Factors Influencing the Privatisation of Urban Solid Waste Collection in Spain

Germà Bel and Antonio Miralles

Summary. This paper analyses some of the organisational aspects of urban solid waste collection. It starts by discussing some of the theoretical issues of contracting out. Then, an explanatory model is specified and estimated on a sample of surveyed municipalities. The purpose is twofold: first, to identify the role of some economic factors when deciding to contract out the service; secondly, to analyse the role of politics in choosing between public production and contracting out. The results show a significant effect of the demand of waste collection on contracting out. There also appears to be a neighbouring effect as municipalities close to others already contracting out are also more prone to do so. Finally, the decisions to contract out seem to have been motivated by pragmatic rather than ideological reasons.

Introduction

The literature on privatisation has dramatically increased in recent years. Many theoretical and empirical papers are focused on the study of the objectives and the effects of privatisation of public companies that operated in competitive markets where no market failures were present and those that operated in non-competitive markets and thus enjoyed considerable market power. Vickers and Yarrow (1991) refer to these transfers from the public to the private sector as type 1 and type 2 privatisations and add a third type that has been much less studied: the contracting out of services previously provided by the public sector.

Although it does not imply the sale of physical assets, contracting out is another type of privatisation, as it consists of the sale of a franchise contract. The contractor, public or private, appropriates any financial surplus derived from the service and the appropriation of this profit is central to the idea of property.

Contracting out has particularly increased in the UK and in the US in the past two decades. In the US, the local governments have faced tax revolts since the late 1970s, cuts in federal and state programmes and other financial difficulties. These factors have forced them to redesign the way local

services are provided and financed. For instance, Proposition 13 passed in California in 1978 implied cuts in the property local tax, which in turn forced the local governments either to cut the service level or to increase specific bills from the provision of services or both. In addition to the decrease in financial resources, tax-payers' demands increased for better services without more taxes (Savas, 1998). This put pressure to increase productivity in the provision of local services.[1] Altogether, these factors contributed to the spread of contracting out the provision of local services in the US. Donahue (1989) offers a broad overview on the issue and Lopez-de-Silanes *et al.* (1997) have carried out an empirical study on the determinants of contracting out in the US.

During the 1980s, the British government was interested in reducing the size of the public sector and cutting back the power of trade unions. Therefore, it was favourable to contracting out. A 1980 Act made competitive tendering in local government construction-related activities compulsory. Early evaluation (Ascher, 1987) argued that the probability of finally contracting out would be larger if it arose as a natural response than if it was imposed politically. However, the British government passed the Local Government Act in 1988, where competitive tendering in local solid waste collection was made compulsory. Tax-payers who wanted cheaper services and business groups which saw the derived economic opportunities supported the Act. The opposition to privatisation came from government employees and trade unions. In fact, according to Porter and Dewey (1998), the contracting out spread faster in the UK than in the US because the British government transferred the benefits to supportive sectors, maximising in this way the support for privatisation, while the same selective compensation was not all that common in the US.

Reimer (1999) has studied the expansion of competitive contracting of local solid waste collection services after the obligation established by the Local Government Act of 1988. She concludes that the spread of contracting out to a private company followed a sequential process. During the first years after the law was passed, there was a clear relationship between the ruling party in the local administration and the nature (public or private) of the tender winner. However, this relationship vanished as time went on. In recent years, economic or geographical factors, such as closeness to one of the branches of a private provider, had become more powerful explanations than the ideological reasons. More precisely, contracting out seems to spread in a network way; the probability of contracting increases as more municipalities in the same area use this formula. Since 1998, competitive tendering has no longer been compulsory in the UK and has been replaced by the Best Value regime. Nonetheless, competition is still the preferred means to achieve efficiency savings and, hence, best value.

Contracting out of urban solid waste collection is extensively used in Spain. In some cities—such as Barcelona—contracting dates back to the 19th century. In recent times, since the 1960s, there have been many cases of contracting, which is now increasingly used. Surprisingly, there is no tradition in the study of this phenomenon and studies in Spain—in particular, economic analyses—are scarce. In Spain—as in US—competitive tendering has never been compulsory, as opposed to the UK experience until 1998. Since the decision to contract out is entirely up to each local government, what are the factors that influence this decision?

This paper will try to fill in this gap by studying the determinants of contracting out urban solid waste collection in Spain. The first section surveys the theoretical literature on contracting from which the hypotheses for the empirical test are derived. In the second section, a model is specified that explains the decision to contract out. This model consists of a cross-section discrete choice estimation that focuses on the specific year in which the decision was taken. To the present authors' knowledge, this is the first time that this year-selection criterion has been used in the literature on this subject. This is more

sensible than simply taking the same year for all the observed municipalities, since one cannot then distinguish between taking the privatisation decision and keeping the service contracted out, even if the decision to contract was taken many years ago. Some hypothesis concerning the privatisation decision are then tested—like, for example, the need to undertake organisational reforms and the importance of political factors. Finally, the most important results are summarised.

The Economics of Contracting Out

Although contracting has not received as much attention in the literature as other aspects related to the public sector and public services, this is not a new concern. In 1859, Edwin Chadwick defined the concept of 'competition for the field', as opposed to the better-known 'competition within the field'. Chadwick (1859) argued that, in some services with decreasing average costs—such as water supply—competition within a municipality resulted in inefficiencies and thus he recommended that all the services be put out to tender.

The fact that the local government is required to guarantee service provision does not also mean that it must provide it itself. Donahue (1989) points out that sometimes the municipality is not the optimal geographical unit to produce the service. Private companies possess some advantages over the public administration: more flexible labour organisation, incentives and accountability; fewer procedural constraints; and a stronger focus on results.

An especial advantage derives from economies of scale. That is, private companies can efficiently distribute fixed costs over several geographical units, as they are not necessarily constrained to a single municipality. Thus, some welfare gains are to be realised. If the total market demand (*TMD*) is larger than that of the municipality (*MD*), the company can offer a lower price.

The contractor can also use a wider incentive scheme for its employees, such as top positions in other locations. Furthermore, the contractor has more incentives for innovation and organisational improvement. Hart *et al.* (1997) argue that, unlike the government, private-sector operators have more incentives to pursue innovations to improve quality or reduce costs because they can claim property rights over the innovations. In short, opening up to competition by means of a bidding process can result in cost minimisation and thus technical efficiency. Figure 1 shows the welfare gains due to scale economies together with technical efficiency.

However, contracting does not come without costs, the most important being transaction costs (Domberger and Jensen, 1997). Transaction costs include administrative
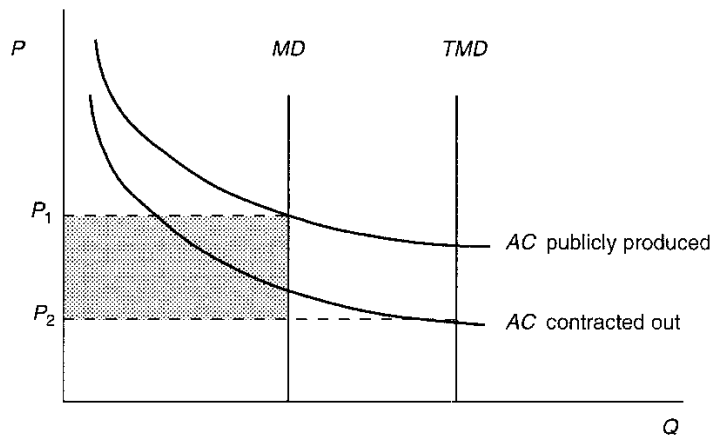

Figure 1. Welfare gains obtained by contracting out the services.

costs and those of incomplete contracts, because it is impossible to write a contract that foresees all contingencies. Bailey and Davidson (1999) find out that, even 10 years after contracting, the local governments still monitors inputs and service performance. In fact, the emphasis on procedures, one of the most stressed defects in the public provision of services, does not disappear when the service is contracted, but only takes another form. Sclar (1997, 2000) argues that one needs to take into account the theory of the organisational dimension and the distinction between spot markets and contract markets. The former deal with standardised products, where a high degree of competition is possible and quality can be monitored. However, the latter are different. For example, they refer to continued services.

Domberger and Jensen (1997) explain that contracting will be more successful: the less the magnitude and specificity of the assets; the less relatively important the difficult-to-contract quality characteristics—i.e. those ones difficult to specify and monitor; and, the higher the real or potential supply of competition. In other words, the theory suggests that the higher the uncertainty, the higher the risk of contracting failure. It also suggests that public provision will be more efficient than contracting the greater the asset specificity.

In the case of solid waste collection, there is little magnitude and asset specificity; quality can easily be monitored and there might be substantial competition on the supply side—although Reimer (1999) finds a tendency to concentration in this service in the UK. The largest companies held about 60 per cent of the solid waste collection contracts awarded to private providers. Anyway, this service seems to be suitable for contracting out.

The pure market formula, where every household contracts its own service to a private provider, has clear disadvantages. It is usually more expensive because no economies of scale can be realised. There are also additional costs of individual billing, because the contractor must bear the cost of unpaid bills and it might charge higher service fees.

These are reasons why a single provider has generally carried out solid waste collection, and the payment consists of a mandatory local fee.[2] Depending on the formula specified in the contract, the fees either fund the direct provision of the service or are used to make a global payment agreed upon in the contract. The existing empirical studies on the effects of urban solid waste collection contracting out refer mostly to the US and the UK. For example, Savas (1987, 2000) and Hodge (2000) have examined these empirical studies, and their results suggest that there have been cost reductions derived from contracting out.

An Explanatory Model for the Decision to Contract out Solid Waste Collection in Urban Areas

It is hypothesised that the local governments use contracting as a response to the need to improve on the organisation and flexibility of the service. This is motivated by the efficiency gains derived from economies of scale and the reduction of X-inefficiencies. These benefits must be compared with: the possible gains from improving internal organisation while keeping direct public provision; and, the costs of monitoring associated with contracting. On the other hand, contracting is favoured in those areas where there have been previous experiences with this process. Finally, it is hypothesised that local politicians follow pragmatic rather than ideological criteria to take decisions.

A binomial discrete choice model is used to test the hypotheses. The dependent variable is the service production method—Y—and it takes a value of zero in the case of direct public production and of one if the service is contracted. The relationship between the dependent variable and a number of explanatory variables is estimated. The statistical inference is performed for two different periods: first, for the period 1979–98—that is, since the first year of democratic local governments in Spain—and secondly, for the period 1991–98, for which information on all the explanatory variables is available.

Data and Sources

The sample consists of municipalities in Catalonia that filled out the *Survey on Production of Local Services*, a survey designed and carried out by the authors' research group. The survey was sent to all municipalities in Catalonia.[3] Data were obtained on the nature of the provision of the service (i.e. whether it is publicly or privately produced), the level (local or supralocal) at which the service is produced and the year when the service was contracted, if it was so. The information on the demand side was obtained from two different sources: for the period 1979–98, the total population is used as a proxy for the demand of the service and was obtained from the statistics of the Catalonian Statistical Institute; from 1991 on, direct data on the demand of the service were provided by the Catalonian Council of Waste Treatment. These data allowed the calculation of the daily generation of waste. The data on the local electoral results were obtained from the Catalonian Statistical Institute. For those cases where the electoral results did not yield an absolute majority of any political party in the year the service was contracted, individual queries were carried out to identify the political party in office that year. The data on the structure and dispersion of the municipalities were obtained from the Information System for the Local Government. Finally, the financial burden data were provided by the Catalonian Auditing Court, the information being available since 1990.

The Explanatory Variables

The demand for solid waste collection (Q) is the first explanatory variable to be considered. As the demand increases, the management of the service becomes more complex so that organisational improvements and more flexibility are required. An increase in the demand implies an increase in expected profits derived from reduction of inefficiencies by contracting out, while supervision costs associated with contracting out become relatively less important. These factors might have a positive impact on the decision to contract. However, there might be a limit to the exploitation of economies of scale. Stevens (1978) and Dubin and Navarro (1988) find scale economies in municipalities with populations below 20 000. Also, Stevens (1978) finds constant returns to scale in cities with populations of over 50 000.[4] On the other hand, high levels of urban solid waste collection are associated with large cities, which in turn are most capable of undergoing organisational reforms, of hiring the best managers and introducing elements of flexibility in the service production.

It is sensible to think that the relation between the level of solid waste and the decision to contract out has an inverse-U shape. This suggests that, in relatively small cities, obstacles to contracting out are larger, due to high supervision costs, because little benefit is to be gained from reducing inefficiencies and because there is little incentive to undertake any organisational change. As demand increases, the supervision costs become relatively less important, the advantages from reducing inefficiencies increase and so does the probability of contracting out. However, when demand is too high, the exhaustion of scale economies and the higher capacity to undertake organisational improvements in the public production of the service could put a halt to the decision to contract out.

In the analysis for the period 1979–98, the population variable (POP) is used as the proxy for the demand for the service. This variable is constructed from the local population given in the Census of Population. The population figure is taken from the Census nearest to the year when the service was contracted. For those cities where the service has always been provided directly by the local government, the population figure is taken from the 1996 Census, the most recent year available. The square of the population (POP^2) is also included to test for the inverse U-shape hypothesis. Notice that the inclusion of this variable does not pose a problem of co-linearity. This would only be an issue if the sample size were within a very small

interval, which is not the case. For the period 1991–98, the variable Daily Generation of Waste (DGW) is used; this directly measures the demand for the service. For those cities where the service was contracted, the value of this variable is taken in the year when the decision to contract was taken. For the other cities, the value of Daily Generation of Waste in 1998 is used, the most recent year available. As with the population, the square of this variable (DGW^2) is also included to test for the inverse U-shape hypothesis.

The second explanatory variable is the municipality dispersion (D), which includes the number of population units within the city area. The higher the dispersion, the higher the service costs and thus the higher the complexity. This factor would favour contracting.

The third explanatory variable tries to capture the neighbouring effects that might play a role, positively influencing the choice to contract out. One of these indicators is the use of contracting in nearby municipalities or in a given area of reference. Following Reimer (1999), it is hypothesised that the neighbouring effect positively influences the decision to contract out for two reasons. First, the closeness to cities where the service is already contracted enables the private providers to offer attractive plans to the municipality that is considering to contract, due to economies of scale. (Donahue, 1989, offers a more detailed explanation). Secondly, the local government can compare the management of the service with that of the neighbouring cities or reference cities, which in turn favours contracting out. To pick up the neighbouring effect, a variable called (NE) is used. This variable is the percentage of the municipalities in a reference area that had contracted out the service by the beginning of the period considered. For territorial planning purposes, Catalonia is divided into six administrative areas, some of which are smaller than a Spanish province. These will be the reference areas. For the period 1979–98, the neighbouring effect in 1979 ($NE79$) is used; for the period 1991–98, that in 1991 ($NE91$) is used.

The fourth explanatory variable is the ideological stand of the local government, given by the variable called Political Indicator (PI). This is a qualitative variable that takes a value of one if, in the year the service was contracted, the municipality had a conservative government and takes a value of zero if the political stand of the local government was left or centre-left. In those cities where the service had not been contracted, the variable takes a value of one if the conservative governments had been predominant during the period considered and it takes a value of zero otherwise. If the ideological position of the local government plays a role in the decision to contract, it would be expected that its coefficient be positive and significant. Conversely, if the decision has a pragmatic motivation, this variable would not be significant.

Finally, for the period 1991–98, two additional variables are included: the Index of Global Financial Burden ($IGFB$) that captures the financial burden for each municipality; and the supralocal association of the service (SLA). With respect to the variable $IGFB$, organisational reform is expected to be more likely as the budget constraints of the municipality become more severe—because the need arises to reduce expenditure. The data for this variable are only available since 1990, so it can only be used for the period 1991–98. For the municipalities that contracted the service, the financial burden of the year prior to the decision of contracting is taken, as the debt burden should have had an effect prior to the decision. For those municipalities that directly produced the service during the period, the fiscal burden in 1997 is used.

The last variable, the supralocal association of the service (SLA), implies the transfer of the service to a public body at a higher geographical level. In the case of Catalonia, new administrative units were established in 1987: the *comarcas* (counties), which constitute a geographical unit larger than the municipality, are especially appropriate to share the provision of the service. The supralocal association could have favoured the decision

to contract because it increases the volume of waste collection and thus the dispersion in the area then covered. Therefore, it introduces complexity in the service and economies of scale advantages that can induce contracting out. Moreover, the transfer of the service to a higher body involves an organisational change that might favour the political decision to contract. Certainly, as the distance between citizens and the decision-making body increases, the political risk linked to privatisation reduces. On the other hand, aggregating the service at a superior geographical level could be seen as an alternative to contracting out in order to achieve economies of scale. The variable *SLA* is qualitative and takes a value of one if the municipality has the service transferred to this superior administrative unit and it takes a value of zero otherwise.

The Model

The function for the increase in the local government politician's expected utility takes the following form

$$\Delta U_{0,1} = f(Q, D, NE, PI, IGFB, SLA)$$

where, 0, 1 indicates the change from public service production to contracting, and the arguments in the utility function have already been discussed above.

As previously explained, the model used is a binomial discrete choice model, where the dependent variable takes a value of 1 if the municipality contracted out the service during the period analysed and a value of 0 if the service continued being publicly produced. That is, for each municipality i

Period 1979–98

$$Y_i = \begin{cases} 1 \text{ if } \Delta U_{0,1}^i = f(Q, D, NE, PI)_i > 0 \\ 0 \text{ if } \Delta U_{0,1}^i = f(Q, D, NE, PI)_i \leq 0 \end{cases}$$

Period 1991–98

$$Y_i = \begin{cases} 1 \text{ if } \Delta U_{0,1}^i = f(Q, D, NE, PI; IGFB, SLA)_i > 0 \\ 0 \text{ if } \Delta U_{0,1}^i = f(Q, D, NE, PI; IGFB, SLA)_i \leq 0 \end{cases}$$

Two estimations were run. The first comprises the period 1979–98, for which population is used as a proxy for the waste collection demand and the budget restriction and the supralocal association variables are not included. In the second estimation, period 1991–98, information is available on all the variables; in addition, the demand variable directly measures the demand for the service.

The models estimated are the following

(1) For 1979–98,

$$Y_i = \Phi(\beta_0 + \beta_1 POP_i + \beta_2 POP_i^2 + \beta_3 D_i + \beta_4 NE79_i + \beta_5 PI_i) + \varepsilon_i$$

(2) For 1991–98,

$$Y_i = \Phi(\beta_0 + \beta_1 DGW_i + \beta_2 DGW_i^2 + \beta_3 D_i + \beta_4 NE91_i + \beta_5 PI_i + \beta_6 IGFB_i + \beta_7 SLA_i) + \varepsilon_i$$

Where, Φ is the cumulative distribution function for a standard normally distributed variable and ε is the disturbance term.

Recent studies of political decisions at the local level, such as Lopez-de-Silanes *et al.* (1997) and Warner and Hebdon (2001), have used qualitative endogenous variable models (directly as in the probit and logit models or indirectly as in the tobit model). In this study, the probit model has been chosen rather than the logit model as the former turns out to be the most suitable for the periods considered and also because it allows for the estimation of heteroscedastic models. Thus far, the literature gives no indication of the superiority of one model over the other (Greene, 2000). Finally, for each period, the model is estimated both excluding the political indicator (*PI*) and including it. This is because it is interesting to see how the estimation does with only economic variables.

The Results

Table 1 shows the results for the period 1979–98. Table 2 presents the results for the period 1991–98. The overall significance of the model is quite high, especially for the best specifications of the model, equation (1) (overall significance > 99 per cent) and equation (2OK) (overall significance > 97.5 per cent). The explanatory power of the

Table 1. Factors explaining the contracting out of urban solid waste collection, 1979–98

Variable	Equation (1) coefficient	Equation (1bis) coefficient
Constant	− 0.1328	− 0.0489
	(0.668)	(0.922)
POP	0.0001	0.0001
	(0.014)**	(0.009)***
POP2	− 1.96 · 10–9	− 2.02 · 10–9
	(0.006)***	(0.004)***
D	− 0.0201	− 0.0249
	(0.565)	(0.469)
NE79	0.0259	0.0252
	(0.048)*	(0.050)*
PI	−	0.2382
		(0.594)
Wald test of joint significance[a]	0.0037***	0.0079***
Pseudo R^2	0.2045	0.2074
N	90	90

[a]Probability of non-significance of the model.

Notes: Figures in parenthesis are the probabilities that the coefficient be zero, using White's robust estimation.

***indicates significant at the 1 per cent level; **indicates significant at the 2.5 per cent level; and *indicates significant at the 5 per cent level.

The likelihood test confirms equation 1 as the better one. In particular, χ^2 takes the value 0.178972, which lies in the range of non-rejection of the null hypothesis, the null hypothesis being that *PI* should not be included.

model is moderate but by no means unimportant. The R^2 ranges between 0.205 and 0.259 (which is a good range for a binomial discrete choice model) and it is slightly higher for the period 1991–98. This might be due to the higher accuracy of the variable *DGW* as an indicator for the demand and the inclusion of the supralocal association variable even though it does not appear to be significant.

The demand variable, either approached by population (*POP*) or by the generation of waste (*DGW*), is the most significant, at around the 99 per cent significance level. This offers indirect evidence of economies and diseconomies of scale.[5] The fact that the signs are positive for *POP* and *DGW* and negative for POP^2 and DGW^2 validates the hypothesis that the relation between the demand and the tendency to contract out displays an inverse-U shape. That is, the decision to contract is more likely as population and demand increase up to a point where this tendency slightly decreases.[6]

The other variable that seems to explain the decision to contract is the existence of neighbouring municipalities where contracting was already used (*NE*); this variable is always significant at a significance level above 95 per cent. The higher the percentage of neighbouring municipalities that already contract out, the more likely it is that the municipality will decide to contract out the service.

The population dispersion in the city and the supralocal association do not appear to be significant. Neither does the financial burden. The variable *IGFB*, which is used for the period 1991–98, has a positive sign, as expected, but its coefficient is not significantly different from zero.[7] The financial situation of the municipalities does not seem to have an effect on the decision to contract.

Finally, the variable *PI*, which represents the ideological stand of the local government, is not significant. This suggests that local politicians take a pragmatic rather than an ideological position when considering

Table 2. Factors explaining the contracting out of urban solid waste collection, 1991–98

Variable	Equation (2) coefficient	Equation (2bis) coefficient	Equation (2OK) coefficient
Constant	−0.9525	−1.1338	−0.9099
	(0.128)	(0.110)	(0.129)
DGW	0.1451	0.1494	0.1438
	(0.013)**	(0.009)***	(0.012)**
DGW^2	−0.0018	−0.0018	−0.0018
	(0.006)***	(0.004)***	(0.005)***
D	−0.0284	−0.0348	−0.0297
	(0.498)	(0.405)	(0.473)
$NE91$	0.0190	0.0186	0.0189
	(0.037)*	(0.039)*	(0.040)*
PI	—	0.2021	—
		(0.635)	
$IGFB$	0.0019	0.0017	—
	(0.837)	(0.852)	
SLA	0.7281	0.6714	0.7231
	(0.164)	(0.218)	(0.169)
Wald test of joint significance[a]	0.0410*	0.0364*	0.0233**
Pseudo R^2	0.2594	0.2631	0.2588
N	41	41	41

[a]Probability of non-significance of the model.

Notes: Figures in parenthesis are the probabilities that the coefficient be zero, using White's robust estimation. ***indicates significant at the 1 per cent level; **indicates significant at the 2.5 per cent level; and *indicates significant at the 5 per cent level.

The likelihood test for the coefficients on *IGFB* and *PI* being equal to zero (χ^2 with 3 degrees of freedom) takes the value 5.5747 (critical value = 7.82).

these issues. This does not necessarily imply that politics and political economy do not play any role in the decision to contract out.[8] What the results indicate is that there is no party political or ideological bias in the decision.

Conclusion

Contracting out urban solid waste collection has increased in recent years in Spain and now is a widely used means of managing this service. This paper has analysed the determinants of the decision to contract out this service. The existing literature suggests a number of hypotheses to explain this decision so an explanatory model was set up to test for these alternative hypotheses.

The results indicate that there is a significant relationship between the demand for waste collection and the decision to contract. This offers indirect evidence that delivery costs are relevant to the decision on contracting out. Moreover, the relationship between demand and the decision to contract is inverse-U shaped. This may be interpreted as follows. Cities with a relatively small population, and thus small demand, can gain little quantitative advantage from reducing inefficiencies, but face relatively large supervision costs if they contract. These factors, together with the fact that small cities are less able to undertake reforms to improve the service, explain the small probability of contracting in this type of municipality. As the population increases, the supervision costs decrease relatively and the expected benefits from contracting out increase, which in turn make the cities more prone to contract. However, economies of scale might be exhausted after a certain city size is reached. Similarly, very large cities might be more capable of undergoing internal reforms in the direct production of the service. Thus, when the cities are too large, the probability of contracting out decreases.

Municipalities have a higher probability of contracting if this practice is widespread in neighbouring cities. There are two reasons for this. First, the politician has more avail-able information on the results of contracting, which reduces the uncertainty and risk associated with any change in the management of this kind of high-social-sensitivity service. Secondly, the contractors already operating in the nearby municipalities can exploit economies of scale and therefore offer attractive contracts to the city.

Evidence has not been found that municipality budget restrictions have an effect on the decision to contract. Financial reasons, which have motivated the privatisation of public companies, probably play a small role in this case because this type of privatisation does not generate direct revenues for the administration. The objective of improving efficiency might have played a more important role. The results are supportive of the hypothesis that local governments were led by pragmatic rather than ideological motives. Therefore, there is no party-political or ideological bias in the decision to contract.

There are other interesting aspects of the process of organisational reform in the management of local services that are not analysed here. In particular, issues relating to the effects on efficiency and effectiveness of the services contracted out, the tendency to concentration in this type of service and the consequences for the competition are central to the discussion. These issues remain for a future research agenda.

Notes

1. According to the International City Management Association survey (ICMA, 1989), by 1989 23.9 per cent of the local governments had contracted out once or more. The easiest services to contract out were those which can clearly be standardised, which require of a large number of employees/providers and skills or specialised equipment.
2. In big metropolitan areas, an increasing practice is to split up the city into districts and contract the service in each district according to different procedures. The reasons for this are the exhaustion of economies of scale and the possibility of competition between different districts within the metropolitan area. ICMA (1989) gives an account of this procedure in Phoenix, Arizona. More recently, in 2000, the city of Barcelona was divided

into four districts for the concession of the service.

3. The percentage of responses is high as far as population is concerned (the answers cover about 60 per cent of the total population) and somehow lower as far as the number of municipalities is concerned (13.3 per cent). The significance of the responses is low in the municipalities with populations below 1000 inhabitants, but it increases rapidly thereafter; 37 per cent of the cities with populations between 5000 and 20 000 people are covered; 50 per cent of those between 20 000 and 50 000; and two-thirds of the cities with over 50 000 inhabitants. The sample is random and representative of the municipalities of Catalonia, even though the results are less representative for those municipalities with under 1000 inhabitants.

4. This could be the reason why large cities such as Phoenix and Barcelona tend to divide the city into districts and independently contract the service for each of these districts.

5. To analyse directly the effect of costs on privatisation would require the estimation of a cost function based on the actual costs of collecting waste. However, in most cases, there is no historical information on actual costs back in the year in which the service was first contracted out. Therefore, estimating a cost function is not feasible. Instead, historical information on the generation of waste and especially on population is more much extensive and available, and allows costs to be approached through these variables which are related to demand.

6. Direct inspection of the sample shows that frequency of contracting out is lower in municipalities having a population under 5000, although increasing with population within them. That is to say, smaller with 0–1000 inhabitants, and larger with 1000–5000 inhabitants. Contracting reaches its peak in municipalities having populations between 5000 and 20 000. In cities of over 20 000, the frequency of contracting slightly decreases.

7. The inclusion of the variable *IGFB* introduces heteroscedasticity problems. Thus the estimators in equations (2) and (2bis) might not be consistent (Yatchew and Griliches, 1985). We re-estimated the model of equation 2bis using Harvey (1976) estimation to take care of the heteroscedasticity problem and we compared it with the correct model, 2OK, which does not include IGFB and PI. The coefficients have the same sign, are also significant and are of about the same magnitude.

8. As pointed out by a referee, a pragmatic

motivation does not imply that neither politics nor political economy play any role. For instance, it could be the case that a single special-interest-group lobbies different parties. In such a case, classical models of political competition predict convergence in policies, which would be also consistent with these empirical results.

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