) + c(e) - b(e))$.

(D) Finally, the public authority can still decide to provide public services in-house, *i.e.* through a public employee. This case is also a "bundling" case of ownership,

rights to decide and to hold benefits, but all these attributes are given to the public authority. It then corresponds to the public provision of Hart, Shleifer, and Vishny [1997].

It then remains to determine incentives obtained under the new types of agreements to compare them with first best levels of investments, as well as those obtained under privatization and public provision.

2.3.1 Equilibria in public-private arrangements

For simplicity's sake, we compare here each type of contractual schemes described above, as well as in-house provision. We focus on one example in each case, *i.e.* concession contracts (type 1), lease contracts for innovations about the facility (type 2), and management contract with cost plus schemes (type 3).[17]

Concession contracts

As described in (A), decision rights are attributed to the private manager, as he decides for the major investments. Furthermore, even if he does not own the assets, he directly collects fees on users, which means that he benefits from the receipts of the exploitation of the service c(e) without suffering from the adverse effect b(e). The renegotiation takes place over the quality innovation, as it generates a benefit equals to $\beta(i)$ for the public authority, that is split 50:50.

If the case corresponds mathematically to the privatization case described in the previous chapter, and then lead to the incentives e_1 such as $c'(e_1) = 1$ and i_1 such as $\frac{1}{2}\beta'(i_1) = 1$, some differences are to be noted.

[17] As usual in the GHM approach, all these equilibriums will be determined in a static framework. Effects of career concerns on incentives to invest are then not taken into account. An analysis based on repeated games would be probably useful to such an end. However, we can note that the managers - whether public or private - have uncertain horizons in all cases, since the public authority can still decide to select or to nominate another manager in future.

First, the manager does not own the assets, even if he has temporarily the decision power and the right to perceive benefits.
Second, the public authority as owner of the assets and representant of the public interest may intervene in some ultimate cases, especially when it deems that public interest is concerned. This may have some consequences on renegotiation. Following Hart, Shleifer, and Vishny [1997], this situation is not explored here but chapter 3 is devoted to the powers of public authorities on private managers.

Incentives to invest in quality are then under-optimal, and incentives to invest in cost reduction are over-optimal. The surplus that is thus achieved is:

$$S_1 = UE_1 + UM_1 = B0 + \beta(i_1) + c(e_1) - b(e_1) - C0 - e_1 - i_1.$$

Lease contracts

As described in (B), renegotiation does not only occur on quality innovation, but also on cost-reducing innovation, as the public authority holds decision rights for all types of innovations modifying the infrastructure. Net benefits coming from such a cost-reducing are shared 50/50.

The payoff functions of the parties are thus as follows:

$$UE_2 = \text{B0 - P0} + \tfrac{1}{2}\beta(i_2) + \tfrac{1}{2}(c(e_2) - b(e_2))$$

$$UM_2 = \text{P0 - C0} \ \tfrac{1}{2}\beta(i_2) + \tfrac{1}{2}(c(e_2) - b(e_2)) - e_2 - i_2$$

This structure then gives the following incentives to invest: e_2 such as $\frac{1}{2}(c'(e_2) - b'(e_2)) = 1$, and i_2 such as $\frac{1}{2}\beta'(i_2)=1$. Lease contracts thus generate similar under-optimal incentives to invest in quality innovation as in concession contracts, but generates lower levels of investments in cost reduction, as $\frac{1}{2}(c'(e) - b'(e)) \leq c'(e)$.

This case could not be explored in HSV [1997], as it implies the separation of decision rights from the ownership.

The surplus that is thus achieved is:

$$S_2 = UE_2 + UM_2 = B0 - C0 + \beta(i_2) + c(e_2) - b(e_2)$$

It is worth noting that such a situation occurs for innovations relative to the infrastructure, since the public authority holds the decision rights over the corresponding assets. But, as the private manager is responsible for operation and maintenance, he may decide on its own innovations concerning operational tasks. Incentives to invest in this case are then similar to the case of concession contracts, when the private operators holds the decision rights.

Management contract with cost-plus schemes

As mentioned in (C), renegotiation then occurs on the whole surplus, as the public authority holds decision rights. The sharing of the surplus is then similar to the previous case, but comes from a different situation: not only has the manager no right to decide innovations, but he also does not get residual benefits. Renegotiation is then motivated both to reach the approval of the public authority, and to receive one part of the gains, which was not foreseen ex ante.
The payoffs of the parties are thus as follows:

$$UE_3 = \text{B0 - P0} + \tfrac{1}{2}\ (\beta(i_3) - b(e_3) + c(e_3))$$

$$UM_3 = \text{P0 - C0} + \tfrac{1}{2}\ (\beta(i_3) - b(e_3) + c(e_3)) - e_3 - i_3$$

As the private manager has the right to decide non-contractible investments, the levels of investments are given by the maximization of its utility:
e_3 such as $\frac{1}{2}(-b'(e_3) + c'(e_3)) = 1$ and i_3 such as $\frac{1}{2}\ \beta'(i_3) = 1$

This means that the incentives to invest are similar to the previous cases.
The surplus that is thus achieved is:

$$S_3 = UE_3 + UM_3 = B0 + \beta(i_3) + c(e_3) - b(e_3) - e_3 - i_3 - C0.$$

Equilibrium under public governance

This last case corresponds to the "public ownership" in HSV [1997]: the public authority is the owner of the assets, and holds both decision and payoff rights. A public employee manages the service. In accordance with the description given in section 2 of the previous chapter, incentives are then dependent from the share that the public manager receives from the realized surplus, such as: $\frac{1}{2}\lambda\ (\beta'(i_4))=1$ and $\frac{1}{2}\ \lambda\ (c'(e_4) - b'(e_4)) = 1$. As $0 \leq \lambda \leq 1$, incentives are lower than in the other cases.
The surplus that is thus achieved is:

$$S_4 = UE_4 + UM_4 = B0 + \beta(i_4) + c(e_4) - b(e_4) - C0.$$

2.3.2 Analysis of the optimal ownership structures

The optimal ownership structure is the one generating the greatest global surplus. To determine it, we now rank the levels of incentives achieved in each type of contract.

Main Results

Table 2.4 sums up the different incentives to invest:

By ranking the different incentives to invest, we have:

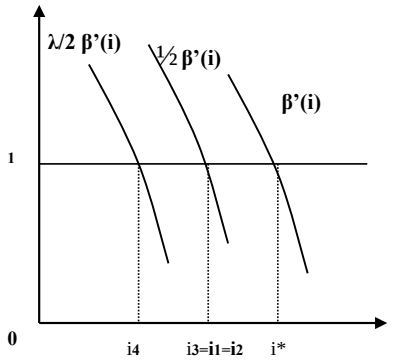
$$i* > i_2 = i_1 = i_3 \geq i_4 \text{ and } e_1 > e* > e_3 = e_2 \geq e_4$$

Table 2.4: *Incentives to invest for each type of innovations and contracts*

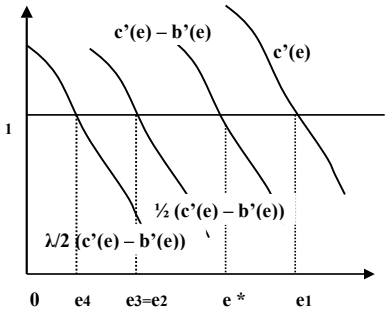
Structures	**Quality investments**	**Cost-reducing investments**
First-Best	i* *such as* $\beta'(i*)= 1$	e* *such as* c'(e*)-b'(e*)=1
Concession contracts	i_1 *such as* $1/2\beta'(i_1) = 1$	e_1 such as $c'(e_1) = 1$
Lease contracts	i_2 *such as* $\frac{1}{2}\beta'(i_2) = 1$	e_2 such as $\frac{1}{2}(c'(e_2) - b'(e_2)) = 1$
Management contract (CP)	i_3 *such as* $\frac{1}{2}\beta'(i_3) = 1$	e_3 such as $\frac{1}{2}(c'(e_3) - b'(e_3)) = 1$
Public contract	i_4 *such as* $\frac{1}{2}\lambda\ \beta'(i_4)$=1	e_4 *such as* $\frac{1}{2}\lambda\ (c'(e_4) - b'(e_4)) = 1$

Consequently, the various incentives to invest can be graphically represented as follows:

Figure 2.2: Equilibrium levels with public-private partnerships



Equilibrium levels of i under different ownership structures



Equilibrium levels of e under different ownership structures

- In accordance with HSV [1997], the private ownership equilibrium, represented here by the concession contract, generates lower incentives to invest in quality investments than the optimal level, but stronger incentives to reduce costs. This result comes mathematically from the first-order conditions and from the concavity of the functions. This is justified by the fact that the adverse effect of cost-reducing investments is not internalized by the private manager, and by the split of the gains from quality innovations.

  Result 1: $i* > i_1$ **and** $e_1 > e*$

- Lease contracts perform similarly to concession contracts for operational tasks. However, whenever innovations deal with the infrastructure, the private operator has to split the net gains from the cost-reducing innovations with the public authority that holds the decision rights. From previous results, incentives to invest in such innovations appear to be lower than the first-best level.

  Result 2: $i* > i_2$ and $e* > e_2$

- Contracts that attribute decision and payoff rights to the public authority (such as cost plus management contracts) entail under-optimal incentives to invest in both quality and cost-reducing innovations, as renegotiations occur for each type of innovations. First-order conditions gathered in table 2.4 and concavity of functions lead to the following result:
  Result 3: $i* > i_3$ **and** $e* > e_3$

- Public ownership appears as the structure that entails the lowest incentives to invest in both types of innovations. This comes from the splitting of the gains with the public manager and the coefficient λ that makes only the innovations depending on the human capital's manager eligible to the renegotiation. As a consequence, result 4 can be established:

  Result 4: $i* \gg i_4$ and $e* \gg e_4$

- From all these results, we note that conclusions of our model appear as consistent with Hart, Shleifer, and Vishny [1997] for quality-enhancing innovations. Indeed, private participation leads to better incentives to innovate in quality than public provision. Yet, this does not apply for cost-reducing investments: contrary to Hart, Shleifer, and Vishny [1997], there is always a type of contractual arrangement with private firms that allows to out perform public provision. Let us now precise such a conclusion through propositions.

Propositions

Proposition 1. *No organizational structure to provide public services allows to reach first-best levels of incentives. Yet, there is always a type of public-private partnership that outperforms - or at least equal- public provision.*

Proof. The ranking of incentives shows that $i* > i_2 = i_1 = i_3 \geq i_4$ and $e_1 > e* > e_3 = e_2 \geq e_4$. In other words, public provision leads to the lowest incentives both in quality and cost-reducing innovations, and is outperformed by contractual tools involving a private partner. These contracts do not reach optimal incentives, but are close to the first-best level. The only case in which public provision performs as efficiently as private provision is when $\lambda = 1$, *i.e.* all innovations are embodied in the human capital of the public manager, which may appear as a very special case. □

Proposition 2. *When cost-reducing innovation is relatively unimportant, and quality innovation has a strong impact, private provision is preferable to in-house provision, whatever the type of contract that is concluded with the private party.*

Proof. Suppose that the function b(e) is replaced by θ b(e), where θ>0, and c(e) is replaced by ϕ c(e), where ϕ>0. Then for θ and ϕ sufficiently small, net gains from cost reductions converge to zero, and the total surplus is determined by gains from quality innovations. Contracts that lead to the greater level of incentives in quality are those involving a private partner, *i.e.* concession, management with cost-plus or lease contracts. Yet, when $\lambda = 1$, public solution performs similarly. □

Proposition 3. *When cost-reducing innovation has an important positive impact (*i.e. *entails weak adverse effect or generate strong cost reductions), concession contracts are superior to other organizational structures.*

Proof. Suppose that the function b(e) is replaced by θ b(e), where θ>0. Then for θ sufficiently small, concession contracts are preferable to other organizational structures to provide services.

Indeed, as $\theta \to 0$, the damage to quality from cost reduction disappears. Under these conditions, concession contracts lead to the efficient choice of e (since c'(e) $\approx$ c'(e) - b'(e)).

Such a conclusion is valid, whatever the importance of quality gains in the total surplus, as concession contracts lead to the same level of quality investments as management or lease contracts. This level is under-optimal but higher than the level reached under public provision. □

Proposition 4. *When cost-reducing innovation has a weak positive impact (*i.e. *entails relatively strong adverse effect), management or lease contracts are superior to other organizational structures.*

Proof. Suppose that b'(e)≡ c'(e)-σ d(e), where σ>0. If $\sigma \to 0$ the social gains from cost reduction, -b(e) + c(e), converge to zero: the quality damage fully offset the cost savings.[18]

Then, for σ sufficiently small, (c'(e)- b'(e))→ 0, and $e* \to e_2 = e_3 \geq e_4$. It is yet to be noted that proposition 4 is valid for innovations relative to the infrastructure: indeed, lease contracts perform as management contracts with cost-plus schemes for those innovations, but lead to incentives similar to the concession contracts for operational tasks. Finally, here again, in the very special case where $\lambda = 1$, then $e_3 = e_2 = e_4$ and management or lease contracts is as efficient as public provision. □

Before concluding, we now discuss our results compared to HSV [1997] and the applications they mention.

[18] A strong adverse effect of cost-reducing investments entail a weak total net surplus of cost-reducing investments, as in each case, c'-b'>0.

2.3.3 Applications

Whereas HSV [1997] conclude to the preference of public provision in some cases (*i.e.* when cost-reducing investments can induce strong negative effects on quality, innovation is relatively unimportant, ex post competition or conditions for consumer choice are not really effective, or reputational mechanisms are weak), our model rejects such a conclusion. Indeed, results show that there is always a type of private involvement that outperforms public provision. How can we relate this result to the examples illustrating HSV [1997]?
In their article, garbage collection is described as a service for which the damage to quality from the various types of investments is low. The authors conclude that privatization is preferable, which is confirmed by several empirical studies, such as Donahue [1989]. Our model also predicts private involvement, and even precise what type of contract is the best appropriate according to the importance of quality innovations.

According to HSV [1997], the management of schools appears undetermined on a static level: "the damage to cutting costs may be large (b(e)), but innovation is probably important, and the incentives of public employed teachers are weak". The authors then refer to the dynamic analysis to prove that private provision is better. Thanks to ex post competition, damages on quality can be evaluated by consumers and private managers cannot sacrifice this quality.
The value of our model is to reject the public provision on the first step of the analysis, without the need to introduce new arguments about dynamics. Indeed, proposition 4 shows that when the adverse effect is relatively strong, some contracts with private participation perform better than public provision.

Let us now turn to the main example analyzed in HSV [1997]: the management of prisons. As quality of personnel and use of force are not totally contractible and can lead to strong damages on social welfare, public provision is then justified. This seems all the more convincing as statistics show that only 3% of the prisons

are privately managed. Another relevant example of public provision is given by the police and the armed forces. A privatization would attribute private managers enormous powers, and risks to hold up the government or society. As an extreme case, nobody can think of privatizing nuclear weapons. Yet, these arguments rather show how strong the damages on quality cost-reducing investments can entail, as it may affect the safety of society and lives of people. Such examples can then be considered as outside the scope of both models: indeed, one of the assumption mentioned in the framework of the model is $c'(e) - b'(e) > 0$, which entails that in HSV [1997] as well as in our model, we only deal with public services whose marginal gains from cost-reducing investments are greater than the marginal damages they can entail. The damages described in the previous examples are so strong that they are probably beyond the scope of our models. Public provision observed in prisons and in the armed forces then does not seem to discredit our results.

2.4 Conclusion of chapter 2

Laffont and Tirole [1993] argue that private involvement in the management of public services lead to both lower costs and quality. In contrast, HSV [1997] demonstrate that in some cases, it can induce both lower costs and higher quality. Our model is consistent with this result, but goes further by showing that there is always a degree of private involvement that is socially efficient. Private involvement can then be justified for some public services that fit the assumptions we postulate, especially as for damages on quality linked to cost-reducing investments.
Indeed, contractual tools allow today public authorities to cede, for a defined period, rights to make decisions over the assets in unforseen contingencies, and rights to benefit from the revenue generated by the exploitation of these assets. This does not mean to cede full ownership of the assets since they go back to the State at the end of the contract. The previous model has therefore tried to integrate such characteristics. This implies to modify the theoretical notion of "residual control rights" as defined by the property-rights literature, since ownership does no longer represent the vector of decision and payoff rights.

With such a methodology, efficiency of mixed organizational structure between full public and full private management can be evaluated, which allows to takes the analysis further than the bipolar case presented in HSV [1997]. Results are similar for incentives in quality-enhancing innovations, but show different levels of investments in cost-reduction. Thus, the conclusion, according to which public provision is preferable when adverse effects of cost reduction are strong, is then contradicted by our results: public provision does not appear as efficient for the management of public services, in which the marginal gain of cost reduction is superior to the marginal adverse effect that is generated. Indeed, contracts mixing public and private partners allow local authorities to authorize or reject the implementations of investments, even if private managers benefits from payoffs derived from the exploitation of the assets. Before choosing investments in cost reduction, the private manager has to reach an agreement with the public party that holds

the right to decide new investments. As a consequence, adverse effects of cost reduction are taken into account, and this allows to preserve some deteriorations of social benefits. Incentives to invest both in quality and cost-reducing innovations then generally prove to be more efficient when a private manager is involved in the exploitation of a public service than under in-house provision.

Yet, our analysis needs to be nuanced for several reasons.
First, as in HSV [1997], we implicitly postulate that public authorities defend public interest, and that there is no corruption nor patronage.
Second, ex post competition between the suppliers of the good and future business are not taken into account in the model. This is a strong assumption to the extent that it may modify the incentives of a private operator to invest in quality innovations, as he may get a lower price for any quality shortfall resulting from a cost reduction and a higher price for any quality improvement. Private firms enrolled in concession or lease contracts are then likely to develop first-best incentives to invest in quality, as it is the case in lease contracts. Effects of concerns for future business will be explored in chapter 4.
Moreover, we postulate that renegotiations occur efficiently under Nash-Bargaining games, with no specific bargaining power of public authorities. This is not also the case, especially when public interest is at stake.
Finally, our model is based on a formal and contractual vision of public-private partnerships. Yet, it is worth mentioning that PPPs are also public-private relationships, and that extra-contractual elements are likely to play a role during the execution of contracts (Macaulay [1963]), especially for elements that are observable for the parties but non verifiable, and hence non enforceable by courts.
These last points will be explored the second part of this dissertation.

A brief Conclusion to Part I

The first part of this dissertation aims to demonstrate to what extent the notion of "property rights" is a key notion to study organizational structures in public services.

Chapter 1 has recalled the foundations of the property-rights approach developed by Grossman, Hart and Moore, and has shown its relevancy to analyze the trade-off between public and private provision. Chapter 2 has suggested that a full understanding of public-private partnerships calls for a refinement of the vision of ownership proposed by these authors.

More precisely, in the property-rights literature, the owner possesses the "residual control rights" over the assets. As a consequence, he can decide what has not been contractually foreseen ex ante, and generally can get residual benefits. This is essential to the extent that all things cannot be contracted in a way that can be enforced by third parties, such as courts, especially because it will be too costly for the contractors. Thus, the approval of the owner is indispensable to implement things that were not foreseen ex ante, such as innovations. To reach the agreement of all parties, *i.e.* the owner and if needed, the agent whose human capital allows to implement innovations, the GHM approach postulates costless and efficient ex post renegotiations, mainly modeled through Nash Bargaining games. These renegotiations lead to share the ex post surplus among the parties whose approval is

needed. Therefore, the various allocations of property rights lead to various bargaining outcomes.

By anticipating ex ante the ex post sharing of the gains for the different allocations of property rights, parties have more or less incentives to invest in human capital to search for innovations in each case.

This method has deserved many attention for the study of organizational structures, and has also lead to fruitful analyzes for the sector of public services, as exposed in subsection 1.3. of chapter 1. However, much remains to be done to fully understand different ways public services can be organized, all the more so as the number of contractual structures to reach such an end keeps on growing, and become more and more complex.

Indeed, if property rights still appear as a useful notion to evaluate costs and benefits of each contractual organization, they need to be more precisely analyzed. Bundling decision and payoff rights to ownership is quite criticizable, since legislators allows to allocate these various rights to different agents. By decomposing such rights founding property, chapter 2 allows to better appreciate the large continuum of public-private partnerships, beyond the bipolar case of privatization and public provision. Results show that for some public services, there is always a degree of private participation that is socially efficient. Indeed, while Hart, Shleifer, and Vishny [1997] consider that private provision cannot internalize the adverse effects of cost reduction on quality, the splitting of property rights shows that public authorities may partially oblige to some internalization, by transferring only partially rights linked to property to private operators.

Yet, the efficiency of contractual arrangements is influenced by other factors than the allocation of rights between public and private partners. One major determinant is the way these contracts are enforced. Thus, part II of this dissertation proposes to take further the analysis by exploring the conditions of contractual enforcement of public-private partnerships . Both legal rules and concern for future business come now under study to understand their impacts on achieved efficiency.

Part II

LEGAL AND INFORMAL PRACTICES IN PUBLIC-PRIVATE PARTNERSHIPS

Chapter 3

The legal extra powers of public authorities as co-contractor*

"Arrangements governing private participation include many rules to be interpreted, applied, and enforced (...) Applying these rules requires considerable judgment. Designing an arrangement therefore involves deciding which people, committees, and organizations - that is, which institutions - will interpret and apply the rules."

World Bank [2006a]

3.1 Introduction

Chapter 2 shows how the integration of some legal aspects in the model of Hart, Shleifer, and Vishny [1997] modifies their results, recalled in chapter 1. The split

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of property rights is allowed by many legislations around the world, however, other legal rules are more specific to some countries. Among these rules, it is frequently observed that " the governing apparatus and personnel of developed states are subject to bodies of public law, whose distinction from private law is based on special characteristics and requirements of the state, as contrasted with those of individual citizens and of the private-commercial economic sector" (Drewry [2000]:59).
For instance, Civil law countries have often administrative law governing transactions with public authorities. They may attribute some specific powers to public party, such as a right to unilaterally modify contracts when public interest is deemed to be concerned. This is notably the case in France and it represents a strong difference in comparison to contracts between two private entities. Such powers lead to unbalanced bargaining positions between parties, which may a priori discourage private participation in public contracting. However, observations - as those from table 1.1 in chapter 1 - show that it is not the case. Contrary to what could be expected, private firms are willing to contract with public parties in spite of these rules. It is then worth wondering what kinds of impacts legal rules may have on contractual outcomes, and whether they have to be fostered or not. Therefore, this chapter focus on the institutional framework of public-private partnerships, and more precisely on the legal component of this framework. Let us now justify this interest, and precise our perspective.

The role of institutions to support efficient cooperation between public and private partners has been underlined many times, for instance in reports edited by the World Bank or the European commission (World Bank [2006a], European Commission [2003b], Kaufmann, Kraay, and Pablo [1999]). In parallel, institutions – and especially legal environment – have drawn a growing attention in the economic literature. Several reasons explain this interest.
First, institutions are considered as arising and evolving "to underpin economic activity and exchange by protecting property rights, enforcing contracts, and collectively providing physical and organizational infrastructure." (Dixit [2006]).
Works such as North [1987, 1990, 1991], North, Wallis, and Weingast [2006]; Greif

[1993]; Greif, Milgrom, and Weingast [1994]; Aoki [2001a,b, 2004], or Dixit [2004] show how they determine economic growth and transactional efficiency.

Moreover, as mentioned earlier, models of economic growth have shown that labor and capital do not suffice to explain economic growth and discrepancies between countries. Therefore, institutions are likely to matter.

Cross country analyzes have then multiplied to determine the influence of various institutional variables on GDP per habitant or on the level of private investments (Acemoglu, Johnson, and Robinson [2001], Clague [1996], Keefer and Stasavage [2002]). In parallel, enquiries have been carried out to assess the impact of institutions on economic activity (*Business and Entreprises Performance Survey*, *World Business Environment Survey*, *Doing Business*), and efforts have been done to create indicators measuring the quality of institutions (KKZ (Kaufmann, Kraay, and Zoido-Lobaton) by the World bank to evaluate governance, Corruption Perceptions Index (CPI) of Transparency International for corruption, International Country Risk Guide and Business Environment Risk Intelligence (BERI) for risk). In spite of the many controversies raised by these studies, they prove the need to clarify the role of institutions on economic activity.

Legal environment is part of the institutions in which economic transactions take place. Focusing on it, works by La Porta, Lopez de Silanes, Shleifer, and Vishny [1997, 1998, 1999]; Djankov, La Porta, Lopez de Silanes, and Shleifer [2005] insist on the impact of "legal families" - especially civil law or common law traditions - on today's institutional endowments (as the protection of minority shareholders), which in turn determine investments. In the same way, the World Bank report "Doing Business" (World Bank [2006b]) provides measures of business regulation and their enforcement that impact on economic growth. Results of these works tend to prove the greater efficiency of common law systems, but have raised many debates and criticisms, both on methodology and results (Rodrik, Subramanian, and Trebbi [2004], Berkowitz, Pistor, and Richard [2000], Acemoglu, Johnson, and Robinson [2001], Du Marais [2006]).

While works on the impacts of institutions on private business have been flourishing, few has been done about their influence on public-private agreements. Renego-

tiation has drawn many interests in the literature on PPPs (Guasch, Laffont, and Straub [2006], Guasch [2004], Laffont and Tirole [1990]), but these works mainly deal with factors causing renegotiation or impact of asymmetric information. To our knowledge, no work specifically models the impact of legal rules governing renegotiation on contractual outcomes. This may seem quite surprising, since ex post bargaining processes are known to be crucial.[1] As Guasch, Laffont, and Straub [2003] put it, "the importance of enforcement of laws has been stressed by the Chicago School (...) but has been little addressed by modern contract theory" (footnote 5, p.7).

To go back to the property-rights literature, the model of Hart, Shleifer, and Vishny [1997] says for instance nothing about the legal environment in which parties contract. As traditional in the GHM approach, renegotiations occur between parties because some parameters have not been contracted on ex ante in a way that can be enforced by courts. As previously demonstrated, the parties make up for this incompleteness by revising the terms of the contract, when information about benefits and costs are received (Hart and Moore [1988]). However, whether legal rules constrain or not the conditions of the bargaining is not discussed. This seems all the more surprising as results of the bargaining mainly determine the ex post share of the surplus, and then the ex ante incentives to invest, as shown in Aghion, Dewatripont, and Rey [1994], or De Meza and Lockwood [1998] for private goods. In this chapter, we deal with public goods, and propose a refinement of Hart, Shleifer, and Vishny [1997] to try to better apprehend renegotiations between public and private partners. This allows us to keep the rigorous technical framework of the property-rights approach, described in chapter 1, to evaluate organizational efficiency, and to take into account the legal environment of contracts between public and private partners.

Then, we wonder whether the legal environment in which public-private agreements are implemented has an influence on the achieved efficiency. More precisely,

[1] Let us remember on this subject that, as for Williamson [1985], "a governance system should be defined as the complex set of constraints that shape the ex post bargaining over the quasi rents generated in the course of a relationship."

this chapter mainly focuses on the right granted to public authorities to unilaterally modify contracts when public interest justifies it. *The goal of this work is then to evaluate how legal rules to defend public interest may change bargaining conditions - and then contractual efficiency - when parties have to renegotiate their contract.*

To this end, section 3.2 sums up the rules that apply when contracts between public and private entities are implemented. In many countries, public authorities are granted special rights to defend public interest. They may for instance impose some renegotiations, and even cancel contracts, to defend public interest.
Therefore, section 3.3 includes specific powers of public authority, as those observed in the French legal framework, in the model of Hart, Shleifer, and Vishny [1997], to compare to the situation where such specific rules do not apply. It is shown that these rights limit the adverse effect of cost reduction on social benefits, as public authorities impose renegotiation when this adverse effect is considered as damaging public interest. This forces private operators to partly internalize this adverse effect. As a consequence, the scope of renegotiation changes thanks to these rights.
Section 3.4 goes a step further, and focus on the conditions of the bargaining game beyond the scope of renegotiations. Because of unilateral right of cancelation, public authorities may also threat the private manager during renegotiations, and impose their own share of the surplus. Therefore, not only do legal rights impact on the scope of renegotiation, but they may also influence the bargaining process. Instead of the Nash bargaining game, this section introduces a "take-it-or-leave-it" process, to model the power of public authorities, when they can credibly threat the private co-contractor.
In a nutshell, results of this chapter show that (1) there is a growing trend for public authorities to grant specific unilateral rights of modification and cancelation, when they contract with private partners. This may allow to change the scope of renegotiation, and force the operators to internalize the adverse effects of cost reduction on quality. Therefore, it is demonstrated (2) that these legal

rights ameliorate contractual efficiency. Yet, such rights may also give public parties strong powers to threat their co-contractors. This may influence bargaining processes between contractors. In this case, (3) it appears that the legal rule is insufficient to predict the effects on contractual efficiency. The use and interpretation of legal rules by both contractors determine whether performance is increased or decreased.

3.2 Contracts and legal rights for public authorities

This first section aims to demonstrate what kinds of specific powers public authorities have at disposal, when they contract with a private operator. Indeed, "public law is qualitatively different from private law because public functions and obligations are - in so many respects - different from private ones (...) Hence the fact that governments are often subject to the jurisdiction of constitutional courts; and state bureaucracies are usually subject to regimes of administrative law, of which there are numerous variations, applied in many cases by specialized administrative courts, tribunals and ombudsman systems" (Drewry [2000]:59-60). This is particularly the case in civil law countries.[2] "In common law systems there is no legal distinction between contracts involving only private firms and contracts such as concessions that involve a public authority and a private firm. Private participation contracts are governed by the same law and same courts that business people rely on for their dealings with each other. Common law contracts are very flexible, and almost any agreement can be put into a contract and enforced. In many civil law countries, however, a separate administrative law governs contracts for private participation." (World Bank [2006a]). Focusing on French civil law, Apelbaum [2004] goes as far as saying that such rights distinguish French public-private partnerships from the others.

However, this point of view is not shared by all. Indeed, as for Auby, Kirat, Marty, and Vidal [2005], in the United States – that have a common law tradition –, contracting officers have the unilateral rights of modifications and cancelations, either because of the private operator (Termination for Default), or because of discretionary power of public authorities (Termination for Convenience of the Government). Part 43 of the *Federal Acquisition Regulation* (FAR) mentions how unilateral changes can be made by contracting officers in such a context. Yet, it

[2]Civil law and common law countries are usually distinguished. Civil law is used in France, Belgium and Spain, and many other continental European countries, and most of their former colonies. Common law is used in the United Kingdom and most of its former colonies, including the United States.

is worth mentioning that these rules apply to contract modifications for all types of contracts including construction and architect-engineer contracts. It does not apply to orders for supplies or services not otherwise changing the terms of contracts or agreements (e.g., delivery orders under indefinite-delivery contracts), or modifications for extraordinary contractual relief.

Then, opposing civil law and common law countries can be discussed to determine whose countries attribute unilateral powers of intervention to the public authority when contracting with private firms. However, such a classification is not central to the analysis exposed below, and attract much more lawyers' attention than that of the economists. Our goal is not to compare civil and common law systems as works by La Porta (that have been previously mentioned) or the "Doing Business" report (World Bank [2006b]) propose to do. Instead, what deserves our interest is the economic efficiency of such legal rules that attribute specific powers to public authorities. Do they allow to reach a better efficiency? To what extent do they influence bargaining of ex post surplus?
For simplicity's sake, this chapter mainly deals with the effects of rules that can be found in the French legal system, such as those exposed in the following subsection.

3.2.1 French law and public contracting

As just mentioned, in the French legal system, specific rules govern transactions with public authorities and are part of the French Administrative law. Some of these rules are "background laws" that apply even if they are not written in the contract.[3] Changing or modifying an administrative law principle is not legally possible. The following rights are part of the background law and apply when

[3]This is consistent with the idea that French civil law is highly formalized, contrary to the common law tradition. As noted by Djankov, Porta, Lopez-De-Silanes, and Shleifer [2003], these differences go back to the Enlightenment and the French Revolution. "In France, the revolutionaries and Napoleon did not trust the judges, and instituted heavily codified judicial procedures as a way to control judicial discretion (...) In England and the United States, in contrast, lawyers and judges were on the "right" side of the revolution, and hence the political process accommodated a great deal more judicial independence."

services are contracted out, *i.e.* for management contracts, leases, and concessions.

- *Right of unilateral modification* : In the name of public interest, the contracting authority may have the right to modify aspects of the contract. As noted by the World Bank [2006a], the contracting authority does not have the right to change the contract's financial provisions or its fundamental nature, but it can change such aspects as the specification of the service to be provided. "In France the law makes void any attempt to override the contracting authority's ability to unilaterally cancel a contract. Some civil law codes also contain mandatory notice periods before termination for breach of contract that cannot be avoided or overridden" (World Bank [2006a]:155).

- *Right of unilateral cancelation*: The contracting authority has the right to cancel the contract early (although it must compensate the operator).

In compensation for these specific rights, the operator has a right to financial equilibrium, so that the operator is not worse off in comparison to what was previously established ex ante in the contract (for example, a higher tariff can be allowed if the contracting authority required higher service standards).
World Bank [2006a] mentions the following particular doctrines that form part of the operator's right to "financial equilibrium" in France, and which have counterparts in other civil law countries:

- *Fait du prince*: Relief is granted when the contracting authority has caused the operator's profits to decrease without breaching the contract. In this case, the contracting authority's action has adversely affected the operator and was unforeseeable when the contract was concluded. Moreover, the action taken by the contracting authority has to be specific to the operator.[4]

[4]Therefore, general decisions concerning all enterprises are not considered as "*Fait du prince*", but they may give rise to damages on the basis of the *imprévision* principle.

- *Imprévision*: The operator has to be compensated for financial difficulties because of large, unforeseen and exceptional changes in economic conditions that make execution of the agreement financially hazardous. Examples may be major devaluations, price controls decided by an authority other than the contracting authority, or a reduction in working hours that increases labor costs. Let us note that the operator's compensation is not equal to the total losses or damages incurred.

- *Force majeure*: If unpredictable and uncontrollable events make the performance of the contract materially impossible, the operator is exonerate from its obligations. For example, a spill from a chemical factory causing permanent pollution of the only water source would be considered *force majeure*.

However, background rules about financial equilibrium are sometimes ambiguous. "For example, the jurisprudence on restoring the "financial equilibrium" of the contract is not clear on what "financial equilibrium" really means. So writing clear rules into the contract is safest. It is generally a good idea to specifically outline in the contract what rights the contracting authority has to demand unilateral changes in services, and to include provisions that deal explicitly with the circumstances under which the operator is to be compensated" (World Bank [2006a]:156).

Let us now analyze what types of economic effects are expected from such a legal framework.

3.2.2 Theoretical consequences

In this subsection, we try to draw some consequences about the previous description of background rules protecting public interest. We show that (1) they can be assimilate to some inalienable residual decision rights hold by public authorities about protection of public interest and generate new renegotiations, and (2) that they may have various consequences on the conditions under which bargaining about non-contractible investments takes place.

At first sight, from what has been described previously about the right of unilateral modifications, public authorities may renegotiate contractual arrangements with private operators, provided the financial equilibrium and the fundamental nature of the contract are protected. These powers are justified by the need to protect public interest. Let us recall that such a notion is central to policy debates and for governments, but there is little - if any- consensus on what exactly constitutes public interest (Long, Weil, Braibant, and Genevois [2001], Peiser [2001]). Therefore, the defense of public interest seems to lead to some contractual incompleteness: public authorities cannot write detailed contracts, specifying what to do in every contingency to protect this interest. To fill this gap, background rules allow the public party to impose unilateral modifications, and even cancelations.

Then, such unilateral modifications are more likely to raise when public interest is affected by events that public authorities did not foresee when they sign the contract. For instance, when the private operator implements new innovations to reduce costs, and when the quality of service is reduced because of adverse effects, the public authority may change contractual terms to limit this damage and protect public interest.

Everything happens as if such rules grant public authorities with some "inalienable decisions rights" about public interest. Indeed, even if residual control and payoff rights are transferred to the private partner (as discussed in chapter 2), public authorities may still intervene to defend public interest thanks to these specific background rules. As a consequence, they are close from the description of inalienable decision rights given by Baker, Gibbons, and Murphy [2004] (p.4), *i.e.* "those that are left attached to the asset after all alienable decision rights have been removed (and perhaps reallocated)". Whatever the rights hold by the private sector, these rules allow public authorities to change contractual arrangements if public interest needs so. This prerogative cannot be transferred and applies even if it is not written in the contract, hence its "inalienability".

The right of unilateral modification may then allow public authorities to ask for renegotiation, when social damages are observed, especially when they were not foreseen ex ante in the contract. Therefore, renegotiations may happen, while it

would not be the case if public authorities were not granted these specific rights. This allows to lower adverse effects on quality, in order to protect public interest. These new renegotiations to limit cost reduction represent the first consequence of unilateral rights granted to the public authority.

A second consequence deals with the conditions in which bargaining takes place. Indeed, if public authorities use their specific rights to threat their co-contractor to breach contracts if their requirements are not applied, this leads to strong changes in the bargaining process. This probably represents an abusive use of the unilateral rights described above, but private operators may fear such a misuse. This would dissuade private firms to contract with public authorities. To illustrate this argument, a report by The Social Market Foundation's Risk Commission [2005] states that "many larger businesses report that they are seriously affected by political and regulatory risk; that is the uncertainties caused by policy and regulatory processes". The fear that public authorities use their rights to appropriate a larger share of the surplus could dissuade private operators to contract with them.
However, as mentioned in introduction, statistics are not consistent with this argument: as demonstrated in the previous subsection, French administrative law attributes strong powers of intervention to public authorities, and yet, many local public services are contracted out. Moreover, a growing number of countries – whether from civil law tradition or not – have modified their legal framework through special laws or statutes to allow state intervention whenever public interest deserves so, and give some guarantees about initial financial commitments.
This is for instance the case for Bulgaria, Croatia, Hungary, Romania, Slovenia, and Turkey in Central and South East Europe; Brazil, Chile, Columbia, and Peru in Latin America, and the Philippines, Thailand, and Vietnam in Asia.[5] Then,

[5]World Bank [2006a] quotes some examples: In Romania, Article 33 of the Concession Law provides the concessionaire compensation when its financial balance is impaired by measures imposed by Romanian authorities or created by force majeure or other causes beyond the control of the operator. In Slovenia, the Public Trading Services Law entitles the contractor compensation for expenses incurred when delivering services required in "unforeseeable circumstances." In the Philippines, the build-own-transfer (BOT) Law on the financing, construction, operation, and maintenance of infrastructure projects by the private sector guarantees operators a rate of return on investment reflecting the prevailing cost of capital in the domestic and international markets.

section 3.4 proposes to focus on the consequences of unilateral rights of modification and cancelation on bargaining process between public and private partners, to determine how they impact on contractual efficiency.

To sum up, in many countries – and France provides a useful example– the legal context in which agreements between public and private partners are signed and executed is generally quite different from rules to apply in case of contracts between two private entities. As a consequence, there is no doubt that public-private partnerships cannot be assimilated to pure private agreements, and a full understanding of their functioning implies to take into account such a legal environment. Specific rights granted to public authorities may have consequences both on renegotiations and on bargaining conditions.
The following section tries to rigorously understand how unilateral right of modification allows some new renegotiations through the framework of Hart, Shleifer, and Vishny [1997]. Section 3.4 deals with bargaining conditions.

3.3 Incomplete contracts and Rights of unilateral intervention

The goal of this part is to integrate the right of unilateral public intervention in the general framework of Hart, Shleifer, and Vishny [1997]. To isolate the effect of the legal rules described in the previous section, we include them in the seminal "private provision" case of Hart, Shleifer, and Vishny [1997], recalled in chapter 1. As the authors do, we assume that the private firm is the owner of the assets. Yet, in departure from this work, public authorities may impose renegotiations to protect public interest. Once the equilibrium levels of investments will be determined in this configuration, they will be compared to those of the other organizational structures of Hart, Shleifer, and Vishny [1997], *i.e.* private provision (without specific powers granted to public authorities) and public provision.

3.3.1 Equilibrium under private provision with specific rights for public authority

Suppose that a public service is managed by a private operator[6], but the public authority benefits from a right of unilateral modification (*i.e.* right of unilateral renegotiation) if public interest is damaged, as described in the previous subsection for the French case.

In accordance with the GHM approach, information is still assumed to be symmetric between parties: special bargaining power of public authorities then comes from their specific legal rights, and not from private information.

As a consequence, compared to Hart, Shleifer, and Vishny [1997], the right to unilateral intervention modifies the "residual control rights", whereby the sole approval of the owner is needed to implement innovations. When cost reduction can damage public interest, decisions of the owner can be offset ex post by the public authority. As in the privatization case, at date 1, *i.e.* once research investments

[6]The case under study here can be assimilated to a concession contract – as described in the previous chapter – with special powers attributed to the public authority.

have been made and parties learn the nature of potential quality improvements and cost reductions, bargaining takes place.[7]

Yet, contrary to what was previously postulated, the public authority can unilaterally decide to modify the contract, if damages b(e) are considered as too strong. As a consequence, when b(e) is considered as too strong, the contracting party imposes renegotiation and nash bargaining applies on the net surplus of cost reduction, *i.e.* c(e)-b(e). Gains from cost reduction are thus split 50:50. Management of quality innovations is similar to the privatization case, which leads to the following manager's payoff function of the manager:

$$UM_2 = P0 - C0 + \tfrac{1}{2}(c(e_{2M}) - b(e_{2M})) + \tfrac{1}{2}\beta(i_{2M}) - e_{2M} - i_{2M}$$

where e_{2M} and i_{2M} denote the incentives to invest in cost reduction and quality under private participation with specific powers granted to the public authority.

The unique solution of the program is given by the first-order conditions:

$$\tfrac{1}{2}(c'(e_{2M}) - b'(e_{2M})) = 1 \text{ and } \tfrac{1}{2}\beta'(i_{2M}) = 1$$

The total surplus obtained in case of private participation with special power of the public authority is then:

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

3.3.2 Analysis of the results

For the quality innovations, the situation has not changed compared to the "privatization" case. Indeed, $i_M = i_{2M}$, which leads to the following ranking, as proved by Hart, Shleifer, and Vishny [1997]:

[7]Indeed, at this date, uncertainty is resolved, and the value of b(e) and c(e) can be shared.

$$i* > i_M = i_{2M} \geq i_p$$

However, incentives for cost reducing innovations are lower than in the privatization case. They are under optimal, but higher than in those observed under public provision.

Indeed, from concavity and first order conditions illustrated in figure 3.1, the following proposition can be established:

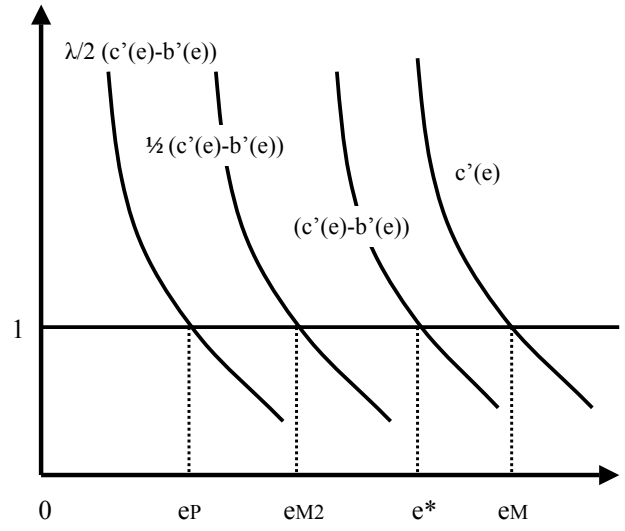
Proposition 1. $e_M > e^* > e_{2M} \geq e_p$

Privatization leads to over-optimal incentives, since the adverse effect of cost reduction on social benefits is not taken into account by the private manager - owner of the assets. In case of contracts with special powers granted to the public authority, renegotiation can be unilaterally decided if public interest needs so. As a consequence, net surplus of the investment is split, which lower the incentives to invest, as the adverse effect is thus internalized. Indeed, from the first-order conditions and concavity of functions, the share that results from the bargaining ($i.e.$ $\frac{c'(e)-b'(e)}{2}$) is lower than the expected gain observed in case of privatization (c'(e)), as illustrated in figure 3.1.

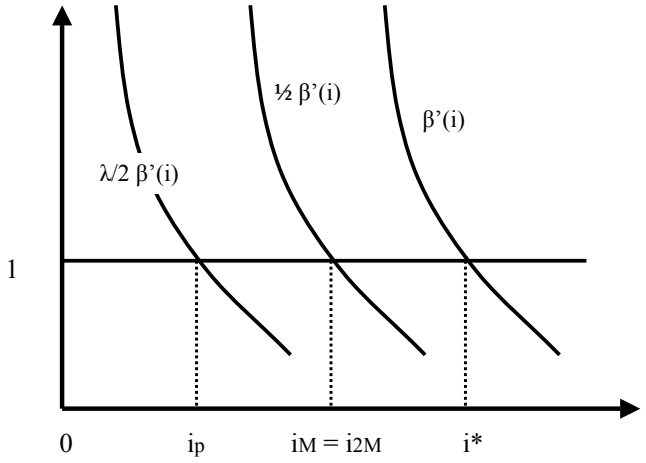
However, this share is superior to that observed in case of public provision, where renegotiation takes over the proportion of the surplus that depends on human capital, and leads to the gain $\frac{\lambda(c'(e)-b'(e))}{2}$ for the public manager. As a consequence, private participation with special powers for the public authority always outperform public provision, except when all innovation are embodied in the human capital of the manager, $i.e.$ $\lambda = 1$. In this latter case, incentives are similar in both types of provisions.

The equilibriums obtained under these various types of provision are illustrated in figure 3.1.

Figure 3.1: Equilibrium levels including special powers of public authorities



Equilibrium levels of e under different types of provision



Equilibrium levels of i under different types of provision

In accordance with Part 1 of Proposition 3 demonstrated in Hart, Shleifer, and Vishny [1997], privatization is preferable when adverse effects of cost reduction on social benefits are small. As they show, if the function b(e) is replaced by $\theta b(e)$, where $\theta > 0$, then for θ sufficiently small, private ownership is superior to public ownership.
Since $\theta \to 0$, cost reduction does no longer entail social damages, which means that (c'(e)-b'(e)) $\to$ c'(e), and then privatization leads to the optimal incentives to invest. Incentives to invest in quality are equal in privatization and in private participation with special powers for the public authority, privatization appears as more efficient than other organizational structures.

However, propositions that can be established when incentives to invest in cost reduction are relatively unimportant, or when damages effects are high, are different than those established by Hart, Shleifer, and Vishny [1997].

Proposition 2. *If b(e) is replaced by $\theta b(e)$, where $\theta > 0$, and c(e) is replaced by $\phi c(e)$, where θ, $\phi > 0$, then for θ, ϕ sufficiently small and $\lambda < 1$, privatization and private participation with special powers for the public authority achieve similar efficiency, and are preferable to public provision.*

Indeed, if θ, $\phi \to 0$, then e^*, e_p, e_{2M}, e_M all converge to zero. Thus only the choice of i matters. Incentives are under-optimal in all organizational structures, but are the lowest under public provision. As a consequence, even if privatization and private participation do not reach first best, they are perform better than public provision.
As a result, when opportunities for cost reduction are small, and when the public employee has relatively weak incentives ($\lambda < 1$), social damages due to cost reduction are avoided and the introduction of private firms – whether through privatization or private participation – leads to better incentives to invest in quality.

However, the growing of social damages due to cost reduction gives private partic-

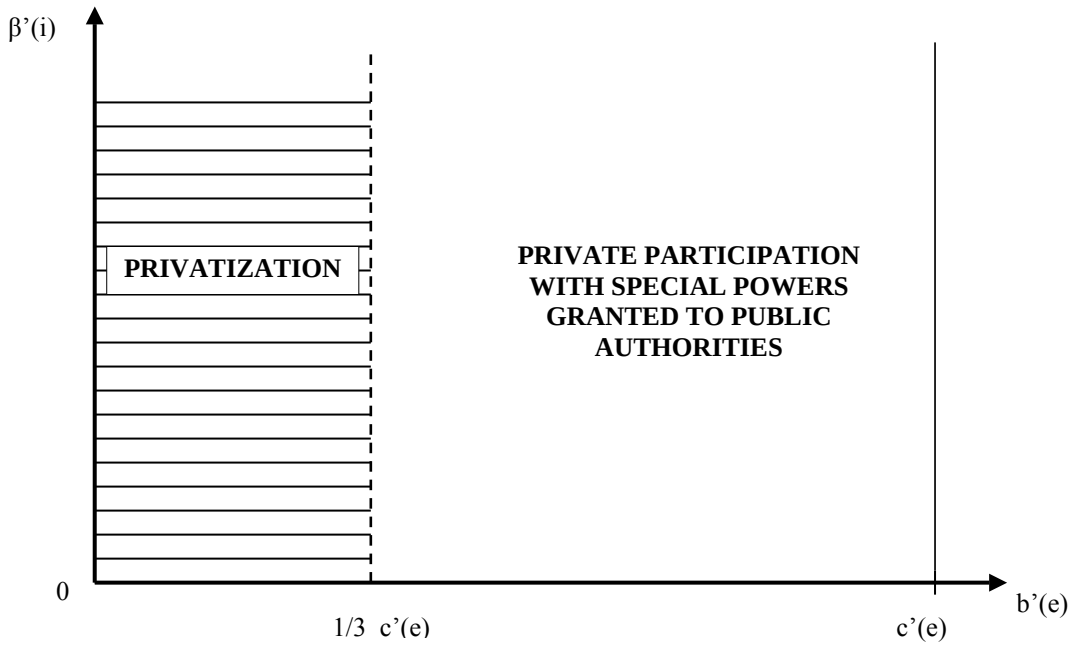
ipation the edge over privatization.

Proposition 3. *When marginal social damages are evaluated to be higher than one third of the gains obtained by reducing cost (b'(e)> $\frac{1}{3}$ c'(e)), private participation with special powers for the public authority performs better than the other organizational forms.*

Proposition 3 follows from the following facts:
First, following proposition 1, no organizational structure allows to reach first best, but the closest incentives are observed under privatization or private participation with specific powers granted to public authorities. Public provision performs lower both in cost reduction and in quality-enhancing innovations. The trade-off then takes place between both organizational structures.
Second, assumptions given in Hart, Shleifer, and Vishny [1997] mention that investments in cost reduction have positive marginal effects, *i.e.* c'(e)-b'(e)> 0. In other words, since b'(e)$\geq$ 0, the following equation is coming: c'(e) $> b'(e) \geq 0$.
When $b'(e) \rightarrow 0$, then $(c'(e) - b'(e)) \rightarrow c'(e)$, which means that when there is no adverse effect on quality caused by cost reduction, private provision leads to optimal level of investments.
On the contrary, when $b'(e) \rightarrow c'(e)$, then $c'(e) - b'(e) \rightarrow 0$, as $\frac{c'(e)-b'(e)}{2}$. As a consequence, optimal levels of investments converge to the levels obtained under private participation with specific powers to public authorities.
In other words, optimal levels tend towards private provision or private participation according to the level of adverse effect. If this level is close from the amount of cost reduction, private participation is preferable.
We note that when $b'(e) = \frac{c'(e)}{3}$, then $(\frac{1}{2})(c'(e) - b'(e)) \rightarrow \frac{c'(e)}{3}$, and $c'(e) - b'(e) \rightarrow \frac{2c'(e)}{3}$. Optimal levels of investments are then at the same distance of private provision and private participation with specific powers granted to public authorities, as $\frac{c'(e)}{3} \leq \frac{2c'(e)}{3} \leq c'(e)$. As a result, when $b'(e) \leq \frac{c'(e)}{3}$, then private provision is preferred, while if $b'(e) \geq \frac{c'(e)}{3}$, private participation is more efficient. The trade-off is not changed by quality innovations, as their levels are the same under both organizational structures.

Figure 3.2 illustrates the optimal organizational structure. On the X-axis, the marginal values of social damages b'(e) are reported, and go from 0 to c'(e), as justified earlier. On the Y-axis, the net marginal value of quality innovation $\beta'(i)$ is reported.

Figure 3.2: Optimal organizational structures



Granting specific powers to public authority then yields greater cost efficiency than public provision, and allows to integrate damages effects on social benefits. From the propositions established above, it then appears to be the more efficient organizational structure in many cases.

Moreover, when social damages are rather weak, such a right is not used, and this organizational structure develops the same incentives as under privatization. As a conclusion, it seems that in many cases, such an organizational form is to be preferred. Granting right of unilateral renegotiation to public authorities is then efficient, whenever public interest needs so.

3.4 Discussion

To establish previous results, right of unilateral modification has been considered as a means to force parties to renegotiate on net surplus from cost reduction, while the allocation of residual control rights does not foresee such a renegotiation. This right can be used when social damages b(e), that come from cost reducing innovation e, are strong. As previously justified, this interpretation legal rules is close from what Baker, Gibbons, and Murphy [2004] call "inalienable decision rights": even if the private operator has control over the assets, all the decisions cannot be transferred to him. Inalienable decision rights about public interest remain hold by the public party. Therefore, new renegotiation appear and lower cost-reducing investments damaging quality.

However, in some particular cases, interpretations of these rights may differ. Not only do they break the logic of residual control rights by introducing renegotiation with the private operator for cost reducing innovations, but they also create unbalanced bargaining positions between public and private partners. This is all the more the case as public authorities may also have a right of unilateral cancelation of contracts, as described in the first section, that can be considered as an additional threat on the private operator.
This section then focus on situations where public authorities have both rights at disposal, *i.e.* rights of unilateral modification and cancelation, which modifies bargaining positions by giving strong powers to the public authority. To this end, the first subsection discusses to what extent the legal rights exposed in section 3.2 can induce other bargaining games than that of Nash. The two subsequent subsections propose some possible applications of another bargaining game derived from the rights to unilateral renegotiation and cancelation.

3.4.1 Rights of unilateral intervention and bargaining games

The description of rights of unilateral modification and cancelation in section 3.2 shows that the public authority can decide renegotiation on his own. Moreover, as he can also impose termination of the contract, conditions under which parties bargain can be supposed to be largely determined by the public authority. As a consequence, modeling renegotiation through Nash bargaining may be put into question. Indeed, under Nash bargaining process, each partner receives a share of the "cake" equal to the utility they individually obtain from not reaching agreement, and then they split equally "the remaining cake", *i.e.* they each obtain 50% of the net additional surplus created by their cooperation (Muthoo [1999]). Such a bargaining game is not necessarily adapted to the situation when a public authority can unilaterally impose renegotiation, and eventually threaten to cancel the contract. This is a crucial point as Nash bargaining game largely determine results obtained in property-rights models. Hart and Moore [2007b] admit that alternative bargaining games can solve the hold-up problem parties face:

> This model, as it stands, has some weaknesses. First, the parties may be able to devise a clever mechanism that overcomes the fact that S's trade is uncertain at date 0. Two such mechanisms have been proposed. In one the parties try to allocate date 1 bargaining power (...) One way to do this is for the parties to agree at date 0 that B has the right to make a take-it-or-leave-it offer to S at date 1. B will propose the efficient service for price just above S's cost and will receive all the surplus. One potential problem with such a scheme is that S might reject B's offer and try to renegotiate a better deal. However, if there is a deadline for trade, B can ignore such a rejection, confident that at the last moment S will accept B's offer, since a small profit is better than nothing.

In case of private goods, several works have shown that alternative bargaining games in property-rights models lead to different results. For instance, Aghion, Dewatripont, and Rey [1994] show that in a business trading, first best incentives can be achieved when the buyer is granted with all the bargaining power, and the seller has three choices: to accept the proposal, to reject it (and the bargaining game continues, with the seller paying a damage payment if the bargaining game finally breaks down), or to select an outside option (which corresponds to no trade).[8] De Meza and Lockwood [1998] propose to include the alternating-offers protocol of Rubinstein [1982] in a model inspired by Hart and Moore [1990], and show that results thus differ.

To go back to the study of public services, a change in the bargaining process may be legitimate. Indeed, Nash bargaining game seems unadapted to renegotiation imposed by public authorities. This is especially the case when public authorities are big enough to change the organizational form of public services at low cost, which makes the threat to cancel the contract all the more credible. To the contrary, the "take-it-or-leave-it" bargaining game (or "ultimatum game") foresees that a proposer makes an offer, that can be either accepted, or rejected by the co-contractor. In the first case, the agreement is struck, otherwise, *i.e.* in case of rejection, this ends the bargaining, and each partner obtains an additional payoff of zero. Such a situation could be imagined in the case of public contracting, and the description of the rights of public authorities given in subsection 3.2 justified such a bargaining game.

Indeed, rights to unilateral modification and cancelation described in subsection 3.2 provide the public authority with all the bargaining power[9], since the public authority can threaten the private operator to use his right to unilateral cancelation

[8]This procedure is likely to be valid only in particular situations, as noted by Hart [1995]. Indeed, it is hard to enforce the procedure, to find anything corresponding to the outside option of no trade and to ensure that the bargaining ends at this point.

[9]The "take-it-or-leave-it" axiomatic differs from the Rubinstein's alternating-offers one to the extent that public authority is automatically the proposer, and there is no selection of the proposer with probability $\frac{1}{2}$. The responder, *i.e.* the private operator, may then accept the proposal, or reject it, which leads to the end of the contractual relationship as the public authority is entitled to cancel contracts in the name of public interest.

and turns to public provision[10], if the latter rejects the proposition.

"Take-it-or-leave-it" game is all the more relevant in a property-rights model about local public services, as another interpretation of the GHM bargaining solution is "as the solution to a simple bargaining game where each manager is selected with equal probability to make a "take-it-or-leave-it" offer to the other" (De Meza and Lockwood [1998]). In the case of public contracting with the legal framework described in section 3.2, the equal probability to be proposer is upset, and the public authority appears as the sole proposer, when it deems to be of public interest.
As a result, whenever the proposed ex post share is superior to zero, he will always prefer to accept the renegotiation, worth zero, rather than reject the proposal. It follows that the public authority needs only to offer the private operator an amount $\varepsilon > 0$ to persuade him to accept its offer. The sub-game perfect equilibrium is such as $\varepsilon \approx 0$. Therefore, the public authority is free to determine the share of the surplus she wants, and can even get all of this surplus.[11]
As the condition $\varepsilon > 0$ can be fulfilled in many ways, many different outcomes can result from the bargaining. Whether public authorities will have a "fair" or "unfair" use of these rights is crucial to find the share of the surplus they will impose. This intuition is consistent with several statements that are to be found in reports by international organizations. For instance, World Bank [2006a] (p. 125) mentions that " arrangements governing private participation include many rules to be interpreted, applied, and enforced (...) Applying these rules requires considerable judgment. Designing an arrangement therefore involves deciding which people, committees, and organizations -that is, which institutions- will interpret and apply

[10]One could think that the threat is not credible, as public provision leads to lower incentives. However, the public authority can still propose $\varepsilon \approx \frac{\lambda(c'(e)-b'(e))}{2}$, so that he becomes indifferent between turning to public provision or bargaining with the private operator. The case of "unfair" use of right of unilateral modification is then all the more possible as $\lambda \to 0$.

[11]Hart [1995] (chapter 4) already proposes to solve the hold-up problem that occurs in trading by granting the buyer 100 per cent of the bargaining power in any contract renegotiation, as exposed above. But in this context, the limits of this solution lie in the difficulties to enforce such a rule. The seller could arrange an informal meeting to recapture some of her bargaining power. However, in the case of contractual agreements between public and private parties, such a situation is no longer possible: the public authority can cancel the contract and turns to public provision.

the rules." Similar conclusions are drawn by International Monetary Fund [2004] (p.15), for which " Political commitment and good governance are prerequisite for success (...) potential private partners need to know that the government is fair in its dealings with the private sector, and will meet the commitments it makes under PPPs".

In accordance with such a perspective, two cases are explored in the following subsections to show how the interpretation of the rules are likely to matter: first, the case of a "fair" public authority that uses his right only to compensate his damages b(e); second, the case of an "unfair" public authority that uses his right to extract all the uncontractible surplus, *i.e.* $\varepsilon \to 0$.

3.4.2 Equilibrium under "fair" unilateral modification

Suppose first that the public authority uses its right of unilateral renegotiation in the "spirit of the law", *i.e.* to defend public interest, and then compensates social damages. Such an interpretation of this right induces that bargaining should lead to transfer only the value of social damages b(e) to the public authority, when a cost-reducing innovation occurs. In other words, the renegotiation process can be derived to a "take-it-or-leave-it" offer, where the public authority ask for full compensation of its damages, else the contract is canceled.

Once investments "e" and "i" have been made, parties are able to renegotiate. The right to unilateral renegotiation can be used only when public interest justifies it. Then, it mainly concerns cost reduction innovations that may have strong adverse effects on social benefits that were not foreseen ex ante.
As a consequence, quality innovations induce renegotiations for the public authority to accept to share the potential gains with the private operator, and then leads to Nash bargaining. However, in case of cost reducing innovations, the public authority can use its right to unilateral modification when b(e) is strong enough. As it also has a right of unilateral cancelation, its bargaining position is the strongest

and leads to a "take-it-or-leave-it" offer, especially when there is no cost to organizational change, as described in the previous subsection.[12]

If the public authority decides to defend public interest by compensating its damages, it can a priori impose a renegotiation to transfer a part of the private operator's gains, that equals $\alpha c(e)$ with $\alpha \in [0,1]$, such as $\alpha c(e) = b(e)$.[13]

As described previously, rights to unilateral modification and cancelation provides the public authority with all the bargaining power. If the private operator rejects the bargaining, this ends the contractual relationship.

As a consequence, payoffs of the parties become:

$$U_E = -P0 + B0 + \tfrac{1}{2}\beta(i_{M3}) - b(e_{M3}) + \alpha c(e_{M3}) \text{ and}$$
$$U_{M3} = P0 - C0 + \tfrac{1}{2}\beta(i_{M3}) + c(e_{M3}) - \alpha c(e_{M3}) - i_{M3} - e_{M3}$$

where e_{M3} and i_{M3} denote the incentives to invest in cost reduction and quality of the private manager, when the public authority "fairly" uses its unilateral rights of renegotiation.

As $\alpha c(e) = b(e)$, the previous equations become:

$$U_E = -P0 + B0 + \tfrac{1}{2}\beta(i_{M3})) \text{ and}$$
$$U_{M3} = P0 - C0 + \tfrac{1}{2}\beta(i_{M3}) + c(e_{M3}) - b(e_{M3}) - i_{M3} - e_{M3}$$

First order conditions give the following incentives to invest:

$$e_{M3} \text{ such as } c'(e_{M3}) - b'(e_{M3}) = 1 \text{ and } i_{M3} \text{ such as } \tfrac{1}{2}\beta'(i_{M3}) = 1$$

[12] There is still no discounting.

[13] It has been earlier proved that c'(e)> $b'(e) \geq 0$.

In other words, first best incentives are achieved for cost reduction innovations thanks to the unilateral right of intervention of the public authority.

Such an interpretation implicitly assumes that public authorities use their right only in defense of public interest and do not take advantage of it beyond the social damages they suffer from. As a consequence, it forces the private operator to fully internalize the externality on social benefits, by forcing renegotiation, while the initial allocation of residual control rights does not foresee such renegotiation. Hence the following proposition:

Proposition 4. *When public authorities:*
(1) support low costs in case of organizational change in public services (so that their threat is credible),
(2) use their right of unilateral contractual modification or cancelation in "the spirit of the law", i.e. to strictly compensate social damages,
first best incentives to reduce cost can be achieved, and provision of public services with private operators is preferable to other organizational structures.

However, one can question the self-limitation of the public authority. If its rights lead it to be the proposer of a "take-it-or-leave-it" offer, as a rational agent, it can impose to appropriate the whole rents of the innovations. This scenario is now explored in the following subsection.

3.4.3 Equilibrium under unfair use of unilateral rights

If public authorities can impose the terms of the renegotiation and support low cost in case of organizational changes, rationality would lead public authorities to extract the whole uncontractible rents, as private operators still prefer to continue the contractual relationship than exercise their outside option, leading to the possible termination of the contract.

Such an outcome corresponds to the theoretical issue of the "ultimatum game".[14]

As a consequence, once investments in research have been made to reduce cost, parties can bargain, since as previously, c(e) and b(e) become verifiable ex post. Then, in the extreme case, the public party can decide to appropriate all of the gains of cost reductions, *i.e.* c(e).

Therefore, payoffs of the parties become:

$$U_{E4} = -P0 + B0 + \tfrac{1}{2}\beta(i_{M4}) + c(e_{M4}) - c(e_{M4}) \text{ and}$$
$$U_{M4} = P0 - C0 + \tfrac{1}{2}\beta(i_{M4}) - b(e_{M4}) - i_{M4} - e_{M4}$$

where e_{M4} and i_{M4} denote the incentives to invest in cost reduction and quality of the private manager, when the public authority "unfairly" uses its unilateral rights of renegotiation.

If the private manager anticipates such an outcome, he has no incentive to invest, hence $e_{M4} = 0$, because he is totally hold up. As unilateral rights of renegotiation cannot be mobilized for quality innovations[15], the following proposition can be established:

Proposition 5. *When:*
(1) Costs to organizational changes are low,
(2) Rights of unilateral contractual modification or cancelation are "unfairly" used by public authorities,
there is no incentive to invest in cost-reducing investments for the private manager.

[14]Descriptions of the Ultimatum game is given by Camerer and Thaler [1995]: "The ultimatum game could not be simpler. Two players are allotted a sum of money. The first player, now often called the Proposer, offers some portion of the money to the second player, called the Responder. If the Responder accepts, she gets what was offered, and the Proposer gets the rest. If the Responder rejects the offer, both players get nothing. This game first attracted attention because the empirical results differed so dramatically from the predictions of game theory, which assumes self-interest."

[15]Remember that specific rights can be used only to protect public interest in case of social damages.

Therefore, rights of unilateral modification and cancelation granted to public authorities have no certain effects on contractual efficiency. These effects mainly depend on the way private operators anticipate their use - or misuse - by public authorities.

3.5 Conclusion of chapter 3

This chapter has focused on the consequences of legal rules governing contracts between public and private partners. This has been surprisingly few explored by the economic literature up to now, especially in the approach of Grossman, Hart and Moore, which is yet a rigorous methodology to determine contractual efficiency. Therefore, our goal was to propose a refinement of the model of Hart, Shleifer, and Vishny [1997] to include legal rules enforcing contracts between public and private partners, and evaluate their impacts on incentives to invest.

First, we observe a growing trend to grant specific rights to public authorities, when they contract with private firms. Focusing on the French case, public authorities may unilaterally modify contractual terms under some conditions, and even cancel contracts, to protect public interest. This represents a strong constraint on private partners. Yet, observations show that such rules are not dissuasive.

To understand this surprising fact, some modifications have been introduced in the model of Hart, Shleifer, and Vishny [1997]. If the private operator decides to implement cost-reducing investments having strong adverse effect on social benefits, the public party may impose some renegotiations to limit this adverse effect. As a consequence, renegotiations occur, while it was not the case under the traditional "private provision" case, where public authorities do not have specific rights. Our first result derived from subsection 3.3.2 shows that such new renegotiations allow to lower incentives to invest in cost-reducing investments with adverse effects on social benefits, and then allow to ameliorate contractual efficiency. Yet, considering both rights of unilateral modification and cancelation, even bargaining conditions may be changed.

Indeed, our second result is to show that if the public authority decides to credibly threaten the private co-contractor, he may impose his own share of the surplus. As shown in section 3.4, the final impact depends on the interpretation of the rules by the public authority (and as anticipated by the private operator). In case of a "fair" use of these rights, this may allow to totally internalize the adverse effect of cost reduction, and then leads to optimal levels of investments. Yet, if public parties

have an "unfair" use of these rights, they may impose to receive the total surplus. This means that the private party is hold up and refuses to invest. Then, right to unilateral modifications can both boost or stop incentives of private operators to innovate. Therefore, final effects depend on:

- Bargaining games
- Cost of organizational change (that makes more or less credible the threat to cancel contracts)
- Fair or unfair use of specific rights

As a consequence, the general conclusion of this chapter is that rules but also anticipations of their uses matter for successful public-private partnerships. On this subject, a report of The Social Market Foundation's Risk Commission [2005] is consistent with this conclusion: "Business, whether publicly or privately owned, needs clarity about the rules of engagement with Government in its widest sense, including legislative and regulatory risk. If the framework is clear, the company is free to concentrate on managing the risks within its own control or sphere of influence, including the delivery of high quality efficient services to customers."

Therefore, there is something more than "the letter of the law" to fully understand the contractual relationship between public and private partners. The following chapter proposes to deepen the analysis on the nature of the contractual relationship by wondering to what extent informal practices - beyond legal requirements - can be sustained in contracts between public and private partners.

Chapter 4

Horizontal Integration and Relational contracting*

" Business dealings are (...) riddled with relational contracts (...) through which the parties reach accomodations when unforeseen or uncontracted-for events occur. Similar relationships also exist horizontally (...) Whether vertical or horizontal, these relational contracts influence the behaviors of firms."

Baker, Gibbons, and Murphy [2002] (p.39)

4.1 Introduction

In the past few decades, the European Union has been promoting private participation and competition in public services, considered as a way to increase efficiency

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in the management of public services.[1] More precisely, in a first horizontal communication of 1996,[2] the Commission explained the interplay for the citizens' benefit between Community measures in the areas of competition and free circulation and public service tasks. It was updated in 2000[3] with a view to increasing the legal certainty for operators as regards the application of competition and internal market rules to their activities. In 2001, these two communications were complemented by a Report to the Laeken European Council.[4] This report responds to concerns with regard to the economic viability of operators entrusted with public service tasks. It highlights the guarantees offered by Article 86 (2) of the Treaty,[5] community action and the responsibility of the Member States, in particular as regards to the definition of public service obligations (European Commission [2003a]).
However, statistics about the management of public services seem rather disconnected with such a trend, aiming to promote competition. Many local public authorities concentrate the various services they have in charge in the hands of a single operator, which a priori minimizes the positive effects of competition. Therefore, it seems that public authorities have been rather convinced to "vertically disintegrate" services (at least in France), but surprisingly enough, have in parallel choose to "horizontally integrate" them.

When observing management practices more precisely, most private operators are global groups capable of providing many local public services. As a consequence, the market for public services is rather oligopolistic, especially for "environmental services" such as water, sanitation, waste or energy managements, as illustrated by table 4.1.

[1] Let us note however that both notions are different: private participation does not necessary mean competition, as a private firm can be a monopole, and competition does not exclude the participation of public firms, that can be in competition with private firms on some markets. In the European union, both private participation and competition are promoted.

[2] "Services of general interest in Europe", OJ C 281, 26.9.1996, p.3

[3] "Services of general interest in Europe", OJ C 17, 19.1.2001, p.4

[4] COM(2001) 598 final, 17.10.2001

[5] Article 86 (2) provides: "Undertakings entrusted with the operation of services of general economic interest ... shall be subject to the rules contained in this Treaty, in particular to the rules on competition, insofar as the application of such rules does not obstruct the performance, in law or in fact, of the particular tasks assigned to them. The development of trade must not be affected to such an extent as would be contrary to the interests of the Community".

Table 4.1: Market shares in % of French urban population, year 2004.

	Water management	Garbage collection and treatment	Urban warming
Veolia	40%	37 %	38 %
Suez	20 %	21 %	47 %
SAUR	10 %	9 %	
Independent operators	1 %	6 %	8%
In house provision	29 %	27 %	7 %

Source: *Direction des affaires économiques internationales, Ministère de l'équipement [2004]*

Therefore, public authorities often rely on the same operator to provide different services they choose to contract out. This seems surprising when one thinks of the egalitarian and transparency principles of the European Union for attribution of markets.[6]

How then to explain the gap between the will to promote competition and the observation of a rather concentrated market for public services? Is competition effective or does it reduce to a goal mentioned in formal official speeches ?
Up to now, few works have been done on this theme. As shown in chapter 1, many works deal with PPPs but focus on their design (Bennett and Iossa [2006]), on the trade-off with public provision (Hart, Shleifer, and Vishny [1997], Hart [2003]), or on factors causing their renegotiation (Guasch, Laffont, and Straub [2003], Guasch [2004]). To our knowledge, no work specifically deals with horizontal integration in PPPs, and the reasons for the concentration of services, with the exception of Gence-Creux [2001]. The latter documents a tendency for local public authorities in France to rely on the same operator for providing several different public services such as water, cable television, garbage collection etc. He shows that a mayor who has electoral concerns may be led to favor a unique manager even though this

[6]Such concentration is not specific to France. In a guide for Nova Scotia Municipalities that might be interested by PPPs (p.9), a warning is written about limited competition: "Where municipalities are seeking to increase private partner participation in services that have been provided by the public partner, there may be a limited number of firms with the experience or expertise to compete for the contract. In such cases, a public monopoly may simply be replaced with a private monopoly that nullifies many of the advantages of a partnership." See $http://gov.ns.ca/snsmr/muns/fin/pdf - ppp/ppp_1.pdf$

choice proves to be inefficient. However, no explanation has been proposed for such market concentration in case of benevolent government.
In this chapter, we try to propose such an explanation by relying on "relational contracts", as defined by Baker, Gibbons, and Murphy [2002] or Baker, Gibbons, and Murphy [2004]. As previously assumed, contractual incompleteness is here taken for granted: Indeed, quality of services public authorities want is often difficult or prohibitively costly to specify in details ex ante, at least in a way to be enforced by courts. As a consequence, renegotiations occur ex post. Yet, parties may also tacitly agree on the way uncontractible parameters can be managed. As these dealings cannot be enforced by courts, their self-enforcement comes from perspectives of future business between partners, and the need for a good reputation. The model we propose gives insights about how several transactions might be "connected" or interrelated, which is a critic that is often addressed to the theoretical approach that focuses on only transaction's characteristics. To be more precise, under some conditions, horizontal integration may force the private manager to respect the informal dealing at lower costs. In such a perspective, horizontal integration appears as an instrument in the service of the parties' relationship.

Section 4.2 develops a model in which a public authority decides to contract out the management of two services, whose uncontractible investments have different impacts on social benefit. The public authority can decide either to "horizontally" integrate the services by delegating them to one single private operator, or she can choose two different managers. The key question here is whether such a choice has consequences on promises about how to deal with non-contractible outcomes. In a static framework, these informal dealings prove to be irrelevant, and whether transactions are horizontally integrated or not has no impact. Private provision leads to optimal incentives for the service with low adverse effect, but over-optimal investments for the service with high adverse effect.
Yet, when parties have concerns for future business, relational contracts can encourage useful actions. This is explored in section 4.3. Indeed, a private partner may accept to invest at a level that is socially optimal, if he is rewarded for such a

behavior, by a bonus or a promise to be chosen again in subsequent periods. His deviation can be punished in the long run. Our results show that with two different services, with and the other without adverse effects of cost reduction on social benefits, horizontal integration disproportionately increases the sanction compared to the gains in case of deviation. In other words, with such a configuration, informal agreements are more easily sustainable when the private manager has both contracts in charge. The bonus the public authority has to pay to achieve the social optimum is then lower, which means that the total price paid to manage both services is lower in case of horizontal integration than in case of horizontal disintegration.

Section 4.4 then proposes to test such a proposition on an original database combining data from the French Environment Institute (IFEN) and the French Health Ministry (DGS), on 5000 local public authorities in 1998 and 2001. Results show that the choice of the same operator in order to operate both distribution and sanitation of water is not neutral.

4.2 The theoretical model

4.2.1 The general framework

To study the issues at stake, we build a theoretical framework based on Hart et al. [1997], but we include two services. In this subsection, we give some precisions about the modifications of the general framework adopted in the other chapters. Indeed, we assume here that a benevolent public authority (PA, to whom we will refer to as "she") is in charge of providing two public services to users. We denote these services as $\mathscr{A}$ and $\mathscr{B}$. To provide the services in question, we assume that PA has to rely on external operators through the use of contracts.[7]

More specifically, we assume that *ex ante*, PA may describe and specify in a contract some aspects of the provision of a good. However, when executing the contract, the private operator of a service may come up with new innovative ways to adapt the service to users' need, or to reduce the costs of provision of these services. Such innovations are often difficult and costly to anticipate *ex ante*, which leads to some contractual incompleteness as defined in chapter 1. Hence, when such innovations turn up, parties will revise the contract ex post when it is clear to them how the relevant contingencies are.

4.2.1.1 Production technologies

To fix our ideas, we will assumed that, *ex ante*, for a given service, the cost of provision incurred by an operator is C_s^0, $s \in \{\mathscr{A}, \mathscr{B}\}$. For simplicity's sake, this cost is assumed to be the same for all operators, and it is known to all. In the same way, we denote the benefits to society that come from the provision of the basic service s as B_s^0, $s \in \{\mathscr{A}, \mathscr{B}\}$. Following Hart, Shleifer, and Vishny [1997] recalled in chapter 1, we call this good the "basic" good, and denote its price P_s^0.

[7] Contrary to Hart, Shleifer, and Vishny [1997], we will not consider the public provision case, to focus on horizontal integration and disintegration when contracting out.

Yet, operators may undertake efforts to innovate on the service provided during the execution phase. Two types of innovations are considered: innovations that lead to a reduction in costs, and innovations that lead to a better quality of the provided service. Efforts devoted to cost-reducing innovations (resp. quality-enhancing innovations) for a given service s are denoted e_s (resp. i_s), $s \in \{\mathscr{A}, \mathscr{B}\}$. Upon implementing the innovations, the social benefits and costs of providing a given service s become

$$\begin{aligned} B_s &= B_s^0 - b_s(e_s) + \beta_s(i_s) \\ C_s &= C_s^0 - c_s(e_s) - i_s - e_s \end{aligned}$$

where $c_s(e_s) \geq 0$ is the reduction in costs corresponding to the cost innovation for service s, $b_s(e_s) \geq 0$ is the reduction in quality corresponding to the cost innovations for service s, and $\beta_s(i_s)$ is the quality increases net of costs from the quality innovations for service s, $s \in \{\mathscr{A}, \mathscr{B}\}$. The function b_s measures how much quality is affected because of a (noncontractible) reduction of costs for service s.

For our purpose, we assume that service $\mathscr{A}$ and $\mathscr{B}$ differ in terms of the perspectives for cost-reducing innovations and quality-enhancing innovations. In particular, we assume that for service $\mathscr{A}$, there are no perspective for quality-enhancing innovations, and that costs reductions do not have any impact on the quality of the service provided. In other words, $b_{\mathscr{A}}(e_{\mathscr{A}}) = 0$ and $\beta_{\mathscr{A}}(i_{\mathscr{A}}) = 0$. On the other hand, the perspectives of innovation for service $\mathscr{B}$ and their impact on costs and social benefits to the society correspond to the classical case analyzed in Hart, Shleifer, and Vishny [1997], *i.e.* include adverse effects in case of cost reduction, and potential quality innovations. This assumption is meant to capture the fact that cost-reducing perspectives and quality-enhancing opportunities differ across different services. Notice that we also assume that both services are not related in any way.

In accordance with Hart, Shleifer, and Vishny [1997], we make the following standard assumptions on c_s, $b_{\mathscr{B}}$ and $\beta_{\mathscr{B}}$: $b_{\mathscr{B}}(0) = 0$, $b'_{\mathscr{B}}(e_{\mathscr{B}}) \geq 0$, $b''_{\mathscr{B}}(e^{\mathscr{B}}) \geq 0$; $c_s(0) = 0$, $c'_s(0) = \infty$, $c'_s(e_s) > 0$, $c''_s(e_s) < 0$, $c'_s(\infty) = 0$; $\beta_{\mathscr{B}}(0) = 0$, $\beta'_{\mathscr{B}}(0) = \infty$,

$\beta''_{\mathscr{B}}(i_{\mathscr{B}}) > 0$, $\beta''_{\mathscr{B}}(i_{\mathscr{B}}) < 0$, $\beta'(\infty) = 0$; $c'_{\mathscr{B}}(e_{\mathscr{B}}) - b'_{\mathscr{B}}(e_{\mathscr{B}}) \geq 0$. The assumptions $c'_{\mathscr{B}}(e_{\mathscr{B}}) - b'_{\mathscr{B}}(e_{\mathscr{B}}) \geq 0$ and $\beta'_{\mathscr{B}}(i_{\mathscr{B}}) > 0$ say that the quality reduction from a cost innovation for service $\mathscr{B}$ does not offset the quality increase.

An operator's overall *ex ante* costs can therefore be written as follows:

$$\begin{aligned} \text{For service } \mathscr{A} &: C^0_{\mathscr{A}} - c_{\mathscr{A}}(e_{\mathscr{A}}) + e_{\mathscr{A}} \\ \text{For service } \mathscr{B} &: C^0_{\mathscr{B}} - c_{\mathscr{B}}(e_{\mathscr{B}}) + e_{\mathscr{B}} + i_{\mathscr{B}} \end{aligned}$$

4.2.1.2 Contracts

Following the literature, we further assume that $i_{\mathscr{B}}$, , $b_{\mathscr{B}}$, $\beta_{\mathscr{B}}$, e_s and c_s, with $s \in \{\mathscr{A}, \mathscr{B}\}$, are observable to the contracting parties, but are not verifiable to outsiders (such as a court). Therefore, these variables cannot be part of an enforceable contract. Furthermore, since these variables are not contractible *ex ante*, PA and the private operator(s) may renegotiate the initial contract, once the innovations are discovered. Similar with Hart, Shleifer, and Vishny [1997], we assume that if the parties renegotiate the contract *ex post*, the gains from renegotiation are divided between them according to Nash bargaining outcome. The timing of the one shot static game is depicted in the following figure.

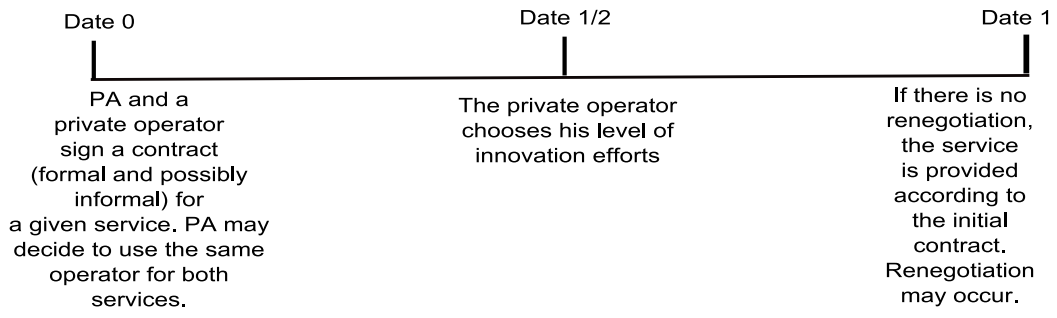


Figure 4.1: Timing of the game

However, PA may proposes an additional informal contract to the operator to share the gains from innovation that are not contracted on ex ante, thus avoiding *ex post* renegotiations. An informal contract here aims to motivate the operator to achieve first-best levels of investments e_s and i_s, in exchange of a supplementary monetary transfer, denoted T_s from PA to the operator of a given service s. Such a contract, however, may not be enforced by any third party, since innovative efforts are non-verifiable. Consistent with the economic literature, an informal contract is self-enforcing for each party if the payoff stream from cooperation is higher than the payoff stream from deviation (Baker, Gibbons, and Murphy [2002], Baker, Gibbons, and Murphy [2004]). As such the informal contract that we discuss in this paper corresponds to a relational contract. We model such an aspect using a repeated game framework, in which an informal contract is consider to be self-enforcing in the shadow of the future. This issue will be further discussed later on in section 4.3.

Hence, in our framework, PA is confronted with the decision to whether use a same private operator (horizontal integration) to ensure the provision of both services, or to delegate the provision of both services to two different operators (horizontal disintegration). In other words, PA may choose to bundle the provision of both services or not. We suppose that PA is benevolent, and then will take these decisions to maximize consumers' surplus.[8]

4.2.2 The first best

First, we will briefly derive the first-best case to serve as a benchmark. In this situation, we assume contractual completeness for e_s and i_s.
We adapt here the results mentioned in section 1.3 of chapter 1, contracting parties

[8] As in HSV [1997], the public authority does not maximize the global surplus during renegotiations: its utility function is given by the welfare of the rest of society, excluding the manager M. Indeed, " The political process aligns G's and society's interests (since M has negligible voting power, his interests receive negligible weight). As will become clear, if G placed the same weight on M's utility as on the rest of society, the first-best could be achieved".

will choose e_s and i_s to maximize total net surplus from their reading relationship, and divide the surplus between themselves using lump-sum transfers. As a consequence, first-best incentives are those maximizing:

$$\max_{e_s,i_s} \quad [-b_s(e_s) + c_s(e_s) + \beta_s(i_s) - e_s - i_s]$$

The first best level of efforts for cost-reducing innovations e_s^{FB} and for quality-enhancing innovations i_s^{FB} for service s are therefore characterized by the following:

$$\begin{aligned} b_s'(e_s^{FB}) - c_s'(e_s^{FB}) &= 1 \\ \beta_s'(i_s^{FB}) &= 1 \end{aligned}$$

This leads to the first-best surplus for each service:

$$S^{FB} = B_s^0 - C_s^0 + \beta_s(i_s^{FB}) + c_s(e_s^{FB}) - b_s(e_s^{FB}) - e_s^{FB} - i_s^{FB}$$

4.2.3 The one-shot game

In chapter 1, we show that, using Nash bargaining games, private provision leads to the following payoffs:
For the public authority:

$$U_s^{PA} = B_s^0 - P_s^0 + \frac{1}{2}\beta_s(i_s) - b_s(e_s)$$

and for the private operator: $U_s^{M_s}$ is

$$U_s^{M_s} = P_s^0 - C_s^0 + \frac{1}{2}\beta_s(i_s) + c_s(e_s) - e_s - i_s$$

Maximizing his utility, the private operator of service s chooses e_s^{NB} and i_s^{NB} to satisfy

$$\begin{aligned} c_s'(e_s^{NB}) &= 1 \\ \frac{1}{2}\beta_s'(i_s^{NB}) &= 1 \end{aligned}$$

Hence, if we compare these results to the first-best case, we see that for service $\mathscr{A}$, the efforts devoted to the cost-reducing innovations are optimal. Indeed, as $b_{\mathscr{A}}(e_{\mathscr{A}}) = 0$ and $\beta_{\mathscr{A}}(i) = 0$, then $c'_{\mathscr{A}}(e^{NB}_{\mathscr{A}}) - b'_{\mathscr{A}}(e^{NB}_{\mathscr{A}}) \rightarrow c'_{\mathscr{A}}(e^{NB}_{\mathscr{A}})$. Therefore, incentives to reduce costs achieve optimal levels for service $\mathscr{A}$.

However, for the service $\mathscr{B}$, contractual incompleteness leads to overoptimal incentives for efforts devoted to cost-reducing innovations, and under-provision of efforts devoted to quality-enhancing innovations, as shown by Hart, Shleifer, and Vishny [1997]. This is because the private operator does not internalize sufficiently the negative effect of cost-reducing innovations for society, and his incentives for quality-enhancing innovations are dampened by the fact that he only gets half of the benefits of those innovations at the margin.

The total surplus for contract $\mathscr{A}$ is in this case:

$$S^{NB}_{\mathscr{A}} \quad = \quad B^0_{\mathscr{A}} - C^0_{\mathscr{A}} + c_{\mathscr{A}}(e^{NB}_{\mathscr{A}}) - e^{NB}_{\mathscr{A}}$$

as $\beta_{\mathscr{A}}(i_{\mathscr{A}}) = 0$ and $b_{\mathscr{A}}(e_{\mathscr{A}}) = 0$.

and for contract $\mathscr{B}$:

$$S^{NB}_{\mathscr{B}} \quad = \quad B^0_{\mathscr{B}} - C^0_{\mathscr{B}} + c_{\mathscr{B}}(e^{NB}_{\mathscr{B}}) + \beta_{\mathscr{B}}(i^{NB}_{\mathscr{B}}) - b_{\mathscr{B}}(e^{NB}_{\mathscr{B}}) - e^{NB}_{\mathscr{B}} - i^{NB}_{\mathscr{B}}$$

Granting both contracts to the same operator has *a priori* no effect. Indeed, in such a case, PA's utility function is written

$$U^{PA}_{\mathscr{A}+\mathscr{B}} = [B^0_{\mathscr{A}} - P^0_{\mathscr{A}}] + [B^0_{\mathscr{B}} - P^0_{\mathscr{B}} + \frac{1}{2}\beta_{\mathscr{B}}(e_{\mathscr{B}}) - b_{\mathscr{A}}(e_{\mathscr{A}})]$$

and operator M's utility function is:

$$U^{M}_{\mathscr{A}+\mathscr{B}} = [P^0_{\mathscr{A}} - C^0_{\mathscr{A}} + c_{\mathscr{A}}(e_{\mathscr{A}}) - e_{\mathscr{A}}] + [P^0_{\mathscr{B}} - C^0_{\mathscr{B}} + \frac{1}{2}\beta_{\mathscr{B}}(i_{\mathscr{B}}) + c_{\mathscr{B}}(e_{\mathscr{B}}) - e_{\mathscr{B}} - i_{\mathscr{B}}]$$

A utility-maximizing operator M will choose $e^{NB}_{\mathscr{A}}$, $e^{NB}_{\mathscr{B}}$ and $i^{NB}_{\mathscr{B}}$ to satisfy the

following first order conditions

$$\begin{aligned} c'_{\mathscr{A}}(e^{NB}_{\mathscr{A}}) &= 1 \\ c'_{\mathscr{B}}(e^{NB}_{\mathscr{B}}) &= 1 \\ \frac{1}{2}\beta'_{\mathscr{B}}(i^{NB}_{\mathscr{B}}) &= 1 \end{aligned}$$

All this is resumed in the following proposition.

Proposition 1. *Under a static game, with two services, one with and the other without adverse effects on quality when reducing costs, it is irrelevant for a public authority to consider granting contracts to a same operator or to different operators.*

The proposition above is rather straightforward, given our assumption that the services are not related in any way.

4.3 The repeated game framework

When the agents are in a long term relationship and care about the future, the lack of incentives to invest in i and the over-optimal incentive to invest in e should not be so severe. Such an intuition is based on recent developments on "relational contracts" (Baker, Gibbons, and Murphy [2002], Baker, Gibbons, and Murphy [2004]), *i.e.* informal agreements about observable but non verifiable parameters sustained by the value of future relationships.[9] These works demonstrate that incentives derived from various allocations of ownership may change when concerns for future are taken into account. To this end, the authors use repeated-game models, and show how incentives vary, and how the underpinning informal dealings become self-enforced.

We will follow here such an approach by appealing to the grim trigger strategies framework developed by Friedman [1971]. A period in our framework is considered as a contract's duration. As a consequence, at each period, the public authority can choose to pursuit or to stop the relationship. The discount factor is denoted $0 \leq \delta \leq 1$. Following Halonen [2002], we suppose that parties implicitly agree to make efficient investments, and to share total ex post surplus.

For service $\mathscr{A}$, the first-best is reached even in a static game as shown in the previous section. Therefore, there is no need of a relational contract to achieve optimal levels of efforts devoted to innovation. However, this is not the case for service $\mathscr{B}$, where private provision leads to over-optimal incentives to reduce costs, as the adverse effect is not internalized by the private manager, and to under-optimal incentives for quality-enhancing investments.
For this service, we therefore suppose that the private manager implicitly agrees to make the first best levels of efforts devoted to innovation e^{FB} and i^{FB}, *i.e.* levels of efforts that maximizes total surplus, but do not maximizes his own utility. As a result, the PA's utility is increased, as the adverse effect from cost-reducing

[9] Bull [1987] and Klein [1988] also suggest that reputation effects can limit holdup problems.

innovations is internalized. Let us denote $U_{\mathscr{B}}^{M_{\mathscr{B}},FB}$ and $U_{\mathscr{B}}^{PA,FB}$ the utilities of the operator for service $\mathscr{B}$ and of the PA when first-best investments are made during the management of service $\mathscr{B}$. To compensate the decrease in utility of the private operator, the PA gives him a transfer $T_{\mathscr{B}}$ that is paid at the end of each period, *i.e.* when levels of efforts become observable by parties. In case of relational contracting, final payoffs of each party are then:

$$\begin{aligned} U_{\mathscr{B}}^{M_{\mathscr{B}},R} &= U_{\mathscr{B}}^{M_{\mathscr{B}},FB} + T_{\mathscr{B}} \\ U_{\mathscr{B}}^{PA,R} &= U_{\mathscr{B}}^{PA,FB} - T_{\mathscr{B}} \end{aligned}$$

Note that the only relevant information about the previous period is whether there was or not deviation. It then remains to determine what kind of transfer $T_{\mathscr{B}}$ (*i.e.* sharing of the surplus) allows such a relational contract to be respected by both contracting partners.[10] To this end, let us first precise what the trigger strategy means here:

- Either each partner accepts the relational agreement, ie the private manager makes optimal levels of investments. He receives a transfer from the public authority. There is no reason for the relationship to be stopped as first-best is achieved.

- Else, one of the partners reneges. If the private operator cheats, he prefers to invest to maximize his own utility, *i.e.* he prefers to have $U_{\mathscr{B}}^{M_{\mathscr{B}},NB}$ than $U_{\mathscr{B}}^{M_{\mathscr{B}},R}$. However, from this point, he is no longer considered as trustworthy. This means that the PA will select him again for the subsequent periods with a probability $0 \leq p \leq 1$, and will refuse to contract with him with a probability $(1-p)$.[11]

[10] Such a transfer can correspond to a price increase during the execution of the contract.

[11] What happens in case of reneging is that the public authority is free to decide to stop the game with the private manager (and then turn to public provision or choose another private manager), or to continue the relationship, *i.e.* to select him again but without informal dealings, as the private manager is now considered as not trustworthy. For instance, we can suppose that

If the public authority reneges, *i.e.* refuses to give the transfer while the private manager has made first-best incentives, then the latter applies nash bargaining rules for the rest of the game. If he is chosen for the following periods, he will not accept any informal dealing, and returns to the non-cooperative solution.

As in the static game, $P^0_{\mathscr{B}}$ represents the (*ex ante*) price paid by the public authority to the private manager to provide the service. As $T_{\mathscr{B}}$ is the *ex post* transfer given to the private manager, the total price paid by the public authority when relational contracting is honored on both sides is $P^0_{\mathscr{B}} + T_{\mathscr{B}}$ for service $\mathscr{B}$.

First best will be supported in equilibrium only if the discounted payoff stream from efficient behavior exceeds the payoff stream from the deviation path for both agents. We will show that when two contracts - one with and the other without adverse effect - are signed by the same partners, the level of transfer $T_{\mathscr{B}}$ is lower than when only one contract is delegated. As a consequence, the total price is lower in case of "horizontal integration" than in case of "horizontal disintegration".

4.3.1 Horizontal disintegration: A different operator for each service

4.3.1.1 Share of the uncontractible surplus

Suppose that the public authority has chosen a different operator for each service. For the service $\mathscr{A}$, there is no relational agreement to implement to achieve first-best, as incentives of the private manager correspond to the optimal levels, even in the one-shot game. The total price paid by the public authority is then $P^0_{\mathscr{A}}$, as described in the previous part.

the market is oligopolistic, and there is no other alternative than this private manager, or the costs to go back to the public provision are too high. To model such an alternative, there is a probability that affects reversion to Nash equilibrium of the static game as "punishment". Hence, the parameter $(1-p)$ allows us to capture outside options available to PA should he decide to change for another operator at the end of the contract.

For service $\mathscr{B}$, first-best levels of incentives are achieved if the relational contract described above is implemented. Beyond the formal contract signed *ex ante* for a price $P^0_{\mathscr{B}}$, an informal dealing is agreed on by the partners. Let us denote $T_{\mathscr{B}}$ the transfer of the public authority to the private manager in such a case. We try to determine the level of such a transfer.[12] As just mentioned, first-best will be supported in equilibrium if, for both partners, the discounted payoff stream is higher under relational contracting than under the deviation path, *i.e.* :

- for the private manager:

$$\frac{U_{\mathscr{B}}^{M_{\mathscr{B}},FB} + T_{\mathscr{B}}}{1-\delta} \geq U_{\mathscr{B}}^{M_{\mathscr{B}},NB} + \frac{\delta p U_{\mathscr{B}}^{M_{\mathscr{B}},NB}}{1-\delta} \tag{4.1}$$

  Indeed, the private manager obtains $U_{\mathscr{B}}^{M_{\mathscr{B}},NB}$ when he deviates, and then receives $\frac{\delta p U_{\mathscr{B}}^{M_{\mathscr{B}},NB}}{1-\delta}$ (See appendix for demonstration).

- for the public authority:

$$\frac{U_{\mathscr{B}}^{PA_{\mathscr{B}},FB} - T_{\mathscr{B}}}{1-\delta} \geq U_{\mathscr{B}}^{PA_{\mathscr{B}},FB} + \frac{\delta p U_{\mathscr{B}}^{PA_{\mathscr{B}},NB}}{1-\delta} + \frac{\delta(1-p) U_{\mathscr{B}}^{PA_{\mathscr{B}},oo}}{1-\delta} \tag{4.2}$$

  where $U_{\mathscr{B}}^{PA_{\mathscr{B}},00}$ represents the utility of the public authority derived from her outside option, *i.e.* either public provision or the selection of another private manager for the next periods (with or without informal dealings). Gain from deviation for the public authority is $U_{\mathscr{B}}^{PA_{\mathscr{B}},FB}$, as he chooses not to give the transfer to the private manager the bonus and benefits from the optimal investments. It follows that the private manager will no longer trust the PA if he is selected again (with probability p) for the next periods.

[12] One could argue that the threat of the sanction is strong enough to dissuade the private operator from reneging. This is true when $p \to 0$, i.e. the public authority can get rid of the private manager forever. But, when $p \to 1$, as discussed in the previous footnote, then the threat is not strong enough and a bonus is needed. Comparative statistics on results of the following subsection will show that $\frac{dT}{dp} > 0$, then the higher p is, the highest T has to be.

Equation 4.1 leads to:

$$\begin{aligned} \frac{U_{\mathscr{B}}^{M_{\mathscr{B}},FB} + T_{\mathscr{B}}}{1-\delta} &\geq U_{\mathscr{B}}^{M_{\mathscr{B}},NB} + \frac{\delta p U_{\mathscr{B}}^{M_{\mathscr{B}},NB}}{1-\delta} \\ U_{\mathscr{B}}^{M_{\mathscr{B}},FB} + T_{\mathscr{B}} &\geq U_{\mathscr{B}}^{M_{\mathscr{B}},NB}(1-\delta) + \delta p U_{\mathscr{B}}^{M_{\mathscr{B}},NB} \end{aligned}$$

$$T_{\mathscr{B}} \geq \delta(p-1)U_{\mathscr{B}}^{M_{\mathscr{B}},NB} + U_{\mathscr{B}}^{M_{\mathscr{B}},NB} - U_{\mathscr{B}}^{M_{\mathscr{B}},FB} \tag{4.3}$$

As a result, when $T_{\mathscr{B}}$, *i.e.* the bonus paid by the public authority to the private manager when the relational contract is honored, is at least equal to $\delta(p-1)U_{\mathscr{B}}^{M_{\mathscr{B}},NB} + U_{\mathscr{B}}^{M_{\mathscr{B}},NB} - U_{\mathscr{B}}^{M_{\mathscr{B}},FB}$, the relational contract is self-enforced for the private manager.[13] Then, equation 4.3 is the incentive compatibility for the private manager.

Let us note that the lower the transfer is, the lower temptations to deviate are for the other partner that has to give the amount of transfer. Moreover, since PA only cares about consumers' surplus, she will have an interest to pay the lowest possible transfer.[14] Therefore, $T_{\mathscr{B}}^*$ is such as 4.3 is just satisfied, *i.e.* :

$$T_{\mathscr{B}}^* = [\delta(p-1)]U_{\mathscr{B}}^{M_{\mathscr{B}},NB} + U_{\mathscr{B}}^{M_{\mathscr{B}},NB} - U_{\mathscr{B}}^{M_{\mathscr{B}},FB}$$

4.3.1.2 Total cost for the public authority

The total total cost for PA to provide both services is then:

- $P_{\mathscr{A}}^0$ for the service $\mathscr{A}$
- $P_{\mathscr{B}}^0 + T_{\mathscr{B}}^*$, *i.e.* the *ex ante* price $P_{\mathscr{B}}^0$ and the *ex post* surplus, for service $\mathscr{B}$

[13] Note that in this case, $U_{\mathscr{B}}^{M_{\mathscr{B}},R} = U_{\mathscr{B}}^{M_{\mathscr{B}},FB} + T_{\mathscr{B}}$, *i.e.* $U_{\mathscr{B}}^{M_{\mathscr{B}},R} = \delta(p-1)U_{\mathscr{B}}^{M_{\mathscr{B}},NB} + U_{\mathscr{B}}^{M_{\mathscr{B}},NB}$

[14] Indeed, we may think that benefits from the optimal management of public services dedicated to public interest is sufficiently high that PA would have adequate incentives to respect her end of the dealing, *i.e.* to pay the minimum amount of bonus necessary to provide the private operator with incentives to undertake the investment efforts. This can be seen from the fact that the PA's outside option cannot enable her to achieve the first-best situation if she does not honor the informal contract. However, we are aware that this assumption may be too restrictive, and we intend to explore this issue in more details in the near future.

Denoting P^D such a cost, we have $P^D = P^0_{\mathscr{A}} + P^0_{\mathscr{B}} + T^*_{\mathscr{B}}$.

4.3.2 Horizontal integration: A same private operator

4.3.2.1 Share of the uncontractible surplus

Suppose now that both services are bundled, *i.e.* a same private operator is managing them. Let us determine the sharing rule $T_{\mathscr{A}+\mathscr{B}}$ of the surplus that allows to make relational contract self-enforced.

In a similar way to the previous case, the private manager either accepts the sharing rule $T_{\mathscr{A}+\mathscr{B}}$, or deviates and prefers Nash bargaining rules. As a consequence, the public authority will select him again for each service with a probability $0 \leq p \leq 1$. Yet, contrary to the case of horizontal disintegration, punishment is here applied to both contracts: when the private partner deviate, the public authority applies his sanction, *i.e.* the probability p to be chosen again at subsequent periods, on contracts for both service $\mathscr{A}$ and $\mathscr{B}$.

As a consequence, when the informal dealing is respected, the private manager's utility $U^{M,R}_{\mathscr{A}+\mathscr{B}}$ is:

- The utility derived from the contract for service $\mathscr{A}$, *i.e.* $U^{M,FB}_{\mathscr{A}} = U^{M,NB}_{\mathscr{A}}$, as first-best is achieved through Nash bargaining
- And the utility of the second contract with first-best investments plus the bonus, *i.e.* $U^{M,FB}_{\mathscr{B}} + T_{\mathscr{A}+\mathscr{B}}$

As a consequence, $U^{M,R}_{\mathscr{A}+\mathscr{B}} = U^{M,NB}_{\mathscr{A}} + U^{M,FB}_{\mathscr{B}} + T_{\mathscr{A}+\mathscr{B}}$.

In case of deviation, he gains on the contract for service $\mathscr{B}$[15], *i.e.* $U^{M,NB}_{\mathscr{B}}$, but would

[15]Recall that for service $\mathscr{A}$, the Nash solution for the operator corresponds to the first-best, so there is no deviation as such.

be selected again for the other periods with a probability p, for both contracts. As a result, the private manager honors his informal agreement when:

$$\begin{aligned}
\frac{U_{\mathscr{A}}^{M,NB} + UM_{\mathscr{B}}^{M,FB} + T_{\mathscr{A}+\mathscr{B}}}{1-\delta} &\geq (U_{\mathscr{A}}^{M,NB} + U_{\mathscr{B}}^{M,NB}) + \frac{p\delta(U_{\mathscr{A}}^{M,NB} + U_{\mathscr{B}}^{M,NB})}{1-\delta} \\
U_{\mathscr{A}}^{M,NB} + UM_{\mathscr{B}}^{M,FB} + T_{\mathscr{A}+\mathscr{B}} &\geq (U_{\mathscr{A}}^{M,NB} + U_{\mathscr{B}}^{M,NB})(1-\delta) + p\delta(U_{\mathscr{A}}^{M,NB} + U_{\mathscr{B}}^{M,NB}) \\
T_{\mathscr{A}+\mathscr{B}} &\geq (U_{\mathscr{A}}^{M,NB} + U_{\mathscr{B}}^{M,NB})\delta(p-1) + (U_{\mathscr{B}}^{M,NB} - UM_{\mathscr{B}}^{M,FB})
\end{aligned}$$

In the same way as our discussion above, PA will want to choose the lowest possible amount of transfer in order to maximize consumers' surplus. Furthermore, the lower the transfer is, the lower temptations to deviate are for the public authority that has to give the amount of transfer. As a consequence, when both contracts are bundled:

$$T_{\mathscr{A}+\mathscr{B}}^{*} = (U_{\mathscr{A}}^{M,NB} + U_{\mathscr{B}}^{M,NB})\delta(p-1) + (U_{\mathscr{B}}^{M,NB} - UM_{\mathscr{B}}^{M,FB})$$

Let us now compare horizontal integration and disintegration.

4.3.2.2 Total cost for the public authority

In case of horizontal integration, the total cost for PA is therefore:

- $P_{\mathscr{A}}^{0}$ for the service $\mathscr{A}$
- $P_{\mathscr{B}}^{0} + T_{\mathscr{A}+\mathscr{B}}$, *i.e.* the *ex ante* price $P_{\mathscr{B}}^{0}$ and the *ex post* surplus, for the service $\mathscr{B}$

Denoting P^{I} such a cost, we have $P^{I} = P_{\mathscr{A}}^{0} + P_{\mathscr{B}}^{0} + T_{\mathscr{A}+\mathscr{B}}$.

4.3.3 Cost comparison and proposition

Let us now compare the total cost in each cases:

- In case of horizontal disintegration, the total cost paid by the public authority is $P^D = P^0_{\mathscr{A}} + P^0_{\mathscr{B}} + T^*_{\mathscr{B}}$, *i.e.*

$$P^D = P^0_{\mathscr{A}} + P^0_{\mathscr{B}} + \delta(p-1)U^{M_{\mathscr{B}},NB}_{\mathscr{B}} + U^{M_{\mathscr{B}},NB}_{\mathscr{B}} - U^{M_{\mathscr{B}},FB}_{\mathscr{B}}$$

- In case of horizontal integration, the total cost paid by the public authority is $P^I = P^0_{\mathscr{A}} + P^0_{\mathscr{B}} + T_{\mathscr{A}+\mathscr{B}}$, *i.e.*

$$P^I = P^0_{\mathscr{A}} + P^0_{\mathscr{B}} + \delta(p-1)(U^{M,NB}_{\mathscr{A}} + U^{M,NB}_{\mathscr{B}}) + (U^{M,NB}_{\mathscr{B}} - UM^{M,FB}_{\mathscr{B}})$$

Parameters defining P^I and P^D are the same ex ante prices $P^0_{\mathscr{A}} + P^0_{\mathscr{B}}$, and the same final terms $U^{M,NB}_{\mathscr{B}} - UM^{M,FB}_{\mathscr{B}}$. Differences are then the first terms on the right of the equation $(U^{M,NB}_{\mathscr{A}} + U^{M,NB}_{\mathscr{B}})\delta(p-1)$ and $\delta(p-1)U^{M_{\mathscr{B}},NB}_{\mathscr{B}}$.

With $0 \leq p \leq 1$, $(U^{M,NB}_{\mathscr{A}} + U^{M,NB}_{\mathscr{B}})\delta(p-1) \leq \delta(p-1)U^{M_{\mathscr{B}},NB}_{\mathscr{B}}$, then $P^I \leq P^D$.

Proposition 2. *When two services - one with and another without adverse effect- are concentrated in the hands of one single operator, it may lead to lower prices to pay, compared to the situation where both services are contracted out to different private firms.*

In the following section, we propose an empirical analysis to see whether this result is consistent with what can be observed in some data about water sector.

4.4 An empirical analysis of horizontal concentration in the French water sector

4.4.1 Putting the Model to the test

Before turning to the empirical analysis, we address some preliminary issues of interpretation. Our baseline model focus on two types of services, one with and the other without adverse effect on quality in case of uncontractible cost reduction. It points out that horizontal integration, *i.e.* the provision of both services by the same private operator, facilitates the enforcement of relational contracts.
Putting our theory to the test implies to find at least one service whose uncontractible cost-reducing investments do not impact on quality. This is a very strong empirical challenge, as it implies some "limited" contractual incompleteness: cost-reducing investments could not be contracted on ex ante, but would never damage quality. It seems to us extremely difficult to find a service with such characteristics. Yet, data at our disposal give information about two services, one whose uncontractible cost reductions are likely to entail strong adverse effects on quality, while the other is likely to generate weak adverse effects. Matching our theory to the data therefore requires us to extend our proposition to generate a prediction that can be tested in an empirical study. We will then consider that **when two services - one with *high* and the other with *low* adverse effects on quality in case of uncontractible cost reduction - prices paid by public authority are likely to be lower in case of horizontal integration than in case of horizontal disintegration**. To evaluate the empirical relevance of such a proposition, we draw our attention to the French water sector. Let us now justify why it provides us a particular interesting empirical testing ground for our study.

There are two types of water services that a municipality has to provide to consumers: drinking water services and waste water (or sanitation) services. The provision of the former service involves producing and distributing drinking water to the population, while the latter involves collecting used water and treating it in

an adequate way. Moreover, we observe that generally, firms that provide one of these services can provide the other service.

Furthermore, it seems that quality is a more sensible topic of concern for drinking water than for waste water services. Sanitary risks exist in both cases but because of public safety dimensions related to drinking water, the population is more able to observe quality in this service than in waste water service. As a consequence, municipalities may be more concerned with providing adequate incentives to ensure the quality of drinking water provided to the population, in contrast with the quality of treatment for waste water. This may be seen from the number of norms that regulate the quality of drinking water and for the quality of waste water. For instance, in Europe, the European Council Directive 98/83/EC (Official Journal OJ L 330 of 05.12.1998) of 3 November 1998 on the quality of water intended for human consumption defines a number of about 53 norms that drinking water is subjected to. In contrast, the European Council Directive 91/271/EEC of 21 May 1991 concerning urban waste water treatment defines only about 5 norms for waste water treatment. This may also suggests that control for quality in drinking water can be costly and more complicated than for waste water. We may therefore think that adverse quality effects may be more limited in waste water services than drinking water services. As such, the industry is close to the theoretical case which we study.

The French case is also interesting because of the "*intuitu personae*" principle that regulates PPP contracts. Indeed, while a municipality has to organize a call for tender if it wishes to attribute a contract to an external operator, it is not legally obliged to publish any objective or subjective criteria for selecting the winning tender (Auby [1997]). Hence municipalities have a greater latitude in selecting a private partner, making it easier for them to use the same operator for the provision of various services and to propose relational contracting.

Our theoretical model points out that horizontal integration may be a means to

enhance the efficiency of relational contracts. Empirically, this implies that prices for drinking water services should be lower when the same operator is being used to provide for both types of water services. This is what we seek to verify in the data.

In the following, we will briefly discuss our data and our empirical methodology before presenting the results of our empirical study.

4.4.2 The Data

In order to test our propositions, we have developed a unique dataset by combining data from the French Environment Institute (IFEN) and the French Health Ministry (DGS), on 5000 local public authorities in 1998 and 2001.[16] This sample is representative the total population of French local public authorities: all sizes of local authorities are proportionally represented, with the exception of large local authorities that are all included in the sample. Local authorities may make different organizational choices for water production and distribution, so we restrict to observations where water production and distribution are organized in the same way (*i.e.* through exactly the same type of contractual arrangement). This reduces our sample to 4443 observations. Eliminating observations with missing data, further reduces the sample to 3650. We then restrict our database to the public private partnerships observations (1866 observations). The unit of observation is a municipality. The following table (table 4.2) provides definitions of all variables used in the empirical model along with descriptive statistics

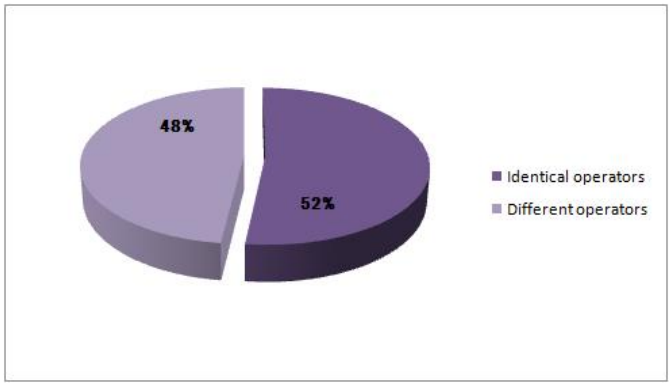
[16] All data comes from the IFEN and SCEES, with the exception of data concerning the type of treatment used for water before it is distributed, which comes from the DGS (Direction Générale de la Santé).

Table 4.2: Description of our variables

VARIABLES	DESCRIPTION	MEAN	MIN	MAX	N
PRICE 2001	Price in euros, for the production and distribution of water, taking into account fixed fee but not taxes. These are the prices in force in 2001, but contracts may have been signed before 2001	154,02	43,54	378,70	1866
IDENT	Takes value 1 if the local authority chose the same operator to operate distribution and sanitation of water	0,52	0	1	1866
PAST TIME	Number of year since the contract is signed	9,87	0	78	1569
TREATA2	Takes value 1 when raw water needs a desinfection treatment	0,15	0	1	1866
TREATA3	Takes value 1 when raw water needs a heavy desinfection treatment	0,17	0	1	1866
TREATMIXA2	Takes value 1 when raw water needs mix kind of treatment (A1 and A2 because water comes from different sites)	0,06	0	1	1866
TREATMIXA3	Takes value 1 when raw water needs a heavy desinfection treatment (A1 or A2 and A3 because water comes from different sites)	0,05	0	1	1866
UNDERGROUND WATER	Takes value 1 when water origin is underground	0,69	0	1	1866
TOURISTIC AREA	Takes value 1 when the area where water is distributed is a touristic area	0,13	0	1	1866
EXTENSION	Number of Km of network developed to extend the network	0,50	0	51	1866
INVST PROGRAM	Takes value 1 when the contract specifies an investment program	0,62	0	1	1866
REPLACEMENT	Number of Km of network developed to replace the network	0,49	0	23	1866
LEAKRATIO	Volume of lost water / size of the network	0,26	0,00	0,94	1866
INTERAUTHORITY	Takes value 1 if the local authority is organizing the distribution of water in cooperation with other local authorities	0,67	0	1	1866
LIMITATION OF WATER VOLUME	Takes value 1 if consumed volume of water is constrained by reglementation at some period of time during the year	0,03	0	1	1866
INDEPENDENCE RATIO	Total volume distributed / (total volume distributed + imported volume)	0,89	0,23	1	1866
INHABITANTS	Number of inhabitants concerned by the contract / 10 000	0,73	0,0031	22,54	1866
INHABITANTS2	Square (Number of inhabitants concerned by the contract) / 1000 000	253,00	961,00	50800	1866
DENSITY	Number of Km of network / Number of Inhabitants	22,52	0,31	1 438	1866

What we are interested in is the impact for local authorities from choosing the same operator in order to operate both distribution and sanitation of water. Before looking at descriptive statistics on this issue, let us first have a look at the data, to see whether contracts for both types of services are concentrated in the hands of the same operator in the French water sector. The following figure (figure 4.2) shows that 52% of the municipalities in our sample uses the same operator for the provision of drinking water services and sanitation services. As a crude approximation, and assuming that there are only 3 operators available and that choices are randomly distributed, we should only observe that about 33% of municipalities use the same operator for both contracts.[17]

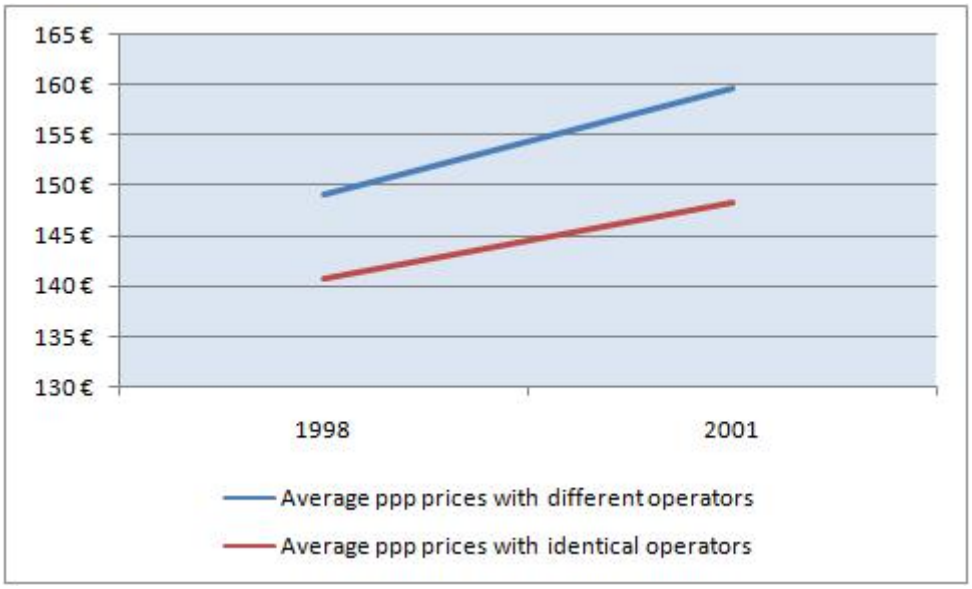
Figure 4.2: Share of French municipalities using the same operator for the provision of drinking water services and sanitation services.



A first look at the data permits us to suspect that this choice is not neutral. As showed in the following graph (figure 4.3), at first glance, this choice impacts on both the price level and their evolution through time.

[17]Each of the three major player has a probability of 0.33 to be chosen for a service, hence the probability that the same operator is chosen for both services is $0.33 \times 0.33 \times 3 \approx 0.33$.

Figure 4.3: Average prices per 120m^3 of drinking water in 1998 and 2001 for PPPs, according to whether a same operator is used or not.



4.4.3 Empirical methodology

To go a step further, we must take into account the fact that each local authority is unique. Each water service is characterized by a specific environment that may also impact on prices and their evolution (e.g. characteristics of the networks, size of the population, ...).

We begin by estimating a least squares regression of price on a set of exogenous factors that may impact on the production costs of the service and then on the price of distributed water:

$$p = D\delta + X\beta + T\eta + u \qquad \text{with } u \rightsquigarrow (0, \Sigma)$$

where p is price, D contains indicators of the relational level for each contract, X is a set of exogenous factors characterizing each service, T is a set of exogenous controls, and u is the (heteroskedastic) stochastic error. We are interested in the coefficients, δ, which measure the average shift in price across different relationship types ranging from relational to non-relational contracts.

An econometric problem arises, however, from the fact that a local public authority's choice of relationship type is endogenous. In particular, there may be individual heterogeneity across local public authorities that is unobserved by the econometrician, but that is correlated with both relationship choice and performance. In this case, $\mathbb{E}[Du|X] \neq 0$. Least Squares estimates of the specification above will be biased and inconsistent.

While a full structural model of the determination of relationship choice is beyond the scope of this paper, we separately estimate a probit model of the decision to choose the same operator to operate both services as a function of X and T, and Z a set of variables that should affect relationship choices but not prices. We find that indeed there is non-random sorting of local public authorities across relationship choices.

Thus in order to obtain unbiased estimates of the impact of (endogenous) relationship choice on performance, we estimate a switching regressions model with endogenous switching allowing cross-equation correlation in the errors:

$$\begin{aligned} p &= D\delta + X\beta + T\eta + u \\ D^* &= X\alpha + T\lambda + Z\gamma + v \\ D &= \begin{cases} 1 & \text{if} \quad X\alpha + T\lambda + Z\gamma \geq v \\ 0 & \text{if} \quad X\alpha + T\lambda + Z\gamma < v \end{cases} \end{aligned}$$

Here D is an indicator that takes the value one when local authorities choose the same operator for both distribution and sanitation of water and zero elsewhere. The D equation is normalized by the standard deviation of v , and we assume that $(p\ D)$ is distributed bivariate normal with mean zero and variance-covariance:

$$\Gamma = \begin{bmatrix} \sigma_u^2 & \sigma_{uv} \\ \sigma_{uv} & 1 \end{bmatrix}$$

This procedure accounts for endogeneity in the choice, D, and yields unbiased estimates of δ, the unconditional mean premium or discount paid by consumers in a municipality that has chosen only one operator for both services.[18]

We will now discuss our variables. A first set of control that we used in our estima-

[18] Applying conditional normal theory and change of variables yields the individual contribution

tions concerns the characteristics of providing drinking water services, X. In this set for variables, we attempt for account for factors that may have an impact on prices for drinking water. Such characteristics include the complexity of the technology needed to treat raw water (the variables TreatA2, TreatA3, TreatMixA12 and TreatMixA3), the source of raw water (the variable Underground Water), the abundance of raw water in a municipality (the variables Independence Ratio and Limitation of Water Volume), and the characteristics of the water distribution network (the variables Density, Leak Ratio, Replacement and Extension). In this set of variables, we have also included some characteristics of the contractual relation such as the elapsed time since the beginning of the contract (the variable Past Time) and whether an investment program is specified in the contract (Invst Program). We also attempt to account for the fact that a municipality may organize the provision of drinking water services by associating itself with other municipalities nearby (the variable Interauthority).

In addition for these controls, we include several variables that attempt to capture the characteristics of a municipality which may have consequences on prices for drinking water. These variables include the level of population in a municipality (and its square), and whether the municipality is a tourist area.

Finally, in our switching regression model, we use a set of dummies for French "Régions" in our Z variables. A "Région" is the most important political entity in which a local public authority is situated.

A more complete discussion on the rationale of using these variables as control for

to the likelihood:

$$f(p_1, D_i) = \frac{1}{\sqrt{\sigma_u^2}}\phi\left(\frac{u_i}{\sqrt{\sigma_u^2}}\right)\left[1-\Phi\left(\frac{(-x_i\beta - z_i\gamma - v_i)/\sqrt{\sigma_u^2}}{\sqrt{1-\rho^2}}\right)\right]^{D_i} \left[\Phi\left(\frac{(-x_i\beta - z_i\gamma - v_i)/\sqrt{\sigma_u^2}}{\sqrt{1-\rho^2}}\right)\right]^{1-D_i}$$

In our switching regressions model, the β are not separately identifiable because the X enter both the p and D equations, however our initial Least Squares estimation is sufficient for predictive purposes, and allows us to interpret the estimated β.

water prices can be found in Chong, Huet, Saussier, and Steiner [2006b].

We are interested in whether, after controlling for the influences of these variables, the fact of using the same operator for drinking water services and sanitation services does indeed lead to lower water prices.

4.4.4 Estimation results

We will now discuss the results of our estimations. The results from our OLS regressions are presented in table 4.3, and those from our switching regressions are presented in table 4.4. We run these regressions both for prices in 2001, and for the first difference of prices for drinking water between 1998 and 2001.

Table 4.3: Results of our OLS regressions

	Price in 2001				Price increase between 1998 & 2001			
	model1 OLS	model2 OLS	model3 OLS	model4 OLS	model5 OLS	model6 OLS	model7 OLS	model8 OLS
Ident		-4.588*	-4.206*	-3.670+		-2.674*	-3.280**	-2.223*
		(1.909)	(2.054)	(2.051)		(1.064)	(1.164)	(1.113)
TreatA2	13.933***	14.071***	11.279***	8.871**	0.521	0.601	1.357	-0.591
	(2.999)	(2.994)	(3.228)	(3.081)	(1.711)	(1.704)	(1.940)	(1.938)
TreatA3	5.612+	5.542+	8.530**	6.165+	-1.371	-1.411	-1.870	-3.260
	(2.895)	(2.892)	(3.114)	(3.295)	(1.786)	(1.778)	(1.905)	(1.989)
TreatMix A12	-0.884	-0.890	8.430	3.458	-4.656+	-4.659+	-4.790	-4.471
	(4.759)	(4.752)	(5.144)	(4.720)	(2.520)	(2.510)	(3.015)	(3.139)
TreatMix A3	3.051	2.588	6.113	1.614	2.489	2.219	2.389	0.450
	(5.167)	(5.186)	(5.261)	(5.225)	(3.226)	(3.224)	(3.267)	(3.295)
Underground Water	-18.487***	-18.479***	-21.216***	-14.318***	0.285	0.290	-0.508	0.033
	(2.674)	(2.666)	(2.863)	(2.964)	(1.814)	(1.811)	(1.967)	(1.952)
Independence Ratio	-14.234**	-13.705**	-9.134+	-2.224	1.865	2.174	0.385	-1.453
	(4.395)	(4.400)	(4.701)	(4.484)	(2.279)	(2.289)	(2.476)	(2.532)
Tourist Area	-0.663	-1.224	-2.476	0.492	1.231	0.904	1.449	0.275
	(3.026)	(3.017)	(3.263)	(3.198)	(1.640)	(1.643)	(1.790)	(1.765)
Invst Program	0.388	0.630	-0.493	-2.938	0.902	1.043	1.652	1.624
	(1.916)	(1.912)	(2.047)	(2.063)	(1.572)	(1.572)	(1.699)	(1.640)
Extension	-0.341	-0.288	-0.035	0.081	1.167	1.198	1.058	0.899
	(0.579)	(0.560)	(0.543)	(0.505)	(0.831)	(0.849)	(0.805)	(0.749)
Replacement	1.540	1.552	-0.209	-0.442	2.080	2.087	3.074	3.185
	(1.060)	(1.063)	(0.912)	(0.905)	(2.463)	(2.468)	(3.025)	(2.801)
Leak Ratio	-1.517	-1.373	9.232	26.576**	12.308**	12.392**	15.878**	9.216+
	(7.874)	(7.878)	(8.943)	(9.071)	(4.733)	(4.719)	(5.321)	(5.476)
Interauthority	19.543***	18.745***	19.328***	18.782***	-6.315***	-6.780***	-8.304***	-5.459***
	(2.238)	(2.210)	(2.395)	(2.354)	(1.312)	(1.316)	(1.483)	(1.445)
Limit. Water Vol.	14.769*	14.748*	-1.811	-16.883+	1.227	1.215	7.173	-6.135
	(6.063)	(6.115)	(5.944)	(9.866)	(5.388)	(5.396)	(5.158)	(4.670)
Density	0.160+	0.155+	0.150+	0.140+	0.007	0.004	0.002	0.013
	(0.088)	(0.086)	(0.081)	(0.074)	(0.010)	(0.009)	(0.009)	(0.014)
Inhabitants2	0.004***	0.004***	0.006***	0.005***	0.001*	0.001*	0.001*	0.001*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)
Inhabitants	-8.801***	-8.665***	-11.554***	-9.646***	-2.413*	-2.334*	-2.890*	-2.978*
	(1.399)	(1.367)	(1.395)	(1.334)	(1.188)	(1.186)	(1.370)	(1.279)
Past Time			0.362***	0.361***			-0.074	-0.031
			(0.101)	(0.101)			(0.053)	(0.054)
Département Dummies				Yes***				Yes***
Intercept	164.427***	167.204***	162.369***	137.355***	6.666*	8.284*	10.505**	32.209**
	(6.083)	(6.213)	(6.677)	(13.539)	(3.251)	(3.278)	(3.601)	(11.744)
R2	0,2	0,21	0,25	0,33	0.050	0.053	0.079	0.149
N	1866	1866	1569	1569	1866	1866	1569	1569

*Note: Robust standard errors are presented in parentheses. Fixed effects jointly significant where included. *** denotes significance at 0.1% level, **denotes significance at 1 % level, * denotes significance at 5% level, + denotes significance at 10% level.*

The estimations of our control variables are on the overall consistent across our various OLS regressions on prices in 2001, and across our OLS regressions on the first difference in prices between 1998 and 2001.

Notice also that the impact of choosing the same operator for both water services results are in line with our proposition (Model 1 to Model 4). Even when we include variables taking into account specificities of each local authority water service, results suggest that there still exist a significant impact of variable IDENT on observed prices. This impact is negative, suggesting that using the same private operator for operating both distribution and sanitation of water reduces prices paid by consumers.

Results also suggest that prices increase through time after contracts are signed. This may be the result of repeated contract renegotiations. Indeed, another interesting variable in these regressions is the time elapsed since the contract for drinking water services is signed. This variable is positive in our regressions. This means that prices tend on the average to be higher when a contract has been signed a long time ago. This may be due to the fact that for contracts that are signed long ago, there is relatively more frequent renegotiation to modify prices, and resulting in higher prices. Therefore this result may show that renegotiations do actually occur.

The price increase estimates are also suggesting an impact of choosing the same operator to operate the both service (model 5 to model 8).

Table 4.4: Results of our switching regressions

	Ident	Price 2001	Price Increase between 98 & 01
	model9 Probit	model10 OLS	model11 OLS
IDENT		-4.873*	-3.475*
		(2.165)	(1.475)
TreatA2	0.087	9.679***	0.775
	(0.114)	(2.789)	(1.859)
TreatA3	0.235+	4.644	-2.777
	(0.137)	(3.328)	(2.218)
TreatMix A12	0.087	-5.150	-4.110
	(0.172)	(4.319)	(2.878)
TreatMix A3	-0.275	-0.408	1.090
	(0.180)	(4.455)	(2.970)
Independence	0.180	-8.148+	2.014
Ratio	(0.175)	(4.234)	(2.822)
Underground	-0.045	-7.306*	1.602
Water	(0.121)	(2.959)	(1.972)
Tourist	-0.308**	-2.807	-1.157
Area	(0.118)	(2.714)	(1.809)
Invst	0.177*	0.679	0.946
Program	(0.074)	(1.802)	(1.201)
Extension	0.032	-0.452	1.093**
	(0.027)	(0.519)	(0.604)
Replacement	0.011	1.652+	2.040***
	(0.042)	(0.853)	(0.568)
Leak	0.070	12.694+	8.629+
Ratio	(0.297)	(6.911)	(4.606)
Interauthority	-0.456***	18.432***	-5.283***
	(0.085)	(2.055)	(1.371)
Limit.	0.245	-4.539	-6.630+
Water Vol.	(0.235)	(5.762)	(3.841)
Density	-0.006*	0.110***	0.011
	(0.003)	(0.020)	(0.013)
Inhabitants2	-0.000+	0.004***	0.001*
	(0.000)	(0.001)	(0.001)
Inhabitants	0.103+	-8.614***	-2.505**
	(0.060)	(1.244)	(0.829)
Departement Dummies		Yes***	Yes***
Regional Dummies	Yes***		
Intercept	-0.017	151.629***	3.495***
	(0.602)	(24.211)	(0.017)
Rho		0.135*	0.004
		(0.061)	(0.064)
R2			0.053
N	1813	1813	1813

*Note: Standard errors are presented in parentheses. Fixed effects jointly significant where included. *** denotes significance at 0.1% level, **denotes significance at 1 % level, * denotes significance at 5% level, + denotes significance at 10% level.*

We could see from the results of these switching regressions that the negative effects of using a same operator on water prices in 2001 and the first difference between prices in 1998 and 2001 remains significant, even after accounting for the possible endogeneity in such a choice. These results also show that one should account for such a dimension in OLS regressions on water prices in 2001, since the inter-equation correlation ρ is significant. This points out that factors influencing the decision to use a same operator for both services that are unobserved to the econometrician also influence the observed water prices in level. However, the impact in prices is low, and this correlation is not significant when the explained variable is the first difference of water prices. In this latter case, OLS estimates can be considered to be consistent.

In conclusion, these estimations show that when a same operator is used to provide for drinking water services and waste water services, prices for drinking water services are significantly lower for consumers, and the price increase between 1998 and 2001 is also lower. This empirical result is consistent with the predictions of our theoretical model.

4.4.5 Alternative explanation

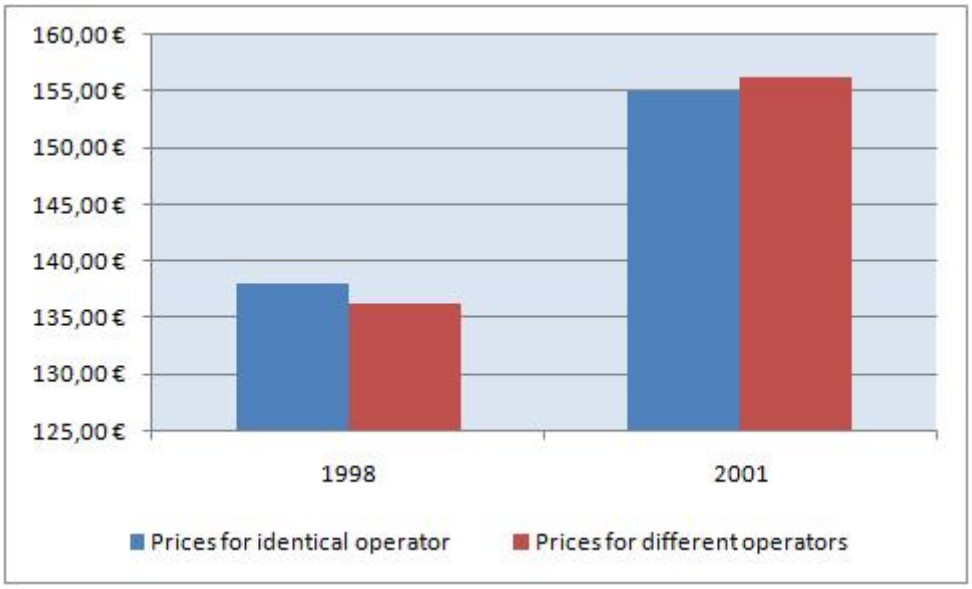
Before concluding, it seems to us that our previous results could come under discussion.

One may rightfully wonder whether the lower price for water observed in figure 4.3 when an identical operator is in charge of the provision of both services may stem from reasons pertaining to economies of scale and/or of scope. We would like to argue that this is not the case, for there seem to be little synergy between both types of activity. A report submitted to the UK water regulator, the OFWAT, shows some empirical evidence on this issue for the English and Welsh water industry (Stone and Webster Consultants [2004]). Using data from the English and Welsh water sector between 1992-93 and 2002-03, the report found no evidence

of economies of scale nor economies of scope between drinking water services and sewage services. Using data from water utilities in Wiscousin, Garcia, Moreaux, and Reynaud [2007] found no evidence for economies of vertical integration even between production and distribution of drinking water. However, this latter study does not attempt to assess scale or scope economies for drinking water services and waste water services.

Another indication of potential scale and scope economies might be found in the value of the contract according to the private operator, depending on the fact that he bids on one service or on both of them. If such economies exist, this should reflect in lower (initial) prices for contracts when the private operator already manages sewage. We do not observe lower bid when only one operator manage both services. The initial prices per 120 m^3 of water for contracts signed in 1998 and 2001 is shown in figure 4.4.

Figure 4.4: Average initial prices per 120m^3 of drinking water for contracts signed in 1998 and 2001, according to whether both services are granted to an identical operator or not.

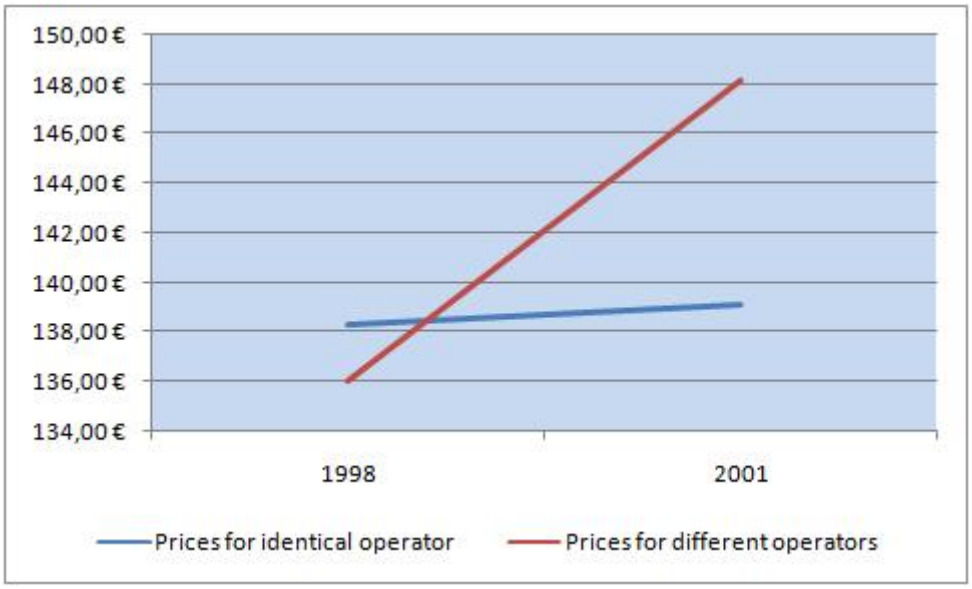


As one may see from figure 4.4, average initial prices do not seem to be that different when contracts for sewage services and drinking water services are granted

to an identical operator or not.

What is even more interesting is to look at price evolution of contracts signed in 1998 depending on the fact that both services are managed by the same operator or not. The following graph (based on 32 contracts signed in 1998) suggests clearly that when the same operator manages both services, prices might be more stable through time.

Figure 4.5: Evolution of average prices per 120m^3 of drinking water for contracts signed in 1998, according to whether both services are granted to an identical operator or not (N=32).



This is consistent with our model and might be explained by the fact that such contracts are more protected against renegotiation initiated by the operator once the contract is signed.[19]

In order to ensure that relational contracts are the main reason why water prices may be lower when both services are run by a same operator, and not because of

[19]Guasch [2004] found that water contracts are more exposed to renegotiation compared to other industries. More than 75% of water contracts in his database are renegotiated less than two years after contract signature. We are not able to check in our database if prices increases are coming from renegotiations. Nevertheless, because public authorities decide unilaterally of contractual provisions, this could not be explained by ex ante operators' strategies in negotiating contractual terms depending on the fact they or they do not manage both services.

reasons pertaining to scale and scope economies, we have also chosen to run our OLS regressions using the first difference in observed water prices between 2001 and 1998 as our explained variable. Indeed, one may expect that possible scale and scope economies remain constant over time. Hence, benefits from any possible scale and scope economies that may arise in the event of horizontal integration on observed prices should not be reflected in the first difference of water prices between 2001 and 1998.

Given these observations, we are quite comfortable that the observed lower water prices when an identical operator is charged of both services are not due to economies of scale and/or scope.

4.5 Conclusion of chapter 4

In this chapter, we seek to understand why local public authorities tend to concentrate the provision of various services in the hands of a single operator, which seems to be disconnected with the current trend to promote competition in the organization of public services. We suggest that such horizontal concentration may be desirable, in that it enhances the efficiency of relational contracts between local public authorities and private operators. To show this, we constructed a model based on the incomplete contract literature. We then show that horizontal integration can contribute to lower overall costs of providing local public services in the setting that we have discussed above. This may be explained by the fact that relational contracts are more easily sustained in the latter case, as deviations from the relational contracts can be more severely punished.
We then look at the empirical relevance of our findings using data from the French water sector. In particular, our regressions show that drinking water prices are significantly lower when a same operator is in charge of providing waste water services, *ceteris paribus*. This empirical result is robust to several specifications and consistent with our story on relational contracts.

On the whole, our study suggests that informal dealings, and relational contracts are important dimensions in public-private partnerships, especially in a world where it is impossible for contracting parties to anticipate contingencies that may arise throughout a contract's lifetime. Hence, these aspects should be accounted for when one ponders on the use of public-private partnerships for the provision of public services. That said, we believe that our study still has several shortcomings, the foremost of which is that authorities are assumed to be benevolent. However, as recalled in chapter 1, this assumption is also made by Hart, Shleifer, and Vishny [1997], and we can consider our work as a refinement of this general framework to introduce informal practices and a dynamic perspective.

Appendix

Once the manager has reneged on his informal commitment, he is chosen at subsequent periods with a probability $p \in [0;1]$. This implies that at each period, his expected gain is pU_s^{NB} where s denotes the service $\mathscr{B}$ in case of horizontal disintegration, and denotes the services $\mathscr{A}$ and $\mathscr{B}$ in case of horizontal integration.

Let us note that such a probability is applied at each contract renewal, whether he has been chosen at previous period or not.

$U_{t,s}^{M,E}$ represents the expected payoff stream of the manager at period t, once he has cheated in period $(t-1)$. We may define $U_{t,s}^{M,E}$ as:

$$U_{t,s}^{M,E} = p[U_{t,s}^{M,NB} + \delta U_{t+1,s}^{M,E}] + (1-p)[0 + \delta U_{t+1,s}^{M,E}]$$

It then comes:

$$\begin{aligned}
U_{t,s}^{M,E} &= pU_{t,s}^{M,NB} + \delta pU_{t+1,s}^{M,E} + (1-p)\delta U_{t+1,s}^{M,E} \\
U_{t,s}^{M,E} &= pU_{t,s}^{M,NB} + \delta pU_{t+1,s}^{M,E} \\
U_{t,s}^{M,E} &= pU_{t,s}^{M,NB} + \delta p[U_{t+1,s}^{M,NB} + \delta U_{t+2,s}^{M,E}] \\
U_{t,s}^{M,E} &= pU_{t,s}^{M,NB} + \delta p[U_{t+1,s}^{M,NB} + \delta U_{t+2,s}^{M,E}] \\
U_{t,s}^{M,E} &= pU_{t,s}^{M,NB} + \delta pU_{t+1,s}^{M,NB} + \delta^2[U_{t+2,s}^{M,E} + \delta^2 U_{t+3,s}^{M,E}] \\
U_{t,s}^{M,E} &= pU_{t,s}^{M,NB} + \delta pU_{t+1,s}^{M,NB} + \delta^2 U_{t+2,s}^{M,NB} + \delta^3 U_{t+3,s}^{M,E}
\end{aligned}$$

By recurrence, we deduce that:

$$U_{t,s}^{M,E} = \sum_{i=0}^{i=\infty} [\delta^i pU_{t+i,s}^{M,NB}]$$

At each period i $U_{t+i,s}^{M,NB} = U_s^{M,NB}$, then

$$U_{t,s}^{M,E} = \sum_{i=0}^{i=\infty} [\delta^i p U_s^{M,NB}]$$
$$U_{t,s}^{M,E} = \frac{p U_s^{M,NB}}{1-\delta}$$

Therefore, if the manager cheats in period $t-1$, his expected gain is $U_s^{M,NB}$ in this period as he chooses the levels of investments that maximizes his own present payoff, instead of first best level. For the next periods, he expects a discounted gain $U_{t,s}^{M,E}$. This can be write as follows:

$$\begin{aligned} U_s^{M,E} &= [U_s^{M,NB}] + \delta U_{t,s}^{M,E} \\ &= U_s^{M,NB} + \frac{\delta p U_s^{M,NB}}{1-\delta} \end{aligned}$$

A Brief Conclusion to Part II

Part II of this dissertation has focused on formal and informal practices in contractual relationships between public and private partners. The global conclusion of this part is to show that a full understanding of public-private partnerships needs to take into account the environment of these contracts, whether legal or relational. To try to account for these effects, some modifications of the property-rights literature have been done, that are summarized in what follows.

Chapter 3 has dealt with the legal environment of public-private partnerships. In some countries, legal rules may grant public authorities with specific powers of unilateral renegotiations and cancelations when they contract with private operators. This naturally impacts on the conditions under which renegotiations take place. Our first result is to show that such powers may lower incentives of the private manager to invest in cost-reducing investments that damage social benefits. Indeed, these specific rights are used to protect public interest. Then, they may induce some renegotiations when quality of services is affected by investments that were not contracted on ex ante. These renegotiations are generated by the specific powers of public authorities, and do not happen in the "private provision" case of Hart, Shleifer, and Vishny [1997]. They allow to increase efficiency of contracts with private partners. However, a second consequence may be drawn from

the rights of the public sector. Indeed, they also influence bargaining powers, and then bargaining games. If public authorities may credibly threaten private contractors to cancel contracts, they may impose their own share of the surplus in case of ex post renegotiations. If they have a "fair" use of this right, they only ask for a full compensation of social damages, but private operators may also fear to be totally hold up in case of a misuse of these specific rights. Therefore, when we focus on bargaining conditions, results of specific powers granted to public authorities mainly depend on the anticipated use of these rights. But in any case, they are not neutral on achieved contractual efficiency, and change the renegotiation processes described in the property-rights literature.

Beyond practices coming from legal rules, public-private partnerships may also be influenced by informal arrangements. For instance, the choice of the private operator by public authorities has some consequences on these informal dealings, and then on contractual efficiency. If public authorities decide to concentrate services in the hands of one single operator, this seems *a priori* paradoxical. Indeed, everything is done to create competition and a large diversity of offers, which should lead to uncorrelated choices between services. Yet, when taking into account informal practices between contractors, such a concentration may appear as a strategic choice. If partners have several contracts together and elaborate informal arrangements, any deviation from informal commitments can be more strongly sanctioned. Therefore, the model proposed in chapter 4 suggests that informal dealings about non-contractible investments are more likely to be self-enforced when parties share several contracts. The reason is that parties prefer to respect their informal dealings than to deviate if the payoff stream from cooperation is higher than payoff stream from deviation. As the punishment in case of reneging may be applied on all the contracts partners have together, the payoff stream from deviation is all the more reduced. Then, incentives not to deviate are higher under "horizontal integration", where services are provided by a same private operator, than in case of horizontal disintegration, when different private managers are chosen for different services. Such a result seems to be consistent with our econometric analysis

on the French water sector, that shows that total prices by public authorities for drinking water services are lower, when the same private firm also provide sewage service.

General Conclusion

This dissertation has shown that the approach developed by Grossman, Hart and Moore (GHM) is a useful and rigorous theoretical framework for the study of public-private partnerships in the management of local public services, but needs to be adapted to better understand what makes these contractual arrangements different from other types of cooperation between two private entities. Indeed, many local public services are today organized through complex contracts between public and private partners, whose efficiency has to be evaluated. First, we draw our attention to the way the notion of property rights is taken into account in these contracts (part I), and then we turn to formal and informal practices in public-private partnerships (II). This general conclusion recalls the main results of this dissertation, and mentions some of their limits.

Our first goal was to justify why the property rights literature is a useful theoretical basis to deal with contracts observed in the management of local public services. Foundations of the "GHM approach" have been recalled in chapter 1. This theoretical framework allows to evaluate costs and benefits of integration. It postulates contractual incompleteness due to non verifiability by outsiders of some parameters, such as human capital investments, and evaluates the consequences of the allocation of residual control rights through property rights. All these elements

offer an interesting perspective for the study of organizational structures in public services. This is confirmed by fruitful analyzes such as Hart, Shleifer, and Vishny [1997], Hart [2003], Shleifer [1998], or Bennett and Iossa [2006]. However, observations of public-private partnerships call for some modifications of this approach, especially to explain the large diversity of contracts that are to be found, the impacts of legal rules that govern agreements between public and private partners, and why public authorities may be willing to concentrate several services in the hands of one single private operators. The subsequent chapters of this dissertation have focused on each of these aspects.

Indeed, simple observations of contracts between public and private partners show a large diversity of partnerships, that allocate differently rights to make residual decisions and to get residual benefits among parties. Then, bundling ownership, residual decision and payoff rights raises some issues to apprehend the various contracts that allow public and private partners to work together. As a consequence, a more detailed approach of the various rights defining "property" allows to appreciate the different contractual tools public authorities have to involve private operators in the management of public services. Indeed, the split of property rights allows different combinations. The model proposed in chapter 2 has then shown that each type of public-private partnership can prove to be more efficient than -or at least equal to- public provision, depending on the characteristics of public services, and when marginal benefits of cost reduction are superior to marginal social damages. Therefore, assuming that the owner of the assets does not always hold residual decision and payoff rights allow to change the conclusions obtained by Hart, Shleifer, and Vishny [1997]. A criticism that could be addressed to this study is that it does not take into account career concerns on incentives to invest, which may be different for public and private managers. Yet, in both cases, temporal horizon may be considered as limited, as a public authority can still decide to select or to nominate another manager in future.

To go back to the GHM approach, one may highlight that this framework has first

been initiated to evaluate costs and benefits of integration between two private entities. But rules governing contracts between two firms are not the same as those for public-private partnerships, especially as regards to renegotiations. In many countries, an unbalanced bargaining position between contractors is introduced in the name of public interest. As a consequence, public authorities may unilaterally modify contractual terms, or even cancel contracts. This softens the social damages caused by cost reduction, since such powers oblige private operators to internalize part of these adverse effects. One can even believe that the right to unilaterally cancel the contract represents a threat that can lead to a "take-it-or-leave-it" offer from the public authority. As a consequence, a risk to appropriate the whole rent of the ex post surplus exist, and the final outcomes are mainly dependent from the way such legal powers are used.

The interest of this contribution is to show that the legal framework is not neutral to determine contractual efficiency. Yet, a shortcoming to this chapter is the absence of empirical evidence that would corroborate these theoretical propositions. If such a project deserves attention, many difficulties are to be noted. First, a comparison between legal frameworks needs the collection of worldwide data on management of local public services. Another difficulty is that it assumes to have a precise knowledge of legal rules that govern public-private partnerships in each country, as the distinction between civil law and common law countries seems to come easily under discussion in our case, as suggested in chapter 3.

However, such an empirical work would helpfully contribute to determine the influence of legal rules on efficiency of public-private partnerships, and will probably deserve attention in future works.

Finally, relationships between public and private partners may also entail some informal practices. Chapter 4 has shown that this may explain why public authorities are sometimes willing to choose a single operator for several different public services, which is a problem that has deserved little attention up to now. Indeed, informal agreements are all the more sustainable as the payoff stream from cooperation is high, and that of defection is low. The contribution of this chapter is to

show under some conditions that the "bundling" of services allows to increase the punishment, when one of the partner reneges from his informal commitment. Such a result seems consistent with observations of managerial practices in drinking water and sewage services in France. Therefore, horizontal integration would make informal dealings about non-contractible investments more self-enforced, which may increase achieved efficiency.

Yet, a richer analysis would include to extend these empirical analyzes to other types of local public services.

Moreover, in accordance with Hart, Shleifer, and Vishny [1997], we have assumed in this dissertation that public authorities are benevolent. It would be probably worth investigating corruption practices in contracts between public and private partners, to determine potential risks and dangers of these arrangements, compared to public provision of services. Some works turn to such a direction (Chong [2007], Martimort and Straub [2006], Straub [2007]).

To conclude, the property-rights framework appears as a relevant theoretical framework to analyze organizational structures of public services, but some theoretical refinements have to - and probably remain to be- done to offer propositions to public decision-makers. This dissertation has tried to propose some of these modifications, and also insists on the need to integrate the environment -whether legal or relational- to have a better understanding of public-private cooperation. It seems that global organizational efficiency is not just a contractual matter, but strongly depends on the environment in which public-private partnerships are implemented.

As a consequence, studies to evaluate costs and benefits of institutional parameters, whether legal, social, or political, need to be conducted both at empirical and theoretical levels. These concerns seem to motivate new axes of research in the economic literature, and this dissertation has tried to help this effort along.

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