CONTRACTUAL CHOICE AND PERFORMANCE :

THE CASE OF WATER SUPPLY IN FRANCE

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1. Introduction

A great variety of contractual arrangements coexist today in the provision of public utilities such as water supply, urban transportation, and electricity. In the extensive set of modes of governance to which these arrangements correspond, the "purely" integrated form of a service provider owned and managed as a public "bureau" appears as a very specific case, and maybe one in extinction. The general reexamination of public provision for these services that developed in the 1980's raises the issue of the extension of government activities. This question by far exceeds the problem of privatization, with which it is too often identified. Beyond the transfer of property rights, important decisions must be made about the choice of the most satisfactory mode of governance for providing these services. Recent research (Hart, Shleifer and Vishny, 1997; Williamson, 1999) looks for more rigorous analytical foundations to the resulting trade-off.

With regard to these issues, the case of water supply is a particularly rich domain. There is no doubt about the importance of guaranteeing safe and regular provision of water to the population. However, the choice of the most relevant mode of governance for doing so efficiently, i.e., at a low price and with high quality, remains an open question. Recent studies (e.g., Ménard and Shirley, 1999) show a significant dispersion of results for similar contracts, suggesting a major impact of institutional factors. Depending on the context, public providers

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sometime perform quite well while, symmetrically, private operators also fail. Other studies claim that disengagement of local authorities in favor of private sector participation systematically improves performance, at least under certain conditions (Gatty, 1998; World Bank, 1995). Last, empirical surveys show innumerable malfunctions, whatever the mode of governance is (*Rapport à la Cour des Comptes* , 1997).

The French situation presents an exceptional terrain for studying these questions. Water supply has been under local responsibility for centuries, generating a wide variety of solutions. At the same time the rules of the game constraining choices (e.g., environmental laws) are the same for all, making the institutional environment continuous, stable and homogeneous. Thus, it becomes feasible to compare alternative modes of governance that monitor similar activities. In this paper, we take advantage of this situation to shed light on two questions. How much does the choice of a governance structure for providing public utilities depend on economic choices related to characteristics of the good to be distributed and the transactions that are involved in doing so? And do some modes outperform others systematically?

More precisely, this paper presents preliminary results based on a detailed comparative analysis of performance for different contractual arrangements in the water sector. The study put aside factors that may depend on institutional elements (e.g., political influence) in order to focus on variables related to the governance per se. We used a data base that provides information on all units supplying water (WSU) to towns of more than 5000 inhabitants. This panel includes 2109 WSU, for a period of three years (1993-1995); it represents 73 % of the French population[1].

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[1] A coming study will complete these data by a set of contracts that covers all the main cities, with information about a wide variety of variables (such as size, demography, and geological factors).

After a short overview of the organization of the water sector in France (section 2), we introduce our analytical framework, based on recent developments in transaction cost economics (section 3). The propositions derived from that framework are then tested on our data set, in order to shed light on the economic rationale behind the choice of a mode of governance (section 4) and on the links between the arrangements chosen and their performance (section 5). We show that these choices, although they are made in a sector that is particularly sensitive to political decisions, obey significant economic determinants. Neglecting the latter in making the choice of a contractual arrangement translates immediately into decrements in performance.

2. Contractual arrangements: characteristics of our sample.

Before proceeding to the analysis itself, we need to briefly introduce some major characteristics of the organization of the water sector in France. Considering the goal of this paper, we will not report strictly institutional characteristics (e.g., laws regulating the entire sector).

Water supply is different from other French network industries providing services to the public, such as mail, rail transportation, and electricity, in that it has traditionally been decentralized. The choice of the mode of governance and its monitoring depend primarily on local authorities. Successive laws have defined the general rules within which these choices operate. There are three main types of law that govern the sector: (i) Laws defining quality standards, because of the externalities on public health; (ii) Laws compelling decision-makers to obey rules intended to make these choices transparent, in order to reduce risks of “capture” by operators and risks of corruption; (iii) Laws oriented toward the protection of the environment and of a scarce resource.

Within these general rules, which allow a flexibility unknown in most other public utilities in France, there is a wide variety of contractual arrangements and of their accompanying modes of governance. It is standard to differentiate three families of arrangements.

The first one is that of public bureaus ("Régies") that involve direct ownership and control by local authorities. This mode is called "*gestion directe"* (direct management). Three sub-varieties can be identified. The "régie directe" is actually a public department through which local authorities manage directly the provision of water. The "régie autonome" characterizes a situation in which the agency providing water acquires financial autonomy but remains without legal independence: legally, it is not distinct from the local government. Last, the "régie personnalisée" identifies a public agency with financial autonomy and some autonomy in its corporate governance (with a Board of Administration, usually appointed by local authorities, and a director elected by the Board).

A second mode of governance is characterized by the involvement of an external partner, a private operator acting as a manager, while the water system remains publicly owned. This is called "*gestion intermédiaire"* (intermediary management), with an associated governance structure identified as "Régie assistée". In one sub-variety, the "régie intéressée", the operation and maintenance of the service are outsourced to a contractor, while local authorities remain responsible for investments and financial risks. The operator is involved in determining the price of the service and is paid a fixed amount for the service provided, usually complemented by revenue based on performance. The other sub-variety, the "gérance", differs essentially with regard to the incentive mechanism, since the operator is not involved in price setting and receives a fixed amount for his services.

The third family covers different forms of "franchising" and is called "*gestion déléguée*" (delegated management). Typically, this is a contractual arrangement in which the franchiser, i.e., the local government, delegates to a franchisee, i.e., a private operator, the responsibility

of providing water. In the case of “affermage”, which corresponds to a lease, the franchiser delegates the operation and maintenance of the system as well as some investments to the franchisee, with the contract specifying goals and constraints (e.g., delays for connections), while the local government remains in charge of all major investments and bears financial risks. The franchisee assumes the risks related to the daily maintenance and operation, and is paid by collecting bills from users according to rules (e.g., prices) negotiated in the contract. The other case is that of a “concession”, in which local authorities delegate investments, maintenance and daily operation (connecting, billing, collecting) to a private operator through a long term contract. The operator bears the financial risks and gets its revenues by collecting bills from users, under constraints (e.g., prices) negotiated in the contract. At the end of the contract, all assets remain the property of local authorities.

One last arrangement to be mentioned, although it is extremely marginal in France, as in almost all countries [2], is privatization, in which case a private operator fully owns and operates all assets related to the provision of water.

To summarize, there is a wide spectrum of arrangements, and all of them are present in France (see table 2). However, most of our study will focus on the three dominant forms, i.e., public bureaus, lease and concessions, notwithstanding the diversity introduced by the sub-varieties. Together, these three forms represent over 95% of the arrangements. The number of fully private operators in our sample is too small to be significant in our tests[3]. The distribution of contractual arrangements among the three forms is provided in Table 1. We have indicated the size of populations concerned, since this variable is important in measuring the full significance of the distribution system adopted; moreover, this variable will play an important role in our analysis.

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[2] UK is the only significant exception so far, with the privatization of water in England and Wales in 1989. The sector remains highly regulated by the OFWAT (Office of Water Services).

Table 1. Permanent average population by type of arrangement

Contractual Arrangements	Observations	Average population	Std. Error	Min.	Max.
Direct Management	534	18704	41745	528	606147
Lease	1416	16619	32709	200	586501
Concession	102	58112	116550	3065	698127

One last thing needs to be mentioned. All the operators, whatever their status is, are coordinated and partially supervised by regional agencies ("Agences de l'Eau"). These agencies correspond to the main rivers defining the major basins that provide water[4]. These agencies are designed to coordinate the usage of a collective resource by the different users and to prevent and control pollution. Their main interest for our study is that they provide us with a geographical dimension, thus allowing a more precise distribution of contractual arrangements that includes geological and climatic factors. These factors have an important impact on costs and on consumption. In 1995, for the WSU serving more than 5000 inhabitants, the distribution of contractual arrangements is shown by Table 2.

Table 2. Distribution of contractual arrangements by regional agencies.

[3] In an ongoing project we are planning case studies to examine their performance.
[4] Corsica and Oversea Territories (DOM) are exceptions: they correspond to an area, not a basin.

	Regional Agencies							
Contractual Arrangements	Seine-Normandie	Loire-Bretagne	Rhône-Méditerranée-Corse	Adour-Garonne	Départements d'Outre-mer	Rhin-Meuse	Artois-Picardie	TOTAL
Direct Management	16,7	24,6	23,1	22,7	0	43,2	30,9	23,8
Assisted Direct Management	1,1	1,5	1,2	1,8	15,1	3,4	2,3	1,5
Lease	71	61,5	74,3	65,5	84,9	53,4	57,6	67,1
Concession	7,8	6,9	1,2	5,2	0	0	8,6	4,8
Privatization	2,5	0	0,2	0,3	0	0	0,6	0,8
Others	0,9	5,5	0	4,5	0	0	0	2
Observations	438	468	520	287	73	148	175	2109

Source : Direction Générale de la Santé

These data point out the interest of a study of the water sector for the economy of organizations and contracts. They show that, for the same sector, producing goods and services that are relatively homogeneous, using well known technologies, and sharing characteristics with most network industries, we have a large variety of contractual arrangements. This raises questions that are at the core of our study: How do we explain such a diversity of arrangements for organizing similar transactions? Does this diversity translate in significant differences in performance? And is there a logical and coherent distribution of these performance differences (if they exist) among the modes of governance?

3. Our analytical framework.

Three main approaches to the problem of the choice of contractual arrangements have been developed in recent economic literature [5]. A first approach put the emphasis on asymmetry of information between the government and the operator as the key factor in the provision of public utilities (Laffont and Tirole, 1993). Choosing the best information revealing scheme ex-ante is therefore at the core of the trade-off among alternative modes of governance, e.g., if asymmetries are such that the franchiser (the government) can not obtain the relevant information, it may be better for him to provide the service directly, which is a form of integration. As a result, this type of analysis focuses essentially on the incentive mechanisms and neglects ex-post adaptation that requires devices built into the mode of governance. A

second approach emphasizes the allocation of residual property rights in the decision to outsource a service versus to provide it "in house" (Hart, Schleifer and Vishny, 1997). There is a trade-off between quality and cost in providing a collective service with the assumption that there exist an adverse effect between quality and cost (i.e., it is not possible to increase quality and decrease cost at the same time). The choice of the mode of governance must be made according to the priority, with public bureaus emphasizing quality factors, since their lack of control over residual rights provides them little incentive to reduce costs, while private operators react the other way around. This analysis raises important issues, since the trade-off between quality and cost is so central in the provision of water; but it ignores the variety of potential contracts between the polar cases of private versus public operators. A third approach analyzes the choice of a mode of governance as the search for a form that proposes relevant incentives ex-ante without neglecting the role of contractual hazards that will require adaptation ex-post. The degree of adaptability required, and therefore the form of the contract, will depend on the characteristics of transactions at stake. Initially developed for explaining the trade-off between making or buying, and progressively extended to take into account intermediate modes of governance ("hybrid arrangements"), the framework of the economics of transaction has recently been applied to the decision that a government must make between providing a service itself, or outsourcing it through contractual arrangements (Williamson, 1999).

In order to answer the questions raised at the end of section 2, we will use this last approach that has been so successful empirically[6]. The analytical framework, largely developed in Williamson (1985; see also 1996), is now well known. Let us assume that agents are looking

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[5] What follows is a highly simplified summary of the different approaches. Space constraints notwithstanding, it is important to make explicit and in comparative terms some reasons for our choice of the approach developed in this paper.

[6] For surveys of this empirical literature, see Joskow, 1988 ; Klein and Shelanski, 1995 ; Crocker-Masten 1996 ;Coeurderoy and Quelin, 1997 and Masten-Saussier, 2000.

for efficient modes of organization, i.e., arrangements that will minimize both their costs of production **and** their costs of transaction, under the constraint that represents the risk of opportunistic behavior of their partners. The theory then predicts that the trade-off among different possible arrangements, and the adequacy of the resulting choice, depend on the characteristics of the transaction that the mode of governance has to organize. Identifying these characteristics makes the central proposition testable: efficient modes of governance are those in correspondence with the degree of specificity of the assets required by the transaction and the degree of uncertainty surrounding this transaction. As a consequence, misalignment of an arrangement increases transaction costs, providing incentives to shift to another arrangement. A very large number of econometric tests confirm the robustness of this prediction, particularly for cases in which the trade-off for a firm is between buying on the market or making in-house.

More recent studies have extended the initial model, showing a wide array of arrangements between markets and integrated firms. Moreover, some of these studies have shown circumstances in which several substantially different arrangements coexist, without significant differences in performance (Ménard, 1996). At first sight, the data above suggest that this is the case for water supply in France, since several modes of governance have persisted over time within the same institutional environment. A main goal of this study is to determine whether there is a relationship between modes of governance and performance. If performance is similar across very different arrangements operating on the same transactions within the same environment, then transaction cost theory would be weakened. On the other hand, if performance differs, then the persistence of different forms would have to be explained by other factors, e.g., the political dimension involved in choosing the mode of governance for providing water, path dependency, and so forth.

In order to explore the determinants of the mode of governance and the resulting performance, we will define propositions based on the hard core of transaction cost economics, i.e., the hypothesis that a mode of governance performs much better if it fits the characteristics of the transaction it supports, namely, specificity of assets and uncertainty. Space constraints making us unable to look at these determinants and their rationale [7], we will restrict ourselves to applying the basic propositions to the case under review, in order to focus on our data and our test.

Proposition 1: The more a geographic area requires specific investments to provide water, the lower is the probability of outsourcing these investments (i.e., delegating), everything else remaining constant.

This proposition results directly from Williamson's hypothesis, one of the most often tested, according to which a higher degree of specificity in investments pushes towards more integration. In our version, this means that when highly specific investments are required, it is likely that integrated forms (i.e., "régies") will prevail over arrangements that are closer to market forms (e.g., concession).

Proposition 2: With specific investments required for distributing water in a certain area, the higher the uncertainty in that distribution, the lower the probability of outsourcing these investments (i.e., delegating), everything else remaining constant.

Again, this proposition simply expresses Williamson's hypothesis that there is a close relationship between the degree of uncertainty surrounding a transaction and the degree of integration. Indeed, increasing uncertainty pushes towards the adoption of a mode of governance that allows tight control, the polar case being full integration. In our typology of

[7] The heuristic model is in Williamson 1985, chap.4 . More is developed in Williamson 1996 and, with more technical details, in Saussier, 1997, 1999.

arrangements, direct management by a public bureau ("régie directe") is the extreme expression of such integration.

These two propositions, now quite standard in transaction cost economics, do not shed light on the institutional dimension involved in the decision to choose a specific mode of governance. Indeed, the logic underlying these propositions focuses on economic determinants. In all that precedes, we assume that agents have a strong incentive to choose the most efficient mode of governance. This assumption is quite reasonable when we study actors operating in highly competitive markets. It can be seriously challenged, however, in an analysis of the decisions made by local authorities for utilities that are largely protected from competition. In these circumstances, it is likely that important factors other than economic efficiency, e.g., support of key political constituencies, will play an important role. For example, local authorities may choose a form that will allow them to influence local employment, a much easier task with a public bureau ("régie") than with a private operator whose autonomy of decision is protected by a long term concession. Political orientation may also be a factor[8]. We plan to come back to these issues in another paper.

One last thing that we want to consider, because of its importance to local authorities, is the role of financial constraints. Specific investments are usually costly and can hardly (or not at all) be redeployed. Water is a sector with very important sunk costs, and these costs represent a very high proportion of total costs (up to 80%; Shirley and Ménard, 1999). Many local governments will therefore be subject to financial constraints that do not allow them to chose the mode of governance they would otherwise prefer for that type of investment. This can actually be considered as another side of specific investments. We translate this into the following proposition:

Proposition 3: Local authorities with limited budgets are more likely to choose to outsource than to provide the service themselves, when significant specific investments are involved, everything else remaining constant.

4. The choice of the mode of governance: our variables.

Our analysis is based on a sample of 2109 Water Supply Units (WSU), serving all towns of over 5000 inhabitants, for the period 1993-1995. These units represent only 7.3 % of the total units providing water to the French population, but they cover the needs of 72.6 % of the total population. In order to test our propositions, we have identified for each unit, during the period under review, information relevant to the characteristics of transactions identified in our theoretical framework, namely: investments, uncertainty, and the financial constraint.

4.1. Investments.

According to our proposition 1, geographical areas that require large investments to guarantee a reliable supply of water should push toward integration by local authorities, i.e., WSU should be under their direct control ("régie"). So far, we do not have coherent data on investments required for each WSU. However, we were able to identify proxies that are closely correlated with the level of investments.

Properties of raw water.

One indicator of the volume of investments needed is the quality of raw water available and the related treatment it requires from the WSU. The worse the quality of raw water, the greater the investments required for its treatment. Quality of surface water is indicated by a standardized typology: A1 is for raw water that requires only simple mechanical filtering with

[8] A previous study, based on a limited number of cities, concluded that the political orientation of local authorities did not play any significant role in the choice of the mode of governance (Derycke, 1990). But

light disinfection; at A2, raw water requires a combination of physical and chemical treatment, plus disinfection; for A3, raw water needs all of the previous treatments, plus a refining process; last, the level OS ("out of standard") designates quality that poses exceptional problems. To represent this quality factor, for which we have the relevant information, we use the variable A3OS which takes value 1 if the WSU operates in departments (the French administrative unit) where there exist raw water of quality A3 or OS, 0 otherwise.

Origin of water.

As for underground water, we do not have information on its initial quality, before treatment. However, it is well known that underground water is of much better quality than surface water. Hence, units for purifying underground water are less complex and less expensive. On the other hand, underground water is more costly to exploit: pumping requires investments significantly larger than does routing surface water into canalization. For similar quality, different sources of water therefore require significantly different amounts of investment. To capture this characteristic, we have isolated the WSU that operate in departments where all water comes from underground.. This variable is labeled WATUND.

Population affected.

Last, the size of the population for which a WSU provides water also plays an important role in the size of investments as well as in the dependency of local authorities on a potential private operator. First, the larger the size of a population, the more rapid amortization can be. This will reduce the incentive to have long term contracts in which control is more diffuse, thus favoring the risk of opportunistic behavior by the operator. Second, the size of the population also influences the economic and technical capacities that local authorities can

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political factors may still be involved that transcend delineation of political parties (e.g., influence, corruption).

mobilize. Small towns have fewer internal resources either to produce water themselves or to monitor and control a private operator, while using external expertise is costly, since private operators have little interest in managing smaller systems. This may explain the tendency of small towns to create pools, either to provide water directly through a joint bureau or to outsource. When the population is large, local authorities can much more easily hire technical expertise and, simultaneously, their market is more attractive to the private operators. With a large population, the choice of a contractual arrangement is much more open. We capture this effect with the variable PERMPOP.

To summarize, we have three proxies with which we can indicate the degree of specificity of investments required: A3OS, WATUND and PERMPOP.

4.2. Uncertainty

Our proposition 2 suggests that areas in which transactions are plagued with a high level of uncertainty should be "integrated", i.e., water should be provided through direct management ("régie"). Sources of uncertainty may include climate (rainfall, drought) and other unknown factors that influence the volume of water to be distributed (economic development of the area, variation of future population) or its quality. The available data do not provide us with fully satisfying proxies for these factors. However, taking into account the basins through dummies allows us to approximate part of the problem, since they correspond to natural geographic area (climate) and to areas with specific urban and economic development.

4.3 Financial constraints

Last, our proposition 3 emphasizes that the size of investments also translates into financial constraints. In addition to the size of the population, which obviously affects the potential budget of local authorities (see our variable PERMPOP), another factor plays an important role: the gap between average and permanent population, a factor largely due to seasonal

variation. Indeed, such variations, when they are substantial (e.g., winter resorts, or the Riviera in the summer) require substantial investments to meet the seasonal demand, and these investments are often very significant relatively to the financial resources available to local authorities. We capture this with our variable DELTAPOP.

4.4 Performance.

In our introduction, we stressed that one important goal of this paper is to evaluate performance of each mode of governance. Indeed, a key point of our analysis is to identify whether or not we can observe significant differences according to the mode of governance chosen, and to determine if there is a mode better adapted to the characteristics of the distribution of water. As is well known, choosing the relevant variables for measuring performance is not trivial. Several dimensions can be taken into account, and several indicators can be chosen: financial, economic, or even physical. In this paper, we adopt a simple criterion with a clear rationale for water service, the capacity of WSU to provide water that meets legal standards[9].

In France, standards of quality are defined by a legal decree (no. 89.3, from January 3, 1989)[10]. Their implementation and control are under the responsibility of powerful regional administrations ("Directions Departementales des Affaires Sanitaires et Sociales, DDASS). Any anomaly detected by controllers of the DDASS or of specialized organizations must be reported to DDASS and is followed, according to the severity of the anomaly, by additional controls, by imposition of measures to correct the situation or, when threat to health is serious, by prohibition of the incriminated water for consumption.

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[9] Being in a well-developed country, we assume that all population is connected. Rate of connection is a major issue in developing countries (see Ménard and Shirley, 1999).

[10] General quality standards are based on those established by the World Health Organization in 1986. Sanitary standards for water for human consumption are defined more precisely in another decree (no. 98-3 , from January 03, 1989). Also relevant are the decrees adopted by the European Union (no.75-440 ; no.79-869 and no.80-778).

Standards of quality have changed significantly over this century, with increasingly tighter requirements. At the beginning of the century, drinkable water was defined through six chemical parameters and the identification of two microorganisms. Before the decree of 1989, 21 parameters were taken into consideration. Now there are 62 parameters used for determining quality of drinkable water. Obviously, these parameters cover a very diversified set of factors. Some serve essentially as indicators of the good condition of facilities (e.g., indicators of turbidity), so that they do not necessarily signal a risk for consumers. But most have a direct relation to health. Another important point to mention relates to the potentially large variation in the quality of water. Quality of raw water depends on where it is captured. It is subject to hazards related to natural conditions (hydro-geology, meteorology) as well as to temporary pollution. It also varies according to the type of treatment. Last, it changes in the distribution process, by getting mixed with other sources of water, by contact with materials used, and by exogenous sources of pollution. Since our goal here is to measure as directly as possible performance of contractual arrangements, we focus on the quality of water after treatment but before transportation and distribution to final consumers [11]. We use the variable DETECT, which takes value 1 for a WSU that has been identified as producing water not meeting the standards, zero otherwise.

4.5. Checklist of our variables.

Table 3 summarizes all variables used in our econometric tests.

[11] Indeed, in transportation and distribution, several factors can interfere to change the quality of water without the responsibility of the WSU being involved (e.g., negative effects of road work, or of pollution originating outside of the water system) .

Table 3: Variables and their meaning

	Variables	Définition
Dependant Variables	REGIE	Variable taking value 1 when the mode of organization is direct management.
	DELEG	Variable taking value 1 when the mode of organization is direct management; value 2 for leasing; value 3 for concession.
	DETECT	Variable taking value 1 for a WSU that has been identified distributing bad quality water, at least once within a year, 0 otherwise.
Investments	DELTAPOP	Variable equals to the gap between average and permanent population.
	PERMPOP	Variable equals to the permanent population concerned by the WSU.
	A3OS	Variable taking value 1 when the WSU operates in a department where there exist raw water of bad quality (A3 or OS quality levels)
	WATUND	Variable taking value 1 when the WSU operates in a department where all water comes from underground.
Control Variables	SN	Variable taking value 1 when the WSU operates in an area supervised by the Seine-Normandie regional agency
	LB	Variable taking value 1 when the WSU operates in an area supervised by the Loire-Bretagne regional agency.
	RMC	Variable taking value 1 when the WSU operates in an area supervised by the Rhône-Méditérannée-Corse regional agency.
	AG	Variable taking value 1 when the WSU operates in an area supervised by the Adour-Garonne regional agency.
	DOM	Variable taking value 1 when the WSU operates in an area supervised by the DOM regional agency.
	RM	Variable taking value 1 when the WSU operates in an area supervised by the Rhin-Meuse regional agency.

5.Results

As already mentioned, our econometric regressions intended to clarify two main issues: what are the determinants of contractual choice? And what is the relationship between the arrangement chosen and its performance? Our results confirm the robustness of the predictions we made using transaction cost economics.

5.1. Determinants of contractual choice.

In order to analyze the determinants of the choice of the arrangement which characterizes a WSU, we have defined a variable DELEG. This variable reflects the degree of delegation chosen by local authorities (see Table 3). It takes value 1 when the mode of organization is direct management by local authorities (“régie”), i.e., there is no delegation to a private operator; value 2 for leasing, which corresponds to a partial delegation of authority to a private operator; and value 3 if the contract is a concession, which is the maximum

involvement of a private operator short of full privatization[12]. Results of our tests are in table 4.

Table 4. Determinants of contractual choice.

Independant Variables	Ordered Logit DELEG (1)	Ordered Logit DELEG (2)	Multinomial logit DELEG (3)# *Régie*	Multinomial logit DELEG (3)# *Concession*	Multinomial logit DELEG (4)# *Régie*	Multinomial logit DELEG (4)# *Concession*	Logit DELEG (5)
SN	0,67 (3,41)***	0,72 (3,47)***	-0,81 (-4,48)***	1,03 (3,034)***	-0,87 (-3,99)***	-0,07 (-0,19)	-0,84 (-3,94)***
LB	0,21 (1,09)	0,20 (1,04)	-0,20 (-1,24)	1,23 (3,63***)	-0,25 (-1,29)	0,05 (0,156)	-0,23 (-1,21)
RMC	0,15 (0,803)	-0,06 (-0,31)	-0,50 (-3,33)***	-1,44 (-2,90)***	-0,56 (-2,79)***	-2,65 (-5,09)***	-0,37 (-1,90)*
AG	0,23 (1,135)	0,13 (0,63)	-0,30 (-1,69)*	0,59 (1,53)	-0,36 (-1,67)*	-0,54 (-1,28)	-0,28 (-1,33)
DOM	0,50 (1,68)*	0,28 (0,90)	-	-	-	-	-1,03 (-2,79)***
RM	-0,75 (-3,30)***	-0,99 (-4,15)***	-	-	-	-	0,55 (2,34)***
PERMPOP	-	0,043 (3,70)***	0,018 (1,21)	0,077 (4,47)***	0,01 (0,26)	0,32 (4,83)***	-0,001 (-0,14)
$PERMPOP^2/10^{12}$	-	-	-	-	-0,042 (-0,13)	-0,97 (-2,83)***	-
$PERMPOP^3/10^{18}$	-	-	-	-	-0,068 (0,17)	0,85 (2,03)**	-
DELTAPOP	-	0,30 (1,87)*	-0,63 (-2,37)**	-0,28 (-0,63)	-0,65 (-2,42)**	-0,25 (-0,63)	-0,61 (-2,31)***
WATUND	-	-0,55 -3,33***	-0,018 (-0,10)	-2,96 (-4,04)***	-0,05 (-0,29)	-3,20 (-4,35)***	0,13 (0,75)
A3OS	-	-0,34 -2,63***	-0,19 (-1,44)	-2,23 (-5,43)***	-0,21 (-1,52)	-2,41 (-5,85)***	-0,042 (-0,31)
Constant	0,85 (5,22)***	1,02 (5,68)***	-0,56 (-4,91)***	-2,72 (-9,88)***	-0,47 (-2,50)***	-1,94 (-5,63)***	-0,69 (-3,94)***
Log Likelihood	-1522	-1505	-1458		-1285		-1145
Observations	2052	2052	1831		1831		2052

For all our estimations, we took into account the possibility that PERMPOP would have nonlinear effects on the decision to choose a mode of governance. There were no significant effects except in regression DELEG (4).

*** Significant at the 1% level; ** significant at the 5% level; * significant at the 10% level.

WSU operating in overseas territories (DOM) and in the basin monitored by the Rhin-Meuse agency have been removed from the regression, because in these two cases, there is no concession contract. Hence, the total number of observations is down to 1831. Results are identical in the constraint model in which the variable DELTAPOP intervenes only in the decision whether or not to outsource water provision (i.e., it is not involved in the decision to choose the specific form of outsourcing, lease versus concession).

[12] We have already mentioned that for towns of more than 5000 inhabitants in France, which is the base of our data set, there are not enough cases of fully privatized modes of governance to be significant in our tests.

A preliminary comment is necessary with regard to column DELEG (1), in which there are significant differences according to the basins. This was already noticeable in Table 2. Local authorities in the Seine-Normandie basin delegate much more water provision than in other regions. Conversely, local authorities in Rhin-Meuse delegate much less. Other basins are in between[13]. A similar result has been observed previously on a much more limited sample of WSU (Derycke, 1990).

Let us now introduce the variables that measure the key characteristics of transactions involved in the choice of the mode of governance. For all of them, results are significant (see column DELEG (2)). Indeed, these choices are unambiguously related to the explanatory variables that we have identified.

First, our results show a clear impact of PERMPOP. The larger the population concerned, the more we observe delegation by local authorities. This supports our first **proposition**: the larger the population, the smaller the investment per capita[14], and the better the profitability for an operator. Indeed, anticipation of good profitability gives local authorities the choice between providing «in house» or delegating to an operator; it also provides an incentive for operators to bid, since they can reasonably expect normal amortization of their investments within the limit of the duration of the contract[15]. In these circumstances, there is an incentive to delegate.

Second, for the WSU operating in areas in which water comes exclusively from underground, or in areas in which there exist surface water of bad quality, our test shows a clear predominance of direct management through public bureaus («régies») and, to a lesser degree,

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[13] Overseas territories (DOM) are an exception, since they virtually all use lease arrangements. The only possible explanation we can see for that is of political and/or administrative origin.

[14] In our sample, size of population is strongly correlated with demographic density. Therefore, we infer that it is per capita investment, not the absolute value of investment, that explains the result.

[15] It must be mentioned here that duration of contract is regulated. A law adopted in 1993 (Loi Barnier) stipulated that duration not exceed 20 years. Lease contracts usually have a duration within the 7 to 12 years range. Concessions are almost all for more than 15 years (and now less than 20 by the law).

of lease contracts. These modes allow local authorities to exert tighter control over the operator, public («régie») or private (lease), than they could over a concession. This result substantiates our second **proposition**. Raw water of bad quality or of underground origin requires much larger investments; shaving costs or being vulnerable to opportunistic behavior by a private operator would have a negative effect on quality of water and on the health of the population, with political consequences as a direct effect[16].

Third, our test shows that the more variable the population served by a WSU, the more likely it is that the arrangement adopted will be delegation to a private operator. Indeed, these modes relax the financial constraint for the local authorities. The result confirms our last **proposition.**

Considering the quality of the data available, we decided to go a step further and to check the robustness of our results. One possibility is to proceed to an estimation in assuming that the variable DELEG is a qualitative variable, but not an ordered one[17]. The results, based on a regression in a multinomial model, confirms our propositions (see DELEG (3) in our table). They also provide more precision on the effect of each variable on the choice of arrangements open to local authorities. The most noticeable effect is that strong seasonal variation in the population (DELTAPOP) has a significant impact on the decision to not provide water through a public bureau («régie»). The other variables do not play a determinant role in that choice with this model. This is confirmed by another estimation, in which the dependent variable is binary (see column DELEG (5)). One interesting result is that larger populations (PERMPOP) increase significantly the probability that water will be provided through a concession contract rather than a lease, with the possibility of a nonlinear effect (see column

[16] Indeed, we do not suggest that local decision makers are purely oriented towards maximizing the well-being of the population ; but they make their choice with awareness of the political consequences of responsibility for water of bad quality being delivered to their constituencies.

[17] The error in applying an ordered model to a non-ordered variable is much higher than the converse (Maddala, 1983).

DELEG (4)). On the other hand, bad water quality, or an underground source of water, increases the probability that distribution will be through a public bureau («régie») or a lease, rather than through a concession that would escape the control of local authorities.

To summarize, our results seem robust. They also suggest that the choice of a mode of governance proceeds in two steps. The decision to outsource or not depends centrally on the financial constraint, particularly when investments are major ones. If the decision is to outsource, then the choice between a lease and a concession depends largely on the density of the population and the concomitant investments. This last point reinforces the idea that control over potential opportunistic behavior plays an important role in the decision process. Indeed, local authorities have much more control over the private operator under a lease than under a concession. In the former arrangement, investments that the operator will engage directly are almost always much less than in the latter, and major investments remain under the control of local authorities. Moreover, the duration of a lease being significantly shorter, control over the private operator and the capacity to put him under competitive pressure are easier.

Therefore, it seems that the choice of a mode of governance is not random, nor is it based purely on political determinants. There are factors involved that suggest economic rationale in these choices. This being said, we must also acknowledge that, with the data available for this paper, a significant part of the variation in choices remains unexplained, which suggests that important explanatory factors are neglected.

5.2 Mode of governance and performance.

Another goal of our paper is to test if there is a close relationship between contractual arrangements and performance. One puzzling aspect that confronts transaction cost economics is the coexistence in some sectors, for long periods of time, of different modes governing the

same transactions (Ménard, 1996). Again, our data set is particularly useful for examining aspects of this issue since, within the same rules of the game, we have an array of arrangements that have been operating for years, some for decades. If the theory is right, different modes of governance monitoring transactions with similar characteristics should have different performance.

As mentioned very briefly in 4.4, in order to measure the impact of contractual choice on performance of our WSU, we selected a simple, observable, and unchallenged criterion when it comes to provision of water, i.e., quality (which involves safety in this sector). More precisely, we considered the probability for a WSU to be identified as failure to meet at least one parameter of quality as defined by the law, at least once a year, whatever this parameter is[18]. Hence, our variable DETECT takes value 1 for a WSU that has been identified as failing at least one quality parameter, at least once within a year, 0 otherwise.

Our sample covered three years. Data were available for 1942 of the 2109 WSU of our initial sample. Results of our econometric tests are summarized in the following table.

[18] Some of these parameters, e.g., turbidity, pose not risk to public health.

Table 5. Modes of organization and performance.

Independant Variables	Logit DETECT (1)	Logit DETECT (2)#	Logit DETECT (3)@
SN	-0,50 (-4,11)***	-	-0,94 (-3,70)***
LB	0,47 (4,22)***	0,45 (2,53)***	-0,86 (-2,44)***
RMC	0,69 (6,03)***	-3,80 (-5,19)***	0,41 (1,27)
AG	1,19 (9,79)***	1,01 (4,88)***	-
DOM	4,43 (6,09)***	-	-
RM	0,53 (3,73)***	-	0,32 (0,25)
PERMPOP	2,64 (2,99)***	6,65 (2,68)	3,41 (1,21)
DELTAPOP	2,90 (3,30)***	-	-
WATUND	0,78 (7,75)***	-	-
A3OS	0,68 (9,14)***	-	-
CONTROL-NUMBERS	-0,10 (-2,95)***	-0,27 (-2,59)***	-0,14 (-1,19)
AFFERMAGE	0,55 (3,57)***	-	-0,27 (-0,82)
REGIE	0,89 (5,64)***	0,10 (0,70)	-0,12 (-0,33)
Constant	-1,76 (-10,16)***	-0,24 (-0,08)	0,42 (1,05)
Log Likelihood	-3650	-673	-504
Observations	5826	1101	795

In all our estimations, variables POP^2 and POP^3 are not significant.

***: significant at the 1% level; **: significant at the 5 % level ; *: significant at the 10 ¨% level

: This estimation concerns only small units (less than 50000 inhabitants) in which there is no significant variation of population during the year (DELTAPOP = 0) and operating in areas with water surface of bad quality (A3OS = 1)

@: This estimation concerns only small units (less than 50000 inhabitants) in which there is no significant variation of population during the year (DELTAPOP = 0) and operating in areas with underground raw water only (WATUND = 1).

Results of our tests show that concession is the mode of governance that performs the best (see column DETECT (1)), even when the specific characteristics of the different basins are taken into account. In contrast, , public bureaus («régies») have the worst performance, in that

the probability of their distributing water that is below some legal standards is significantly higher.

More precisely, this is the result we obtain if we assume that the contractual arrangement is given, i.e., we consider the arrangement as exogenous. But one important contribution of transaction cost economics is to make the choice of the mode of governance endogenous: Each mode has its advantages and its disadvantages, with the «right» choice depending on the characteristics of the transactions that the arrangement will have to organize. In that respect, the decision for a government to make «in house», i.e. through its own «bureau», rather than outsourcing, should correspond to the same logic (Williamson, 1999). If it is so, there should be situations in which the «integrated» form that is a public bureau («régie») should perform at least as well as other forms. According to the theoretical explanation of integration (and a public bureau is a form of integration into the government), this should occur in areas that require heavy investments per capita to produce and distribute water that meets quality standards and in areas in which costly water treatment installations are required.

In order to test this proposition, we **first** focused on WSU serving less than 50,000 inhabitants and operating in areas with bad quality surface water (A3 and OS). WSU operating in areas in which raw water comes exclusively from underground sources (i.e., is of much better quality) are excluded. Thus, we are concentrating our analysis on areas in which important investments are required and in which quality is a real problem. Our sample then shrinks to 1101 WSU, among which only 9 operate under a concession; we eliminate these 9 units in order to focus on the measure of the respective performance of public bureaus («régies») and lease contracts. In the situation thus described, public bureaus perform at least as well as lease units (see column DETECT (2)); this is consistent with what the theory suggests.

In other terms, we need to re-examine our initial result that showed a comparative advantage of concessions over all other forms. More precisely, a more refined test shows that WSU

under lease or concession perform better than public bureaus only when the latter do not correspond to what the theory suggests to be the most adapted form with regard to the characteristics of the transactions. But when these characteristics correspond to those for which one would expect integration according to predictions made by transaction cost economics, then the comparative advantage of lease and concessions disappears. In a **second** step, we extended our analysis to WSU operating in areas with raw water of underground origin and with populations of less than 50,000 inhabitants. The result is identical to the previous one (see DETECT (3)). Hence, the two approaches converge: when public bureaus («regies») have been chosen in situations with characteristics that correspond to what transaction cost economics predicts, these integrated forms perform at least as well as lease or concession.

Therefore we obtain quite consistent results. **First**, the choice of the mode of governance seems to follow an implicit economic logic that conforms to what transaction cost economics predicts, notwithstanding the influence of other factors, e.g., politics. **Moreover**, this choice of a mode of governance does have a direct impact on the performance of the WSU, as measured by the criterion of quality relative to legal standards. There are significant differences in performance among WSU. But these differences do not express the absolute advantage of one mode of governance over the others. Rather, they follow a logic predicted by transaction cost economics. Indeed, integrated arrangements («regies») are used in situations in which problems of raw water quality are the most acute, and in which investments required are significantly greater; or, to put it the other way around, when the integrated form («régies») is adopted in such circumstances, its performance is comparable to and sometimes better than the performance of private operators working in similar conditions.

6.Conclusion.

Very few empirical studies have analyzed the trade-off among different contractual arrangements in provision of public utilities. There is a vast literature on the decision to integrate or not, including econometric tests, particularly in transaction cost economics. But, to our knowledge, there have been no previous econometric test that used the same theoretical apparatus for understanding decisions made by governments either to provide a service directly ("in house") or to outsource part of the service (lease) or all of it (concession or privatization) to a private operator.

Our paper proposes a test of that type. Our study relies on a detailed set of data that have never been used for that purpose so far. We used these data to explore with the help of econometrics two questions that are central in industrial organization: what determines the choice of a specific mode of governance among a set of possible forms? And how do alternative modes of governance perform with regard to the same type of transactions? The first question has generated tens of econometric studies in transaction cost economics but, to our knowledge, none on the decision by a government to outsource or not. As for the second question, there is an extremely small set of empirical tests of this issue, since it is very unusual to have data on several alternative arrangements, operating on the same type of transactions, with no interference of changes in technology or the institutional environment. In the French water system, we found such a set of data, and have developed preliminary results on our two questions.

Although this is still an exploratory paper, with more data to analyze in future studies, our initial results are very encouraging. In a sector in which most interpretations of the choice of the mode of governance have relied heavily on political factors, we have shown that there is room for an economic explanation: Characteristics of transactions at stake do impose a least part of their logic on the choice of decision makers. Our results also strongly suggest that

there is no absolute advantage for one specific mode of governance. We observe instead some comparative advantages that depend crucially on the characteristics of the transactions that modes of governance organize. In our sample, the integrated form with public ownership ("régies") often performs well, sometimes even better than privately operated utilities. But this occurs only when transactions have some specific characteristics that we have identified here. We are now developing our data set in order to include more direct measures of investments and costs. We are also collecting data on prices, and extending the period under review. More results can be expected.

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CONTRACTUAL CHOICE AND PERFORMANCE :

THE CASE OF WATER SUPPLY IN FRANCE

Claude Ménard and Stéphane Saussier

Summary

There is a vast literature in transaction cost economics on the choice made by firms to integrate or not. To our knowledge, there have been no previous tests for understanding decisions made by governments to provide a service or to outsource. Our paper presents such a test, using a data base on all units supplying water for towns of more than 5000 inhabitants in France. Our results strongly support that: 1) There is an economic rationale to contractual choices in public utilities; 2) There is no absolute advantage for one specific mode of governance, performance depending on the fitness of the mode of governance to the attributes of the transaction.

Résumé

Il existe une littérature abondante en économie des coûts de transaction sur le choix d'une entreprise entre faire ou faire faire. A notre connaissance, il n'y a pas de test économétrique de ce type portant sur l'arbitrage que fait un gouvernement entre offrir directement un service ou le confier à un opérateur Nous présentons un tel test, utilisant une base de données qui porte sur l'ensemble des Unités Distributrices d'Eau pour les villes françaises de plus de 5000 habitants. Nos résultats suggèrent fortement : 1) qu'il y a une logique économique dans les choix contractuels effectués ; 2) qu'il n'y pas d'avantage absolu pour un mode de

gouvernance, les performances dépendant de l'adéquation d'un mode aux attributs des transactions.

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