"Why do municipalities cooperate to provide local public services? An empirical analysis"

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Abstract

Intermunicipal cooperation is being increasingly adopted in various countries as a part of local service delivery reforms. This paper draws on survey data from Spain's municipalities to examine the reasons underpinning the decisions of local governments to engage in intermunicipal cooperation and privatisation. Our empirical analysis indicates that small municipalities prefer to rely on cooperation for reducing costs, while their larger counterparts prefer to privatise the delivery of services. By cooperating, scale economies can be achieved with lower transaction costs and fewer concerns for competition than is the case via private production.

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1. Introduction

In recent decades local governments have adopted different formulas for reorganising public service provision. In the case of smaller municipalities, privatisation and/or intermunicipal cooperation can prove especially useful for delivering a service at a lower cost. In practice, both formulas involve aggregating the production of several municipalities, thereby enabling small municipalities to attain an optimal scale of production by exploiting the economies of scale that are inherent to many local services. Intermunicipal cooperation of this kind is widespread in Europe, being found in countries such as France, the Netherlands and Spain. In Spain, cooperation is compatible with privatising the production of the service (Bel, 2006; Bel and Fageda, 2008). In other countries, such as the Netherlands (Bel, Dijkgraf, Fageda and Gradus, 2010) and Norway (Sörensen, 2007), cooperation means maintaining public production.

The empirical evidence available does not show any systematic relationship between privatisation and cost reduction in the local sphere (Bel and Warner, 2008; Bel, Fageda and Warner, 2010). The benefits to be gained from exploiting scale economies are often counterbalanced by the problems that privatisation presents in terms of the monopolisation of contracts and market concentration (Bel, Hebdon and Warner, 2007). Furthermore, privatisation in the local sphere is usually achieved via contractual agreements between the public administration and the external company, which in a context of uncertainty and imperfect information, can lead to additional transaction costs associated with the design and supervision of these contracts (Brown and Potoski, 2003).

In the case of smaller municipalities, high transaction costs and a lack of competition can be of particular relevance (Bel and Miralles, 2003; Bel and Fageda, 2011). In such situations, intermunicipal cooperation may be a better alternative than privatisation for achieving scale economies with lower transaction costs (if opting for cooperation with public production). Indeed, Bel, Fageda and Mur (2011) show that cooperation can be more effective than privatisation in reducing costs in the provision of solid waste services in smaller municipalities. However, intermunicipal cooperation is not without its problems. Sörensen (2007) in discussing the situation in Norway, and Garrone, Grilli and Rousseau (2010) in Italy show that the organisation responsible for managing municipal cooperation in these countries is a multi-government body, which may aggravate principal-agent problems by increasing the distance between municipal government and the body in charge of production. Garrone, Grilli and Rousseau (2010) claim that executive discretion is a major source of inefficiency.

The literature currently presents a shortage of empirical papers analyzing the decision to engage in intermunicipal cooperation.[1] We are aware of an empirical study conducted by Tiller and Jakus (2005) examining the factors that account for decisions made by counties in Tennessee (US) to cooperate in the use of landfills in their provision of a solid waste service. However, to the best of our knowledge no multivariate analysis of the determinants of intermunicipal cooperation for solid waste collection and transportation has yet to be undertaken. Our study seeks to contribute to the literature by filling this gap. Moreover, this paper links decisions concerning cooperation and privatisation, which is a new step in the literature.

The paper undertakes an empirical analysis of the determinants of the decisions to privatise and cooperate in the provision of solid waste services using data from 92 municipalities in the region of Aragon (Spain) for 2008. The defining characteristic of the municipalities of this region is their very small population size. Here cooperation is centred on supra-municipal bodies that share the costs of co-ordination and transaction among a group of municipalities. Therefore, this study focuses its attention on the use of intermunicipal cooperation compared to the privatisation of the provision of solid waste services as instruments for reorganising the service in smaller municipalities. It is this that constitutes the main contribution of our paper.

The rest of the paper is organised as follows. We first review previous studies of the factors accounting for local privatisation, which provide us with a frame of reference for the analysis of the decision to cooperate. Next, we specify the empirical model adopted in studying the determinants of the decision to privatise and cooperate in the provision of solid waste services. We then list the sources and main characteristics of the data for the sample of municipalities that make up our study. In the next section, we present our empirical results, emphasising the differences in the factors that account for the decision to cooperate as opposed to the decision to privatise. Finally, we summarise the main conclusions arising from our empirical work.

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[1] Note that intermunicipal cooperation differs from the intermunicipal agreements typical of the United States, since in the latter case the agreement is usually a contract assigning responsibility for the service to just one of the municipalities (Holzer and Fry, 2011). As such, the system operated might be seen as intermunicipal contracting. The factors influencing intermunicipal contracting have been studied for the US (e.g. Warner and Hebdon, 2001), and Hefetz and Warner (2011) emphasize the role it can play in services when competition is low.

2. Intermunicipal cooperation and privatisation: Empirical background

From a theoretical point of view, intermunicipal cooperation could be an alternative when seeking an optimum scale of production for a local service, and thus for achieving scale economies with lower transaction costs. Indeed, by cooperating several municipalities are able to share coordination costs, as well as the transaction costs that arise from entering into contractual agreements when a municipality chooses both cooperation and privatisation. As mentioned above, we are unaware of any previous studies of the factors that might account for cooperation in municipal services, other than Tiller and Jakus (2005), which uses variables related to population size, population density, environmental requirements and landfill-related characteristics to explain the decisions taken by the Tennessee counties.

This section reviews the existing literature on the factors explaining privatisation. This review is useful both for our own empirical analysis of factors determining privatisation as well as for identifying factors that might determine intermunicipal cooperation. In this regard, local governments must make a decision regarding how to deliver local services. The options open to them include public or private production with cooperation, or public or private production with no cooperation. Thus, it is our contention that the explanatory factors that determine the decision whether or not to privatise production of the service should also be taken into account when local governments take their decision to cooperate or not.

There is abundant empirical evidence available concerning the factors that explain a decision to privatise (Bel and Fageda, 2007, 2009). In general, the literature identifies four main factors: fiscal concerns, reasons of efficiency, political motives and those of an ideological nature. One group of studies, focused primarily on the US experience, analyses a range of local services.[2] In this research, the factors that present the most systematic relationship with privatisation are the existence of legal limits on fiscal pressure (positive) and the presence of a large number of public employees (negative).

Other studies focus their attention on individual services, thereby enabling a larger number of control variables to be considered. Additionally, such an approach can provide results which while more general, are more robust, and capture the decision to privatise more appropriately. The first

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[2] They include Ferris (1986); Morgan, Hirlinger and England (1988); Benton and Menzel (1992); Miranda (1994); Greene (1996); Nelson (1997); López de Silanes, Shleifer and Vishny (1997); Kodrzycki (1998); Warner and Hebdon (2001); Warner and Hefetz (2002a); Levin and Tadelis (2010).

studies of single services examined the US experience.[3] In the last decade multivariate analyses have also been undertaken in Europe, in services such as solid waste management,[4] and water supply.[5] Some studies confirm that demographic factors play an important part in local government decision making (McGuire, Ohsfeldt and van Cott, 1987; Dijkgraaf, Gradus and Melenberg, 2003; Walls, Macauley and Anderson, 2005), while others are unable to make this confirmation (Ferris and Graddy, 1988; Ohlsson, 2003). However, when scale economies are combined with the transaction costs deemed likely as a result of privatisation, there is evidence that privatisation is more probable in services with lower transaction costs (Ménard and Saussier, 2000; Walls, Macauley and Anderson, 2005; Bel and Fageda, 2008).

As for empirical evidence regarding the relationship between fiscal aspects and privatisation, the results are again mixed. Only those of Ferris and Graddy (1988), and to a lesser degree Bel and Fageda (2008), are consistent with the hypothesis that the amount of contracting increases if the fiscal burden does also. Similarly, the results suggest that central government transfers are inversely related with privatisation, given that there is now less emphasis on possible cost savings. This conclusion is suggested in studies by Hirsch (1995), and Dijkgraaf, Gradus and Melenberg (2003).

As for ideological concerns, there is considerable divergence in the results reported to date. Thus, a left-wing ideology presents a negative relationship with the outsourcing of solid waste services in the models of Dubin and Navarro (1988) and Walls, Macauley and Anderson (2005). By contrast, the ideology of elected officials does not appear to be significant for the decision to privatise in the studies of McGuire, Ohsfeldt and van Cott (1987), Hirsch (1995), López de Silanes, Shleifer and Vishny (1997) and Ohlsson (2003). Meanwhile, the results of Bel and Fageda (2008) vary according to the sub-sample of municipalities analysed.

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[3] McGuire, Ohsfeldt and van Cott (1987), Dubin and Navarro (1988), Ferris and Graddy (1988), Stein (1990), Hirsch (1995), and Walls, Macauley and Anderson (2005)

[4] Ohlsson (2003) in Sweden, Dijkgraaf, Gradus and Melenberg (2003) in the Netherlands, and Bel and Miralles (2003), Bel and Fageda (2008) and Bel, Fageda and Mur (2010) in Spain.

[5] Ménard and Saussier (2000) in France, and Miralles (2009), González-Gómez and Guardiola (2009), González-Gómez, Picazo-Tadeo and Guardiola (2011), and Picazo-Tadeo, González-Gómez, Guardiola and Ruiz-Villaverde (2011) in Spain.

Less ambiguous results are obtained in relation to other questions. The empirical evidence suggests that salary differences and union activity are positively associated with privatisation[6] (McGuire, Ohsfeldt and van Cott, 1987; López de Silanes, Shleifer and Vishny, 1997).

The main innovation introduced by the models of Chandler and Feuille (1994), Bel and Miralles (2003), Miralles (2009) and Bel, Fageda and Mur (2010) is that information concerning the explanatory variables is obtained at the time when the local government decides to privatise. Generally, the results obtained in these studies report a positive relationship between service demands or, alternatively, the population of the municipality, and the decision to privatise. However, Miralles' (2009) results suggest that municipalities with larger populations that had better qualified politicians that did not privatise the service in the 1980s, had less interest in privatising at the end of the 90s. Likewise, the models of Bel and Miralles (2003) and Miralles (2009) confirm, in general, that if there has been previous experiences of privatisation in the area, it is more likely that a municipality will opt for outsourcing.

Overall, the results obtained in the many studies examining the factors that account for local privatisation differ widely. As González-Gómez, Picazo-Tadeo and Guardiola (2011) suggest, the reasons leading to the privatisation of a service do not necessarily coincide; that is, the type of service can condition the decision of local governments (Ferris and Graddy, 1988; Nelson, 1997; Joassart-Marcelli and Musso, 2005).

3. An empirical model estimating the determinants of privatisation and cooperation

This section develops an empirical model which includes the determinants of the decision to privatise and/or cooperate in the delivery of solid waste services in Aragon. The public manager will reform (privatise, cooperate) the provision of this service if by so doing it leads to an increase in its utility. Thus, we consider the following function of increased utility of local government i:

$$\Delta U^{i}_{0,1} = f \text{ (COST, FISCAL\_BURDEN, IDEOLOGY)} \qquad (1)$$

where 0, 1 indicates the decision to reform the service provision. The increase (or not) in utility of the local government i of reforming service production will depend on the following group of

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[6] In the model proposed by McGuire, Ohsfeldt and van Cott (1987), when certain variables relating to ideology or population are excluded, salary differences keep the same sign but are not significant. Meanwhile, López de Silanes, Shleifer and Vishny (1997) find that the salary gap has a positive effect on privatisation for the complete sample of services analysed. However, in individual analyses the expected effect and sign are maintained only in health centres, with very uneven results being obtained for the other services.

explanatory factors: costs and the existence of scale economies (COST), the financial restrictions of the municipality (FISCAL_BURDEN) and the ideology of the party which the mayor represents (IDEOLOGY). A more precise description of the estimated models can be given as follows:

- Equation of the determinants of privatisation:

$$PRIVATIZATION_i = \beta_0 + \beta_1 POP_i + \beta_2 POP^2_i + \beta_3 DISP_i + \beta_4 FISCAL\_BURDEN_i +$$
$$+ \beta_5 IDEOLOGY_i + \varepsilon_i \qquad (2)$$

- Equation of the determinants of cooperation:

$$COOPERATION_i = \beta_0 + \beta_1 POP08_i + \beta_2 POP08^2_i + \beta_3 DISP_i + \beta_4 FISCAL\_BURDEN08_i +$$
$$+ \beta_5 IDEOLOGY08_i + \varepsilon_i \qquad (3)$$

The dependent variables in these two equations are as follows. In equation (2), $PRIVATIZATION_i$ is a dummy variable which takes the value 1 if the municipality has outsourced production of the service to a private company during the period analysed, and the value 0 if the municipality maintains public production at the end of the period. The public option includes direct municipal management and production through a publicly owned company. In equation (3), $COOPERATION_i$ is a dummy variable which takes the value 1 if the municipality has decided to cooperate with other municipalities during the period analysed, and the value 0 if the municipality does not cooperate at the end of the period.

Adhering to the previous literature on the factors that explain privatisation, we consider the following variables both for the decision to privatise or to cooperate: variables relating to costs and scale economies (through the population served, *POP* and *POP²*), to the complexity of providing the service (through the dispersion of the population, *DISP*), fiscal burden (financial burden of local governments, *FISCAL_BURDEN*) and ideological variables (mayor's political party, *IDEOLOGY*).

The period analysed begins in 1979, the year in which municipal democracy was restored in Spain, and ends in 2008[7]. Thus, in 1979 all the municipalities in the sample delivered the service under a system of public ownership[8]. In analysing the decision to privatise, the explanatory variables were included at the moment the decision was taken (and if production remains public,

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[7] The reason for selecting 1979 as the start of our period is that decisions taken during the Franco dictatorship could skew the analysis of explanatory factors, especially political factors, as these decisions to privatise were not made in a democratic context. Consequently, going back to earlier years would introduce serious distortions in our analysis. Meanwhile, 2008 is the target year for which information was requested in our research.

[8] This fact meant eliminating estimations for municipalities which had outsourced the service before 1979. Specifically, the municipalities where observations were excluded are Cella (1977), Épila (1965), Fraga (1970), Tarazona (1962) and Zaragoza (1942).

the data refer to 2008). By contrast, in our analysis of cooperation, 2008 data are used for all the explanatory variables, since we do not know the year in which the decision was taken to cooperate with other municipalities.

Below, we list the expected effects of each of the explanatory variables on the decision to privatise and cooperate:

a) *Total population of the municipality* (*POP, POP08*). To calculate the possible effect that the demand for a local service can have on the decision to reform the provision of that service we used the population and the square of the population.

Based on our review of the empirical literature, smaller municipalities may privatise more frequently because they can obtain significant cost savings if the firm that delivers the service can aggregate the production of several municipalities (Hirsch, 1995; Dijkgraaf, Gradus and Melenberg, 2003).

By contrast, the largest municipalities can exploit scale economies with public production and, thus, they have less need to privatise (Warner and Hefetz, 2002a; Bel and Miralles, 2003).
 However, small municipalities may incur higher costs when contracting services. Indeed, contracting the delivery of the service to an external firm may lead to transaction costs derived from designing and supervising the contracts. These transaction costs might exceed the possible cost savings derived from the exploitation of scale economies and, therefore, they may privatise less frequently (Bel and Miralles, 2003). Consequently, the expected effect for the coefficient associated with this variable is ambiguous.

In the case of cooperation, the small size of Aragonese municipalities makes the provision of solid waste services more difficult, so they may opt for intermunicipal cooperation through supramunicipal entities (comarcas). By cooperating, they may attain an optimum scale of production for the service and, thus, they may take advantage of scale economies with greatly reduced transaction costs. By contrast, there is less possibility of achieving scale economies through cooperation in the largest municipalities. Consequently, the expected effect for the coefficient associated with this variable is negative. For municipalities with larger populations, the expected effect of additional population increases must be diluted, so that the coefficient associated with the variable of the square of the population may take a positive sign.

b) *Municipal dispersion* (*DISP).* This variable was constructed as the number of population centres within a municipality.

Greater municipal dispersion increases the complexity of the service and this can lead to higher costs. In these circumstances, municipalities may be more interested in privatising the service (Bel and Miralles, 2003) or in cooperating.

However, greater municipal dispersion also makes local government supervision more complex. Indeed, greater dispersion makes it considerably more difficult to ensure that the service is provided properly. This could induce the local government to maintain the production of the service within its own administrative district. Thus, the expected effect of the variable of dispersion on the likelihood of privatisation and also cooperation is *a priori* ambiguous.

c) *Index of financial burden* (*FISCAL_BURDEN*, FISCAL_BURDE08). We constructed this variable as the quotient between the costs of the debt (interest plus amortisation) and revenue. The financial difficulties of a municipality can be a decisive factor in the privatisation of local services, especially in small municipalities, as this privatisation can lead to reduced costs.

Apart from the exploitation of scale economies, comarcas (the supramunicipal entities in charge of cooperation) can reduce co-ordination and transaction costs as they can be distributed among the different services the comarca provides co-operatively. In a context of financial difficulties, locals governments can also opt to cooperate to reduce costs.

Thus, the expected effect of the variable of fiscal burden on the likelihood of privatisation or cooperation is *a priori* positive.

d) *Ideology of local politicians* (*IDEOLOGY, IDEOLOGY08*). This is a qualitative variable taking the value 1 if the political ideology of the mayor is right-wing, and the value 0 if the mayor's political ideology is left-wing.

The question we are trying to capture with this variable is if local politicians taking the decision to privatise can be influenced by ideological criteria. Left-wing parties are normally associated with public values and, thus, governments with this ideology would tend to be associated with greater public production. By contrast, right-wing governments tend to be associated with private production. Consequently, if the ideological stance of the local government plays a role in the contracting decision, we would expect this variable to be positive.

We also seek to show whether local politicians who decide to cooperate can be influenced by ideological criteria. If the ideological stance of local governments plays a role in the decision to

cooperate, the coefficient would be statistically significant, although whether it would have a positive or negative sign is ambiguous. Insofar as the decision to cooperate can be seen as a pragmatic one, the expected effect for the coefficient associated with this variable in the case of the equation of determinants of cooperation is not clear.

The variables used and their expected signs are summarised in Table 1. It should be pointed out that while the expected sign of the relationship between population size and the decision to cooperate is clear, this relationship is more ambiguous in the case of the decision to privatise. Thus, in the case that the probability of co-operating diminishes with population size, while the probability of privatising increases with population size, we would be obtaining certain evidence that small municipalities obtain greater advantages from cooperation but not from privatisation.

Table 1. Expected effects of the explanatory variables on factors explaining privatisation and/or cooperation

	Expected effect	
Independent variables	**Dependent Variable: PROD**	**Dependent Variable: TITU**
POP/POP08	Undetermined	-
$POP^2/POP08^2$	Undetermined	+
DISP	Undetermined	Undetermined
FISCAL_BURDEN/FISCAL_BURDEN08	+	+
IDEOLOGY/IDEOLOGY08	+	Undetermined

4. Data

The data used in the empirical analysis were obtained from a survey sent out to Aragonese municipalities with more than 1000 inhabitants. Table 2 presents the general characteristics of the sample obtained. The information obtained refers to 2008. The survey provides information for a sample of 98 municipalities, representing 84% of the municipalities with more than 1000 inhabitants. Information is available for all the municipalities with 2000 or more inhabitants. If we analyse the degree of representativeness of the sample according to the overall population, the coverage is nearly 98% of the population of the municipalities in this population range.

Table 2. Representativeness of the information on urban solid waste

Municipalities included in the analysis (> 1000 inhabitants)				
Nº inhabitants	1,001-2,000	2,001-5,000	5,001-10,000	> 10,000	Total > 1000
Nº municipalities	38	39	8	13	98
% of the total	69.10%	95.12%	100%	100%	83.76%
Population	49,828	125,212	62,335	906,234	1,143,609
% of the total	70.25%	96.11%	100%	100%	97.76%
Total municipalities of Aragon (> 1000 inhabitants) and population (2008)				
Nº inhabitants	1,001-2,000	2,001-5,000	5,001-10,000	> 10,000	Total > 1000
Nº municipalities	55	41	8	13	117
Population	70,925	130,278	62,335	906,234	1,169,772

Source: Author' own, based on the survey, and *Instituto Aragonés de Estadística*.

The degree of private production in the municipalities of Aragón has remained very stable. In 2008, the solid waste service was delivered by private companies in about 60% of municipalities and for 80% of the population. These are very similar percentages – almost identical – to those recorded in previous surveys and studies by the same authors for 2003. By contrast, as seen in Table 3, over the last five years intermunicipal cooperation has increased; practised by 82% of municipalities in 2003, it had become the chosen form of delivery of 88% in 2008. At present, in the municipalities with between 1,001 to 2,000 inhabitants cooperation has reached a maximum level, diminishing thereafter as the population of the municipality increases.

Table 3. Intermunicipal cooperation in the USW service. Aragon (2003, 2008)

	Cooperating	
Size of municipality	2003	2008
Municipalities with 1,001-2,000 inhabitants	85.71	94.74
Municipalities with 2,001-5,000 inhabitants	88.57	89.74
Municipalities with 5,001-10,000 inhabitants	87.50	87.50
More than 10,000 inhabitants	41.66	53.85
Total municipalities *	82.00	88.00

Note: * Total results have been adjusted to correct the bias due to differences in the representation of the municipalities of the sample.

Source: Author's own, based on the survey.

Table 4 divides the sample into municipalities that cooperate and those that do not, and compares the frequencies of each form of production in each segment of municipalities between 2003 and 2008. In 2008, unlike 2003, the municipalities that do not cooperate present a slightly higher frequency of private production than those that cooperate. On the other hand, pure public production (public company + direct public management) is more frequent in municipalities with intermunicipal cooperation. Meanwhile, in 2008, 86% of private

municipalities and 89% of public ones cooperated in the production of the service, compared to 82% and 78%, respectively, in 2003. Overall, intermunicipal cooperation is highly widespread in Aragón and is compatible with all forms of production.

Table 4. Intermunicipal cooperation and form of production in Aragón, municipalities above 1,000 inhabitants (2003, 2008) (in %)

	Solid urban waste					
	Intermunicipal Cooperation		Municipal		Total	
Form of production	2003	2008	2003	2008	2003	2008
Private	65.6	62.4	60.0	69.2	64.5	63.2
Public company	8.2	18.8	6.7	15.4	7.9	18.4
Direct public	26.2	18.8	33.3	15.4	27.6	18.4
Total municipalities	100.0	100.0	100.0	100.00	100.0	100.0

Note: The results have not been corrected for bias. They are presented in a homogeneous form.

Source: Author's own, based on the survey for 2008. Data for 2003 in Mur (2008).

As mentioned above, to estimate the factors which might have influenced the decision to privatise, the explanatory variables were included at the time of making that decision, or in previous years. By contrast, when analysing cooperation, the 2008 data were used for all the explanatory variables, as we do not have information regarding the year in which it was decided to cooperate with other municipalities.

The municipal population data were provided by the *Instituto Nacional de Estadística* (http://www.ine.es). For municipalities that retained the public delivery of the service throughout the 1979-2008 period, the population recorded at the 2008 census is given. However, for municipalities which privatised the service, the population figure included is that taken from the census conduced nearest to the first year of outsourcing. In the case of the decision to cooperate, the data for the population variable refer always to 2008.

The information regarding municipal dispersion is published on the website of the *Instituto Aragonés de Estadística* (http://portal.aragon.es). In this case, all information corresponds to the year 2008. The information needed to calculate the municipal financial burden and to ascertain the mayor's political party were gathered from the website of the Government of Aragón (http://servicios.aragon.es/portalAALL/home.do).

To take into consideration the possible effects of municipal financial restrictions on the decision to privatise, we considered the municipal budget for the year immediately before the service was outsourced. For municipalities with direct municipal management the budgets for 2008 were considered. In the case of the decision to cooperate, the data for the corresponding explanatory variable refer to 2008.

The ideological variable is specified as a qualitative variable taking the value 1 if in the year of privatisation the political ideology of the mayor was right-wing, and the value 0 if it was left-wing[9]. Meanwhile, for municipalities which retained public production at the end of the period, the variable takes the value 1 if during the period analysed the ideology of local politicians was mainly right-wing, and the value 0 if not. This variable is specified in the decision to cooperate as a qualitative variable taking the value 1 if the political ideology of the mayor was right-wing, and the value 0 if it was left-wing.

Tables 5 and 6 present the descriptive statistics for the variables of the model of the equation for privatising and co-operating, respectively.

Table 5. Descriptive statistics for the variables of the model of determinants of privatisation

Continuous variables	Mean	Standard deviation	Minimum	Maximum	N
POP	4454.8	7140.2	752	51117	92
DISP	3.6	5.1	1	33	92
FISCAL_BURDEN	2.9	8.7	0	61.5	92
Discrete variables	**Number observations 1**	**Number observations 0**	**N**		
PRIV. (Private production=1; public=0)	56	36	92		
IDEO. (Mayor is right-wing=1; left-wing= 0)	48	44	92		

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[9] We considered the mayor's political affiliation to be left-wing if he or she belonged to Partido Socialista Obrero Español (PSOE), Izquierda Unida (IU) or *Chunta Aragonesista* and right-wing if he or she belonged to Unión de Centro Democrático (UCD), Partido Popular (PP, formerly Alianza Popular) or Partido Aragonés (PAR).

Table 6. Descriptive statistics for the variables of the model of determinants of cooperation

Continuous variables	Mean	Standard deviation	Minimum	Maximum	N
POP08	4767.9	7235.1	752	51117	92
DISP	3.6	5.1	1	33	92
FISCAL_BURDEN 08	0.6	2.4	0	17.19	92
Discrete variables		**Number observations 1**	**Number observations 0**	**N**	
IDEO. 08 (Mayor is right-wing=1; left-wing= 0)		22	70	92	
COOP. (Municipal cooperation=1; no cooperation=0)		81	11	92	

5. Results

Tables 7 and 8 show the results of the estimation of the determinants of privatisation and cooperation, respectively. Column 1 shows the coefficients obtained from the estimation, while column 2 shows the change in the probability of the event (privatisation, cooperation) taking place when the explanatory variable in question shifts from its minimum to maximum value, assuming that all the other explanatory variables remain constant.

A binary probit was used as the estimation technique as the dependent variables are dummies taking the value 1 (when a municipality decides to privatise or cooperate) and 0 when service provision is not reformed. The standard errors are robust to any problem of heteroscedasticity and any possible correlation between observations in the same province is taken into account by the execution of clusters by province.

As for the decision to privatise, evidence was found to indicate that the size of the municipality will substantially influence the probability of privatising service provision. Specifically, the larger the municipality, the greater is the probability that the local government will enter into contractual agreements with external firms to provide the service. This is shown by the coefficient - positive and significant at the 1% level - of the variable associated with the municipality's population.

However, this is a decreasing relationship as the coefficient associated with the population squared variable is negative and also statistically significant at the 1% level. From this, we derive that privatisation is most frequent in mid-sized municipalities. In such municipalities, the use of contracts with external firms can enable scale economies to be exploited, while at the same time covering the transaction costs that arise from having to design and supervise contracts with

external agents. It must be borne in mind, however, that the sample of municipalities considered here refers to municipalities with low populations in general.

Indeed, the effect in terms of the change in probability associated with the population variables is very high, reaching values above 80%. As we might expect, the coefficient associated with the population variable is negative and statistically significant at the 1% level in the equation of determinants of cooperation. And the effect on the change of probabilities is very high, nearly 100%.

Thus, we can confirm that small municipalities need to cooperate with other municipalities in order to reduce the costs of providing the service. The need to exploit scale economies, which is not possible for small municipalities, may be one of the main factors driving the decision to cooperate. The coefficient associated with the population squared variable is positive and statistically significant at the 1% level but its effect in terms of the change in probabilities is modest. For municipalities with a relatively high population threshold, this variable is probably capturing the possibility that the exploitation of scale economies has less influence on the decision whether to cooperate.

To summarise, mid-sized municipalities appear to derive the greatest advantages from privatisation, while cooperation appears to be most beneficial for small municipalities. Cooperation allows the problems of competition and the transaction costs that can arise with privatisation, and to which small municipalities are particularly sensitive, to be avoided.

Table 7. Empirical results of the estimation of determinants of privatisation (probit)

	Coefficient	Change in probability
Constant	-0.22 (1.51)	-
POP	0.0004 (0.00011)***	83.91%
POP^2	-2.60e-08 (8.32e-09)***	83.71%
DISP	-0.10 (0.05)**	49.64%
FISCAL_BURDEN	0.04 (0.03)	47.88%
IDEOLOGY	0.45 (0.69)	11.39%
Pseudo R^2	0.14	
Test χ^2	9.86	
Log-pseudolikelihood	-52.74	
N	92	

Note 1: Column (3) shows the change in probability of deciding to privatise when the explanatory variable in question shifts from the minimum to the maximum value (from 0 to 1 if it is a dummy), with the other variables remaining constant.
Note 2: *** indicates significant at the level of 1%; ** indicates significant at the level of 5%; * indicates significant at the level of 10%.

Note 3: In brackets, standard errors robust to heteroscedasticity and applying clusters by province.

Table 8. Empirical results of the estimation of determinants of cooperation (probit)

	Coefficient	Change in probability
Constant	3.61 (0,54)***	-
POP08	-0.00030 (0.00009)***	-97.77%
POP08^2	5.38e-09 (1.34e-09)***	9.92%
DISP	-0.06 (0.03)*	22.81%
FISCAL_BURDEN08	0.63 (0.13)***	10.14%
IDEOLOGY08	- 0.92 (0.22)***	7.41%
Pseudo R^2	0.22	
Test χ^2	14.74***	
Log-pseudolikelihood	-26.03	
N	92	

Note 1: Column (3) shows the change in probability of deciding to cooperate when the explanatory variable in question shifts from the minimum to the maximum value (from 0 to 1 if it is a dummy), with the other variables remaining constant.
Note 2: *** indicates significant at the level of 1%; ** indicates significant at the level of 5%; * indicates significant at the level of 10%.

Note 3: In brackets, standard errors robust to heteroscedasticity and applying clusters by province.

On the other hand, the more dispersed a municipality, the lower is the probability that the municipality will outsource the service. Indeed, the coefficient associated with the variable of dispersion is negative and statistically significant at the 5% level. The effect in terms of probabilities is also substantial, at around 50%. From this result we derive that, in small municipalities, the negative effect derived from the greater complexity of supervising the quality of the service can be greater than the positive effect derived from the greater complexity associated with costs.

The coefficient of the municipal dispersion variable is negative and statistically significant at the 10% level in the equation of determinants of cooperation. This suggests that greater municipal dispersion can provide greater incentives to maintaining the service production under the local administration, given the difficulties involved in supervising the quality of the service. The effect of this variable in terms of the change in probabilities is quite substantial at around 23%.

In relation to the decision to privatise, the coefficients of the variables capturing the effect of the financial burden of the local government and the political affiliation of the mayor are not statistically significant, although the sign is positive, as might be expected. The effect in terms of the change in probabilities is important when the analysis refers to the financial burden variable. This may indicate that the mean effect of the variable is relevant, but that this relevance is greatly dispersed among the different municipalities in the sample.

As for cooperation, the coefficient associated with the financial burden variable is positive and statistically significant at the 1% level, although the effect in terms of the change in probabilities is relatively modest, at around 10%. This suggests that the municipalities with financial difficulties

may have an incentive to cut costs, and a possible strategy for containing costs may involve co-operating with other municipalities in delivering the service.

Although the cost factors seem to be the main determinants of the decision to cooperate or otherwise, we find evidence that municipalities with right-wing mayors tend to cooperate less. In fact, the coefficient associated with the dummy variable for right-wing mayors is negative and statistically significant at 1%. However, it should be taken into account that the effect in terms of the change in probabilities is less than 8%. Thus, the effect of this variable is relevant from the statistical point of view but not from the economic point of view. To summarise, the fact that cooperation within the Aragonese comarcas has been driven by the laws and regulations of regional institutions with a majority of left-wing parties may well contribute to understanding why municipalities governed by right-wing mayors are more reluctant to participate in co-operative formulas.

6. Conclusion

This study has analysed the factors that explain why small municipalities decide whether to privatise and/or cooperate in the delivery of a service. In carrying out our empirical analysis we designed and conducted a survey of the Aragonese municipalities with more than 1000 inhabitants, thus obtaining information that could further our analysis and that was valuable for providing substantiated results.

As regards the factors leading to the decision to privatise the service, our evidence is very much in line with the most frequently reported results in the literature. Specifically, an inverted U was obtained for the relationship between privatisation and municipality size, with privatisation being more likely in medium-sized municipalities. By contrast, the more dispersed a municipality, the lower the probability that the municipality chose to outsource the service. From this result we conclude that, in small municipalities, the negative effect derived from the greater complexity of supervising the quality of the service can be greater than the positive effect derived from the greater complexity associated with costs. The coefficients of the variables capturing the effect of the local government's financial burden and the political affiliation of the mayor are not statistically significant although the sign is positive, as might be expected.

More interesting, due to its novelty, is the analysis of the factors explaining the decision to cooperate, which as far as we know has no antecedents in the literature. The results of the

empirical analysis confirm that small municipalities need to cooperate with other municipalities so as to reduce the costs of providing the service. The need to exploit scale economies, which is not possible for small municipalities individually, may be one of the main factors driving the decision to cooperate.

Furthermore, our analysis of the determinants of cooperation show that greater municipal dispersion can stimulate service production by the municipal administration, due to the greater difficulties faced in supervising the quality of the service. Similarly, municipalities with financial difficulties may be motivated to reduce costs, and one possible strategy is to cooperate with other municipalities in providing the service. Finally, it should be noted that right-wing mayors are more reluctant to cooperate, probably reflecting a reaction to the fact that this policy has been driven by supramunicipal institutions in which left-wing parties hold a majority.

Cost considerations seem to be particularly influential in the decision of local governments to privatise or cooperate in the delivery of solid waste collection. Our analysis shows that small municipalities prefer to cooperate so as to reduce costs, while larger municipalities prefer to privatise the delivery of the service. Hence, the clear policy implication of our work is that intermunicipal cooperation, as opposed to privatisation, may well be an optimal solution for the delivery of services by local governments in small municipalities. Municipalities of this type have to face problems of lack of competition and high transaction costs, while facing the need to exploit scale economies. By cooperating, scale economies can be achieved with lower transaction costs and fewer concerns for competition than is the case via private production.

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