

## 24 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 1980s 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. Research by Hart, Shleifer and Vishny (1997) and 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. Studies such as 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 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 (World Bank 1995; Gatty 1998). Last, empirical surveys show innumerable malfunctions, whatever the mode of governance is (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

**Contractual choice and performance**

441

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 chapter, 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 chapter presents 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 database that provides information on all units supplying water (WSU) to towns of more than 5,000 inhabitants. This panel includes 2,109 WSU, for a period of three years (1993–5); it represents 73 percent of the French population.<sup>1</sup>

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 chapter, 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: (1) Laws defining quality standards, because of the externalities on public

442 **Claude Ménard and Stéphane Saussier**

health; (2) 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; (3) Laws oriented toward the protection of the environment and of a scarce resource.

Within these general rules, which allow 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”) involving 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 directly manage 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

**Contractual choice and performance**

443

Table 24.1. *Permanent average population, by type of arrangement*

Contractual arrangements	Observations	Average population	Std error	Min	Max
Direct management	534	18,704	41,745	528	606,147
Lease	1,416	16,619	32,709	200	586,501
Concession	102	58,112	116,550	3,065	698,127

Source: Direction Générale de la Santé.

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,<sup>2</sup> 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 24.2). 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 percent of the arrangements. The number of fully private operators in our sample is too small to be significant in our tests.<sup>3</sup> The distribution of contractual arrangements among the three forms is provided in table 24.1. 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.

One last thing needs to be mentioned. All the operators, whatever their status, 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.<sup>4</sup> 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

Table 24.2. *Distribution of contractual arrangements, by regional agencies*

Contractual arrangements	Regional agencies								Total
	Seine-Normandie	Loire-Bretagne	Rhône-Méditerranée	Adour-Garonne	Départements d'Outre-mer	Rhin-Meuse	Artois-Picardie		
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		2,109

Source: Direction Générale de la Santé.

**Contractual choice and performance**

445

geological and climatic factors. These factors have an important impact on costs and on consumption. In 1995, for the WSU serving more than 5,000 inhabitants, table 24.2 shows the distribution of contractual arrangements.

These data demonstrate 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.<sup>5</sup> 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. For example, 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 providing 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 exists 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.<sup>6</sup> The analytical framework, largely developed in Williamson (1985; see also 1996), is now well known. Let us assume that agents are looking 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 confirms 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 chapter is to determine whether there is a relationship between modes of governance and performance. If performance were 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

**Contractual choice and performance**

447

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 prevent us from looking at these determinants and their rationale,<sup>7</sup> 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. concessions).

**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 us towards the adoption of a mode of governance that allows tight control, the polar case being full integration. In our typology of 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 (TCE), 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. So far, we have assumed 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

448 **Claude Ménard and Stéphane Saussier**

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.<sup>8</sup> 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 percent: Shirley and Ménard 2002). Many local governments will therefore be subject to financial constraints that do not allow them to choose 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 2,109 Water Supply Units (WSU), serving all towns of over 5,000 inhabitants, for the period 1993–5. These units represent only 7.3 percent of the total units providing water to the French population, but they cover the needs of 72.6 percent 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

**Contractual choice and performance**

449

required for each WSU. However, we were able to identify proxies that are closely correlated with the level of investments.

*4.1.1 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 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.

*4.1.2 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*.

*4.1.3 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 mobilize. Small towns have fewer internal resources either to produce water themselves or to monitor and control private operators, while using external expertise is costly,

450 **Claude Ménard and Stéphane Saussier**

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 that 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 owing 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 chapter was to evaluate performance of each mode of governance. Indeed, a key point of our analysis is to identify whether or not we can observe

**Contractual choice and performance**

451

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 chapter, we adopt a simple criterion with a clear rationale for water service, the capacity of WSU to provide water that meets legal standards.<sup>9</sup>

In France, standards of quality are defined by a legal decree (no. 89.3, from January 3, 1989).<sup>10</sup> 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. It 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.

Standards of quality changed significantly over the twentieth 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, twenty-one parameters were taken into consideration. Now there are sixty-two 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. The quality of raw water depends on where it is captured. It is subject to hazards related to natural conditions (hydrogeology, 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.<sup>11</sup> 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 24.3 summarizes all variables used in our econometric tests.

Table 24.3. *Variables and their meaning*

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

**Contractual choice and performance**

453

variable reflects the degree of delegation chosen by local authorities (see table 24.3). 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.<sup>12</sup> The results of our tests are in table 24.4.

A preliminary comment is necessary with regard to column *DELEG* (1) in table 24.4, in which there are significant differences according to the basins. This was already noticeable in table 24.2. 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.<sup>13</sup> 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) in table 24.4). 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 proposition 1: the larger the population, the smaller the investment *per capita*,<sup>14</sup> 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.<sup>15</sup> 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, 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 proposition 2. 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.<sup>16</sup>

*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 proposition 3.

Table 24.4. Determinants of contractual choice

Independent variables	Ordered logit		Multinomial logit DELEG (3)#		Multinomial logit DELEG (4)#		Logit REGIE (5)
	DELEG (1)	DELEG (2)	Régie	Concession	Régie	Concession	
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 <sup>2</sup> /10 <sup>12</sup>	-	-	-	-	-0.042 (-0.13)	-0.97 (-2.83)***	-
PERMPOP <sup>3</sup> /10 <sup>18</sup>	-	-	-	-	-0.068 (0.17)	0.85 (2.03)**	-

<i>DELTAPOP</i>	-	0.30	-0.63	-0.28	-0.65	-0.25	-0.61
		(1.87)*	(-2.37)**	(-0.63)	(-2.42)**	(-0.63)	(-2.31)***
<i>WATUND</i>	-	-0.55	-0.018	-2.96	-0.50	-3.20	0.13
		-3.33***	(-0.10)	(-4.04)***	(-0.29)	(-4.35)***	(0.75)
<i>A3OS</i>	-	-0.34	-0.19	-2.23	-0.21	-2.41	-0.042
		-2.63***	(-1.44)	(-5.43)***	(-1.52)	(-5.85)***	(-0.31)
<i>Constant</i>	0.85	1.02	-0.56	-2.72	-0.47	-1.94	-0.69
	(5.22)***	(5.68)***	(-4.91)**	(-9.88)***	(-2.50)***	(-5.63)***	(-3.94)***
Log likelihood	-1522	-1505	-1458				-1145
Observations	2052	2052	1831			1831	2052

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

\*\*\* Significant at the 1 percent level; \*\* significant at the 5 percent level; \* significant at the 10 percent 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 1,831. 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).

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.<sup>17</sup> The results, based on a regression in a multinomial model, confirm our propositions (see *DELEG* (3) in table 24.4). 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) in table 24.4). 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 non-linear effect (see column *DELEG* (4) in table 24.4). 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 chapter, a significant part of the variation in choices remains unexplained, which suggests that important explanatory factors have been neglected.

**Contractual choice and performance**

457

*5.2 Mode of governance and performance*

Another goal of our chapter is to test if there is a close relationship between contractual arrangements and performance. One puzzling aspect that confronts transaction-cost economics (TCE) 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. Indeed, local authorities having chosen the “wrong fit,” i.e. a contractual arrangement that is not well aligned with the transactions having the characteristics that we have identified above, should be much more exposed to opportunistic behavior from the operator, e.g. under-investments, repeated renegotiations. These malfunctions should reflect in the quality of the product delivered, which is precisely what our data measure.

As mentioned very briefly in sub-section 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 failing to meet at least one parameter of quality as defined by the law, at least once a year, whatever this parameter is.<sup>18</sup> 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 1,942 of the 2,109 WSU of our initial sample. Results of our econometric tests are summarized in table 24.5.

Results of our tests show that concession is the mode of governance that performs the best (see column *DETECT* (1) in table 24.5), even when the specific characteristics of the different basins are taken into account. In contrast, public bureaus (“régies”) have the worst performance, in that their probability of 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 TCE 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

458 **Claude Ménard and Stéphane Saussier**Table 24.5. *Modes of organization and performance*

Independent variables	Logit <i>DETECT</i> (1)	Logit <i>DETECT</i> (2) <sup>#</sup>	Logit <i>DETECT</i> (3) <sup>@</sup>
<i>SN</i>	-0.50 (-4.11)***	-	-0.94 (-3.70)***
<i>LB</i>	0.47 (4.22)***	0.45 (2.53)***	-0.86 (-2.44)***
<i>RMC</i>	0.69 (6.03)***	-3.80 (-5.19)***	0.41 (1.27)
<i>AG</i>	1.19 (9.79)***	1.01 (4.88)***	-
<i>DOM</i>	4.43 (6.09)***	-	-
<i>RM</i>	0.53 (3.73)***	-	0.32 (0.25)
<i>PERMPOP</i>	2.64 (2.99)***	6.65 (2.68)	3.41 (1.21)
<i>DELTAPOP</i>	2.90 (3.30)***	-	-
<i>WATUND</i>	0.78 (7.75)***	-	-
<i>A3OS</i>	0.68 (9.14)***	-	-
<i>CONTROL NUMBERS</i>	-0.10 (-2.95)***	-0.27 (-2.59)***	-0.14 (-1.19)
<i>AFFERMAGE</i>	0.55 (3.57)***	-	-0.27 (-0.82)
<i>REGIE</i>	0.89 (5.64)***	0.10 (0.70)	-0.12 (-0.33)
<i>Constant</i>	-1.76 (-10.16)***	-0.24 (-0.08)	0.42 (1.05)
Log likelihood	-3650	-673	-504
Observations	5826	1101	795

Notes: In all our estimations, variables *PERMPOP*<sup>2</sup> and *PERMPOP*<sup>3</sup> are not significant.  
 \*\*\* Significant at the 1 percent level; \*\* significant at the 5 percent level; \* significant at the 10 percent level.

<sup>#</sup> This estimation concerns only small units (less than 50,000 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 (*A3O3* = 1).

<sup>@</sup> This estimation concerns only small units (less than 50,000 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).

**Contractual choice and performance**

459

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 1,101 WSU, among which only nine operate under a concession; we eliminate these nine 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) in table 24.5); this is consistent with what the theory suggests.

In other terms, we need to reexamine 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 TCE, 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) in table 24.5). Hence, the two approaches converge: when public bureaus (“régies”) have been chosen in situations with characteristics that correspond to what TCE 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 TCE 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 logic predicted by TCE. Indeed, integrated arrangements (“régies”) are used in situations in which problems of raw water quality are the most acute, and in which investments required are significantly greater. 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 TCE. But, to our knowledge, there have been no previous econometric tests 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 chapter 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? How do alternative modes of governance perform with regard to the same type of transactions? The first question has generated many econometric studies in TCE 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 chapter, 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 at least part of their logic on the choice of decision-makers. Our results

**Contractual choice and performance**

461

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.

## NOTES

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1. A forthcoming 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).
2. The United Kingdom is the only significant exception so far, with the privatization of water in England and Wales in 1989. The sector remains highly regulated by OFWAT (the Office of Water Services).
3. In an on-going 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.
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 chapter.
6. For surveys of this empirical literature, see Joskow (1988a); Klein and Shelanski (1995); Crocker and Masten (1996); Coeurderoy and Quelin (1997), and Masten and Saussier see chapter 16 in this volume, pp. 273–291.
7. The heuristic model is in Williamson (1985, chapter 4). More is developed in Williamson (1996) and, with more technical details, in Saussier (1997, 1999).
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 political factors may still be involved that transcend delineation of political parties (e.g. influence, corruption).
9. France being a highly developed country, we assume that all population is connected. Rate of connection is a major issue in developing countries (see Shirley and Ménard 2002).
10. General quality standards are based on those established by the World Health Organization (WHO) in 1986. Sanitary standards for water for human consumption are defined more precisely in another decree (no. 98-3,

462 **Claude Ménard and Stéphane Saussier**

from January 3, 1989). Also relevant are the decrees adopted by the EU (no. 75-440, no. 79-869, and no. 80-778).

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 roadwork, or of pollution originating outside of the water system).
12. We have already mentioned that for towns of more than 5,000 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.
13. Overseas territories (DOM) are an exception, since they virtually all use lease arrangements. The only possible explanation we can see for that is 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, which 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 can not exceed twenty years. Lease contracts usually have duration within the seven–twelve years' range. Concessions are almost all for more than fifteen years (and now less than twenty by the Loi Barnier).
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).
18. Some of these parameters, e.g. turbidity, pose no risk to public health.