"Get what you pay for?"
The story underneath remunicipalizations in the water sector

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Abstract

We adress the question of remunicipalization of water services in France. Gathering information on the 1998-2015 period concerning the way more than 1 200 French municipalities are organizing their water services at contract renewal time, we identified nearly 130 remunicipalization cases. Using an endogenous switching regression model in a two-stage probit estimation we found that the choice of municipalities is driven by expectations concerning price and leak: efficiency consideration are thus important drivers. However we also find evidence of mimetic behaviors suggesting that municipalities that are uniformed or not skilled enough to anticipate the consequence of their choice on efficiency might rely on observed decisions coming from municipalities from the neighborhood. (JEL: H0, H7, K00, L33)

1 Introduction

This paper is interested in the way local public services are organized and often remunicipalized – a practice sometimes called 'reverse privatization' (Hefetz and Warner (2007)), reverse contracting or reinternalization – that is a growing phenomenon in industrialized countries. For example, Hefetz and Warner (2007) show that in the US, remunicipalization increased from 12% in the 1992-1997 period to 18% of all government service delivery in the 1997-2002 period. This phenomenon is especially widespread in the water public services, as illustrated by the cities of Berlin, Paris and Hamburg in Europe, or Atlanta in the United States, where remunicipalization of water services took place during the last decade.

Contractual theories and especially transaction cost economics (TCE) derive firm boundaries as an efficient response to market transaction costs (Bresnahan and Levin (2012); Lafontaine and Slade (2007)) and naturally, by extension, give predictions on the make or buy issues for public services. TCE predicts a relationship between underlying features of transactions and observed decision to make or to contract out. Considerations of asset specificity as well as contractual complexity are then central (Levin and Tadelis (2010)).

In this respect, the water sector is of special interest since the two main dimensions of TCE namely, asset specificity and contractual complexity are relatively weak compared to many other public services (Levin and Tadelis (2010)). Indeed, the asset usually remains at the charge of and the property of the municipality, whatever the regime, and human capital is typically not a barrier when remunicipalization occurs since municipalities usually hire the franchisee staff from the private company previously in charge of the service. The "lock-in" between the municipalities and the (often private) entities in charge of providing water services is thus expected to be moderate in this sector. Finally, water provision is likely to be subject to low contractual complexity. Quality of water and its physical network are both easily measurable so that contractual complexity is potentially limited. Therefore, those conditions make the provision of water services a good candidate for privatization but also a good candidate for frequent organizational changes. Municipalities that historically choose to privatize a service may easily revert to in-house provision. In a recent book Kishimoto et al. (2015) found that between March 2000 and March 2015 more than 200 cases of water remunicipalisation occurred in 37 countries. The number of cases doubled in the 2010-2015 period compared with the 2000-2010 period, illustrating a remunicipalization tendency, especially in high-income countries, where the majority of remunicipalisations took place.

The case of France is particularly interesting. Privatization has been there the rule more than the exception in the water sector for more than a century (more than 70% of the population is served by privatized water utilities). However there is a new tendency toward remunicipalization, illustrated by the remunicipalization of public water services in the city of Paris in 2009. Furthermore, as mentionned by Kishimoto, Lobina and Petitjean (2015), for the majority of water services, remunicipalization took place in France (nearly 50% of their worldwide observed cases). It is thus interesting to find out why a system which seems to have working well for a long time – the privatization of water services – seems to be rejected now and to investigate what are the main drivers of remunicipalization.

This new tendency for remunicipalization may have several explanations. Some remunicipalization might be constrained remunicipalizations, e.g. contracts which are early terminated by one of the two parties or municipalities forced to remunicipalize because there are no bidders for a contract. However, according to some authors such as (McDonald (2016)), the main rea-

son lying behind remunicipalizations is dissatisfaction with private management performances. Rising prices and underinvestment issues are from this respect important parameters. Besides these efficiency concerns, other matters might be part of the explanation, especially political concerns such as ideology or willingness to be re-elected by politicians (Boycko et al. (1996)) or mimetic behaviors. Because water is often considered a 'special' public service, with emotional dimensions, the search for more efficiency (through efficient pricing and investments) might not be the only or the principal motivation for remunicipalization. It is fair to say that studies looking at the relative efficiency of public versus private management of water services leads to mix conclusions. In addition, those studies often look at only one dimension of efficiency, frequently prices or operating costs. For example, in a study concerning water services in France on the 1998 – 2008 period, Chong et al. (2015) found that water prices are (slightly) higher when municipalities chose to go private, but only for small cities (i.e. less than 10,000 inhabitants). They also found that efficiency consideration partly drives the decision to remunicipalize for big cities, suggesting that they are important for those cities but may be not for smaller ones. Other performance dimensions, equally important, are not included in the study, such as, investment efforts on the network to reduce leakages.

In this paper we adress those questions using a new data set on water services in France. Gathering information on the 1998-2015 period concerning the way more than 1 200 French municipalities are organizing their water services at contract renewal time, we identified nearly 300 remunicipalization cases. In order to investigate why municipalities decide to remunicipalize water services, we focus on efficiency indicators (i.e. price and leak) as well as on other indicators that might capture the willingness of municipalities to pursue other objectives (i.e. political party, debts, unemployment levels at the municipality level) or their lack of information (i.e. mimetic behavior). In order to obtain consistant estimators taking into account endogeneity and simultaneity issues, we used an endogenous switching regression model in a two-stage probit estimation. Our results suggest that municipalities decision to remunicipalize a water service is connected to expectations concerning efficiency: efficiency consideration are thus important drivers. However we also find evidence of mimetic behaviors suggesting that municipalities that are uniformed or not skilled enough to anticipate the consequences of their choice on price and leak might rely on observed decisions coming from neighborhood municipalities.

The paper is organized as follows. We first come back on evidence, institutional details and potential drivers of remunicipalizations in France (section 2). We then turn to our data and empirical strategy (section 3) before to present our results (section 4). Conclusions follow.

2 Remunicipalization in the French Water Sector

2.1 The Institutional Environment

In France, as in most European countries, municipalities must provide local public services that have public good characteristics. Municipalities monitor prices, control entry and exit of firms into the market, organize competition, and ensure uninterrupted service. Water provision refers to the production and the distribution of water, and sewage implies wastewater collection and treatment. Water provision and sewage are two distinct public services and can be managed by two different operators. We focus in this paper on water provision. If the responsibility for public services provision is public however, its management can be either

public or private. Although some municipalities manage production through direct public management and undertake all operations and investments needed for the provision of the service, the dominating organizational form is private management. Under private management, the main contractual form is the lease contract in which the operator manages the service, invests in the network and gets a financial compensation through consumer receipts. Contrary to other industrialized countries, there is no price-cap or rate-of-return regulation for water utilities in France as there is no national regulator. Such regulation has been replaced by a regulation by contract in the case of a private operator, or a decision of the municipality board in the case of public operation. In the case of private management, rules have been defined to ensure that standards are respected during the operation for limiting the opportunistic behavior of operators and preserve competition between firms.

Price setting is different whether the local community has chosen to privatize the service or not. Under direct public management, the municipality council designs rates in order to generate revenues that allow the utility to cover its costs. French legislation requires the water utility budget to be balanced following the so-called 'cost-recovery principle' (or 'water pays water'). Prices are thus set to cover operating and capital costs and no payment for water provision may be diverted to other uses. No subsidies can be used, regardless of the governance form used. Under private management, the rate structure is determined by projecting financial accounts provided by the operator over the duration of the contract. The contract includes periodic revisions of water rates using a price index adjusting formula. The relationship between the local municipality and the firm is formalized by means of a contract that specifies a price structure, a formula of price revision and negotiated clauses allowing for exceptional conditions. The successful bidder benefits from a local monopoly for the duration of the contract, that is on average 12 years in France. At the renewal time 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 to remunicipalize.

One final interesting feature of the French water sector is that all infrastructure remains the property of the municipality. Contracts with private operators can stipulate specific infrastructure improvements to be carried out by the private operator, and stipulate that the private operator will maintain infrastructure to keep water loss below specified levels. The cost of the requisite work is priced into the operator's contract bid. Thus, when a municipality decides to remunicipalize, there is no payment required from public authority to the incumbent private operator.

2.2 Remunicipalizations: Evidences

Table 1 shows the total number of contract renewals and distinguishes between privatizations and remunicipalizations observed in our sample from 1998 and 2015 (the data set will be presented in details in the next section). The overall tendency of privatizations versus remunicipalizations shows that there have been some cycles of privatizations (1998-2001) and remunicipalizations (1998-2009), and some periods with almost the same number of privatizations and remunicipalizations (2010-2014). Overall, we observe more remunicipalizations than privatizations, respectively 290 versus 236 between 1998 and 2015, for a total of 2,289 new contracts.

	Municipalities		New Contracts	Remunicipalizations			Privatizations		
Year	Count	Population	Count	Count	% Contract Renewal	Population	Count	% Contract Renewal	Population
1998-2001	4987	41 851 320	395	39	10%	436 417	105	27%	640 994
2002-2004	4987	42 014 224	413	14	3%	44 401	17	4%	55 724
2005-2008	5215	42 582 788	851	113	13%	696 283	50	6%	165 779
2009	9915	21 509 758	83	52	63%	2 644 153	15	18%	106 457
2010	9858	21 367 100	111	11	10%	117 431	17	15%	221 298
2011	9753	21 154 976	102	16	16%	154 561	7	7%	15 815
2012	9666	21 078 094	97	13	13%	110 703	9	9%	69 112
2013	9429	20 654 816	86	19	22%	84 608	13	15%	19 616
2014	9197	20 275 608	80	4	5%	105 446	3	4%	1 061
2015	9040	15 800 907	71	9	13%	26 116	0	0%	-
Total	**82 047**	**268 289 591**	**2289**	**290**	**13%**	**4 420 119**	**236**	**10%**	**1 295 856**

Table 1: Contract renewals in France and Remunicipalizations

2.3 Remunicipalizations: what drivers?

At contract renewal time, the decision to remunicipalize is very similar to the classical make or buy decision that has been largely studied in organizational economics for private transactions. Theoretical frameworks designed to tackle "make or buy" issues and contracting strategies between private firms may have provided some of the clearest insights into issues related to contracting with governments (de Bettignies and Ross (2009)). From an economic point of view, transactors that are looking for economic efficiency will choose to contract out if the expected gains (net of transaction costs) from doing so are greater than those of organizing the transaction internally. All the question is to identify the main ingredients that will increase (decrease) the cost of contracting out more than the cost of organizing the transaction internally. As stated by Masten and Saussier (2000) "Because the returns transactors expect from governing their transactions in different ways are difficult, if not impossible, to observe, a testable theory of contracting requires that the theory relate the benefits and costs of alternative governance arrangements to observable features of the transaction". Depending on theoretical approaches, asset specificity, transaction's complexity or asymetric information might be considered as main drivers of transaction costs and hence are the basis of hypothesis to be tested.

However, because water contracts are public contracts resulting from the decision of municipalities, it is natural to believe that considerations other than economic efficiency, such as political considerations (Le Squeren (2016)) or mimetic behaviors due to a lack of information (Brown and Potoski (2003) might drive the decision remunicipalize or not a transaction previously contracted out.

3 Dataset and Empirical Strategy

3.1 Data and Summary Statistics

In order to investigate the determinant of remunicipalization, we merged three datasets: data from the French Environment Institute (IFEN-SOeS), the National Agency for Water (ONEMA) and the French Health Ministry (DGS). The unit of observation is a municipality. IFEN-SOeS collected data from roughly 5,000 water authorities four times in 1998, 2001, 2004 and 2008. The sample represents more than 75% of the entire French population for

which services are provided and is representative of the total population of French municipal public water authorities. From 2008, ONEMA collected data on all existing French water services on a yearly basis until 2015. Finally, DGS provides data on water treatments at the municipal-level for all the years included in our sample.

Basic statistics concerning the efficiency of water services show that private and in-house management significantly differ in terms of our main variables of interest namely, price and leak. Table 2 shows that, in average, the distribution of a cubic meter of water is significantly more expensive under private provision (0.14 euro), whereas in-house management seems to be less efficient regarding the maintenance of the network since leaks are in average 4 points higher than under private management. This suggest that search for efficiency might play a role in the decision to privatize or not water services depending on which dimension (price or leak) appears crucial to the municipality.

	In-house	**Private**	**Difference**
Price	1,51	1,66	-0.14***
Leak	0,25	0,21	0.039***

Table 2: Average value for price and leak across management

To go deeper into the analysis, in what follows, we focus only on observations related to renewed contracts. To understand why municipalities decide to remunicipalize we need to compare situations where the municipality decides to keep the contract under private management with cases where the public authority switches to in-house provision. This allows to isolate the factors facilitating the switching likelihood. Restricting our sample only to renewed contracts over the period 1998-2015, we end up with 1,304 contracts of which 135 cases of remunicipalization, so that the remaining 1,169 ones are related to cities keeping private provision of water distribution services.
Table 3 presents descriptive statistics for the variables of interest. Our dataset is made of several variables, which are explanatory of costs and leak ratios such as the origin of water or the type of technology used to treat water. These variables are important to understand the efficiency differences between municipalities. For example, ground water is usually associated with higher risk associated with variation of the quality of raw water because it is more easily polluted than underground water. We also control for the treatment complexity. In our dataset, there are six types of treatments: there can be no treatment; a simple disinfection (Water Treatment 1); an average disinfection (Water Treatment 2); a heavy disinfection (Water Treatment 3); or mixed treatments including a heavy treatment (Water Treatment 4) or only light and average treatments (Water Treatment 5). Other variables might capture the presence of scale economies such as the number of inhabitants or the density of the network. Touristic area is a dummy capturing whether the city is considered as being touristic or not. They are usually characterized by oversized networks, which can positively impact costs in order to be able to provide water to the population during peaks of consumption.

We also collected additional data that we believe are more connected to other than efficiency objectives the municipalities might follow. As López-de Silanes et al. (1997) suggest, labor-

market conditions, budget constraints and ideology may drive privitization decisions. Therefore, we include the yearly local unemployment rate, the amount of debt of the municipality and personnel expenses in our model. We eventually account for the political party of the mayor. We expect that those variables might influence the mayor's decision to remunicipalize. There also could be the case of a mimetic behavior of municipalities that would be reflected by a positive spillover from of the number of neighborhood cities with in-house provision of water distribution services over decision to remunicipalize. We also suspect that the same argument is valid for the number of neighboors that remunicipalized. We thus calculated for each pair of cities the distance between them and obtained four variables, *NEIGHBOR_INHOUSE_25*, *NEIGHBOR_INHOUSE_50*, *NEIGHBOR_REMU_25*, and *NEIGHBOR_REMU_50*. The first two variables represent the number of cities providing distribution of water in-house in a radius of respectively 25 and 50 kilometers. The two last ones, represent the number of cities that remunicipalized this service in a radius of respectively 25 and 50 kilometers.

Variable	Definition	Count	Mean	Median	SD	Min	Max
PRICE	Average price per cubic meter, all taxes included	1304	1,47	1,42	0,46	0,51	3,13
LEAK	(Production – Billed water) x 100/ Production	1304	0,26	0,24	0,11	0,10	0,68
PRIVATE	Dummy equal to 1 for privately managed services	1304	0,90	1,00	0,30	0,00	1,00
SURFACE	Dummy equal to 1 if the water is pumped out from the surface	1304	0,12	0,00	0,32	0,00	1,00
NETWORK_DENSITY	Number of inhabitants per km of network	1304	60,52	41,00	69,08	1,00	891,00
POP	Takes the value 1 if population<5000, 2 if 5000<population<10000, and 3 if population>10000	1304	1,46	1,00	0,72	1,00	3,00
TOURISTIC	Dummy equal to 1 if the municipality is a touristic area	1304	0,06	0,00	0,24	0,00	1,00
INTER_AUTHORITY	Takes value 1 if the local authority is organizing the distribution of water in cooperation with other local authorities	1304	0,71	1,00	0,45	0,00	1,00
UNEMPLOYMENT	Annual local unemployment rate (%)	1304	7,55	7,20	1,87	3,30	15,80
DEBT	Annual debt of the municipality (thousand euros)	1304	4 921 522	1 372 500	11 255 576	0,00	183 319 008
PERSONNEL EXPENSES	Annual personnel expenses of the municipality (thousand euros)	1304	2 818 059	772 000	6 178 869	0,00	75 398 000
WATER_TREATMENT 1	Dummy equal to 1 if raw water needs a light treatment before distribution	1304	0,55	1,00	0,50	0,00	1,00
WATER_TREATMENT 2	Dummy equal to 1 if raw water needs an average treatment before distribution	1304	0,14	0,00	0,34	0,00	1,00
WATER_TREATMENT 3	Dummy equal to 1 if raw water needs a heavy treatment before distribution	1304	0,18	0,00	0,39	0,00	1,00
WATER_TREATMENT 4	Dummy equal to 1 if raw water needs a mixture of treatments including a heavy treatment	1304	0,07	0,00	0,25	0,00	1,00
WATER_TREATMENT 5	Dummy equal to 1 if raw water needs a mixture of light and average treatment	1304	0,05	0,00	0,23	0,00	1,00

Table 3: Summary statistics

3.2 Econometric Strategy

In order to investigate the determinants of remunicipalization, we estimate the following probit model:

$$\begin{aligned} REMU^*_{it} &= \beta_1 OVERPRICE_{it} + \beta_2 OVERLEAK_{it} + \beta_3 OVERPRICE_{it} * POP_{it} \\ &+\beta_4 OVERLEAK_{it} * POP_{it} + \beta_5 SURFACE_{it} + \beta_6 TOURISTIC_{it} \\ &+\beta_7 DENSITY_{it} + \beta_8 UNEMPLOYMENT_{it} + \beta_9 DEBT_{it} \\ &+\beta_{10} PERSONNEL_{it} + \beta_{11} INTER\_AUTHORITYit \\ &+\beta_{12} TREATMENT_{it} + \beta_{13} NEIGHBOR\_INHOUSE\_25_{it} \\ &+\beta_{14} NEIGHBOR\_INHOUSE\_50_{it} + \beta_{15} NEIGHBOR\_REMU\_25_{it} \\ &+\beta_{16} NEIGHBOR\_REMU\_50_{it} \end{aligned} \quad (1)$$

where $REMU^*_{it}$ is a dummy variable equal to one if the city decides to remunicipalize at the end of the contract. In particular, we want to assess the extent to which the difference between overpricing and overleaking influence the decision to remunicipalize. Variable OVERPRICE is the difference between the price under remunicipalization and the one if the service is still provided privately. If remunicipalization actually occurs, we observe the price under this regime but not the one that would have prevailed if the service is provided privately. The reverse applies if remunicipalization does not happen namely, we do not observe what would have been the price under remunicipalization. We thus need to calculate counterfactual pricing. This suggestion is also valid for the OVERLEAK variable. Therefore, we construct two variables:

$$OVERPRICE_{it} = PRICE_{it} \text{ (if } REMU_{it} = 0) \text{ - } PRICE_{it} \text{ (if } REMU_{it} = 1)$$
$$OVERLEAK_{it} = LEAK_{it} \text{ (if } REMU_{it} = 0) \text{ - } LEAK_{it} \text{ (if } REMU_{it} = 1)$$

However, this specification has two limitations. The first one comes from the counterfactual calculation. As said earlier, in the case where the municipality does not remunicipalize, we do not observe the price that would prevail under such regime. The same point is valid for the counterfactual if the municipalities to stay under a private regime.
Also, the second issue comes from the simultaneity between the decision to remunicipalize, and $OVERPRICE$ as well as $OVERLEAK$. Indeed, one might suspect that endogeneity arises since the price and leak differentials probably impact remunicipalization decisions whereas, on the other side, this choice may influence these spreads.
To overcome those two issues, missing counterfactual and endogeneity, we use an endogenous switching regression model following the methodology introduced by Lee (1978). Thus we define our model as a system made of equation (1) and:

$$\begin{aligned} PRICE_{it} &= \gamma_1 SURFACE_{it} + \gamma_2 TOURISTIC_{it} + \gamma_3 POP_{it} \\ &+\gamma_4 DENSITY_{it} + \gamma_5 TREATMENT_{it} \\ &+\gamma_6 INTER\_AUTHORITY_{it} \\ &\text{if } REMU_{it}=0, \end{aligned} \quad (2)$$

$$
\begin{aligned}
PRICE_{it} &= \alpha_1 SURFACE_{it} + \alpha_2 TOURISTIC_{it} + \alpha_3 POP_{it} \\
&\quad + \alpha_4 DENSITY_{it} + \alpha_5 TREATMENT_{it} \\
&\quad + \alpha_6 INTER\_AUTHORITY_{it} \qquad (3) \\
&\quad \text{if } REMU_{it}=1,
\end{aligned}
$$

$$
\begin{aligned}
LEAK_{it} &= \zeta_1 SURFACE_{it} + \zeta_2 TOURISTIC_{it} + \zeta_3 POP_{it} \\
&\quad + \zeta_4 DENSITY_{it} + \zeta_5 TREATMENT_{it} \\
&\quad + \zeta_6 INTER\_AUTHORITY_{it} \qquad (4) \\
&\quad \text{if } REMU_{it}=0,
\end{aligned}
$$

$$
\begin{aligned}
LEAK_{it} &= \nu_1 SURFACE_{it} + \nu_2 TOURISTIC_{it} + \nu_3 POP_{it} \\
&\quad + \nu_4 DENSITY_{it} + \nu_5 TREATMENT_{it} \\
&\quad + \nu_6 INTER\_AUTHORITY_{it} \qquad (5) \\
&\quad \text{if } REMU_{it}=1,
\end{aligned}
$$

We apply a two-stage probit estimation where we substitute equations (2), (3), (4) and (5) into (1) so that we obtain a reduced-form probit model. The selection equation is estimated by a probit and includes all of the X variables as well as additional variables such as $UNEMPLOYMENT_{it}$, $DEBT_{it}$, $PERSONNEL_{it}$, $NEIGHBOR\_INHOUSE\_25_{it}$, $NEIGHBOR\_INHOUSE\_50_{it}$, $NEIGHBOR\_REMU\_25_{it}$, $NEIGHBOR\_REMU\_50_{it}$.
Using the estimates from the reduced-form probit $\widehat{REMU}_{it}$, we are able to calculate the counterfactual settings. We are then able to obtain $\widehat{OVERPRICE}_{it}$ and $\widehat{OVERLEAK}_{it}$, so that we can include them into the probit equation.

4 Results

Results from the endogenous switching model are displayed in Table 4. Since ρ_0 and ρ_1 are both significantly different from zero, we are confident that there was endogeneity issues so that an endogenous switching model is necessary.
When interpreting the results from equations (2) and (3), we observe that price is negatively and significantly affected by the size of the city (POP), meaning that large cities may benefit from a price discount. Complexity inflates price of water distribution since the coefficient for *SURFACE* and *TREATMENT* are significantly positive, except for the case of remunicipalization where *TREATMENT* is no longer significant but still positive. When interpreting the estimated results from equations (4) and (5), we see that the larger the city, the lower the leak. However, this effect is not significant when looking at cases where remunicipalization took place even if the coefficient is still negative. The complexity works in the opposite direction relative to the price estimations, since a higher complexity decreases in average the leak. This result makes sense since higher complexity is associated with higher costs, so that incentives to reduce leak are stronger. This is reflected by the signifiant and negative coefficients for *SURFACE* and *TREATMENT*. The coefficient for *TREATMENT* is no longer significant when looking at the results from equation (5), but still negative.

	PRICE			LEAK				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Selection	Equation (2)	Equation (3)	Selection	Equation (4)	Equation (5)	Counterfactual Probit	
OVERPRICE							1.269***	1.461***
							(0.178)	(0.401)
POP 5K-10K x OVERPRICE							0.0785	-0.0678
							(0.370)	(0.511)
POP>10K x OVERPRICE							0.630	0.600
							(0.531)	(0.655)
OVERLEAK							-1.695**	0.215
							(0.750)	(1.751)
POP 5K-10K x OVERLEAK							-1.564	-3.879
							(1.861)	(2.546)
POP>10K x OVERLEAK							-5.418**	-8.142**
							(2.667)	(3.275)
POP	0.246***	-0.211***	-0.139*	0.0171	-0.0130**	-0.0247		
	(0.0951)	(0.0232)	(0.0749)	(0.104)	(0.00529)	(0.0157)		
POP 5K-10K							0.0942	0.0113
							(0.253)	(0.327)
POP>10K							-0.428	-0.550
							(0.424)	(0.489)
SURFACE	0.284*	0.312***	0.0989	0.301*	-0.0299***	-0.0463*	0.232	0.664*
	(0.153)	(0.0460)	(0.124)	(0.177)	(0.0105)	(0.0279)	(0.218)	(0.360)
DENSITY	-0.000834	0.000698***	0.000898	-0.00137	1.77e-06	-0.000145	-0.00104	-2.26e-05
	(0.00115)	(0.000246)	(0.000986)	(0.00132)	(5.52e-05)	(0.000222)	(0.00170)	(0.00236)
INTER_AUTHORITY	0.00935	0.0437	-0.0673	-0.0704	0.00171	0.00393	-0.220	-0.504**
	(0.108)	(0.0311)	(0.0943)	(0.126)	(0.00709)	(0.0211)	(0.151)	(0.231)
TOURISTIC	-0.142	0.0297	0.0246	-0.0485	-0.0114	0.0277	0.160	0.400
	(0.212)	(0.0555)	(0.174)	(0.231)	(0.0125)	(0.0394)	(0.265)	(0.368)
TREATMENT	-0.0259	0.0414***	0.107***	-0.0218	-0.00863***	0.00326		
	(0.0399)	(0.0121)	(0.0359)	(0.0510)	(0.00275)	(0.00816)		
TREATMENT 1							-0.394	-0.160
							(0.316)	(0.473)
TREATMENT 2							-0.0566	-0.545
							(0.331)	(0.538)
TREATMENT 3							-0.909**	-1.508**
							(0.355)	(0.593)
TREATMENT 4							-0.124	-0.191
							(0.391)	(0.565)
UNEMPLOYMENT	0.00603			0.0560*			0.109***	0.117*
	(0.0235)			(0.0300)			(0.0371)	(0.0603)
DEBT	-4.65e-09			-4.43e-09			9.35e-10	-8.70e-10
	(7.80e-09)			(1.02e-08)			(1.48e-08)	(1.67e-08)
PERSONNEL	4.09e-09			1.91e-08			1.43e-08	1.69e-08
	(1.15e-08)			(2.06e-08)			(3.18e-08)	(3.53e-08)
NEIGHBOR_INHOUSE_25	0.00251			0.0185*			0.0245*	0.0431*
	(0.00981)			(0.0110)			(0.0133)	(0.0224)
NEIGHBOR_INHOUSE_50	0.00283			-0.00165			-0.00224	-0.0104
	(0.00265)			(0.00332)			(0.00426)	(0.00737)
NEIGHBOR_REMU_25	0.209***			0.342***			0.393***	0.500***
	(0.0527)			(0.0667)			(0.0745)	(0.132)
NEIGHBOR_REMU_50	0.0342			0.0419			0.0183	0.0230
	(0.0246)			(0.0345)			(0.0403)	(0.0757)
LEFT_WING								0.445**
								(0.221)
Constant	-1.890***	1.517***	1.170***	-2.031***	0.291***	0.283***		
	(0.255)	(0.0452)	(0.283)	(0.325)	(0.0104)	(0.0474)		
Sigma 0		0.456***						
		(0.0113)						
Rho 0		-0.928***						
		(0.0288)						
Sigma 1			0.418***					
			(0.0383)					
Rho 1			0.3197***					
			(0.255)					
Observations	1,215	1,215	1,215	1,215	1,215	1,215	1,207	515

Table 4: The determinants of remunicipalization

Since the main objective of this paper is to find out the determinants of remunicipalization, the results of interest are given by the counterfactual probit equations (columns (7) and (8)). We first focus on the estimations given in column (7). Two important results come out from the estimation. First, the larger the price discount the more likely remunicipalization is, as the coefficient for $OVERPRICE$ is significantly positive. This means that an decrease in the price after the switching relative to what would have been the price if the municipality stays under private regime, significantly increases the chances of remunicipalization. The size of the city does not seem to have any significant influence over this price discount. Second, switching is less likely when an overleak is expected, meaning that an increase in the leak ratio after the switching relative to what would have been the leak ratio if the municipality stays under private regime, significantly reduces the chances of remunicipalization. This effect is even more important when looking at large cities of more than 10,000 inhabitants. Complexity does not seem to play an important role in this estimation. Interestingly, the local unemployment rate has a positive and significant impact of the likelihood of remunicipalization. This makes sense since reverting the service back to in-house provision may create jobs, so that the larger the unemployment rate, the more important the dimension of employment. We also observe that there is a positive effect of local influence. First, the number of cities with in-house provision of water distribution services in a radius of 25 kilometers positively influences the chances of switching. The same results is valid when looking at the number of neighborhood cities that remunicipalized. These two findings does no longer hold when focusing on a larger radius of 50 kilometers.
Finally, results given in column (8) that are including the political color of the municipality are pretty similar except that the impact of overleak is no longer significant but that the effect of $SURFACE$ is significantly positive and the coefficient of $INTER\_AUTHORITY$ is negative and significant. The most important variable we need to focus on in this specification is $LEFT\_WING$. It is associated with a positive and significant coefficient, meaning that remunicipalization is more likely when the mayor is from the left-wing.

5 Conclusions

This paper has studied the determinants of remunicipalizations. Using data gathered from a variety of sources, we use a two-stage probit estimation to explain remunicipalizations of water public services in French municipalities between 1998 and 2015. Our results show that remunicipalizations are determined by expectations about the evolution of price and leaks after remunicipalizations, but also by other factors, such as the tendency to remunicipalize in neighboring cities, local unemployment or political affiliation of the mayor. Our analysis thus provides a framework to analyse the dynamics of remunicipalizations. It shows that remunicipalization are fostered by a mixture of efficiency concerns, ideology and mimetism.
Our analysis leaves many questions open. Our analysis focuses only on the determinants of remunicipalizations; it would be interesting to study the impact of remunicipalizations - and privatizations - on performance. A more ambitious project would be to assess the outcomes of remunicipalization decisions on service quality or transaction costs. This would however require more detailed data, which is one reason why evidence on this front is limited.

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