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**PRIVATIZATION AND COMPETITION IN THE DELIVERY
OF LOCAL SERVICES: AN EMPIRICAL EXAMINATION
OF THE DUAL MARKET HYPOTHESIS**

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

Abstract:

This paper empirically analyses the hypothesis of the existence of a dual market for contracts in local services. Large firms that operate on a 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 least populated and/or rural municipalities. The dual market implies the high concentration and dominance of major firms in large municipalities, and local monopolies in the smaller ones. This market structure is harmful to 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.

Keywords: Competition, Concentration, Local Services, Privatization

1. Introduction

Privatization of local services has been a major 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 achieving cost savings in service delivery.¹ According to this view, private firms would be able to exploit scale economies through the aggregation of production across several territorial jurisdictions (Donahue, 1989) since many local services have a significant amount of fixed costs. In this respect, however, municipal jurisdictions do not usually fit the optimum geographical scale from a production point of view. To the extent that the considered local service is affected by scale economies, it may be technically more efficient that a single 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. Unlike public managers, private managers are able to claim the property rights of innovations.

Furthermore, privatization may promote competition in the market for 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 a single firm delivers the service in the corresponding municipality. However, an efficient allocation of resources may

¹ Bel and Fageda (2007a) provide a recent, comprehensive review of empirical evidence on the motivations for privatizing local services.

be obtained through competition *for* the market (Chadwick, 1859; Demsetz, 1968). According to this view, privatization is implemented through contracts with external firms that obtain the right to deliver the service in the municipality for a specified number of years.² As long as several firms can compete for the contract, there is room for competition for the market.

Although several reasons may explain why local privatization leads to cost savings, there is no agreement in 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 in 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 empirical analysis aimed at testing the hypothesis that such a dual market for delivery contracts exists. We claim that large firms that operate on a national (or even supranational) basis will control the contracts for delivering the service in the most

² Contracting out and transferring firms to the private sector differ in many aspects. However, contracting out 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.

populated and/or urban municipalities, whereas small firms that operate at a local level will have the contracts for delivering the service in the least populated and/or rural municipalities. The existence of a dual market may imply the high concentration and dominance of major firms in large municipalities, and local monopolies in the smaller ones. This market structure would be harmful to competition *for* the market as the effective number of competitors in each contract tender would be low across all municipalities. Hence, the opportunities for obtaining cost savings from privatization would be seriously damaged.

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

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

2. Relationship to the literature

One possible explanation for the ambiguous effects of local privatization on cost concerns transaction costs. All the cost advantages of privatization mentioned above must be put in relation to the higher transaction costs that may be associated with not producing the service internally (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 large

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

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 studies that are more recent do not find a positive relationship for the service (Boyne, 1998; Bel and Warner, 2007). An alternative explanation of the ambiguous relationship between privatization and costs in solid waste collection concerns the degree of competition for contracts in the markets. While transaction costs should not explain the disappointing results of privatization in solid waste collection, the literature is in agreement that, with regard to the efficiency of service delivery, competition matters more than the form of production (Vickers and Yarrow, 1988; Hodge, 2000).

In this respect, scale economies in solid waste collection usually make it advisable for just one firm to operate 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 exploited as the population of the municipality increases (Pommerehne and Frey, 1977; Stevens, 1978, Callan and Thomas, 2001; Dijkgraaf and Gradus, 2003; Bel,

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, easy measurement) and 5 (high specificity, difficult measurement). They find an asset specificity of 3.00 and an ease of measurement of 2.06 for residential solid waste, and commercial waste ratings are 3.06 and 1.97, respectively. In both cases, these ratings are significantly below the ratings found for services with high asset specificity like water distribution. Levin and Tadelis (2007) build indicators based on the difficulty of contracting, as perceived by city managers, and find that the difficulty of contracting is below average for all services related to waste.

2006a). In this way, scale economies in solid waste collection are particularly significant for small and medium-sized municipalities.⁴

An effective number of competitors in contract tenders must go hand in hand with the technical efficiency that can be obtained from a single firm operating in 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 contracts will likely be a major determinant of the cost savings that can be obtained from privatization in solid waste collection.

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 if several firms participate in subsequent contract tenders and can effectively compete with the incumbent will competition for the market be ensured.

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 regarded as a disturbing issue. Indeed, it is sensible to argue that a high level of concentration may reduce the number of effective competitors in contract tenders. Hence, soft competition for the market should induce lower chances of cost savings from privatization.

⁴ It is worth noting here that small municipalities may use inter-municipal cooperation as a possible alternative to exploiting scale economies, and such an organizational form, therefore, may also affect the cost savings that can be obtained from privatization (Bel and Fageda, 2007b).

Empirical evidence about the relationship between privatization, competition and costs in the delivery of solid waste collection is scarce. However, some studies have found that competition has a clear effect on costs. Domberger, Meadowcroft and Thompson (1986), Szymanski and Wilkins (1993) and Szymanski (1996) obtain empirical evidence for the United Kingdom showing that the use of competitive tendering for contracts explains differences in solid waste collection delivery costs across a rich sample of municipalities. On the other hand, Domberger, Meadowcroft and Thompson (1986), and Szymanski and Wilkins (1993) do not find significant differences in whether the contract holder is a public or a private firm within a competitive framework. Gómez-Lobo and Szymanski (2001), however, find that the number of competitors in contract tenders does have 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 countries other than the United Kingdom. As far as we know, only studies for the Netherlands and Spain have examined how competition influences the costs of local services. 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 when 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 when bidding for contracts. Lastly, Bel and Costas (2006) empirically analyze whether contracting out is, effectively, a process that converges 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 seven years, they find that costs in cities with

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.

recent privatization are lower than costs under public production. However, no significant differences in costs are found between municipalities with old privatization and those using public production.

Next we test a new hypothesis that relates to a different (but equally concerning) competition scenario in small and large municipalities. Specifically, 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 most profitable contracts, while the typical market structure for small municipalities is a local monopoly with very few players in subsequent contract tenders.

3. Data

Most of the data used in our empirical analysis have been obtained from a Survey on Local Services Production. The questionnaire asked different organizational aspects of the delivery, such as production form—whether bureaucracy, public firm, mixed public-private firm, or private firm—the name of the firm that holds the contract, the number of firms in contract tenders, and so on. It was directed at municipalities with over 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 it was implemented by Catalonia's Competition Commission in late 2006 and early 2007.

The implementation of the survey has provided complete and sufficient information regarding the year 2006 for 255 municipalities.⁶ The sample includes 56% of the municipalities in Catalonia that have a population of over 1,000 inhabitants. As the percentage of responses to the questionnaire is higher for large municipalities, the population

⁶ All data obtained in the survey are available upon request.

included in the sample represents 82.4% of the total population of municipalities of more than 1,000 inhabitants, and 80.1% of the total population of Catalonia. In addition, the information obtained in 2000 through an earlier survey of municipalities in Catalonia⁷ makes it possible to compare 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. Relative weight is computed in terms of both the number of municipalities and the total population. The data show that a high proportion of municipalities have contracted out the delivery of the service to a private firm. In addition, the high percentage of municipalities with private production shows a remarkable stability over time, since it is 81.2% in 2006, which is statistically equivalent to the figure of 81.7% found for 2000 (Bel, 2006a). The percentage of population served by private firms is higher, nearly 90%, and it is also statistically equivalent in 2006 and 2000.

Insert table 1 about here

Concerning the analysis of competition in the market for 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 contract tenders, unlike in other countries such as the Netherlands and Norway. In our sample, information on concentration measures refer to 200 municipalities, while data on the number of firms that have participated in the most recent contract tender are only available for 154 municipalities.⁸ Note also that the

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

⁸ From the 207 municipalities with private production responding to 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. In addition, there are 46 municipalities with private

dynamic analysis is done only for the 103 municipalities that filled out the questionnaire both in 2000 and in 2006,⁹ so that we can have a homogeneous sample for sound comparison.

Table 2 shows the market share of the major private firms that operate in the market for solid waste collection. It is readily seen that the largest firm, Fomento de Construcciones y Contratas (FCC), has almost 27% of all contracts, representing 47% of the total population served by private firms. There are two other major players with market shares higher than 10%, both in terms of contracts and in terms of total population: Ferrovial-Cespa has 13% of the contracts and serves 15% of the population and 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 service in large municipalities. The remaining firms operating in this market have a very small market share, and operate only at a regional or local level.

Insert table 2 about here

The three major players in Catalonia are the leading firms in the Spanish countrywide market as well.¹⁰ In 2003, FCC had 33% of the contracts and 52% of the population served

production (22% of all municipalities with private production that responded to the survey) that did not report information on the number of competitors in contract tenders. Overall, we have information on the name of the firm holding the contract and on the number of firms participating in the most recent contract tender for 154 municipalities.

⁹ It is important to note that the number of observations used in the empirical analysis increases by three units since the largest municipality in the sample, Barcelona, has divided the delivery of the service into four districts. As a result, 200 municipalities in 2006 generate 203 observations. Concerning the comparison between 2000 and 2006, 103 municipalities generate 106 observations.

¹⁰ And even at a supranational level, since some of them are active players in foreign markets like the United Kingdom (Davies, 2007).

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.

Table 3 shows the values of the most commonly used measures of concentration in 2006. The concentration rates for the single largest firm 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 structure of the market, which is characterized by three large firms and many small firms, explains why concentration is found to be higher when using concentration rates than when using the HHI index. Table 4 shows that concentration has increased by 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

Lastly, table 5 shows the number of firms that have participated in the most recent contract tender. It can be seen that the mean number of firms is always low, between two and four, and that the mean number of firms tends to increase when the size of the municipality also increases. One exception arises in municipalities of between 20,000 and 30,000 inhabitants, which have the largest average of firms in the most recent contract tender. 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 to private firms than their population alone would warrant. In addition to this, it could well be the case that the

municipalities within this range of population, while being attractive to major firms, 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 the number of firms in contract tenders by municipality size, we have split our sample into two equivalent halves. The first is made up of the 84 observations for populations below 10,000 inhabitants (53.5 % of our subsample). The second is made up of the 73 observations for populations above 10,000 inhabitants (46.5 % of our subsample). 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 from privatization are conditioned upon the degree of competition in the market for local services. The concentration measures and the number of firms participating in contract tenders 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 contract tenders seems to indicate that the degree of competition for the market in our sample is very soft. In addition, 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.

The concentration and dominance of the largest firms in highly populated municipalities, and the monopolization of contracts by local firms in small towns likely create a disturbing scenario in terms of competition. In the next section, we empirically examine the dual market hypothesis by estimating the factors explaining local government's selection of the winner in the most recent contract tender. Should we find evidence of the dual market hypothesis, we

will have provided a sensible explanation of the ambiguous relationship between local privatization and costs for services where transaction costs are of moderate significance.

4. The empirical model

Here we examine which characteristics of municipalities increase the likelihood 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 considerably higher than the rest of the small private firms that deliver solid waste in Catalonia (as well as in Spain): FCC, Cespa and Urbaser.

Along these lines, we estimate the following equation for municipalities ($m = 1, \dots, M$) where the delivery of solid waste is undertaken by a private firm:

$$D^{major}_m = \alpha + \beta_1 Population_m + \beta_2 \%Major_region_c + \beta_3 Number_firms_m + \beta_4 D^{national-party}_m + \beta_5 D^{regional-party}_m + \varepsilon \quad (1)$$

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

As explanatory variables, we include a variable for the population of the municipality (*Population*), given by the information provided by the Catalan 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. By contrast, smaller firms that operate at a regional or local level will tend to operate in small municipalities. Thus, the sign of the coefficient associated with this variable is expected to be positive.

We also include a variable for the percentage of municipalities in 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 secured the contract. In this regard, we expect that large firms will be interested in monopolizing geographical areas composed of several municipalities that are contiguous. Indeed, monopolizing geographical areas allows for a better exploitation of scale economies that come from sharing fixed costs at a higher level of output. It also enables the development of a pre-emption strategy, since monopolization creates entry barriers for other firms in the corresponding municipalities of the geographical area. Thus, the sign of the coefficient associated with this variable is expected to be positive, since large firms are more likely to 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 of one municipality (costs, public or private firms delivering the service, and the identity of the private firm, if relevant) affect the market features of the municipalities in its vicinity. Thus, our empirical estimation must account for any possible spatial correlation in the local government's selection of the contract winner. To do so, our estimation procedure considers the possible correlation in the selections of local governments in the same region. Should we find differences in the results when spatial correlation is or is not accounted for, we will also obtain additional evidence of the significance of the geographical environment.

Furthermore, we include a variable for the number of firms that have participated in the most recent contract tender, $Number_firms$. We anticipate the existence of a positive relationship between the likelihood that the contract winner is a major firm and the number of

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

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

In short, the dual market hypothesis will be confirmed if: 1) large firms are more likely to be 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); or 3) large firms are more likely to be the contract holders in those municipalities where a higher number of firms has participated in the most recent contract tender.

Finally, we also consider as explanatory variables two dummy variables that take a value of 1 when the mayor of the municipality belongs to the Socialist Party (PSC-PSOE, $D^{\text{national-party}}$) or, alternatively, when the mayor belongs to the regionalist center-right party (CiU, $D^{\text{regional-party}}$). These two parties represent a high proportion of the mayors in the municipalities in our sample (40% and 33%, respectively),¹² and this explains why we focus our attention only on these two political parties. The two variables aim to test an additional hypothesis to the dual market hypothesis. 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.

¹² The other municipalities in our sample, comprising 27%, have mayors who belong to a wide variety of smaller parties—either national or regional—as well as a significant number of mayors who belong to strictly local parties.

Among other factors that could lead to relationships of the national firm-national party type and the regional firm-regional party type, we can include issues related to electoral campaign financing, party organization financing, and 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 with the national party, while we expect a negative sign in the coefficient of the variable associated with 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 the 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 them that there is a high variability in the continuous variables. Note that half of the municipalities in our sample that have private delivery have chosen a major firm. In addition to this, as noted above, a high proportion of the municipalities have a mayor who 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 because of the binary nature of the dependent variable. We estimate different specifications of the equation for factors explaining local government selection of the contract holder. In specification (1), we do not account for spatial correlation and the variable for the number of firms is not included as an explanatory variable. Specification (2) accounts for spatial correlation in the same

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

circumstances. In specification (3), we do not account for spatial correlation but the variable for the number of firms is included as an explanatory variable. In specification (4), we do account for spatial correlation. Recall that data on the number of firms in the most recent contract tender are not available for our entire sample of municipalities.

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 or not we consider spatial correlation. The variable for population, however, is only significant in the specifications that do account for spatial correlation. Concerning the specifications that include the number of firms as an 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.

In this regard, our results show that the higher the percentage of municipalities in the region that have chosen a major firm, the higher the probability that a major firm will be 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 are more likely to be the contract holders in large municipalities and in those municipalities in which more firms have participated in the most recent contract tender. 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 usually bidders as well. Given that the average number of bidders is below four even in the largest municipalities, this suggests 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 to large firms as these municipalities may share the same urban area with a very large municipality, such as Barcelona.

By contrast, smaller regional or local firms are more likely to be the contract holders in small municipalities that, in turn, do not receive many bids in contract tenders. In this way, the smaller firms may work as a local monopoly and not suffer from competition for the market, since very few firms (if any, other than the incumbent) participate in subsequent contract tenders.

The dominance of major firms in large municipalities and local monopolies in small municipalities seems 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 who 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 mayors belonging to the main regional party is negative although not statistically significant. Hence, regional parties do not positively influence the likelihood of a major firm winning 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 selection concerning the contract holder in the period 2000-2006. To account for these possible changes, we use a discrete variable as a dependent variable. The variable takes a value of 1 if the contract holder has moved from a minor to a

major firm in the considered period, a value of 0 if the contract holder is of the same type in the considered period (e.g. a minor or major firm), and a value of -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 for 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 four observations) that filled out 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 seven have made a change from a major to a minor firm. This should have an effect on 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 have a major firm as a contract holder also increases, and it increases when the mayor belongs to the main national party as well. The rest of the variables have the expected signs but are not statistically significant, probably due, as mentioned, to the fact that there is 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 over time and that the 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 for 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 degree 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 is of importance in producing local services efficiently.

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 sense, the market analyzed is characterized by a high degree of concentration and the number of firms that have participated in contract tenders 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 in highly populated municipalities and, it would appear, in municipalities that belong to the same urban area. Although the number of firms that participate in contract tenders may be higher in these municipalities, major firms seem very often to win the award process.

Smaller firms that operate at a regional or local level dominate the market for contracts in less-populated municipalities and, it would appear, in municipalities from rural areas isolated from big cities. In these cases, the number of firms that participate in contract tenders 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 ensuring that the award contracting procedures have the maximum number of effective competitors. Only in such a case will the tariffs charged by contract holders 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: Obtained by the 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: Obtained by the authors from survey on local services.

Note: Data on name of firms available for only 200 municipalities (203 observations).

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

	CR1 (%)	CR4 (%)	HHI
Contracts	26.96	53.61	0.106
Population	47.42	81.82	0.278

Source: Obtained by the 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: Obtained by the authors from survey on local services.

Table 5. Number of firms in most recent contract tender

Municipality 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: Obtained by the authors from survey on local services

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

Table 6. T-test for mean differences in number of firms in most recent contract tender

Municipality 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: Obtained by the 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-party}	203	82	121	
D^{regional-party}	203	67	136	
D^{other-parties}	203	54	149	

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

Source: Obtained by the 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)**
D^{national-party}	0.83 (0.38)**	0.83 (0.18)***	0.81 (0.45)*	0.81 (0.24)***
D^{regional-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 not included.

Specification (2): Correction for spatial correlation & variable for number of firms not 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 heteroskedasticity).

Note 3: Significance at 1% (***), 5% (**), 10% (*).

Note 4: In specification (4), D^{regional-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)		
ΔPopulation	1.81 (1.84)	1.81 (1.50)
Δ%Major_Region	-3.19 (1.89)*	-3.19 (1.55)**
D^{national-party}	-1.24 (1.02)	-1.24 (0.73)*
D^{regional-party}	-0.88 (0.95)	-0.88 (0.68)
Intercept	-1.51 (0.59)	-1.51 (0.51)***
1 (from minor to major)		
ΔPopulation	1.35 (2.34)	1.35 (1.01)
Δ%Major_Region	1.82 (0.90)**	1.82 (0.35)***
D^{national-party}	2.23 (1.02)**	2.23 (1.08)**
D^{regional-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 heteroskedasticity).

Note 3: Significance at 1% (***), 5% (**), 10% (*).

Note 4: D^{major} (from 0 to -1: 7 observations, from 0 to 1 observations: 18, no change: 81).



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