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Competition effects of intercity bus tendering reforms in Spain

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Abstract

Spain operates a 'competition for the market' system to award the regulated monopoly rights to run intercity bus services across its different regions. Such tendering system has undergone different changes since 2007. We assess the impact of those changes on different outcomes of the auctions, such as participation, submitted prices and frequencies, as well as on outcomes of the whole process in terms of prices and frequencies offered to final consumers. The results show that the design of the terms of tender can significantly modify the conditions under which bus services are operated. The weight given to price bids in the score function is shown to be a relevant variable to increase competition for the market.

JEL Codes: C54, D44, L51, L92, R41.

Keywords: tendering, intercity bus, coach, score function auctions, Spain.

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1. Introduction

The markets of regulated intercity bus services have traditionally not received much attention by economic researchers. The fact that apparently these services have not experienced significant technological changes and that their demand is stagnant or decreasing may explain the lack of interest on them[2]. However, the previous statement does not imply that no lessons can be learned from its analysis. The variety of regulatory settings applied to bus and coach services in different countries, ranging from monopolistic public provision to outright liberalisation provides an interesting framework in which such regimes can be compared (see van de Velde 2009). Although the sector has traditionally been heavily regulated, with restricted entry and lack of competition in most cases, some countries have tried to liberalise it following the UK experience of the 1980s (White, 1995; White and Robbins, 2012)

An alternative to a liberalised regime with free entry is that of countries like Spain, where monopolistic concessions are awarded for a route or group of routes. In this case, the way to introduce competitive pressure on the operators has to be by means of 'competition for the market' mechanisms. In these cases, the details of the tendering process are of utmost importance, since small differences in the institutional design can have large impacts in terms of how much effective competition develops in those markets. Therefore, assessing the impact of changes in the tendering design can be of interest to identify how competition for the market can, or cannot, be developed. The Spanish market is an appropriate one to deal with this issue given that in recent years a number of changes have taken place in the design of the tendering mechanism. The availability of detailed information on the terms of tender conditions, the value of submitted bids and the tendering outcomes makes it possible to empirically measure the quantitative effects of tendering design changes. Specifically, we assess the impacts on the number of bidders, the probability that the incumbent wins the contract and on the two main economic variables: price and service level. Firstly, we assess the impacts

[2] Some recent exceptions include Ida and Talit (2015), who describe the operation of the tendering process in Israel, and Beck and Walter (2013), who analyse regional differences in the tendering of bus services in Germany. Van de Velde (2014) discusses recent policy changes in urban and intercity services. Recent experience with policy reform and liberalisation in countries such as France, Germany or Italy is analysed by Blayac and Bougette (2017), Dürr et al (2017), Dürr and Hüschelrath (2017) or Grimaldi et al (2016).

of the terms of tender on the winning bid. We then look deeper on the specific changes in the tendering design, which include not only changes in the scoring weights, but also important modifications such as the progressive removal of entry requirements and advantages for the incumbent. Making use of the available information on all the submitted bids for each contract, we further investigate which are the specific characteristics of the terms of tender that most influence submitted price and frequency bids.

Excluding urban and metropolitan services, buses account for 63% of all public transport trips in Spain in 2023. For that same market segment rail has a 24% share, while air services (including island routes, in which it has no effective competitor) represent 12%.

The fact that (without taking into account distance travelled) buses are responsible for the largest part of the market is a striking feature of the Spanish market when it is compared with other European countries of similar size. This can be explained by the fact that contrary to them bus services in Spain were not traditionally excluded from the main transport corridors, which in other countries were reserved for railways (Van de Velde, 2009).

The paper is structured as follows: Section 2 details the changes in the tendering design that have taken place since 2007. In section 3 we estimate a participation equation and we carry out an empirical analysis of the impact that changes on the bidding process have had on the number of received bids per contract and the prices and bus frequencies provided by the winning firm. In section 4 we investigate the effects of the main characteristics of the terms of tender on price and frequency bids of all participating firms. Section 5 summarises our main results and concludes.

2. The contracts' awarding system

Regular intercity bus services in Spain are operated as monopolistic contracts, which are awarded by means of open tender procedures. In the case of interregional routes the design of the contract and of the tendering procedure falls under the responsibility of the Ministry of Transport, while in the case of regional services the corresponding regional government assumes that role. The analysis in this paper focuses exclusively on

routes regulated and awarded by the central government by means of contracts that include several interregional routes. Table 1 summarizes the main characteristics of such contracts.

However, the figures in Table 1 correspond to average values, which hide a substantial heterogeneity between contracts. As an example of such differences, we note that whereas there are 19 contracts with less than 50 000 passengers per year, other three carry more than 1 million customers.

Table 1. Characteristics of the interregional bus contracts. 2023

Number of contracts	77
Length of the network (kms)	68 539
Average length (kms)	890
Passengers	28 549 098
Passenger-kilometres (millions)	5 266
Average trip length (kms)	184
Average vehicle load factor (passengers/vehicle)	28
Vehicle-kilometres (millions)	189.16
Revenue per passenger*km (€)	0.068
Revenue per vehicle*km (€)	1.9

Source: Observatorio del Transporte de Viajeros por Carretera. Contratos de Gestión de la Administración General del Estado (2024)

It is interesting to note that operators receive no subsidies, even if some of the routes included in the contract are unprofitable. A given contract will typically combine loss-making routes with profitable ones in the same region or corridor, effectively imposing a cross-subsidization mechanism among users[3].

The Spanish bus market has traditionally been characterized by a high level of atomization in terms of firms' size. Originally, contracts were handed to small local private companies that operated just one of them. However, in the last decades an intense process of mergers and acquisitions has taken place in the sector, including the takeover of some of them by international firms, with the consequent increase in the

[3] This traditional no-subsidization characteristic of the system at the national scale has been challenged by bail-out of some contracts after the Covid-19 pandemic. A policy of strong subsidization of public transport tickets was implemented following the energy crisis in early 2022. Recently, some contracts have been open for tender with explicit governmental transfers.

level of market concentration. Table 2 reports the size of the largest groups according to different measures. As can be observed, the market is highly concentrated, with the three largest groups operating almost half the contracts, transporting three quarters of total passengers and providing seven of every ten bus-kilometres.

Table 2. Activity levels of the largest intercity bus operators. 2023

Company	Contracts	Passengers (%)	Passengers-km (%)	Bus-km (%)
ALSA	22	50,88%	66,11%	61,63%
SAMAR	11	18,03%	6,65%	8,39%
AVANZA	6	10,60%	8,23%	8,60%
JIMENEZ	4	3,07%	2,73%	3,04%
MONBUS	4	0,44%	0,85%	1,14%
INTERBUS	3	5,75%	3,99%	3,25%
HIFE	3	1,46%	0,45%	1,29%
SOCIBUS	3	1,19%	3,25%	4,72%
BAM	3	0,92%	1,86%	1,57%
CEVESA	3	0,53%	0,22%	0,74%
AISA	2	0,78%	0,64%	0,75%
R.J. Autocares	2	0,52%	0,33%	0,53%
I.R.BUS	1	3,18%	0,66%	0,55%
BILMAN BUS	1	0,83%	3,10%	2,33%
LAX	1	0,63%	0,08%	0,13%
LEDA	1	0,36%	0,30%	0,32%
SAN SEBASTIAN	1	0,26%	0,10%	0,30%
THERPASA	1	0,25%	0,18%	0,23%
BAD-SEV BUS	1	0,19%	0,18%	0,18%
MOLINERO	1	0,05%	0,01%	0,03%
LA BURUNDESA	1	0,04%	0,02%	0,04%
LINECAR	1	0,03%	0,04%	0,25%
Concentration ratios				
CR3	51.32%	79.51%	81.00%	78.62%
CR6	65.79%	91.51%	91.34%	89.63%

Source: Observatorio del Transporte de Viajeros por Carretera. Contratos de Gestión de la Administración General del Estado (2024)

The tendering regime is regulated according to a 1987 law[4] which characterises intercity bus services as public services which have to be provided by means of a competitively-awarded contract. Besides guaranteeing exclusivity rights to the bus operator, the contract details the bus routes in terms of number and location of bus stops, maximum prices, service frequencies, timetables and any other relevant service attribute.

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

Contracts are awarded by means of an auction mechanism at which interested firms need to submit closed bids over a set of different variables (prices, frequencies, bus fleet age, etc.) specified in the terms of tender and which are evaluated under a pre-defined and public score function. The general conditions under which this tendering system operates are defined by the 1987 Law, which has been modified several times, in particular due to the transposition of regulation EC 1370/2007. However, despite such changes both the decision about which items to include in the score function and their weights remain under the control of the Ministry of Transport, which designs the terms of tender when calling bids for a contract's renewal auction. The observed changes in such terms make it possible to empirically assess which are their impacts on the on the outcomes of the tendering process.

The remaining part of this section summarizes the main changes that have taken place in the tendering process.

In 1987, as the LOTT was passed, existing bus routes under previous concessions were automatically extended for 20 years while a set of 25 routes for which either no existing concession existed or were newly created were put out for tender. Those concessions attracted a relatively large number of bids, with 29 different offers for the Madrid-Algeciras route, 23 for coast-to-coast services between Irún and Algeciras, or 21 for the relatively rural Badajoz-Murcia one. The prices for those newly tendered routes were below those that had been extended (OECD, 2000). Although both extended and newly awarded concessions were due to expire at different moments of time after in 2007, due to administrative delays or contract extensions justified on different grounds the expiring date of some contracts would not take place until 2013 or even later.

In 2007, shortly before the first contracts that were about to expire would be put out for tender, the Ministry of Transport reached an agreement with incumbent operators, trade unions, bus manufacturers and consumers' associations that specified the design of the terms of tender under which those contracts would be awarded. The first row of table 3 summarizes the weights given to each group of variables under those terms, and shows that only 15% of the total was awarded on the basis of price and frequency bids. Besides, price competition was severely limited by setting an upper and lower limit on fare bids. These limits were established for 5 different categories of contracts, according

to the number of passenger-kilometres carried. In each case, the maximum and minimum fares were based on current fares applied by the incumbents. Similar limits were set on frequencies[5]. The imposition of such limits together with the weights given to price and frequency bids resulted in the technical impossibility of a new entrant winning over the incumbent on the basis of better price and frequency bids, as the terms of tender also included an explicit 5% preference for the incumbent in case of close valuations.

Given their overtly anti-competitive character, the design of these terms of tender was heavily criticised by the Spanish competition authority on the grounds that it favoured the continuity of the incumbent operator and imposed unnecessary limits to competition (CNC, 2008). Despite those criticisms, nine contracts were awarded using those terms before the Ministry of Transport modified the tendering design and included some of the competition authority's recommendations. These new terms were used to award 10 contracts from 2009 onwards. However, in 2010 a new report by the competition authority (CNC, 2010) argued that the changes were not substantial given that although prices and frequencies were given a higher combined weight of 23%, the subsisting preference for the incumbent and the quantitative limits on prices and frequencies were regarded to be anti-competitive. Besides such critiques from the competition authority, the terms of tender were also challenged in courts, as some bus operators took them to the administrative one and won their case, forcing the Ministry of Transport to issue a new version in 2011.

Although the weight of prices and frequencies increased to 40%, these terms of tender were also contentious given that they required the contract winner to subrogate the incumbent's drivers under their existing working conditions[6] and kept the preference for the incumbent in case of ties. Additionally, although the price variable was given a higher weight, potential price competition was limited as it was enough to bid the price of the existing contract in order to obtain 22 of the 25 awarded points. Only five routes

[5] Strictly speaking, bids are made on the total bus-kms offered every year. However, given that the length of the itineraries is fixed, this implies offering an average frequency level. We use the term 'frequency' throughout the paper to refer to this variable, under the assumption that higher or better frequencies imply more bus services per unit of time (and not a wider gap between bus services).

[6] Previous terms of tender awarded 20 out of 100 points to firms compromising themselves to doing so, thus making it compulsory *de facto* for any winning bidder.

were tendered out under those terms before they were taken again to court by firms not operating any contract.

In 2014 a new version of the terms of tender was published and used to award a new round of contracts, which by this point accumulated and important backlog. The 2014 terms give a 55% weight in the score function to price and frequency bids. On each of these variables the corresponding points are assigned proportionally, with zero points for the highest fare (lowest frequency) and full points for the lowest fare (highest frequency). However, the terms of tender maintain an upper limit on fares and a lower limit on frequencies, whose values remains a discretionary decision by the regulator, who has never explained or justified how they are computed. It is important to note that such upper limit on fares has increased in real terms for tenders after 2015[7], whereas the lower limit for frequencies was progressively reduced. As can be observed in equation A.1 in the appendix[8], the maximum fare rose by 2.6 euro cents after 2015 with respect 2007, whereas in subsequent tenders the rise was about 1 cent. In the case of frequencies, equation A.2. shows how the minimum number of bus*kilometres that can be bid with respect the current levels has decreased over time, with a minimum in the terms of tender of 2014.

The 2014 terms of tender also extend the labour force subrogation requisites to all route personnel in related activities, such as fare collecting, maintenance or administrative staff. Given the ability of the incumbent to define such activities in a flexible way, this requisite may provide it with an important advantage in as much as it would be better able to integrate its own workforce than a rival could. Other features that may be detrimental for competition in those terms of tender are the obligation of the contract winner to pay a 1% revenue annual fee, the requirement of three-year experience in similar services with an equal or larger bus fleet and the award of 35% of total points on the basis of variables whose quantification depends on value judgements not defined in an explicit formula: comfort levels, rolling stock quality, attention to the public, etc.

[7] The terms of tender corresponding to 2014 can be subdivided in two groups: 2014a correspond to those used in contracts during 2014 while the 2014b are those used in 2015.
[8] Equations A.1 and A.2 in the Appendix have been estimated following the procedure described in Section 3.

Table 3. Score function weights to bid variables in different terms of tender (%)

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
2018	35	12	17	9	27	100
2019	40	20	9	8	23	100

In 2016 the Ministry of Transport once again modified the terms of tender. Although the total weight given to prices and frequencies was kept constant at 55%, the importance of fares was increased to 45%, at the expense of frequencies, which decreased to 10%. Although the computation of both price and frequency bids was modified from the previous proportional into a two-part system, the new system rendered similar results to the proportional one. Given the high weight given to the price variable, which arguably is the most important one, this version of the terms of tender can be considered the most pro-competitive one.

The new terms of tender approved in 2018 represented a reversal in terms of competition. This is because of three main changes. Firstly, the weight given to price and frequency bids was lowered to 51%. Secondly, the formula used to assign the points was again modified in such a way that it limited the points awarded to the lowest price or the highest frequency bids. Thirdly, a 'podium' system was introduced for some of the variables requiring a qualitative assessment. This implied that that the only thing that mattered is 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 is again reduced.

The 2018 terms of tender were again taken to court, forcing the Ministry to modify them in a 2019 version which clearly favours competition in prices and frequencies, as the weight given these two variables rose to 60% and the criteria to assign points were reverted in order to promote competition, supressing the 'podium' system.

We have seen that over a 12 year period seven different terms of tender designs have been used to award intercity bus contracts, with substantial differences in the characteristics of some of them. In the next section we empirically assess the impact that such designs may have had on the outcomes of the retendering processes.

3. Empirical analysis of bidding outcomes

The discussion in the previous section shows that the design of the tendering process has experienced changes in so many different details that it would be very difficult to identify the specific effect that each one of them may have had. Therefore, in this section we examine which of the different designs of the tendering terms have encouraged competition and, consequently, resulted in lower fares and higher frequencies. We start by analysing the determinants of firm participation in the auctions, followed by testing if more competitive terms of tender have effectively encouraged competition for the market. We do so by analysing their impact on the number of bids per tender, the probability that the incumbent wins the auction and the fares and frequencies of the winning firm.

In order to carry out our empirical analyses, we exploit the data from the 59 contracts put out for tender by the Ministry of Transport between 2007 and 2019, for which we can observe the design of the terms of tender (2007, 2009, 2011, 2014, 2016, 2018 or 2019). As a result of some of the judicial procedures mentioned in the previous section, some of the tenders were suspended at different stages prior to the awarding of the contract. This implies that the number of observations is not the same for all outcome variables.

Table 4 shows the distribution of contracts and the average number of bids received according to the terms of tender type used in their auction. For each contract we observe the identity of bidding firms and their bid details, together with their resulting score. We identify the highest-score bid as the contract winner, even in cases where the contract was not finally awarded because the tender terms were challenged in court and/or the Ministry suspended the tendering process before awarding the contract[9].

[9] This implies that data for some contracts may be incomplete. For instance, with the 2018 terms of tender five contracts were tendered but only in one of them was the procedure completed. In the other four

Table A.3 in the Appendix details the main characteristics and available observations for each contract.

Table 4. Number of contracts and average submitted bids under each terms of tender type

Terms of tender	Contracts	%	Bids per contract
2007	9	15.2	2.4
2009	10	17	4.9
2011	6	10.2	9.8
2014	24	40.7	5.4
2016	6	10.1	8.7
2018	2	3.4	6.5
2019	2	3.4	5.5
Total	59	100	5.7

Table 4 shows that the number of tenders varies a lot. This is mainly due to the process of discussion with the competition authorities and the court challenges by some firms, which lead to frequent modifications of the terms of tender, as explained in the previous section. The period with the largest number of auctions corresponds to the years 2014 and 2015, when a substantial backlog of contracts waiting to be retendered had been generated. After 2016, a slowdown in the rate of tendering is observed, as the terms of tender were again taken to court forcing the Ministry of Transport to suspend the awarding of some contracts. Something similar happened with the 2018 terms of tender. The contracts auctioned with the 2019 terms of tender were expected to be awarded in 2020. However, the COVID-19 pandemic stopped the process, as the Ministry of Transport considered that the conditions significantly differed from those specified in the terms of tender. Although bids had been submitted to one contract tendered under such design, the Ministry decided to suspend its award. During the year 2020 the Ministry opened a discussion process about different details of the tendering procedure (including the design of the itineraries and, eventually, the steps towards market liberalisation) during which no contracts have been tendered.

cases the tender was suspended at different stages before the opening of the bids. Such eventualities explain why the number of observations differs among the estimated equations reported in this section.

3.1. Participation

An issue that we analyse prior to the tendering outcomes is that of firms' participation in the auctions. In order to do so, we construct a database of all firms[10] that take place in any auction during the period 2007-2019, which includes firms' characteristics (employees and age), geographical location (headquarters at provincial level) and whether they are part or not of a large group.

Table 5 shows the results of estimating a logit model of firm's participation in any of the 59 contracts, where the dependent variable takes the value 1 if the firm submits a bid for that contract, and 0 otherwise. The dependent variables are the proximity to the location of the contract (defined by means of a dummy variable that takes the value 1 if any of the contract's routes cover the province where firm's headquarters are located[11]), firm size (measured by the number of employees the year before the tendering) and the contract's volume (passengers-kms transported the year before). The estimated coefficients show that all these variables have a positive impact on participation probability, as does being the contract's incumbent. Groups are more likely to take part than independent firms, while participation probability decreases with firms' age. Regarding the impact of the terms of tender, the 2014 design is shown to significantly attract more bidders.

[10] A total of 127 firms have taken part in at least a one auction during this period. However, some of them have disappeared during our sample period, either going bankrupt or merging with other firms.

[11] In the case of groups with various subsidiaries located across the country, we consider always a proximity value of 1.

Table 5. Estimation results. Firms' participation in contract tenders

Logit. Dep Var: 1 if the firm submits a bid; 0 otherwise.			
	Coefficient	Std. Err.	t stat
Constant	-10.587	1.44	-7.37
Proximity	1.311	0.15	8.73
Group	0.924	0.17	5.53
ln employment	0.269	0.06	4.42
ln (pax-km)	0.418	0.09	4.44
ln (age)	-0.279	0.07	-3.78
Incumbent	4.141	0.55	7.49
Terms of tender:			
2009	-0.573	0.37	-1.55
2011	0.378	0.56	0.68
2014	0.630	0.21	2.98
2016	0.402	0.21	1.93
2018	-0.336	0.32	-1.04
Observations		5955	
Pseudo-R2		0.232	

Note: standard errors are robust and clustered at contract level

3.2. Tendering outcomes

We now turn to the analysis of the impact of the terms of tender design on the outcomes of the tendering process, which are the number of received bids, the probability of the incumbent winning the contract, and the prices and frequencies offered by the winning firm. The method used to identify the potential impacts of the terms of tender on such outcomes relies on the estimation of a reduced-form equation for each dependent variable of interest, where we include as regressors dummy variables identifying the terms of tender version as well as other determinants that may contribute to explain the outcomes. Therefore, the equations to be estimated take the general form:

$$y = \alpha + \beta_1 d_{2009} + \beta_2 d_{2011} + \beta_3 d_{2014} + \beta_4 d_{2016} + \beta_5 d_{2018} + \beta_6 d_{2019} + \gamma X + \epsilon \qquad [1]$$

where *y* is the dependent variable of interest, the d_t dummy variables measure under which version of the terms of tender the contract is auctioned (with the 2007 ones acting as the excluded reference category), and X may consider contract's characteristics such as its size, which may affect the observed outcomes.

In the different estimated equations, we have computed both robust and clustered standard errors (according to the terms of tender). When we use this last option to deal with potential autocorrelation within each group, much lower standard errors are obtained. However, the computation of clustered standard errors is known to be problematic in the case of dummy variables, such as the ones identifying the terms of tender, which are our main variables of interest. Therefore, we opt for the most conservative option and present our estimates with robust standard errors. The same estimations with clustered errors are shown in the appendix.

3.2.1. Number of bids and incumbent's winning probability

As shown in table 4, a contract receives almost six bids on average. However, the range of variation of this variable is wide and it is not infrequent for a contract to receive more than 10 bids, or even 16 in three of them. In order to test if the tendering design may have the effect of attracting a different number of firms, we estimate a version of equation [1] where the dependent variable is the number of submitted bids. It would be necessary to take into account that the number of bids depends on the expected profitability of the route, but given the absence of data to measure such profitability we proxy this variable by the number of passenger-kilometres carried in the year prior to the tender.

Given the character of submitted bids as a count measure, we estimate the effects of tendering design changes by means of a Poisson regression. The estimation results are reported in the first column of table 6, which shows that the terms of tender of 2011, 2014 and 2016 attracted a significantly larger number of bids. These results are consistent with the ones obtained in the estimation of the participation equation at firm level, and can be interpreted as evidence that reducing the anticompetitive elements in the terms of tender results into a higher number of bids. Nonetheless, in the auctions using the last two versions of the terms of tender the number of bids is not statistically different from that received by the 2007 terms of tender, which act as the reference category. It should be recalled that the 2018 and 2019 terms of tender have just been used for 1 and 2 tenders, respectively, thus casting doubts on any conclusion drawn from their results.

Table 6. Estimation results. Submitted bids and probability of renewal by the incumbent.

	Number of bids (Poisson regression)		Prob. incumbent wins (Logit model)	
	Coefficient	t stat	Coefficient	t stat
Constant	-2.942	-3.73	-9.266	-2.66
ln passenger-km	0.261	5.06	0.754	3.07
Terms of tender:				
2009	-0.069	-0.29	-2.068	-1.44
2011	0.721	2.47	-2.409	-1.86
2014	0.441	2.49	-2.532	-2.35
2016	0.603	2.92	-4.372	-2.99
2018	0.138	0.64		
2019	-0.032	-0.14	-4.086	-2.50
Observations	59		51	
Pseudo-R2	0.271		0.22	
Mean dep. Var.	5.69		0.59	
St. Dev. Dep. Var.	4.03		0.50	

Note: t-statistics are computed from robust standard errors

The second outcome we look at is the probability that the incumbent operator wins the contract when it is put out for tender. In our data this happens in 59% of the cases, but our interest lies in whether this probability may be influenced by the design of the terms of tender. The second column of table 6 presents the estimation results of a logit model whose dependent variable takes the value one when the incumbent wins the contract, and zero in all other cases. The sample is limited to those auctions in which the incumbent participated, which drops its size to 51 observations. Although significance levels are low, we find evidence that incumbent operators are more likely to win larger contracts, and that this probability decreases with the most recent designs of the terms of tender.

3.2.2. Bids' dispersion

Another way of approximating the competitive character of the terms of tender is by observing if they have an impact on the dispersion of submitted bids. The underlying assumption here is that designs incentivizing more competitive behaviour would result in a higher level of dispersion in submitted bids. Table 7 reports such effects on the dispersion of price and frequency bids, defined as the relative difference between the

highest and lowest bid in each case. The first column shows the effect of the different terms of tender on price bids' dispersion, revealing an increase in price competition as the relative weight of prices in the score function increases. This trend, however, breaks after the 2018 terms of tender.

Table 7. Estimation results. Range of variation of price and frequency bids

Dependent variable:	ln highest /lowest price bids		ln highest /lowest frequency bids	
	Coefficient	t stat	Coefficient	t stat
Constant	-0.6097	-4.09	0.0272	1.87
ln passenger-km	0.0443	4.16		
Terms of tender:				
2009	0.0483	0.93	0.0455	1.95
2011	0.0696	1.52	0.1572	3.14
2014	0.1513	2.64	0.2385	5.63
2016	0.3849	7.55	0.2163	5.42
2018	0.1038	2.93		
2019	0.0996	1.15	0.1393	2.64
Observations	56		55	
Adjusted R2	0.41		0.30	
Regression S.E	0.17		0.14	
Mean Dep. Variable	0.22		0.18	
St. Dev. Dep. Var.	0.22		0.16	

Dispersion of frequency bids also increases as terms of tender become more competitive, as shown in the second column of table 7. The highest impact is that of the 2014 version.

3.2.3. Prices

We now look at how the design of the terms of tender influence the winning bid's price. In order to do so, we regress the winning price -defined as fare per kilometre- against the terms of tender dummy variables, adding the contract's passenger-kms as a control variable. We expect that those terms of tender that promote competition will result in lower fares.

Table 8 shows the estimation results, where three alternative measures of the dependent variable are used: the winning fare, the ratio of the winning fare relative to the current price of the contract, and the ratio of the winning fare to the auction's

reference price (which is the price above which bids would receive no points). In all cases natural logarithms are taken on fares and passenger-kms. Fares are CPI-deflated.

Table 8. Estimation results. Winner's price

Dep. Variable	Ln winner's price		ln winner's price /current price		ln winner's price/ reference price	
	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat
Constant	-5.705	-21.38	0.451	2.09	0.549	4.37
ln passenger-km	-0.110	-5.72	-0.032	-2.12	-0.042	-4.82
Tems of tender:						
2009	0.062	0.70	0.098	1.46	-0.048	-1.01
2011	0.035	0.43	0.044	0.62	-0.030	-0.70
2014	0.149	2.39	0.051	0.88	-0.156	-3.13
2016	-0.017	-0.15	-0.241	-2.19	-0.309	-4.67
2018	0.303	4.59	0.368	7.48	-0.027	-0.83
2019	0.283	2.99			0.026	0.63
Observations	56		54		56	
Adjusted R2	0.56		0.28		0.44	
Regression S.E.	0.18		0.18		0.14	
Mean Dep. Var	-7.38		-0.05		-0.24	
St. Dev. Dep. Var.	0.27		0.21		0.19	

Regarding the winning fare, it is clear that price significantly diminishes with the contract's size. A 10% increase in the number of passenger-kms results in a 1.1% decrease in the fare per kilometre, as firms can take advantage of economies of scale and offer lower prices. Regarding the impact of the terms of tender, and contrary to what could be expected given the previous results on the determinants of auction's participation, the terms of tender of 2014, 2018 and 2019 would have contributed to increasing prices. A negative sign is obtained only in the case of 2016 design, but it is not statically significant.

One possible explanation of these results is that the characteristics of the contracts being tendered are masking the price of the winning bid. In order to take such effect into account, the second column of table 8 reports the estimation results using as dependent variable the winning fare relative to the current fare in the tendered contract. The results show that although the terms of tender of 2008, 2011 and 2014 had no impact with respect of those of 2007, the 2016 design result in a 24% fares' reduction. On the contrary, the reduction in the score given to fares and the limited

points given to the extreme bids in prices in the 2018 tender result in a 37% price increase

Finally, we specify the dependent variable as the winning price relative to the reference price acting as upper limit. In this case, a different picture emerges as a significant and negative impact on price takes place with the 2014 and 2016 designs. The apparent paradox of prices in absolute levels not responding to the terms of tender in those years, but falling relative to the reference prices is explained by the discretional increase in the reference prices that took place in the terms of tender around those dates. More precisely, as the estimation results of equation A.1 in the appendix show, the reference price per kilometre under the 2014 terms of tender increased by 2.6 euro cents with respect to the 2007 ones, whereas for the subsequent designs the figures are 0.9 in 2016, 1.2 in 2017 and 1.0 in 2019.

The picture that results from these results is one in which although changes in the terms of tender since 2014 have favoured price competition, the simultaneous increase in the reference fares has had a countervailing effect, with the overall result that more intense competition between bidders has not lead to lower prices for intercity bus users. Besides, setting higher reference prices in the terms of tender may act as an incentive for firms to bid high fares to avoid the risk of being disqualified by submitting too low bids on relative terms. For contracts tendered under the 2014 design, the rise in the reference fare would fully compensate for the increase in price competition, whereas for those under the 2016 terms of tender a fare reduction with respect the previous one takes place. However, the 2018 terms of tender imply a reversal of price competition intensity. Although, as the number of observations with such design is very limited, and thus conclusions based on them should be taken with caution, a significant increase in price is observed both in absolute terms and with respect to the previous fare.

3.2.4. Frequencies.

Besides prices, the most relevant variable under which bus services can compete are the frequencies provided. Given that the length of the routes' itineraries included in each contract is fixed, average frequencies are directly determined by the number of bus-kilometres offered, which is the variable included in the score function. Thus, and in

accordance with the terminology employed in the terms of tender, we identify better frequencies with an increase in total bus-kilometres run.

Adapting equation 1, we estimate the impact of the terms of tender on frequencies. We specify two different versions of the dependent variable, as the number of bus-kilometres of the winning bid relative to the those of the previous contract and relative to the minimum reference value specified in the terms of tender, respectively. In this case we do not control for any contract size variable, since it would be almost perfectly correlated with the dependent variable[12].

The results in table 9 show the impact of the terms of tender designs on bus frequencies. When comparing the change with respect to the contract's previous frequencies, we see that the changes in the terms of tender make no statistically significant difference. However, when the dependent variable is defined as the winning bid relative to the minimum level of bus-kilometres stated in the terms of tender, the estimated coefficients all become significant. The largest impact is found with the 2014 terms, with slight decreases when using the 2016 and 2018 designs. The interpretation of these results needs to take into account that the minimum reference value for bus-kilometre specified in the terms of tender decreased from 0.98 of the contract's previous year value to just 0.59 in 2014, and then slightly rose in 2016. As in the case of prices, a significant part of the increased competition in frequency bids is compensated by the modification of the reference values.

4. Analysis of individual bids.

The previous section has analysed the relationship between the design of the terms of tender and the outcomes of the tendering processes. We now address the same issue by looking at the behaviour of individual bids, characterizing regulatory design by the relative weights given to price and frequency bids. The data used to estimate the corresponding equations originates from all the bids submitted between 2007 and 2019.

[12] Given that for equations with bus-kilometres as dependent variables all regressors are dummy variables, it is not possible to correctly compute the clustered standard errors. Therefore, we only report regression results with robust standard errors.

Table 9. Estimation results. Winner's frequency.

	ln winner's frequency/current frequency		ln winner's frequency/reference frequency	
	Coefficient	t stat	Coefficient	t stat
Constant	-0.034	-0.46	0.006	1.00
Terms of tender:				
2009	0.013	0.13	0.073	3.88
2011	-0.131	-1.11	0.121	2.88
2014	-0.213	-1.53	0.330	7.83
2016	-0.147	-0.82	0.240	7.61
2018			0.239	2.54
Observations	52		55	
Adjusted R2	-0.02		0.45	
Regression S.E.	0.41		0.14	
Mean dep. Variable	-0.15		0.20	
St. Dev. Dep. Var.	0.40		0.19	

The empirical approach in this section is very similar to the one followed by Koning and van de Meerendonk (2014) in their analysis of the impact of scoring weights in the procurement of welfare-to-work services in the Netherlands. As in our case, these authors take advantage of the data generated in a period during which the weights of the scoring function were modified to observe how firms react in terms of the bided prices and quality of services provided.

We consider that the price and frequency bids made by each firm depend on a group of contracts' and firms' characteristics. Among the first ones, we consider the weight given to prices and frequencies in the corresponding terms of tender, the length of the offered contract (in years), the reference value of the corresponding variable (highest possible price and lowest possible frequencies) and measures of the contract's size (in the case of prices, we include the average of passenger-kms transported in the three previous years, while for frequencies, we consider the average occupancy rate per bus-km.). Firm's characteristics are summarised by a dummy variable identifying each participating firm, plus a dummy variable to consider cases of bids submitted by joint ventures.

Therefore, the equations that we estimate are:

$$price_i = \alpha + \beta_1 weight_i + \beta_2\, length_i + \beta_3 reference_i + \beta_4\, paxkm_i + \beta_5\, joint_i + \\ + \sum_{f=1}^{F} \gamma_f\, I_{fi} + \varepsilon_i \quad [2]$$

$$frequency_i = \alpha + \beta_1 weight_i + \beta_2\, length_i + \beta_3 reference_i + \beta_4\, occupancy_i + \\ \beta_5\, joint_i + + \sum_{f=1}^{F} \gamma_f\, I_{fi} + \varepsilon_i \quad [3]$$

Where the variables are the ones mentioned in the previous paragraph, α, β and γ are coefficients to be estimated, the subindex i refers to bids while I_{fi} is an identifier taking the value one when the firm f submits bid i. The identification of each firm by a specific coefficient makes it possible to take into account unobserved heterogeneous characteristics that may be constant across time. Price is the submitted fare bid in euros per kilometre, while frequencies is the number of bus-kilometres considered in the bid over the minimum number specified in the terms of tender.

Table 10 shows the descriptive statistics of the 253 bids submitted to any of the contracts in which detailed information is available. On average, firms submit price bids of 5.7 euro cents per kilometre when the reference price is 7.3, while they improve the reference value of 1.78 million bus-kms with further 344 000.

When estimating equations [2] and [3], we consider whether the firms' bidding behaviour may be different depending on the competitive intensity that the terms of tender designs generate. The results from the analysis in section 4 have shown that from 2014 onwards competition has been more intense than what could be observed before. We therefore divide our sample in two periods, and estimate the same equations for each one of them. The results are shown in tables 11 and 12.

For both variables, the results corresponding to the second period (post 2014) reveal a more competitive behaviour by firms. In the case of prices, the results of the first period show that the only variable which significantly explains price bid is the reference level set in terms of tender. However, after 2014 firms also respond with lower bids when prices have a higher weight in the score function, contracts' are longer and of a larger size. On average, for each ten additional points in the score function, fare per kilometre would decrease by 1.03 euro cents.

Table 10. Descriptive statistics. Firm's price and frequency bids.

Variable	Obs	Mean	Std. Dev.	Min	Max
Price	253	0.057	0.016	0.025	0.123
Frequency	253	344 135	447 914	0	2 256 782
Weight (price)	253	31.50	11.26	10	45
Weight (frequency)	253	14.11	5.39	5	20
Length	253	9.69	1.13	5	12
Joint	253	0.30	0.45	0	1
Paxkm (millions)	253	55.1	63.0	0.258	208
Reference (price)	253	0.073	0.019	0.040	0.135
Reference (freq.)	253	1 782 555	1 602 970	40 420	5 880 138
Occupancy (pax/bus)	253	25.06	11.88	3.23	52.70

Source: individual bids. Note that average contract's characteristics are weighted by the number of bids received by each contract.

Table 11. Estimation results. Price bids

Period	2007-2013		2014-2019	
	Coefficient	t stat	Coefficient	t stat
Constant	0.00275	0.12	0.11341	5.50
Weight price	-0.00007	-0.29	-0.00103	-3.58
Length	-0.00239	-1.23	-0.00460	-3.41
Reference price	1.36257	5.03	0.48665	4.29
Passengers-km	-3.08e-11	-1.07	-9.25e-11	-2.98
Joint	-0.00554	-1.65	0.00958	1.89
& individual firms' effects				
Observations	89		164	
R2	0.89		0.82	

Note: t statistics obtained from robust standard errors.

In the case of frequencies, a similar pattern emerges. With the terms of tender used prior to 2014, the only variable that can explain the patter of submitted bids is the minimum frequency level set for each auction. After that date the weight of frequencies in the score function gains statistical significance, although it is clearly much less important than what we have seen in the case of prices. Firms, therefore, appear to be much more respondent to the weight given to the price bid than to the frequencies' one.

Table 12. Estimation results. Frequency bids

Period	2007-2013		2014-2019	
	Coefficient	t stat	Coefficient	t stat
Constant	-2914677.0	-0.64	-532224.2	-1.17
Weight frequency	4610.10	0.83	8931.12	1.47
Length	20498.18	0.47	27096.89	0.58
Reference frequency	0.0434	2.37	0.2726	5.99
Occupancy	1935.44	0.96	11232.76	1.76
Joint	3762.83	0.05	-721362.6	-3.51
& individual firms' effects				
Observations	89		164	
R2	.71		.88	

Note: t statistics obtained from robust standard errors.

5. Conclusions

This paper analyses the effects of design changes that have taken place in the tendering of intercity bus services in Spain since 2007, focusing on their impact on observable outcomes such as the intensity of competition and prices and frequencies offered to final users. The results show the 2014 and 2016 designs of the terms of tender have been the ones most favourable to competition, and that firms seem to respond more intensely to the weight of prices in the score function than to that of frequencies. However, the regulatory system still has many features that can be considered as entry barriers to the 'competition for the market' system whose results are far from what could be obtained in a liberalised setting. In particular, it is subject to regulatory changes that may go in the opposite direction to market opening

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Appendix

Table A.1. Estimation results. Reference price. Maximum fare in terms of tender (cents/km)

	Coefficient	t stat
Constant	0.075	47.34
Passenger-kms	-1.26e-10	-5.32
Terms of tender:		
2009	0.002	0.78
2011	0.002	0.57
2014-a	0.006	1.06
2014-b	0.026	4.71
2016	0.009	1.67
2018	0.012	4.03
2019	0.011	4.45
Observations	59	
Adjusted-R2	0.50	
Mean dep. Variable	0.081	
St. Dev. Dep. Var.	0.019	
Pseudo-R2	0.23	

Notes: prices CPI-deflated; robust standard errors; The terms of tender corresponding to 2014 can be subdivided in two groups: 2014a correspond to those used in contracts during 2014 while the 2014b are those used in 2015.

Table A.2. Estimation results. Reference frequency. Minimum frequency in terms of tender (bus-km.)

	Coefficient	t stat
Terms of tender:		
2009	0.981	12.12
2011	0.920	11.98
2014-a	0.767	7.74
2014-b	0.586	5.91
2016	0.667	11.33
2018	0.681	6.87
Observations	54	
Adjusted-R2	0.19	
Mean dep. Variable	0.771	
St. Dev. Dep. Var.	0.271	
Pseudo-R2	0.23	

Note: robust standard errors

Table A.3. Estimation results. Submitted bids and probability of renewal by the incumbent.

Clustered standard errors at terms of tender level.

	Number of bids (Poisson regression)		**Prob. incumbent wins (Logit model)**	
	Coefficient	t stat	Coefficient	t stat
Constant	-2.942	-2.86	-9.266	-4.55
ln passenger-km	0.261	3.87	0.754	4.93
Terms of tender:				
2009	-0.069	-0.38	-2.068	-4.49
2011	0.721	4.28	-2.409	-5.62
2014	0.441	6.54	-2.532	-6.91
2016	0.603	4.42	-4.372	-7.35
2018	0.138	0.73		
2019	-0.032	-0.17	-4.086	-6.09
Observations	59		51	
Pseudo-R2	0.271		0.22	
Mean dep. Var.	5.69		0.59	
St. Dev. Dep. Var.	4.03		0.50	

Table A.4. Estimation results. Winner's price

Clustered standard errors at terms of tender level.

Dep. Variable	Ln winner's price		ln winner's price /current price		ln winner's price/ reference price	
	Coefficient	t stat	Coefficient	t stat	Coefficient	t stat
Constant	-5.705	-15.17	0.451	0.99	0.549	3.28
ln passenger-km	-0.110	-4.14	-0.032	-1.01	-0.042	-3.60
Terms of tender:						
2009	0.062	0.77	0.098	1.00	-0.048	-1.34
2011	0.035	0.66	0.044	0.68	-0.030	-1.26
2014	0.149	3.33	0.051	0.95	-0.156	-7.82
2016	-0.017	-0.22	-0.241	-2.49	-0.309	-8.70
2018	0.303	4.70	0.368	4.68	-0.027	-0.96
2019	0.283	2.97			0.026	0.61
Observations	56		54		56	
Adjusted R2	0.56		0.28		0.44	
Regression S.E.	0.18		0.18		0.14	
Mean Dep. Var	-7.38		-0.05		-0.24	
St. Dev. Dep. Var.	0.27		0.21		0.19	