Network information and performances in franchise bidding agreements: evidence from the French water industry ♣

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Abstract
The literature focusing on franchise bidding agreements points out the existence of information asymmetries that may affect the performance of these contracts. Indeed the private firm operating the service generally detain better information about the costs of the service than the public authority and may exploit this advantage to increase its profits unduly. However empirical works trying to put into evidence the impact of informational asymmetries on the performance of franchise bidding schemes are still scarce. Focusing on a sample of 5000 French municipalities observed in 2004, we show that the water price increases as information on the network improves when the service is managed directly by the municipality. However such a link is not observed when the service is delegated to privates firms. This result may indicate that the costs incurred by municipalities to discover information on their network are counterbalanced by the gain they obtain from the decrease in the informational advantage of the private firm, leaving the water price unchanged in delegated services.

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Keywords
Franchise bidding, water industry, information asymmetries, network information, organizational performances.

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1. Introduction

Franchise bidding agreements have been viewed by several scholars as an efficient way to introduce competition in natural monopoly industries (Demsetz [1968], Posner [1972]). Examples of industries where these agreements have been extensively used are the television cable sector in the United States (Zupan [1989a, 1989b]), the water sector in France (Chong et. al [2006] or the highway sector in Chile (Engel et. al [1997]).

Demsetz [1968] emphasizes that when the number of firms attending the bidding process is sufficiently high and if there is no possibility of collusion among them, competition for the market will enable the public authority to select the most efficient firm. What’s more, as the franchise granted is limited in time, the winning bidder will have incentives to maintain its price at a competitive level all along the contract in order to maximize its chances to be renewed at the subsequent auction\(^1\). Hence, franchise bidding contracts for natural monopolies aim to avoid the inefficient outcomes associated with monopoly pricing.

However in practice, economists identified several failures that may weaken the performance of franchise bidding schemes (Crocker and Masten [1996]). The existence of information asymmetries between the public authority and the private firm is one of the major problems that may affect these agreements (Laffont and Tirole [1993]). Even if the firm’s operating costs are initially revealed to the public authority through a competitive auction process, they may evolve over time because the environment is not static\(^2\). Then the private firm may develop over time a private information about its operating costs\(^3\). After signing the contract, it may naturally be tempted to ask for price renegotiations by pretending that its costs have unexpectedly increased because of unfavourable external events. The public authority may be reluctant to refuse the renegotiations because it fears for the financial health of the private company that has to ensure the provision of public services that are often strategic\(^4\). Indeed, financial problems of the franchise may lead to risks of decrease in the service quality resulting in disruptions or interruptions in service provision. In the worst case, the firm may go bankrupt, which would be politically unacceptable (Williamson [1976], Guash [2004]).

As a result, exploiting its informational advantage enables the private firm to increase its profits excessively. The “New Economics of Regulation” (Laffont [1994]) developed a lot of theoretical Principal-Agent models that propose potential solutions to deal with these informational asymmetries\(^5\). One of these solutions could consist in finding some means to oblige the private firm to inform about its operating costs. For instance the public authority may use auditing procedures (Baron & Besanko [1984b]). It may also oblige the firm to produce financial reports or accounting data\(^6\). Whatever the method used, reducing the informational rent of the firm is costly. Therefore, the decision to control the firm or not

\(^{1}\) An efficient bidding process ensures that the winning firm will propose a price for the service that is close to its unit average cost. Indeed marginal cost pricing is impossible in these industries precisely because they present natural monopoly features.

\(^{2}\) For instance, new technologies may appear, demand may fluctuate, the macroeconomic situation may evolve as well as conditions of supply at the local level.

\(^{3}\) As Armstrong and Sappington [2007] emphasize, “because of its superior resources, its ongoing management of production, and its frequent direct contact with customers, a regulated firm will often be better informed than the regulator about both its technology and consumer demand”.

\(^{4}\) Water provision, garbage collection or urban transports are some examples of public services that are politically strategic.

\(^{5}\) See Armstrong & Sappington [2007] for a survey of these models.

\(^{6}\) In such a case, the public authority would nevertheless need to have auditing capabilities because it would be obliged to verify that the information transmitted by the firm are not false.
requires that the municipality compares the benefits of improved information to the costs incurred to oblige the firm to tell the truth (Armstrong & Sappington [2007]).

Using a database of 5000 French municipalities observed in 2004, we show that when municipalities get more and more information about their water network, the price paid by consumers increases when the service is operated directly by the municipality. However the water price is not affected by the improvement in the municipalities’ network information when the service is managed by a private firm through a franchise bidding contract. This result may be consistent with the idea that the costs incurred to get more information on the network are offset by the efficiency gains resulting from the decrease in the informational advantage of the private firm, leaving the price unchanged in franchise bidding contracts. However, municipalities’ primary goal is not to reduce the informational rents of the private firm when they try to get better information about their water network; their goal is to develop a better knowledge of their underground infrastructures in order to realize more efficient investments in network’s renewal. Nevertheless, the indirect consequence of such a policy may be to reduce the firm’s leeway for manipulating its operating costs, which would be beneficial for customers. As far as we know, there is no empirical study that tries to evaluate the impact of the acquisition of network information on the performance of franchise bidding contracts.

The paper is organized as follows. In the first part, we present the theoretical framework and apply it to the water industry. The second part is more specifically devoted to the description of the French water industry. In the third part, we present our data and proceed to statistical treatments that enable us to emphasize some interesting results with regards to the link between network information, organizational choices and price performances. Conclusion follows.

2. Theoretical background

We consider a municipality (the Principal) that must organize the provision of a public service with natural monopoly features. She can decide either to provide the service itself, or to delegate the operation to a private firm (the Agent). When the municipality chooses a franchise bidding agreement, the firm develops over time private information about its operating costs. As a result, he may be tempted to complain that its costs are too high in order to obtain price increases and then, to boost its profits. A public employee has no incentive to behave this way as its wage does not depend on its operating costs. As a consequence, information asymmetries induce inefficiencies in franchise bidding contracts that must be dealt with.

For instance, if we consider the water industry, a great part of the network is underground and then invisible. When the water service is operated by a private firm through a franchise bidding contract, he may be tempted to declare a bad network’s quality and then, high maintenance costs in order to obtain the right to charge higher prices to consumers. Therefore, the municipality may find it important to gather information about the water network so as to reduce the leeway of the private firm for cost manipulations.

In order to obtain more information about the network, a municipality can use auditing procedures by relying to independent experts. She can also ask the private firm to produce and diffuse explicit information on the network and make some controls so as to verify that the
information transmitted are correct\textsuperscript{7}. These policies are costly but may also induce sizeable advantages.

Let’s sum up our framework by a simple model in order to fix the ideas. At date $t_0$, the private firm (or the public employee) announces its operating costs. At date $t_1$, the municipality decides to obtain more information about her water network and asks the private firm (or the public employee if the service is municipalized) to produce and transmit explicit information about the water network\textsuperscript{8}. The municipality may agree on a price increase in order to finance the production of information. At date $t_2$, information is transmitted to the municipality. Then, a price revision may occur. In a Principal-Agent framework, what would be the incidence of this policy on the water price paid by consumers in the short-run?

Two different factors may impact on the water price at the end of period $t_2$: the cost of information production and control on the one hand, and the benefits of improved information on the other hand. As it will be shown below, the overall effect is unclear in the short-run but it may not be the same whether the municipality chose in-house provision or a franchise bidding contract.

One can think that a private firm may spontaneously be willing to produce a certain level of network information because a too bad network knowledge may deprive his profits\textsuperscript{9}. Conversely, getting information on the network does not affect the public employee’s profits. He then has no spontaneous incentives to realize efforts in this sense. That’s why, when the municipality asks for new network information, production costs may be higher in municipalized services than in delegated services. Arguably, some information wanted by the municipality may already be available on request to the private firm without further investigations on the network, which is less likely if this information is asked to a public employee.

Nevertheless, if production costs are higher, what we will call control costs are probably less important in municipalized services than in franchise bidding agreements. We will divide these control costs in two categories. Transmission costs refer to the situation when the private firm hide some existing information to the municipality whereas verification costs refer to the situation when the municipality has to ensure that information transmitted is reliable.

At date $t_1$, the private firm is likely to underestimate the quantity of information he detains. More precisely, he may be tempted to hide information and pretend that the production costs are high in order to obtain a price increase and perceive undue profits. What’s more, the firm may also be tempted to transmit false information to the municipality by signalling a bad network quality so as to preserve his informational rent. Indeed, if at date $t_0$, the firm announces high operating costs and if information transmitted at date $t_2$ reveals that the network’s quality is good and then, that his operating costs are low, the municipality will decide to shut down the water price, which would mean a loss of informational rent for the

\textsuperscript{7} We will call “explicit information” the part of the network’s information that is shared with the municipality by the private firm (or public employee). The nature of these information can be diverse (age of each portion of the network, material used for the pipes, etc.) as we will see in the empirical part.

\textsuperscript{8} Indeed, we can naturally expect that the one who operates the network day-by-day is the one who will be able to produce and transmit network’s information at the least cost.

\textsuperscript{9} For instance, insufficient network information induces inefficient investment programs and excess water leakages, as it will be discussed below.
private firm. The municipality may then have to incur additional control costs in order to ensure that the private operator does not hide existing information and that information transmitted by the firm about the network is correct. These control costs are obviously not supported in municipalized services to the extent that once information is produced, a public employee has no financial interest in lying about both the quantity of information he detains and the nature of the information transmitted.

To summarize, production costs may be higher in municipalized services, but control costs may be greater when water provision is private. Therefore, at a theoretical point of view, it is not clear whether the overall impact of these costs on water prices will be greater in municipalized services or in franchise bidding agreements.

If acquiring more explicit network information induces several costs, it may also involve sizeable benefits. First, a better network knowledge enables (in the long run) more efficient investments programs in network’s renewal and (in the short run) better infrastructure maintenance as water leakages may be detected and fixed more quickly, be the service delegated or operated directly by the municipality. Second, when the service is delegated, the informational advantage of the private firm is reduced and then, the performance of the franchise bidding agreement should be enhanced. Arguably, if the firm anticipates that the municipality will ask new information on the network at date \( t_1 \) and will exert an effective control, he may relinquish to hide or distort information at date \( t_1 \) and he may be tempted to report truthfully about its operating costs at date \( t_0 \). Indeed, if information transmitted at date \( t_2 \) is not compatible with the firm’s ex ante report and if shirking is detected, the price will be readjusted downward and the firm may incur additional costs (contractual penalties, loss of reputation etc.). The following table sums up the short-run and long-run gains induced by the acquisition of explicit information about the network:

| Table 1. Short-run and long-run gains from the acquisition of explicit information about the network |
|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|--------------------------------------------------|
| **Short-run benefits**                           | **Long-run benefits**                            |
| **Municipalized services**  | **Delegated services**                            | **Municipalized services**  | **Delegated services**                            |
| More efficient infrastructure maintenance       | More efficient infrastructure maintenance        | More efficient network's renewal                    | More efficient network's renewal                    |
| Fewer information asymmetries                    |                                                   |                                                   |                                                   |

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10 Obviously, these control costs may be reflected in the consumers’ water bills.
11 We remind again that private firms’ network information, albeit greater than municipalities, is not necessarily optimal. Indeed, collecting new information about the underground pipes is costly so that the private firm may not necessarily have the appropriate incentives to optimise his network’s knowledge. This is especially true in the French water industry to the extent that private firms do not own the network and their contract is of limited duration (most delegated contracts do not exceed 12 years). Therefore, by being obliged to produce and transmit explicit information to the municipality, the private firm may improve its own network knowledge at the same time.
12 The gains partly consist in cost reduction that may benefit to the consumers through price decreases. However, better efficiency may also be achieved with regards to other dimensions of performance. For instance, service quality may be improved to the extent that more efficient infrastructures’ maintenance and renewals lead to lower risks of service interruptions. As our data do not enable us to undertake a complete welfare analysis, the paper will merely study the consequences of variations in municipalities’ network information on the water price paid by consumers (see below).
One can consider that if a municipality decides to set up some measures that enable her to get better information about its water network, this is precisely because she anticipates net benefits, at least in the long-run.

All in all, the short-run benefits induced by a better network’s knowledge should be greater when the service is delegated than when the service is municipalized to the extent that unlike a public employee, a private firm has a financial interest in exploiting its informational advantage on the network.

The following table summarizes the comparative short-run gains and costs of improved information according to the organizational mode chosen by the municipality with regards to water provision:

<table>
<thead>
<tr>
<th>Costs and benefits</th>
<th>Municipalized services</th>
<th>Delegated services</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition costs</td>
<td>-13</td>
<td>+</td>
</tr>
<tr>
<td>Control costs</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Short-run benefits</td>
<td>-</td>
<td>+</td>
</tr>
</tbody>
</table>

Our analysis raises two empirical questions: do the benefits of improved information outweigh the costs in the short-run? Does improved network information affect the performance of municipalized services and delegated services in a similar way? Before addressing these questions, it seems important to describe briefly the main features of the French water industry as it will be the support of our empirical analysis.

### 3. The French water industry

In France, the water industry is organized at a local level. More precisely, municipalities can decide to manage themselves their water service. The organizational mode for water distribution can then be referred to as direct management. But municipalities can also choose to call upon a private firm using a franchise bidding contract. In this case, the private firm is chosen after a bidding procedure and is given the right to operate the service for a certain number of years.

Direct management and franchise bidding agreements have different properties with regards to incentives for information production and diffusion. When direct management is the organizational mode, the service is operated by a public employee who is a civil servant paid by a fixed wage. He then has few incentives to gather information about the network as his remuneration does not depend on the network’s performance. However, he may not be reluctant to transmit the available information to the municipality. Conversely, the network’s performance may affect the private firm’s remuneration. For instance, too many water losses

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13 The sign « minus » in the first row and first column means that municipalized services have a disadvantage with regards to acquisition costs compared to delegated services. Naturally, the signs in the third column are the reverse of those in the second column.

14 In fact, in this case, municipalities can choose among several organizational modes. See Chong et al. [2006] for more precisions.

15 The duration of a contract for water provision is limited to 20 years by the French legislation (Barnier law [1995]). For more details about the organization of the bidding procedure in France, see Chong et al. [2006].

16 His wage increases with an index reflecting seniority but does not depend on his performances.
may deprive its profits. As a consequence, he may have more incentives to get information about the underground infrastructures as a better network’s knowledge enables more efficient pipes’ maintenance and renewals. Nevertheless, he may be less reluctant to transmit some information collected to the municipality so as to preserve his informational rents. That’s why, as emphasized above, the municipality may have to undergo additional control costs in franchise bidding agreements.

In France, the informational advantage of private firms operating local water services is not a trivial problem. The French public Court of Auditors emphasizes that if some municipalities are well informed about the quality of their infrastructures, in particular by requiring private firms to actualise regularly the network maps, many of them are not. The Court indicates that municipalities should ensure that private firms regularly transmit actualised data about the water service and they should control for the reliability of these information. At last, the Court points out that good information about the network’s quality are a prerequisite for an efficient network maintenance and renewal\textsuperscript{17}.

However, if it’s obvious that a good network’s knowledge is socially desirable in the long-run\textsuperscript{18}, the short-run effects of policies aiming to improve network information are unclear. As emphasized above, short-run benefits as well as short-run costs may be observed and the overall impact on the operating costs and therefore, on the water price, is ambiguous. But more importantly, the impact may not necessarily be the same according to the organizational mode chosen by the municipality, which is not a trivial prediction. That’s why, in what follows, we propose to investigate this question empirically using data on the French water industry.

4. Empirical analysis

4.1. Data

Our initial sample is made up of 5000 French municipalities observed in 2004. We created this dataset by combining information obtained with the French Environment Institute (IFEN) and the French Health Ministry (DGS)\textsuperscript{19}. All municipalities’ size is proportionally represented except for large municipalities that are all present in the sample. Municipalities may not necessarily have the same organizational mode for water production and water distribution. But in order to realize relevant performance comparisons across organizational modes, we restricted our analysis to public authorities for which this is the case. Our final sample then reduces to 4479 observations. The unit of observation is a municipality in 2004.

Price

Our performance indicator is the retail price of water paid by consumers for an annual consumption of 120 cubic meters net of national and local taxes (variable \textit{PRICE}).

\textsuperscript{17} See Cour des Comptes [2003], p. 55, 56 & 57.

\textsuperscript{18} Efficient network maintenance as well as relevant investment’s programs not only reduce the long-run costs of water provision. An improvement of the network’s quality also results in a better service quality for consumers by decreasing the likelihood of water shut-off. Environmental gains can also be expected in the sense that fewer leakages contribute to the preservation of water resources.

\textsuperscript{19} All data come from IFEN and SCEES (Service Central des Enquêtes et Etudes Statistiques) except the data concerning the kind of treatment used for raw water, which come from the DGS (Direction Générale de la Santé).
Governance choice
We create a dummy variable equal to 1 if the municipality decided to assign the production and distribution of water to private company and 0 otherwise (variable *DELEG*).

Network information quality
One of the indicators used by practitioners to measure network information quality is the percentage of the network’s maps actualized every year. We can then infer that municipalities dispose of better short-run information if 100% of the maps are actualized a given year than if they are not. In the database, three variables are available:

*INFOTOP* indicates the percentage of the network’s maps actualized in 2004 with topographic information.

*INFODESC* indicates the percentage of the network’s maps actualized in 2004 with a detailed description of each section.

*INFOLOC* indicates the percentage of the network’s maps actualized in 2004 with localisation and inventory of the interventions.

The three variables enable us to construct a measure of short-run network information

\[
INFO = \frac{INFOTOP + INFODESC + INFOLOC}{3}
\]

3.2. Some statistical results
The first graph reveals that an increase in information quality increases the price on the overall sample, especially when the level of the *INFO* variable exceeds 20%. This result seems to indicate that the short-run costs of information collection exceed the short-run benefits.

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20 We were told by practitioners that *INFODESC* and *INFOLOC* provide more network information than *INFOTOP*. However, as it is difficult to find an appropriate weighting, we constructed *INFO* as a mean of the three available variables. We also considered each of the information variables separately in the statistical analysis that is presented below.
However, graph 2 and 3 suggest that this positive link is especially explained by municipalized services. Indeed, there is no obvious correlation between information quality and price performance for delegated services:

As a result, when we directly focus on the price difference between delegated services and municipalized services, we observe that the gap between the two organizational modes decreases as information quality increases\(^2\)

\(^2\) Indeed, as graph 2 and graph 3 reveal, water prices prove to be higher on average in delegated services than in municipalized services for several reasons (See Chong et. al [2006] for more details).
The first stick of graph 4 can be interpreted as follows: when less than 20% of the network maps are actualised in 2004, the average price difference between delegated services and municipalized services approximately attains 42 euros. This difference is just 30 euros when information quality is excellent (i.e. when the values for \textit{INFO} exceed 80%).

The decrease in price difference across organizational modes can also be observed if we consider each of the three information variables separately. This is what is shown in graph 5, 6 and 7. According to the variable used, the price difference varies between 6 to 8 euros.

\begin{center}
\textbf{Graph 5: INFOTOP and organizational performances}
\end{center}

\begin{center}
\textbf{Graph 6: INFODESC and organizational performances}
\end{center}

\footnote{A problem arose here since we lack variance when we consider each information variable separately. More precisely, the three information variable often takes extreme values (0% and 100%) but more rarely intermediate values. That’s why, in order to obtain relevant and homogeneous group of observations, only two classes were considered for these variables: a first class accounting for the observations with less than 50% of the network maps actualized in 2004 and a second class accounting for the observations with 50% of the network maps or more actualized in 2004.}
4.2. Discussion

The fact that the costs undergone to acquire more network information outweigh the benefits in the short-run may explain why municipalities are reluctant to get information about their network. As emphasized above, the French public Court of Auditors deplores such a behaviour to the extent that in the long-run, a bad network’s knowledge may result in inefficient investments programs and a deterioration of the network’s quality. But some municipalities may only be preoccupied by short-run concerns and therefore, they may not necessarily be willing to increase the burden of consumers’ water bills.

However, our results suggest that the improvement of information quality clearly increases prices in municipalized services, but this seems to be less obvious in delegated services. To the extent that prices are on average higher in delegated services, our statistical analysis then concludes that the price difference between the two organisational modes reduces when information quality improves. The question is why an improvement of information quality does not impact the performance of each organizational mode in the same way? We can try to give some elements of answer relying to the analytical framework described above and to the French institutional context.

First, let’s remind that our theoretical analysis reached the conclusion that delegated services may have a comparative disadvantage with regards to control costs. However, our contention is that these disadvantages may be attenuated in high populated municipalities for two reasons. First, these municipalities generally dispose of more important internal skills than low populated ones, which enables them to exert a relatively more efficient (and then less costly) control of their private operator. Second, high populated municipalities represent an attractive market for private operators, which means that if shirking is detected, firms will have more to lose if their contract is not renewed. As a consequence, assuming that the probability for the municipality to detect shirking is constant, moral hazard issues may be less acute in high populated municipalities, which may result in less monitoring costs on average.
As graph 8 clearly shows, information quality is positively correlated to the size of the municipality.

Graph 8: percentage of the network maps actualized in 2004 (INFO) and size of the municipality

When network information is excellent (INFO > 80%), the average size of municipalities exceeds 12000 inhabitants. This is more than twice as much as the average size of municipalities where network information is bad (INFO < 20%). This result may reflect the fact that high populated municipalities dispose of more important financial resources to invest in information acquisition.

Combining all this statistical evidence with our analytical framework, we can now advance a plausible explanation for the reasons why the improvement of information quality does not affect the water price of municipalized services in the same way as delegated services. As municipalities’ average size increase, control costs may decrease. This is especially true for delegated services to the extent that, as emphasized above, public employees have fewer incentives to hide or distort information\(^{23}\). Consequently, when more explicit information is acquired (typically in high populated municipalities), the comparative disadvantage of delegated services with regards to control costs may be reduced whereas their comparative advantage in terms of both production costs and short-run benefits may not be affected. Indeed, concerning production costs, we have no reason to think that the public employee’s incentives to invest in the production of network information can be affected by the size of the municipality. Concerning short-run benefits, the improvement of network’s explicit information provide the municipality with a better idea of the operator’s operating costs, which may reduce its informational advantage. But the municipality may benefit from these gains before she acquires network information. If the firm anticipates that the municipality will seek to acquire new network information in the near future, he may report truthfully about its operating costs in the first place.

\(^{23}\) Arguably, another reason that may explain why high populated municipalities are more willing to invest in information acquisition is precisely because detecting hidden or unreliable information may be less costly for them.
5. Conclusion

In this article, we presented some preliminary results concerning the incidence of the acquisition of network information on organizational performance in public services with natural monopoly features. For our study, we relied to a dataset of 5000 municipalities observed in the French water industry in 2004. We found that acquiring explicit information on the network increase prices in the short-run, which may explain why some municipalities are reluctant to invest in such a task. Municipalities may be reluctant to increase consumers’ water bills to get more network information, which may result in a deterioration of the network’s quality in the long run. However, our results show that as water prices are higher in delegated services, the price difference between franchise bidding and municipalized services shrinks as network information improves. We tried to give a plausible explanation for this result, relying to a Principal/Agent framework and to the French institutional context. One of our arguments lies in the existence of information asymmetries in franchise bidding contracts that do not exist when the service is municipalized. When network information improves, firms’ informational rents are reduced, which may contribute to offset the costs incurred to acquire this information and then, to limit price increases in franchise bidding contracts.

We are aware that our interpretation may be open to criticism; other explanations based on other analytical frameworks may exist. What’s more, the results presented are still preliminary and have to be confirmed by a rigorous econometric analysis.

However that may be, our study raises an important point: the organizational choice realized by municipalities for water provision may impact on their own incentives to acquire network information. Various organizational modes may result in different short-run costs and benefits of information acquisition. Now, the more costly the improvement of network information and the fewer the expected short-run benefits, the less municipalities may be willing to invest in information acquisition. This is problematic since under-investment in information acquisition may produce undesirable outcomes in the long-run (deterioration of the network’s quality, inefficient investments etc.). Therefore, our analysis suggests that a municipality should opt for the organizational mode that maximizes her incentives to acquire network information, ceteris paribus. This may be perceived as a trivial result. However, it seems that this argument is not developed in the empirical literature focusing on the trade-off between public and private provision24. Therefore, to the extent that bad information quality may significantly impede the performance of water services in the long-run, municipalities should not underestimate the impact that their organizational choice may have on their own incentives to acquire network information.

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24 The empirical literature emphasizes other important parameters that may affect this trade-off such as municipalities financial constraints, the complexity of the service, the difficulty (or not) to introduce an effective ex ante competition between several suppliers, etc.
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