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

Document de Treball 2012/17 33 pàg.
Working Paper 2012/17 33 pag.

"Regulation of Port Charges in Spain: Global versus Local Competition"

Xavier Fageda and Marta Gonzalez-Aregall

Institut de Recerca en Economia Aplicada | *Research Institute of Applied Economics*

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/ • CONTACT: 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.

Abstract

This article examines the determinants of traffic volumes and the revenues per tonne generated by Spain's port authorities. The interest of the study lies on the strong differences between port authorities in a context of strict regulation but that provides some scope for price competition. We find that port charges influence the amount of traffic that a port is able to generate. Furthermore, we find clear evidence of local price competition and report mixed results for global competition. Revenues per tonne are higher in ports operating more international regular lines and with multinational terminal operators, while they are lower in ports with nearby competing facilities and where the market share of the dominant shipping firm is high.

JEL classification:.
Keywords: ports, revenues, traffic, prices.

Xavier Fageda, Department of Economic Policy. Grup de Recerca en Governs i Mercats (GiM). Avda. Diagonal 690. 08034. Barcelona. E-mail: xfageda@ub.edu
Marta Gonzalez-Aregall, Department of Economic Policy. Grup de Recerca en Governs i Mercats (GiM). Avda. Diagonal 690. 08034. Barcelona. E-mail: m.gonzalez@ub.edu

1. Introduction

Globalization and containerization have led to an increase in maritime freight traffic with shipping companies tending to operate out of just a few ports that serve as their logistic platforms. This has resulted in fierce competition among the world's ports as they seek to attract the traffic of the shipping companies.

In this context of fierce competition, and taking into account that port users are often multinational companies operating at the global scale, the study of port charges takes on considerable relevance. Firstly, port charges are generally subject to strong regulation, but in a context of global competition the market power of port authorities is not altogether clear. Secondly, port charges are one of the factors that influence the port selection of shipping companies and shippers (Tongzon & Sawant, 2007; Steven & Corsi, 2012). Indeed, it is in port terminals where up to 50% of all container transport costs are generated (Fossey, 2002; Slack & Fremont, 2005). Finally, port charges are also significant since they determine the revenues that the Port Authority has available to finance its investments and current operations and they may also serve to alleviate problems of congestion.

Several empirical studies have examined the cost and efficiency indicators of ports (for a review, see Gonzalez & Trujillo, 2009)[1], while others have focused on the pricing strategies of shipping companies (e.g., Stojstrom, 1989, Fung et al., 2003). However, no previous empirical study has examined the determination of port charges in any detail[2].

In this paper, we undertake an empirical examination of the determinants of the traffic and revenue per tonne of Spain's port authorities by estimating a simultaneous equation system using data from 2004 to 2010.

[1] In general, the main factors assessed in these articles are related to the size and ownership of the port authorities (see, for example, Tongzon and Heng, 2005; Cheon et al., 2010).
[2] Several theoretical papers have, however, examined different issues related to port charges and competition (see, for example, De Borger et al., 2008; Van Reeven, 2010).

Although the analysis focuses specifically on Spain, it is of relevance to other countries as it is quite usual that port charges are subject to strict regulation. The Spanish case is of particular interest because of the heterogeneity of the 28 port authorities. Here, we find ports that just serve the local hinterland while other ports, typically the largest, are involved in global markets. Furthermore, we find some terminals that are managed by private (multinational or national) firms and others managed by public firms or the Port Authority itself. However, all port authorities are subject to a common regulation.

Our objectives are, on the one hand, to determine whether port charges have a direct impact on traffic volumes; and, on the other hand, to examine whether the current legal system in Spain offers any scope for price competition despite the high degree of regulation of port charges. Thus, our goal is to study the influence of regulation and of different types of competition (i.e., global or local) on the revenue a port authority is able to generate. Finally, an additional objective of our study is to offer evidence as to which actor in the port system (i.e., the port authorities, terminal operators or shipping companies) wields the effective market power.

The rest of the paper is organized as follows: Section 2 outlines the main features of the regulation of ports in Spain; Section 3 describes the empirical model used, including the sources of data and a justification of the explanatory variables selected. Section 4 provides an analysis of data describing Spanish ports. Section 5 explains the results of our regression analysis and the last section is devoted to summarizing the main findings and discussing the policy implications.

2. Regulation of port charges in Spain

The two main agencies managing the ports of Spain are “Puertos del Estado” and Port Authorities[3]. “Puertos del Estado” is a public company under the auspices of the Ministry of Transport. Its main objectives are to coordinate operations, and to approve the port authorities’ investment plans. Additionally, it is the agency that regulates the prices that the firms managing the terminals charge to shipping companies. It is financed by a share (four per cent) of the total revenues of each port authority located on the mainland and a share (two per cent) of the revenues of ports situated in Spain’s islands and in Ceuta and Melilla.

[3] For details about the reform of port management in Spain, see Castillo-Manzano et al. (2008), González and Trujillo (2008) and Castillo-Manzano, J.I. (2010).

The Port Authorities, on the other hand, are public institutions with their own legal personality and a president appointed by the regional Government. The president’s role is to propose investment plans and establish concession contracts with the companies that operate at the terminal. All the Port Authorities are financed by property income, port charges and contributions from the inter-port solidarity fund.

Our analysis of port charges is based on the regulation introduced in 2003 (Law 48/2003) and we draw on data between 2004 (the first full year when this law was applied) and 2010.[4]

Terminal operators have to pay two charges to the Port Authorities: a fee for the private occupation of a public area and a fee for the use of a public domain. The former is fixed according to the area occupied, and the charge is updated on an annual basis in line with the consumer price index. By contrast, the second fee is fixed according to the type and volume of activity and the degree of utility of the service obtained. Both fees depend on the land value of the port area and they are paid directly from the concessionaire to the Port Authority.

Shipping companies also have to pay a fee for the special use of port facilities. This is determined by three separate charges. Firstly, a good’s rate that is based on a classification of different types of goods.[5] This classification is the same for all the port authorities and is, in theory, determined by port infrastructure costs. The regulation provides various parameters depending on the particular group of merchandise. In general, the parameter related to the rate of bulk goods is the lowest, while it is less clear as to whether containerized or general cargo pay higher prices. In general, however, the rate charged to the different goods is not related to any specific economic criteria, since goods with a higher economic value are not necessarily charged a higher fee. Secondly, the vessel rate is determined by the size of the vessel. Finally, the passenger rate is determined by the units of transport (passengers, vehicles, etc.). These rates are paid directly by the shipping companies to the Port Authority.

[4] A new regulation introduced in 2010 provided greater incentives to manage the environmental sustainability of the port and to attract new sources of private investment.
[5] In relation to this rate, Núñez-Sánchez et al. (2011) examine the relationship between price levels and marginal costs. They find that prices are generally higher, but nevertheless similar to marginal costs.

As such, the regulation provides some scope for price competition through the application of two tools: a correction coefficient and discounts. The correction coefficient is the percentage that each Port Authority can apply in order to modify the fee paid by the shipping companies. A priori, these correction coefficient rates are established according to criteria such as the needs of investment, the debt level or the expected demand for each port authority. However, the most important feature of the correction coefficient is that it implies a “regulation of maximum profit”. Indeed, a port authority with higher profit levels than the national mean has to decrease its prices by up to 15%, while a port authority with lower profit levels has to increase its prices by up to 15%. This regulation of maximum profits may generate an economic distortion, since the price setting is not necessarily related to the costs of each Port Authority.

The second tool to promote competition comprises the discounts that port authorities can apply under certain conditions. In the case of terminal operators, discounts may be applied to public entities or firms that have a substantial investment in the port. Numerically, the discounts on terminal operators vary within a range from 10 to 50% of the terminal operator’s fee.

In the case of shipping companies, discounts depend on the type of rate. As regards the vessel rate, the port authority may apply discounts if a shipping company is an intensive user of the port facilities, if it has regular lines in that port, if it ships goods to the Spanish islands or to Ceuta and Melilla, and if it contributes to an improvement in the port’s environmental practices. As for the good’s rate, discounts depend on the country of origin and the type and amount of traffic. It is not clearly established in the legislation which type of traffic is entitled to most discounts, and so it tends to be left to the discretion of the Port Authority. Finally, discounts can be applied to passengers who live on an island.

The regulation fixes each Port Authority with an upper limit as regards the maximum amount that the discounts can represent as a share of its total revenue. Specifically, the sum of all discounts cannot exceed ten per cent of the mean total revenue for the last five-year period. However, a shipping company may enjoy specific discounts that represent a substantial discount on the fees that they should pay to the port authority. Specifically, these discounts may range from 10 to 70% of one of the three rates (goods, passengers and vessel).

In short, shipping companies that use a port as a hub can benefit from higher discounts. Furthermore, terminal operators that invest substantially in a port may also benefit from higher discounts. Here, it should be borne in mind that the amount of discounts that a shipping company or terminal operator can receive from the port authority may depend on their relative market power. A shipping company with a substantial share of traffic in the port may wield considerable negotiating power because the port depends on its activity and the shipping company could easily transfer its ships to another endpoint. By contrast, the negotiating power of the terminal operator could be weaker because it has to invest in what are largely sunk assets, including cranes or the rights to use the public domain.

3. The empirical model

In this section we develop an empirical model to estimate the determinants of traffic in Spanish ports and their revenues per tonne, drawing on data for the period 2004-2010. To the best of our knowledge there are no previous empirical studies of port charges that can substantiate our equations. In identifying the determinants of demand, we have considered those used in typical demand models for transport infrastructure. In general, the use of transport infrastructure depends on the demographic size and the wealth of the region in which the infrastructure is located, its geographical location, the prices charged for using the infrastructure and, in the case of ports, the extent of industrial activity and the degree of internationalization of the port activity itself.

Port charges are considered dependent on the volume and type of traffic, on competition and on the relative market power of the users of the infrastructure. Unlike ports, several empirical studies have examined the determinants of revenues or charges in airports (Van Dender, 2007; Bel & Fageda, 2010; Bilotkach et al., 2012). Our pricing equation, therefore, follows the same line of reasoning as that adopted in these papers focused on airports, but we incorporate the particular characteristics of ports and the price regulation framework that prevails in Spain.

We estimate a demand equation in which the dependent variable is the amount of traffic handled by the port authority and a pricing equation in which the dependent variable is the revenue per tonne generated by the port authority. The equations to be estimated are as follows:

The demand equation (1)

$$Traffic_{it} = \beta_0 + \beta_1 \log(revenue\_per\_tonne_{it}) + \beta_2 GDP_{it} + \beta_3 pop_{it} + \beta_4 indus_{it} + \beta_5 long_{it} + \beta_6 latit_{it} + \beta_7 percen\text{int}erna_{it} + \beta_8 car_{it} + \beta_9 year05 + \beta_{10} year06 + \beta_{11} year07 + \beta_{12} year08 + \beta_{13} year09 + \beta_{14} year10 + \varepsilon_t$$

The pricing equation (2):

$$\text{Re}venue\_per\_tonne_{it} = \alpha_0 + \alpha_1 \log(Traffic_{it}) + \alpha_2 pax_{it} + \alpha_3 number\_nearby\_port_{it} + \alpha_4 hhi_{it} + \alpha_5 multinational_{it} + \alpha_6 perc\text{int}erna_{it} + \alpha_7 bulk_{it} + \alpha_8 conten_{it} + \alpha_9 island_{it} + \alpha_{10} ceumel_{it} + \alpha_{11} year05 + \alpha_{12} year06 + \alpha_{13} year07 + \alpha_{14} year08 + \alpha_{15} year09 + \alpha_{16} year10 + \xi_t$$

- *Demand Equation*

In the demand equation, the dependent variable (TRAFFIC) is the total amount of traffic in all the port authorities *i* during year *t* expressed in tonnes. Data on port traffic were taken from the historical series provided by the Ministry of Transport. We consider the following variables when explaining the traffic in a port authority *i* during year *t*:

1) Log (Revenue per tonne). We consider all revenue per tonne for all the port authorities. To calculate this we take into account the total revenues of each port authority and we divide this by the total amount of traffic. Total revenue data were taken from the annual reports of each port authority and port traffic data were taken from the Ministry of Transport's historical series. In this variable lies the main interest of our traffic equation. We expect ports that charge lower prices to capture more traffic, i.e., we are interested in determining whether prices affect the volume of traffic generated by the port. While it seems clear that a port's traffic depends on the fundamental attributes of its hinterland, including its population, GDP and geographical location, we seek to test whether these charges might also influence traffic after controlling for these attributes. Other key factors such as land accessibility by train or road cannot be taken into consideration due to a lack of data. Note that this variable is expressed in logs because the relationship between traffic and revenue per tonne is not linear.

2) Gross domestic product per capita in region i during year t (GDP). The information for this variable was obtained from Spain's Institute of Statistics (INE). These data are available at the regional level (NUTS 2). We expect the coefficient of this variable to present a positive sign since wealthier regions should generate more demand for maritime transport services.

3) Population in region i during year t (POPULATION). These data are available at the provincial level (NUTS 3) and again are provided by the INE. We expect the coefficient of this variable to present a positive sign since the demand for maritime transport services should be higher in more highly populated cities.

4) We capture the industrial activity (INDUSTRIAL) as the total number of employees in the industry sector (data from the INE) at the autonomous region level (NUTS 2). The demand for maritime transport services should be higher in industrial areas with a more intense import/export activity, so we expect to find a positive relation between industrial activity and the amount of traffic.

5) Due to its geography, namely a Peninsula jutting out into the Mediterranean and the Atlantic Seas, Spain makes an interesting case study. We, therefore, employ two variables of location. On the one hand, the (LONGITUDE) variable indicates whether the port is situated in the east (positive sign) or the west (negative sign); and, on the other hand, the (LATITUDE) variable is positive when the port is in the north and negative when located in the south. Spain's largest ports lie in the Mediterranean Sea and absorb part of the international trade originating from Asia since the shipping companies use the Suez Canal. As such, we expect a positive sign for the longitude variable and a negative sign for the latitude variable.

6) We also construct a dummy variable to account for a particularly important industrial sector in Spain.[6] We consider a dummy variable that takes a value of 1 for a region with an automobile production plant and 0 otherwise. In assigning this variable we consider if the production plant is located within a specific provincial level (NUTS 3). Here, we expect a positive sign, on the understanding that if an automobile production plant is located in the region, then the port should benefit from more traffic because of the increased amount of imports and exports in that region

[6] According to the Bank of Spain (Banco de España, Boletin Economico May 2011), the exports of the automotive industry accounted for 22.2% of total exports in 2010.

7) PERCINTERNA: The percentage of international regular lines among the total number of regular lines. Ports that have a higher number of international regular lines should generate more traffic than is generated by the local hinterland; so, we expect the coefficient of this variable to present a positive sign.

8) Finally, we consider six dummy variables, one for each year in the study, in order to take into account the time effect. We estimate this time effect from 2005 to 2010 with 2004 serving as the year of reference.

- Pricing Equation

The dependent variable is the total revenue per tonne that the port authority charges to its concessionaires and to the shipping companies (REVENUES PER TONNE). The explanatory variables are the following:

A) Log (traffic): We consider the total amount of traffic handled by each port authority. As above, we use logs because the relationship between traffic and revenue per tonne is not linear. We expect the coefficient of this variable to present a negative sign as some components of the port charges are fixed and the regulations establish that ports generating higher profits (i.e., handling more traffic) have to reduce their prices ("regulation of maximum profit").

B) Some ports move a substantial number of passengers. Thus, we construct a dummy variable (PAX) that takes a value of 1 for ports handling more than a million passengers during 2009.[7] The information is available form the "Puertos del Estado". Further, as the legislation shows that the terminal operator's fee is established by the land value, the variable can be interpreted in two ways. First, in a tourist region the land value of the area occupied by the port will be higher. Second, while the variable may capture the fact that a higher number of passengers will generate more income, the number of tonnes transported will not be affected. Thus, in consequence we expect the coefficient of this variable to present a positive sign.

[7] The ports are Almeria, Bahía de Algeciras, Baleares, Barcelona, Ceuta, Las Palmas and Santa Cruz de Tenerife. Source: www.puertos.es

C) Spain has 28 port authorities that manage 44 ports of general interest. Given this number, several ports may be located very close to each other; in some instances we even find more than one port in the same province (NUTS 3). Thus, we consider the intensity of local competition by including a variable that measures the number of ports within a one-hundred mile (NUMBER NEARBY PORTS). The information is available from the "Puertos del Estado". We expect that the intensity of competition for a port authority to increase with the number of nearby ports. Hence, we expect this variable to present a negative sign as the port authority may have more incentives to apply discounts due to more intense local competition.

D) We consider the market power of the shipping companies by including a variable of concentration at the port level. To do this, we count all the regular lines that the shipping companies provide in each port. Note that, especially in the largest ports, some regular lines are operated by more than one regular shipping line. We construct a Herfindahl-Hirschman Index (HHI) based on the sum of the square shares enjoyed by the shipping companies operating in the port.[8] To calculate the HHI we take the total number of companies that operate a regular line and their respective shares among the total regular lines. We create our own database from the annual reports of all the port authorities.

We expect shipping companies with a larger share in the port's traffic to have a higher bargaining power in negotiations with the port authority since the port's total traffic will be more dependent on the decisions of those specific shipping lines. Thus, port authorities may have more incentives to offer discounts if just a few shipping lines concentrate the supply of regular lines. Thus, we expect this coefficient to present a negative sign associated with the HHI variable. In ports in which the shipping lines present low levels of concentration, shippers may also play a key role in choosing the port to handle their goods.

The most accurate measure of the shipping companies' share of traffic would be the frequency or total capacity of ships that arrive at a port, but unfortunately this information is not available. Furthermore, data have had to be collected manually using the annual reports or websites of each port authority. Thus, we only have data for 2010.

[8] Some values are missing for Aviles, Huelva, Las Palmas, Motril and Santa Cruz de Tenerife.

E) As an indicator of the level of operation of the terminal operator, we create a dummy variable (MULTINATIONAL) that takes a value of 1 if the terminal operator is a multinational company and 0 otherwise. This variable seeks to measure the presence of multinational companies among terminal operators. The port authority could have incentives to apply discounts to firms that operate at the global level because these firms may offer greater potential for investment than public firms or private firms that operate at a local level. In this regard, the bargaining power of the terminal operators could be weakened by the fact that they have already incurred major investments with high sunk costs.[9] By contrast, multinational operators tend to manage specialized container terminals that may well be associated with higher costs than other terminals (due, for example, to more expensive cranes). Thus, a priori, the sign of the coefficient associated with this variable is unclear. Note that the higher costs associated with facilities required to handle containers could also be captured by a variable that accounts for the percentage of total traffic transported by containers.

F) The percentage of international regular lines among the total number of regular lines (PERCINTERNA). Port authorities may have incentives to apply more discounts when traffic is restricted to a higher percentage of international regular lines, which may be subject to global competition. However, international regular lines are less subject to intermodal competition from rail and road. Thus, a priori, the sign of the coefficient associated with this variable is unclear.

G) Charges to shipping companies according to the category of the good. A (BULK) good is charged as a “cheaper” good, so this should have a direct impact on revenue per tonne. Thus, we expect the coefficient associated with this variable to present a negative sign.

H) At the same time, we can consider the degree of containerization (CONTE) of a port though the percentage of containerized traffic over total traffic. The classification of goods in terms of the level of charges does not clearly distinguish between containerized and general traffic. However, container traffic may be associated with higher costs due to a need for more specialized assets. In any case, a priori, the sign of the coefficient associated with this variable is unclear because it might be the case that goods belonging to the general traffic category (such as cars) are more expensive than container traffic.

[9] For example, in Barcelona the multinational company Hutchison Port Holdings Group opened a new container terminal in September 2012. The new terminal occupies a 100-hectare site, boasts a quay that is 1,500 meters long and has the capacity to handle 2.65 million TEUs each year. The total investment in the new terminal amounts to about 500 million euros.

I) The regulation grants peripheral or isolated regions some specific advantages. To take this into account, we construct two dummy variables. (ISLAND) takes a value of 1 for ports located in Spanish Islands (Balearics and Canaries). We also include a variable (CEUMEL) that takes a value of 1 if the ports are located in the two Spanish cities in North Africa: Ceuta and Melilla. Traffic to these peripheral locations is not subject to intermodal competition from road and rail but at the same time the current regulation fixes lower charges for ports located in islands. Thus, the sign of the coefficient associated with this variable is unclear.

J) Finally, we consider six dummy variables, one for each year in the study, in order to take into account the time effect. We estimate this time effect from 2005 to 2010 with 2004 serving as the year of reference.

4. Data on Spanish ports

The Spanish port system comprises 28 authorities and a total of 44 general interest ports. The data used have been taken from the Ministry of Transport, “Puertos Del Estado” and the annual reports published by the Port Authorities for the period 2004-2010.

Table 1. Main characteristics of Spanish ports

PORT AUTHORITIES (Abbreviation)	TOTAL TRAFFIC (TONNES)	CONTAIN-ERS (TEU)	Nº OF SPECIALIZED TERMINALS (FIRMS)	TOTAL Nº REGULAR LINES	% INTERNATIONAL REGULAR LINES	DOMINANT SHIPPING COMPANY	HHI
B.ALGECIRAS (ALG)	71,048,280	3,138,092	2 (APM / HANJIN)	67	92.54 %	Maersk	0.609
VALENCIA (VAL)	51,662,952	3,099,570	3 (NOATUM / MSC / TCB)	80	96.25 %	MSC	0.015
BARCELONA (BAR)	46,098,736	2,171,957	2 (TCB / TerCat-Hutchison	95	81.05 %	MSC	0.008
BILBAO (BIL)	36,023,316	508,930	1 (NOATUM)	104	93.27 %	MacAndrews	0.002
TARRAGONA (TAR)	32,111,253	79,767	1 (DP WORLD)	21	85.71 %	ZIM integrated Shipping Services	0.016
LAS PALMAS (PAL)	24,271,682	1,196,118	-	n.a.	n.a	n.a.	n.a
CARTAGENA (CAR)	23,587,996	43,903	-	31	100 %	Maersk Line	0.111
HUELVA (HUE)	20,544,759	0	-	n.a.	n.a.	n.a	n.a
GIJÓN (GIJ)	18,991,113	17,166	1 (TCB)	7	85.71 %	WEC LINES	0.183
S.C.TENERIFE (TEN)	18,352,238	419,823	1 (TCB)	86	83.72 %	n.a	n.a.
A CORUÑA (COR)	13,281,465	4,447	-	1	100 %	OPDR Hamburg	1
BALEARS (BAL)	13,054,753	170,444	-	12	0 %	Eurolineas Marítimas	0.206
CASTELLÓN (CAS)	12,644,303	73,100	-	23	100 %	Línea Messina	0.085
FERROL-S.CIBRAO (FER)	10,948,753	1,550	-	3	100 %	-	-
SANTANDER (SAN)	5,688,419	651	-	21	100 %	Wallenius Wilhemsen Lines	0.036
ALMERIA (ALM)	5,445,873	985	-	6	83.33 %	Acciona Transmediterranea	0.13
B.CÁDIZ (CAD)	5,294,482	127,623	1 (CONCASA)	12	50 %	-	-
AVILES (AVI)	5,032,211	6,926	-	1	0 %	Guixar	1
PASAIA/PASAJES (PAS)	4,846,814	3	-	6	83.33 %	UECC Norway	0.183
VIGO (VIG)	4,777,592	216,229	-	65	87.69 %	MITSUI 0.S.K. LINES	0.008
SEVILLA (SEV)	4,681,031	128,032	-	14	92.86 %	ZIM Lines	0.140
MÁLAGA (MAL)	3,952,267	321,975	1 (NOATUM)	10	70 %	Terminales del Sudeste-Grupo NOATUM	0.528
ALICANTE (ALI)	3,112,125	155,921	-	21	52.38 %	-	-
CEUTA (CEU)	2,439,006	11,628	-	4	25 %	-	-
MOTRIL (MOT)	2,385,934	787	-	n.a.	n.a.	n.a.	n.a.
MARÍN.PONTEVEDRA (MARI)	1,817,693	36,106	-	4	75 %	Seatrade	0.25
VILAGARCIA DE AROUSA (VIL)	1,081,373	4,775	-	3	66.66 %	P. & J. CARRASCO. SL	1
MELILLA (MEL)	798,395	21,031	-	4	50 %	Cia Trasmediterránea	0.16

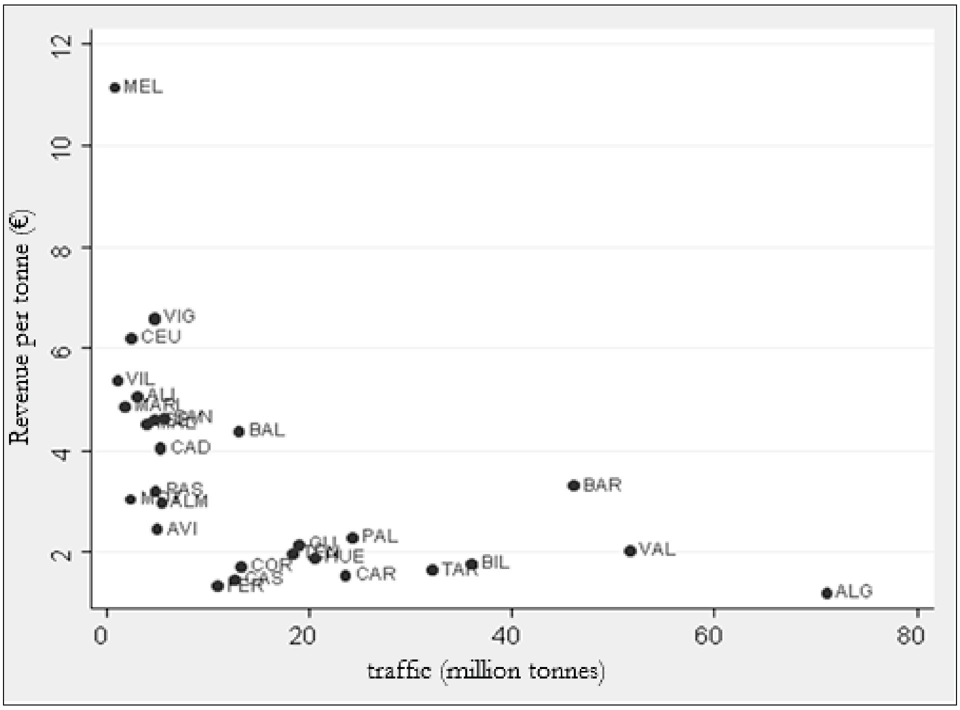
Note: Traffic data refer to the mean values for the period 2004-2010, while data on regular lines are for 2010.

Source: Based on information obtained from the Ministry of Transport and the annual reports of all the Port Authorities.

As Table 1 shows, Algeciras, Valencia and Barcelona are the ports handling most traffic and with most containers. The table also shows that only nine of the 28 Port Authorities have specialized container terminals. In general, the largest ports have Terminal Operators that are managed by some of the world's leading companies. They include the Hutchison Port Holdings Group in Barcelona and DP World in Tarragona. TCB is a national firm that operates around the world and has a presence in several Spanish ports. Other terminals are managed directly by shipping companies. This is the case of MSC in Valencia and Hanjin in Algeciras.

In the case of shipping companies, the dominant company is generally a multinational firm operating globally. The concentration index, indicative of the number of regular lines on which the shipping companies offer services, shows that in most ports there is a diversification of shipping operations. As such, there are very few ports that function as a hub for one specific shipping company. Thus, the largest ports, including Barcelona, Valencia and Tarragona, are used by a highly diversified range of shipping companies. The main exception here, however, is the port of Algeciras (which handles the most traffic in Spain). In this port, one shipping company (Maersk) handles around 60% of total traffic. Although to a lesser degree, some concentration is also apparent in Malaga, the Balearics and Melilla where local shipping companies tend to dominate the domestic regular lines. The concentration levels are also higher than the mean sample in some northern ports (Gijón and Pontevedra, for example) with international shipping companies dominating a large number of regular lines. Note that, except in the Balearics, Aviles and Ceuta, traffic is mainly centered on international regular lines.

Figure 1. Scatter plot between traffic and port revenues per tonne.



Source: Based on information obtained from the Ministry of Transport and the annual reports of all the Port Authorities.

Figure 1 shows a scatter plot describing the relationship between traffic and port revenues per tonne. The largest ports (Algeciras or Valencia) have more traffic but lower revenues per tonne than most of the other ports.[10] However, revenues per tonne are higher in Barcelona than in several smaller ports. It is clear, therefore, that the charges in operation in Algeciras (which serves as a hub) are lower than those in Barcelona and Valencia (which operates as a gateway). In addition, revenues per tonne are especially low in a group of large ports that specialize in bulk traffic (namely, Tarragona, Bilbao and Cartagena).

It seems that below a certain traffic limit (around 10 million tonnes), revenues per tonne become higher. A possible explanation for this might be that some components of port charges are fixed regardless of the level of traffic. Furthermore, the correction coefficient (which imposes a regulation of maximum profit) might also account for the lower charges made by the large ports.

[10] Note that only four of the 28 ports reported losses in the period under review.

5. Estimation and results

The data used for estimating the equations considered herein have a time-series, cross-sectional structure (data panel). Various techniques and estimation models are available for estimating equations with data panels of this nature.

The random effects model, however, is not a suitable alternative in our context because the random effects may be correlated with some of the explanatory variables. Likewise, the Hausman test is not useful for testing the suitability of the random effects because several explanatory variables are time-invariant, which means that results for the random and fixed effects models will differ. Here, the use of the fixed effects means that we may fail to identify the effect of the time-invariant variables, such as a port with an island location. This shortcoming of the fixed effects model is particularly grave in the case of the pricing equation because our variables designed to capture competition do not vary over time. This is the case of the dummy variable for multinationals that operate at least one terminal in the port, the number of nearby ports and the concentration index based on the shares of shipping companies operating regular lines in the port. Thus, here we have opted to present the results of the demand equation using the pooled model and the fixed effects model, but in the case of the latter we have excluded the time-invariant variables. The results of the pricing equation are based on the pooled model, taking into account that our analysis focuses primarily on the between rather than the within variation of the data.

Furthermore, our estimates might present heteroscedasticity, non-stationarity and temporal autocorrelation problems in the error term. Here, the Wooldridge test for autocorrelation in panel data shows that we may have a problem of serial autocorrelation which we correct through clusters of time. The Levin-Lin-Chu test of unit roots indicates that the dependent variables (traffic, revenues per tonne) do not contain a unit root and, hence, we can confirm that there is no long-term co-integration relationship. Furthermore, the standard errors are robust to any problem of heteroscedasticity after applying White standard errors.

We also take into account the possibility that some endogenous explanatory variables might bias the estimations. In the case of the demand equation, the revenues per tonne variable may be endogenous. In the case of the pricing equation, we do not consider the multinational variable to be endogenous because the investment plans of the multinational terminal operators represent specific, one-off decisions. By contrast, we do consider two endogenous variables in the pricing equation, namely, traffic and the HHI.

Thus, the estimation is made using the two-stage least squares estimator. The instruments of the traffic and concentration index variables in the pricing equation are: GDP, Population, Longitude, Latitude, Industry and Car (see descriptions in section three above). The instruments of the revenues per tonne variable in the demand equation are: Passengers, Number of nearby ports, Multinational, Bulk, Containerization, Island and Ceumel (see descriptions in section three above). The partial R2 in the first step of the estimation shows that the instruments are strong.

Finally, we also take into account a potential problem of multicollinearity due to the correlation of some of the explanatory variables. The variance inflation factor is lower than 2 in the demand equation and lower than 3 in the pricing equation so we can conclude that there is no problem of multicollinearity.

Table 2 shows the results of the estimation of the demand equation which analyzes the determinants of traffic in Spanish ports. Recall that data for certain variables, including the HHI and percentage of international regular lines, are not available for all port authorities. Thus, the first column shows the results for all port authorities but not for all variables, while the second column shows the results for all variables but not for all port authorities. The last two columns show the results with fixed and temporal effects (third column) and with fixed effects but without temporal effects (fourth column).

Table 2. Demand equation estimates

VARIABLES	(1) Traffic	(2) Traffic	FE (with temporal effects)	FE (without temporal effects)
L(revenues per tonne)	-1.81e+07*** (512,847.4)	-1.57e+07*** (675,427)	-1.08e+07*** (3874881)	-1.15e+07*** (3497284)
GDP	1,063*** (109.7)	1,048*** (96.92)	121.2 (392.8)	841.7*** (242.6)
Population	5.065*** (0.174)	5.679*** (0.298)	12.23 (7.773)	21.96*** (6.141)
Longitude	462,285*** (69,141)	482,875*** (73,672)	-	-
Latitude	-137,047*** (63,513)	-1406105*** (75,459)	-	-
Industrial	2,402* (988.5)	591.2 (983.9)	-3,429 (13,427)	-4,613 (14,305)
Perceninterna	-	5449036*** (1101141)	-	-
Car	9525619*** (1027756)	6988020*** (1258756)	-	-
year05	567,005*** (134,191)	512,828** (139,018)	886,104 (891,459)	-
year06	-967,688*** (230,457)	-654,064** (254,886)	16325876 (1381009)	-
year07	-653,291* (336,125)	-478,639 (375,430)	2600079 (1838656)	-
year08	2101162*** (338,839)	1728708** (501,398)	4136835* (2390560)	-
year09	3056310*** (242,316)	2384515*** (509,219)	3120380 (2522385)	-
year10	2741688*** (243,741)	1968283*** (510,284)	31551344 (2450749)	-
Constant	5.91e+07*** (3291372)	5.51e+07*** (5196879)	9193976 (1.56e+07)	-1.40e+07* (8321118)
Observations	189	170	190	190
F	49.14 ***	48.15***	8902.91***	8499.12***
R^2	0.60	0.60	0.44	0.37

Note 1: Standard errors in brackets.
Note 2: Statistical significance at 1%(***), 5%(**), 10% (*)

The explanatory capacity of the estimated models is quite satisfactory with a high R2. The following conclusions can be drawn from our findings. First, as expected, the variables of GDP per capita, population, industrial activity and the dummy for the car industry are all statistically significant. Similarly, and as expected, all the variables related to the economic activity of the region in which the port is located have a substantial influence on traffic.

In addition, the location variable reveals that there is more traffic in the East (the longitude coefficient being positive) and in the South (the latitude coefficient being negative), so that the Mediterranean Sea handles more traffic. This, as discussed, is attributable to the use of the Suez Canal route which leads to a concentration of the traffic linking Asia with Europe.

This result is in line with that obtained for the variable of the percentage of international regular lines. The coefficient associated with this variable is positive and statistically significant. Thus, we find evidence that ports with more international regular lines have a greater capacity to generate traffic beyond that directly related with the local hinterland.

Importantly, the coefficient associated with the revenues per tonne variable is negative and statistically significant in all the regressions. Thus, we find that an increase in port charges reduces the volume of traffic and that not only the demographic size, geographical location and economic activity of the hinterland influence the amount of traffic that a port is able to generate. Controlling for all these variables, traffic seems to be determined by the price levels. Together with the level of investment, port managers may also influence the decisions of shipping companies and shippers. In terms of elasticities, a 10% increase in revenues per tonne produces an 11% decrease in traffic.

Overall, from our results, we can infer that the regulation of port charges is important as a competitiveness factor. Of course, there are other elements including the costs of transporting goods to and from the port over land that we are unable to capture and which must have an influence on the competitiveness of ports.

Table 3 shows the results of the estimation of the pricing equation and explains the determinants of the revenues per tonne for the Spanish ports. The first column shows the results for all port authorities but not for all variables, while the second column shows the results for all variables but not for all port authorities.

Table 3. Pricing equation estimates

VARIABLES	(1) Revenues per tonne	(2) Revenues per tonne
ltraffic	-1.326*** (0.219)	-1.728*** (0.202)
pax	-0.191 (0.182)	0.0996 (0.208)
n100	-0.310** (0.0912)	-0.342*** (0.0642)
multinational	0.651** (0.193)	1.122*** (0.216)
perceninterna	-	1.444** (0.419)
bulk	-3.933*** (0.252)	-2.756*** (0.470)
conte	-1.200*** (0.293)	0.0857 (0.593)
island	-0.874*** (0.202)	1.622** (0.544)
ceumel	2.004** (0.585)	2.389** (0.810)
hhi	-	-0.873*** (0.176)
year05	0.142*** (0.0167)	0.177*** (0.0164)
year06	0.274*** (0.0310)	0.346*** (0.0296)
year07	0.433*** (0.0358)	0.522*** (0.0340)
year08	1.200*** (0.0176)	1.328*** (0.0166)
year09	1.540*** (0.0184)	1.626*** (0.0182)
year10	1.236*** (0.0100)	1.246*** (0.0162)
Constant	26.97*** (3.620)	31.34*** (2.955)
Observations	189	163
F	33.09***	40.32***
R^2	0.78	0.81

Note 1: Standard errors in brackets.
Note 2: Statistical significance at 1%(***), 5%(**), 10% (*)

We find that more traffic is associated with lower revenues per tonne. Indeed, the coefficient associated with the traffic variable is negative and statistically significant. This result can be justified in terms of scale economies (i.e., costs per tonne fall as traffic volume rises) provided some charges remain fixed. Moreover, the regulations governing port charges place a limit on the maximum amount of profits. So, the ports with most traffic have a greater probability of making more extraordinary profits and this regulation imposes a reduction in their prices.

In addition, the coefficient associated with the island variable is negative and statistically significant. This result can also be explained by the regulations governing port charges whereby ports located on islands issue lower charges, even though their traffic is largely captive. By contrast, the coefficient associated with the variables of Ceuta and Melilla is positive. In these port cities, higher prices may well reflect the higher amount of captive traffic.

The coefficient of the number of nearby ports variable is negative and statistically significant. This finding has two possible interpretations. First, it seems that the discount system functions in the case of local competition. Second, the existence of an excessive number of ports would seem to have a detrimental impact on each port authority's income per tonne.

The coefficients associated with the containerization and bulk variables are negative and statistically significant, but while the passenger variable is also negative it does not reach statistically significant levels. In this sense, and based on Spanish legislation and the good's rate, bulk traffic is cheaper than the containerized merchandise. Here, it would seem that non-containerized general merchandise, such as cars, is more expensive to ship than containerized merchandise. The containerization variable, therefore, does not seem to capture the higher costs associated with the specific assets required to handle containers. However, the multinational variable does capture the effect associated with higher costs.

Similarly, the coefficient associated with the variable of multinational companies serving as the terminal operator presents a positive sign and is statistically significant. Thus, we find that terminal operators do not benefit from discounts. Here, we can conclude that such a situation negatively affects the competition between ports that are subject to global competition, and that these ports are unable to improve their competitive position via price changes. A further key aspect related to this positive correlation is the importance of the increased costs associated with the investment in a specialized container terminal. In this sense, the specific investment implies considerable sunk costs that weaken the operator's bargaining power with the port authority.

In the case of the shipping companies, the coefficient associated with the HHI variable has a negative sign and is statistically significant. We find that the discount system works only in ports with many regular lines, such as the hub ports. From our results we can infer that the shipping companies with a high market share enjoy stronger negotiating powers when seeking discounts from the port authorities. Thus, our results seem to indicate that the market power of the shipping companies is greater than that of the terminal operators.

The coefficient associated with the percentage of regular international lines is positive and statistically significant. We find that ports with greater volumes of international traffic report higher revenues per tonne, while the national shipping lines pay less than international shipping lines. This might be because the international lines require larger ships and, as such, the charges associated with these ships will be higher. In addition, ports with a multinational terminal operator have more international regular container lines. Furthermore, the national regular lines must compete with alternative modes of transport, e.g. road or railway transport. Yet, ports linked to international regular lines and which are thus subject to global competition do not seem to be able to apply charges that are any lower than those applied by ports subject solely to local competition.

6. Conclusions

In this paper, we have found that an increase in port charges is associated with lower volumes of traffic, so that the former are important as a competitiveness factor of Spain's ports. Our results also show that the discount system works only in ports where a number of shipping companies operate many regular lines but not in ports whose terminals are managed by multinational companies or in those with higher volumes of international traffic. Such a situation has a negative impact on the competition between ports that are subject to global competition and raises the costs of terminal operators when they make an investment. By contrast, we have found evidence that if there is a significant number of nearby ports the revenues per tonne decrease. Thus, the discount system does seem to work in instances of local competition, although it is less clear in the case of global competition.

In Spain, the 28 port authorities operate common regulations but they differ markedly in terms of their size, the functions of their terminal operators and shipping companies and the type of traffic they handle. More specifically, the main specialized container ports do not compete with other national ports but rather with the other major ports of Europe. Most of Spain's large ports need to improve their accessibility by land, but in a context of severe budgetary constraints affecting the public administration, these investments will presumably have to be made by private companies. Such investments can then either be financed by tolls paid by users or by a deferred payment from the public administration. Our analysis, however, suggests that higher user costs will undermine the volume of port traffic (i.e., the tolls might have the equivalent impact of an increase in port fees). The current regulations are quite strict and may prevent port authorities from compensating port users for higher land costs by implementing a pricing system.

Likewise, there are large multinational companies operating terminals that have invested large sums of money in several Spanish ports. These investments (with their associated sunk costs) create strong links between the port authority and the company. For this reason, the negotiating position of the terminal operator can be weakened. In fact, we have found that they sometimes pay higher prices than public firms (even the Port Authority) or national firms. However, it seems that the bargaining power of shipping companies is stronger, especially when they enjoy a high market share. In this sense, it seems that the regulation of prices in Spain favors lower prices in hub ports, such as Algeciras, but this is not the case in gateway ports, such as Barcelona or Valencia, which have a much more diversified traffic.

To conclude, it is worth noting that the amount of revenue per tonne that a port authority is able to generate has a strong influence on its profits. As the Port Authorities in Spain are public entities, it is questionable whether their aim should be to maximize profits. On the one hand, higher levels of revenue can help finance increased port capacity and be used to contribute to the financing of other ports. On the other hand, higher levels of revenue can damage the competitive position of ports in a context of intense global competition.

Thus, port authorities have to consider the following trade-offs when setting charges: lower prices can contribute to higher volumes of traffic while high prices can serve to fund investment. Hence, we conclude that pricing regulations affect not only a port's competitive position, but also its ability to finance investments. In a context of global competition, ports should have some flexibility in defining their business strategy without overlooking any potential mechanisms of solidarity.

References

Bel, G., Fageda, X (2010). Privatization, regulation and airport pricing: An empirical analysis for Europe, Journal of Regulatory Economics, 37(2),142-161.

Bilotkach, V., Clougherty, J.A., Muller, J., Zhang, A. (2012) “Regulation, privatization, and airport charges: panel data evidence from European airports” 42; 73–94 Journal of Regulatory Economics.

Castillo-Manzano,J.I. (2010). “El sistema portuario español: buscando un nuevo rumbo”. Economistas, 123; 290-295.

Castillo-Manzano, J. I., López-Valpuesta, L., Pérez, J. J., 2008. Economic analysis of the Spanish port sector reform during the 1990s. Transportation Research Part A: Policy and Practice, 42(8), 1056-1063.

Cheon, S., Dowall, D. & Song, D. (2010). “Evaluating impacts of institutional reforms on port efficiency changes: Ownership, corporate structure, and total factor productivity changes of world container ports”. Transport Research Part E. 46, 546-561.

De Borger, Proost, S and Van Dender, K. (2008) “Private Port Pricing and Public Investment in Port and Hinterland Capacity”, Journal of Transport Economics and Policy, 42(3) pp. 527-561.

Fossey, J.(2002) “Global outlook of future trends in container shipping and port development” Paper presented at the Ports and Logistics Conference, Johor Bahru, September.

Fung, M., Cheng, L. and Qiu, L. (2003) “The impact of terminal handling charges on overall shipping charges: an empirical study”. Transport Research Part A. 37, 703-716.

González, M. and Trujillo, L. (2009). “Efficiency Measurement in the Port Industry: A Survey of the Empirical Evidence”, Journal of Transport Economic and Policy, 43(2) pp.157-192.

González, M. and Trujillo, L. (2008). Reforms and infrastructure efficiency in Spain’s container ports, Transportation Research Part A 42, pp.243-257.

Núñez-Sánchez, R., Jara-Díaz,S and Coto-Millán,P. (2011) “Public regulation and passengers importance in port infrastructure costs”, Transport Research Part A, 45, 653-666.

Slack, B. and FrémontA., (2005): “Transformation of port terminal operations: from local to the global”, Transport Reviews, 25 (1), 117-130.

Steven, A. and Corsi, T. (2012): “Choosing a port: An analysis of containerized imports into the US”. Transport Research Part E, 48 (4); 881-895.

Stojstrom, W. (1989) “Collusion in Ocean Shipping: A test of monopoly and empty core models”, Journal of Political Economy, 97 (5), 1160-79.

Tongzon (1995) “Determinants of port performance and efficiency”, Transport Research Part A, 29(3), 245-252.

Tongzon,J and Heng,W. (2005) Port privatization, efficiency and competitiveness: Some empirical evidence from container ports (terminals). Transport Research Part A, 39. 405-424.

Tongzon and Sawant, (2007), “Port choice in a competitive environment: from the shipping lines’ perspective”. Applied Economics, 39, 477-492.

Van Dender, Kurt (2007) “Determinants of fares and operating revenues at US airports”. *Journal of Urban Economics*, 62 (2), 317-336.

Van Reeven, P. (2010): “The effect of Competition on Economic Rents in Seaports”. Journal of Transport Economics and Policy, 44 (1) pp. 79–92.

Llista Document de Treball

List Working Paper

WP 2012/17 "Regulation of Port Charges in Spain: Global versus Local Competition" Fageda, X. and Gonzalez-Aregall, M.

WP 2012/16 "Pass-through in dollarized countries: should Ecuador abandon the U.S. Dollar?" Marí del Cristo, M.L. and Gómez-Puig, M.

WP 2012/15 "A Note on the Relationship Between the Cyclicality of Markups and Fiscal Policy" Claeys, P. and Costa, L.F.

WP 2012/14 "Do intra- and inter-industry spillovers matter? CDM model estimates for Spain" Goya, E.; Vayá, E and Suriñach, J.

WP 2012/13 "What Drives the Choice of Partners in R&D Cooperation? Heterogeneity across Sectors" Badillo, E. and Moreno, R.

WP 2012/12 "Corruption and local politics: does it pay to be a crook?" Jiménez, J.L. and García, C.

WP 2012/11 "Not always sunny in paradise: prices and brand diversity in touristic areas supermarkets" Campos, J.; Jiménez, J.L. and Suárez-Alemán, A.

WP 2012/10 "The institutional, economic and social determinants of local government transparency" Albalate, D.

WP 2012/09 "The business excellence attraction composite index (BEACI). Design and apllication to the municipalities of the Barcelona province" Murillo, J.; Romaní, J.; Suriñach, J.

WP 2012/08 "Policy options for the promotion of electric vehicles: a review" Perdiguero, J. and Jiménez, J.L.

WP 2012/07 "Price differences between domestic and international air markets: an empirical application to routes from Gran Canaria" Fageda, X.; Jiménez, J.L. and Díaz Santamaría, C.

WP 2012/06 "Building a "quality in work" index in Spain" López-Tamayo, J.; Royuela, V. and Suriñach, J.

WP 2012/05 "Mergers and difference-in-difference estimator: why firms do not increase prices?" Jiménez, J.L. and Perdiguero, J.

WP 2012/04 "What attracts knowledge workers? The role of space, social connections, institutions, jobs and amenities" Miguélez, E. and Moreno, R.

WP 2012/03 "What Drives the Urban Wage Premium? Evidence along the Wage Distribution" Matano, A. and Naticchioni, P.

WP 2012/02 "Location Patterns of Creative Capital and Regional Disparities in Spain" Kerimoglu, E. and Karahasan, B.C.

WP 2012/01 "The connection between distortion risk measures and ordered weighted averaging operators" Belles-Sampera, J.; Merigó, J.M.; Guillén, M. and Santolino, M.

WP 2011/26 "Productivity and innovation spillovers: Micro evidence from Spain" Goya, E.; Vayá, E. and Suriñach, J.

WP 2011/25 "The regional distribution of unemployment. What do micro-data tell us?" López-Bazo, E. and Motellón, E.

WP 2011/24 "Vertical relations and local competition: an empirical approach" Perdiguero, J.

WP 2011/23 "Air services on thin routes: Regional versus low-cost airlines" Fageda, X. and Flores-Fillol, R.

WP 2011/22 "Measuring early childhood health: a composite index comparing Colombian departments" Osorio, A.M.; Bolancé, C. and Alcañiz, M.

WP 2011/21 "A relational approach to the geography of innovation: a typology of regions" Moreno, R. and Miguélez, E.

WP 2011/20 "Does Rigidity of Prices Hide Collusion?" Jiménez, J.L and Perdiguero, J.

WP 2011/19 "Factors affecting hospital admission and recovery stay duration of in-patient motor victims in Spain" Santolino, M.; Bolancé, C. and Alcañiz, M.

WP 2011/18 "Why do municipalities cooperate to provide local public services? An empirical analysis" Bel, G.; Fageda, X. and Mur, M.

WP 2011/17 "The "farthest" need the best. Human capital composition and development-specific economic growth" Manca, F.

WP 2011/16 "Causality and contagion in peripheral EMU public debt markets: a dynamic approach" Gómez-Puig, M. and Sosvilla-Rivero, S.

WP 2011/15 "The influence of decision-maker effort and case complexity on appealed rulings subject to multi-categorical selection" Santolino, M. and Söderberg, M.

WP 2011/14 "Agglomeration, Inequality and Economic Growth" Castells, D. and Royuela, V.

WP 2011/13 "A correlation sensitivity analysis of non-life underwriting risk in solvency capital requirement estimation" Bermúdez, L.; Ferri, A. and Guillén, M.

WP 2011/12 "Assessing agglomeration economies in a spatial framework with endogenous regressors" Artis, M.J.; Miguélez, E. and Moreno, R.

WP 2011/11 "Privatization, cooperation and costs of solid waste services in small towns" Bel, G; Fageda, X. and Mur, M.

WP 2011/10 "Privatization and PPPS in transportation infrastructure: Network effects of increasing user fees" Albalate, D. and Bel, G.

WP 2011/09 "Debating as a classroom tool for adapting learning outcomes to the European higher education area" Jiménez, J.L.; Perdiguero, J. and Suárez, A.

WP 2011/08 "Influence of the claimant's behavioural features on motor compensation outcomes" Ayuso, M; Bermúdez L. and Santolino, M.

WP 2011/07 "Geography of talent and regional differences in Spain" Karahasan, B.C. and Kerimoglu E.

WP 2011/06 "How Important to a City Are Tourists and Daytrippers? The Economic Impact of Tourism on The City of Barcelona" Murillo, J; Vayá, E; Romaní, J. and Suriñach, J.

WP 2011/05 "Singling out individual inventors from patent data" Miguélez,E. and Gómez-Miguélez, I.

WP 2011/04 "¿La sobreeducación de los padres afecta al rendimiento académico de sus hijos?" Nieto, S; Ramos, R.

WP 2011/03 "The Transatlantic Productivity Gap: Is R&D the Main Culprit?" Ortega-Argilés, R.; Piva, M.; and Vivarelli, M.

WP 2011/02 "The Spatial Distribution of Human Capital: Can It Really Be Explained by Regional Differences in Market Access?" Karahasan, B.C. and López-Bazo, E

WP 2011/01 "I If you want me to stay, pay" . Claeys, P and Martire, F

WP 2010/16 "Infrastructure and nation building: The regulation and financing of network transportation infrastructures in Spain (1720-2010)"Bel,G

WP 2010/15 “Fiscal policy and economic stability: does PIGS stand for Procyclicality In Government Spending?” Maravalle, A ; Claeys, P.

WP 2010/14 “Economic and social convergence in Colombia” Royuela, V; Adolfo García, G.

WP 2010/13 “Symmetric or asymmetric gasoline prices? A meta-analysis approach” Perdiguero, J.

WP 2010/12 “Ownership, Incentives and Hospitals” Fageda,X and Fiz, E.

WP 2010/11 “Prediction of the economic cost of individual long-term care in the Spanish population” Bolancé, C; Alemany, R ; and Guillén M

WP 2010/10 “On the Dynamics of Exports and FDI: The Spanish Internationalization Process” Martínez-Martín J.

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 JL. 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 fligths 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" Albalate, 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" Albalate, D.; Bel, G.

WP 2008/01 "Shaping urban traffic patterns through congestion charging: What factors drive success or failure?" Albalate, 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" Albalate, 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" Albalate, 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" Albalate, 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/ • **CONTACT:** irea@ub.edu