Privatization and competition in the delivery of local services: An empirical examination of the dual market hypothesis

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Abstract: This paper empirically analyses the hypothesis of the existence of a dual market for contracts in local services. Large firms that operate on national basis control the contracts for delivery in the most populated and/or urban municipalities, whereas small firms that operate at a local level have the contracts in the less populated and/or rural municipalities. The dual market implies high concentration and dominance of major firms in large municipalities, and local monopolies in the smaller ones. This market structure is harmful for competition for the market as the effective number of competitors is low across all municipalities. Thus, it damages the likelihood of obtaining cost savings from privatization.

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1. Introduction

Privatization of local services has been a relevant policy widely implemented all over the world. Private delivery of solid waste collection is now common in many European and Anglo-Saxon countries. Hence, several empirical studies have examined the motivations and consequences of local services privatization.

One of the major motivations for local privatization could be related to achieve costs savings in services delivery.[1] In this way, private firms may exploit scale economies through the aggregation of production of several territorial jurisdictions (Donahue, 1989) since many local services have a significant amount of fixed costs. To this regard, municipal jurisdictions do not usually fit with the optimum geographical scale from the production point of view. To the extent that the considered local service is affected by scale economies, it may be technically efficient that one firm delivers the service in several jurisdictions.

Privatization may also allow a more powerful structure of incentives for managers (Hart, Schleifer and Vishny; 1997). Indeed, private firms may have more incentives to undertake innovations that reduce costs. In contrast to public managers, private managers are able to claim the property rights of innovations.

Furthermore, privatization may promote competition in the market of local services (Niskanen 1971; Savas 1987). In the delivery of local services, competition *in* the market is usually neither possible nor efficient since it is usually optimal that just one firm delivers the service in the corresponding municipality. However, the efficient allocation of resources may be obtained through competition *for* the market (Chadwick, 1859; Demsetz, 1968). In this way, privatization is implemented through contracts with external firms that obtain the right

[1] Bel and Fageda (2007a) provide a recent and comprehensive review of empirical evidence on motivations of privatization of local services.

to deliver the service in the municipality for a specified number of years.[2] As long as several firms may compete for the contract, there is room for competition for the market.

Although several reasons may explain that local privatization leads to cost savings, there is no agreement on the empirical literature about the relationship between privatization and costs. In fact, recent surveys about local privatization and costs do not find a systematic superiority of private production (Boyne, 1998; Hodge, 2000; Sclar, 2000; Bel and Warner, 2007). A possible explanation for the unclear relationship between privatization and costs relates to the dynamics of the markets for local services, which are typically characterized by a lack of effective competition (Sclar, 2000; Bel and Costas, 2006; Dijkgraaf and Gradus, 2007a). Lack of effective competition can be especially severe in small municipalities, as they usually have fewer numbers of private contractors available (Warner and Hefetz, 2003). In their study of the solid waste sector in Spain, Bel and Costas (2006, p. 17) find descriptive evidence that "suggests a highly concentrated sector, with the major contracts in the hands of the leading firms at one extreme, and a high degree of small firms and contracts at the other."

In this paper, we conduct an analysis oriented to empirically test the hypothesis of the existence of such a dual market for delivery contracts. We claim that large firms that operate on national (or even supra-national) basis will control the contracts for delivering the service in the most populated and/or urban municipalities, whereas small firms that operate at a local level will have the contracts for delivering the service in the less populated and/or rural municipalities. The existence of a dual market may imply high concentration and dominance of major firms in large municipalities, and local monopolies in the smaller ones. This market structure would be harmful in terms of competition for the market as the effective number of

[2] Contracting out and transferring firms to the private sector differ in many aspects. However, the contracting out of services previously provided by the public sector is usually considered as another type of privatization (Vickers and Yarrow, 1991). Even if it does not imply the sale of physical assets, it consists of the sale of a franchise contract. The contractor appropriates any financial surplus derived from the service, and the appropriation of this profit is central to the idea of property rights.

competitors in each bid for the contract would be low across all municipalities. Hence, the opportunities for obtaining cost savings from privatization would be strongly damaged.

To test out hypothesis we take advantage of data from a survey of Spanish municipalities to examine the dynamics of competition in the market of solid waste, which is one of the most relevant local services. Indeed, solid waste is among the services with largest impact on local government expenditures, and it has received extensive attention in the literature.

The rest of the paper is organized as follows. Next, we relate our study to empirical works that analyze competition in local services. The third section explains the characteristics of the survey from which data is obtained, and examine results of the survey concerning production form and market structure indicators. In the fourth section, we develop an empirical model to identify local government choices of contract holders in order to test the hypothesis of the dual markets. In section five, we discuss our results. Finally, we draw our main conclusion.

2. Relationship to the literature

One possible explanation of the ambiguous effects of local privatization on costs has to do with transaction costs. All the cost advantages mentioned above of privatization must be put in relation to the higher transaction costs that may be associated to not produce internally the service (Ferris and Graddy, 1994; Brown and Potoski, 2003; Levin and Tadelis, 2007). It is worth noting here that transaction costs should be particularly high in services with a high amount of specific assets and whose performance is not easily measurable. High transaction costs are not expected in solid waste collection since this service delivery is not particularly complex (Brown and Potoski, 2005; Levin and Tadelis, 2007).[3]

[3] Brown and Potoski (2005) measure asset specificity and ease of measurement for 64 local services in the US. They build indicators ranging from 1 (low specificity, or easy measurement) and 5 (high specificity, and difficult measurement). They find asset specificity of 3.00 and ease of measurement 2.06 for residential solid waste; for commercial waste ratings are 3.06 and 1.97 respectively. In both cases, they are significantly below the ratings found for services with high assets specificity like water distribution. Levin and Tadelis (2007) build indicators on contract difficulty, as perceived by city managers, and find that contract difficulty is below the average for all services related to waste.

However, the relationship between privatization and costs for solid waste collection is by no means clear. Early studies in the seventies and eighties tended to find cost savings from privatization in solid waste collection, but more recent studies do not find such positive relationship for this service (Boyne, 1998; Bel and Warner, 2007). An alternative explanation of the ambiguous relationship between privatization and costs in solid waste collection has to do with the degree of competition in the markets for contracts. While transaction costs should not explain the disappointing results of privatization in solid waste collection, the literature agrees that competition matters more than the form of production concerning services delivery efficiency (Vickers and Yarrow, 1988; Hodge, 2000).

To this regard, scale economies in solid waste collection makes usually advisable that just one firm operates in each municipality (Dubin and Navarro, 1988; Antonioli and Filippini, 2002). Several studies find that scale economies are significant for this service, although they are eventually exhausted as long as the population of the municipality increases (Pommerehne and Frey, 1977; Stevens, 1978, Callan and Thomas, 2001; Dijkgraaf and Gradus, 2003; Bel, 2006a). In this way, scale economies in solid waste collection are particularly relevant for small and medium-sized municipalities.[4]

An effective number of competitors in the bids for contracts must accompany technical efficiency that can be obtained from just one firm operating the market, so that such technical efficiency is accompanied by allocative efficiency. Indeed, tariffs charged by firms must respond to the costs of delivering the service. Thus, the intensity of competition for the contracts will likely be a major determinant of the cost savings that can be obtained from privatization in solid waste collection.

[4] It is worth noting here that small municipalities may use intermunicipal cooperation as a possible alternative to exploit scale economies so that such organizational form may also condition cost savings that can be obtained from privatization (Bel and Fageda, 2007b).

It is worth noting that the dynamics of contracting out local services delivery tend to create a bilateral monopoly formed by the local government and the contract holder with strong incumbency advantages for the latter (Domberger and Jensen, 1997; Sclar, 2000). Only in case that several firms participate in the successive bids for contracts and they may effectively compete with the incumbent, competition for the market will be binding.

A high level of concentration in solid waste collection has been reported for the Netherlands (Dijkgraaf and Gradus, 2007a), Spain (Bel and Costas, 2006; Bel, 2006b), the United Kingdom (Davis, 2007), and the United States (Warner and Bel, 2008). Since the market features of this service should be similar in other countries where private delivery is significant, such high concentration must be taken as a disturbing issue. Indeed, it is sensible to argue that a high level of concentration may reduce the number of effective competitors in the bids for contracts. Hence, soft competition for the market should induce lower chances of cost savings from privatization.

Empirical evidence about the relationship between privatization, competition and costs in the delivery of solid waste collection is scarce. However, some studies have found a clear effect of competition on costs. Domberger, Meadowcroft and Thompson (1986), Szymanski and Wilkins (1993) and Symanski (1996) obtain empirical evidence for the United Kingdom showing that the use of competitive tendering in the bids for contracts explains differences in solid waste collection delivery costs across a rich sample of municipalities. On the contrary, Domberger, Meadowcroft and Thompson (1986), and Szymanski and Wilkins (1993) do not find relevant differences from the fact that the contract holder is a public or a private firm within a competitive framework. In a similar fashion, Gómez-Lobo and Symanski (2001) find that the number of competitors in the bids for contracts has a significant influence on the costs of solid waste collection in the United Kingdom.

Empirical analyses about competition in local services and costs are even scarcer for other countries away from the United Kingdom. As far as we know, only studies for Netherlands and Spain have examined how competition conditions influence on local services costs. Dijkgraaf and Gradus (2007a, 2007b) show that high levels of concentration imply higher costs in the delivery of local services for the Dutch market, particularly in case that contract holders are private firms.[5] This result is attributed to collusion between private firms when concentration is high, so that they may ask for higher tariffs than the optimal ones in the bids for contracts. Finally, Bel and Costas (2006) analyze empirically whether contracting out is effectively a process that converge to a bilateral monopoly. To do so, they test the hypothesis that the older the first contract of externalization, the higher the probability that competition for the market has decreased. Taking into account that the average length of contracts in their sample for Spain is less than 7 years, they find that costs in cities with recent privatization are lower than costs under public production. However, no significant differences in costs between municipalities with old privatization and those using public production are found.

Next we test a new hypothesis that relates to a different (but equally concerning) competition scenario in small and large municipalities. Indeed, we test the hypothesis of the existence of dual markets in the contracts for local services. We expect that the major firms control the largest and more profitable contracts, while the typical market structure for small municipalities is a local monopoly with very few players in the successive bids for contracts.

3. Data

Most of the data used in our empirical analysis has been obtained from a Survey on Local Services Production. The questionnaire asked different organizational aspects of the delivery, such as production form (whether public internal –bureaucracy-, public firm, mixed public-private firm, or private firm), the name of the firm that holds the contract, the number of firms

[5] Public firms are active players in the markets for contracts of local services delivery in the Netherlands, contrary to what happens in other countries like Spain,.

in the bids for contracts, and so on. It was addressed to municipalities with a population larger than 1.000 inhabitants in the Spanish Region of Catalonia. These municipalities include 97.2% of the total population of Catalonia. The questionnaire was designed by researchers at the University of Barcelona, and was implemented by the Catalonian Competition Commission through late 2006 and early 2007.

The implementation of the survey has allowed obtaining complete and sufficient information relative to 2006 for 255 municipalities.[6] The sample includes 56 per cent of municipalities from Catalonia that have a population above 1,000 inhabitants. As the percentage of answers to the questionnaire is higher for large municipalities, the population included in the sample represents 82.4 per cent of the total population of municipalities above 1,000 inhabitants, and 80.1 per cent of the total population of Catalonia. The information obtained in a previous survey for municipalities from Catalonia[7] at 2000 also allows comparing the dynamics of privatization and concentration in the period 2000-2006.

Table 1 displays the relative weight of the different production forms in our sample of municipalities in 2006. Such relative weight is computed both in terms of number of municipalities and of total population. Data shows that a high proportion of municipalities has contracted out to a private firm the delivery of the service. In addition, the high percentage of municipalities with private production shows a remarkable stability overtime, since it is 81.2 per cent in 2006, which is statistically equivalent to that 81.7% found for 2000 (Bel, 2006a). Percentage of population served by private firms is higher, near to 90%, and is statistically equivalent too in 2006 and 2000.

Insert table 1 about here

[6] All data obtained in the survey is available upon request.

[7] Data on the sample of municipalities that filled the questionnaire at 2000 was used in a previous study (Bel and Costas, 2006).

Concerning the analysis of competition in the market of solid waste collection, we focus on the municipalities where a private firm delivers the service. This must be the case since public firms in Spain do not usually participate in the bids for contracts, contrary to other countries like the Netherlands or Norway. In our sample, information on concentration measures refer to 200 municipalities, while data for the number of firms that participate in the bids for the last contract is just available for 154 municipalities.[8] Note also that the dynamic analysis is done just for 103 municipalities that filled the questionnaire both in 2000 and in 2006,[9] so that we can have a homogeneous sample that allows a sound comparison.

Table 2 shows the market share of he major private firms that operate in the market of solid waste collection. It is readily seen that the largest firm, Fomento de Construcciones y Contratas –FCC-, has almost 27 per cent of all contracts that represent 47 per cent of total population served by private firms. There are two other major players with market shares higher than 10 per cent both in terms of contracts and in terms of total population: Ferrovial-Cespa has 13% of the contracts and serves 15% of the population; ACS-Urbaser has 10% of the contracts and serves 17% of the population. Note that the market share of these three major players is higher in terms of population than in terms of contracts. Thus, it is clear that they tend to deliver the service in large municipalities. The rest of firms that operate in this market have a very small market share, and operate just at a regional or local level.

Insert table 2 about here

[8] From the 207 municipalities with private production that answered the questionnaire, seven (3%) did not include the name of the firm holding the contract. Hence, we have information on the private firm holding the contract for 200 municipalities. Besides this, there are 46 municipalities with private production (22% of all municipalities with private production that responded the survey) that did not report information on the number of competitors in the bids for contracts. Overall, we have information on the name of the firm holding the contract and on the number of firms participating in the last bid for the contract for 154 municipalities.

[9] It is important to note that the number of observations used in the empirical analysis increases in three units since the largest municipality of the sample, Barcelona, has divided the deliver of the service in 4 districts. Because of this, 200 municipalities in 2006 generate 203 observations. Concerning the comparison between 2000 and 2006, 103 municipalities generate 106 observations.

The three major players in Catalonia are the leading firms too in the Spanish countrywide market.[10] In 2003, FCC had 33% of the contracts and 52% of the population served by private firms. Ferrovial-Cespa had 18% of the contracts and 17% of the population. The third major player, ACS-Urbaser, had 14% of the contracts and served 16% of the population (Bel, 2006b, p. 240). Indeed, the Catalan market seems to be representative of the Spanish market as a whole regarding concentration.

Tables 3 shows the values of the most commonly used measures of concentration at 2006. The concentration rates for the one largest and the four largest firms are very high, particularly when considering population. The Hirschman-Herfindahl (HHI) index indicates a lower level of concentration in terms of contracts but a much higher degree in terms of population. Note that the firm structure of the market, which is characterized by three large firms and many small firms, explains that concentration is measured to be higher when using concentration rates than when using the HHI index. Table 4 shows that concentration has increased in about four or five points in the period 2000-2006, regardless of the measure used.

Insert table 3 about here

Insert table 4 about here

Finally, table 5 shows the number of firms that have participated in the bid for the last contract. It can be seen that the mean number of firms is always low, between 2 and 4, and that such mean number of firms tends to increase when the size of the municipality also increases. One exception refers to municipalities with population between 20.000 and 30.000 inhabitants, which have the largest average of firms in the bids of the last contracts. This may be explained by the fact that many of the municipalities in this population range are municipalities that share the same metropolitan area with the largest city in our sample, Barcelona. Hence, those municipalities may be more attractive for private firms than their

[10] And even at a supra-national level, since some of them are active players in foreign markets like the United Kingdom (Davies, 2007)

population alone would justify. In addition to this, it could well be the case that the municipalities within this range of population, while being attractive for major firms, they are not too large as to prevent some competition from local or regional players.

Insert table 5 about here

In order to test the statistical significance of the difference in number of firms in the bid for the contracts according to the size of the municipality, we have split our sample in two equivalent pieces. The first one is formed with the 84 observations with population below 10,000 inhabitants (53.5 % of our sub-sample). The second is formed with the 73 observations with population above 10,000 inhabitants (46.5 % of our sub-sample). Table 6 displays the statistical analysis of the differences, which shows that the difference between small municipalities (fewer firms) and large municipalities (more firms) is statistically significant (significance at 1%).

Insert table 6 about here

As mentioned above, the potential cost savings of privatization are conditioned upon the degree of competition in the market of local services. The concentration measures and the number of firms that participate in the bids for the contracts are the most robust indicators of the degree of competition in the market. In this sense, the high levels of concentration and the low number of firms that, on average, participate in the bids for the contracts seem to indicate that the degree of competition for the market in our sample is very soft. In addition to this, our data seem to indicate that the major firms in this market operate in large municipalities that, in turn, are those municipalities with more firms interested in winning the contracts to deliver solid waste collection.

Concentration and dominance of the largest firms in highly populated municipalities, and monopolization of contracts by local firms in small towns likely create a disturbing scenario in terms of competition. In the next section, we examine empirically the dual markets

hypothesis through the estimation of the factors explaining local government's choices of the winner in the bid for the last contract. In case that we find evidence of the dual market hypothesis, we would provide a sensible explanation of the ambiguous relationship between local privatization and costs for services with a moderate relevance of transaction costs.

4. The empirical model

Here we examine which characteristics of municipalities makes more likely that the firm that won the last contract to deliver solid waste collection is one of the major firms in the market. In our context, it is clear that the major firms are those three firms with a market share much higher than the rest of small private firms that deliver solid waste in Catalonia (as well as in Spain): FCC, Cespa and Urbaser.

In this way, we estimate the following equation for the municipalities ($m = 1,\ldots\ldots M$) where the delivery of solid waste is undertaken by a private firm:

$$D^{major}{}_{m} = a + ß_1 Population_{m} + ß_2 \%Major\_region_{c} + ß_3 Number\_firms_{m} + ß_4 D^{national\text{-}party}{}_{m} + \\ + ß_5 D^{regional\text{-}party}{}_{m} + e \qquad (1)$$

In the equation to estimate, the dependent variable (D^{major}) is a dummy variable that takes value 1 in those municipalities where the last contract to deliver solid waste was won by one of the three major firms of the market, and it takes value 0 in other case.

As explanatory variables, we include a variable for population of the municipality (*Population*) given the information provided by the Catalonian Statistics Institute, "IDESCAT", at the beginning of January 2006. We expect that major firms are more interested in winning the contracts for delivering local services in large municipalities where the amount of revenues that can be obtained is high. On the contrary, smaller firms that operate at a regional or local level will tend to operate in small municipalities. Thus, the sign of the coefficient associated to this variable is expected to be positive.

We also include a variable for the percentage of municipalities of the Region *c* in which a major firm is the holder of the contract, *%Major_region*.[11] This variable is intended to capture the influence of the geographical environment on the likelihood that a major firm has got the contract. In this sense, we expect that large firms will have interest in monopolizing geographical areas composed of several municipalities contiguously located. Indeed, the monopolization of geographical areas allows a better exploitation of scale economies that comes from sharing fixed costs with a higher amount of output. It allows also developing a pre-emption strategy, as such monopolization creates entry barriers for other firms in the corresponding municipalities of the geographical area. Thus, the sign of the coefficient associated to this variable is expected to be positive since large firms will more likely win the contracts in the municipalities of the regions in which they have a major presence.

It is worth noting here that Bivand and Symanski (2000) show that spatial correlation is present in the delivery of solid waste so that the market features in one municipality (costs, public or private firms delivering the service and the identity of the private firm if pertinent) affects the market features of the municipalities in the same neighborhood. Thus, our empirical estimation must account for the possible spatial correlation in the local government's choices of the contract winner. To this regard, our estimation procedure considers the possible correlation in the choices of local governments of the same region. In case that we find differences in the results when accounting or not for spatial correlation, we will also obtain additional evidence of the relevance of the geographical environment.

Furthermore, we include a variable that refers to the number of firms that have participated in the bid for the last contract, *Number_firms*. We expect the existence of a positive relationship between the likelihood that the contract winner is a major firm and the number of firms that have participated in the bid. Indeed, large firms will compete more

[11] In our analysis, we have used the seven regions used by the Autonomous Government of Catalonia for purposes of regional planning and policy implementation.

aggressively for the most profitable contracts in which several firms may be interested as well. On the contrary, major firms should not participate in less profitable contracts in other municipalities where just regional or local firms may have some interest. Hence, we expect a positive sign for the coefficient associated to this variable. Data for this variable is not available for all the municipalities of our sample, so that we estimate different specifications of equation (1) that are differentiated by including or not this explanatory variable.

In short, the dual market hypothesis will be confirmed in case that: 1) large firms are more likely the contract winners in large municipalities; 2) large firms tend to monopolize geographical areas (for example, those areas in which several municipalities share the same urban area); and 3) large firms are more likely the contract holders in those municipalities where a higher number of firms has participated in the last bid for the contract.

Finally, we also consider as explanatory variables two dummy variables that take value 1 when the Mayor of the municipality belongs to the Socialist Party (PSC-PSOE, $D^{national\text{-}party}$) or, alternatively, when the Mayor belongs to the regionalist Center-Right party (CiU, $D^{regional\text{-}party}$). These two parties represent a high proportion of the Mayors in the municipalities in our sample (40% and 33%, respectively),[12] and this explains that we focus the attention just on these two political parties. These two variables pretend to test an additional hypothesis to that related to the dual markets. In this way, we expect that national parties will have closer relationships with large firms that operate at the national level, while regional parties will tend to have closer relationships with smaller firms that operate at a regional or local level. Among other factors that could induce relationships of the type national firm-national party and regional firm-regional party, we can include issues related to electoral campaign financing,

[12] The other municipalities in our sample, 27%, have Mayors that belong to a wide variety of smaller parties –either national or regional–, as well as a significant number of Mayors that belong to strictly local parties.

party organization financing, or sharing information on firms by local politicians within the same party.[13]

Hence, we expect a positive sign in the coefficient of the dummy variable associated to the national party, while we expect a negative sign in the coefficient of the variable associated to the regional party. Indeed, the likelihood that a major firm is the contract holder should be higher when the Mayor of the municipality belongs to the main national party and such likelihood should be lower when the Mayor belongs to the main regional party.

5. Results

Table 7 provides some descriptive statistics of the variables used in the estimation of equation (1). It is clear from here that there is a high variability in the continuous variables. Note that half of the municipalities of our sample with private delivery have chosen a major firm. In addition to this, as noted above, a high proportion of the municipalities have a Mayor that belongs to the Socialist Party (PSC-PSOE) or to the Regionalist Center-Right party (CiU).

Insert table 7 about here

Table 8 shows the results of the estimation using the logit technique due to the binary nature of the dependent variable. We estimate different specifications of the equation for factors explaining local government choices of the contract holder. In specification (1), we do not account for spatial correlation and the variable for number of firms is not included as explanatory variable. In such a setting, specification (2) accounts for spatial correlation. In specification (3), we do not account for spatial correlation but the variable for the number of firms is included as explanatory variable. In specification (4), we also account for spatial correlation. Recall that data for the number of firms in the bid for the last contract is not available for all our sample of municipalities.

[13] Indeed, this discussion is very interesting but it goes far beyond the core interests of our analysis.

Insert table 8 about here

The overall explanatory power of the equation estimated is reasonably good, while all the variables have the expected signs. We find significant differences in the estimated standard errors whether we consider spatial correlation. Indeed, the variable for population is only significant in the specifications that account for spatial correlation. Concerning the specifications that include the number of firms as explanatory variable, it can be seen that the statistical significance of most of the explanatory variables is generally higher when accounting for spatial correlation. Thus, we find evidence that geography matters in explaining the likelihood that a large firm will be the contract holder in the corresponding municipality.

To this regard, our results show that the higher the percentage of municipalities of the region that have chosen a major firm the higher the probability that a major firm is the contract holder in the municipality. Hence, we find evidence that firms tend to monopolize geographical areas to exploit better scale economies and impose entry barriers to competitors.

More importantly, we find strong evidence in favor of the dual market hypothesis. Major firms will be more likely the contract holders in large municipalities and in those municipalities in which more firms have participated in the bid for the last contract. We can infer from this result that major firms will tend to operate in large municipalities. Although a higher number of firms participate in the bids for the most profitable contracts, the three major firms are usual bidders. Given that the average number of bidders is below 4 even in the largest municipalities, this suggest the existence of a highly oligopolistic sector in this segment of the market. Note here that the monopolization of geographical areas may also imply that some medium-sized municipalities are attractive for large firms as these municipalities may share the same urban area with a very large municipality, such as Barcelona.

On the contrary, smaller regional or local firms will be more likely the contract holders in small municipalities that, in turn, do not receive many offers in the bids for the contracts. In this way, these smaller firms may work as a local monopoly that do not suffer from competition for the market as very few firms (if any other than the incumbent) participate in the successive bids for the contract.

Dominance of major firms in large municipalities and local monopolies in small municipalities seem to indicate that the intensity of competition in local markets is lower than optimal from a social welfare point of view.

We also obtain evidence in favor of the hypothesis that firms and political parties have closer relationships according to the geographical scale in which they operate. Indeed, the coefficient of the dummy variable for a Mayor that belongs to the main national party is positive and statistically significant. Thus, we find that the likelihood that a major firm is a contract holder will be higher in those municipalities where the Mayor belongs to the main national party. Otherwise, the coefficient of the dummy variable for the Mayor that belongs to the main regional party is negative although no statistically significant. Hence, regional parties do not influence positively on the likelihood that a major firm wins a contract to deliver solid waste collection.

Table 9 indicates the results of an estimation that uses a multinomial logit technique to identify changes in local government's choices concerning the contract holder in the period 2000-2006. To account for these possible changes, we use as dependent variable a discrete variable. The variable takes value 1 if the contract holder has moved from a minor to a major firm in the considered period, value 0 if the contract holder is of the same type in the considered period (e.g. minor or major firm), and value -1 if the contract holder has moved from a major to a minor firm. Following equation (1), we use as explanatory variables the increase in the values of population and the percentage of municipalities in the region with a

major firm holding a contract in the period 2000-2006, and the values for 2006 concerning the political variables.

Note that we make the estimation for the 103 municipalities (106 observations, since the city of Barcelona provides 4 observations) that filled the questionnaire both in 2000 and in 2006. There is a high stability in the type of contract holder across the considered municipalities since only 18 of them have made a change from a minor to a major firm, and only 7 have made a change from a major to a minor firm. This should affect the results of our estimation due to the low variability of data for this dynamic estimation.

Insert table 9 about here

In any case, results from this additional estimation show that the likelihood that a major firm is a contract holder increases when the percentage of municipalities in the region that has a major as a contract holder also increases, and also increases when the Mayor belongs to the main national party. The rest of the variables have the expected signs but are not statistically significant, probably due to the mentioned fact of a high stability in the type of contract holder. From these results, we can infer that the tendency towards the monopolization of geographical areas is increasing along time and that relationships between major firms and national parties are becoming even stronger.

6. Concluding remarks

Empirical studies about the impact on costs of the private delivery of local services do not find a robust positive relationship between costs savings and privatization. One possible explanation of this ambiguous relationship is that privatization implies some transaction costs due to the use of external firms to deliver the service. However, evidence for local services that are not affected by a high amount of transaction costs, such as solid waste collection, is not conclusive either concerning the expected cost savings from privatization. An additional

explanation is the lack of competition in the markets for local services since several studies show that competition rather than ownership matters to produce efficiently local services.

In this paper, we have shown that competition may be soft in solid waste collection when there is an intensive use of private delivery. In this way, the market analyzed is characterized by a high degree of concentration and the number of firms that has participated in the bids for the contracts is relatively low.

More importantly, we have found empirical evidence in favor of the dual market hypothesis. Large firms that operate at a national level dominate the market for contracts concerning high-populated municipalities and, likely, municipalities that belong to the same urban area. Although the number of firms that participate in the bids for the contracts may be higher in these municipalities, major firms seem to win very often the award process.

Smaller firms that operate at a regional or local level dominate the market for contracts concerning low-populated municipalities and, likely, municipalities from rural areas isolated from big cities. In these cases, the number of firms that participate in the bids for the contracts may be particularly low so that the scope of competition for the market is very modest.

In short, cost savings from privatization require strong competition in the markets of contracts for local services. More attention must be devoted to the award contracting procedures to have the maximum number of effective competitors. Only in such a case, tariffs charged by contract holders will be clearly related to the costs of delivering the service.

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TABLES AND FIGURES

Table 1. Production forms for solid waste collection in Catalonia. Municipalities and Population (%). 2006

	Internal (Bureaucracy)	Public firm	Mixed public-private firm	Private firm
Municipalities N=255	6.7% n=17	6.3% n=16	5.9% n=15	81.2% n=207
Population N= 5,707,855	1.4% 77,978	7.1% 408,087	3.4% 193,500	88.1% 5,028,290

Source: Authors' from Survey on Local Services

Table 2. Market shares of contracts for local services in Catalonia. 2006 (N = 203)

Firm	Contracts (%)	Population (%)
FCC	26,96	47,42
CESPA	13,24	14,91
URBASER	10,29	17,03
A.J. RUZ	2,94	0,60
COSBAPSA	2,45	0,57
ECOSENDA	1,96	0,66
JUAN & JUAN	1,96	0,66
JAUME ORÓ	1,96	0,28
REST (<2%)	38,24	18,18

Source: Authors' from Survey on Local Services
Note: Data for name of firms available only for 200 municipalities (203 observations)

Table 3. Concentration index for solid waste collection in Catalonia. 2006 (N = 203)

Year	CR1 (%)	CR4 (%)	HHI
Contracts	26,96	53,61	0,106
Population	47,42	81,82	0,278

Source: Authors' from Survey on Local Services

Table 4. Evolution of concentration for solid waste collection in Catalonia. Population (N = 106)

Year	CR1 (%)	CR4 (%)	HHI
2000	46,82	78,44	0,268
2006	49,37	83,84	0,304

Source: Authors' from Survey on Local Services

Table 5. Number of firms in the last contract

Municipalities size	N	Mean	Standard Deviation
1000-5000	53	2.47	1.08
5000-10000	31	3.39	1.49
10001-20000	28	3.57	1.54
20001-30000	14	3.78	1.31
30001-50000	12	3.58	1.62
>50000	19	3.63	1.34
Total	157	3.19	1.43

Source: Authors' from Survey on Local Services

Note: Data for number of firms available only for 154 municipalities (157 observations)

Table 6. T-test for mean differences in number of firms in the last contract

Municipalities size	N	Mean	Standard error	T-statistic
< 10000 (1)	84	2.80	0.14	-
> 10000 (2)	73	3.63	0.16	-
Differences (1) – (2)	-	-0.83	0.22	-3.72***

Note: Significance at 1% (***), 5% (**), 10% (*)

Source: Authors' from Survey on Local Services

Table 7. Descriptive Statistics (N = 203, Year = 2006)

	Continuous variables			
	Mean	**Standard Deviation**	**Minimum**	**Maximum**
Population	25,388.64	62,356.84	1,052	401,401
%Major-region	48.60	16.69	0	66.7
Number-Firms	3.19	1.43	1	8
	Discrete variables			
	Total observations	**Number of observations with value 1**	**Number of observations with value 0**	
D^{major}	203	100	103	
$D^{national\text{-}party}$	203	82	121	
$D^{regional\text{-}party}$	203	67	136	
$D^{other\text{-}parties}$	203	54	149	

Note: Data for number of firms available only for 154 municipalities (157 observations)

Source: Authors' from Survey on Local Services

Table 8. Estimates of the equation (logit). Period: 2006

	Specification (1)	Specification (2)	Specification (3)	Specification (4)
Population	6.56e-06 (5.00e-06)	6.56e-06 (2.98e-06)**	0.00001 (9.20e-06)	0.00001 (7.23e-06)**
%Major_region	0.038 (0.009)***	0.038 (0.008)***	0.021 (0.011)*	0.021 (0.009)**
$\mathbf{D^{national\text{-}party}}$	0.83 (0.38)**	0.83 (0.18)***	0.81 (0.45)*	0.81 (0.24)***
$\mathbf{D^{regional\text{-}party}}$	-0.55 (0.40)	-0.55 (0.43)	-0.54 (0.47)	-0.54 (0.35)
Number-Firms	-	-	0.25 (0.14)*	0.25 (0.08)***
Intercept	-2.25 (0.56)***	-2.25 (0.33)***	-2.23 (0.64)	-2.23 (0.32)***
N	203	203	157	157
Pseudo R^2	0.16	0.16	0.19	0.19
χ^2 (joint sig.)	33.18***	404.54***	30.51***	126.00***
Log pseudolikelihood	-116.60	-116.60	-87.51	-87.51

Note 1: Specification (1); No Correction for spatial correlation & variable for number of firms no included.
Specification (2); Correction for spatial correlation & variable for number of firms no included.
Specification (3); No Correction for spatial correlation & variable for number of firms included.
Specification (4); Correction for spatial correlation & variable for number of firms included.
Note 2: Standard errors in parentheses (robust to heteroscedasticity)
Note 3: Significance at 1% (***), 5% (**), 10% (*)
Note 4: In specification (4), $D^{regional\text{-}party}$ is significant at 13%

Table 9. Estimates of the dynamic equation (multinomial logit). Period: 2000-2006

	Specification (1)	Specification (2)
-1 (from major to minor)		
?Population	1.81 (1.84)	1.81 (1.50)
?%Major_Region	-3.19 (1.89)*	-3.19 (1.55)**
$\mathbf{D^{national\text{-}party}}$	-1.24 (1.02)	-1.24 (0.73)*
$\mathbf{D^{regional\text{-}party}}$	-0.88 (0.95)	-0.88 (0.68)
Intercept	-1.51 (0.59)	-1.51 (0.51)***
1 (from minor to major)		
?Population	1.35 (2.34)	1.35 (1.01)
?%Major_Region	1.82 (0.90)**	1.82 (0.35)***
$\mathbf{D^{national\text{-}party}}$	2.23 (1.02)**	2.23 (1.08)**
$\mathbf{D^{regional\text{-}party}}$	0.56 (1.27)	0.56 (1.46)
Intercept	-3.75 (1.03)***	-3.75 (1.09)***
N	106	106
Pseudo R^2	0.12	0.12
χ^2 (joint sig.)	17.59***	48.75***
Log pseudolikelihood	-63.58	-63.58

Note 1: Specification (1); No Correction for spatial correlation
Specification (2); Correction for spatial correlation
Note 2: Standard errors in parentheses (robust to heteroscedasticity)
Note 3: Significance at 1% (***), 5% (**), 10% (*)
Note 4: D^{Cmajor} (from 0 to -1: 7 observations, from 0 to 1 observations: 18, no change: 81)