

---

# “Urban transport governance reform in Barcelona”

Daniel Albalade, Germà Bel and Joan Calzada

---



Institut de Recerca en Economia Aplicada Regional i Pública  
*Research Institute of Applied Economics*

**Universitat de Barcelona**

Av. Diagonal, 690 • 08034 Barcelona

WEBSITE: [www.ub.edu/irea/](http://www.ub.edu/irea/) • CONTACT: [irea@ub.edu](mailto:irea@ub.edu)

The Research Institute of Applied Economics (IREA) in Barcelona was founded in 2005, as a research institute in applied economics. Three consolidated research groups make up the institute: AQR, RISK and GiM, and a large number of members are involved in the Institute. IREA focuses on four priority lines of investigation: (i) the quantitative study of regional and urban economic activity and analysis of regional and local economic policies, (ii) study of public economic activity in markets, particularly in the fields of empirical evaluation of privatization, the regulation and competition in the markets of public services using state of industrial economy, (iii) risk analysis in finance and insurance, and (iv) the development of micro and macro econometrics applied for the analysis of economic activity, particularly for quantitative evaluation of public policies.

IREA Working Papers often represent preliminary work and are circulated to encourage discussion. Citation of such a paper should account for its provisional character. For that reason, IREA Working Papers may not be reproduced or distributed without the written consent of the author. A revised version may be available directly from the author.

Any opinions expressed here are those of the author(s) and not those of IREA. Research published in this series may include views on policy, but the institute itself takes no institutional policy positions.

---

### *Abstract*

---

The unusual mixed public-private structure of the urban bus market in the metropolitan area of Barcelona provides an interesting context in which to analyze the management challenges and opportunities of the partial privatization of public services. Initiatives used by the public regulator to promote competition for contracts, such as short term concessions to private contractors and the removal of entry barriers, have considerable potential for improving efficiency and quality. The growth in the share of routes managed by private firms in recent years shows that privatization is a credible threat that may well stimulate improved performance among public managers. The type of reform implemented in Barcelona is of interest to all metropolitan areas large enough to operate under constant returns to scale regimes, and suitable for potential concessions of routes in segregated areas inside the metropolitan area, so as not to miss out on the benefits of economies of density.

### *JEL classification:*

**Keywords:** Privatization, mixed public-private, regulation, competition

Daniel Albalade is Associate Professor at Universitat de Barcelona. Departament de Política Econòmica. E-mail: [albalate@ub.edu](mailto:albalate@ub.edu).

Germà Bel is Professor at Universitat de Barcelona and Guest Professor at Barcelona Graduate School of Economics. Departament de Política Econòmica. E-mail: [gbel@ub.edu](mailto:gbel@ub.edu).

Joan Calzada is Associate Professor at Universitat de Barcelona. Departament de Política Econòmica. E-mail: [calzada@ub.edu](mailto:calzada@ub.edu).

---

### *Acknowledgements:*

---

This study has received financial support from the Spanish Ministry of Education (ECO 2009-06946ECO). We are grateful for helpful comments and suggestions from Xavier Fageda, and the other members of the research group Governments and Markets at the University of Barcelona. We are indebted as well to people at Entitat Metropolitana del Transport, and particularly to Pelayo Martínez Bauluz. Usual disclaimer applies.

## 1 Introduction

Local bus transportation in the Metropolitan Area of Barcelona is a mixed system in which one public and several private firms supply the service in different areas. *Transports Metropolitans de Barcelona* (TMB, henceforth) is a firm that is fully owned by the local government and operates daily urban routes in downtown Barcelona and the immediate surroundings, representing around 60% of the route length in the metropolitan area. While TMB offers transportation services in downtown Barcelona, a group of private concessionaires connect the suburban areas with the city centre and operate all nightly routes. A local regulatory agency, the *Entitat Metropolitana del Transport* (EMT, henceforth) is responsible for awarding and regulating concessions.

Mixed public-private systems in which public and private operators coexist within a jurisdiction are quite unusual in the European Union. In fact, most European metropolitan areas and large cities make a choice between purely public and purely private forms of delivery. Urban bus services are private in almost all cities in England and most cities in France (Savage, 1993; Dárbera, 1995; Labridge and Sealey, 2000; Amaral et al., 2006). On the other hand, in most cities in Germany, Italy and Spain the service is provided by public firms. Competition between public and private suppliers within a city has made some headway in the Scandinavian countries, which are generally more given to introducing competition in product and services markets. This means that Barcelona is the only large metropolitan area in Europe with a large-scale mixed public-private service organization.<sup>1</sup> This regulatory strategy is not common even in the US, although mixed public-private systems operate many local services in that country (Warner and Hefetz, 2008), such as residential solid waste collection and water distribution (Warner and Bel, 2008).

The objective of this paper is to examine Barcelona's transportation system taking into account the reform in its governance and regulation. Reforms of this kind have not been applied in other large cities and have not been analyzed so far in the literature. Our study explores the main features of the city's regulatory regime: the coexistence of public and private firms, the competitive tendering process, and the incentive regulation applied to concessionaires. We thus provide a thorough analysis of a regulatory system applied in a large metropolitan area.

Our study expands on the literature on partial privatization, which suggests that the mixed public-private provision of bus services may reduce scale economies but helps to discipline operators. The presence of a public operator gives the regulator information about costs and demands that is useful for overseeing private operators, and may also help to protect passengers' interests in areas with thin demand. By contrast, private firms are useful to identify the inefficiencies of public firms and to moderate the demands of public employees. We use the literature on monopoly regulation to explain the options available to transportation

---

<sup>1</sup> Between 1985 and 1994 public and private bus companies coexisted in the metropolitan area of London (UK) (See Amaral, Saussier and Yvrande-Billon, 2006). The main difference vis-à-vis Barcelona is that in London public operators participated in competitive biddings with private presence.

regulators in order to enhance service provision and concessionaires' performance. We emphasize the need to remove entry barriers in the tendering process so as to increase competition for the concessions, and to use incentives and penalization mechanisms so as to improve concessionaire efficiency.

So our study presents and discusses the management strategy applied by EMT to the Barcelona transportation system. The main shortcoming of the approach is that TMB retains a great deal of autonomy with regard to EMT, which makes the regulation of the public firm difficult. In spite of this, EMT has been quite effective in increasing competition for the market and in promoting the efficiency of private operators. The progressive elimination of entry barriers in the tendering process has made the market more competitive and has allowed more firms to participate. Nevertheless, in recent years no substantial alternation has been observed in the operation of concessions. Our understanding of this result is that EMT uses competitive pressure to discipline private incumbents. As regards the regulation of concessions, we explain that the introduction of incentive mechanisms in contract design promotes the operator's efforts to increase efficiency without affecting the quality of the service.

The remainder of the paper is organized as follows. Section 2 provides a theoretical discussion of how partial privatization, competition and regulation can be introduced in urban transportation. Section 3 presents the case of Barcelona, as an example of how these theoretical recommendations can be implemented in a market. Finally, the last section presents our conclusions.

## **2. Theoretical background**

This section analyzes three key regulatory aspects that determine the performance of operators in the market. First, we discuss the merits of a mixed public-private system for enhancing market regulation. Next, we explain how the use of a competitive tendering process to choose the concessionaires might force firms to reveal true information about their costs and thus increase social welfare. Finally, we describe some regulatory instruments that can be used in bus transportation to increase the efficiency of concessionaires and to reduce the subsidies given to them.

### **2.1 Public-private systems**

The provision of many utilities like telecommunications, electricity, water and transportation entail important scale and density economies which mean that it is efficient to give the exclusive rights to operate the service to a single firm. In the case of local bus transportation, however, the literature finds that the provision of this service does not imply significant scale economies. As a consequence, it is possible to divide the metropolitan area into separate routes or regions and to award them to different concessionaires to facilitate the use of benchmarking

techniques. What is more, in this context public and private firms might operate different concessions. Let us deal with each of these issues in turn.

A classical dilemma in the provision of public services is the impossibility of simultaneously reaching both productive and allocative efficiency when there are increasing returns of scale in production. Bearing this in mind, a key issue when organizing bus transportation is to assess whether scale and density economies are sufficiently important to prevent the fragmentation of the market into different concessions.

A number of papers have used multivariate analysis to examine the existence of scale and density economies in the field of urban bus transportation (Table 1).<sup>2</sup> Anna Matas and José L. Raymond (1998) analyzed the costs of nine firms in Spain's largest cities for the period 1983-1995. Their results indicate the existence of substantial density economies but constant economies of scale (they also report decreasing returns to scale for the largest firms in the sample). Massimo Filippini and Paola Prioni (2003) reach a similar conclusion when analyzing a sample of 34 Swiss firms in the period 1991-1995. Their empirical analysis shows the existence of substantial economies of density, and constant returns to scale. For Switzerland as well, Mehdi Farsi, Aurelio Fetz and Filippini (2007) analyze a sample of 16 multimodal transportation firms (trams, trolleys and motor buses) with data for the period 1985-1997. Their analysis indicates the existence of increasing returns to scale for most firms, although most of them are small.

**Table 1. Empirical multivariate results for returns to scale in local bus transportation service**

<b>Study</b>	<b>Country</b>	<b>Functional form</b>	<b>Results on scale returns</b>
Viton (1981)	United Kingdom	Trans-logarithmic	Increasing returns to density.
Matas and Raymond (1998)	Spain	Trans-logarithmic	Increasing returns to density. Constant returns to scale, with decreasing returns for the largest firms.
Filippini and Prioni (2003)	Switzerland	Trans-logarithmic	Increasing returns to density. Constant returns to scale
Farsi, Fetz and Filippini (2007)	Switzerland	Quadratic	Increasing returns to scale

Source: Elaborated by the authors.

The results of these empirical studies have important implications for the management of local bus transportation systems. The fact that returns to scale are on average constant, and that some large firms even show decreasing returns to scale, implies that no scale benefits are lost when creating several concessions in a large metropolitan area.<sup>3</sup> As in the case of

<sup>2</sup> Shaw-Er, Chiang and Chen (2005) and De Borger and Kerstens (2006) review this literature, which began with Viton (1981). Although to a lesser extent, there is some empirical evidence available for the case of bus regional services (see Cambini and Filippini, 2003).

<sup>3</sup> Fraquelli et al. (2004) find economies of scope associated with urban-intercity diversification, suggesting that the merging of neighboring firms could improve local networks. David Hensher (2003) analyzes the effects of the contract area in competitive tendering procedures. Larger areas can reduce competition but some scale economies can be obtained for small firms (fewer than 100 buses).

Barcelona, competition between different providers can be introduced at the urban-section level.

Once we accept the potential advantages of creating several concessions for operating the bus service in a city, the next question to analyze is whether it makes sense to provide the services through public firms or rather to allow the participation of private firms in the market. In recent decades, a number of papers have shown the benefits of privatizing bus operators. Ginés De Rus and Gustavo Nombela (1997) found that public firms in Spain use 30 per cent more employees than private firms to serve the same km-vehicle, and pay wages that are 18 per cent higher, a striking result if we bear in mind that labor costs account for a substantial part of bus operator costs. Ian Savage (1993) and Peter R. White (1997) reported significant cost reductions after the privatization of local bus operators in the UK, mainly due to wage reductions. In Switzerland, Filippini and Prioni (2003) found that private operators are more efficient in providing regional services, and Fumitoshi Mizutani and Takuya Urakami (2002) obtained similar results for Japan.<sup>4</sup> The downside is that it is difficult to obtain reliable information to regulate private firms. Therefore, politicians should only contemplate privatization when the costs gains offset the regulatory burden created by the asymmetries of information between the operators and the regulator.

Since the 1980s many European countries have implemented significant changes in the organizational and regulatory framework of their bus services under the auspices of the European Commission (European Commission, 2005 and 2007). The UK, France and Spain have all embarked on liberalizing the market in an attempt to reap the benefits of privatization. But other hybrid organizational forms are gaining importance in the bus sector, such as mixed firms, where public and private sector share ownership, or mixed public-private systems, where public and private firms coexist in the same territorial jurisdiction.

A mixed firm is one way to escape the classical public-private delivery dilemma. Ownership is divided between the local government and the private sector, and the firm operates entirely within the framework of private commercial law. In Spain, this formula has been applied extensively in solid waste and water services, the private partners tending to be large firms with a well-established reputation in the sector (Warner and Bel, 2008).<sup>5</sup> Usually, the private partner manages the day-to-day operations of the firm, whereas the government retains the control of the firm's longer-term planning activities (Bel and Fageda, 2010).

In the US the term "mixed public-private system" has a very different meaning. It is understood as a market organization system in which several public and private firms provide the service within the same local jurisdiction. This system does not affect the structure of firms

---

<sup>4</sup> Lee and Rivosplata (2001) also obtain this conclusion for New Zealand and Chile.

<sup>5</sup> Yvrande-Billon (2006) and Roy and Yvrande-Billon (2007) describe the presence of these semi-public firms in France. They report that 21 per cent of French local authorities choose this form of provision and that public-private partnership via a semi-public company is the worst organizational choice a local authority can make in terms of technical efficiency.

but partially privatizes the organization of service delivery at a spatial and institutional level: mixed delivery does not occur at the firm level.

Mixed public-private provision allows governments to pursue different types of objective: 1) they can compare firms' production processes and costs, while still retaining direct involvement in service delivery (Miranda and Lerner, 1995; Shleifer, 1995). The most efficient companies obtain better conditions, and inefficient ones are penalized (Armstrong and Sappington, 2006). Therefore, a mixed system reduces the costs of regulation<sup>6</sup>; 2) by managing competitive contracting processes between the different firms, a mixed public-private system increases the number of available service providers in the jurisdiction and thus fosters competition in the local market (Ballard and Warner, 2000); 3) The mixed system facilitates public-private cooperation in service provision when public firms are responsible for some parts of the service and private firms take care of other aspects (Warner and Hefetz, 2008). For example, a public firm can serve within-downtown routes while private firms can serve center-periphery routes.

Another advantage of mixed systems is that public firm managers and labor unions may feel threatened by the possibility of privatization; the mixed system can modify their concerns for efficiency and reduce the likelihood of strikes (Hatry, 1999; Dijkgraaf and Gradus, 2007). This is especially important in countries like Spain where, as several papers have shown, the inefficiency gap between private and public bus companies is associated with labor factor management. Indeed, during the TMB workers' strike in late 2007 and early 2008, one of the local government's negotiation tools was the threat that they would award new routes in downtown Barcelona to private companies. The possibility of privatization was raised by the government to enhance its bargaining power: the threat was made more credible by the presence of a large number of private firms already operating in the city's metropolitan area.

To summarize: mixed systems can increase competition in the local market, provide information on the nature and the costs of the service (thus reducing information asymmetries and transaction costs) and ensure government capacity to guarantee failsafe service in case of contract failure (Warner and Bel, 2008).

## 2.2 Competition under partial privatization

In the bus industry, density economies make it inefficient to introduce competition at the route level. In fact, it is technically more efficient to have only one company operating each route. However, public authorities may still tender the concession of routes and award them to the

---

<sup>6</sup> Dalen and Gómez-Lobo (2003) analyze the use of yardstick competition in the Norwegian bus market. They compare two main types of contracts: individually bargained contracts and contracts based on a yardstick model. They show that the latter significantly reduces operating costs.



firms asking for the lowest subsidy, or to those obtaining a higher score when considering several aspects such as the price, the coverage or the quality.<sup>7</sup>

The attractiveness of tender systems is that bidders have the incentive to reveal their true costs and enable the regulator to select the best offer. When this occurs, tenders may replicate the results of a competitive market, provided that information is good enough and a sufficient number of firms are available to enter the bid. Of course, competitive bidding is less effective when the regulator has other concerns besides the price (or the cost) of the service being offered. When public authorities also care about other quantitative and qualitative attributes of the service it is difficult to determine the winning bidder. Moreover, when the definition of the service is not sufficiently clear, competitive tendering may result in the selection of the most opportunistic bidder, the one that is most aware of contractual blanks that it can exploit (Bajari et al., 2003; Yvrande-Billon, 2006).

According to Antonio Estache and Andrés Gómez-Lobo (2005), there are several ways of tendering a route: contracts can be tendered based on a multivariable selection criterion, which includes the fare offered by firms as well as quality variables<sup>8</sup>, or they can be awarded to the firm that requests the lowest subsidy. In this case, the firm receives a subsidy that covers the estimated revenue shortfall compared with costs. Firms may or may not retain revenues from fares, and this determines their transfers. If a firm's revenues do not depend on revenues from passengers (which is dependent on passenger numbers), it will be less interested in attracting customers.

In spite of this, many studies have shown that competitive bidding may imply problems that make it difficult to introduce efficiency in the market (Williamson, 1976; Littlechild, 2002). Auctions become less attractive when few firms participate in the process or when there is the possibility of collusion. The larger the number of firms in the auction, the lower the declared costs and, as a consequence, the subsidy to be paid. The case of London confirms this: Miguel Amaral, Stéphane Saussier and Anne Yvrande-Billon (2009) found a high negative correlation between the number of bidders and the cost of service during the years of public-private coexistence. Yvrande-Billon (2006) also reports that in the French market between 1996 and 1999 companies consulted each other in order to divide up the market between them.

Another important limitation of tendering systems is that contracts are incomplete when there is uncertainty about the evolution of key aspects affecting the sector. In this regard, one of the most important deficiency of auctions is “Williamson’s Transformation”. Oliver Williamson (1976) noted that after overcoming the competitors and making sunk investments, the

---

<sup>7</sup> Demsetz (1968) showed that competitive tendering is an alternative to natural monopoly regulation when authorities use *ex ante* competition to better regulate the winner of the concession in the second stage. Several tendering processes can be used to allocate scarce resources like spectrum or to choose the provider of a service. Prats and Valletti (2003) offer a detailed comparison of auctions and “beauty contests”.

<sup>8</sup> This does not eradicate all the problems. An incumbent operator might oversupply in the frequency dimension so as not to leave gaps that rivals could enter.

relationship between the government and the concessionaire becomes a bilateral monopoly and the absence of competition has a negative effect on the achievements made by competitive auction.

Several strategies have been proposed in order to mitigate this problem. First, in order to avoid Williamson's transformation, regulators can award short-term contracts subject to recurrent auctions. Short contracts reduce market risks and allow the regulator to adjust the contract to changes in technology and demand. However, when operators need to incur in important sunk costs, longer time horizons may be required to ensure dynamic efficiency. In these circumstances, negotiations are likely, and concessionaires can engage in some opportunistic behavior.

Finally, several authors have highlighted the consequences of competitive tendering for the market structure. In the UK, Christopher Nash (2005) describes the extensive consolidation of companies and the dominance of the industry by the three large groups. Similar results are identified by Gunnar Alexandersson et al. (1998) for Sweden and by Terje Mathisen and Gisle Solvoll (2008) for Norway. These studies show that the uncertainty about competitive tendering probably increases cross-ownership and reduces the number of bus firms. The reduced number of firms may be a problem in a competitive process. However, the change of the industry costs structure may also reflect the increase in efficiency, although scale economies are not very important in this activity.

Another reason why tendering might not be effective is that there might not be enough participants in the tender to guarantee sufficient competition. Regulators might be interested in reducing entry barriers in the market to increase participation in the tendering process and to reduce the amount of subsidies granted. According to William Baumol (1982), in a perfect contestable market, the threat of competition from potential entrants disciplines incumbent firms to reduce their prices and obtain normal returns.<sup>9</sup> In the bus industry, regulators can apply a range of strategies to increase the contestability of the market. For example, in Barcelona and in many French cities local authorities maintain the ownership of the infrastructures and tender only the provision of the service. Regulators offer concessionaires essential equipment such as coaches and buses in order to reduce their initial investments. This strategy reduces entry barriers and makes the market more contestable. However, incumbents and potential entrants never have exactly the same opportunities since the former are better informed regarding assets, quality and demand features than their rivals. Another strategy for increasing participation is to use a route-by-route tender instead of network tendering. In this case, competition can be expected to be high; however, it may imply higher coordination costs (Boitani and Cambini, 2006).

The literature reports ambiguous results regarding the relationship between competitive tendering and cost efficiency. Isotope (1998) estimates that the use of competitive bidding in

---

<sup>9</sup> Shepherd (1984) and Baumol (1987) explain the conditions of the markets and the firms that make a market contestable.

Europe can reduce costs by 35% with market fragmentation – breaking up public monopoly – and privatization.<sup>10</sup> John Preston (2005) considers that tenders typically give unit costs that are around 20% lower than in the case of an unchallenged public monopoly operator. Analyzing the tendering process in London initiated in 1985, David Kennedy (1996) reports that the estimated cost savings from tendering were 18 per cent from 1987 to 1992. Considerable cost savings were achieved through reductions in labor costs, due to improved working practices and increased productivity. In spite of this, Hensher and Ian Wallis (2005) show that contract prices in London in the five years up to 2000/01 increased at an average rate of around 10 per cent per annum, while in the rest of Great Britain the rate of increase was somewhat higher. Factors that contributed to this increase are higher standards (such as low floor buses) and input prices.

Analyzing the use of competitive bidding in France since 1993, Yvrande-Billon (2006) concludes that it did not lead to better performance, due to the lack of transparency of the attribution processes and the limited monitoring capabilities of local authorities. Indeed, since 1993 the unit costs of service provision have continued to increase. An explanation of this is that French local authorities collect bids from pre-qualified firms with whom it enters in separate negotiations in order to determine the detailed contractual terms. Finally, it chooses the winner, which is not necessarily the most efficient. In spite of this, when analyzing the period 1995-2002 Roy and Yvrande-Billon (2007) show that private operators outperform public ones in terms of technical efficiency.

Results of the applications of tendering processes in Italy have been poor. Assessing the effects of the competitive tendering processes implemented in this country since 1998, Andrea Boitani and Carlo Cambini (2006) report that there were few participants, that incumbents were able to gain the franchise almost everywhere, and that subsidy savings were in many cases negligible.

In summary, as in other sectors, privatization may bring about initial cost reductions but costs can increase over time (Bel, Fageda and Warner, 2010).

## 2.3 Regulation of concessionaires

The regulation of bus concessions does not differ greatly from regulation of other monopolies.<sup>11</sup> Regulators establish the prices and the quality of the services, define the relationship between operators, and supervise compliance with the conditions of the concessions. The design of these regulations is essential to attract the interest of firms in a tendering process: firms want a clear, stable regulatory regime that allows them to estimate the costs and revenues of concessions.

---

<sup>10</sup> Similar results have been obtained from the tendering process in other network industries such as telecommunications, electricity, water and sewerage. See Wellenius (2002) and Bel and Calzada (2009).

<sup>11</sup> Several articles have studied how governments increase their regulatory presence when deregulating markets and privatizing public monopolies (Albalade, Bel and Fageda, 2009; Gómez-Ibañez, 2003)

An important aspect of contracts established with private operators is the degree of risk-sharing. Roy and Yvrande-Billon (2007) explain that there are essentially two types of risk in the bus sector: "the production risk", associated with the production costs of a fixed level of service, independent of the volume of passengers, and the "revenue risk", associated with the sale of transport services. In France, the recognition of these risks gives rise to three different contracts: net cost contracts; gross cost contracts; and management contracts (Table 2).

**Table 2. Type of contracts in urban bus services in France**

	Type of contract		
	Net cost contract	Gross cost contract	Management contract
Risk burden	Both product and revenue risks are borne by the transport company	The production risk is taken by the transport company while the revenue risk is borne by the local authority	Both production and revenue risks are borne by the local authority instead of the transport company
Payment	The operator only receives a subsidy equal to the difference between the anticipated total operating costs and revenues	The operator pays an agreed price for the production of a fixed amount of services	The private operator receives a remuneration that is independent of its performance
Percentage of contracts (2002)	51%	27%	21%

Source: Based on information provided in Roy and Yvrande-Billon (2007)

Roy and Yvrande-Billon (2007) report a downward trend in the presence of management contracts in France in recent years. In addition, they show that operators under management contracts exhibit a higher level of technical inefficiency than operators under other contract arrangements. Private operators regulated with gross cost contracts have the highest efficiency scores. However, they emphasize that, although statistically significant, the performance differentials between the various regulatory schemes are slight. Therefore, only marginal improvements in technical efficiency are to be expected from regulatory changes.

More generally, contracts with bus operators must indicate the mechanism used to regulate prices and quality, the technology that can be used and the coverage that must be attained by the operators. One advantage of having several concessions in the same municipality is that monopoly regulations can be complemented with benchmarking techniques.

The concessions also define the duration of the contracts. A short contract period reduces market risks and allows the regulator to adjust the contracts to the changes in technology and in demand. Moreover, consumers benefit more immediately from the productivity gains generated by operators. However, the longer the contract, the greater the investment incentives for reducing cost. The existence of this trade-off makes the definition of the duration of the contract a complex task: Longer time horizons may enhance dynamic efficiency but may increase subsidies to firm. In order to avoid this problem, Eduardo Engel, Ronald Fisher and Alexander Galetovic (2001) have suggested using an auction design where the regulator fixes the prices and firms bid for the Least-Present-Value of Revenues. In this

context, the duration of the concessions can be adjusted according to the operator's revenues. This type of concession is useful when there is uncertainty about the demand for the service.

### 3. Barcelona's Regulatory Model

In this section we analyze the mixed public-private system used in the metropolitan area of Barcelona and the regulatory instruments designed to monitor the concessionaires. This analysis highlights some of the achievements of the *Entitat Metropolitana del Transport* (EMT) in increasing efficiency in the market in accordance with the theoretical background described above, and also identifies the areas that still present weaknesses and provide room for further management improvements.

EMT was created in 1987 to regulate the provision of bus transportation in 18 municipalities in Barcelona's metropolitan area, an urban continuum of 331.5 sq. km. with a population of 2.8 million people.<sup>12</sup> EMT's governing body is formed by representatives of all the municipalities covered by the service. Representatives are appointed by each municipal council. The city of Barcelona appoints 11 representatives, municipalities with more than 100,000 inhabitants appoint three representatives, and municipalities with populations below 100,000 appoint one representative.

In Barcelona, metro and bus fares are integrated and subsidized to ensure affordability. EMT's responsibilities are the management, planning and coordination of mass public surface transportation services. It also regulates the city's metro network, which is operated by the public firm *Ferrocarril Metropolità de Barcelona SA* (Barcelona Metropolitan Railways).<sup>13</sup> Public transportation services in the metropolitan area of Barcelona are funded via a range of mechanisms: (1) A management contract with bus and metro operators; (2) A transportation tax; and (3) Transfers from other local institutions in the area.

#### 3.1 Mixed public-private delivery

Surface transportation in Barcelona is organized as a mixed system. EMT regulates public and private bus operators. The publicly-owned firm *Transports Metropolitans de Barcelona* (TMB) operates urban day-time routes in the city of Barcelona and its vicinity. TMB absorbs 75% of passengers, 62% of km of service and 70% of the vehicles (see Tables 3 and 4). The area not covered by TMB is operated by a group of much smaller private firms. Generally these firms connect the suburbs and the downtown area and also operate urban routes at night. Routes are grouped in districts and operated monopolistically for the period defined in the concession contracts.

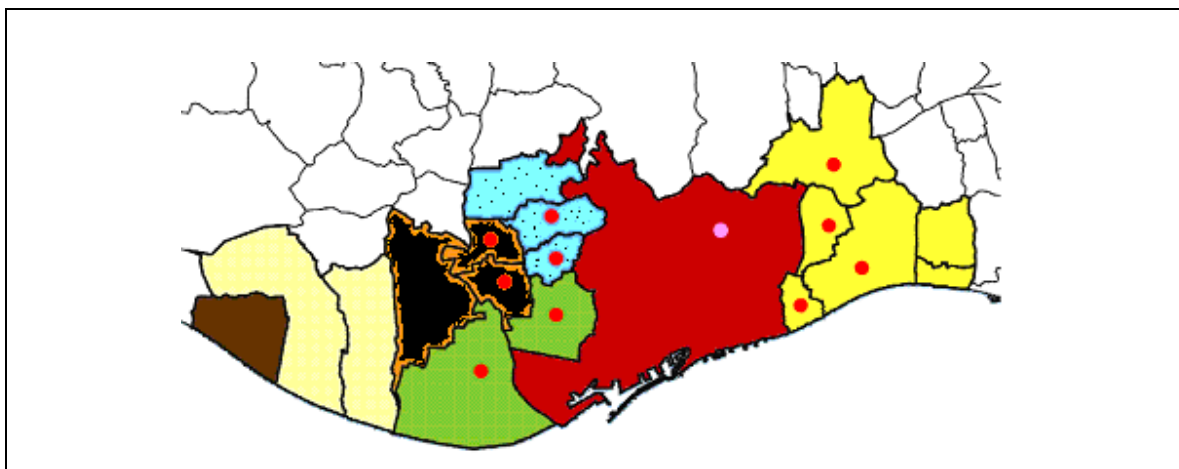
---

<sup>12</sup> As stressed by Vickerman (2008) these conditions make it advisable to organize public transportation beyond the strict municipal boundaries of the central city in the metropolitan area.

<sup>13</sup> EMT also regulates the taxi service through the Metropolitan Taxi Institute (IMET).

Figure 1 shows the location of public and private operators in the metropolitan area of Barcelona. The red area shows the municipality of Barcelona, which is operated by TMB. The rest of the municipalities are served by private operators regulated by EMT. Several municipalities outside Barcelona are grouped in the same concession. Finally, the red dots indicate the municipalities where TMB also serves certain routes.

Figure 1. Concessions according to operators and municipalities



Source: *Entitat Metropolitana del Transport*.

In recent years, the relevance of private operators has increased: between 2003 and 2006 the number of passengers transported by private firms has grown by 18 per cent, while the number of passengers transported by TMB has only increased by 2 per cent (Table 4). On the other hand, in terms of number of metropolitan routes private firms operate 45 per cent of the total.

Table 3. Demand and supply for bus services in the Barcelona metropolitan area, 2006.

Bus services	Passengers (millions)	Routes	Fleet	Operational kilometers	Bus stops
TMB	207.72 (75%)	109 (55%)	1,066 (70%)	42,054 (62%)	2,566 (46%)
Private Companies	65.68 (25%)	88 (45%)	466 (30%)	26,021 (38%)	2,989 (54%)

Source: Data provided by EMT

Table 4. Growth in demand (million passengers) for bus services.

Bus service	2003	2004	2005	2006	Increase 03-06
TMB	203.7	205.0	205.0	207.7	2.0%
Private Companies	56.4	59.6	61.6	65.7	16.5%

Private Market Share	21.7	22.5	23.1	24.0	10.5%
----------------------	------	------	------	------	-------

Source: Data provided by EMT.

Table 4 also shows that since 2003 the market share of private management has increased at the expense of TMB. Table 5 shows that both the operational km served and the number of routes has grown significantly in the case of lines managed by private firms. Therefore, new lines in the metropolitan area are contracted out to private operators, instead of extending TMB's network beyond downtown Barcelona. Illustrations of this strategy are the 22.6% increase in operational km recorded by private operators between 2003 and 2006, and the 15.8% rise in the number of lines.

Table 5. Supply growth if TMB and private companies

Bus service	2003	2004	2005	2006	Increase 03-06
TMB					
Routes	104	103	103	109	4.8%
Operational Km	41,468.6	40,937.7	40,985.5	42,054	1.4%
Private Companies					
Routes	76	77	81	88	15.8%
Operational Km	21,214	22,049	22,791	26,021	22.6%
Private Share					
Routes	42.2%	42.8%	44.0%	44.7	5.9%
Operational Km	33.8%	35.0%	35.7%	38.2%	13.0%

Source: Data provided by EMT.

The coexistence of public and private operators in the same service jurisdiction is not common in Europe, except for the Scandinavian countries. As stated above, one of the advantages of a mixed system is the possibility of using benchmarking regulation, which allows the comparison of the efficiency of public and private firms. However, in Barcelona, the application of benchmarking techniques is limited by the absence of a general regulator for both public and private operators.. EMT only coordinates the services provided by TMB and is in charge of funding it, but cannot use incentive regulation to minimize costs and enhance quality. TMB enjoys considerable freedom to design and plan its services and is not regulated by the concession contract. In spite of this, in recent years some indirect benchmarking has been present during negotiations with TMB employees regarding their employment conditions.

The absence of a strong control over TMB is the main limitation of the Barcelona model and the hardest problem to address, due to political interference on the boards of both EMT and TMB. In spite of this, we can still compare the economic efficiency of the private and public operators by computing the cost per km driven.<sup>14</sup> For TMB's routes, the cost per km driven is 4.9 euros, while the average cost for private operators is 3.3 euros. Table 6 shows that in all private concessions for which economic data are available, the cost per km driven is lower than in the case of TMB.

<sup>14</sup> It is not possible to compute the cost per vehicle-km or passenger-km, the most commonly used ratios in transport economics, because the information is not available.

Table 6. Cost per Km driven by concession contract (2006)

Concessions	Cost per Km driven
C1	2.06
C2	2.65
C3	3.11
C4	3.08
C5	3.37
C6	4.28
C7	3.51
C8	4.12
Mean	3.27
TMB	4.94

Note: The identity of private operators is preserved for reasons of confidentiality.  
Source: Data provided by EMT and TMB.

Private operators have far less management autonomy than TMB. EMT organizes the tendering process, establishes the subsidies that operators receive and implements incentives to improve efficiency and to control the quality of the service. In the next section we analyze these regulatory instruments.

### 3.2 Competitive tendering

The tendering procedures in Barcelona consider groups of routes that make up districts, which allow concessionaires to cross-subsidize the ones that are unprofitable. EMT tenders different types of concessions according to the profitability of the activity and the public service obligations imposed on the firms.<sup>15</sup> Private operators can bid for three different types of contracts: 1) Concessions regulated by public service obligations; 2) Concessions exempt from public service obligations; and 3) Profitable concessions that must pay a price to EMT.

The first type of concession is the most frequent and it implies that the bus operator must offer a service subject to quality inspection in exchange for a subsidy that covers its losses. Therefore, in this case the risks are mainly borne by the local authority. These concessions last for five years but can be extended for two or three years more.

The second type of concession was tendered before the 1970s and was not originally subject to public service obligations. In this case, concessionaires assume all the risk and are not subsidized by EMT. The duration of these concessions is around 30 years, but many of them are about to expire and will be replaced by the first type of contract. In recent years, EMT has negotiated with concessionaires the inclusion of several public service obligations to reflect the urban and socio-economic needs of the municipalities surrounding Barcelona: for example,

---

<sup>15</sup> The regulation of the sector is based on the Regulation (EC) No/370/2007 of the European Parliament and of the Council of 2 October 2007 on public passenger transport services by rail and by road.



EMT has asked for the extension of some routes, or for the increase in the frequency. When these modifications have been agreed, EMT has subsidized the costs of the new obligations.

Finally, the third group of concessions is designed for profitable routes. A clear example is the route that connects downtown Barcelona and the airport. Under this contract system, the operator pays an annual fee to EMT based on its declared revenues. In the last decade, another operator called TOMBUS used this type of contract to exploit some high-traffic routes in downtown Barcelona, directly competing with TMB, although this firm gave up the concession in 2008.

Each time a regulated concession expires, EMT grants a new one via a competitive tendering process. Participants in these tenders are usually operators based in Barcelona and in other Spanish cities. EMT assesses the offers of firms, taking into account five aspects:

- 1) The economic proposal: operating costs per km and expected rate of return. This is an essential element in the assessment of the bid, since the difference between the operating costs and the regulated tariff determines the subsidy that the firm must receive;
- 2) Expected demand; children, the elderly and the disabled do not pay for urban transportation. As a consequence, EMT is interested in knowing the firm's expected demand from paying passengers, because only these passengers will reduce the subsidy given to the firm;
- 3) Staff and equipment used in the area of the concession. This information is useful to assess efficiency;
- 4) Experience in the sector and ability to exploiting the service; and
- 5) Description of the coaches used to provide the service.

The EMT assesses all the technical and economic aspects of the bids, and assigns a score to each of them. Finally, it chooses the concessionaire with the highest score. Private concessions are usually awarded for five-year periods, short enough to ensure recurrent competition for the market. Besides, the contracts usually include the possibility of an extension of two or more years, contingent on the operator's performance, which is measured taking into account quality objectives, launching of marketing campaigns, and acceptance of new objectives. Therefore, EMT uses contract duration to incentivize efficiency: first, it establishes short contracts, and second it extends the concessions if the operators prove efficient.

As discussed above, a key aspect for the success of a tender process is to guarantee the participation of a number of operators. In Barcelona, EMT tries to encourage participation by making the market more contestable. When a new firm wins a tender it can use all its management abilities to operate the service, but it uses the same staff and equipment as its predecessors. As in France and Italy, the regulator owns the bus fleets, or strongly finances them. Furthermore, EMT owns two bus garages and is currently building new ones. As a

result, vehicles and garages, the most important investments required in the bus industry, are provided by EMT. The regulator also establishes that successful bidders must maintain the jobs of the employees of their predecessor and also the working conditions. All these measures make the market very contestable and eliminate some of Williamson's criticisms of the incompleteness of contracts. However, it also makes it very difficult for an entrant to offer a better bid than the incumbent.

Table 7. Concessions tendered in Barcelona. *Entitat Metropolitana del Transport*.

Concession (urban area)	Year of tender	Number of bidders	Concession length	Extension Incentives	Economic Incentives
<b>Concession with public service obligations</b>					
Baix Llobregat	1996	3	5	No	Yes
Hospitalet	1991	1	5	No	No
	2001	5	5	4 years	Yes
Sant Feliu	1998	4	5	4 years	Yes
Esplugues	1993	2	5	No	No
	1998	3	5	No	No
El Prat	2006	3	2	3 years	No
Barcelonès Nord (day service)	1998	4	8	4 years	Yes
Barcelonès Nord (night service)	1998	4	5	3 years	Yes
	2006	2	5	2 years	Yes
<b>Concessions that have agreed to include some general service obligations</b>					
Castelldefels	1994	4	n.a	n.a.	No
St. Boi-Cornellà	2003	1	n.a	n.a	No
Viladecans	2001	1	n.a	No	No
Gavà	1995	1	n.a	No	No
	2002	1	n.a	No	No
<b>Profitable Concessions</b>					
Airport (Aerobus)	1990	4	10	No	No
Tombús	1990	6	10	No	No

Source: Based on information provided by EMT

Surprisingly, in spite of this tendering strategy, few incumbent operators have been removed in recent years<sup>16</sup>. Table 7 displays information on recent tenders completed in Barcelona,

<sup>16</sup> Boitani and Cambini (2006) and Yvrande-Billon (2006) report the same results for Italy and France. Yvrande-Billon (2006) explains that in France between 1995 and 2002, 123 out of 165 tenders led to the renewal of the incumbent. She argues that incumbents usually propose better bids than their competitors.

paying special attention to the number of bidders and the type of contract awarded. Even though an average of four firms have participated in the bidding process, concessions have always been awarded to the incumbents, probably due to their greater efficiency. In addition, the scoring system used by EMT may also benefit incumbents because the proposals are valued taking into account the firm's reputation and previous experience. However, direct inspection of the bidding documents has revealed that entrants only made a lower economic offer in two out of nine tender processes.

### 3.3 Concession regulation

EMT defines the characteristics of the service offered by the concessionaires, establishes network routes, fares and quality levels, and organizes the tenders.

Concessions of private firms are given incentives to improve efficiency and quality. The first contracts designed by EMT only included a subsidy equal to the difference between the firm's operating costs and the revenues generated. More recently, however, several incentives have been added to the contracts to improve concessionaires' performance.

The subsidy offered to concessionaires with public service obligations is computed taking into account the net loss of operating the service,  $L$ , and a set of variables,  $G$ , that reflect their efficiency:

$$\begin{aligned} S &= L + G \\ &= (C_o + C_f) - I + G_t + G_e + G_o + G_s \end{aligned}$$

The net loss of operating the service,  $L$ , reflects the operating costs,  $C_o$ , plus the financial cost of the equipment not supplied by EMT,  $C_f$ , minus the ordinary and extraordinary revenues obtained by the firm,  $I$ . The firm's operating costs cover the wages of drivers and other employees, petrol, energy and other costs expenses. These costs depend mainly on the evolution of wages, oil prices, and the retail prices index.

$G$  comprises a variety of instruments designed to improve the conduct of regulated firms. First,  $G_t$  reflects the number of paying passengers served by the firm that do not benefit from social tariffs. If the concessionaire carries out marketing campaigns that increase the number of passengers paying the regular price, it receives a percentage of the additional revenues generated. Second,  $G_e$  shows the extraordinary revenues attracted by the firm, for example through advertisements or by the sale of old vehicles. The concessionaire obtains one third of the total revenues generated in this way.<sup>17</sup>

---

<sup>17</sup> This type of revenue sharing regulation has also been used in other network industries such as telecommunications (Sappington and Weisman, 1996, Ai and Sappington, 2002).

Finally,  $G_o$  reflects the quality of the service measured through objective instruments and  $G_s$  shows users' impressions of service quality, measured through direct interviews. One of the main concerns in privatizing the provision of bus services is that private concessionaires may lower the quality of the service in order to reduce costs (Hart, Shleifer and Vishny, 1997; Levin and Tadelis, 2010). To avoid this, EMT incorporates several quality indicators in the compensating mechanism offered to the firm. It measures objective quality on the basis of objectives such as punctuality, regularity, interior cleanliness of vehicles, information, customer services, and driving quality. Subjective or perceived quality is measured through interviews asking users about timetable coordination and transfers, customer services, punctuality, driving quality, comfort of vehicles, adequacy of stops, cleanliness of vehicles and information received in case of a timetable or route modification.

Concessions not subject to public service obligations were initially not regulated through these mechanisms. In recent years, however, most of the concessions have been modified to extend the routes or to provide greater frequency. In these cases, EMT offers the same type of subsidies as the ones described above.

Finally, in the case of profitable routes (today, only the downtown Barcelona - airport route), EMT receives a fixed percentage of the firm's total revenues. In this particular case, the firm is in charge of providing all human and material equipment.

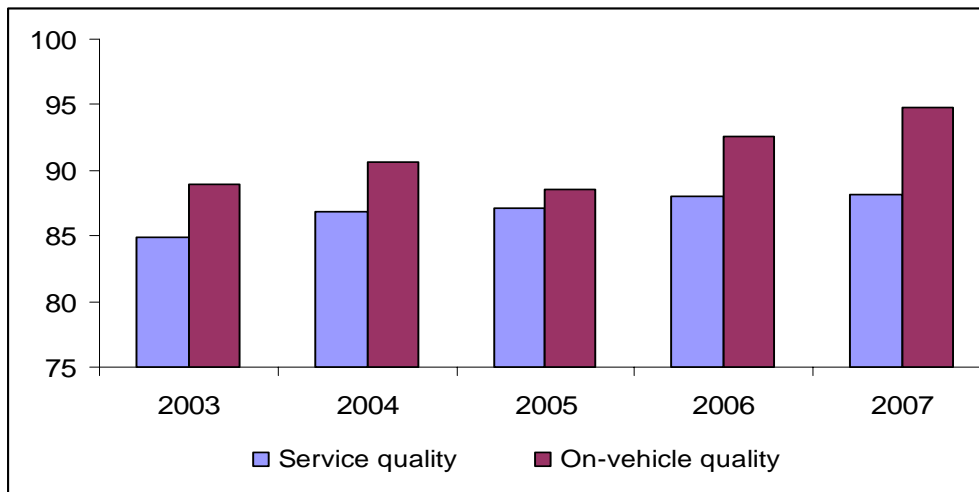
Table 8. Comparison between contracts with and without incentives.

	<b>Without incentives</b>	<b>With incentives</b>
<b>SAME CONCESSION, SAME OPERATOR</b>	<b>1995-2002</b>	<b>2002-2006</b>
Annual Average Increase of Passengers	1.7%	7.0%
Annual Average Increase of Paying Passengers	-1.6%	7.0%
Annual Average Increase of Extraordinary Revenues	30%	155%
<b>SAME OPERATOR, DIFFERENT CONCESSION</b>	<b>1998-2006 (Esplugues)</b>	<b>1998 -2006 (St. Feliu)</b>
Annual Average Increase of Passengers	46%	110%
Annual Average Increase of Payment Passengers	59%	86%
Annual Average Increase of Extraordinary Revenues	33%	65%
Increase of Subjective Quality Indicator	-3%	2%

Source: Based on information provided by EMT

But do these incentives work? Table 8 offers an initial appraisal by comparing concessions with and without incentive contracts. Considering the concessions operated by the same producer over time, we can compare their mean performance before and after the introduction of incentive schemes. By doing so, we find that on average the concessionaires obtained a larger increase in paying passengers and in extraordinary revenues after the introduction of incentives. Also, by comparing different concessions operated by the same firm – for example, Esplugues and St. Feliu – we observe that contracts with incentives provide higher increases in paying passengers, extraordinary revenues, and quality. In fact, in recent years the average quality – both service and on-vehicle – has increased significantly (Figure 2).

Figure 2. Service and on-vehicle quality of regulated private operators.



Source: *Entitat Metropolitana del Transport*.

#### 4. Conclusion

The exceptional mixed public-private structure of the urban bus market in the metropolitan area of Barcelona provides an interesting context in which to analyze the management challenges and opportunities of partial privatization. As regards metropolitan transportation governance, the presence of a large number of sub-areas in the metropolitan area of Barcelona has facilitated the contracting out of the service in certain municipalities. This is consistent with the scale and density characteristics of urban bus services that allow market fragmentation.

One of the key features of the EMT's regulatory model in Barcelona have been the establishment of short-term concessions and the removal of entry barriers by maintaining the public ownership of bus fleets and bus garages. These measures have great potential for increasing competition in the market and for improving efficiency. Short contracts and the possibility of expanding the concessions have helped to avoid opportunistic behavior by incumbents and have increased efficiency. Other essential aspects of the Barcelona model are the incentives and penalizations introduced in the last decade in the contract design. An illustration of the effects of these policies is the fact that costs per km driven are lower in all private concessions than in the government-owned company: an average of 3.3 euros versus 4.9 euros. Similarly, incentives of private operators' contracts have produced significant improvements in attracting paying passengers, extraordinary revenues, and quality.

Another interesting result of the Barcelona regulatory model is the growth in the share of routes managed by private firms, from 33.8% in 2003 to 38.2% in 2006. These practices may also have positive effects on the performance of TMB, because the threat of privatization of either additional or new routes is more credible if private providers are already operating in the area. And a credible threat of privatization may well stimulate performance improvements by public managers (Hatry, 1988; Bel, 2006; Bel, Fageda & Warner, 2010). In fact, the local government used this tool to confront a tough strike by TMB workers in late 2007-early 2008.

Even without alternation in the concessions and the geographical distribution of operators (Figure 1), the regulatory framework implemented by EMT has reduced entry barriers and has empowered it to enforce the strict fulfillment of contracts. Under an inherently incomplete contract framework, EMT is particularly interested in achieving bargaining power to negotiate the aspects that are difficult to include in a contract but are important for the management of the network. This bargaining power may allow EMT to complement formal and relational contracting (Brown, Potosky and Van Slyke, 2006; and Poppo and Zenger, 2002). The advantages of using relational contracting in the bus services has been stressed by Didier Van de Velde (2007), because in many circumstances it is important to focus more on agreement about the contracting process rather than to attempt to draw up complete contracts. Further research on the use of relational contracting in the case of the Barcelona bus transportation system is likely to provide valuable new insights.

In all, the case of governance reform in the Barcelona urban bus service provides an interesting illustration of how partial privatization and competitive pressures can be used to provide more flexibility in the provision of the service and to impose discipline on the public operator. In turn, competitive pressures in the bidding process can be used to discipline private providers and to increase the bargaining power of the regulator. This type of reform is of interest to all metropolitan areas large enough to operate under constant returns to scale regime, and suitable for potential concessions of routes in segregated areas of the metropolitan area, so as not to miss out on the benefits of economies of density.

## References

- Ai, Chunrong and David Sappington. 2002. 'The Impact of State Incentive Regulation on the U.S. Telecommunications Industry', *Journal of Regulatory Economics* 22 (2):133-160.
- Albalade, Daniel, Germà Bel, and Xavier Fageda. 2009. 'Privatization and Regulatory reform of toll motorways in Europe', *Governance* 22 (2): 295-318.
- Alexandersson, Gunnar, Staffan Hulten and Stefan Fölster. 1998. 'The effect of competition in Swedish local bus services', *Journal of Transport Economics and Policy*, 32 (2): 203-219.
- Amaral, Miguel, Stéphane Saussier and Anne Yvrande-Billon. 2009. 'Auction procedures and competition in public services: The case of urban public transport in France and London', *Utilities Policy*, 17 (2): 166-175.
- Armstrong, Mark and David Sappington. 2006. 'Regulation, Competition and Liberalization,' *Journal of Economic Literature*, 44 (2): 325-366.
- Ballard, M.J. and Mildred Warner. 2000. 'Taking the High Road: Local Government Restructuring and the Quest for Quality', in AFSCME (ed.): *Power Tools for Fighting Privatization*, Washington DC: American Federation of State, County and Municipal Employees, 6/1- 6/53.
- Bajari, Patrick, Robert McMillan and Steven Tadelis. 2003. *Auctions versus negotiations in procurement: an empirical analysis*. *Journal of Law, Economics and Organization*, 25 (2): 372-399.
- Baumol, William. 1987. 'Natural Monopoly and Contestable Market Analysis', in A. Gillie, L. Levacia and G. Thompson (eds) *Politics and Economic Policy*, Hodder and Stoughton, London.
- Bel, Germà. 2006. *Economía y política de la privatización local*. Madrid: Marcial Pons.
- Bel, Germà and Joan Calzada. 2009. 'Privatization and Universal Service Obligations', *Journal of Institutional and Theoretical Economics*, 165 (4): 650-699.
- Bel, Germà and Xavier Fageda. 2010. 'Partial privatization in local services delivery: An empirical analysis on the choice of mixed firms', *Local Government Studies*, 36 (1): 129-149.
- Bel, Germà, Xavier Fageda and Mildred Warner, 2010. 'Is Private Production of Public Services Cheaper than Public Production? A meta-regression analysis of solid waste and water services', *Journal of Policy Analysis and Management*, 29 (3): forthcoming.
- Boitani, Andrea and Carlo Cambini. 2006. 'To bid or not to bid, this is the question: the Italian experience in competitive tendering for local bus services', *European transport*, 33: 41-53.
- Brown, Trevor, Matthew Potoski and David Van Slyke. 2007. 'Trust and contract completeness in the public sector', *Local Government Studies*, 33 (4): 607-623.
- Cambini, Carlo and Massimo Filippini. 2003. 'Competitive tendering and optimal size in the regional bus transportation industry', *Annals of Public and Cooperative Economics*, 74(1): 163-182.
- Dalen, Dag M. and Andrés Gómez-Lobo. 2003. 'Yardstick on the road: regulatory contracts and cost efficiency in the Norwegian bus industry', *Transportation*, 30 (4): 371-386.
- De Borger, Bruno and Kristiann Kerstens. 2006. *The Performance of the bus-transit operators*. Document du travail du CEM, 2006-03.
- Demsetz, Harold. 1968. 'Why regulate utilities?', *Journal of Law and Economics*, 11 (1): 55-65.
- De Rus, Ginés and Gustavo Nombela. 1997. 'Privatización of urban bus services in Spain', *Journal of Transport Economics and Policy* 31(1): 115-129.
- Dijkgraaf, Elbert and Raymond Gradus. 2007. 'Collusion in the Dutch waste collection market', *Local Government Studies* 33(4): 573-588.

- Engel, Eduardo, Roald Fischer and Alexander Galetovic. 2001. 'Least-Present-Value-of-Revenue Auctions and Highway Franchising', *Journal of Political Economy*, 109 (5): 993–1020.
- Estache, Antonio and Andrés Gómez-Lobo. 2005. 'Limits to competition in urban bus services in developing countries', *Transport Reviews*, 25 (2): 139-158.
- European Commission. (2005. *Proposal for a regulation of the European Parliament and of the Council on public passenger transport services by rail and by road*. COM (2005) 319 final, Official Journal of the European Communities, Brussels.
- Farsi, Mehdi, Aurelio Fetz and Massimo Filippini. 2007. 'Economies of scale and scope in local public transportation', *Journal of Transport Economics and Policy*, 41 (3): 345-361.
- Filippini, Massimo and Paola Prioni, 2003. 'The influence of ownership on the cost of bus service provision in Switzerland: an empirical illustration', *Applied Economics*, 35 (6): 683-690.
- Franquelli, Giovanni, Massimiliano Piacenza and Graziano Abrate. 2004. 'Regulating public transport networks: how do urban-intercity diversification and speed-up measures affect firms' cost performance', *Annals of Public and Cooperative Economics*, 75, 193-225.
- Gagnepain, Philippe and Marc Ivaldi. 2002. 'Incentive regulatory policies: the case of public transport systems in France', *Rand Journal of Economics*, 33 (4): 605-629.
- Gómez-Ibáñez, José A. 2003. *Regulating Infrastructure: Monopoly, Contracts and Discretion*. Cambridge, MA: Harvard University Press.
- Hart, Oliver D., Andrei Shleifer and Robert W. Vishny. 1997. 'The Proper scope of government: Theory and an application to prisons', *Quarterly Journal of Economics*, 112 (4): 1127-1161.
- Hatry, Harry P. 1988. 'Privatization presents problems', *National Civic Review*, 77 (2): 112-17.
- Hatry, Harry P. 1999. *Privatization: The Provision of Public Services by the Private Sector*, McFarland & Company Inc., Jefferson N.C.
- Hensher, David. 2003. 'Contract areas and service quality issues in public transit provision: some thoughts on the European and Australian context', *Journal of Public Transportation*, 6 (1): 15-42.
- Hensher, David and Ian P. Wallis. 2005. 'Competitive tendering as a contracting mechanism for subsidising transport: The bus experience', *Journal of Transport Economics and Policy*, 39 (3): 295-321.
- Isotope. 1998. *Improved structure and organization for urban transport operations of passengers in Europe*, European Commission (4th RTD Framework Programme): Urban Transport, European Communities, Luxembourg.
- Kennedy, David. 1996. 'London bus tendering: a welfare balance', *Transport Policy*, 2 (4): 243-249.
- Landau, Martin. 1969. 'Redundancy, rationality, and the problem of duplication and overlap', *Public Administration Review*, 39 (6): 346-358.
- Langridge, R. and R. Sealey. 2000. 'Contestability in the UK bus industry? The National Bus Company, and the 'Tilling Mark II' effect', *Transport Policy*, 7 (2): 105-115.
- Lee, R.W. and C.R. Rivasplata. 2001. 'Metropolitan transportation planning in the 1990s: comparisons and contracts in New Zealand, Chile and California', *Transport Policy*, 8 (1): 47-61.
- Levin, Jonathan and Steven Tadelis. 2010. 'Contracting for government services: theory and evidence from U.S. cities', *Journal of Industrial Economics*, forthcoming.
- Littlechild, Stephen. 2002. 'Competitive bidding for a long-term electricity distribution contract', *Review of Network Economics*, 1 (1): 1-38.



- Matas, Anna and Josep Lluís Raymond. 1998. 'Technical characteristics and efficiency of urban bus companies: The case of Spain', *Transportation*, 25 (3): 243–263.
- Matas, Anna and Francisco López del Pino. 1999. 'Posibilidades de competencia en el autobús urbano', *Papeles de Economía Española*, 82: 238-259.
- Mathisen, Terje. A. and Gisle Solvoll. 2008. 'Competitive tendering and structural changes: an example from the bus industry', *Transport Policy*, 15 (1): 1-11.
- Miranda, Rowan and Allan Lerner. 1995. 'Bureaucracy, Organizational Redundancy, and the Privatization of Public Services', *Public Administration Review*, 55 (2): 193-200.
- Mizutani, F. and T. Urakami. 2002. *A private-public comparison of bus service operators. The 42nd European Congress of Regional Science Association* pp. 1-23. — Conference paper
- Nash, Christopher A. 2005. 'Privatization in transport', in K. Button and D. Hensher (eds.): *Handbook of transport strategy, policy and Institutions*, Vol. 6. Elsevier, Amsterdam.
- Poppo, Laura and Todd Zenger. 2002. 'Do formal contracts and relational governance function as substitutes or complements', *Strategic Management Journal* 23, 707-725.
- Preston, John. (2005): 'Tendering of services', in Kenneth Button and David Hensher (eds.): *Handbook of transport strategy, policy and Institutions*, Vol. 6. Elsevier, Amsterdam.
- Roy, William and Anne Yvrande-Billon. 2007. 'Ownership, contractual practices and technical efficiency: the case of the French urban public transport sector', *Journal of Transport Economics and Policy*, 41 (2): 257-282.
- Sappington, David and Dennis Weisman. 1996. 'Revenue sharing in incentive regulation plans', *Information Economics and Policy*, 8 (3): 229-248.
- Savage, Ian. 1993. 'Deregulation and privatization of Britain's Local Bus industry', *Journal of Regulatory Economics*, 5 (2): 143-158.
- Schmitz, Patrick W. 2000. 'Partial privatisation and incomplete contracts; the proper scope of government reconsidered', *Finanzarchiv*, 56 (4): 394-411.
- Shaw-Er, Judi, Wang Chiang & Ya-Wen Chen, 2005. 'Cost structure and technological change of local public transport: The Kaohsiung City Bus case', *Applied Economics*, 37 (12): 1399–1410.
- Shepherd, William. 1984. 'Contestability vs. competition', *American Economic Review*, 74 (4): 572-587.
- Shleifer, Andrei. 1985. 'A theory of yardstick competition', *Rand Journal of Economics* 16 (3): 319-327.
- van de Velde, Didier. 2007. *A new regulation for the European public transport*. 10th Conference on competition and ownership in land passenger transport. (Thredbo 10). Hamilton, Australia, 12-17 August 2007.
- Vickerman, Roger. 2008. 'Provision of public transport under conflicting regulatory regimes', *Transportation Research A*, 42 (9): 1176-1182.
- Viton, Philip. 1981. 'A translog cost function for urban bus transport', *Journal of Industrial Economics*, 29 (3): 287-304.
- Walters, Jackie and Jan Owen Jansson. 2008. 'Risk and reward in public transportation contracting', *Research in Transportation Economics*, 22 (1): 26-30.
- Warner, Mildred and Germà Bel. 2008. 'Competition or Monopoly? Comparing Privatization of Local Public Services in the U.S. and Spain', *Public Administration*, 86 (3): 723-735.
- Warner, Mildred and Amir Hefetz. 2008. 'Managing Markets for Public Service: The Role of Mixed Public/Private Delivery of City Services', *Public Administration Review*, 68 (1): 155-166.
- White, P.R. 1997. 'What conclusions can be drawn about bus deregulation in Britain?', *Transport Reviews*, 17 (1): 1-16.

- Willamson, Oliver. 1976. 'Franchise Bidding for Natural Monopolies-in General and with Respect to CATV', *The Bell Journal of Economics* 7 (1): 73-104.
- Yvrande-Billon, Anne. 2006. 'The attribution process of delegation contracts in the French urban public transport sector: why competitive tendering is a myth'. *Annals of Public and Cooperative Economics*, 77 (4): 453-478.

## Notes

---

*Llista Document de Treball*

*List Working Paper*

---

- WP 2010/09 “Urban transport governance reform in Barcelona” Albalate, D ; Bel, G and Calzada, J.
- WP 2010/08 “Cómo (no) adaptar una asignatura al EEES: Lecciones desde la experiencia comparada en España” Florido C. ; Jiménez J.L. and Perdiguero J.
- WP 2010/07 “Price rivalry in airline markets: A study of a successful strategy of a network carrier against a low-cost carrier” Fageda, X ; Jiménez J.L. ; Perdiguero , J.
- WP 2010/06 “La reforma de la contratación en el mercado de trabajo: entre la flexibilidad y la seguridad” Royuela V. and Manuel Sanchis M.
- WP 2010/05 “Discrete distributions when modeling the disability severity score of motor victims” Boucher, J and Santolino, M
- WP 2010/04 “Does privatization spur regulation? Evidence from the regulatory reform of European airports . Bel, G. and Fageda, X.”
- WP 2010/03 “High-Speed Rail: Lessons for Policy Makers from Experiences Abroad”. Albalate, D ; and Bel, G.”
- WP 2010/02 “Speed limit laws in America: Economics, politics and geography”. Albalate, D ; and Bel, G.”
- WP 2010/01 “Research Networks and Inventors’ Mobility as Drivers of Innovation: Evidence from Europe” Miguélez, E. ; Moreno, R. ”
- WP 2009/26 “Social Preferences and Transport Policy: The case of US speed limits” Albalate, D.
- WP 2009/25 “Human Capital Spillovers Productivity and Regional Convergence in Spain” , Ramos, R ; Artis, M. ; Suriñach, J.
- WP 2009/24 “Human Capital and Regional Wage Gaps” ,López-Bazo,E. Motellón E.
- WP 2009/23 “Is Private Production of Public Services Cheaper than Public Production? A meta-regression analysis of solid waste and water services” Bel, G.; Fageda, X.; Warner. M.E.
- WP 2009/22 “Institutional Determinants of Military Spending” Bel, G., Elias-Moreno, F.
- WP 2009/21 “Fiscal Regime Shifts in Portugal” Afonso, A., Claeys, P., Sousa, R.M.
- WP 2009/20 “Health care utilization among immigrants and native-born populations in 11 European countries. Results from the Survey of Health, Ageing and Retirement in Europe” Solé-Auró, A., Guillén, M., Crimmins, E.M.
- WP 2009/19 “La efectividad de las políticas activas de mercado de trabajo para luchar contra el paro. La experiencia de Cataluña” Ramos, R., Suriñach, J., Artís, M.
- WP 2009/18 “Is the Wage Curve Formal or Informal? Evidence for Colombia” Ramos, R., Duque, J.C., Suriñach, J.
- WP 2009/17 “General Equilibrium Long-Run Determinants for Spanish FDI: A Spatial Panel Data Approach” Martínez-Martín, J.
- WP 2009/16 “Scientists on the move: tracing scientists’ mobility and its spatial distribution” Miguélez, E.; Moreno, R.; Suriñach, J.
- WP 2009/15 “The First Privatization Policy in a Democracy: Selling State-Owned Enterprises in 1948-1950 Puerto Rico” Bel, G.
- WP 2009/14 “Appropriate IPRs, Human Capital Composition and Economic Growth” Manca, F.
- WP 2009/13 “Human Capital Composition and Economic Growth at a Regional Level” Manca, F.
- WP 2009/12 “Technology Catching-up and the Role of Institutions” Manca, F.

- WP 2009/11 "A missing spatial link in institutional quality" Claeys, P.; Manca, F.
- WP 2009/10 "Tourism and Exports as a means of Growth" Cortés-Jiménez, I.; Pulina, M.; Riera i Prunera, C.; Artís, M.
- WP 2009/09 "Evidence on the role of ownership structure on firms' innovative performance" Ortega-Argilés, R.; Moreno, R.
- WP 2009/08 "¿Por qué se privatizan servicios en los municipios (pequeños)? Evidencia empírica sobre residuos sólidos y agua" Bel, G.; Fageda, X.; Mur, M.
- WP 2009/07 "Empirical analysis of solid management waste costs: Some evidence from Galicia, Spain" Bel, G.; Fageda, X.
- WP 2009/06 "Intercontinental flights from European Airports: Towards hub concentration or not?" Bel, G.; Fageda, X.
- WP 2009/05 "Factors explaining urban transport systems in large European cities: A cross-sectional approach" Albalade, D.; Bel, G.
- WP 2009/04 "Regional economic growth and human capital: the role of overeducation" Ramos, R.; Suriñach, J.; Artís, M.
- WP 2009/03 "Regional heterogeneity in wage distributions. Evidence from Spain" Motellón, E.; López-Bazo, E.; El-Attar, M.
- WP 2009/02 "Modelling the disability severity score in motor insurance claims: an application to the Spanish case" Santolino, M.; Boucher, J.P.
- WP 2009/01 "Quality in work and aggregate productivity" Royuela, V.; Suriñach, J.
- WP 2008/16 "Intermunicipal cooperation and privatization of solid waste services among small municipalities in Spain" Bel, G.; Mur, M.
- WP 2008/15 "Similar problems, different solutions: Comparing refuse collection in the Netherlands and Spain" Bel, G.; Dijkgraaf, E.; Fageda, X.; Gradus, R.
- WP 2008/14 "Determinants of the decision to appeal against motor bodily injury settlements awarded by Spanish trial courts" Santolino, M.
- WP 2008/13 "Does social capital reinforce technological inputs in the creation of knowledge? Evidence from the Spanish regions" Miguélez, E.; Moreno, R.; Artís, M.
- WP 2008/12 "Testing the FTPL across government tiers" Claeys, P.; Ramos, R.; Suriñach, J.
- WP 2008/11 "Internet Banking in Europe: a comparative analysis" Arnaboldi, F.; Claeys, P.
- WP 2008/10 "Fiscal policy and interest rates: the role of financial and economic integration" Claeys, P.; Moreno, R.; Suriñach, J.
- WP 2008/09 "Health of Immigrants in European countries" Solé-Auró, A.; M.Crimmins, E.
- WP 2008/08 "The Role of Firm Size in Training Provision Decisions: evidence from Spain" Castany, L.
- WP 2008/07 "Forecasting the maximum compensation offer in the automobile BI claims negotiation process" Ayuso, M.; Santolino, M.
- WP 2008/06 "Prediction of individual automobile RBNS claim reserves in the context of Solvency II" Ayuso, M.; Santolino, M.
- WP 2008/05 "Panel Data Stochastic Convergence Analysis of the Mexican Regions" Carrion-i-Silvestre, J.L.; German-Soto, V.
- WP 2008/04 "Local privatization, intermunicipal cooperation, transaction costs and political interests: Evidence from Spain" Bel, G.; Fageda, X.

- WP 2008/03 "Choosing hybrid organizations for local services delivery: An empirical analysis of partial privatization" Bel, G.; Fageda, X.
- WP 2008/02 "Motorways, tolls and road safety. Evidence from European Panel Data" Albalade, D.; Bel, G.
- WP 2008/01 "Shaping urban traffic patterns through congestion charging: What factors drive success or failure?" Albalade, D.; Bel, G.
- WP 2007/19 "La distribución regional de la temporalidad en España. Análisis de sus determinantes" Motellón, E.
- WP 2007/18 "Regional returns to physical capital: are they conditioned by educational attainment?" López-Bazo, E.; Moreno, R.
- WP 2007/17 "Does human capital stimulate investment in physical capital? evidence from a cost system framework" López-Bazo, E.; Moreno, R.
- WP 2007/16 "Do innovation and human capital explain the productivity gap between small and large firms?" Castany, L.; López-Bazo, E.; Moreno, R.
- WP 2007/15 "Estimating the effects of fiscal policy under the budget constraint" Claeys, P.
- WP 2007/14 "Fiscal sustainability across government tiers: an assessment of soft budget constraints" Claeys, P.; Ramos, R.; Suriñach, J.
- WP 2007/13 "The institutional vs. the academic definition of the quality of work life. What is the focus of the European Commission?" Royuela, V.; López-Tamayo, J.; Suriñach, J.
- WP 2007/12 "Cambios en la distribución salarial en España, 1995-2002. Efectos a través del tipo de contrato" Motellón, E.; López-Bazo, E.; El-Attar, M.
- WP 2007/11 "EU-15 sovereign governments' cost of borrowing after seven years of monetary union" Gómez-Puig, M.
- WP 2007/10 "Another Look at the Null of Stationary Real Exchange Rates: Panel Data with Structural Breaks and Cross-section Dependence" Syed A. Basher; Carrion-i-Silvestre, J.L.
- WP 2007/09 "Multicointegration, polynomial cointegration and I(2) cointegration with structural breaks. An application to the sustainability of the US external deficit" Berenguer-Rico, V.; Carrion-i-Silvestre, J.L.
- WP 2007/08 "Has concentration evolved similarly in manufacturing and services? A sensitivity analysis" Ruiz-Valenzuela, J.; Moreno-Serrano, R.; Vaya-Valcarce, E.
- WP 2007/07 "Defining housing market areas using commuting and migration algorithms. Catalonia (Spain) as an applied case study" Royuela, C.; Vargas, M.
- WP 2007/06 "Regulating Concessions of Toll Motorways, An Empirical Study on Fixed vs. Variable Term Contracts" Albalade, D.; Bel, G.
- WP 2007/05 "Decomposing differences in total factor productivity across firm size" Castany, L.; Lopez-Bazo, E.; Moreno, R.
- WP 2007/04 "Privatization and Regulation of Toll Motorways in Europe" Albalade, D.; Bel, G.; Fageda, X.
- WP 2007/03 "Is the influence of quality of life on urban growth non-stationary in space? A case study of Barcelona" Royuela, V.; Moreno, R.; Vayá, E.
- WP 2007/02 "Sustainability of EU fiscal policies. A panel test" Claeys, P.
- WP 2007/01 "Research networks and scientific production in Economics: The recent Spanish experience" Duque, J.C.; Ramos, R.; Royuela, V.

- WP 2006/10 "Term structure of interest rate. European financial integration" Fontanals-Albiol, H.; Ruiz-Dotras, E.; Bolancé-Losilla, C.
- WP 2006/09 "Patrones de publicación internacional (ssci) de los autores afiliados a universidades españolas, en el ámbito económico-empresarial (1994-2004)" Suriñach, J.; Duque, J.C.; Royuela, V.
- WP 2006/08 "Supervised regionalization methods: A survey" Duque, J.C.; Ramos, R.; Suriñach, J.
- WP 2006/07 "Against the mainstream: nazi privatization in 1930s germany" Bel, G.
- WP 2006/06 "Economía Urbana y Calidad de Vida. Una revisión del estado del conocimiento en España" Royuela, V.; Lambiri, D.; Biagi, B.
- WP 2006/05 "Calculation of the variance in surveys of the economic climate" Alcañiz, M.; Costa, A.; Guillén, M.; Luna, C.; Rovira, C.
- WP 2006/04 "Time-varying effects when analysing customer lifetime duration: application to the insurance market" Guillen, M.; Nielsen, J.P.; Scheike, T.; Perez-Marin, A.M.
- WP 2006/03 "Lowering blood alcohol content levels to save lives the european experience" Albalade, D.
- WP 2006/02 "An analysis of the determinants in economics and business publications by spanish universities between 1994 and 2004" Ramos, R.; Royuela, V.; Suriñach, J.
- WP 2006/01 "Job losses, outsourcing and relocation: empirical evidence using microdata" Artís, M.; Ramos, R.; Suriñach, J.



Institut de Recerca en Economia Aplicada Regional i Pública  
*Research Institute of Applied Economics*

**Universitat de Barcelona**  
Av. Diagonal, 690 • 08034 Barcelona

---

**WEBSITE:** [www.ub.edu/irea/](http://www.ub.edu/irea/) • **CONTACT:** [irea@ub.edu](mailto:irea@ub.edu)

---

