

## **BIG GUYS EAT BIG CAKES: FIRM SIZE AND CONTRACTING IN URBAN AND RURAL AREAS**

**Abstract:** A great deal of attention has been devoted to the analysis of different levels of privatization in urban and rural areas. However, no empirical study has been carried until now on what types of firms are present in different geographical environments. Our analysis shows that large firms that operate on national basis dominate the contracts for delivery in the most populated and urban municipalities, whereas small firms that operate at a local level usually have the contracts in the less populated and rural municipalities. This market structure may be harmful for competition in both types of municipalities, damaging the likelihood of obtaining cost savings from privatization.

**Keywords:** Local Services, Privatization, Contracting, Urban areas, Rural areas

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.<sup>1</sup>

However, there is no agreement in the empirical literature on the relationship between privatization and costs. In fact, recent surveys do not find a systematic superiority of private production (Hirsch 1995; Boyne 1998; Hodge 2000). 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). Hence, policy analysis has stressed the fact that weakly competitive markets may fail to deliver the costs savings expected, and the importance for public managers to manage the market to ensure competition (Brown and Potoski 2003a, 2004, 2005; Hefetz and Warner 2004; Lamothe, Lamothe and Feiock 2008; Warner and Hefetz 2008).

Lack of effective competition can be especially severe in small and rural municipalities, as they usually have fewer numbers of private contractors available. Since the seminal work

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<sup>1</sup> Bel and Fageda (2007) provide a recent and comprehensive review of empirical evidence on motivations of privatization of local services.

by Ferris (1986), many empirical studies for the US have tested the hypothesis that local governments do contract more to produce services in metropolitan than in rural areas since the market for local services is thicker in the former areas. In particular, Warner and Hefetz (2002, 2003) show that high-income suburbs take the highest benefit from market-based approaches in comparison to central cities and rural areas. Brown and Potoski (2003a) find that the use of contracts in metropolitan and urban areas with different levels of population depends on the ability of achieving scale economies by internal production and the number of potential contract partners that are available when externalizing the service delivery.

The empirical literature that analyses the different intensity in the use of contracts by local governments to produce services in central cities, suburbs or rural areas is extensive. We contribute to this literature by examining what types of firms are present in different geographical environments. Indeed, 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 urban municipalities, whereas small firms that operate at a local level will usually have the contracts for delivering the service in the less populated and/or rural municipalities.

Our empirical analysis 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.

We find empirical evidence of differences in the type of firms that operate in different geographical environments. Large firms that operate at a national level dominate the market for contracts concerning high-populated municipalities and municipalities that belong to the same metropolitan area. On the contrary, smaller firms that operate at a regional or local level dominate the market for contracts concerning low-populated municipalities and

municipalities from rural areas isolated from big cities. Additionally, in small municipalities and rural areas, 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.

Results of the empirical analysis 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 both types of municipalities.. Hence, the opportunities for obtaining cost savings from privatization would be strongly damaged both for urban and rural municipalities.<sup>2</sup>

Important policy implications emerge from our analysis: public managers need to know and use different tools available to stimulate competition in the market. In this way, service delivery can be segmented into multiple districts (when the dimension of the jurisdiction is large enough so that scale economies are not lost), so that yardstick competition can be introduced within a jurisdiction. In the same way, public managers can be active in looking for new bidders that operate in other geographic areas beyond its jurisdiction to promote spillover effects. Additionally, publicly owned units can be encouraged to compete for contracts outside their own jurisdiction, so that the number of available external vendors increases.

The rest of the paper is organized as follows. Next, we refer to studies that are related to our object of study and are related to our empirical analysis. Then, we explain the characteristics of the survey from which data are obtained, and examine results of the survey concerning production form and market structure indicators. In the following section, we develop an empirical model to identify local government choices of contract holders and then we discuss our results. Finally, we draw our main conclusions.

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<sup>2</sup> Unfortunately, our survey does not provide data for service delivery costs (which are not publicly available, either). Therefore, we cannot evaluate how the problems for competition caused by market differentiation between urban and rural areas may affect performance.

## RELATIONSHIP TO THE LITERATURE

In this section, we briefly review literature directly related to our analysis. First, we pay attention to theoretical and empirical studies on the relationship between privatization, competition and costs. Second, we review empirical analysis on the differences in privatization between urban and rural areas.

### **Privatization, competition and costs**

Achieving costs savings has been a major motivation for local privatization in services delivery. 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.<sup>3</sup>

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

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<sup>3</sup> 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 2008).

to deliver the service in the municipality for a specified number of years.<sup>4</sup> 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, as mentioned above. One possible explanation of the ambiguous effects of local privatization on costs relates to 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 2003b; Levin and Tadelis 2009). 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 waste collection since this service delivery is not particularly complex (Brown and Potoski 2005; Levin and Tadelis 2009).<sup>5</sup>

However, the relationship between privatization and costs for solid waste collection is by no means clear even if transaction costs may be low for this service. Early studies in the seventies and eighties tended to find cost savings from privatization in solid waste collection, but recent studies do not find such positive relationship for this service (Boyne 1998; Bel and Warner 2008). 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

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<sup>4</sup> 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.

<sup>5</sup> 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 (2009) 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.

of privatization in solid waste collection, competition seems to matter more than the form of production concerning services delivery efficiency (Vickers and Yarrow 1988; Hodge 2000).

Empirical evidence about the relationship between privatization, competition and costs in the delivery of solid waste collection is scarce. However, some studies have found empirical evidence of the effect of competition on costs for the United Kingdom (Domberger, Meadowcroft and Thompson 1986; Szymanski and Wilkins 1993; Szymanski 1996; Gómez-Lobo and Szymanski 2001). Other studies for the 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 in the Dutch market. Finally, Bel and Costas (2006) show that contracting out in Spain is a process that converges to a bilateral monopoly to the extent that costs in cities with recent privatization are lower than costs under public delivery, but no significant differences in costs between cities with old privatization and those using public delivery are found.<sup>6</sup>

### **Differences in privatization between urban and rural areas**

While the empirical literature that studies the relationship between privatization, competition and costs is scarce, many works test the hypothesis that local governments would use contracts more often in those cities where the potential number of vendors should be higher.

Since the seminal work of Ferris (1986), several empirical studies for US analyze whether privatization may be more likely in large urban areas. This is so since markets for local services may be more competitive in those municipalities than in rural areas (Morgan, Hirlinger and England 1988; Ferris and Graddy 1988; Stein 1990; Benton and Menzel 1992; Miranda 1994; Hirsch 1995; Greene 1996; Nelson 1997; Kodrizek 1998).

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<sup>6</sup> Note that the dynamics of contracting out local services 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 when several firms participate in the successive bids for contracts and they may effectively compete with the incumbent, competition for the market is strong.

More recent studies using more robust techniques and wider samples of US municipalities have also tested service delivery choices of local governments distinguishing between rural and urban municipalities (Warner and Hefetz 2002, 2003; Brown and Potoski 2003a; Walls, Macauley and Anderson 2005; Warner 2007; Levin and Tadelis 2009).

Warner and Hefetz (2002) and Warner (2007) develop a discriminant analysis for several local services to show that privatization to for-profit firms is highest among suburbs of metropolitan areas, while public production is more common in core metropolitan cities and rural areas. They argue that suburbs take the highest benefit from market-based approaches due to their higher levels of income. Warner and Hefetz (2003) obtain similar results by estimating probit multivariate regressions.

Brown and Potoski (2003a) examine factors explaining production choices of governments for a wide range of local services and focus on those aspects that influence the amount of transaction costs involved. They argue that transaction costs from contracting may be higher in less competitive markets since local governments may not have the information on prices and quality provided by different firms in the successive bids for the contract. In this regard, they consider that local markets should be more competitive in more populated and metropolitan areas with larger number of potential contract partners. Their empirical analysis shows that, within metropolitan areas, contracting is more likely in smaller municipalities. Indeed, the largest ones do not take advantage of markets due to their ability to exploit scale economies. Regarding non-metropolitan areas, they find that contracting is more likely in larger municipalities since they are not large enough to exploit economies of scale and they have more potential vendors than smaller rural areas.

Walls, Macauley and Anderson (2005) estimate a multinomial logit to identify the determinants of organizational forms in residential waste management. As in other studies that consider several services, they find as well that suburbs are more prone to contract to for-

profit private firms than rural areas, and there is a prevalence of internal production in central cities. They claim that historical facts may explain that result.

On their side, Levin and Tadelis (2009) develop a theoretical model with an empirical application to explain the determinants of privatization controlling for several service and city characteristics. They show that large and urban municipalities do more contracting since they face less contract difficulties than small and rural municipalities face. Their analysis indicates that contract difficulties in small and rural areas are due to the fact that these municipalities face a thin market of external providers.

In a recent paper, Lamothe, Lamothe and Feiock (2008) check as well the hypothesis that delivery contracts should be more likely in areas where markets are more competitive. To test their hypothesis they use –as other studies do- a dummy variable indicating whether the city is located in a metropolitan area. Interestingly, they use as well a variable indicating the total number of private service firms in the county where the city is located. While the metro variable shows no significance, the number of total private firms is positively and significantly associated with contracting out, although the effect is not particularly strong. Lamothe, Lamothe and Feiock emphasize that the small effect they find could be attributed to the fact that they consider the total number of private service firms, rather than the actual number of potential vendors for each service.

To sum up, a great deal of attention has been devoted to the varying intensity in the use of contracts by governments for service delivery in central cities, suburbs and rural areas. However, previous works do not examine what types of firms are present in different geographical environments. Next, we test a new hypothesis that relates to a different (but equally distressing) competition scenario in large and urban municipalities in comparison to small and rural areas. 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.

## **DATA AND SOURCES**

Most data used in our analysis was obtained from a Survey on Local Services Production. The questionnaire asked different organizational aspects, such as production form (whether public internal –bureaucracy-, publicly owned firm, mixed public-private firm, or private firm),<sup>7</sup> the name of the firm holding the contract, and the number of firms in the bids for contracts. It was sent to cities with population larger than 1.000 inhabitants in the Spanish Region of Catalonia. These cities include 97.2 percent of the total population of Catalonia. The questionnaire was designed by researchers at the University of Barcelona, and was implemented by the Catalanian Competition Commission through late 2006 and early 2007.

The implementation of the survey has allowed obtaining sufficient information relative to 2006 for 255 municipalities (all data obtained in the survey are available upon request). The sample includes 56 percent of municipalities from Catalonia that have a population above 1,000 inhabitants. As the percentage of answers to the questionnaire is higher for large cities, the population included in the sample represents 82.4 percent of the total population of municipalities above 1,000 inhabitants, and 80.1 percent of the total population of Catalonia. The information obtained from a previous survey for municipalities in Catalonia<sup>8</sup> at 2000 also allows comparing the dynamics of privatization and concentration in the period 2000-2006.

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<sup>7</sup> In the publicly owned firms (public firms henceforth) the government has control over the organization of the service delivery. However, public firms are managed and organized under private commercial law rules, which means they have wide flexibility regarding crucial factors such as labour organization and inputs purchases. Hence, the autonomy of managers is much greater with a public firm than under bureaucratic delivery. Mixed public-private firms are firms where ownership is divided between the government and the private sector. Usually, the government retains a control stake in the firm, but the firm operates under private commercial law. The private partner tends to be a large firm with a solid position in the market for private production of the particular local service. Warner and Bel (2008) provide a detailed analysis of these organizational forms in Spain.

<sup>8</sup> Data on the cities that contributed to the 2000 Survey was used in a previous study (Bel and Costas 2006).

The urban structure of Catalonia is quite representative of Spain as a whole. Average population of Catalonian cities was 7,542 inhabitants in 2006, whereas average population of the Spanish municipalities was 5,513. These figures are relatively close to those of other Southern European countries such as Italy and France, but significantly smaller than that of most countries in central and northern Europe. Private delivery of solid waste is hegemonic in Catalonia, as it is in Spain. In fact, the population served by private firms in Catalonia is close to 90%, higher than the Spanish percentage (67%). The three major players in the Catalan market for solid waste (Fomento de Construcciones y Contratas –FCC-, Ferrovial-Cespa and ACS-Urbaser) are the three largest in the Spanish market as well (Bel 2006). Overall, we believe that the solid waste market in Catalonia is representative of that in the rest of Spain.

### **THE MARKET STRUCTURE**

The relative weight of the different production forms in our sample of municipalities in 2006 is shown in table 1. We compute such relative weight both in terms of number of municipalities and of total population. Data show 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 percent in 2006, which is statistically equivalent to that 81.7 percent found for 2000 (Bel 2006). Percentage of population served by private firms is higher, near to 90 percent, and is statistically equivalent too in 2006 and 2000.

**Insert table 1 about here**

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 are just available for 154 municipalities.<sup>9</sup> Note also that the dynamic analysis is done just for 103 municipalities that filled the questionnaire both in 2000 and in 2006,<sup>10</sup> so that we can have a homogeneous sample that allows a sound comparison.

Table 2 shows the market share of the major private firms that operate in the market of solid waste collection. The largest firm, Fomento de Construcciones y Contratas –FCC-, has almost 27 percent of all contracts, which represents more than 47 percent of total population served by private firms. There are two other major players with market shares higher than 10 percent both in terms of contracts and in terms of total population: Ferrovial-Cespa has 13 percent of the contracts and serves almost 15 percent of the population; ACS-Urbaser has almost 11 percent of the contracts and serves 18 percent 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**

As mentioned above, the three major players in Catalonia are the leading firms as well in the Spanish countrywide market.<sup>11</sup> In 2003, FCC had 33 percent of the contracts and 52 percent of the population served by private firms. Ferrovial-Cespa had 18 percent of the

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<sup>9</sup> 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, 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. Non-respondent cities do not look systematically different from respondent cities in the rest of crucial variables, so we believe our survey does not have non-response bias. Overall, we have information on the name of the firm and on the number of firms participating in the last bid for the contract for 154 municipalities.

<sup>10</sup> 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 delivery 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.

<sup>11</sup> And even at a supra-national level, since some of them are active players in foreign markets like the United Kingdom (Davies, 2007)

contracts and 17 percent of the population. The third major player, ACS-Urbaser, had 14 percent of the contracts and served 16 percent of the population (Bel, 2006, 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 for population. Note that the firm structure of the market -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.

In order to analyze the degree of competitiveness in the solid waste market in Catalonia we can take as benchmark the official guidelines on market structure and competition used in the United States and in Europe. According to the Federal Trade Commission and the US Department of Justice, markets can be categorized as unconcentrated (HHI below 0.10), moderately concentrated (HHI between 0.10 and 0.18) and highly concentrated (HHI above 0.18). The European Commission establishes that competition may be considered tough enough in markets with a HHI below 0.20. Table 3 indicates that the considered market is highly concentrated in terms of population in 2006, which is the relevant measure for solid waste collection. In addition to this, 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. The mean number of firms is between two and four, and that 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 cities that share the same metropolitan area with the largest city in our sample, Barcelona. Hence, those cities may be more attractive for private firms than their 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.

In this regard, table 6 shows the statistical significance of the difference in number of firms in the bid for the contracts according to 1) the size of the municipality, 2) the type of municipality (whether it belongs to a metropolitan or non metropolitan area). Concerning 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 percent of our sub-sample). The second is formed with the 73 observations with population above 10,000 inhabitants (46.5 percent of our sub-sample). Concerning the type of municipality, the sub-sample of metropolitan areas refer to 16 observations. We find that the difference between small municipalities (fewer firms) and large municipalities (more firms) is statistically significant (at 1 percent). In the same vein, the number of firms is larger in cities within metropolitan areas and the difference is significant from a statistical point of view.

**Insert table 5 about here**

**Insert table 6 about here**

As mentioned above, the degree of competition could condition the potential cost savings of privatization in the market for local services. It seems that the aggregate concentration is high in the considered market and that the number of firms in many municipalities opting for the contracts may be just one or two. In addition to this, our data seem to indicate that the

major firms in this market operate in large municipalities and/or municipalities within metropolitan areas. In turn, these are the 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 differences in the competitive scenario in large and metropolitan municipalities in comparison to small and rural municipalities by estimating the factors explaining local government's choices of the winner in the bid for the last contract.

## 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 ( $m = 1, \dots, M$ ) where the delivery of solid waste is undertaken by a private firm:

$$D^{major}_m = \alpha + \beta_1 Population_m + \beta_2 D^{metropolitan-areas} + \beta_3 Number\_firms_m + \beta_4 \%Major\_region_c + \beta_5 D^{national-party}_m + \beta_6 D^{regional-party}_m + \varepsilon \quad (1)$$

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 population of the municipality (*Population*) and a dummy variable that takes the value 1 for those municipalities within a metropolitan area ( $D^{metropolitan-areas}$ ) given the information provided by the Catalanian Statistics Institute,

‘IDESCAT’.<sup>12</sup> We expect that major firms are more interested in winning the contracts for delivering local services in large cities and in cities within metropolitan areas where the amount of revenues that can be obtained is much higher. On the contrary, smaller firms that operate at a regional or local level will tend to operate in small and rural municipalities. Thus, we expect the sign of the coefficient associated to these variables to be positive.

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 be more prone to compete for the contracts involving large amounts of revenues. On the contrary, major firms should be less prone to 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.

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*.<sup>13</sup> This variable is intended to capture the influence of the geographical environment on the likelihood that a major firm has won 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 due to the aggregation of production of nearby municipalities. Thus, we expect the sign of the coefficient associated to this variable 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.

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<sup>12</sup> We consider municipalities within metropolitan areas to be those municipalities that are part of the county of the capital of each of the four provinces of Catalonia. Note that in Europe, by contrast to US, does not exist a common statistical definition of a metropolitan area.

<sup>13</sup> In our analysis, we have used the seven regions used by the Government of Catalonia for purposes of regional planning and policy implementation.

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,  $D^{\text{national-party}}$ ) 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 percent and 33 percent, respectively),<sup>14</sup> and this explains that we focus the attention just on these two political parties. 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, party organization financing, or sharing information on firms by local politicians within the same party.<sup>15</sup>

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.

## **RESULTS**

### **Static analysis**

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

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<sup>14</sup> 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. It is worth mentioning that council-manager cities are not a usual form of government structure in Spain.

<sup>15</sup> Carr, LeRoux and Shrestha (2009) emphasize the importance of communication networks created through institutional ties.

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**

To conduct our estimation we use the logit technique due to the binary nature of the dependent variable. The standard errors are clustered by region, which implies assuming a cross-sectional correlation between the random error terms of municipalities belonging to a same region. Choices of one municipality concerning contracts may influence on choices made by other municipalities in the same neighborhood, so that random shocks may affect in a similar way to municipalities within the same region.

We estimate different specifications of the equation for factors explaining local government choices of the contract holder. Note that data for the number of firms opting for the contract is not available for all the municipalities of our sample, so that we first estimate equation (1) including the number of firms as explanatory variable, and then we estimate that equation using the whole sample of municipalities. When using the whole sample, we also consider different specifications that exclude the variable either for population or for metropolitan areas. These two variables are correlated since municipalities within metropolitan areas tend to be municipalities with a population higher than the sample average. Hence, we must also include both explanatory variables separately in alternative regressions to account for a possible problem of multicollineality that prevent from identifying appropriately the individual effect of each variable.

Table 8 shows the results of the estimation of equation (1) with the different specifications that we consider. The overall explanatory power of the equation estimated is reasonably good,<sup>16</sup> while all the variables have the expected signs.

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<sup>16</sup> The explanatory power obtained in empirical studies on the determinants of local privatization (literature closely related to our work) typically lies between 0.10 and 0.15 as measured by the

### **Insert table 8 about here**

We find that major firms will be more likely the contract holders in large and urban municipalities and in those municipalities in which more firms have participated in the bid for the last contract. Indeed, the sign of the variable for number of firms is positive and statistically significant, while the sign of the variables for population and metropolitan areas are positive and significant when we consider it individually.

Hence, we show that the competitive scenario in large and urban municipalities is quite different in comparison to small and rural municipalities. Indeed, we can infer from our empirical analysis that major firms will tend to operate in large and urban 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 four even in the largest municipalities, this suggests the existence of a highly oligopolistic sector in this segment of the market.

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) may be participating in the successive bids for the contract.

In addition to this, 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 due to the aggregation of production of nearby municipalities.

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Pseudo- $R^2$  (Bel 2006). Recall that we are using the logit technique due to the binary nature of the dependent variable.

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 its statistical significance is modest). Hence, regional parties do not influence positively on the likelihood that a major firm wins a contract to deliver solid waste collection.

### **Dynamic analysis**

To this point, we also want to identify changes in local government's choices concerning the contract holder in the period 2000-2006. To account for these possible changes, we construct a discrete dependent variable with three possible values. 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, the dummy variable for metropolitan areas and the values for 2006 concerning the political variables.

Given the nature of the dependent variable, we make the estimation using the multinomial logit technique. Note that we have a sample of 103 municipalities (106 observations, since the city of Barcelona provides 4 observations) that filled the questionnaire both in 2000 and in 2006. Overall, 86 municipalities implemented a new bidding process (or a renegotiation) between 2000 and 2006. Hence, we estimate changes for these 86 municipalities, which

provide 86 observations (since the city of Barcelona did not run a bid within that period). There is a high stability in the type of contract holder across the considered municipalities since only 17 of them have made a change from a minor to a major firm, and only three have made a change from a major to a minor firm.<sup>17</sup> On the contrary, the bidding process in 66 municipalities did not result in a change of the type of firm size. Results from this additional estimation are shown in table 9.

**Insert table 9 about here**

Concerning the move from major to minor firms, several explanatory variables are statistically significant but we must be cautious in the interpretation of results for this change since just three municipalities made it in the considered period. More relevant are results for the move from minor to major firms as contract holders in the municipality. Indeed, we can see that moving from a minor to a major firm is more likely in those municipalities with higher increases in population, so that major firms are winning contracts in the most dynamic municipalities from a demographic point of view.

In addition to this, the move from a minor to a major firm is more likely when the percentage of municipalities in the corresponding region that has a major as a contract holder has also increased in the considered period. This is also the case when the Mayor belongs to the main national party. 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.

To conclude this section, we think it is interesting to note that among the 66 municipalities that did retain the same type of firm size, 29 cities have a major firm delivering the service. However, in seven of such cases, even if the firm size type did not

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<sup>17</sup> Some municipalities that were using a single major firm in 2000 are using a ‘temporary joint venture’ (UTE) of firms in 2006. We have been careful to consider as ‘major’ those UTEs lead by a major firm in 2006.

change, the actual firm changed. In this way, Urbaser won five new contracts, FCC lost two contracts overall (FCC won two cities and lost four), and Cespa lost three contracts.

First, this shows that some room for competition exists between major firms. Second, we believe it is remarkable the fact that Urbaser (that was not a major player until it won a contract for a district in Barcelona in 1999) seems to have been aggressively competing in the last years. This could be a good outcome from the change in the system of waste management in Barcelona, effectively implemented beginning 2000,<sup>18</sup> since it helped creating a new major player in the regional market. In the same way, it is worth mentioning that very recently (December 2008) the city of Barcelona has awarded the new contracts for 2009-2017 to one firm in each district, which means four firms in the city, instead of three (since FCC had the contract in two districts until now). Because of this, we can expect that the new firm in the city, Comsa/CLD, could become too a major player in the regional market, thus increasing competition within the city (yardstick competition) as well as outside the city (spillover effects).

## **CONCLUDING REMARKS**

Empirical studies about the impact on costs of the private delivery of local services do not find a robust and systematically 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.

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<sup>18</sup> A complete analysis of this reform can be found in Bel and Warner (2009)

In this paper, we have shown that competition may be soft in solid waste collection both in urban and rural areas. In this regard, we have found empirical evidence of differences in the type of firms that operate in different geographical environments. Large firms that operate at a national level dominate the market for contracts concerning high-populated municipalities and municipalities that belong to the same metropolitan 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 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.

Important policy implications emerge from our analysis. Cost savings from privatization require strong competition in the markets for local services, and public managers need to know and use different tools available to stimulate competition in the market. In this way, service delivery can be segmented into multiple districts, so that more competition can be introduced within a jurisdiction. In the same way, public managers can be active in looking after new bidders that operate in other geographic areas beyond its jurisdiction. Indeed, the case of Barcelona illustrates the opportunities for yardstick competition and spillover effects. In addition to this, publicly owned units can be encouraged to compete for contracts. Overall, 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.

To conduct our research we have been able to obtain data on number of bids and winners for a sample of around 200 municipalities. Similarly, we have been able to track the bids overtime for more than 100 municipalities. This has allowed us to analyze interesting issues

related to firm size and contracting in urban and rural areas for the market of solid waste delivery. Extending the analysis to other services in the same region, as well as on the same service in other regions/countries would enrich the results and improve our capability for generalization. Conducting this extension will require a huge effort since the data needed is not publicly available, and must be obtained by means of specific surveys. We leave this undertaking for future research.

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## TABLES AND FIGURES

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

	<b>Internal (Bureaucracy)</b>	<b>Public firm</b>	<b>Mixed public-private firm</b>	<b>Private firm</b>
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)**

<b>Firm</b>	<b>Contracts (%)</b>	<b>Population (%)</b>
FCC	26.6	47.4
CESPA	13.3	14.9
URBASER	10.9	18.0
A.J. RUZ	3.0	0.6
COSBAPSA	2.5	0.8
ECOSENDA	2.0	0.7
JUAN & JUAN	2.0	0.7
JAUME ORÓ	2.0	0.3
REST (<2%)	37.7	17.0

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)**

<b>Year</b>	<b>CR1 (%)</b>	<b>CR4 (%)</b>	<b>HHI</b>
<b>Contracts</b>	26.6	53.8	0.107
<b>Population</b>	47.4	82.8	0.281

Source: Authors' from Survey on Local Services

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

<b>Year</b>	<b>CR1 (%)</b>	<b>CR4 (%)</b>	<b>HHI</b>
2000	46.8	78.4	0.268
2006	49.4	84.9	0.308

Source: Authors' from Survey on Local Services

**Table 5. Number of firms that have participated in the bid for the last contract (N)**

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
<b>Total</b>	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 that have participated in the bid 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	-
<b>Differences (1) – (2)</b>	-	-0.83	0.22	-3.72***
<b>Type of municipality</b>				
<b>Non Metropolitan areas (1)</b>	141	3.12	0.12	
<b>Metropolitan areas (2)</b>	16	3.75	0.31	
<b>Differences (1) – (2)</b>	-	-0.62	0.37	-1.65*

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
<b>Population</b>	25,388.64	62,356.84	1,052	401,401
<b>%Major-region</b>	49.08	16.97	0	66.7
<b>Number-Firms</b>	3.19	1.43	1	8
Discrete variables				
	Total observations	Number of observations with value 1	Number of observations with value 0	
<b>D<sup>major</sup></b>	203	101	102	
<b>D<sup>national-party</sup></b>	203	82	121	
<b>D<sup>regional-party</sup></b>	203	67	136	
<b>D<sup>other-parties</sup></b>	203	54	149	
<b>D<sup>Metropolitan_areas</sup></b>	203	28	175	

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)
<b>Population</b>	0.000015 (9.36e-06)*	5.43e-06 (6.30e-06)	6.87e-06 (3.42e-06)**	-
<b>D<sup>Metropolitan_areas</sup></b>	0.32 (0.82)	1.51 (0.89)*	-	1.59 (0.80)**
<b>Number-Firms</b>	0.25 (0.08)***	-	-	-
<b>%Major_region</b>	0.02 (0.008)***	0.03 (0.005)***	0.04 (0.008)***	0.04 (0.005)***
<b>D<sup>national-party</sup></b>	0.84 (0.28)***	0.97 (0.22)***	0.84 (0.18)***	1.08 (0.22)***
<b>D<sup>regional-party</sup></b>	-0.58 (0.37) <sup>+</sup>	-0.69 (0.44) <sup>+</sup>	-0.59 (0.43)	-0.70 (0.45) <sup>+</sup>
<b>Intercept</b>	-2.26 (0.34)***	-2.29 (0.28)***	-2.24 (0.33)***	-2.32 (0.27)***
N	157	203	203	203
Pseudo R <sup>2</sup>	0.20	0.20	0.17	0.20
$\chi^2$ (joint sig.)	667.80***	195.99***	413.78***	201.04***
Log pseudolikelihood	-86.82	-112.06	-116.26	-112.51

Note 1: Standard errors in parentheses (robust to heteroscedasticity and clustered by region)

Note 2: Significance at 1% (\*\*\*), 5% (\*\*), 10% (\*), 12% (<sup>+</sup>)

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

<b>-1 (from major to minor)</b>	
<b><math>\Delta\%</math>Major Region</b>	-6.15 (4.60)
<b>D<sup>national-party</sup></b>	-35.50 (0.90)***
<b>D<sup>regional-party</sup></b>	-0.67 (0.50)
<b>D<sup>Metropolitan_areas</sup></b>	-35.91 (2.24)***
<b><math>\Delta</math>Population</b>	2.85 (0.47)***
<b>Intercept</b>	-1.64 (0.46)***
<b>1 (from minor to major)</b>	
<b><math>\Delta\%</math>Major Region</b>	1.36 (0.51)***
<b>D<sup>national-party</sup></b>	1.45 (0.88)*
<b>D<sup>regional-party</sup></b>	-0.05 (1.42)
<b>D<sup>Metropolitan_areas</sup></b>	-0.39 (1.04)
<b><math>\Delta</math>Population</b>	5.32 (1.62)***
<b>Intercept</b>	-3.37 (0.80)***
N	86
Pseudo R <sup>2</sup>	0.17
$\chi^2$ (joint sig.)	21.34***
Log pseudolikelihood	-60.32

Note 1: Standard errors in parentheses (robust to heteroscedasticity and clustered by region)

Note 2: Significance at 1% (\*\*\*), 5% (\*\*), 10% (\*)

Note 3: Changes from from 0 to -1 (major to minor firm): 3 observations. Changes from 0 to 1 (minor to major firm): 17 observations. No change: 66 observations.