TOMB PRICE DISCRIMINATION IN CEMETERIES: COMPETITION IN THE MARKET FOR CORPSES?

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Abstract

We study empirically the determinants of public tomb prices in a sample of Spanish towns. We document strong evidence in favor that cemeteries act as local monopolies that use s econd degree price discrimination to maximize profits. Additionally we report that local cemetery prices react to competition from private cremation companies. This c ompetition is associated with lower price dispersion caused by an i ncrease in the minimum niche prices with no ef fect on other higher niche prices. We conclude that cemete ries have acco mmodated and facilitated entry of private cremation companies through an i ncrease in those niche prices more likely to affect cremation demand.

Keywords

Me gustan los cementerios de muertos bien repletos
Que oliendo a sangre y cieno
Impidan el respirar
Y allí un sepulturero
con tétrica mirada y manos despiadadas
los cráneos machacar
ESPRONCEDA

Introduction

Most economics models predict that prices will not escalate in response to an increase in the number of competitors. Consistently, most of the empirical evidence suggests that prices indeed go down when more rivals enter any given market[1]. Yet, considerably less research has been devoted to investigate if this stylized fact also holds when prices are not decided by profit maximizing companies but rather they are set directly by public authorities. The study of public pricing behavior is important to study the real effect of competition for those markets in which private operators coexist with public enterprises as it happens in markets like education, sport installations, parking, postal services, airports, vehicle inspection, security or health markets. Our goal is to contribute to fill this gap in the literature by studying the pricing behavior of council towns in a sample of Spanish cities that compete with private cremation companies. By this, we hope to contribute to the ongoing debate whether antitrust rules should be equally applied to profit and non-for-profit enterprises. With the same motivation, we investigate whether public operators follow similar pricing discrimination policies that we could expect from private local monopolies.

A priori we could think that standard economic model assumptions do not hold for public entities since prices are not chosen to maximize profits but rather to achieve other goals than maximizing social welfare[2]. Legal mandates may indeed require public enterprises to consider values different from efficiency when fixing the prices for the services provided[3]. In this regard, there are not clear a priori reasons why prices set by the civil servants working for the government should vary in response to an increase in market competition caused by the entry of other public or private operators providing a substitute product or service. On the contrary, in case public prices are designed to maximize social welfare, basic economic theory they suggest that prices should be set equal to the marginal cost of providing the product or service. Since marginal costs do not depend on the number of competitors we should observe a zero effect on public prices as a reaction to an increase in the number of competitors. Yet, civil servants may have other goals than solely maximizing consumer's surplus in that particular market when deciding public prices. For example, they may intend to use the extra government revenues obtained by charging higher prices to cross- subsidize other unrelated activities that the public authorities think that deserve higher priority. If this is

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[1] See the classical reference of Bresnahan & Reiss (1987) and Bresnahan & Reiss (1991).
[2] See, for example, Pelzman (1971) and Sappintong & Sydack (2003).
[3] There may be a legal intricacy here as Spanish Law introduces some rules and limits in public pricing policies. When a service is only provided by the State or public authorities its price is named a "public tax". These public services may be below cost (although ideally taxes charged for them should be aimed to cover the cost of service). If services are provided by the State in competition with private firms, its price is named "public price", and in this case the law requires it to be above the cost of service.

the case, state owned enterprises may act as if they were maximizing a utility function in which operating profits is one of the arguments as it has been modeled by Sappington and Sidak (2003) and Philipson and Posner (2001). Under these circumstances public prices may indeed go down as a reaction to an increase in competition to avoid an erosion of profits in exactly the same way as a private operator would respond to the entry of a new competitor. Alternatively, private operators have strong incentives to lobby the local public institutions in favor of higher public prices to expand their private business market share in detriment of public revenues as well as the individual consumer. One goal in this paper is precisely to test which one of these explanations: "capture of the regulator to increase prices" versus "state companies behaving competitively as private companies" fits best the data in a sample of local cemeteries.

The other main objective of this paper is to investigate whether local public monopolies pricing policy is consistent with a standard model of private monopoly nonlinear pricing. A priori, a pricing behavior that maximizes social welfare should set all niche prices equal to the marginal cost of an additional niche. Since labor costs of a burial service does not change with the number of years of the niche concession or with the accessibility of the niche and since the surface of niches are quite similar for all type of niches we should expect that niche prices per year not to vary with the niche accessibility or the duration of the concession. On the contrary, a monopoly that maximizes profits will use the number of years of the niche concession and differences in the niche accessibility as mechanism to discriminate among consumers according to their different willingness to pay for the product and therefore charge different niche prices according to these characteristics. Below we report empirical evidence that the local cemeteries indeed act as local monopolies in their pricing policies.

The rest of the paper is structured as follows, section 2 briefly summarizes the related literature on the topics covered in the paper, section 3 describes basic regulatory conditions of the cemetery and crematory services market in Spain while section 4 discusses the standard implications of second degree price discrimination and the nature of competition for Spanish public cemeteries. Section 5 describes the sample and variable construction, section 6 displays and discusses our empirical observations while section 7 concludes.

To model ranking data, Thurstone (1931) proposed transforming the observed ranking patterns to patterns of binary paired comparisons and fitting his paired comparisons model (Thurstone, 1927) to the transformed data. The classical method for estimating this model (Mosteller, 1951a; Torgerson, 1958) consists in obtaining the normal deviate corresponding to each paired comparisons mean, and then estimate the model parameters from these deviates by least squares. This is a mean structure approach to estimating Thurstone's Case V model as it only uses univariate information (the means) from the paired comparisons. Most Thurstonian models for paired comparisons and ranking data are not identified when estimated as a mean structure. Estimating them as a mean structure requires introducing unnecessary identification restrictions on the models. The most notable exception is Thurstone's Case V model for ranking data. This model is identified if estimated only from the means of the paired comparisons. Here, we provide asymptotically correct standard errors and goodness of fit test for this model when it is estimated as a mean structure using the classical estimation procedure described.

2. Related Literature Review

Up to our knowledge this is the first study that analyzes the pricing behavior of public enterprises in cemetery services. There are some contributions that examine pricing behavior of public enterprises in the U.S.[4], like Peltzman (1971) classical study about electric utilities and a relatively large number of papers that study the effect of market concentration on prices in the hospital industry with mixed results (Lynk, 1995; Japsen, 1998, Simpson and Shin, 1998; Dranove and Lindwick, 1999, Keele et alia, 1999; Kessler and MacClellan, 1999, Lynk and Neumann, 1999). Yet, we not know of any study that performs an empirical analysis of state-owned-cemetery pricing behavior.

On the other hand, there are a number of papers that have investigated the price discrimination policies of private operators in competitive environments. According to the extant theory, the effect of competition on price discrimination dispersion caused by optimal price discrimination policies is not univocal (for a complete review of the theoretical literature on this topic see Stole, 2006). In Stole (1995) competition increases price dispersion since high valuation consumers are more brand loyal and therefore price reductions needed to make them switch brands are so large that they are unprofitable. As a result competition affects proportionally more the lower prices increasing price dispersion. On the contrary, Rochet and Stole (1999) high valuation consumer receive larger surplus from consuming any brand and therefore are more likely to switch to a less preferred product in response to a price reduction. As a result competition is stronger for high valuation consumers and price dispersion is reduced with competition. From the empirical side, Ivaldi and Martimort (1994) analyze the price curvature in electric utilities, Borenstein and Rose (1994) documents less price dispersion in the airline industry in less concentrated markets while Busse and Rynsman (2005) show how the price of yellow pages advertising goes down more for larger advertisements under increasing competition and therefore reducing price dispersion.

3. Regulation of body disposal in Spain: Cemeteries and Crematories

As in any other country, the law in Spain requires properly disposal of human dead bodies. The three legal alternatives are ground burial in cemeteries; sea burial and cremation. The most preferred option is ground burial in cemeteries chosen by more than 70% of the population.

For sanitary and hygienic reasons, the Law in Spain requires every local town to have a cemetery[5]. Cemeteries have to follow in their construction and management strict legal and regulatory constraints. These conditions and requirements are set by each autonomous community, and thus may vary[6]. In general, the regulation establishes that the construction,

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[4] See Pelzman (1971) and Sappintong & Sydack (2003)

[5] See article 26.1.a) of the Law 7/1985, April 2 1985 (LBRL), only exceptionally it allows several towns to get together to build a joint cemetery.

[6] In those cases in which no regional regulation is adopted, the state regulation contained in decree 2263/1974 of 20 july will be applicable.

enlargement or reform of cemeteries requires public approval. Of course, private initiative in cemetery services is allowed[7], however private cemeteries are required to respect and follow the same legal and regulatory requirements that public cemeteries[8]. These requirements concern the exact location of the cemetery (which is also affected by other local administrative regulations regarding planning and use of urban spaces), the distance it has to maintain from other buildings and constructions, soil conditions (subject to an hydro geologic study), wind direction, cemetery capacity (generally for burials the next 10 years but with enough land to build tombs and niches for the next 25 years), size and material of the tombs and niches, and other services required for hygienic or sanitary reasons or for the benefit of visitors.

Although State regulation does not require local towns to have a crematory, most of the regions have imposed this requirement themselves to the biggest cities. Thus, the requirement to have a public crematory varies with the population of the town. Private crematories have also been established, mainly by funeral firms, normally in the installations where the viewing facilities (*tanatorios*) and other funeral services are rendered.

In this regard, the market of body disposal has been historically linked with the market for funeral services, which covers all the services and rituals rendered from death to the act of final disposal. Indeed, cemetery and crematory operators have frequently been funeral companies themselves. Aggarwal (2006), Aggarwall and Ellig (2006), Sutter (2006), Harrington (2002 and 2003) and Harrington and Krynsky (2002) have shown how U.S. State funeral regulations have helped funeral directors to steer demand away from cremation and have also prevented the use of internet as a competitive tool in the funeral markets. Curiously, that may be though as a backlash against the Federal Funeral Rule (16 CFR Part 453), aimed at protecting funeral consumers, but which has allegedly benefited independent casket retailers and crematories at the expense of funeral homes, see McChesney (1990). In Spain, the funeral industry has been characterized historically until recently by important public intervention. Currently, although private firms are allowed to operate, heavy territorial restrictions to competition due to local rules and public local decisions still remain in place[9]

4. Analytical framework

Modeling the pricing behavior of cemeteries as local monopolies
The total amount of money required to hire a cemetery niche varies both with the duration of the concession-from a minimum of one year to a maximum of 99- and the location of the niche that varies depending on the convenience of access for visitors. For example, niches located nearer to the cemetery entrance are more expensive while niches located at a larger height from the ground are cheaper.

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[7] The issue was subject to debate some years ago, but several judgments of the Spanish Supreme Court dealt with it (Supreme Court judgments of 10 and 15 june 1994 and 14 february and 7 november 1995, all regarding the project for a private cemetery in Alcobendas).
[8] See, for example, article 54 of Catalonian Decree 297/1997, of november 25, 1997, establishes that all cemeteries, no matter if public or private are subject to the same legal and regulatory requirements.
[9] See Marcos (2006).

This pricing behavior looks quite similar to the pricing behavior of a monopoly that uses second degree price discrimination to maximize profits; precisely, our goal in this paper is to test whether council towns indeed act as local monopolies when deciding their pricing policy. With this in mind, we first display the empirical implications of a standard model of price discrimination [like Tirole (1988) chapter 3] for the purpose of testing later whether these implications hold in our sample of local cemeteries. For simplification, we consider just one dimension in the differentiation of the product and we assume that the consumer values exclusively the number of years of the concession of the cemetery space and not the accessibility of the niche in the cemetery.

Assume that the utility of a given consumer θ for hiring a cemetery niche for a given number of years is:

$$U(\theta) = A + \theta V(Y(\theta)) - T(Y(\theta))$$

Where Y is the number of years of the concession, $T(Y(\theta))$ is the total price paid for $Y(\theta)$ years and we assume that V(0)=0, V'>0, V''<0.

Note that without loss of generality we can assume that the consumer is hiring a niche for himself in the future or equivalently that he is hiring the cemetery space for a family member. The consumers value positively the total number of years that they are hiring the cemetery niche since we believe that consumers value positively the longer availability of a given space in which the family can worship the memory of deceased family members or closed friends. The utility function of this yearly space availability follows the usual properties of positive and decreasing marginal utility.

The cemetery monopolist (the council town administration) does not know the θ of each individual consumer or family and therefore has to design a pricing scheme restricted to the fact that each consumer or family will voluntarily choose the combination of Y and T that maximizes her utility. The distribution of θ in the populations has a density function f(θ) and a distribution function F(θ) over the interval $\left(\underline{\theta}, \bar{\theta}\right)$.

The monopoly chooses for each θ the pair {Y(θ),T(θ)} that maximizes:

$$\int_{\underline{\theta}}^{\bar{\theta}} (T(\theta) - cY(\theta)) f(\theta) d\theta$$

where c is the constant marginal cost of renting a unit of Y in the cemetery. The monopoly maximization problem is subject to the individual participation constraints:

$A + \theta V(Y(\theta)) - T(Y(\theta)) \geq 0; \forall \theta$

and to the incentive compatibility, IC, constraints

$\theta = \arg\max_{\phi} \{ A + \theta V(Y(\phi)) - T(Y(\phi)) \} \forall \theta$ where we implicitly assume that the IC constraint are continuous and differentiable. The implications of this model are well-known and we do not prove them since its derivation can be easily found in any standard textbook as in Tirole (1988). Basically:

H1) $p = \alpha(\theta)c$ where p=T'(θ); and $\alpha(\theta) = \dfrac{1}{1 - \dfrac{1 - F(\theta)}{\theta f(\theta)}}$. The literature assumes that the

hazard rate $\dfrac{f(\theta)}{1 - F(\theta)}$ increases with θ, and as consequence α s with θ. This is, the marginal price of a given year decreases when Y increases. Note that for the maximum value of θ, $\theta = \overline{\theta}$, $\alpha(\overline{\theta}) = 1$ and $\alpha(\theta) > 1 \forall \theta < \overline{\theta}$. The intuition of this result is that the monopoly charges a lower marginal price to the consumers that value the good the most to generate more consumer surplus that can be extracted from charging a higher average price. For consumers that have a lower valuation of Y the monopoly charges a higher marginal price, maybe even larger than the corresponding monopoly marginal price to avoid high type consumers to pretend that they are of the low valuation type and allow a better differentiation among consumers. As a result, this standard specification implies a Maskin-Riley quantity discount since the marginal price of contracting an additional year in the cemetery decreases with the number of years already contracted.

A Model of Competition for local cemeteries

The natural competitors of public cemeteries are private cemeteries that operate in the same local market. However, a quick view to the stylized facts point out that private cemeteries are quantitatively irrelevant in the Spanish market since there are only a total of 32 private cemeteries in Spain, with many locations not having one, accounting for less than 1% of cemeteries available[10]. Furthermore, there exists only a handful of private cemeteries and most/all of them devoted to minority religions other than the overwhelmingly dominant catholic-Christian majority. Although one may be tempted to think Christian cemeteries constitute a competing force in the market, we exclude them from our analysis and subsequent model. We do so because, catholic cemeteries in all the cities of our sample are congested, and therefore it is impossible to contract for a burial on their premises. Apparently, they remain a strong and powerful competitor in many smaller cities and in rural areas (on which they can have around 20% of the market[11]), however, these are not included in our sample.

This absence of competition from private cemeteries might be due to important regulatory barriers to operate a private cemetery that usually requires at least 150 meters of distance to inhabited places, has to fit in the urban planning regulations of the town and cannot be build on all types of land, depending on the stratification of the soil, the existence of underground water courses and other technical conditions. These regulations do not apply to extant public cemeteries that have been absorbed inside the cities as a result of the process or urban expansion. This clearly gives a first-mover advantage for public cemeteries, since private cemeteries cannot be built in a similar location. In fact, some of the largest private cemeteries are located outside large cities, in an effort to offer a different landscape and to attract different customers.

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[10] These data are extracted from Tribunal de Cuentas (2006), Annex 11.
[11] We thank Emilio Berriartua, General Manager of INTUR for providing as with this un-official estimation.

However, the de facto irrelevance of private cemeteries does not mean that public cemeteries are totally isolated from the discipline of product market competition. Recently a quite powerful substitute product has emerged in the Spanish market that has stolen a sizable market share from the public cemeteries given that cremation of the body instead of burial has become an increasingly chosen option among Spaniards. From a virtual zero in the early 1970s, cremation rates have surged to 17% in 2003 (the source of this figure is Atroesa, the largest crematory company operatingin Spain). The likely explanations for this surge in cremation rates are the non opposition of the Catholic Church since 1964; and the less stringent regulation of private crematories in comparison with private cemeteries. Indeed, private cremation can be conducted in "industrial" facilities, which are not so tightly constrained by planning regulations. Since cremation generates pollution but completely deletes all other sanitary risks (deriving from the decomposition of bodies), private crematories are mainly subject to environmental regulations. Therefore, the main constraint to the setting up of private crematories is the need to invest in expensive equipment that needs to be "certified" by the industry department of the corresponding CCAA. As a result, even if it can be time-consuming and expensive, entry barriers are much lower for the setting up of a private crematory than for the building of a private cemetery, as their possible locations are much more abundant. Moreover, as pointed out before, there is a relationship between private crematories and funeral viewing facilities (tanatories) built by funeral services firms. Private cremation is normally offered by funeral firms that can reach more easily scale economies (in terms of shared premises) with cremation than with burial facilities. Therefore, this easier vertical integration also generates larger incentives to entry the cremation market, rather than the market for cemeteries.

The implicit assumption in our empirical tests will consist in assuming that consumers react to price changes and therefore they may opt with a larger probability to a private crematory depending on the price differences between the two alternatives. If this is the case, public local authorities may change the pricing policy as a reaction to competition from private crematories. If local cemeteries act as pure private enterprises that maximize profits, local cemeteries should react competitively with a decrease in niche prices to the introduction of a privately-owned crematory. (**H2a**).

Yet, state-owned enterprises may care to a lesser degree or even ignore profit maximizing consideration when setting cemetery prices. In the market object of our study, local authorities may want to attract private crematory entry in their local town in order to satisfy regional regulations that force large cities to have a crematory facility available to its citizens, either public or privately owned. Consistent with this train of thought, local cemeteries may increase niche prices to accommodate and facilitate the entry from private operators in the crematory market (**H2b**).

5. Sample and Variable Construction

Cemetery Prices

Local cemetery prices consist in the amount of money a given individual needs to pay to rent a given space in the public cemetery for a determined number of years. Therefore cemetery prices are renting prices since the cemetery space is public property that can be rented for some years but not sold or bought[12] . These prices vary with the number of years that the individual hires the niche and also they vary with other characteristics like the distance of the niche to the floor and to the main row. Different cemeteries classify the niches according to different location criteria. However, in general terms, they divide the niches in tiers. Lower tiers are cheaper and the prices increases for the central tiers (as they are at eye-height; similar to the pricing criteria that hypermarkets use to determine the charges for the space on their shelves). Higher tiers are cheaper than central tiers but, generally, remain more expensive than lower ones. Where cemeteries have older and newer premises, prices are also different for these two groups of constructions within the same or at different local cemeteries (then classified by tiers separately). However, in some cities older locations are cheaper, while in other cities it is the opposite. This probably depends on local preferences, i.e. in certain places the oldest premises can be better or more appreciation due to local traditions, while in other cities they are new premises that have occupied better locations within the cemetery).

In Spain all type of local cemetery prices are set by the corresponding local council towns. We collect information on cemetery prices consulting publicly available local regulations. Given that we need to collect this information separately for each town we start by restricting our sample to those Spanish towns that are capitals of an administrative unit called province. By proceeding in this quite conservative way we make sure that we properly identify the relevant geographic market, crematories are located either on the capital or on a close town. Furthermore, we have opted for the market definition used by Spanish competition authorities in recent decisions[13].

As a result we include information on 52 different Spanish towns that correspond to each province that covers the whole Spanish territory[14]. In five of these 52 cities the local regulations do not provide cemetery prices. In these cases there is a public company that manages the cemeteries and sets the cemetery prices. We asked these public companies for the corresponding cemetery prices by mail and we got an answer of three out of these five cities. As a result our sample gets restricted to fifty cities from the originally 52[15].

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[12] Historically it was possible in Spain to sell and buy a given space in the public cemeteries. However, this was forbidden in the beginning of the XXth century (WHICH LAW, REFERENCES????)

[13] See, with reference to prior opinions, the 2005 *Report of the Competition Defence Service on the acquisition by INTUR of Funerarias del AltoAragón* (N-05031), available at http://www.dgdc.meh.es /informes%20SGC/N05031INFWEB.pdf, visited on aug. 15, 2006).

[14] We plan to expand our simple with information about other council towns in later stages of our research .

[15] We lose the observations corresponding to the cities of Tarragona and Madrid.

The cemetery niche prices present some degree of complexity. First, the total tariff charged depend on the number of years that the consumer hires the niche and second they vary with the location of the niche depending on the convenience of access for visitors.

Private Crematories

We check directly with each council town for the existence of private or public local crematory companies as well as if any private company was involved at all in the management of local cemeteries and crematories. In all cities in our sample there existed a crematory although there is variation in the nature of its property: In 36 cases it belongs to privately owned company while in 14 it belongs to the local council town or to an administrative unit that depends on the council town.

6. Empirical Results

Effect of Competition on Niche Price Dispersion

One of the main goals of the paper is to document and quantify the second degree price discrimination policy implemented by the Spanish local cemeteries. For this, from local cemetery regulations sources, we have collected the whole menu of niche prices in each cemetery belonging to a capital of the administrative unit called province. As we have explained above, niche prices vary both with the number of years of the cemetery licenses and the niche accessibility. Given the impossibility of comparing niche accessibility in different cemeteries, we focus on the minimum and the maximum niche price for each given number of years in the license. In Graph 1 we display the distribution of our 50 cemeteries according to the number of different niche prices offered in our sample In some local cemeteries there is no variation at all in niche prices since there exists a unique niche license for a fixed number of years and the niche licenses are not differentiated by any type of more or less difficulty in accessing the niche. This happens in 13 of the 50 cemeteries in our sample.. The maximum number of prices available in our sample is six different prices corresponding to three different lengths of the niche license and a minimum and a maximum price for each type of license. This happens in only 3 cemeteries while the most common cemetery menu offers just two different cemetery prices: a minimum and a maximum price for a single license duration. This pricing policy is followed in 19 cemeteries in our sample. The average price over the 123 different niche prices in our sample is €1,394[16] with a large degree of variation since the minimum niche price is €24.94 for a niche concession of 10 years in the city of Castellón while the maximum niche price is €72,159 in the city of San Sebastián for a niche concession of 75 years.

Next we estimate the slope of the cemetery price schedule We follow Busse and Rysman (2005) and we use the function $P_{ijk} = A_i Y_j^{\beta_i} Q_k^{\alpha_i}$ where P_{ijk} is the total price of a niche license in province i of duration j and of quality k, Y is the number of years of the license and Q_k is the accessibility of the niche. Note that this function allows a variety of price-year and

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[16] The niche price incluyes the inhumation tax and the cost of inhumation license if aplicable.

price-accessibility curvatures including linear pricing ($\beta_i = 1; \alpha_i = 1$) , quantity discounting ($\beta_i < 1; \alpha_i < 1$) and premia ($\beta_i > 1; \alpha_i > 1$). Consistent with this specification we estimate:

(1) $\log P_{ijk} = \delta_i + \beta_i \log Y_j + \alpha_i Q_k$

Where Q is not in logs because in our specification is just a dummy that indicates highest or lowest accessibility as it has been explained above and δ_i is estimated with a province fixed effect. The first column of Table 1 shows the results of estimating (X) in our sample composed by 123 niche prices corresponding to the year 2006. Note that the point estimate of β is 0.47 statistically different from zero and statistically different from 1 and therefore providing strong empirical evidence of the existence of a quantity discount and second degree price discrimination implemented by the local cemeteries. Our estimates of β point out that an increase in 100% in the duration of the license implies an increase in the niche price of 47% and therefore the niche price per year falls around 53%. Note that our estimates of α indicate that for a given duration of a license, niches of high accessibility are around 79% more expensive than niches of low accessibility. We interpret this as evidence if favor of **H1**.

After having established the existence of price dispersion and quantity discounts, we next investigate whether price dispersion is affected by competition from private crematories. Again we follow Busse and Rysman (2005) and we hypothesize that:

(2) $\beta_i = \gamma_0 + \gamma_1 Competition_i + v_i$ and

(3) $\alpha_i = \lambda_0 + \lambda_1 Competition_i + n_i$

Combining 1, 2 and 3 we get that

(4) $\begin{aligned} \log P_{ijk} = {} & \delta_i + \gamma_0 \log Y_j + \gamma_1 Competition_i \log Y_j + \lambda_0 Q_k \\ & + \lambda_1 Competition_i Q_k + v_i \log Y_j + n_i Q_k \end{aligned}$

The second column of Table 1 shows the result of estimating (4) by OLS, note that the presence in the error term of $v_i \log Y_j + n_i Q_k$ in (ii) implies heteroskedasticity but the pairwise bootstrapping method that we use to construct the confidence intervals is robust to the existence of heteroskedasticity. Table 1 shows that the amount of year discount is not affected by the presence of competition since the interaction term between the duration of the license and competition is not statistically significant. Yet, Table 1 provides evidence that the difference between high accessibility and low accessibility prices decreases when the local cemetery competes with private crematory companies. The estimates of Table 1 suggest that the difference between high accessibility and low accessibility niche prices is 113% in the absence of a private crematory and only 63% when there is competition from a private crematory. We interpret Table 1 as evidence that competition decreases price dispersion in Spanish cemeteries. This empirical finding is consistent with two different explanations. High accessibility niche prices may go down with competition or it could be the case that low accessibility niche prices may go up with competition. The first explanation is consistent with a competitive reaction of cemeteries to competition from crematory companies, while the second explanation would imply accommodation to the competitor's presence. In Graphs 2.a and 2.b we have used the estimated coefficients in Table 1 to plot the niche price-year curve

for both high accessibility and low accessibility niches. In Graph 2.a. the high accessibility curve goes down under competition from private crematories while in Graph 2.b. the low accessibility curve goes up in response to competition. Note however that the niche average price level would go down in the situation depicted in Graph 3.a and it would go up in Graph 3.b. Graph 2.a. is consistent with **H2a** while Graph 2.b. is consistent with **H2b**.

Next we explore the effect on niche price levels of competition from private crematories for disentangling which situation fits best our data of cemetery prices.

Effect of Competition on Price Levels

When studying the effect of competition on price levels our sample gets reduced to just 50 local markets corresponding to 50 Spanish provinces. Since we have just a cross section of data we can not estimate the effect of competition with a local fixed effect and therefore we need to control for other differences in local markets that may influence niche prices. Next we describe the controls that we use later in our econometric specifications:

Controls

Soil price exhibits an important degree of geographic variation in Spain. As in other countries is more expensive in cities and near to the shore. A more expensive soil price might be related to more difficulties and larger investments needed to expand the cemetery and hence it may cause higher niche prices in congested cemeteries. We have been unable to find soil prices statistics but we proxy local soil prices by province housing prices easily available at the web of a government institution, *Ministerio de la Vivienda[17],* where we downloaded information regarding city price per square meter $(m)^2$ of new houses less than two year old. This information was not available for the autonomous African cities of Ceuta and Melilla and therefore we lose two additional observations to get a total sample of just 48 provinces whenever we introduce this control in our regressions.

We are also interested in controlling for regional differences in labor costs. Again we use Spanish government sources and from the *Encuesta Trimestral de Coste Laboral* corresponding to the first quarter of 2006, where we access information of regional labor cost per person. This statistic is developed by the Spanish National Institute of Statistics, INE[18], and although it provides information at the regional level it does not provide labor cost information disaggregated at the province level. This may cause measurement error in those regions that contain more than one province, yet we address this potential problem in our empirical specifications. Since the INE disaggregates Labor Cost depending on the sector of activity we have chosen Construction Labor Costs as representative of Labor costs of Cemeteries. Our rationality for choosing Construction costs rather than Services or Industry Labor Costs is that cemetery requires mostly an unskilled labor force and with similar low levels of specialization as those required in construction.

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[17] http://www.vivienda.es (visited on Aug. 15, 2006).
[18] http://www.ine.es (visited on Aug. 15, 2006).

Municipal cemetery prices are set directly by the local council town but the management of the cemetery might be delegated to a private company. There are four possible ways of organizing local cemetery services by local towns: the town officials may directly manage it as an additional municipal unit (a); the town may directly manage it as a wholly owned private company (b); the town may indirectly manage it through a company with a minority private partner (*sociedad mixta*) (c); or the local council may give an administrative concession to a private firm[19]. This may cause an effect on cemetery prices either because private companies have lower operation costs or alternatively because private companies lobby successfully the local council in favor of larger prices.

We control for any of these two possibilities with a dummy equal to one if a private company was involved at all in the management of public cemeteries.

Some council towns own public crematories that may compete directly with private crematories. This may have an influence on niche prices either because the local council town engages in some sort of cross subsidization between public burial and public cremation or simply because niche prices react in a different way to competition depending whether public crematory prices already react to a direct competitor. We account for this possibility by controlling for local public crematory prices. The sources of these prices are the same local regulations as the niche prices and in those cases in which a public crematory does not exist in the province we consider that public crematory prices are zero.

Independent variable

As before, we identify competition from private crematories with a dummy variable equal to one if there is a private crematory in the local market.

Dependent variable

Below we estimate the effect of competition from private crematories on cemetery price level using two alternative measures of prices as dependent variables: Total cemetery expenditure and Total cemetery expenditure divided by the number of years of the niche license. The second price measure has the advantage that we are properly comparing niche price per year in different localities and therefore we are comparing prices of homogeneous goods. On the contrary, the first measure has the advantage of comparing the real cost paid by the families to bury a deceased member since the cemetery menu prices are not indivisible in a year by year basis and the families are forced to pay upfront the total amount demanded by the local cemetery for the niche. As we show below, the results are the qualitatively the same with both price measures. Table 2 displays the descriptive statistics of all the variables that we use in the regression.

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[19] See Tribunal de Cuentas (2006) for an explanation of all the alternatives (the options could be further enlarged if we took into account whether the town council renders –necessarily through a private company, after 1996 liberalization- also funeral services). Annex 3 of Tribunal de Cuentas (2006) provides evidence of the wide variation present in the management forms of local public cemeteries in Spain.

We have a small sample with only 50 observations and this sample size may question the statistical validity of our results. In particular the asymptotic properties of OLS estimators clearly not hold in such a small sample. However in all our regressions we report the statistical significance of the coefficients using both the standard errors coming from the OLS regression and using a bootstrap method of 2000 regressions on 2000 samples of the size as the original one obtained sampling with replacement the original sample. With a few irrelevant exceptions, the significance results are qualitatively the same using both methods Table 3.a. displays the results of different regressions in which the dependent variable is total cemetery expenditure while Table 3.b displays the results of regressions in which the dependent variable is the average cemetery expenditure per year. The first two columns of Table 1.a. show how competition from private crematories is associated with higher minimum prices. The presence of a private crematory increases the minimum cemetery expenditure by around 55%to 61%. The economic and statistical significance of this correlation does not vary with the inclusion of control variables. The third and fourth columns of Table 3.a. display the results of OLS regressions in which the dependent variable is the average over the different menu prices that a given cemetery offers to its customers. The central columns of Table 3.a show how the effect of competition on average total expenditure is not significant and its point estimate much lower, about half, than the point estimate of the effect of competition on minimum cemetery expenditure in columns 1 and 2. Finally, in columns 5 and 6 we take as dependent variable the maximum price that the local cemetery offers in its menu of prices. We see that the point estimate of the effect of competition on maximum prices is much lower than both average and minimum cemetery prices. We conclude that the effect of competition on cemetery prices is to increase the minimum cemetery expenditure while the effect on the average or maximum cemetery expenditure is inconclusive.

Table 3.b. replicates the exact same previous analysis but taking as dependent variable not total cemetery expenditure but total cemetery expenditure divided by the number of years of the concession of the niche. Note that the results are qualitatively the same, since competition from private crematories increases the minimum niche price per year while it does not affect significantly either average or maximum niche prices per year. Table 3.b suggests that the minimum niche price per year increases between 95% and 82% in those locations with private crematory. This estimate is around two thirds lower for both the average cemetery price per year and the maximum niche price per year. As above we conclude that the competition affects significantly the minimum niche price per year while its effect on the average and maximum niche price per year is inconclusive.

Discussion of the results

We have access to a single cross section of current cemetery prices since past niche prices are not posted and are extremely hard –if not impossible- to obtain. The fact that we do not have a panel data restricts significantly our ability to estimate the effect of competition in public cemetery prices. Pure cross section estimates may be subject to endogeneity bias since it is likely that private crematories will enter precisely in those places with higher cemetery prices. If this is the case, even if cemeteries have reacted to competition with a price reduction we may have estimated a positive correlation between prices and the presence of a

local private crematory. Yet, there are regulatory reasons to believe that the introduction of private crematories is exogenous at least up to some extent. Some autonomous community governments have regulated that every single city with more than 20,000 inhabitants needs to have either a public or a private crematory[20]. As a result, crematory company entry in these markets may be a result of exogenous regulation instead of a reaction to larger niche prices and our estimates would be free of endogeneity bias. Furthermore, this regional regulation may explain why public cemeteries have accommodated the entry of private crematories since private operators may have committed to enter the market under the negotiated condition with local council towns that niche prices should increase.

7. Conclusions

In this paper we have analyzed empirically the determinants of tomb pricing in a sample of Spanish cemeteries. We have found that local cemeteries follow a pricing policy equivalent to a monopoly that uses second degree price discrimination to maximize profits. Additionally, we report that local cemetery prices are affected by competition from private crematories. Niche price dispersion is reduced when a private crematory competes with the cemetery. In particular it seems that local cemeteries have accommodated the entry of private crematories by increasing the minimum niche prices without affecting conclusively other higher tomb pricing in a behavior consistent with the situation depicted in Graph 3.b. Therefore it seems that these type of local state owned enterprises behave less competitively than standard for-profit companies since they facilitate entry of private competitors by increasing prices and as a result reducing consumer welfare.

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[20] Article 39.3 of Castilla-León Decree 16/2005, of february 2005.

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Table 1: Cemetery quantity discount and competition

	Dependent Variable		
	log of price	log of price	log of average price
Intercept	6.94*** (***)	6.86*** (***)	6.86***
	(.37)	(.39)	(.39)
Log (duration)	.47*** (***)	.37*** (***)	-.62***
	(.05)	(.08)	(.08)
Quality	.79*** (***)	1.13*** (***)	1.13***
	(.12)	(.20)	(.20)
Log(Duration)* Competition		.14	.14
		(.10)	(.10)
Quality*Competition		-.50* (*)	-.50*
		(.25)	(.25)
Adj R^2	.74	.76	.76
Obs	123	123	123

All regressions include 50 dummies corresponding to each Spanish province in our sample. (*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1% Std deviation is below the coefficient among parenthesis, we also include the standard deviation computed by a bootstrap of 2000 iterations sampling with replacement the significancy according the bootstrap is reported in red: (*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%

Table 2 Descriptive statistics at the province level

	Mean	Standard deviation	Observations
Maximum Niche Price[1] €	2,447	10087	50
Average Niche Price[1] €	1,234.79	4055.06	50
Minimum Niche Price[1] €	381.91	330.18	50
Maximum Niche Price per year of concession[1] €	83.58	141.52	50
Average Niche Price per year of concession[1] €	53.81	72.10	50
Minimum Niche Price per year of concession[1] €	32.20	50.68	50
Housing prices[2] €	2083.52	573.01	48
Private company involved in Management[3]	0.24	0.43	50
Competition from Private Crematory[4]	0.72	0.45	50
Public Crematory Prices[5] €	170.85	204.76	50
Labor costs[6] €	16149	1988	48

[1]Niche Prices include the niche license price, the inhumation tax and the license for inhumation if applicable.

[2]New housing prices (less than two-year old) in euros per m^2

[3] Dummy variable equal to one if any private company is involved in the management of the local cemeteries

[4]Dummy variable equal to one if there exists a private local crematory.

[5] Cremation prices of public crematory if there is one in the province. If there is none then this variable has value equal to zero.

[6] Year Labor costs in the construction sector.

Table 3.a. Effect of competition on Niche Price levels

	Dependent variable					
	Minimum price	Minimum price	Average Price	Average price	$Log(p_{max})$	$Log(p_{max})$
Intercept	5.19*** (0.23)	-1.96 (10.35)	6.15*** (.25)	-21.44** (8.94)	6.71*** (.28)	-23.73*** (9.71)
Labor costs		.47 (1.01)		1.80* (.90)		1.77* (.98)
Household Prices*Duration of license		0.89 (1.01)		4.08***(***) (.87)		5.43*** (***) (0.95)
Municipal Crematory Prices		.10** (**) (.04)		.09** (***) (.04)		.07* (*) (.04)
Private Management		.26 (.29)		.16 (.25)		-.03 (.41)
Competition from Private crematory	.55** (*) (.27)	.61** (*) (.28)	.26 (.29)	.31 (.25)	.03 (.33)	.07 (.27)
Adj R²	.06	.13	-.00	.37	-.02	.44
Number of Observations	50	48	50	48	50	48

(*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1% Std deviation is below the coefficient among parenthesis, we also include the standard deviation computed by a bootstrap of 2000 iterations sampling with replacement the significancy according the bootstrap method is reported in red: (*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%
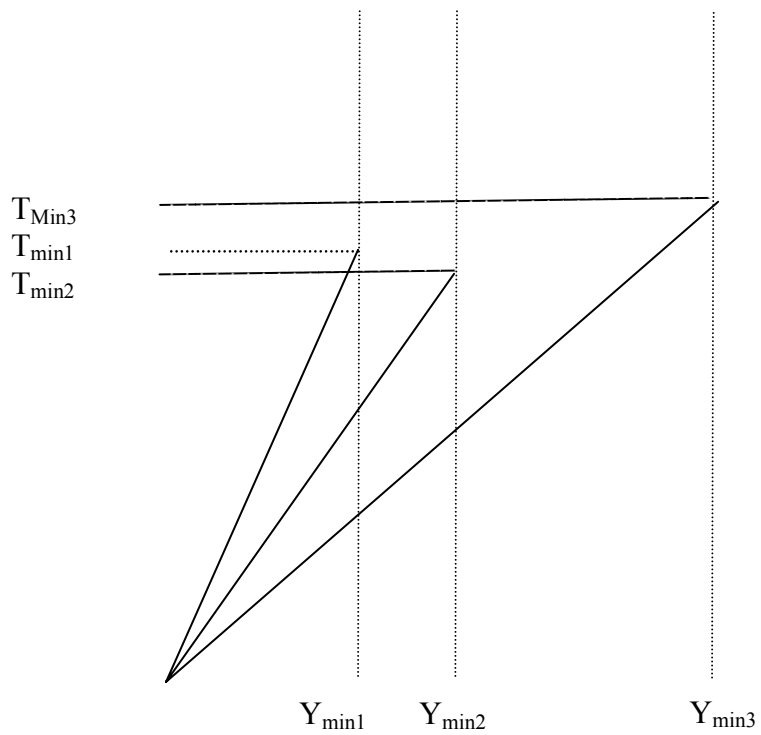
Notes: All variables are in logs; * significant at 10%, ** significant at 5%; *** significant at 1%; in parenthesis the standard deviation; We also computed the standard deviation of the estimation via bootstrap with 2000 re-samples with replacement; the significance according the bootstrap method is reported in parenthesis: (*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%

Table 3.b. Effect of competition on Niche Price per year

(All variables are in logs)

	Log minimum niche price per year	Log of minimum niche price per year	Log of Average niche Price per year	Log of Average niche Price per year	Log of Maximum niche Price per year	Log of Maximum niche Price per year
Intercept	2.06*** (.29)	-3.66 (8.72)	3.14*** (.25)	-13.99 (9.25)	3.62*** (.77)	-16.34 (11.25)
Labor costs		1.95** (**) (.86)		2.46*** (***) (.93)		2.43** (*) (1.14)
Household Prices*Duration of license		-5.65*** (***) (.85)		-2.96*** (***) (.90)		-1.67 (*) (1.10)
Municipal Crematory Prices		.16*** (***) (.04)		.12*** (***) (.04)		.11** (*) (.05)
Private Management		.17 (.24)		.41 (*) (.26)		.54* (*) (.31)
Competition from Private crematory	.95*** (***) (.34)	.82*** (***) (.24)	.45 (*) (.30)	.35 (.26)	.28 (.32)	.21 (.31)
Adj R²	.13	.62	.02	.40	-0.00	.24
Number of Observations	50	48	50	48	50	48

(*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1% Std deviation is below the coefficient among parenthesis, we also include the standard deviation computed by a bootstrap of 2000 iterations sampling with replacement the significancy according the bootstrap is reported in red: (*) Significant at 10%; (**) Significant at 5%; (***) Significant at 1%
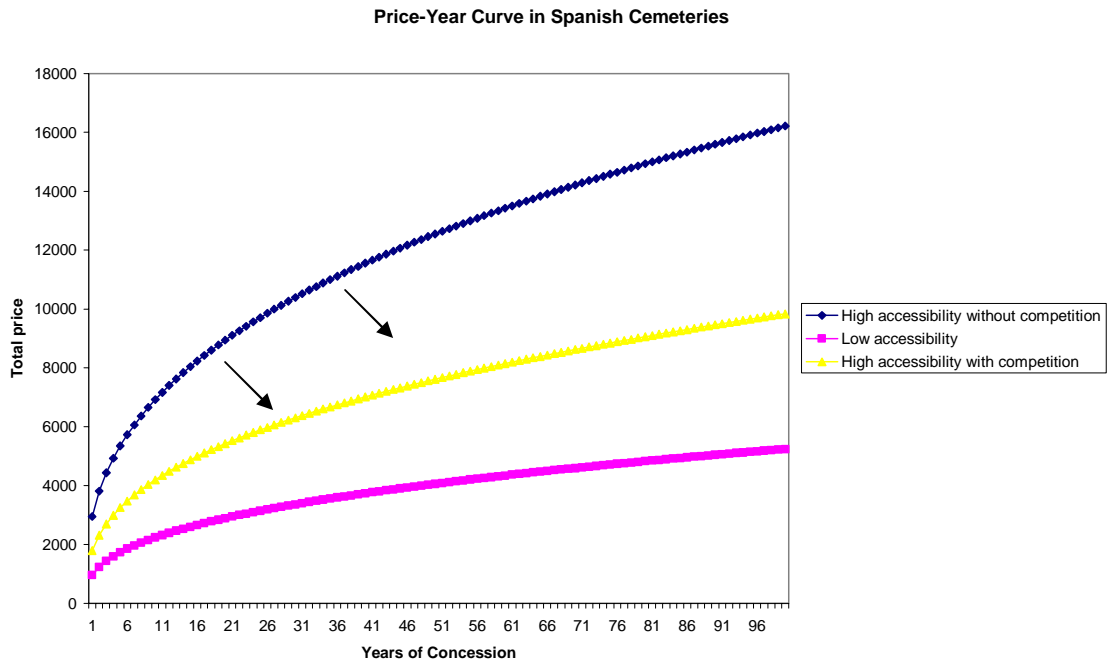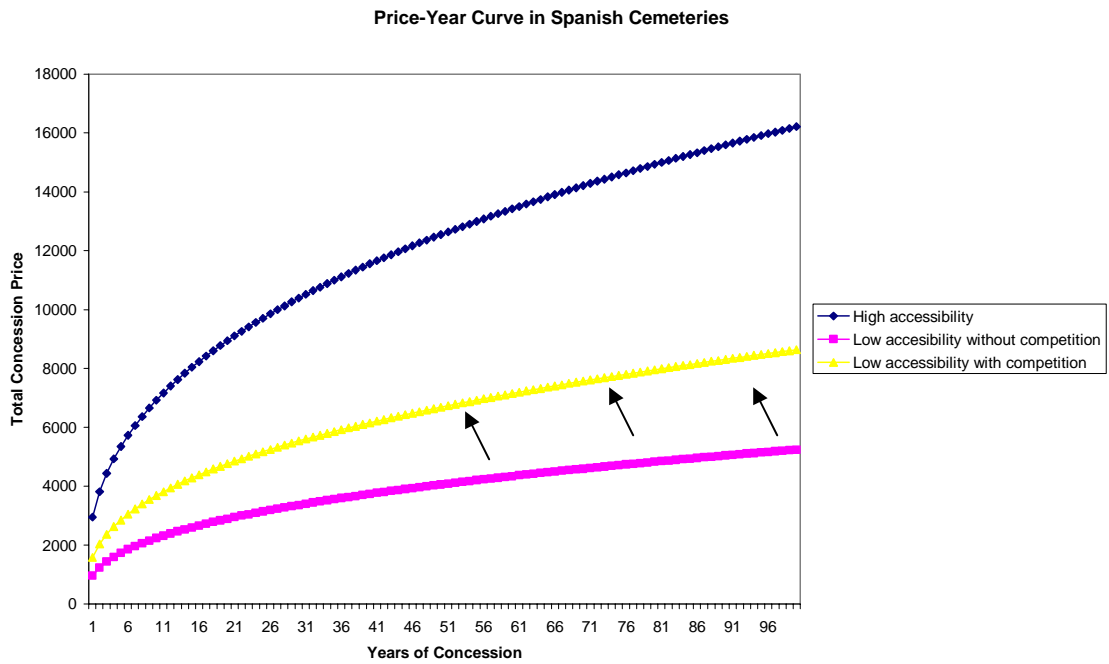
T_{Min3}
T_{min1}
T_{min2}

Y_{min1} Y_{min2} Y_{min3}

Graph 1

Distribution of cemeteries according to the number of different niche prices offered
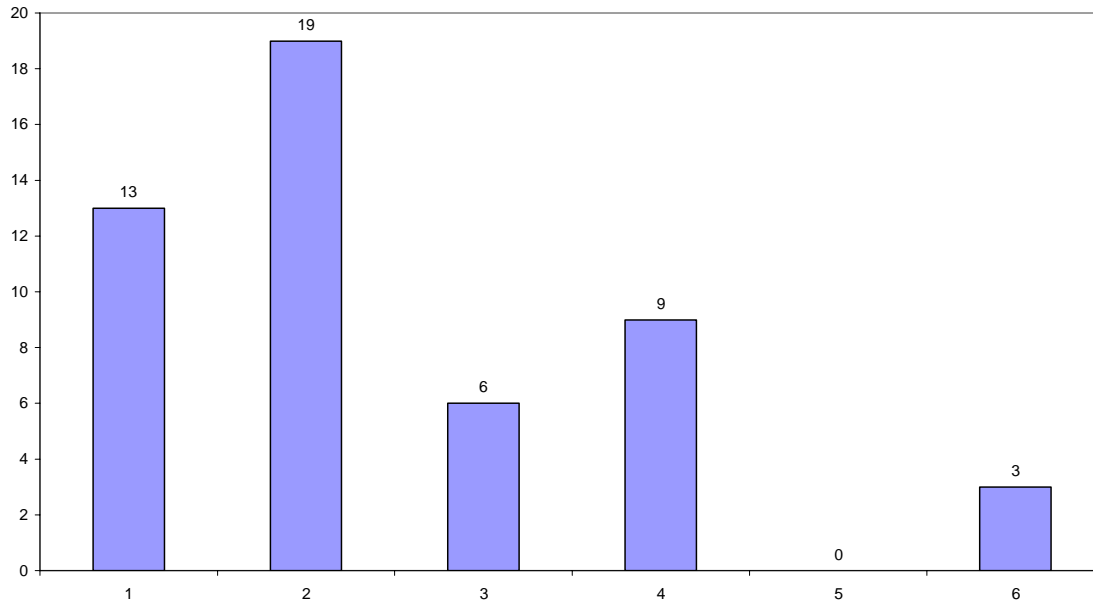
Graph 2.a.

Graph 2.b.

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