chaire eppp

IAE - PANTHEON-SORBONNE

DISCUSSION PAPER SERIES

EPPP DP No. 2012-05

Water under the Bridge: City Size, Bargaining Power, Prices and Franchise Renewals in the Provision of Water

Eshien Chong
Stéphane Saussier
Brian S. Silverman

Chaire Economie des Partenariats Public-Privé
Institut d'Administration des Entreprises

Water under the Bridge: City Size, Bargaining Power, Prices and Franchise Renewals in the Provision of Water

Eshien Chong* Stéphane Saussier† Brian S. Silverman‡

September 4, 2012

Abstract

Since Williamson's 1976 study of franchise bidding for natural monopolies, there has been extensive debate concerning the degree to which transaction-cost problems actually afflict government franchising in practice. We contribute to this debate by proposing that municipalities vary in their ability to discipline franchisees, and that this heterogeneous ability affects franchise renewal patterns and the quasi-rents that franchisees can extract. We study the provision of municipal water services in France, a setting that is characterized by a mix of direct public provision and franchising of private providers. We find that municipalities with fewer than 10,000 residents pay a significant price premium for water provided by private franchisees as compared to publicly provided water, ceteris paribus; in contrast, larger municipalities do not pay a premium. We also find that larger municipalities are significantly less likely to renew an incumbent franchisee that charges an "excessive" price for water, while small municipalities' renewal patterns are not influenced by franchisees' excessive pricing. We interpret the results as evidence that although large municipalities are able to discipline franchisees and thus prevent extraction of quasi-rents, small municipalities are less able to do so.

Keywords: Franchise bidding, transaction costs, contractual choices, public services, water supply.

JEL Codes: H0, H7, K00, L33.

* Sorbonne Business School. <chong.iae@univ-paris1.fr >
† Sorbonne Business School. <saussier@univ-paris1.fr>
‡ Rotman Business School, U. of Toronto. <silverman@rotman.utoronto.ca>

1 Introduction

The provision of natural-monopoly services is beset by significant governance challenges. Oliver Williamson's seminal article on franchise bidding highlighted transaction-cost problems in contracting for monopoly franchises, a common form of providing such services (Williamson 1976). Previous scholarship had assumed contestable bidding both for initial franchise contracts and for renewals (e.g. Demsetz 1968), which would serve to discipline franchise operators in perpetuity. In contrast, Williamson noted that in many settings the incumbent firm would be in a privileged position at time of renewal. Thanks to this fundamental transformation, the incumbent would be able to behave opportunistically, thus reducing the social benefits of franchising vs. alternate options such as regulation or public ownership of the provider.

While Williamson illustrated these problems through a case study of cable television provision in Oakland, California, subsequent large-sample empirical evidence on this subject has generally been mixed. In a study of U.S. cable television franchise contracts, Zupan (1989) attempted to quantify the extent to which incumbent providers held up municipalities in terms of price or service. Although the incumbent supplier was renewed in more than 99.8% of contract expirations, Zupan found that the terms of renewal contracts did not differ substantially from those of new contracts. He concluded that incumbent providers were unable to exercise their incumbency advantage to hold up the municipalities, perhaps because of reputational concerns or effective contractual clauses. Prager (1990) examined communities' satisfaction with their cable service and found evidence of high satisfaction despite occasional frictions between municipality and provider. Both Prager and Zupan concluded that franchise incumbents are constrained from behaving too opportunistically.

Yet more recent assessment suggests that this positive picture of franchise bidding may be misleading. As technological developments have allowed entry of substitutes to cable television, studies have demonstrated that the effectiveness of private competition and the threat of public provision have an enormous effect on the extent to which incumbent providers can be disciplined (Goolsbee and Petrin 2004; Malatesta and Smith 2011; Seamans 2012). More generally, Crocker and Masten (1996: 15) note that the Prager and Zupan studies "have attempted to evaluate the efficacy of franchise bidding in absolute terms, when the relevant question from an institutional choice perspective is how well franchise bidding performs relative to governance of the same transaction through regulation…. Without a basis for comparison, judgments regarding the performance of franchise bidding are inescapably subjective."

In this paper we further explore the behavior of franchisees and municipalities. We address the concerns raised by Crocker and Masten (1996) about the extant research. We study the provision of water in France, where there is a long tradition of both public and private provision of water, and where there is still a healthy mix of both modes today. We explicitly compare performance across organization forms – private provision vs. public provision – and across municipalities that vary in their ability to attract bids and to deliver this service through public provision.

We first identify average differences in price and quality of water between public and private provision, and between small towns and larger municipalities. We then estimate the "expected" price of water, under both organization forms, for each municipality given its characteristics, and identify 1) the degree to which each municipality is "overpaying" or "underpaying" for water under its existing organization form and compared to the alternate organization form. Finally, we examine the behavior of municipalities at the termination of contracts. Specifically, we explore whether a municipality that has relied on private provision renews the incumbent provider, switches to a new provider, or switches to public provision at contract termination.

We find two key results. First, private provision of water is more expensive than public provision, even controlling for the characteristics of privately provided water. However, this price premium is focused primarily in towns of fewer than 10,000 inhabitants; in larger municipalities, the point estimate for private-provision price is one-third that in small towns and is not statistically significant. Second, while larger municipalities respond to "excessive prices" by switching provider or organization form, smaller towns' renewal decisions are unaffected by a provider's past pricing. Specifically, large municipalities respond to excessive private-provider price by non-renewal at the next contract – that is, by switching either to public provision of water or to a different private provider. In contrast, small towns' renewal decisions are not affected by over-pricing.

We interpret this as evidence that a municipality's ability to constrain franchiser opportunism rests on its ability to credibly threaten to bring service in-house or to generate private-sector competition at contract renewal. Large municipalities are more attractive clients and therefore elicit more intense competition from private providers at renewal time. Large municipalities are also more likely than small towns to have the skills or scale necessary to revert to public provision of water. Small towns are less capable of disciplining incumbent providers through either external competition or the threat of public provision. This leads to differences in the behavior of franchisees, who charge a significantly higher premium in small-town contracts than in large-town contracts. Thus we find evidence that is consistent with both Williamson (1976) and with subsequent research that highlighted mechanisms that might constrain franchisee opportunism.

In section II we provide institutional detail about the French water industry. In section III we detail our expectations about prices, quality, and mode of provision of water. Section IV describes the data and specifies our model. Section V presents the results of our estimations. We conclude in section VI.

2 Institutional Details about the French Water Industry

2.1 Alternate organization modes for managing water services

In France, as in most European countries, local public authorities are legally responsible for the provision of local services such as urban transport, distribution of drinking water, sewage treatment, collection and processing of household waste, cultural activities, etc. Because there is no national regulator, local public authorities are in charge of defining the services, selecting providers (which can be in-house), and monitoring performance. Although the responsibility for service provision rests with the public authority, a service can be delivered by either a public or a private provider.

The public authority may choose "direct public management" and itself undertake all operations and investments needed for provision of the service. Alternatively, the local public authority may choose to involve an outsider, almost always a private for-profit firm, in the provision of the service. When local public authorities decide to rely on private water provision, they need to organize a competitive bidding process for the franchise and to negotiate the contract that will govern their relationship with the private operator that wins the right to provide the service.

The French process for competitive bidding is as follows. After deciding to seek private provision of water, a local authority puts a contract out to tender. Various private operators first submit a statement of interest, and then submit a detailed bid for the contract. Whereas many countries require that franchise contracts be awarded to the lowest credible bidder, French law specifies a different selection mechanism. French water-provision contracts are awarded according to a two-step procedure. In the first step, the public authority organizes an open call for tenders. The authority sometimes publicly specifies and prioritizes the criteria that will be used to rank offers, but this is not required. In the second step, the public authority selects one or more candidates and enters a phase of negotiation with the chosen candidate(s). At the end of the negotiation, the public authority chooses its partner and explains its choice.

The municipality is not obliged to choose its partner strictly in terms of objective criteria defined by law, as would be the case in a strict competitive tendering process. This two-step procedure affords a great degree of freedom to the public authority; it can select its partner freely, using both objective and subjective criteria (the latter during the negotiation stage).

The successful bidder benefits from a local monopoly for the duration of the contract. In the French water sector, the average contract has a duration of 12 years. At the end of the contract, the municipal authority chooses to either put a new contract to tender, in which case there is a new round of competitive bidding, or revert water provision to direct public management. In 2010, of the roughly 15,000 water services authorities in France, approximately 65% relied on private operators to manage water provision and 35% relied on direct public management.

French law provides that all infrastructure remains the property of the municipality. Franchise contracts frequently stipulate specific infrastructure improvements to be carried out by the private operator, and/or stipulate that the private operator will maintain/improve infrastructure to keep water loss (due to leaks in the infrastructure) below specified levels. Since the infrastructure is owned by the municipality, the cost of the requisite work is priced into the operator's contract bid.

2.2 The supply of private water providers

Private water provision in France goes back at least as far as the mid-1700s, but became particularly common with the encouragement of Emperor Napoleon III in the mid-19th century. Over the last 100 years, substantial consolidation among providers has yielded a set of three large competitors and a small competitive fringe. Veolia, Suez, and Saur collectively provide water to 60% of French municipalities, covering 65% of the French population. The fringe firms provide water to

5% of the municipalities, covering 2% of the population. The remainder is served through public in-house provision. Thus the three-firm concentration ratio in French water provision is 90% if one focuses solely on privately provided water, or 65% if one includes in-house provision as part of the relevant market.[1]

In the 1990s and 2000s, contracts put out to tender have received, on average, 4.5 statements of interest and 2.6 bids (Tiret 2008).

2.3 Likely triggers of non-renewal

In France roughly 700 water contracts terminate each year. At contract expiration, a local authority has the option to switch from private to in-house management, or to select a different private provider for the subsequent franchise contract. In principle, it should be feasible for a municipality to change providers or to bring water provision in-house. As noted above, physical assets are the property of public authorities from the beginning to the end of the contract and there is no payment required from public authorities to the private operator to switch.

If local authorities' decisions are driven by economic considerations, then it is natural to expect that public authorities are particularly interested in the prices paid by consumers. Price is observable by consumers, who are also voters, and consequently changes in price can potentially affect future election prospects. Relatedly, the popular press focuses principally on price when assessing the performance of water provision (and, indirectly, the performance of local authorities' decision-making competence). Indeed, for more than a decade the popular and academic press in France has devoted widespread attention to how water services are managed and the resulting impact on prices; similarly, consumer groups have produced reports and press releases on the subject. These reports and studies have noted wide variety in the price of water across municipalities in France. Of particular note, these studies indicate that prices paid by consumers are higher when their water services are managed by private operators than under direct public management (e.g., CGDD 2010; Chong et al. 2006; Carpentier et al. 2006). Although many of these reports fail to demonstrate a causal relationship between private management and higher price, the resulting public outcry ensures that local

[1] By way of comparison, the four-firm concentration ratio in the U.S. cable industry is around 80% if one focuses solely on cable television, and around 60% if one includes satellite pay television as part of the relevant market.

authorities are particularly concerned about water price in their water-management decisions. For all of these reasons, price is a salient indicator of performance for local authorities.[2]

3 Competition, Self-Provision, and the Ability to Discipline Incumbent Franchisees

What types of problems might arise in franchise contracts for monopoly services? Williamson (1976) argued that such contracts were likely to be plagued by three classes of problems. First, identifying clear criteria for awarding the initial franchise can be difficult, particularly if the franchised service is complex. Second, there are likely to be execution problems in enforcing performance; to the extent that enforcement is costly or embarrassing to the franchisor, a city may not be able to penalize a franchisee that performs poorly. Third – and the problem that has received the most attention over the last 35 years – even if the franchisee performs appropriately during the first franchise contract, "bidding parity between the incumbent and prospective rivals at the contract renewal interval is unlikely to be realized [p.81]." An incumbent will likely be in a privileged bidding position due to its ownership of specialized assets already in place and to specialized knowledge developed during the operation of the initial franchise award. Consequently, to the extent that these features characterize a particular service, franchise bidding is likely to be plagued by governance problems such that an incumbent franchisee will be able to extract quasi-rents from the city.

Yet in a bilateral monopoly, it is not clear why one party should have greater ability to claim quasi-rents than the other. Zupan (1989) proposed several reasons why an incumbent franchisee might be constrained from engaging in opportunistic behavior even if in a privileged bidding position at the time of contract renewal. The first is reputation; to the extent that behaving opportunistically in one city hurts a franchisee's chances of winning contracts in other cities, the franchisee will refrain from such behavior. The second is the city's threat to backward integrate if the franchisee misbehaves. Thus, a franchisee is likely to be neither willing nor able to extract quasi-rents from a city at renewal

[2] Local authorities are undoubtedly also concerned with the quality of water provided. France has nationwide thresholds (more than 50 parameters following European obligations) for the amount of bacteria and chemicals present in a liter of water. Water is checked in each municipality at a frequency that depends on the number of inhabitants. There is relatively little variation in water quality according to these measures; the average municipality's water meets the standard 92% of the time, with a narrow standard deviation.

time. Empirically, Zupan compared new franchise contracts to franchise renewals in the U.S. cable television industry in 1984-1988 along five criteria of price and quality. Although he found that renewal contracts had 12% higher prices for non-basic TV and, in some specifications, provided fewer channels, he found no difference across contracts for the other criteria and concluded that overall the renewal contracts did not appear substantially different than new contracts. Similarly, Prager (1990) proposed that reputation and city latitude over the bidding process would constrain opportunism by franchisees. Using surveys of community representatives concerning their cable television firms' behavior, she concluded that most communities were satisfied with their service. By the end of the 1980s, then, many scholars interpreted these as evidence that, at least for cable television, "with some exceptions, reneging on franchise agreements and renegotiation problems at the refranchising stage have not been a serious problem in practice" (Joskow 1988: 99, citing the dissertations that yielded Zupan 1989 and Prager 1990).

However, more recent evidence suggests that this conclusion may be too sanguine. Goolsbee and Petrin (2004) study the effect of satellite television, which competes directly with cable providers in every municipality in the U.S., on the price of cable television. Exploiting geographic variation in the quality of satellite signals, they find that the advent of satellite television leads to a price reduction of up to 15% for premium cable packages. Relatedly, Malatesta and Smith (2011) explore the effect of a 2004 legal change that facilitated entry by a New Jersey telecom provider, Verizon, into provision of television services through telephone wires. They find that the terms of renewal for New Jersey cable television franchises are much more favorable for the municipality after the legal change, but only for those municipalities in which Verizon already has telecom equipment. Together, these studies indicate that the latent competition in a franchise renewal is not sufficient to prevent incumbent cable providers from extracting quasi-rents. They also suggest that cities may vary in their ability to attract competition with which to discipline franchisees.

Cities may also vary in the degree to which they can credibly threaten to integrate backwards. In particular, Seamans (2012) notes that cities that own their own municipal electric utilities are better situated than those without such utilities to launch a city-owned television system, because it is technologically feasible to carry television signals along electric utility lines. Thus, such cities can more credibly threaten to integrate into cable television provision. Seamans finds that cable television franchisees invest in technological upgrades more rapidly when serving a municipality that has a municipal electric utility, presumably in response to this threat of public provision. More generally, this study indicates that heterogeneity in the ease of public provision is likely to affect the ability of a city to discipline an incumbent franchisee at renewal.

One source of heterogeneity in cities' ability to attract bids and threaten backward integration likely relates to size. As Levin and Tadelis (2010) note, there may be a minimum size below which a city cannot efficiently produce a given service in-house. To the extent that direct management of a service benefits from scale, a larger city will enjoy lower per-resident costs of provision than a smaller city. At the same time, to the extent that a larger city represents a larger market than a smaller city, it should attract more interest from suppliers, ceteris paribus. Finally, to the extent that reputation does matter to a private water provider, large cities will likely be more visible references than small cities, because they attract more attention from both news media and other cities. Thus, it is likely that city size will be directly related to a city's ability to discipline private franchisees.

Will water provision be affected by transaction-cost problems? Franchises for French water provision appear to be less subject to hazards than many other potentially privatizable activities. In contrast to services for which there are multiple dimensions of quality, such as cable television (clarity of reception; number of channels; availability of specialty channels, etc.), the criteria for awarding a water franchise appear relatively straightforward: water should meet basic health standards, and the fewer contaminants the better. Similarly, water treatment and delivery appears to be fairly straightforward to monitor. In their analysis of a survey of U.S. city administrators, Levin and Tadelis (2010: 523) note that respondents "viewed water treatment as…being fairly routine and saw measuring performance as not unduly difficult." Finally, the idiosyncrasies of the French franchise system should reduce the influence of specialized assets on bidding parity. Whereas U.S. administrators consider potential hold-up regarding specialized assets to be the most daunting contractual problem in water services (Levin and Tadelis 2010), the French regulation stipulating that all infrastructure is owned by the municipality reduces the likelihood that ownership of assets will affect bidding parity.

Nevertheless, water service franchisees do have recourse to actions that can affect franchise execution and bidding parity. Absent an unusually detailed contract, water providers are able to renegotiate rates during a contract as new contingencies arise. A recent analysis of virtually all water contracts in effect in 2009, for French municipalities exceeding 15,000 people, found that more than 40% of the contracts had experienced at least one renegotiation since initiation. Further, those contracts that experienced at least one renegotiation tended to experience multiple renegotiations, averaging nearly six distinct renegotiations per contract, or roughly one every 2-3 years (Porcher, 2012). As Masten (2010) notes in his study of the shift to public ownership of water utilities in the U.S., during such negotiations water providers can cause pain for residents, and presumably generate pressure on the municipality administrators, by scheduling repairs and upgrades to be as disruptive as possible.

Finally, we note that although a franchisee does not own the physical water system in a municipality, the franchisee does possess the detailed data on the condition of the system. Although general information on the layout of the system must be shared with the municipality, specific knowledge on the location of leaks, the condition of particular conduits and pieces of equipment, etc., reside in the information systems of the incumbent operator or in the heads of its employees. Thus, although French water service franchises are likely to be less afflicted by hazards than the "typical" municipal service, there is still reason to anticipate problems of the transaction cost kind, and to expect that a municipality's ability to discipline a franchisee will influence water prices and renewal patterns.

4 Data and Empirical Strategy

4.1 Data and sample

In order to conduct the analysis, we combined data from two government sources, the French Environment Institute (IFEN) and the French Health Ministry (DGS), concerning nearly 5,000 municipal public water authorities out of the 15,000 water authorities in France. Beginning in the late 1990s, IFEN and DGS have collected information from 4,986 water authorities four times at roughly three-year intervals: 1998, 2001, 2004, and 2008. We thus were able to develop a unique panel data set. The sample is representative of the total population of French municipal public water authorities. All sizes of municipalities are proportionately represented, with the exception that all municipalities of

10,000 or more residents are included. The sample represents more than 75% of the entire French population for which water services are provided. Consistent with prior research (Chong et al. 2006), we eliminate 567 municipalities that use a different governance mode for water production than for water distribution. We eliminate another 955 municipalities due to missing or inconsistent information about the identity of the water operator. Finally, we eliminate the nine major cities with populations above 200,000 on the grounds that the challenge of water provision for these cities is qualitatively different than that for smaller municipalities. This leaves us with a final sample of 3,455 municipalities that appear in each of the four years, or 13,820 municipality-year observations. Missing information on price reduces the sample to 11,824 municipality-year observations.

4.2 Empirical strategy

To explore whether overpricing of water leads municipalities to decide against renewing their private water provider, we first need to identify instances of overpricing; then we can assess whether such overpricing affects the likelihood of organizational change. We follow the general approach of Nickerson and Silverman (2003) by first estimating a linear model of water price. We then use the coefficients from this model to generate an "expected" price for each municipality under both in-house provision and private provision of water – that is, the price that the linear model predicts for that municipality given the municipality's characteristics in a given year *t*. The differences between actual price charged in the municipality and these expected prices represent the degree of overpricing (or underpricing) of water in the municipality as of year *t*. We then estimate models of non-renewal in which the overpricing measures appear as independent variables.

4.2.1 Estimation of water price

Our first challenge is to estimate the effect of governance form on water price. Although scholars have previously explored this issue (Carpentier et al. 2006; Chong et al. 2006), prior research has relied on cross-sectional data. We exploit the panel dimension of our data to deal with the issue of endogenous organizational choice. We assume that the price paid by a municipality for water provision depends on characteristics of the water infrastructure, the water services provided, the municipality itself, and the organizational form chosen by the municipality to ensure the provision of water. Specifically:

$$Price_{it} = \boldsymbol{x}'_{it}\boldsymbol{\beta} + u_{it}$$

where $Price_{it}$ is the price paid by consumers for water in municipality i at time t, $\boldsymbol{x}_{it}$ is a vector of characteristics of the water infrastructure, water services provided, and municipality for municipality i at time t, and u_{it} is the usual regression error term. A first difficulty encountered in evaluating the impact of organizational choices on prices stems from the fact that prices are only observable for a chosen organizational form:

$$Price_{it}^{observed} = \begin{cases} Price_{it}^{Private} = \boldsymbol{x}_{it}^{'}\beta^{Private} + u_{it}^{Private} & \text{if municipality } i \text{ uses private provision at time } t \\ Price_{it}^{Inhouse} = \boldsymbol{x}_{it}^{'}\beta^{Inhouse} + u_{it}^{Inhouse} & \text{if municipality } i \text{ uses inhouse provision at time } t \end{cases}$$

The above equation can also be written as follows:

$$Price_{it}^{observed} = Private \times Price_{it}^{Private} + (1 - Private_{it}) \times Price_{it}^{Inhouse}$$

where $Private_{it}$ is an indicator variable that is equal to 1 when municipality i has chosen to organize its water services through a private provider during time t, and 0 otherwise. If we are willing to assume that $\beta^{Private} = \beta^{Inhouse}$ and $u_{it}^{Private} = u_{it}^{Inhouse}$, then it can be shown that the impact of *Private* on water prices can be obtained by estimating the following equation:

$$Price_{it}^{observed} = \boldsymbol{x}'_{it}\,\beta + \pi Private_{it} + u_{it}$$

In particular, the estimate of π should correspond to the average effect on prices paid by consumers when their water service is organized as a franchised private operator, *ceteris paribus*.

Nevertheless, consistent estimates on π are obtained only if the error term in the above equation is uncorrelated with various explanatory variables in the equation. Such an assumption is likely to be violated if organizational forms are chosen by municipalities based on considerations that are unobservable by the researcher (and therefore not accounted for in the estimation equation), and could imply that the error term is correlated with the observed organizational choice. In this case, estimating the above equation using ordinary least-squares estimation will yield a biased estimate for π.

To address this, we assume that the error term can be decomposed into two terms:

$$u_{it} = v_i + \varepsilon_{it}$$

where v_i captures heterogeneity across different municipalities that is invariant through time, and ε_{it} is a random error term. The endogeneity bias discussed above can therefore arise if v_i is correlated with the explanatory variables. For instance, it is possible that the topology of a municipality may influence the cost of water provision, and may systematically drive a municipality to favor one organizational mode. If this dimension is not accounted for among our explanatory variables, then a correlation arises between v_i and the explanatory variables, leading to a biased estimation of π.

There are two means to resolve this issue. First, one can rely on an endogenous switching regression model to account for organizational choices directly in the estimation procedure (e.g. Chong et al. 2006). Second, with panel data one can control for potential correlation using fixed-effect regressions such as the within estimator, the first-difference estimator or the least square dummy variable (LSDV) estimator. The first of these methods requires the use of at least one instrument. As for the latter of these methods, the endogeneity bias can be addressed without need of an instrument as long as any unobserved heterogeneity that leads a municipality to favor an organization form is time-invariant (Hamilton and Nickerson 2003). In our analysis, we appeal to a fixed-effects LSDV specification to obtain consistent estimates for the impact of organizational choice on prices.[3]

4.2.2 Estimation of overpricing

We then use the results of the pricing model to determine the degree to which municipality *i* at time *t* overpays for its water given the expected prices generated by the model. In essence, each municipality *i* faces two "expected" prices. $\overline{Price}_{it}^{Inhouse}$ is the expected price of water for municipality *i* at time *t* if the municipality were to govern its water authority as an in-house public entity. $\overline{Price}_{it}^{Private}$ is the expected price of water for municipality *i* at time *t* if the municipality were to govern its water authority via a franchised private provider. If the municipality's actual price of water, $Price_{it}^{observed}$, exceeds either of these expected prices, then we expect that the municipality should be motivated to

[3] In unreported results, we also run a switching regression model using as instrument the organizational mode chosen for sanitation services. The obtained estimations are comparable with those obtained using a fixed-effects specification. For the sake of expositional simplicity, we report only the fixed-effects estimations. The estimation results from the endogenous switching regressions are available upon request.

not renew with its incumbent private provider. To allow for a more flexible estimation of these expected prices, we allow for coefficients of various explanatory variables to change between organization modes.[4]

4.2.3 Renewal of incumbent water providers

Our final step is to estimate the likelihood that a municipality will renew its incumbent private provider of water. As noted above, there are two possible types of non-renewals. First, upon contract termination a municipality can choose to switch to in-house provision. Second, upon contract termination a municipality can choose to switch to an alternate private provider.[5]

We appeal to regression analysis to understand the factors that drive the renewal decision. Since renewal is a dichotomous choice, we use Probit models to estimate the probability that a municipality renews the incumbent provider. In our data, we observe in year *t* whether a municipality whose franchise contract expired between *t-1* and *t* renewed the incumbent private provider, contracted with a different private provider, or brought water provision in-house. In our estimations, we therefore estimate the likelihood of renewing the incumbent in year *t* as a function of independent variables from *t-1*. But what if an incumbent operator gouges a municipality in the final years of a contract and then offers a competitive bid for the next contract? As noted above in the institutional details section, French municipal water authorities are explicitly allowed to take into account non-price factors when awarding franchises. We assume that a municipality will – or certainly should – take into account the past pricing behavior of an incumbent when making current franchise decisions, and thus overpricing in *t-1* will affect renewal decisions in *t*.

---

[4] The Appendix provides a complete description of the computation of expected prices, and presents the specific estimations used.

[5] Our attribution of choice to the municipality assumes that incumbent private providers are always willing to bid for a new contract with the municipality, and that at least one rival bid is willing to bid as well. This is consistent with what Canneva et al. (2012) observed. Studying all the contracts that expired and put out for new bid in France during 2007, they found that in 99.5% of the case the incumbent submits a bid for renewal and that on average there were 4.2 candidates and 2.5 final offers.

4.3 Dependent variables

In our main results, we seek to estimate the effect of water price on the likelihood that a municipality will renew its incumbent private provider of water. As noted above, this requires three steps: estimation of a price function, construction of measures of overpricing, and estimation of the effect of overpricing on the likelihood of renewal. This necessitates construction of distinct dependent variables for price and for renewal.

$Price_{it}$ is the price paid within municipality *i* in year *t* for 120 cubic meters of water, which is the standard measure of water in Europe (it is approximately the average annual per-capita consumption of water). This price is measured in inflation-adjusted Euros.

$Non\text{-}Renewal_{it}$ is a categorical variable set equal to 1 if municipality *i* switched from its incumbent private provider of water at time *t-1* to either in-house provision of water or to a different private provider at time *t*, and 0 if municipality *i* relied on the same provider in both time periods. The variable is undefined if municipality *i*'s contract with the provider did not terminate between *t-1* and *t*, and therefore the estimations employing this dependent variable exclude municipalities whose contracts did not terminate between *t-1* and *t*.

In sensitivity analyses, we explore whether municipalities exhibit systematic differences in the two types of non-renewals – bringing water provision in-house and switching to a new private provider. For these estimations we disaggregate non-renewal events into two distinct dependent variables representing the two non-renewal types.

$SwitchtoInHouse_{it}$ is a categorical variable set equal to 1 if municipality *i* switched from its incumbent private provider of water at time *t-1* to in-house provision of water at time *t*, and 0 if municipality *i* relied on the incumbent provider in both time periods. The variable is undefined if municipality *i*'s contract with the provider did not terminate between *t-1* and *t*, and therefore the estimations employing this dependent variable exclude municipalities whose contracts did not terminate between *t-1* and *t*. The variable is also undefined if the municipality i switched from one private provider to another; the estimations employing this dependent variable exclude municipalities that switch providers.

$SwitchProviders_{it}$ is a categorical variable set equal to 1 if municipality *i* switched from its incumbent private provider of water at time *t-1* to a different private provider at time *t*, and 0 if municipality *i* relied on the incumbent provider in both time periods. The variable is undefined if municipality *i* relied on in-house provision at time *t-1* or if municipality *i*'s contract with a private provider did not terminate between *t-1* and *t*. Therefore the estimations using this variable exclude municipalities that relied on in-house provision at *t-1* or whose contracts did not terminate between *t-1* and *t*. The variable is also undefined if the municipality i switched from private to in-house provision; thus the estimations employing this dependent variable exclude municipalities that brought water provision in-house.

4.4 Independent variables

4.4.1 Governance mode

$Private_{it}$ is a categorical variable set equal to 1 if municipality *i* relied on private water provision at time *t*, and 0 if it relied on in-house provision.

4.4.2 Water treatment

Water utilities typically must disinfect water to ensure its fitness for human consumption. The IFEN survey assesses the extent of disinfection treatment applied to each municipality's water as falling into one of six categories: no treatment, light treatment, light-medium treatment, medium treatment, medium-heavy treatment, and heavy treatment. Each municipality is assigned to exactly one category in a given year. We created a scale variable, $TreatmentIntensity_{it}$, that was coded 0 for no treatment and progressively higher for more intense treatment levels, up to 5 for heavy treatment. One potential concern about such a scale is that it imposes a linear relationship among the categories when such a relationship may be unwarranted. In unreported results we replaced *TreatmentIntensity* with six categorical variables, each representing one of the IFEN categories. Our main results were qualitatively unchanged. To conserve on degrees of freedom, we present the results with the *TreatmentIntensity* variable.

IFEN also identifies the source a municipality's raw water. This can be surface water, underground water, or a combination of both. The source of water has implications for the extent of filtering it will need (this is distinct from disinfection). In general, surface water is likely to have more pollutants and thus require more filtering than will underground water. We created a scale variable, $WaterOrigin_{it}$, set equal to 0 for underground water, 1 for a mixture of underground and surface water, and 2 for surface water. As with the treatment data, in unreported results we replace *WaterOrigin* with three categorical variables, each representing one of the IFEN categories. Our main results were qualitatively unchanged.

4.4.3 Water quality

The French Health Ministry collects information on the degree to which each municipality's water supply meets national standards for absence of bacteria and chemicals. Using these data we create three variables to measure water quality. $WaterSafety\_Bacteria_{it}$ is defined as the proportion of days during year *t* that municipality *i*'s water met federal standards regarding the presence of bacteria. $WaterSafety\_Chemical_{it}$ is defined analogously for the presence of chemicals. $WaterSafety_{jt}$ is defined as the minimum of the two variables for a given municipality-year observation.

Leaks in a municipal water system are proxies for the quality of the infrastructure. IFEN collects data on the amount of water that is produced (i.e., pumped out of reservoirs) as well as the amount that is billed to customers in each municipality. The difference between these is the amount of water that leaks out somewhere in the municipality's infrastructure system. Leakage is costly to the municipality because customers only pay for the water that they use, and a private water provider (if any) only pays the municipal government for water that is paid for by customers. We include the variable $LeakRatio_{it}$, defined as:

$$1 - \frac{volume\ of\ water\ billed\ to\ customers_{it}}{volume\ of\ water\ produced_{it} + volume\ of\ water\ imported_{it}}$$

where $volume\ of\ water\ imported_{it}$ is the volume of water that municipality *i* purchases from another municipality in year *t*.

4.4.4. Over- and under-pricing

We construct measures of the extent of overpricing as follows:

$$OverpricedvsInhouse = \frac{Price_{it} - \overline{Price}_{it}^{Inhouse}}{Price_{it}}$$

$$OverpricedvsPrivate = \frac{Price_{it} - \overline{Price}_{it}^{Private}}{Price_{it}}$$

where p_{it} is the observed price of water in municipality *i* at time *t*, $\overline{Price}_{it}^{Inhouse}$ is the expected price of water for municipality *i* at time *t* if the municipality were to govern its water authority as an in-house public entity, and $\overline{Price}_{it}^{Private}$ is the expected price of water for municipality *i* at time *t* if the municipality were to govern its water authority through private provision.

If either $OverpricedvsInhouse_{it}$ or $OverpricedvsPrivate_{it}$ is positive at contract expiration, then the municipality should be motivated to not renew the incumbent. For example, if municipality *i* relies on a private provider at time *t* and $OverpricedvsInhouse_{it} > 0$, then the municipality should have an economic motivation to bring water provision in-house. Similarly, if municipality *i* relies on a private provider at time *t* and $OverpricedvsPrivate_{it} > 0$, then the municipality should have an economic motivation to switch providers. Of course, many municipalities will pay actual prices that are below their expected prices; these municipalities are unlikely to switch provider or governance mode.

4.4.5. Control variables that may affect price

Consistent with prior research, we include several variables to control for other municipality characteristics that could affect price. The precise definition of these variables appears in Table 1. $Population_{it}$ controls for the size of municipality *i*'s population. To the extent that there are scale economies in the production and distribution of water, *Population* should be negatively associated with the price of water. $InterAuthority_{it}$ is a categorical variable that controls for instances in which municipality *i* collaborated with neighboring municipalities to purchase or manage its water services. $Limitation_{it}$ is a categorical variable that controls for the existence of regulatory restrictions regarding water usage in a municipality in a given year, while $InvestmentProgram_{it}$ is a categorical variable that controls for the presence of an investment program to augment the water infrastructure in a municipality. $TouristArea_{it}$ is a categorical variable that identifies municipalities that are officially designated as tourist centers. Finally, $IndepRatio_{it}$, measured as the proportion of water used by municipality *i* that was produced by that municipality (as opposed to being imported from outside of the municipality), controls for a municipality's reliance on water from outside its jurisdiction.

4.4.6. Control variables that may affect renewal

For our estimations of municipalities' renewal behavior, we include additional variables that may affect the propensity to renew an incumbent water provider. $SanitationOperator_{it}$ is set equal to 1 if municipality *i* at time *t* uses the same private provider for its sanitation services and for its water services, and 0 otherwise. Although there is no technological interdependence between water services and sanitation services, it is possible that a commitment to a specific firm for both water and sanitation service may reduce the likelihood that a municipality will remove its water provision from that firm. $Duration_{it}$ is set equal to the number of years of the water contract whose expiration has confronted municipality *i* with a renewal/non-renewal decision at time *t*. Conventional transaction cost theory would suggest that contracts of longer duration would facilitate idiosyncratic investments that could hinder competition by non-incumbents and would therefore reduce the likelihood of switching by the municipality.

We also include a set of variables to capture political factors that may encourage certain types of switches. We include $MayorChange_{it}$, set equal to 1 if the mayor of municipality *i* was a different individual at time *t* than at the time when the just-expired franchise contract was awarded, and 0 otherwise. We also include the categorical variables $RightWing_{it}$, and (by omission) $LeftWing_{it}$, to control for the political persuasion of the municipal government at time *t*. (There is too little change in party control over time to incorporate a change-in-party variable.) Conventional wisdom would suggest that, ceteris paribus, right-wing governments would be more receptive than left-wing governments to privatization and less receptive to switching to in-house provision. The precise definitions of these measures appear in Table 1. As Table 1 also notes, the data on political factors is available for only a subset of our total sample.

Descriptive statistics are presented in Table 1. Table 2 elaborates the descriptive statistics by presenting the means of key variables for different subsets of the data, categorized according to municipality size and organization form for water provision. As the Table indicates, for both small and large municipalities, the price of water is significantly higher under private provision than under in-house provision. However, privately provided water undergoes significantly more filtering and disinfection treatment than in-house water; further, privately provided water is of higher quality in terms of bacteria, chemicals, and leaky infrastructure then its in-house provided counterpart. Thus the higher water price under private provision may be driven by reliance on private operators when water requires more treatment, and/or may reflect the higher quality of water delivered. To explore this properly, we turn to multivariate estimation.

5 Results

5.1 Pricing

We first estimate the price of water as a function of organization form. Table 3 shows the results of estimations for both the entire sample of municipalities and various population-based subsamples of municipalities. Models 1 and 2 estimate the model for the entire sample, where Model 1 is a "naive" OLS estimation and Model 2 uses the LSDV estimation described in section 3.2.1. In Model 1, the coefficient on *Private*, 26.942, is positive and significant. Taken at face value, this implies that, ceteris paribus, a municipality will pay nearly 27 Euros more per 120m^3 of water when the water is provided by a private operator than when it is provided via direct public management. This is economically significant; given the average price of 150 Euros for 120m^3 water in the data, the private-operator price premium is nearly 20%.

Although it is a useful baseline, OLS estimation does not account for endogeneity in the organization choice of a municipality. We therefore turn to LSDV estimation in Model 2. In this model, the coefficient on *Private* remains positive and significant. However, its magnitude is reduced by nearly two-thirds, to 11.425. A municipality will pay roughly 11 Euros more per 120m^3 of water when the water is provided by a private operator than when the water is provided via direct public management. This is still economically significant, reflecting an 8% price premium for private provision. This premium exists after controlling for differences in water quality, the extent of water treatment provided, and other characteristics of the water and municipality.

In Models 3-5, we re-estimate Model 2 for three subsamples of the population: municipalities with fewer than 5,000 residents ("very small towns"), municipalities with 5,000-9,999 residents ("small towns"), and municipalities with 10,000 or more residents ("cities"). These models reveal a striking pattern: whereas the coefficient on *Private* is positive, significant, and of substantial magnitude for very small and small towns, it is insignificant and roughly one-third of the magnitude for cities. Based on the point estimate, a very small town will pay roughly 13 Euros more for privately-provided water, and a small town will pay roughly 11 Euros more. In contrast, a large town will pay a statistically insignificant 4-Euro premium for privately-provided water. Overall, these results indicate that the private-operator price premium, which has been noted in prior research, is in fact concentrated among small and very small towns.

Several control variables exhibit interesting associations or non-associations with price. We highlight three of them. First, the coefficient on *WaterSafety* is consistently significant and positive. Water that more consistently meets national standards for chemical and bacteriological safety commands a higher price. In contrast, the intensity of disinfection treatment is only associated with price for very small towns. This may reflect the relative time-invariance of treatment intensity for municipalities other than very small towns. Second, municipalities that purchase water in collaboration with other municipalities tend to pay significantly higher prices.

5.2 Non-renewal of incumbent private operators

As noted in section 3.2.2, we next calculate the extent to which each municipality in each year encounters overpricing or underpricing, measured as the difference between the price it actually pays for water and the predicted price for both its current organization mode and for the alternate organization mode. This yields the variables *Overpriced*, *OverpricedvsInhouse* and *OverpricedvsPrivate*. Additional details, along with tables, are provided in the Appendix.

Having constructed these variables, we then estimate the likelihood that a municipality will not renew its incumbent private water provider at contract expiration. Table 4 shows the results of Probit estimations of the likelihood that a municipality that relies on a private operator at time *t-1*, and whose contract terminates between *t-1* and *t*, will choose not to contract with the incumbent operator. The dependent variable is $NonRenewal_{it}$. Independent variables include the extent of overpricing, measures of water and infrastructure quality, other water and water authority characteristics, and measures of the municipal government's political bent. We estimate the models separately for very small towns, small towns, and cities. (We do not have data on the political composition of very small towns.) In addition to reporting probit coefficients, we report marginal effects in this and all subsequent tables.

As Models 1-2 and 3-5 show, the coefficient on *Overpriced* is statistically insignificant for very small and small towns. Put differently, for very small and small towns, there is no association between the extent of overpricing at time *t-1* and the likelihood that the municipality will choose not to renew the incumbent a time *t*. In contrast, in Models 6-8, the coefficient on *Overpriced* is positive and significant; in cities, an increase in overpricing by a private operator is associated with a greater likelihood of the town's not renewing that operator after contract expiration. The relationship is substantial; in the fully-specified model, at the mean level of overpricing, a 10% increase in overpricing is associated with a 4.4 percentage points increase in the probability of non-renewal. (Since the base rate of non-renewal is roughly 15%, this means that a city facing 10% overpricing above the mean has a non-renewal likelihood of 19.4%, ceteris paribus.) These results imply that although cities are willing and able to discipline private operators that overprice for water, small and very small towns are either unwilling or unable to do so.

Table 4 yields four other insights. First, the coefficient on *LeakRatio* is occasionally positive and significant for cities, but not for small or very small towns. Thus, a city is less likely to renew an incumbent operator when more of the city's water is lost to leaks. This suggests that a city's renewal decision is not only sensitive to price, but also to infrastructure quality, while small and very small towns are not sensitive to either. Second, the coefficient on *WaterSafety* is not significant in these estimations. This is somewhat surprising given the likely salience of failing to meet bacteria and chemical standards. However, the high overall level of water safety in France, particularly in private provision of water, means that there is little variation in the measure: the median value for *WaterSafety* is 1.00 and the first-quartile value is .978. Third, political factors appear to operate differently for cities than for small towns. In cities, *LeftWing* is positively associated with non-renewal; the marginal effect indicates that a city run by a left-wing party is nearly 5% more likely than an identical city run by a right-wing party to forego renewal of an incumbent provider in favor of a new provider or in-house provision. In small towns, however, *LeftWing* is not associated with non-renewal.

We next estimated Probit models of the likelihood that a municipality that relies on a private operator at *t-1*, and whose contract terminates between *t-1* and *t*, will choose to switch to a different private operator rather than re-sign with the incumbent operator. In these estimations, the relevant measure of overpricing is *OverpricedvsPrivate*. Table 5 presents the results. Analogous to Table 4, the coefficients on *OverpricedvsPrivate* are insignificant for very small and small towns (Models 1-5), but are positive and significant for large towns (Models 6-8). The marginal effects in models 6-8 are again large. A city is more likely to change operators rather than renew the incumbent operator as the incumbent's overpricing increases, but small and very small towns' decisions are not influenced by overpricing.

Most coefficients in Table 5 are consistent with those regarding non-renewal more broadly in Table 4. In Model 7 the coefficient on *LeakRatio* is positive and significant, again indicating that a city's decision to change private operators is increased by the level of leakage in its infrastructure. Similarly, left-wing cities are again more likely to spurn the incumbent operator than are right-wing cities. One slight change concerns *WaterSafety*: the coefficient on *WaterSafety* is negative and significant in Model 6 of Table 5, suggesting that a small town's decision to change private operators is reduced by the degree to which the incumbent operator has met water standards. .

Finally, we estimated Probit models of the likelihood that a municipality that relies on a private operator at *t-1*, and whose contract terminates between *t-1* and *t*, will choose to bring water provision in-house – that is, to switch to direct public management of water provision rather than continue to contract it out. In these estimations, the relevant measure of overpricing is *OverpricedvsInhouse*. Once again, the coefficients on the measure of overpricing are positive and significant for cities, and the marginal effects are large, indicating that a city's decision to bring water provision in-house is positively and substantially influenced by the degree of overpricing that it faces from its incumbent provider. The coefficients on *OverpricedvsInhouse* are insignificant once again for small and very small towns. In Models 7 and 8, the coefficient on *SanitationOperator* is negative and significant, indicating that cities are more reluctant to bring water provision in-house when the incumbent franchisee is also the incumbent provider of sanitation services for the city. Left-wing cities are more likely to bring water provision in-house at contract expiration than are right-wing cities. Overall, then, we find consistent evidence that overpricing by a private operator at time *t-1* is associated with non-renewal of that operator at time *t* in municipalities with populations exceeding 10,000 people. In contrast, we find consistent evidence that overpricing by a private operator at time *t-1* has no impact on renewal of that operator at time *t* in municipalities with populations below 10,000 people. Put differently, for small and very small towns, overpricing by a private operator before contract expiration is "water under the bridge."

5.3 Sensitivity analysis: Switching from in-house provision to private operator

Our results indicate that small and very small towns' contract renewal decisions are not affected by incumbent providers' overpricing before contract expiration, while cities' decisions are influenced by incumbent overpricing. Thus far, we cannot say whether the non-responsiveness of towns is due to an inability to discipline incumbents through non-renewal, or to an indifference about overpricing. To gain purchase on this, albeit indirectly, we explore the decision of municipalities that use in-house water provision to switch to private water provision. In any given year, a municipality can choose to cease public management of water and contract with a private operator. And in any given year, a municipality is confronted by both the actual price of its in-house-provided water and the price that it should expect to be charged if it were to rely on private provision; hence, the municipality's in-house water can be overpriced or underpriced relative to expected alternative. If a municipality is simply indifferent to water price, then the extent of overpricing should have no effect on its organization choice, whether renewing an incumbent private operator or continuing with in-house provision. But if a municipality is sensitive to this price but is unable to effectively discipline private operators, then the extent of overpricing in its in-house provision is likely to have a greater impact on the decision to shift from in-house to private provision than on the decision to not renew a private operator. We estimate the likelihood that a municipality switches from in-house provision to private provision in year *t* (in other words, the likelihood that the municipality chooses not to "renew itself" as the operator in year *t*).

This estimation differs from the previous estimations in two ways. The *Duration* variable is not defined for observations involving in-house water provision, so this variable is excluded from the estimation. Similarly, the *SanitationOperator* variable is not defined for observations involving in-house water provision, since a private firm cannot both handle a municipality's sanitation and water services if that municipality handles its own water provision. We replace this variable with *PrivateSanitation*, which is set equal to 1 if municipality i relies on a private operator for sanitation services in year t, and 0 otherwise.

Table 7 presents the results. Consistent with our earlier estimations, the coefficient on *OverpricedvsPrivate* is positive and significant for cities, although the marginal effect is much smaller than for earlier estimations. Now, however, the coefficient on this variable is also positive and significant for small towns as well. This, coupled with the insignificance of these coefficients in the previous estimations, suggests that small towns are not indifferent to price when making organization form decisions. Rather, when making franchise renewal decisions, they are likely constrained by switching costs of the type described by Williamson (1976); costs that are not incurred when moving from public to private provision.[6] For very small towns, the coefficient on *OverpricedvsPrivate* is negative and significant in the constrained Model 1, but falls to insignificance in the fully-specified Model 2. It appears that very small towns are indifferent to the relative price of in-house water when making the decision to privatize. It is possible that these extremely small towns do not look for efficiency in their water provision, but rather seek to optimize on other (political?) dimensions. It is also possible that these towns are less likely to receive useful information to alert them to their inefficient status. Levin and Tadelis (2010) note that the likelihood of having an experienced city manager increases with city size; perhaps very small towns lack a manager with the requisite knowledge or incentive to enhance efficiency. In addition, we assume that potential profits to a private provider from a very small town are smaller than those derived from a larger town; if so, then private providers are not likely to devote much effort to educating very small towns about the potential efficiency benefits of private water provision. Across all models in Table 7, the coefficient on *PrivateSanitation* is positive and significant. Regardless of size category, a municipality is more likely to shift its water provision to a private operator if it has already moved to private provision of sanitation services.

[6] One may wonder whether these small towns are making an error by switching from public to private provision for short-term cost benefits when the shift to private provision appears to generate transaction cost problems subsequently. Future analysis could assess the tradeoff between cost benefits today and the time-discounted higher costs that are likely to accrue subsequently. For now, we merely note that much of the political economy literature suggests that elected officials heavily discount future costs – especially those that will arrive several elections hence – in making decisions (see, for instance, Savedoff and Spiller, 1999).

6 Discussion and conclusion

This study contributes to the debate sparked by Williamson's (1976) seminal article on franchising for government services. By focusing on municipal water services in France, an empirical setting that exhibits a mix of public and private provision, we were able to overcome empirical challenges that have long afflicted large-sample analysis of franchised government services. We examined the price differential between public and private water provision, and franchisee renewal patterns, for municipalities of different sizes. Our results indicate that while cities with populations exceeding 10,000 residents tend to discipline franchisees that overprice by not renewing their contracts, the renewal pattern of towns with fewer than 10,000 residents is not influenced by franchisee overpricing. We interpret this as evidence that cities are able to attract competitive bids or bring service in-house at renewal time if necessary, while small towns are not. We also find that small towns pay a significant price premium for water as compared to in-house provision, while cities do not; we interpret this as evidence that cities' ability to attract competitive bids and/or move to direct public provision serves to discipline franchisees, while small towns are not able to discipline franchisees as effectively. Put differently, while cities in France appear to have sufficient bargaining power to prevent water franchisees from extracting significant quasi-rents, small towns appear to suffer from the problems described by Williamson (1976).

In 2006, France had roughly 950 municipalities with populations in excess of 10,000, with 49% of its population living in those municipalities. The remaining 51% lived in municipalities with fewer than 10,000 inhabitants each. Thus, just over half of the French population lived in municipalities that confront transaction-cost problems in franchise renewals. We noted above that provision of water under the French legal regime is likely to be less subject to transaction-cost issues than the typical franchised service. To the extent that this is accurate, franchise bidding, execution, and renewal problems are likely to be more pervasive for a variety of other municipal services. We leave it to future research to document this effect in practice in other municipal services.

References

Canneva G., Bonnet F. & Duchesne C., 2012. Remise en concurrence des contrats de délégation de service public d'eau potable et d'assainissement - procédures 2007 et 2008. Montpellier, AgroParisTech, 95 p.

Carpentier, A., Nauges, C., Reynaud, A. & Thomas, A., 2006. Effets de la delegation sur le prix de l'eau potable en France : Une analyse à partir de la litterature sur les effets de traitement. *Economie et Prevision*, 174(3), p.1–19.

CGDD, 2010. Services d'eau et d'assainissement : Une inflexion des tendances?

Chong, E., Huet, F., Saussier, S., Steiner, F., 2006. Public-private partnerships and prices: Evidences from water distribution in France. *Review of Industrial Organization*, 29(1), p.149–169.

Crocker, K.J. & Masten, S.E., 1996. Regulation and administered contracts revisited: Lessons from transaction-cost economics for public utility regulation. *Journal of Regulatory Economics*, 9(1), p.5–39.

Demsetz, H., 1968. Why regulate utilities? *Journal of Law and Economics*, 11, p.55–66.

Desrieux, C., Chong, E. & Saussier, S., 2012. Putting all one's eggs in one basket: Relational contracts and the provision of local public services. *Journal of Economic Behavior & Organization*, (forth.).

Gence-Creux, C., 2001. Elections et favoritisme dans l'attribution des marchés de services publics locaux. *Revue Economique*, 52(3), p.753–763.

Goolsbee, A. & Petrin, A., 2004. The consumer gains from direct broadcast satellites and the competition with cable TV. *Econometrica*, 72(2), p.351–381.

Hamilton, B.H. & Nickerson, J.A., 2003. Correcting for endogeneity in strategic management research. *Strategic Organization*, 1(1), p.51–78.

Joskow, P. L., 1988. Asset specificity and the structure of vertical relationships: Empirical evidence. *Journal of Law, Economics, and Organization*, 4(1), p. 95-118.

Levin, J. & Tadelis, S., 2010. Contracting for government services: Theory and evidence from U.S. cities. *Journal of Industrial Economics*, 58(3), p. 507-541.

Malatesta, D. & Smith, C.R., 2011. The effects of competition-based public policy on contractual arrangements. *Policy Studies Journal*, 39(2), p.261–283.

Masten, S.E. 2011. Public utility ownership in 19th-century America: The "aberrant" case of water. *Journal of Law, Economics, and Organization*, 27(3), p.604-654.

Nickerson, J.A. & Silverman, B.S., 2003. Why firms want to organize efficiently and what keeps them from doing so: Inappropriate governance, performance, and adaptation in a deregulated industry. *Administrative Science Quarterly*, p.433–465.

Prager, R.A., 1990. Firm behavior in franchise monopoly markets. *RAND Journal of Economics*, 21(2), p.211–225.

Porcher, S., 2012. An analysis of renegotiations in water franchise contracts. Working paper, University of Paris I.

Savedoff, W. & Spiller, P., 1999. Government opportunism and the provision of water. In: *Spilled Water: Institutional Commitment in the Provision of Water Services*, W. Savedoff & P. Spiller (Eds), Inter American Development Bank (Washington D.C.), p. 1-34.

Seamans, R.C., 2012. Fighting City Hall: Entry deterrence and technology upgrades in cable TV markets. *Management Science,* 58(3), p. 461-475.

Tiret, A. 2008. Presentation des services publics de l'eau et de l'assainissement en France. Federation Professionnelle des Entreprises de l''Eau. Presented at the 2nd meeting of Mayors-Symposium of Cannes, June 25.

Williamson, O.E., 1976. Franchise bidding for natural monopolies: In general and with respect to CATV. *Bell Journal of Economics*, 7(1), p.73–104.

Zupan, M.A., 1989. Cable franchise renewals: Do incumbent firms behave opportunistically? *RAND Journal of Economics*, 20(4), p.473–482.

Table 1 Definition of variables and descriptive statistics

Variable	Definition	Mean	Std Dev	Min	Max
For price estimations	(N = 11,824 municipality-year observations)				
$Price_{it}$	Deflated Price per 120m^3 of water in municipality i in year t	142.3	41.53	50.2	298.3
$Private_{it}$	1 if municipality i relies on private provision in year t, else 0	0.630	0.483	0	1
$TreatmentIntensity_{it}$	6-point scale variable measuring the intensity of water treatment required by municipality i in year t: 0= no treatment, 5= heavy treatment	2.153	1.564	0	5
$WaterOrigin_{it}$	3-point scale variable identifying source of water in municipality i in year t: 0=underground, 1=mixture of underground and surface, 2=surface	0.484	0.767	0	2
$WaterSafety\text{-}Bacteria_{it}$	# of days in year t for which municipality i's water meets legal standard for bacteria / 365	0.954	0.158	0	1
$WaterSafety\text{-}Chemical_{it}$	# of days in year t for which municipality i's water meets legal standard for chemicals / 365	0.936	0.186	0	1
$WaterSafety_{it}$	Minimum of WaterSafety-Bacteria and WaterSafety-Chemical	0.921	0.189	0	1
$LeakRatio_{it}$	$1-\frac{Volume\ of\ water\ billed\ to\ customers}{Volume\ produced+volume\ imported}$ for municipality i in year t	0.227	0.131	0	0.94
$Population_{it}$	Natural log of the number of inhabitants in municipality i in year t	7.759	1.677	2.08	12.2
$Interauthority_{it}$	1 if municipality i organizes water services jointly with other municipalities in year t, else 0	0.720	0.449	0	1
$Limitation_{it}$	1 if water consumption in municipality i is constrained by regulations in year t, else 0	0.063	0.243	0	1
$InvestmentProgram_{it}$	1 if municipality i is undertaking an infrastructure investment program in year t, else 0	0.656	0.475	0	1
$TouristArea_{it}$	1 if municipality i is defined as a tourist area in year t, else 0	0.128	0.335	0	1
$IndepRatio_{it}$	$\frac{Volume\ of\ water\ produced}{Volume\ produced+volume\ imported}$ for municipality i in year t	0.908	0.201	0	1
For renewal estimations [a]	(N = 847 municipality-year observations)				
$NonRenewal_{it}$	1 if municipality i did not renew the incumbent private operator in year t, else 0	0.129	0.335	0	1
$SwitchtoInHouse_{it}$	1 if municipality changed from private to inhouse provision in year t, else 0	0.070	0.255	0	1
$SwitchProviders_{it}$	1 if municipality changed to a different private provider in year t, else 0	0.059	0.236	0	1
$OverpricedvsInhouse_{it}$	$\frac{Observed\ price-expected\ price\ for\ in\text{-}house\ provision}{Observed\ priced}$ for municipality i in year t	0.089	0.115	-1.100	0.549
$OverpricedvsPrivate_{it}$	$\frac{Observed\ price-expected\ price\ for\ private\ provision}{Observed\ priced}$ for municipality i in year t	-0.006	0.112	-1.199	0.350
$Overpriced_{it}$	Maximum of OverpricedvsInhouse and OverpricedvsPrivate	0.090	0.113	-1.100	0.549
$Duration_{it}$	The duration of the franchise contract that expired in municipality i in year t-1	16.847	9.258	0	87
$SanitationOperator_{it}$ [b]	1 if incumbent operator also provided sanitation services in municipality i in year t-1, else 0	0.514	0.500	0	1

$MayorChange_{it}$ [c]	1 if the mayor of municipality i has changed since initiation of the expired franchise contract, else 0	0.394	0.489	0	1
$LeftWing_{it}$ [c]	1 if municipality i's town council is governed by a left-wing party, else 0	0.446	0.499	0	1
$RightWing_{it}$ [c]	1 if municipality i's town council is governed by a right-wing party, else 0	0.554	0.499	0	1

[a] The renewal estimations are restricted to observations for municipality i in year t for which:

1) water was provided by a private operator in t-1, and
2) the franchise contract for water provision expired between t-1 and t.

[b] N for *SanitationOperator* is 771 due to missing information for 76 municipality-year observations.

[c] N for the political variables is 276. Political information is not available for municipalities with populations below 5,000.

Table 2: Summary statistics, by organizational form and municipality size

(* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$)

	Municipalities with fewer than 10,000 inhabitants		Municipalities with 10,000-200,000 inhabitants		
	Inhouse	Private	Inhouse	Private	All
N	3853	5705	525	1741	11824
Price	123.78	156.97 ***	115.09	143.15 ***	142.26
TreatmentIntensity	1.605	2.159 ***	2.343	3.286 ***	2.153
WaterOrigin	0.275	0.473 ***	0.726	0.913 ***	0.484
WaterSafety_Bacteria	0.92	0.97 ***	0.97	0.99 ***	0.95
WaterSafety_Chemical	0.91	0.94 ***	0.96	0.97 **	0.94
WaterSafety	0.88	0.93 ***	0.95	0.97 ***	0.92
LeakRatio	0.240	0.235 *	0.210	0.176 ***	0.227
Population	2225	3028 ***	32655	28471 ***	7828
Interauthority	0.66	0.78 ***	0.51	0.71 ***	0.72
Limitation	0.06	0.06	0.07	0.07	0.06
InvesmenttProgram	0.59	0.63 ***	0.84	0.82	0.66
TouristArea	0.12	0.14 ***	0.11	0.1	0.13
IndepRatio	0.94	0.89 ***	0.93	0.89 ***	0.91

Table 3: Price of water as a function of organizational form

(Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$)

	(1) OLS All Obs.	(2) LSDV All Obs	(3) LSDV Pop. <5,000	(4) LSDV Pop. 5,000-10,000	(5) LSDV Pop. 10,000 – 200,000
Private	26.942**	11.425**	13.456**	11.363*	4.679
	(0.672)	(1.977)	(2.536)	(4.581)	(4.123)
TreatmentIntensity	2.606**	0.804*	0.883	0.484	1.024
	(0.305)	(0.352)	(0.491)	(0.758)	(0.665)
WaterOrigin	8.726**	-1.086	-1.673	2.003	-1.855
	(0.613)	(0.799)	(1.212)	(1.679)	(1.274)
WaterSafety	7.400**	6.211**	5.494**	7.059*	10.753*
	(1.677)	(1.565)	(1.868)	(3.283)	(5.414)
LeakRatio	1.883	-1.391	-4.176	15.409*	1.144
	(2.737)	(2.383)	(2.691)	(7.844)	(5.361)
Population	-5.476**	-7.062	3.114	-40.932	-48.447**
	(0.217)	(6.499)	(7.589)	(21.001)	(17.296)
Interauthority	18.195**	11.560**	13.636**	16.327**	4.910
	(0.814)	(1.546)	(2.426)	(3.191)	(2.567)
Limitation	-1.059	-1.685*	-0.289	-3.381	-4.601*
	(1.372)	(0.835)	(0.985)	(2.293)	(2.086)
InvestmentProgram	2.125**	-0.407	-0.815	0.723	0.439
	(0.767)	(0.533)	(0.640)	(1.539)	(1.275)
TouristArea	6.427**	2.859	-0.076	4.193	5.689
	(1.118)	(2.264)	(3.272)	(3.636)	(5.683)
IndepRatio	-18.790**	-4.223	-4.670	-11.683*	2.954
	(1.919)	(2.245)	(3.234)	(4.837)	(4.208)
Constant	151.186**	175.590**	102.886*	476.089*	595.526**
	(2.899)	(50.638)	(51.924)	(185.038)	(174.628)
Year FE	Yes	Yes	Yes	Yes	Yes
Muni. FE	No	Yes	Yes	Yes	Yes
Adj. R^2	0.2830	0.8044	0.8203	0.7722	0.7631
N	11824	11824	7584	1974	2266

Table 4: Probit estimation, likelihood of non-renewal of incumbent private operator at end of franchise contract

(Standard errors in parentheses; marginal effects in square brackets; $^{*}p < 0.05$, $^{**}p < 0.01$)

	--- population < 5,000-		----- population 5,000 – 10,000 -----			----- population 10,000 – 200,000 -----		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Overpriced	1.285	1.464	-0.220	-1.283	-1.747	5.587**	8.464**	10.735**
	(0.940)	(0.970)	(1.101)	(1.583)	(1.656)	(1.591)	(2.541)	(2.205)
	[0.236]	[0.256]	[-0.056]	[-0.290]	[-0.379]	[1.103]	[0.553]	[0.443]
Duration	-0.007	-0.011	-0.003	-0.015	-0.009	-0.039**	-0.008	-0.011
	(0.009)	(0.010)	(0.011)	(0.015)	(0.014)	(0.015)	(0.024)	(0.023)
	[-0.001]	[-0.002]	[-0.001]	[-0.003]	[-0.002]	[-0.008]	[-0.001]	[-0.000]
TreatmentIntensity		-0.040		-0.013	-0.029		-0.232	-0.244
		(0.062)		(0.110)	(0.111)		(0.192)	(0.196)
		[-0.007]		[-0.003]	[-0.006]		[-0.015]	[-0.010]
WaterOrigin		0.011		-0.039	-0.143		0.784*	0.913**
		(0.132)		(0.206)	(0.216)		(0.363)	(0.309)
		[0.002]		[-0.009]	[-0.031]		[0.051]	[0.038]
WaterSafety		0.547		-4.511	-4.573		4.150	2.200
		(0.743)		(2.582)	(2.403)		(6.549)	(7.613)
		[0.095]		[-1.021]	[-0.992]		[0.271]	[0.091]
LeakRatio		0.720		0.003	-0.374		5.198*	4.556
		(0.588)		(1.219)	(1.250)		(2.266)	(2.364)
		[0.126]		[0.001]	[-0.081]		[0.339]	[0.188]
Intermuni		-0.124		-0.403	-0.291		-1.323**	-0.963*
		(0.196)		(0.336)	(0.338)		(0.484)	(0.490)
		[-0.022]		[-0.091]	[-0.063]		[-0.086]	[-0.040]
SanitationOperator		-0.115		-0.521	-0.497		-0.916	-0.748
		(0.151)		(0.287)	(0.286)		(0.499)	(0.555)
		[-0.020]		[-0.118]	[-0.108]		[-0.060]	[-0.031]
MayorChange					-0.593			-0.672
					(0.382)			(0.502)
					[-0.129]			[-0.028]
LeftWing					-0.489			1.164**
					(0.280)			(0.406)
					[-0.106]			[0.048]
Constant	-1.239**	-1.693*	-0.868**	4.451	4.925	-0.734*	-6.132	-5.002
	(0.185)	(0.707)	(0.260)	(2.648)	(2.544)	(0.339)	(6.466)	(7.213)
pseudo-R^2	0.010	0.025	0.001	0.077	0.114	0.160	0.254	0.561
Log-likelihood	-193.79	-165.09	-74.70	-50.56	-48.54	-43.47	-20.87	-18.11
N	568	503	163	124	124	116	94	94

Table 5: Probit estimation, likelihood of selecting different private provider at end of franchise contract

(Standard errors in parentheses; marginal effects in square brackets; * $p < 0.05$, ** $p < 0.01$)

	-- population < 5,000--		----- population 5,000 – 10,000 -----			---- population 10,000 – 200,000 ----		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OverpricedvsPrivate	1.356	1.902	1.790	2.442	2.240	7.609*	10.405*	12.420**
	(1.069)	(1.213)	(1.476)	(1.774)	(1.707)	(3.479)	(4.179)	(3.853)
	[0.146]	[0.175]	[0.241]	[0.292]	[0.262]	[0.740]	[0.253]	[0.098]
Duration	-0.017	-0.016	-0.013	-0.007	-0.001	-0.028	-0.023	-0.033
	(0.012)	(0.012)	(0.018)	(0.020)	(0.018)	(0.016)	(0.023)	(0.030)
	[-0.002]	[-0.001]	[-0.002]	[-0.001]	[-0.000]	[-0.003]	[-0.001]	[-0.000]
TreatmentIntensity		-0.036		0.012	0.004		-0.429	-0.411*
		(0.061)		(0.117)	(0.114)		(0.220)	(0.198)
		[-0.003]		[0.001]	[0.000]		[-0.010]	[-0.003]
WaterOrigin		-0.139		-0.178	-0.233		1.131**	1.201**
		(0.132)		(0.221)	(0.239)		(0.338)	(0.371)
		[-0.013]		[-0.021]	[-0.027]		[0.027]	[0.009]
WaterSafety		2.919		-5.838	-5.864*		5.107	-1.800
		(2.466)		(3.188)	(2.960)		(7.889)	(8.822)
		[0.268]		[-0.699]	[-0.687]		[0.124]	[-0.014]
LeakRatio		-1.012		-1.811	-2.225		3.499*	3.346
		(0.656)		(1.569)	(1.557)		(1.529)	(1.834)
		[-0.093]		[-0.217]	[-0.261]		[0.085]	[0.026]
InterAuthority		-0.140		-0.117	-0.081			
		(0.244)		(0.380)	(0.374)			
		[-0.013]		[-0.014]	[-0.009]			
SanitationOperator		-0.076		-0.506	-0.452		-0.433	-0.257
		(0.185)		(0.383)	(0.355)		(0.494)	(0.550)
		[-0.007]		[-0.061]	[-0.053]		[-0.011]	[-0.002]
MayorChange								0.257
								(0.557)
								[0.002]
LeftWing					-0.429			1.528**
					(0.340)			(0.430)
					[-0.050]			[0.012]
Constant	-1.339**	-3.673	-1.253**	5.249	5.481	-1.027**	-7.029	-1.475
	(0.195)	(2.322)	(0.316)	(3.409)	(3.226)	(0.431)	(7.839)	(8.634)
pseudo-R^2	0.017	0.061	0.026	0.106	0.124	0.205	0.484	0.572
Log-likelihood	-113.66	-97.42	-38.01	-28.22	-27.64	-24.50	-13.87	-11.51
N	536	477	146	115	115	106	89	89

Table 6: Probit estimation, likelihood of bringing water provision in-house at end of franchise contract

(Standard errors in parentheses; marginal effects in square brackets; * $p < 0.05$, ** $p < 0.01$)

	--- population < 5,000---		----- population 5,000 – 10,000 -----			---- population 10,000 – 200,000 -----		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OverpricedvsInhouse	0.588	0.964	-1.287	-3.114	-3.203	6.118**	7.847**	10.114**
	(1.107)	(1.241)	(1.190)	(1.764)	(1.800)	(1.643)	(2.697)	(2.338)
	[0.068]	[0.098]	[-0.237]	[-0.387]	[-0.393]	[0.574]	[0.247]	[0.166]
Duration	0.000	-0.006	0.003	-0.021	-0.017	-0.051**	-0.048*	-0.040
	(0.010)	(0.012)	(0.012)	(0.015)	(0.014)	(0.014)	(0.024)	(0.030)
	[0.000]	[-0.001]	[0.001]	[-0.003]	[-0.002]	[-0.005]	[-0.002]	[-0.001]
TreatmentIntensity		-0.018		-0.109	-0.108		-0.136	-0.184
		(0.082)		(0.155)	(0.155)		(0.184)	(0.202)
		[-0.002]		[-0.014]	[-0.013]		[-0.004]	[-0.003]
WaterOrigin		0.090		0.212	0.145		0.532	0.656*
		(0.170)		(0.273)	(0.266)		(0.306)	(0.274)
		[0.009]		[0.026]	[0.018]		[0.017]	[0.011]
WaterSafety		-0.101		-2.732	-3.097		5.926	6.758
		(0.674)		(3.910)	(3.658)		(7.532)	(10.205)
		[-0.010]		[-0.340]	[-0.380]		[0.186]	[0.111]
LeakRatio		1.514*		0.646	0.523		2.817	1.719
		(0.604)		(1.344)	(1.339)		(1.712)	(1.982)
		[0.154]		[0.080]	[0.064]		[0.089]	[0.028]
InterAuthority		-0.064		-0.614	-0.585		-0.618	-0.334
		(0.244)		(0.404)	(0.400)		(0.452)	(0.440)
		[-0.007]		[-0.076]	[-0.072]		[-0.019]	[-0.005]
Sanitation		-0.131		-0.620	-0.626		-1.161*	-1.274*
		(0.191)		(0.351)	(0.346)		(0.569)	(0.569)
		[-0.013]		[-0.077]	[-0.077]		[-0.037]	[-0.021]
MayorChange					-0.116			-0.611
					(0.415)			(0.762)
					[-0.014]			[-0.010]
LeftWing					-0.327			1.010*
					(0.312)			(0.415)
					[-0.040]			[0.017]
Constant	-1.625**	-1.821**	-1.164**	2.685	3.238	-0.985**	-7.053	-8.345
	(0.223)	(0.657)	(0.275)	(3.931)	(3.706)	(0.331)	(7.642)	(10.079)
pseudo-R^2	0.002	0.032	0.013	0.137	0.147	0.209	0.417	0.473
Log-likelihood	-121.61	-98.04	-52.90	-31.55	-31.19	-26.42	-14.26	-12.85
N	547	483	155	118	118	109	88	88

Table 7: Probit estimation, likelihood of switching from in-house to private provision of water
(Standard errors in parentheses; marginal effects in square brackets; * $p < 0.05$, ** $p < 0.01$)

	-- population < 5,000---		----- population 5,000 – 10,000 -----			--- population 10,000 – 200,000 ---		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OverpricedvsPrivate	-0.704*	-0.638	0.273**	0.261*	0.225*	0.232	0.609**	0.562**
	(0.304)	(0.329)	(0.081)	(0.106)	(0.101)	(0.152)	(0.151)	(0.127)
	[-0.035]	[-0.030]	[0.024]	[0.010]	[0.007]	[0.019]	[0.004]	[0.003]
TreatmentIntensity		0.003		0.161	0.185		0.082	0.102
		(0.087)		(0.094)	(0.095)		(0.118)	(0.151)
		[0.000]		[0.006]	[0.006]		[0.001]	[0.000]
WaterOrigin		0.112		-0.059	-0.045		-0.547	-0.555
		(0.110)		(0.168)	(0.164)		(0.408)	(0.419)
		[0.005]		[-0.002]	[-0.002]		[-0.004]	[-0.003]
WaterSafety		-0.277		-0.913	-1.135		-1.116	-1.422
		(0.222)		(0.670)	(0.704)		(0.698)	(0.824)
		[-0.013]		[-0.035]	[-0.038]		[-0.007]	[-0.007]
LeakRatio		0.498		2.096**	2.179*		1.200	0.603
		(0.355)		(0.776)	(0.900)		(1.448)	(1.468)
		[0.023]		[0.081]	[0.072]		[0.008]	[0.003]
InterAuthority		0.135		0.786	0.782		0.842*	1.004*
		(0.154)		(0.428)	(0.437)		(0.408)	(0.465)
		[0.006]		[0.030]	[0.026]		[0.006]	[0.005]
PrivateSanitation		0.431**		0.926**	0.846**		1.571**	1.754**
		(0.130)		(0.281)	(0.271)		(0.345)	(0.345)
		[0.020]		[0.036]	[0.028]		[0.011]	[0.008]
MayorChange					-0.068			-0.840
					(0.340)			(0.623)
					[-0.002]			[-0.004]
LeftWing					0.620*			-0.509
					(0.299)			(0.329)
					[0.021]			[-0.002]
Constant	-1.842**	-2.062**	-0.951**	-2.065**	-2.334**	-0.610	0.635	1.056
	(0.097)	(0.405)	(0.233)	(0.709)	(0.725)	(0.662)	(0.991)	(1.024)
pseudo-R^2	0.011	0.050	0.048	0.211	0.247	0.075	0.412	0.453
Log-likelihood	-238.60	-221.45	-80.310	-49.212	-46.995	-67.851	-32.766	-30.479
N	2316	2127	439	361	361	398	355	355

Appendix A: The estimation of efficiency scores

In order to determine whether municipalities are overpaying or underpaying for their water services, we use the information available to us to estimate an expected water price for each municipalities and each year, using the following specification:

$$Price_{it} = Private_{it}\left(\boldsymbol{x}'_{it}\beta^{Private} + u_{it}^{Private}\right) + (1 - Private_{it})(\boldsymbol{x}'_{IT}\beta^{Inhouse} + u_{it}^{Inhouse})$$

where the vector $\boldsymbol{x}_{it}$ contains all the variables that have been used in table 3. In this specification, we allow for the possibility that explanatory variables (such as water treatment technology used) have a distinctive impact across organizational modes on water prices. Moreover, our specification includes municipality fixed effects, so that unobservable time invariant heterogeneity across municipalities can be taken into account to compute the expected water prices for each municipality. The following table (table A.1) shows the estimation results for this specification, based on the size of municipalities.

Table A.1 LSDV estimation for the computation of efficiency scores
(1st stage of organizational change estimations)
(Standard errors in parentheses; * $p < 0.05$, ** $p < 0.01$)

	(1) LSDV Pop. <5,000	(2) LSDV Pop. 5,000 – 10,000	(3) LSDV Pop. 10,000 - 200,000
Private	26.886	57.975	-50.095
	(14.314)	(154.905)	(66.791)
TreatmentIntensity	1.206	0.504	-0.809
	(0.647)	(1.369)	(1.216)
WaterOrigin	-2.268	-0.364	0.692
	(1.506)	(2.865)	(2.497)
WaterSafety	1.257	10.073	16.016*
	(2.499)	(7.636)	(7.292)
LeakRatio	-3.205	21.438*	10.961
	(3.168)	(9.769)	(9.114)
Population	5.256	-38.300	-55.585**
	(5.872)	(20.951)	(16.261)
Interauthority	14.047**	18.062**	6.947
	(2.692)	(4.303)	(3.842)
Limitation	-1.458	2.017	-3.198
	(1.721)	(4.105)	(3.676)
InvestmentProgram	-0.348	-1.847	0.557
	(0.999)	(2.701)	(2.619)

TouristArea	2.172	1.465	-13.152
	(4.495)	(7.150)	(9.029)
IndepRatio	0.393	1.475	-4.247
	(4.166)	(13.700)	(7.683)
Private x TreatmentIntensity	-0.394	-0.115	2.293
	(0.796)	(1.545)	(1.357)
Private x WaterOrigin	1.135	3.573	-3.326
	(1.825)	(3.213)	(2.695)
Private x WaterSafety	8.179^{*}	-6.300	-8.998
	(3.538)	(9.591)	(9.490)
Private x LeakRatio	-4.328	-9.045	-13.932
	(4.653)	(12.189)	(11.200)
Private x Population	-1.358	-3.156	5.490
	(1.868)	(17.558)	(6.721)
Private x Interauthority	-0.115	-2.138	-2.834
	(3.362)	(5.158)	(4.320)
Private x Limitation	1.998	-8.071	-1.452
	(2.210)	(4.937)	(4.189)
Private x InvestProgram	-0.520	3.338	-0.328
	(1.275)	(3.153)	(2.965)
Private x TouristArea	-3.420	3.643	23.183^{**}
	(5.027)	(7.313)	(8.860)
Private x IndepRatio	-7.107	-14.581	8.656
	(5.100)	(14.574)	(8.674)
Constant	84.248^{*}	438.428^{*}	669.558^{**}
	(40.126)	(183.960)	(163.407)
Year FE	Yes	Yes	Yes
Muni. FE	Yes	Yes	Yes
R^2	0.8737	0.8435	0.8346
Adj. R^2	0.8210	0.7718	0.7636
N	7584	1974	2266

Based on the estimated coefficients, we are then able to compute, for each municipality, what are the expected water prices in the current organizational form, and what would have been the expected prices for water in the alternative organizational forms. The extent of this underpricing or overpricing is then normalized using the observed water prices in order to obtain our *OverpricedvsInhouse* and *OverpricedvsPrivate* variables, the former measuring the extent of under- or over-pricing compared to the expected price of in-house provision of water, and the latter corresponding to the extent of under- or over-pricing compared to the expected price of private provision. Therefore, these measures give an idea of the "strength" of economic incentives for a municipality to forego renewal of a franchisee.