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Javier Asensio Ruiz de Alda / Anna Matas Prats

UAB

Universitat Autònoma
de Barcelona

Facultat d´Economia i Empresa

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The impact of 'competition for the market' regulatory designs on intercity bus prices

Javier Asensio[1], Anna Matas

Universitat Autònoma de Barcelona (UAB) &

Institut d'Economia de Barcelona (IEB)

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Abstract

Spain regulates its intercity bus market by means of a 'competition for the market' mechanism, whose design has been modified several times in the last years. This implies that current services are operated under contracts whose conditions are heterogeneous. We take advantage of such fact to empirically measure the impact that regulatory designs may have on fares paid by the users. The results show very large differences between routes whose contracts were awarded under relatively open conditions compared to regionally regulated routes or very old contracts whose concessions were extended and have not been retendered.

Keywords: intercity buses, prices, tendering, competition for the market.

JEL codes: C21, D47, L51, L92, R48.

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1. Introduction.

Contrary to what has become the norm in other European countries, Spain maintains a heavily regulated intercity bus market. Following the UK experience in the 1980s, countries such as Poland (1988), Sweden (1998), Norway (2003), Germany (2013), Italy (2014), France (2015) or Portugal (2019) have liberalised their markets and thus allowed for the entry of new operators who can compete with each other or the incumbents in the market[2]. In Spain, on the contrary, such entry is strictly limited, and competition takes place 'for the market', as firms need to bid in order to win a contract with the public sector which specifies the services to be provided.

However, there are substantial regulatory differences among routes within Spain. Not only are intra- and inter-regional services subject to different norms, but the latter's regulations have experienced frequent changes in the recent past. This implies that the conditions under which current services are operated may be very different, as they depend on the regulatory regimes under which each contract was awarded. To take an extreme case, in early 2021 a customer travelling between Madrid and Segovia (distance 97 kms) would pay a fare of 4.16 €, or slightly more than 4 cents per kilometre, while a trip between Barcelona and Lleida (148 kms) had a price of 22.27 €, or 15 cents per kilometre.

The aim of this paper is to empirically test if such differences can be due to the differences in the regulatory regime under which each service operates. In order to do so, the next section explains the main features and recent evolution of intercity bus regulation in Spain. Section 3 describes the dataset collected for this empirical research, while section 4 presents and discusses the results of the econometric model we use to test our main hypothesis. Section 5 concludes.

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[2] See Aarhaug and Fearnley (2016), Alexandersson et al. (2010), Beria et al. (2018), Blayac and Bougette (2017), Dürr and Hüschelrath (2015), Steer Davis Gleave (2016), Reynolds (2018), Taylor and Ciechanski (2008) and Thust et al. (2016) for different analyses of the liberalisation process in these countries.

2. The Spanish intercity bus market

In Spain, all regular intercity bus services are provided by private operators acting as regulated monopolists during a given period of time[3]. Two types of situations can be identified, depending on the inter- or intra-regional character of the services. In the case of services that connect origins and destinations in different regions of the country, the regulatory authority is the national government's Ministry of Transport. For those routes that take place completely within a given region, the Transport Department of the corresponding regional government will be responsible for awarding and regulating the provision of the services.

The main piece of legislation is the 1987 Transport Law (LOTT)[4], which established the current system of services' tendering by means of a multidimensional auction mechanism. This implies that a pre-specified score function is used to compute the points obtained by each bidder on each variable, weighting the scores to obtain an outcome on a 0-100 scale, with the winner obtaining the contract.

The decision as to which variables are included in the score function and the weights given to each one of them is taken by the regulator when designing the terms of tender for each auction. The law allows the regulator substantial leeway in such choices, although the price paid by the user and the level of frequencies always need to be included as variables in the score function. We refer to the variables and weights included in a particular version of the terms of tender as a regulatory design. Usually, a given regulatory design is used for a set of contracts awarded during a period, with the Ministry of Transport declaring that its purpose is to keep them constant for as long as possible. However, as will be mentioned later, in recent years there have been frequent changes in the regulatory design. We exploit such variability to identify the impact on the prices paid by the users.

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[3] Although the time length of the contract is clearly specified in the terms of tender, delays in the re-tendering procedures may result in longer periods than initially planned. At the moment of writing (Autumn 2021) more than half the contracts are beyond their expected re-tendering timetable.

[4] Ley 16/1987 de Ordenación de los Transportes Terrestres (LOTT).

Under the framework of the LOTT, operators receive no subsidies, even if some of the routes included in their contracts cannot be expected to be operated without losses. In those cases a contract will typically combine loss-making routes with profitable ones in the same region or corridor, effectively imposing a cross-subsidization mechanism among users. However, the operator of a loss-making route can apply to the regulator for a modification of specific itineraries or frequencies, or even for a merger of different contracts provided by the same operator[5].

At the time of passing the LOTT, in 1987, the then existing services were automatically turned into proper concessions, directly awarded to its incumbent operator and given a 20-year extension of the contract. Other services were created as new routes, awarded by means of a competitive auction under the rules previously described. These auctions were very contested, with up to 29 firms bidding for the Madrid-Málaga-Algeciras contract or 23 for the Irún-Algeciras one, that connects the North and South extremes of the country. Such level of competition for the market resulted in lower prices than those offered by the services whose contracts were extended. (OECD, 2001). For instance, prices on the Madrid-Sevilla route, which was tendered at that time, were 30% below those of the comparable Madrid-Bilbao one, whose concession was extended (Barrio, 2013)

The initially expected period of 20 years during which no contracts would be re-tendered was extended in some cases by means of different measures whereby operators would be granted extensions if they kept price increases under certain limits. This policy has to be understood in the context of Spain struggling to meet the Maastricht Treaty convergence criteria in the second half of the 1990s, and in particular the one referring to inflation control. Other extensions were granted as a consequence of particular mergers between contracts operated by the same or different operators.

The result of such extensions was that the earliest re-tendering processes took place in 2007. On that date, the Ministry of Transport reached a compromise with the business association of bus operators running the services and the trade unions representing

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[5] Some operators have abandoned loss-making routes (or announced their intention of doing so) which have frequently been redesigned in so that their sub-regional components are transferred to the corresponding regional governments, who may subsidise them.

their workers, by means of which the terms of tender to be used in the retendering of contracts were agreed on. As summarized in table 1, the 2007 score function gave only a 10% weight to the price bid and 5% to the frequencies. Besides, the incumbent was automatically awarded a 5 point advantage, while price and frequency bids were computed in a way that made it technically impossible for any bidder to generate a 5 point difference. This fact, together with other constraints set on bidder's behaviour, resulted in the incumbents winning all the contracts to which they bided for[6].

The 2007 terms of tender were severely criticised by Spain's competition agency (CNC, 2008). As a result, the regulator modified the terms of tender to be used in 2009, slightly increasing the weights given to price and frequency bids. However, the limits set on the price and frequency bids were not modified, nor was the 5% premium to the incumbent eliminated (CNC, 2010).

Table 1. Weights given to bid variables (%)

Terms of tender	Fare	Frequency	Technical characteristics	Attention to the public	Other	Total
2007	10	5	38	13	34	100
2009	15	8	35	13	29	100
2011	25	15	31	6.5	22.5	100
2014	35	20	17	10.5	17.5	100
2016	45	10	18	11.5	15.5	100

By that time, some bus companies not operating regular services had taken the terms of tender used since 2007 to the Administrative Court, where a ruling declared them void. Thus, the Ministry of Transport had to issue a new version of the terms of tender in 2011, whose score function gave 40% of the weight to prices (25%) and frequencies (15%). However, those terms of tender were also contentious since they made it compulsory for the company winning the contract to re-hire the incumbent's operator labour force assigned to that particular contract, under their existing labour conditions[7].

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[6] A small route received no bids, even from its incumbent, and was subsequently supressed. In two other cases, the incumbents were excluded from the auctions due to formal errors in their submitted bids.

[7] The previous terms of tender had given 20% of the total score to firms accepting such compromise, making it *de facto* a standard practice, since no contract was winnable without it.

Other remaining features of the terms of tender that limited competition where participation conditions in the auction related to firms' size and previous experience, while the incumbent's preference was restricted to draws.

Only five contracts were tendered under those terms before the regulator was again taken to court by some firms, who also won their case. Therefore, by 2014 another version of the terms of tender was issued[8], which was used to award a set of contracts. By that time, there was a significant delay in retendering expired contracts. The 2014 terms of tender awarded a 55% weight to price and frequency bids but, although the lower bound for prices and upper one for frequencies were eliminated for the first time, upper price and lower frequency limits were still imposed, without any explanation as to how they were decided.

The 2014 terms of tender also extended the required subrogation of the incumbent's labour force to all personnel in related activities, such as fare collection, maintenance, or administrative staff. Given the ability of the incumbent to flexibly define such assignments, this requirement can be regarded as an important advantage for the incumbent, as it would be better able to integrate its own workforce. Other features that could be detrimental for competition were the obligation of the contract winner to pay a fee (1% of annual revenue) and the participation requirement of having at least three years of experience in similar services with a bus fleet of similar size.

In 2016 the Ministry of Transport once again modified the terms of tender, increasing the importance of fares up to 45%, while decreasing that of frequencies to 10%. However, the computation of both price and frequency bids was modified form the previous proportional system to a new two-part method, with different ways of computing the points depending on whether the bid was on the upper or lower half of the distribution of submitted bids.

Further changes in 2018 generated a new version of the terms of tender that decreased the weight given to price and frequency bids to just 51%, which is the minimum level

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[8] A preliminary version of the terms was the object of a report by the (by then renamed) competition authority, and some of its recommendations were included in the final version (CNMC, 2014).

imposed by a recently passed law on Public Sector Contracts[9]. These terms of tender also limited the points given to extreme bids in terms of prices or frequencies and introduced a new 'podium' system to value some of the items that require a qualitative assessment. This implied that for those variables the only thing that mattered was the ranking of the bids, as only the best bid obtained the maximum number of points, the second got a lower punctuation and from the third onwards the number of points was again reduced. These terms of tender were used for just one contract held in 2018, before a further modification took place in 2019, which was used in two more contracts. However, in all three cases the regulator suspended the procedure before the contracts were finally awarded, so we observe no price data in routes subject to such regulatory designs.

Intra-regional services are provided under a wider diversity of regulatory regimes, which include combination of subsidies, joint allocation of urban and regional services in an area, on-demand services in rural areas, joint provision of schooling and regular services or subsidised contracts of different intensity. Some regions have passed their own transport laws, which may allow for explicit subsidies for loss making services, while others follow the LOTT procedures. It is beyond our objectives to try to characterise each route according to the terms of tender designed by each regional government, as we have done for the inter-regional ones. Therefore, in the empirical analysis that we report below, we group all regional routes into a single category,

To sum up, and given the already mentioned delays in retendering some contracts, currently operated routes may have been awarded under one of the following nine regulatory regimes: The concessions extended when the LOTT was passed in 1987; the new contracts awarded competitively after the LOTT; contracts which are the result of mergers between concessions of the two previous types; the terms of tender designed in 2007, 2009, 2011, 2014 or 2016 and, finally, regional routes.

Our aim is to test whether such regimes have significant impacts on the prices currently paid by users. In order to do so we estimate a price equation, where additionally to the

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[9] Ley 9/2017 de Contratos del Sector Público.

usual determinants of prices, we will include dummy variables corresponding to the specific regulatory design under which the contract was awarded.

The estimation of price equations for bus services has become a common tool to assess the consequences of the liberalisation in different countries, as shown by different papers in the transport economics literature. Augustin et al. (2014) estimate price equations for services in the United States and Germany, defining the dependent variable as the price per distance. As dependent variables they consider the trip's distance, journey time, number of stops and average service frequency, international connections (in the US) or services to airports (in Germany), as well as a set of measures to take into account intermodal competition (train price, journey time and need to exchange trains). To observe the impact of competition, their US model includes the number of operators in the route, while dummies for the largest firms are considered in both cases. The reported results show that bus prices decrease with the route's distance, although the inclusion of the number of stops as an additional variable makes it difficult to interpret the impact. In the US, prices are observed to decrease with the number of competitors, while the firm-dummies reveal significant price differences between Greyhound and Megabus. In the case of Germany, the dummy for Flixbus services obtains a negative and highly significant coefficient. Also for Germany, De Haas and Schäfer (2017) report that the merger between Flixbus and PostBus had the impact of increasing fares by the resulting company, but not by other competitors. The authors justify this result on the grounds of Postbus' pre-merger policy of low prices as well as on the intensity of intermodal competition.

Fageda and Sansano (2019) also estimate price equations for intercity bus services, collecting data for a sample of national routes in Spain, France, Italy, Germany, Sweden and the United Kingdom. They report negative impacts of route distance and speed on prices per kilometre. They also find that the presence of alternative rail services diminishes prices, while that of air connections does not. The coefficient of their national market concentration measure (HHI index) is not significant. However, when it is interacted with the country dummies, the impact is strongest in Spain, implying that market structure has larger impact in terms of higher prices. The authors interpret this

as a consequence of stronger barriers to entry in Spain, which is the only one of the sampled countries without a liberalised market.

Beria and Bertolin (2018) study the Italian case, estimating a price equation for services operated during the year 2016 obtained from the same webpage that is the source of our data. As all the previously cited papers, they too find a negative impact of travel distance on prices. Besides, there are significant differences depending on the operator providing the service. They also obtain results pointing at intense substitutability between bus services and railways or carpooling.

3. Data

In order to empirically test the hypothesis outlined in the previous section, we have collected data on a sample of intercity bus routes in Spain. One of the problems of gathering representative data for this purpose is to define routes where services provided are comparable in nature (i.e., not mixing rural or on-demand services with high-density corridors). We therefore restrict our choice to routes that connect provincial capitals, which correspond almost exactly to the largest city in each province and provide a geographically distributed sample of origins and destinations. Therefore, connections between smaller villages, or between capitals and those villages, are not considered. This implies that the sample cannot be considered as representative of the whole market for regular bus services in Spain, as a substantial number of routes provide connections to towns or villages with smaller populations than the cities sampled here. However, it should be a valid sample for our purpose of measuring the impact of regulatory changes on prices paid by bus users.

It should also be noted that although the services observed in our data are direct, in the sense of not requiring changing buses, they are not necessarily non-stop express connections, as some stops may be part of the itinerary. Typically, the connection is part of a longer route that links different localities.

The units of observations are routes between capital cities operated with regular bus services on September 23, 2019. Prices were collected three days earlier from checkmybus.es, a website providing price information, but not directly selling tickets. When there is more than one available direct service, we compute the average price for

that route. Additionally to the price and frequency data, other variables have been collected from different sources. From official timetables we are able to obtain both road distances between each origin and destination as well as travel times, making it feasible to compute average speeds in each service. We would expect a negative sign of speed in the price equation, as it reveals the ability of the firm to provide more journeys per bus in a given time period, implying that buses of a smaller average size and fewer drivers may be needed (Fageda and Sansano, 2019).

Distance is used to build a relative measure of price, defined as price per km. Additionally, it is included as an explanatory variable in the model, in order to test if the presence of increasing returns to route length in the provision of bus services and the passing of its generated savings to consumers.

We build a measure of market size for each route as the sum of the population of the two capitals it connects. The expected sign of this variable in the price equation cannot be clearly determined a priori. On the one hand, due to a 'demand effect', higher market size may reflect larger demand levels, shifting the demand function rightwards and resulting in higher prices. On the other hand, in settings with free entry, more intense competition in bigger markets would result in lower prices by means of new firms' entry. Although in the case we deal with the market is not liberalised and competition is 'for the market', such effect may still take the form of more firms participating in auctions involving larger markets, or more aggressive price-bidding.

In competitive markets in which demand levels are higher than the minimum efficient scale, market size can be expected to be negatively correlated with prices, as the entry process of new firms will typically push prices down. In our case, however, market entry is strictly regulated, so that the only response to higher levels of demand comes from the price bids that the operators may make in the auction, or from the participation of a higher number of operators in such auction. In both cases, the role of competition should result in lower prices being paid in larger markets.

We also include in the model a measure of per capita income levels at the provincial level. Higher incomes should generate more travel demand, either directly from final consumers or as a result of higher levels of economic activity. However, intercity bus

services probably are an inferior good for many users[10], when other faster and more expensive alternatives are available (train, private car or plane).

We consider the impact that the availability of alternative modes of transport may have. In the case of air services, we construct a dummy variable showing if direct connections existed at the time between airports in each province. Given that such services would be unfeasible for very short routes, we interact that variable with distance. To consider the competition between bus and rail services, we build a variable showing the relative travel times between origin and destination in each mode[11]. Slower bus than rail services would increase the value of such variable. Therefore, we expect a negative sign for its coefficient as firms would need to compensate longer travel times with lower prices.

Table 2. Descriptive statistics

	Obs.	Mean	Std. Dev.	Max.	Min.
Price (€(km)	223	0.077	0.017	0.150	0.042
Distance (km)	223	488.9	271.3	1255.0	60.0
Income pc (€)	223	36477.5	4674.3	52928.5	31012.5
Population	223	863 257	950 887	3 719 384	125 269
Plane (dummy)	223	0.06	0.24	1.00	0.00
Speed (km/h)	223	74.28	9.71	101.33	46.53
Bus/Rail travel time	223	1.53	0.61	3.21	0.34

Table 2 shows the descriptive statistics of the different variables, while in table 3 the average values are computed for the different types of regulatory designs, as discussed in section 2. We see, without controlling for any other variable, prices are higher for intra-regional and LOTT routes. However, in order to properly assess the impact of regulatory designs we need to estimate an econometric model that includes all potential determinants of prices.

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[10] If intercity bus services are an inferior good, increasing incomes result in a leftward demand shift, thus decreasing both equilibrium price and quantity. Paulley et al (2006) provide evidence of negative income elasticity for bus demand.

[11] We thank Javier Gutiérrez and Juan Carlos García for sharing their computations of rail travel time data. The methodology followed to obtain such measures is detailed at AIReF (2019).

Table 3. Variables' mean values by regulatory design

Regulation	Obs.	Price	Distance	Income pc	Population	Plane	Speed	Bus/rail time
2007	20	0.066	631.20	33 247.80	327 051	0.05	73.06	1.26
2009	12	0.060	752.83	34 374.38	1 102 527	0.08	80.34	1.86
2011	16	0.061	478.06	39 655.50	540 250	0.00	80.51	1.31
2014	22	0.064	786.77	38 079.57	601 037	0.05	76.64	1.70
2016	3	0.061	238.40	37 631.33	1 857 984	0.00	62.22	1.97
LOTT-merger	49	0.075	471.43	37 639.79	778 478	0.10	71.53	1.46
LOTT-new	2	0.069	219.00	36 484.50	1 799 777	0.00	79.63	2.32
LOTT-extension	74	0.084	453.15	36 032.56	1 209 411	0.08	74.25	1.60
Regional	25	0.097	184.92	35 527.28	562 135	0.00	72.75	1.39

4. Estimation and results

The equation that we estimate can be represented as

$$\ln pkm_i = \alpha + \beta X_i + \sum_{r=1}^{R} \gamma_r d_{ri} + \varepsilon_i \qquad [1]$$

Where *pkm* is the dependent variable (price per kilometre paid in 2019, in euro cents), the variables in matrix X include a set of routes' characteristics: distance, income, speed, population (all in natural logarithm terms), as well as the plane dummy multiplied by distance and the ratio of travel times by bus over train. Besides, the *d* are dummy variables that take the value 1 if route *i* is operated under a contract awarded according to the regulatory design *r* of the R categories listed at the end of section 2. The 2007 regulatory design is take as the reference category. The term ε_i is the error term assumed to be normally and independently distributed. We are interested in the changes on prices revealed by the γ coefficients in (1).

An important issue that has to be discussed is whether changes in the regulatory design can be considered exogenous in the price equation. As explained in Section 2, all the changes in the terms of tender have been forced either by the competition commission or by the Administrative Court. So the usual concerns for endogeneity -reverse causation or omission of relevant variables- do not apply in our context.

The results of estimating equation (1) by OLS are shown in table 4. For variables expressed as logs, their coefficients can be directly interpreted as elasticities, As found by the previous literature that estimates price equations for bus services, the coefficient for distance is found to be significantly negative. Prices per km decrease the longer the

trip, revealing the existence of 'economies to distance' in the supply of bus services which are passed on to consumers. In the case of income, we obtain a negative coefficient, consistent with the previously discussed characteristics of intercity bus services as an inferior good. Market size, measured by population sizes, has a significantly positive impact on prices, implying that demand effects outweigh any potential price-reduction due to increasing competition. The availability of airplane services for long trips acts as a substitute to bus services. For the mean length trip in the sample (489 kms), the existence of an alternative plane service would imply a 4.8% reduction in bus fares. In the case of railway services, the faster they are, the lower the price paid by bus users. A 10% improvement in rail travel times with respect to the bus from their mean value would reduce prices by 1.2%.

Table 4. Estimation results

Variable	Estimate	Std. Error	t-stat	Prob
Constant	1.7374*	0.956	1.82	0.071
Ln distance	-0.0678***	0.025	-2.70	0.008
Ln income pc	-0.2730***	0.083	-3.29	0.001
Ln population	0.0968***	0.016	6.24	0.000
Ln speed	-0.5352***	0.110	-4.85	0.000
Plane x dist.	-0.0001**	4.7e-6	-2.40	0.017
Bus/rail time	-0.0784***	0.020	-3.86	0.000
Regulatory designs (reference: 2007)				
2009	-0.0904**	0.034	-2.66	0.009
2011	-0.0314	0.034	-0.92	0.358
2014	-0.0164	0.479	-0.34	0.732
2016	-0.3872**	0.184	-2.10	0.037
LOTT-merger	0.0783**	0.031	2.58	0.011
LOTT- new	0.0161	0.083	0.19	0.847
LOTT- extension	0.1663***	0.028	5.98	0.000
Regional	0.2476***	0.060	4.13	0.000
R2	0.60	Root M.S.E.	0.1419	
Observations	223	F statistic	39.52 (0.00)	

We now focus on the dummy coefficients with which we want to test the response of prices to changes in the regulatory design. The reference category are the services awarded under the 2007 terms of tender. We observe that the design with the largest impact is that of 2016, when the weight of prices in the score function reached 45% of the total. This version of the terms of tender can be considered the most competitive one. Firms seem to respond more intensely to the weight of prices in the score function

than to that of frequencies. On the other hand, routes still operated under extended contracts after the LOTT was passed, or under regulations of regional governments' responsibilities, show the highest prices per unit of distance. These results imply that the regulatory design under which the contract was awarded can explain price differentials of up to 100% of the value of the lowest fare. This would be the case if we compare the predicted values of services run under the 2016 regulatory design (0.048€/km at the sample mean values) with those of a regional contract (0,099€/km).

5. Conclusions.

This paper has looked at the determinants of the differences that users of intercity bus services pay in Spain. The system is regulated under different conditions, which firstly depend on the inter-regional or intra-regional character of the route, and, in the case of the former, on the specific details of the terms of tender under which the contract has been awarded. The results of estimating a price equation show that substantial differences between the prices paid per unit of distance arise as a consequence of the different regulatory designs.

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