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Factors influencing prices and frequencies in the interurban bus market: Evidence from Europe

Xavier Fageda*, Sergi Sansano

University of Barcelona, Spain

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ABSTRACT

We analyze the determinants of prices and frequencies in the interurban bus services (IBS) market. Drawing on data collected from a sample of routes in six large European countries, we find that intramodal competition is based on frequencies while intermodal competition is based on prices. Furthermore, we provide evidence of the regressive nature of the IBS in Europe by showing that routes with low-income endpoints face higher prices. We also find significant price differences between countries, which can be attributed to differences in their respective regulatory systems.

1. Introduction

Interurban bus services (IBS), unlike other modes of transport, such as air and high-speed rail (HSR) travel, do not typically attract the attention of the media or academia. Yet, interurban buses offer a number of advantages. For example, they cover similar routes, usually at lower prices, to those provided by these alternatives modes and, moreover, there is no need to invest in new, costly infrastructure to operate a route, as is obviously the case with HSR (DfT, 2004). According to Eurostat data, in 2013, passenger buses and coaches accounted for 9.2% of inland passenger transport in the EU-28, while trains accounted for 7.4%.[1]

The prices charged by this mode are especially attractive to lower income groups, including the young, the elderly and those without access to a car.[2] In this regard, Balcombe et al. (2004) calculate that interurban bus users have a lower value of time than that of train users.

Promoting the use of IBS also helps reduce the congestion caused by cars (DfT, 2004) and air pollution levels (Heil and Pargal, 1991; Stanley and Watkiss, 2003; Chapman, 2007). All in all, IBS ensure that there are fewer vehicles on the roads. Indeed, Abuhamoud et al. (2011) claim that a double-decker bus is a sustainable mode of transport and can replace up to 50 other motorized vehicles. Note also that the relationship between buses and road safety outcomes is complex but recent studies suggest that the marginal external accidents cost per passenger kilometer of buses is lower than that of cars (Sen et al., 2010; Rizzi and De La Maza, 2017).[3]

Studies about the performance of bus services have usually focused on urban transportation. A typical concern here has been to determine the effect of ownership on efficiency. For example, Albalate et al. (2012) analyzed urban bus transportation in the city of

* Corresponding author at: Department of Applied Economics, University of Barcelona, Av. Diagonal 690, 08034 Barcelona, Spain.
E-mail address: xfageda@ub.edu (X. Fageda).

[1] Note here that Eurostat data do not differentiate between local and longer distance bus.

[2] Surveys report that 40% of regular bus users in the UK and 50% in Greece live in households without access to a car (European Commission, 2009).

[3] Accident cost is a function of accident rate and accident severity (Jansson, 1994). Severity is influenced by speed and rate by the number of vehicles. A greater presence of buses on the roads may decrease the number of accidents as they can each substitute many cars. However, more buses could increase the severity of accidents if they help to increase the speed of cars on the road.

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Barcelona (Spain), concluding that the most efficient way to deliver urban bus services was via partial privatization. Vining and Boardman (1992) found privately owned bus companies to be more efficient than their public counterparts, while Jørgensen et al. (1997) found no differences between public and private companies in Norway. Other studies, including Borcherdinget et al. (1982) and Scheffler et al. (2013), report that a more important determinant of efficiency is the presence or otherwise of competition on a route rather than the ownership structure of the bus companies.[4] Further to this, some recent studies do not find significant differences in the costs of urban bus lines between those operated under competitively tendered contracts and those operated under performance-based negotiated contracts (Filippini et al., 2015; Mouwen and van Ommeren, 2016). A common explanation for that result is that the threat of competitive tendering is sufficient to put pressure on the behavior of operators. An extensive literature review can be found in Ibarra-Rojas et al. (2015).

Interurban bus services, particularly regarding competition and the effects of liberalization, has not been widely studied. Van de Velde (2009, 2014) reviewed the interurban bus regulatory systems being operated in Europe, and found that competition *in* the market, rather than tendering concessions (competing *for* the market), was the most frequent form of competition in Europe. Knorr and Lueg-Arndt (2016) and Dürr and Hüschelrath (2017) provide data that show an important increase in the number of routes served by the German interurban bus market just after its deregulation. For the same market, Dürr et al. (2016) show price increases on duopoly routes as a consequence of the merger between two big players. Augustin et al. (2014) compare the German and US markets suggesting the higher potential of the former due to its lower average distances.[5] Blayac and Bougette (2017) find that the liberalization of French long-distance bus services has had positive effects in terms of fares, number of operators and frequencies. Aarhaug and Fearnley (2016) document a steady traffic growth in the inter-urban market in Norway after its liberalization. Finally, Alexandersson et al. (2011) argue that the Norwegian market is more developed and efficient compared to its Swedish counterpart.

Other studies compare IBS with the services provided by other transport modes, especially rail. For example, Bataille and Steinmetz (2013) examined the effect of introducing interurban buses to compete with trains, while Ahern and Tapley (2008) compared interurban rail and bus passenger preferences in Ireland by combining revealed and stated preference models. Finally, Rojo et al. (2012) analyze which variables affect the probability that a traveler will use a bus or a car for an inter-city journey, by applying different discrete choice models in a dataset based on survey results from a region in Spain. They show that prices, frequencies and the duration of the journey have a relevant influence on modal choice.

We seek to add to this literature by undertaking an empirical analysis of the determinants of prices and frequencies in the interurban bus market through a comparison across countries. To do this, we collected data on routes from a number of large European countries, including France, Germany, Italy, Spain, Sweden and the United Kingdom. Data for the main variables are from May 2015. We focus our attention specifically on the presence of different transportation modes on the routes and the factors characterizing the firms' intramodal competition as well as the regulatory system in operation in each country. Additionally, we analyze whether prices relate to income levels at the route endpoints.

The main results from this analysis indicate that bus prices are lower on routes with richer endpoints; thus, we provide some evidence of a regressive fare-setting scheme in the countries examined. We also find that in the interurban bus market intramodal competition is based on frequencies while intermodal competition is based on prices. Finally, we find substantial differences across the countries examined, which could be attributed to differences in the regulatory model in operation in each country.

The rest of the paper is organized as follows. Section 2 describes the data used and outlines the methodology employed in analyzing the determinants of prices and frequencies in the interurban bus market. *A priori* expectations of the explanatory variables are considered in Section 3, while the estimate results are presented in Section 4. Finally, Section 5 concludes.

2. Data and methodology

2.1. Sample

The sample used in the empirical analysis includes observations for the United Kingdom, Germany, Italy, France, Spain and Sweden. Since both the availability and quality of data differ across countries, we opted to include the five largest EU Member States plus Sweden; the countries with the best data available.

Our unit of observation for the empirical analysis is the routes linking two endpoints. For each country, we include 45 potential links; the result of interconnecting each country's ten largest cities. In each case, the origin is the city with the larger population. Thus, Germany is the country offering most bus routes (with a total of 41[6]), followed by Spain (38), the United Kingdom (37), Italy (25), Sweden (23) and France (13). This gives us 177 interurban bus services for a total of 270 potential links.

In our analysis, we only consider direct routes (but include those that make stops *en route*); after all, identifying all the indirect routes is hardly feasible. By using this strategy, we ensure that our eventual sample is more closely comparable across countries. Having identified which bus company (or companies) provides a service on a given route, we then visit their website(s) and complete all the steps required to book a ticket. In this way we obtain the data for our dependent variables, i.e. the mean price and total

[4] Taylor and Ciechanski (2008) analyze changes in ownership involving Poland's road transport firms after 1990 and they conclude that state ownership remains dominant.

[5] Walter et al. (2011) analyze the inter-urban bus market in Germany before the liberalization took place. By analyzing demand and supply in the long-distance transportation market, they predicted that the share of bus services after the liberalization could be about 5%.

[6] In the case of the four remaining routes, two – Düsseldorf-Essen and Dortmund-Essen – link cities that are less than 50 km apart. According to the German model, interurban buses cannot operate on a route that is under 50 km.