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ABSTRACT *Mixed public–private firms are increasingly used in several European countries. This paper makes use of survey data from Spanish municipalities to examine the motivations of local governments for engaging in partial privatisation of local service delivery of water distribution and solid waste collection. The empirical analysis indicates that mixed firms emerge as a pragmatic middle way between purely public and purely private production. Indeed, local governments make use of mixed firms when cost considerations, financial constraints and private interests exert contradictory pressures. Political and ideological factors play no significant role in that decision.*

KEY WORDS: Privatisation, contracting-out, mixed public–private, local government

Introduction

A large amount of research, theoretical as well as empirical, has analysed why local governments choose to privatise public services or, instead, stick with public delivery. Bel and Fageda (2007) offer a recent and wide review of this literature. The standard framework of analysis has focused on the choice between public production and privatisation/contracting out. However, Warner and Hebdon (2001) and Bel, Hebdon and Warner (2007) emphasise that privatisation is not the sole available option for the reform of local services, and Hefetz and Warner (2007) argue that analysis must move beyond the either/or dichotomy of public versus private production. Hence, more attention must be paid to the fact that local government contracting is a complex management process, which combines transactions costs, managerial concerns, and social choice issues.

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There is an increasing interest in analysing reforms other than strict privatisation and contracting out. Thus, Warner and Hefetz (2008) show significant growth in mixed delivery modes in the US since 1997. Mixed delivery in the US implies that a municipality is divided into several service districts, and purely public delivery is used in one or more districts while purely private production is used in another district or other districts within the same municipality.[1] Another interesting study of reform outside the 'public or private decision' is that by Tavares and Camões (2007). These authors ask why Portuguese municipalities decided to reform bureaucratic delivery by creating municipal corporations, single function entities that have independent corporate status. Even though delivery remains purely public, municipal corporations enjoy more discretion in employment and financial operations and have the right to own property. Because of this, they enjoy more flexibility in organising the delivery of services.

In this paper we examine yet another strategy. Instead of focusing on pure delivery forms (public or private), we analyse the motivations that influence partial privatisation of local services by means of mixed public–private firms. Mixed public–private firms are organisational forms that escape the purely public/purely private dichotomy. Their ownership is divided between the government and the private sector, and they operate exclusively under private commercial law. We want to make clear that our study does not consider other production forms that move beyond the public/private dichotomy, such as non-for-profit organisations, which are widely discussed as emerging hybrid organisational forms in countries like the US. Not-for-profit organisations are never used in Spain for delivery of local services such as solid waste collection or water distribution.[2]

In Spain, the private partners tend to be large firms with an established reputation for delivery of the particular local service. The government retains some degree of control in the firm, while day-to-day operations are usually conducted by the private partner. This allows less costly monitoring, thus reducing transaction costs. In many cases, the local government holds a majority of the shares. Mixed public–private firms play a significant role in the delivery of local services in Spain (Bel, 2006; Warner & Bel, 2008) and other European countries. Bognetti and Robotti (2007) explain the legal status of mixed firms in Italy,[3] discuss the pros and cons of mixed firms regarding efficiency and performance, and find that 14 per cent of local public utilities in Italy are mixed public–private firms.

Mixed public–private firms in Italy are organisationally similar to those we are studying in Spain, but other types of mixed firms are not. For instance, in Italy Bognetti and Robotti (2007) include public–public mixed enterprises, where there are several owners and all of them are public entities. Such mixed public–public firms represent 13 per cent of public utilities in Italy. This type of multi-government firm is not a partial privatisation, and is, therefore, outside our main object of study. Multi-government firms exist in other countries and have been studied in The

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Netherlands (Dijkgraaf & Gradus, 2008a, 2008b) and Norway (Sørensen, 2007). Indeed, in these studies multi-government firms are usually considered a type of public firm. In the same way, it is important to recall that mixed public–private arrangements in the US usually have both purely private firms and purely public units delivering the service within one jurisdiction.[4] Hence, it is not a form of partial privatisation comparable to the partially privatised firms we find in Spain.

The empirical literature on partial privatisation of firms providing local services is scant. With this paper we intend to contribute to the literature by providing an empirical multivariate analysis of the factors that explain partial privatisation: that is, the decision to choose to use a mixed public–private firm to deliver the service, instead of choosing pure production forms – either public or private. From our analysis we find that partial privatisation appears to be more frequent when the factors leading to privatisation (such as cost structure considerations, financial restrictions or private interests, among others) exert contradictory pressures. In this way, partial privatisation seems to emerge as a pragmatic choice between purely public and purely private production choices. In addition to this, mixed public–private firms are positively related to intermunicipal cooperation, which suggests that the desire to take advantage of economies of scale can be another factor leading to partial privatisation.

The rest of the paper is organised as follows. In the second section we review the theoretical literature seeking to explain local government choices concerning forms of service delivery, since this is the framework most useful to the analysis of partial privatisation. In the third section we characterise the organisation of the markets for solid waste collection and water distribution in Spain, since these provide the fields within which we conduct our empirical analysis. In the fourth section we explain our empirical strategy, and in the last section we discuss the results obtained from our estimations. Finally, we draw the main conclusions from our analysis.

Factors Explaining Local Governments' Delivery Choices: Theoretical Background

Under partial privatisation, municipal or supra-municipal governments enter into long-term contracts with private firms through jointly owned firms. Using mixed firms strongly differs from long-term contracts with totally private firms in several important aspects. Key among those differences is the fact that governments can exert control through property rights (in addition to regulatory tools) over the mixed firms. Even if these firms are managed independently of government, the latter maintains a voice in deciding the objectives to be pursued by the firm. Furthermore, government participation on the governing boards of the mixed firms help to reduce the problems resulting from long-term incomplete contracts.

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Based on the theoretical literature on partial privatisation and on the relationship between partial private ownership and managers' choices (e.g. Matsumura, 1998; Matsumura & Kanda, 2005), managers of mixed firms under effective control of local government are expected to give more weight to the objectives of local government and give less weight to profit maximisation. In a similar fashion, Schmitz (2000) shows that partial privatisation may result in an optimal combination of incentives for reducing costs and improving quality in comparison with pure production forms (either public or private).

Several theoretical approaches have been developed in relation to the choice of a production form for local services. Public Choice was the first approach used to comprehensively analyse delivery choices within the domain of public services, and according to this theory, overproduction and inefficiency will be the outcome when politicians and bureaucrats monopolise public services delivery (Niskanen, 1971). Two basic hypotheses that emerge from this approach are that contracting out by local governments improves technical efficiency in the production of the service and also provides lower costs in the service delivery.

The influence of cost considerations in the delivery choices of governments has also been the central issue for another group of privatisation theories that focuses on transaction costs. When deciding whether to make or buy a service, administrative costs and costs from incomplete contracts are important (Williamson, 1979, 1999), and a core role is played by factors such as monitoring and control (Sappington & Stiglitz, 1987). From these theoretical approaches, a core hypothesis emerges: when the transaction costs involved are huge, privatisation is unlikely to deliver cost savings and improved performance. Hence, conditions like asset specificity or difficulty of performance monitoring are central in determining when a local service can be successfully privatised (Brown & Potoski, 2003), because such conditions can make transaction costs prohibitive.

Property rights theory[5] provides another important approach. The theory of incomplete contracts (Grossman & Hart, 1986; Hart & Moore, 1990) offers a useful analytical framework in situations where contracting is a complex operation. Hart, Shleifer and Vishny (1997) suggest that the manager of a private firm producing public services has incentives to reduce costs, but he/she has no concern for quality erosion. Hence, a trade-off between costs savings and service quality is likely to emerge. Privatisation is likely to reduce costs, but it can also result in a lower quality of service. In this theoretical setting, Schmitz (2000) shows that partial privatisation may imply better incentives to reduce costs in comparison to purely public production, while also bringing better incentives to improve quality in comparison to purely private production.

Based on these theoretical approaches, several hypotheses have been raised in the literature dealing with factors that influence local privatisation. These hypotheses can be grouped into two economic and two political

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families (Bel & Fageda, 2007). On the economic side, administrations may be inspired by some combination of fiscal restrictions and anticipated lower costs. Since the 1980s, fiscal motivations have been fed by two major restrictions on local finance working simultaneously. On the one hand, local political environments have reduced the ability to raise revenues; on the other, supra-local restrictions have limited transfers from other administrative areas. Because of this, most studies of privatisation include fiscal variables designed to measure the effects of such restrictions, the usual hypothesis proposing a positive relation between fiscal constraints and privatisation.

Still on the economic side, but now looking at costs, emphasis has been put on the fact that contracting out introduces competition where there is a public monopoly (Savas, 1987) and, by breaking that monopoly, should result in lower costs. A different approach emphasises that cost savings from privatisation can be achieved by exploiting economies of scale when the public service has been delivered within a suboptimal jurisdiction (Donahue, 1989).

On the political side, policy makers can be moved by the desire to win the support of key interest groups, or by loyalty to an ideology. Within a democratic environment, two main motivations guide politicians in their decisions. On one side, politicians seek to win elections and control government. On the other, according to their ideological leanings, politicians have preferences for some policies over others. This dual dimension of politicians within a democratic environment has been named the *citizen-candidate* approach, following theoretical works by Osborne and Slivinski (1996), and Besley and Coate (1997). Within the domain of political interests, the decision to privatise is dependent on the existence of pressure groups (such as industrial interests or trade unions) having a particular interest in the proceeds of a given form of service delivery. Ideology may also influence privatisation: progressive parties have been linked to more pro-public values (hence, more public production), whereas conservative parties are associated with more a pro-private business orientation (hence, more privatisation).

All in all, the hypotheses most commonly analysed in the literature examining the motivations behind the privatisation of local services can be summarised as follows (Bel & Fageda, 2007): a) fiscal constraints should be positively associated with privatisation; b) private production can be encouraged by the desire to reduce costs, either through competition or by exploiting scale economies; c) the relative strength of different interest groups, such as unions or industrial business, should influence local government privatisation decisions; d) progressive governments will be more reluctant to privatise local services, while conservative governments will be more prone to privatisation.

Our main hypothesis is that partial privatisation will be more frequent when those factors leading to privatisation (such as cost structure

considerations, financial restrictions or private interests, among others) exert contradictory pressures. In this situation, partial privatisation may emerge as a pragmatically based 'middle way' between pure public and pure private production choices.

The Organisation of Refuse Collection and Water Distribution in Spain

Spanish municipalities have a legal obligation to provide services for solid waste collection and for water distribution, as established in Law 781/1986 of the Basis for the Local Regime. With regard to the effective delivery of these services, local governments are free to choose between different organisational forms available within the Spanish legal framework. As a result, purely public and purely private production, as well as mixed organisational forms, are all in evidence (Warner & Bel, 2008).

Purely public production exists when a public bureaucracy (a government department) or a public agency (a public unit working under public administrative law) produces the service in-house. In both cases, the bureaucracy or the public agency operates under the rules of public administrative law. Still within the framework of public production are public firms, a more sophisticated organisational form also found in Spain, as well as in some other European Union countries, such as Italy (Bognetti & Robotti, 2007), the Netherlands (Dijkgraaf & Gradus, 2007, 2008b), Norway (Sørensen, 2007), Portugal (Tavares & Camões, 2007), and Sweden (Ohlsson, 2003). These government-owned firms are managed and organised under private commercial law rules. In this way, even if public firms are similar to public bureaucracies and agencies in the sense that the government has ultimate control, the managers of a public firm enjoy much greater autonomy, resulting in much more flexibility regarding inputs purchasing, labour organisation, etc. Interestingly, public firms in Spain do not usually compete for contracts outside their own jurisdiction, contrary to what happens in other European countries such as the Netherlands (Dijkgraaf & Gradus, 2007) and Norway (OECD, 2000).

At the other extreme of the public–private continuum, there is purely private production, which implies that a privately owned firm produces the service. A contract defines the relationship between the public administration and the private firm, and management and organisation within the private firm are governed by the rules of private commercial law.[6] Consequently, private firms have much more flexibility than public bureaucracies concerning such key issues in local services as work force organisation, managers' remuneration, etc.

Besides purely public production (here we include public firms as a form of purely public production, since their operation is completely under government control) and purely private production, another type of organisational form is relevant in Spain: mixed public–private firms (referred to henceforth as mixed firms). Ownership of mixed firms is divided

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between the government and the private sector, while operations are carried out under private commercial law. Under partial privatisation, municipal or supra-municipal governments engage in long-term contracts with private firms through joint ventures (Bel, 2006; Warner & Bel, 2008). Spanish mixed firms do not compete for contracts outside their own jurisdictions, as is common in Italy (Bognetti & Robotti, 2007).

In many cases the government retains a controlling stake in the firm, and the private partner tends to be a firm with an established position in the market for private delivery of local services. In such cases, however, day-to-day operations are usually conducted by the private partner, with the government retaining some degree of control over strategic decisions. In some cases, local governments hold a small fraction of the shares in a mixed firm. Here the private partner has more control over all decisions regarding the service, and the local government benefits from easier access to information about the service and the firm. This allows reduced monitoring costs, thus reducing overall transaction costs.

Data for the organisation of solid waste collection and water distribution services in Spain has been obtained from the *2nd Survey of the Production of Local Services*, carried out by the research unit Public Policies and Economic Regulation at the University of Barcelona. Detailed information on the survey's methodology and the data gathered from it is available in Bel (2006).

With regard to solid waste collection, in 2003 56 per cent of municipalities with a population of over 2,000 had contracted this out to private firms, which implies that two-thirds of the Spanish population is being served by a private firm (see Table 1), since the average population of municipalities

Table 1. Solid waste collection and water distribution (percentage of concessions and percentage of population), Spain 2003

	Public		Private	Hybrid
	Public bureaucracy	Public firm	Private production (contracts)	Mixed firm
	Percentage of municipalities			
Solid waste collection (adjusted total)	24.2	12.4	56.3	7.0
Water distribution (adjusted total)	27.7	23.9	41.8	6.4
	Percentage of the population served			
Solid waste collection (adjusted total)	14.8	12.4	67.0	5.6
Water distribution (adjusted total)	13.8	34.1	40.2	11.7

Notes: Municipalities with a population of over 2,000.

n = 540 (for solid waste collection), and n = 548 (for water distribution).

Percentages do not add up to 100% because one municipality in solid waste collection and two municipalities in water distribution have public and private production coexisting in the same jurisdiction. This represents 0.1% of municipalities and 0.2% of the population served, for both services.

Source: Based on the University of Barcelona survey (Bel, 2006).

with private production is higher than that of municipalities with public production. Public production (bureaucracy plus public firm) exists in 37 per cent of municipalities, but only a little more than one-quarter of the population is served by public delivery. Finally, seven per cent of municipalities (six per cent of the population) are served by mixed firms.

Concerning water distribution, 42 per cent of municipalities with a population over 2,000 had contracted out solid waste collection to private firms in 2003, which implies that 40 per cent of the Spanish population is being served by a private firm, since the average population of municipalities with private production is close to the mean. Public production (bureaucracy plus public firm) exists in more than 50 per cent of municipalities, but only 48 per cent of the population is served by public delivery. Finally, a little more than six per cent of municipalities are served by mixed firms, but this represents 12 per cent of the population.[7]

All in all, mixed firms have a small, but by no means negligible, share of service delivery in solid waste collection and water distribution. In the case of solid waste collection, mixed firms are used in some large cities such as Málaga, the fifth largest city in Spain, and Las Palmas de Gran Canaria. In both cities, the local government owns 50 per cent of the firm, while the private partner owning the other half is Fomento de Construcciones y Contratas (FCC), the largest private provider of solid waste collection services in Spain. However, mixed firms are particularly important among smaller municipalities, and the percentage of the population served is slightly smaller than the percentage of municipalities (7 per cent).

The opposite happens with water distribution: while the percentage of municipalities served by mixed firms is similar to that in solid waste collection, the percentage of the population served is much larger (12 per cent), since mixed firms (like public firms) are relatively frequent in large municipalities (for instance, 16 per cent of municipalities over 100,000 inhabitants are served by mixed firms).[8] Large municipalities served by mixed firms include Valencia, the third most populous city in Spain, as well as several cities with a population of between 200,000 and 500,000 (Alacant, Elx, Granada, Murcia, and Las Palmas de Gran Canaria). In most cases, the private partner is Aguas de Barcelona (AGBAR), the leading private provider of urban water services in Spain.

To sum up, many municipalities in Spain opt for partially privatised delivery of solid waste collection and water distribution. In this way, they engage in joint ventures with private partners in order to organise the delivery of solid waste collection and water distribution. In doing so, they accept higher coordination costs than would follow from purely public organisations. However, compared to purely private production, these municipalities retain more control and information, even as they give an important role to private partners, thus reducing transaction costs. They relinquish some control over the organisation of the service, but they can enjoy whatever benefits the private partners can provide (managerial

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know-how, economies of scale, state-of-the-art technology, incentives and so on). Next, we analyse what factors lead governments in Spain to partially privatise local services, thus choosing mixed firms instead of a pure organisational form (either public or private).

The Empirical Strategy

The data used in the empirical analysis refers to municipalities larger than 2,000 inhabitants in Spain that responded to the survey mentioned above. Information was obtained from 539 municipalities for solid waste collection and 546 municipalities for water distribution.[9] Note that the equation to estimate considers observations for both local services, so that each municipality in the sample may be part of one or two observations. Information contained in the survey is for 2003 and includes the form of delivery (i.e. purely public production, purely private production, partially privatised production),[10] the level (local or supra-local) at which the service is produced and, if applicable, the year when the service was contracted for the first time.

Data for the size of the population of municipalities in 2003 has been obtained from the Spanish Statistics Institute, while details about the local fiscal burden come from the Ministry of Treasury.[11] The website of the Spanish Ministry of Domestic Affairs provides information for electoral results at the city/town level. Finally, data concerning the strength of industrial interests is available in the 2004 Spanish Economic Yearbook published by La Caixa, a Spanish savings bank.

The empirical model reflects the literature on factors explaining local government's delivery choices. In accordance with the theoretical framework stated in section 2, our empirical model includes several variables that capture economic factors; the demand for local services at the municipal level, fiscal stress, industrial interests and transaction costs. Additionally, the model includes variables that account for political and ideological factors. The equation to estimate takes the following form:

$$Y_i = \alpha + \beta_1 pop_i + \beta_2 pop_i^2 + \beta_3 coop_i + \beta_4 transaction_costs + \beta_5 fiscal_burden_i + \beta_6 industrial_interests_i + \beta_7 mayor_{\mathrm{i}} + \beta_8 ideology_{\mathrm{i}} + \varepsilon_{\mathrm{i}} \quad (1)$$

where Y_i is a dummy variable that takes a value of 1 when a mixed firm produces the service and 0 when a pure organisational form (either public or private) is in charge of the delivery of the service.

We include the following explanatory variables in the equation (1). Variables for population and the square of population of municipalities are considered, *pop* and pop^2. Population is usually used as a proxy for the demand for local services. We expect the relationship between the size of demand and the decision to partially privatise to have an inverse-U shape

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(Bel & Miralles, 2003). Dealing with private partners imposes high transaction costs on small towns, while large cities do not benefit from economies of scale or better managerial capacities, since large cities already operate at the optimal scale and enjoy highly skilled managerial capabilities.

Furthermore, we include a dummy variable that accounts for the use of intermunicipal cooperation to deliver the service, *coop*. This variable takes a value of 1 when the service is produced at the supra-municipal level, while it is 0 when production is municipal. Cooperation may bring several of the benefits of private operations (economies of scale, managerial capacities and so on) while affording low transaction costs and a favourable position in the bargaining process.[12]

It should be remembered that the decision to use mixed firms may result in higher transaction costs in comparison to purely public production but lower transaction costs in comparison to purely private production. Keeping this in mind, each service is associated with different transaction costs, depending on the characteristics of the production process (asset specificity, ease of performance measurement). In this regard, we measure the role of transaction costs through a dummy variable for the service under consideration, *transaction_costs*. This variable takes a value of 1 when the service is water distribution and 0 for solid waste collection.

The transaction costs of contracting out should be higher for water distribution than for solid waste collection, since the former service has strong network features. It should be remembered that the percentage of municipalities that use mixed firms is similar for water distribution and solid waste collection, so that the multivariate analysis will allow us to capture the role of transaction costs given the attributes of municipalities.

Building in indicators ranging from 1 (low specificity, or easy measurement) and 5 (high specificity, and difficult measurement), Brown and Potoski (2005) find water distribution to have an asset specificity of 3.94 and an ease of measurement of 2.44. For residential solid waste collection they find an asset specificity of 3.00 and an ease of measurement of 2.06, while the numbers for commercial waste collection are 3.06 and 1.97 respectively. Working in the same way, Bel (2006) provides evidence that contract terms are longer in water distribution than in solid waste collection. In this regard, note that competition for the market should be more feasible for solid waste collection, while natural monopoly features are clearly present in water distribution. Given the attributes of municipalities, using mixed firms as a sort of partial privatisation policy may be appropriate when dealing with services characterised by high transaction costs and no room for competition.

Equation (1) also includes fiscal burden as an explanatory variable, *fiscal_burden*. According to legal specifications in the Spanish budgetary process, we construct this variable as the sum of the financial expenditures (chapters 3 – interests – and 9 – amortisation – of the expenditures budget) over the sum of the ordinary revenues of the local government (chapters 1

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through 5 of the revenues budget).[13] As we mentioned above, some form of private production in delivering services is more likely when local governments face fiscal constraints. The use of private production may imply either contracting out to private firms or engaging in joint ventures with private partners.

We also take into account the influence of industrial interests on privatisation, *industrial_interests*. This variable reflects industrial activity by measuring the dimension of industrial activity in the city relative to the level in the country as a whole. It is based on an index that measures the city's tax revenues over those of the country as a whole. Here tax revenues refer to local taxes for industrial activities. The expected sign of the coefficient for this variable is not clear. The higher the strength of industrial interests, the higher the pressures are to fully privatise the delivery of the service. Hence, the use of purely private (public) production is more (less) likely when the strength of industrial interests increases, but the effect on the use of mixed firms is ambiguous.

The effects of political and ideological influences are captured by using two distinct variables. First, we consider the political affiliation of the mayor, *mayor*. We construct this variable as a dummy variable that takes a value of 1 when the mayor belongs to a conservative party and 0 when the mayor belongs to a progressive party.[14] Local elections in Spain are based on party lists. The members of the municipal council are elected on a proportional basis. The election of the mayor is indirect: after being elected, municipal council members elect the mayor. An absolute majority of votes from the municipal council members is required to be elected as mayor in the first round. If no candidate obtains such a majority, then the first member of the list that obtained the largest amount of votes in the local election becomes mayor.

Second, we consider the ideological position of the constituency in national elections, *ideology*. We construct this variable by measuring the mean percentage of votes obtained by conservative parties in the national elections of 2000 and 2004. In our view, the ideology of the constituency is reflected in its stance in national elections. This is so especially if we remember that Spain has a parliamentary system, and the prime minister is elected by the national parliament. Hence, national elections are the most ideologically motivated elections in Spain.

Note that the political affiliation of the mayor may differ from the ideology the constituency shows in national elections.[15] In fact, a mayor's affiliation might also depend on the relative strength of interest groups (industrial unions, trade unions, and coalitions at the local level, etc). Although these variables are correlated, they may be capturing different aspects of the decision since they are clearly not identical.[16]

Table 2 summarises how we construct each of the variables used in the empirical model, while table 3 indicates the basic statistics of these variables.

Table 2. Description of variables

Variable	Description
Bivariate dependent variable	Dummy variable (0 = pure production form, 1 = mixed firm)
Multivariate dependent variable	Discrete variable (0 = pure public production, 1 = mixed firm, 2 = pure private production)
Pop	Local population
Pop^2	Square of local population
Coop	Dummy variable (1 = service produced at the supra-municipal level, 0 at the municipal level)
Transaction_costs	Dummy variable (1 = water distribution, 0 = solid waste collection)
Fiscal_burden	Sum of financial expenditures over sum of ordinary revenues of the local government
Industrial_interests	Relative share of industrial activity in the city/town (index based on the tax revenues share of the city over the whole country. Tax revenues refer to local taxes for industrial activities)
Mayor	Dummy variable (1 = mayor belongs to a conservative party, 0 = mayor belongs to a progressive party)
Ideology	Percentage of votes obtained by rigth wing parties in the national elections

Table 3. Basic statistics of variables

Variable	Mean	Standard deviation	Minimum value	Maximum value
Pop	44,713.24	118,757.1	2,033	3,092,759
Coop	0.27	0.44	0	1
Transaction_costs	0.50	0.50	0	1
Fiscal_burden	0.08	0.06	0	0.82
Industrial_interests	0.0025	0.0028	0.00020	0.030
Mayor	0.45	0.49	0	1
Ideology	0.49	0.10	0.18	0.80

Results

Table 4 shows the results of the estimates of the two specifications of equation (1) for both water and waste removal. Note that our sample has a severe imbalance between the number of ones and zeros. Complementary log-log models are frequently used to estimate binary models with unbalanced samples. Unlike logit, the complementary log-log regression is based on a skewed distribution function. Results of estimates in Table 2 are presented using both logit and complementary log-log models. It can be seen that both techniques yield very similar outcomes.

The equation is significant at 1 per cent level, and the pseudo-R^2 is in within the usual range for the empirical literature on local privatisation. We find that all variables capturing economic factors are statistically significant while political and ideological factors do not play any significant role. Thus, we find clear evidence that the use of mixed firms by local governments is based on a very pragmatic approach.

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Table 4. Estimates of the equation of factors explaining the use of mixed firms (binary model)

	Specification (1): logit	Specification (2): Complementary log-log
Pop	5.31e–06 (1.42e–06)***	4.69e–06 (1.18e–06)***
Pop^2	−2.04–12 (5.26e–13)***	−1.80e–12 (4.50e–13)***
Coop	1.28 (0.26)***	1.16 (0.23)***
transaction_costs	0.66 (0.27)**	0.60 (0.25)**
fiscal_burden	2.99 (1.23)**	2.70 (1.01)***
industrial_interests	−153.63 (78.00)**	−148.39 (72.94)**
Mayor	0.39 (0.29)	0.35 (0.26)
Ideology	0.05 (1.22)	0.07 (1.13)
Intercept	−3.75 (0.64)***	−3.67 (0.58)***
N	886	886
Pseudo R^2	0.10	–
χ^2 (joint sig.)	41.19***	48.17***
Log pseudolikelihood	−219.01	−219.44

Note 1: Standard errors in parentheses (robust to heteroskedasticity).
Note 2: Significance at the 1% (***), 5% (**).

Coefficients (sign as well as statistical significance) suggest that governments are more prone to enter into mixed firms when the transaction costs of the service are high (+ sign, which should prevent privatisation), when the financial burden of the local government is high (+ sign, which should promote privatisation), and when local industrial interests are weaker (−sign, which should prevent privatisation). Hence, mixed firms appear more frequently when cost considerations, financial restrictions and private interests exert contradictory pressures.

Indeed, high transaction costs and weak industrial interests prevent the choice of purely private production. Pulling in the opposite direction, financial constraints prevent the choice of purely public production. Mixed firms seem to emerge as a type of pragmatically based 'middle way' between pure public and pure private production.

The sign of the coefficients (and its statistical significance) of variables for population show the expected inverse-U shape relationship between municipality size and the decision to partially privatise service delivery. Hence, medium-sized municipalities seem to use mixed firms more commonly. The use of mixed firms allows such municipalities to obtain more benefits than do the associated transaction costs of dealing with private partners.

Mixed firms are also positively related to inter-municipal cooperation. Engaging in a public–private partnership with an industrial partner requires bargaining power on the part of the government. Large cities engage with private partners to create mixed firms by themselves. On the other hand, the joint power of an authority set up for inter-municipal cooperation increases the bargaining power of small municipalities. Hence, mixed firms are more frequently used by small municipalities engaged in cooperation than among small municipalities that do not cooperate. In this regard, the mean

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Table 5. Distribution of population for municipalities that use mixed firms

	Water distribution			Solid waste collection		
	Municipalities (cooperate)	Municipalities (no cooperate)	T-statistic (average differences)	Municipalities (cooperate)	Municipalities (no cooperate)	T-statistic (average differences)
Number municipalities	20	28		16	9	
Population (Average)	22,458	125,461.1	2.74***	15,003.69	134,397.9	2.51**
Population (Standard deviation)	18,006.99	166,578.5		15,315.46	191,857.5	

Note: Significance at the 1% (***), 5% (**).

Table 6. Estimates of the equation of factors explaining the use of mixed firms (multivariate logit)

	Dependent variable: 0 = pure public production, 1 = mixed firm, 2 = pure private production	
Base outcome = mixed firm	Specification (1): Pure public production	Specification (2): Pure private production
Pop	−3.14e–06 (1.37e–06)**	−1.15e–06 (3.30e–06)
Pop^2	1.45e–12 (5.95e–12)**	−2.10e–11 (1.13e–11)
Coop	−0.64 (0.27)**	−1.90 (0.26)***
Transaction_costs	−0.31 (0.28)	−1.02 (0.28)***
Fiscal_burden	−3.95 (1.54)***	−2.22 (1.30)
Industrial_interests	145.88 (79.99)	163.63 (78.39)**
Mayor	−0.47 (0.30)	−0.28 (0.30)
Ideology	−0.65 (1.28)	0.53 (1.28)
Intercept	2.78 (0.68)***	3.07 (0.66)***
N	886	
Pseudo R^2	0.09	
χ^2 (joint sig.)	127.02***	
Log pseudolikelihood	−721.54	

Note: Significance at the 1% (***), 5% (**).

population of municipalities that use mixed firms is much lower when the service delivery is undertaken at the supra-municipal level, as Table 5 shows.

An alternative approach to modelling local government's choices between pure or mixed organisational forms is to estimate equation (1) with a dependent variable that considers the three different organisational forms. This dependent variable takes a value of 0 when a pure public production form is chosen, it takes a value of 1 when a mixed firm is used, and it takes a value of 2 when private firms are in charge of the service delivery. Given the multivariate but discrete nature of the dependent variable, this equation must be estimated using a multinomial logit model.

Results of the estimates of the multinomial logit model are presented in Table 6. The sign of coefficients in specification 1 must be interpreted as the influence (positive or negative) of the associated variable on the likelihood of choosing purely public production over mixed firms, and those signs in specification 2 as the influence of the corresponding variables on the likelihood of choosing purely private production over mixed firms.

Results from Table 6 indicate that the choices faced by local governments concerning mixed firms move beyond the dilemma between purely public and purely private production. It seems that those choices are more related to the dilemma between pure or mixed organisational forms. Most coefficients of the explanatory variables have the same sign when one considers public or private production in relation to mixed firms.

As in the bivariate model, the main finding is that variables capturing economic factors tend to be statistically significant, while political and ideological factors are not influential. Mixed firms are chosen more

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frequently when municipalities cooperate (– sign for public production as well as for private production).

When fiscal constraints are tighter, mixed production is preferred over both public production (– sign for public production) and private production (– sign for private production). In the latter, however, the significance of the coefficient is much lower. Note that fiscal stress does not appear to be an influential factor for local privatisation in countries from the European Union, contrary to the US experience (see Bel & Fageda, 2007).

In any case, fiscal constraints seem to promote the use of mixed firms. In relation to public production, local governments may be pushed to partial privatisation for pragmatic reasons. As for private production, local governments may avoid financial problems by using a mixed model that allows them to retain some control of the firms in charge of service delivery.

Regarding industrial interests, we find that stronger industrial interests increase the likelihood of choosing a private firm over a mixed firm (+ sign for private production). Contrary to what we might expect, stronger industrial interests also make the choice of public production preferable to that of mixed firms (+ sign for public production). However, it is worth noting that the statistical significance of the latter coefficient is modest. Thus, this result is less robust than that relating weak industrial interests to the choice between mixed firms and private firms. Indeed, we need to be cautious in interpreting these results. All in all, private investors may prefer having full control of the firm to engaging in a joint venture with local governments. On the other side, the absence of a strong industrial interest may leave the government with little opportunity to reject public production in favour of either partial or full privatisation.

Additionally we find that larger municipalities choose public production less often than mixed firms, while population does not affect the decision of local governments between private and mixed firms.

Transaction costs do not seem to influence the decision between public production and mixed firms, while high transaction costs prevent the use of private production. Indeed, where transaction costs are high (and there is no room for competition) many municipalities may use partial privatisation as an alternative to complete privatisation.

The increasing relevance of mixed firms in Spain – as well as other European countries – could help explain why public service delivery reform is more stable in Europe than in the US (Warner & Bel, 2008), where oscillation between public delivery and private delivery is much more frequent (Hefetz & Warner, 2004, 2007). It may well be that mixed firms increase flexibility for local governments seeking to implement reform. On the one hand, those seeking to escape from purely public production but unwilling (or unable) to go to purely private production can use mixed firms. On the other, local governments that have experienced a private contract failure may use mixed firms to avoid a return to purely public production.

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Concluding Remarks

The use of mixed public–private firms has a significant and increasing role in several European countries. While the empirical literature concerning local government delivery choices has thus far focused attention on the public versus private dilemma, the various theories have provided empirical tests of cost considerations, fiscal constraints and political and ideological factors. This paper builds on that work to examine the attributes of municipalities that influence decisions to develop mixed firms, rather than using pure production forms (either public or private). The paper then takes the analysis a step further by taking into account the role that inter-municipal cooperation and transaction costs may have on that decision.

The data used comes from a survey of municipalities about their delivery of two important local services: solid waste collection and water distribution. From this survey, we know that mixed firms deliver these services in a significant proportion of municipalities. In Spain, the use of mixed firms can be considered a partial privatisation in which municipal or supra-municipal governments engage in long term contracts with private firms through joint ownership of the firm. Under this mixed organisational form, local governments can take advantage of economies of scale, better managerial capacities and incentives, and so on. At the same time, such arrangements may come with lower transaction costs than would follow from contracting out to a private firm.

Results from the empirical analysis show that the decision to use mixed firms is fundamentally pragmatic. Indeed, mixed firms seem to emerge as a non-ideological 'middle way' between pure public and pure private production.

We find an inverse-U shape relationship between municipality size and the decision to partially privatise a service. Furthermore, municipalities that cooperate regionally are more likely to use mixed firms. Both the size of the municipality and its use of cooperation influence access to economies of scale and the level of transaction costs. In turn, these cost considerations influence the decision on the use of mixed firms.

Along the same lines, we present evidence that local governments are more prone to use mixed firms when the specific transaction costs of the service are high and industrial interests are weaker. High costs and weak local private interests make a choice of purely private production unlikely. The use of mixed firms is also more likely when the fiscal burden on the local government is high, because financial constraints prevent the choice of purely public production.

Hence, local governments make use of mixed firms when cost considerations, financial restrictions and private interests exert contradictory pressures. Political and ideological factors have no influence on a local government's decision to use mixed firms.

Our research raises several interesting questions. It remains unclear whether mixed firms are most likely to replace purely public or purely private production (in other words, whether there is any significant difference between these two potential origins). In the same way, knowing the precise percentage of government ownership in mixed firms would be likely to provide interesting additional insights. Obtaining such information and, therefore, being able to better analyse the dynamics of partial privatisation, is on our agenda for future research.

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Notes

1 Warner and Bel (2008) provide a detailed analysis of the organisation of service delivery in the US.

2 Although some cases of not-for-profit organisations can be found in other areas such as social services. In the same area, it is worth noting that public debate in Spain on local services focuses on the results (quality and cost) provided by the service producer, much more than on the process through which the service is delivered. In this sense, problems related to democratic control are not a primary concern in Spain. This can be explained by the fact that no purely private provision (market provision) exists in Spain, and local governments always retain control (as mandated by national law) of the basic characteristics of the delivery of the services we focus on (such as price and quality standards), regardless of whether they are provided by a public unit, a private firm or a mixed public–private firm.

3 Bognetti and Robotti (2003) analyse the implications of the 2002 Financial Law in terms of the promotion of market mechanisms in local services delivery in Italy, including the use of different types of public–private mixed firms.

4 Other types of mixed delivery exist in the US as well: benchmarking for service redundancy, segmenting the market, or dividing the service into component parts or work sharing (Warner & Hefetz, 2008).

5 Based on seminal works by Alchian (1967) and Alchian and Demsetz (1972).

6 Most contracts with external suppliers are awarded through competitive tendering; but not all of them, since competitive tendering is not compulsory in Spain. As a matter of fact, only private firms participate in bids for contracts, and – as mentioned – public firms and mixed firms do not usually bid for contracts outside their own jurisdiction. Because of this, contracting out is – in practice – equivalent to private production in water distribution and, especially, in solid waste collection.

7 In our sample, one city in solid waste collection (Parla) and two in water distribution (Calvià and Marratxí) have public and private production coexisting within their jurisdiction. This represents 0.1 per cent of municipalities and 0.2 per cent of the population served, for both services. Indeed, mixed public–private market delivery (in the US sense, which means that public and private production coexist in the same jurisdiction) is exceptional in Spain for solid waste collection and water distribution

services. In fact, among European countries, Sweden is the only one in which it is relatively common to find this mixed market delivery (OECD, 2000).

8 Note that percentages in Table 1 are adjusted for differences in city size regarding the frequency of response to the survey. Hence, the adjusted percentage of mixed firms is similar for water distribution and solid waste collection, although the absolute numbers of municipalities with mixed firms differ between both services. This is due to the fact that mixed water distribution firms are more frequent in large municipalities.

9 It should be remembered that, initially, data on the form of production was obtained for 540 municipalities in solid waste collection and 548 in water distribution. However, Parla – in solid waste – and Calvià and Marratxí – in water distribution – have coexisting purely public and purely private production within their municipalities (that is to say, mixed delivery, as in the US). Hence, we have not been able to include these three observations in our empirical analysis.

10 Our sample does not provide detailed information on the percentage of shares retained by the government in the case of mixed firms.

11 Data for this variable refers to 2002 since it is the fiscal burden a year prior to a decision that influences local government choices.

12 It is worth noting that intermunicipal cooperation in Spain – as well as in other European countries – is compatible with any form of organisation (Bel & Costas, 2006; Bel & Fageda, 2007). However, in the Netherlands intermunicipal cooperation is not compatible with private production (Dijkgraaf & Gradus, 2007, 2008b).

13 Data on fiscal burden is not available for nine municipalities so that 18 observations have been excluded from the sample. Data for the other nine municipalities is available only for 2001.

14 We must exclude from the estimation those municipalities whose mayors do not belong to a standard political party (parliamentary representation either at national or regional [state] level), since we cannot precisely infer where such mayors lie on the conservative/progressive continuum.

15 Recall that divergence between the mayor's political affiliation and the ideological leanings of the majority is not that uncommon in countries other than Spain either. For instance, the city of New York is solidly Democrat in the US presidential elections. Nonetheless, both the former mayor, Rudolph Giuliani, and the current mayor, Michael Bloomberg, have Republican affiliations.

16 The joint inclusion of these variables in the estimation could imply a multicollineality problem. However, the results do not change if we estimate these two variables separately.

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