Preventing competition because of "solidarity": Rhetoric and reality of airport investments in Spain

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Abstract:

Spain is the only large European country in which airport management is strictly centralized and publicly owned. This peculiar institutional setting prevents competition among Spanish airports, and policy makers and bureaucrats in charge of the system regularly justify it on grounds of inter-territorial solidarity. This paper tests whether allocation of investments in airports is effectively based on redistributive purposes, as claimed and looks at other factors to explain such allocation. Our empirical analysis suggests that neither a progressive redistribution target nor the scale economies criterion explain allocation decisions. On the contrary, we find that political factors have significant influence on the allocation decisions made by the government.

Key words: Public Enterprise, Legal monopolies, Air Transportation, Models with Panel Data
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Preventing competition because of 'solidarity': Rhetoric and reality of airport investments in Spain[Ψ]

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1. Introduction

Traditionally, airports have been seen as monopolistic infrastructures that hold tight control over flights with origins and destinations in their hinterlands. Consequently, neither economic analysis nor infrastructure policy used to consider competition one of the relevant features of airports. Several changes have introduced competition among airports and weakened the conventional view.

Two changes are particularly important. First, globalization has brought a sharp increase in the demand for long distance flights, which are offered by few airports through an extensive use of connecting traffic. The ability of airports and airlines to channel this flow is a central factor in determining the geographical scope of the route network offered from a particular airport (Bel and Fageda, 2005). And secondly, the increasing use of air transportation for leisure purposes have also produced rivalry between airports to attract point-to-point services of low cost carriers, which can expand traffic at a very high rate.

At the same time, there has been a clear trend towards corporatization of airports since the late eighties. Like privatization, corporatization has been seen as a way to reform airports whose ownership and management have remained public. Within this context, competition has been seen as a powerful tool to stimulate efficiency. In this way, methods such as competitive tendering of commercial services and marketing policies to attract the most valuable airlines have been given a growing role in airport management.

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Competition among airports at the international level is now a standard feature in all developed countries. Moreover, within each country airports compete to grow and win an increasing part of the business. Spain, alone among developed countries with more than one large airport, defies this pattern. Despite having a large population and several large airports, Spain has organized air travel as a totally integrated network: airports are exclusively owned and managed by the central government. Thus, competition among airports does not exist. The market has no role in issues such as pricing or resource allocation. The most relevant features of airport management are decided on bureaucratic basis and approved within the Spanish Government budgetary process.

Why is the Spanish system such an exception? No matter the political affiliation of the ruling party, policy makers and bureaucrats have regularly pointed to inter-territorial solidarity as the main rationale for their choice. The story goes as follows: less developed areas in Spain must have airports for regional development. However, such areas cannot sustain airports costs. Therefore, centralized management and allocation of funds allows the surplus from the largest and most profitable airports to pay for the deficits incurred by the smallest and least profitable airports. In short, rich airports pay for keeping poor airports working.

One could ask whether alternative systems of grants and subsidies could work better to make up the deficits of the non-profitable airports. In every other country, no matter its system of management and funding, these kinds of tools are used so that unprofitable airports can operate. The goal of this paper is not to belabor a question that every other developed nation has answered to its satisfaction.

On the contrary, we will empirically contrast two explanations for the persistence of the unusual model in Spain. On the one hand, there does exist the public interest explanation. From the point of view of the 'general interest', market mechanisms would generate a less than socially desirable level of airport operating facilities, and public intervention is needed to correct this 'market failure'. This is consistent with the standard explanation by policy-makers and bureaucrats we have summarized above.

On the other hand, we explore a public choice approach. Within that framework, the agents of governments are rational utility maximizers: politicians trying to maximize success in elections, while officials seek to maximize their own budget. As long as each group pursues its own-interests they will tend to resist institutional arrangements that might constrain their behavior and enhance opportunities for efficient performance. Within our specific framework, introducing market mechanisms in the provision of public services would limit increases in the discretionary budgets in the control of officials, as stated in Niskanen's (1971) seminal work.

As far as social welfare maximization is concerned, it could be justified constraining market mechanisms with the aim of progressive redistribution. This brings us to a traditional conundrum of public policy; the trade-off between efficiency and equity. However, if we accept that the behavior of public agents is aimed to their own interest, some policies designed to prevent competition might actually be based on selfish motivations, while justified on the grounds of progressive redistribution. In such a case, those policies would pursue neither efficiency nor equity.

As noted, airport management in Spain is embodied with specific features that allow us to test a hypothesis about the behavior of government agents. Since one of the main consequences of integrated airport management is that decisions about investment are centralized in the national government, we want to disentangle the following questions: Is the allocation of investments in Spanish airports effectively based on redistributive purposes? Which factors explain actual allocations? Is airport policy in Spain consistent with publicly announced objectives?

To advance our research we organize the paper as follows. First, we briefly review the main features of the Spanish system of airport management and finance and analyze it within the framework of international models. Next, we systematize the empirical background on determinants of regional allocation of infrastructure investment. Then we proceed with our empirical analysis. Initially, we focus on economic factors, and subsequently, political factors. Finally, we summarize our main results and draw out their main implications.

2. Airport management in Spain: The exception to the rule

High quality airport facilities foster intercity agglomeration economies and influence the location decision of firms, especially those in knowledge intensive sectors (Brueckner, 2003). Hence, the link between the quality of airport facilities and urban economic growth could provide a rationale for guaranteeing airport facilities in less developed regions. In a similar way, scale economies could provide a motivation to support small airports. Indeed, high fixed costs associated with airport operations may help explaining the existence of a positive relationship (although no necessarily a linear one) between air traffic and airport profitability –and so the amount of self-finance available for investments (European Commission, 2002). Thus, airports that generate a low volume of traffic may not be profitable

Managing airports as an integrated national network arises as a, though by no means the only, possible strategy of regional policy. In fact, as shown in table 1, European airports that belong to large national airport networks are usually managed on an autonomous basis. This is the case for Germany, France, Italy and the United Kingdom (and other large Anglo-Saxon countries such as the USA, Canada and Australia). Autonomy is also the case for the Netherlands, Ireland, Denmark, Belgium and Austria. Indeed, in all these countries grants and subsidies to small airports and/or airports located in poor regions are often available from more than one government level.

Where a national network is run in a centralized way, it has just one large airport. Such a situation exists in Sweden, Portugal, Finland and most of the new accession countries. Spanish is unique, because it is the only European country with several large cities and airports in which all airports are managed by a single national agency.

Insert table 1 about here

Indeed, the Spanish Airports and Air Navigation Agency (AENA) owns and manages more than 40 commercial airports in Spain. AENA is a public entity belonging to the Ministry in charge of transportation issues, and it enjoys an autonomous legal and economic status. Investment decisions are centralized and are financed through the surplus of the entire airport system. In this way, there is a system of non-transparent, cross-subsidization across Spanish airports. Importantly,

politicians have justified centralized management on the grounds that it supports territorial cohesion. The possibility of competition between airports or the benefits of a differentiated commercial policy is not recognized.

Where airports are managed on market criteria, the amount of investment in each airport should be strongly associated with the revenues obtained from local operations. Such revenues are fundamentally determined by the amount of traffic at the airport. On the contrary, when a territorial cohesion criterion is in place less developed regions should receive more resources for investment than their share of traffic would justify. Furthermore, scale economies should justify an investment allocation outcome in which large (profitable) airports cross-subsidize small (unprofitable) airports.

Some facts about the investment behavior of AENA cast doubts about political claims concerning the integrated airport network as a guarantee of the territorial cohesion criterion.

The first year of activity of AENA was 1992 (in the previous period, the Ministry in charge of transportation issues was the unique responsible of airport management). Table 2 shows the relationship between investment and passenger traffic for the Spanish airport network in period 1992-2004, and the corresponding relative position of each region in terms of economic development. We present the results aggregated on a regional basis because the regional level is the one for which most of the variables needed for further analysis are available (individual information for each airport is available upon request). Column (3) shows the relationship for every Spanish region between share of total investment and share of total passengers. Where the ratio is larger than one, relative investment in the region is larger than relative traffic. A ratio smaller than one, of course, indicates that relative investment in the region is lower than relative traffic.

Insert table 2 about here

In the period 1992-2004, the richest Spanish region with the largest airport, Madrid, accumulated about 60 per cent of total investment but only 22 per cent of total traffic. The ratio (investment share)/(traffic share) is certainly high: 2.64. Overall, airports in the less developed Spanish regions (Extremadura, Andalusia, Galicia, Murcia and Asturias) received a share of investment lower than their share of air traffic generated. Thus, the allocation of airport investments

in Spain does not seem to follow the territorial cohesion criterion regularly used by politicians to justify centralized management. Furthermore, several lightly populated regions with low levels of air traffic have an investment/traffic ratio smaller than one. In short, we must go look further to determine whether airport investments decisions have been effectively aimed to other objectives.

3. Determinants of regional allocation of infrastructure investment: Empirical background

Since Aschauer's (1989) seminal work, a great number of macro-econometric studies have analyzed the impact of public capital stock on private sector productivity [e.g. Munell (1990), Duffy-Deno and Ebberts (1991), Garcia-Milà and McGuire (1992), and Holtz-Eakin (1994)]. In general terms, such impact is considered to be relevant although there is no agreement on the precise elasticities estimated. The empirical literature on the determinants of the regional allocation of public investments is much scarcer. Attention has been mainly focused on the traditional trade-off between equity and efficiency in public policies. Yamano and Ohkawara (2000) analyze that trade-off for 47 prefectures in Japan. They estimate a production function in order to obtain the marginal productivity of each production factor (labor, private capital and public capital) in the period 1970-1994. Their results suggest that the regional allocation policies in Japan over that period have involved an inefficient outcome. The relative increase of public investment in less developed prefectures has lead to public capital shortages in developed prefectures. Simulation of different alternative policies shows that the overall welfare loss of the actual policy with regard to the efficient one has been considerable.

In a similar fashion, de la Fuente (2005) develops a model to compare the welfare levels involved with different policies for the allocation of public investments across regions. His main goal is to examine whether it is economically sound to use public investment in infrastructure for redistributive purposes when governments have other instruments available, such as taxes and social expenditures. In a second-best scenario, where ex-post redistribution is limited, de la Fuente shows that it is justified to undertake a higher level of investments in less developed regions than required by a strict efficiency criterion. The reasoning underlying this result is that optimality conditions

require equality across regions of the marginal contribution of public investment to welfare, not to output, which depends critically on disparities in the level of income. The model is tested using Spanish data on the infrastructure stock in 1995. Results indicate that the regional allocation of infrastructure investments in Spain has been too redistributive.

Other studies add to this literature by analyzing not just the efficiency-equity issue but also the role of political factors in explaining the regional allocation of public investment in infrastructure.[1] Kemmerling and Stephan (2002) analyze empirically the politico-economic determinants of local infrastructure investment decisions. Indeed, they estimate simultaneously a system of three equations for 87 large German cities in the years 1980, 1986 and 1988. The equation-system is composed of a production function, a local government investment function and a central government investment grant allocation function. Estimates show that the equity objective (measured by the influence of income on investments) matters much more than the efficiency one (measured by the influence of marginal productivity of public capital on investments). In addition, political support from citizens for the incumbent party in the central government is crucial in explaining the distribution of investment grants across cities, while the electoral productivity of each city (in terms of the number of votes that can be obtained from citizens indifferent between the two parties) does not seem to influence central government investment choices.

Closely related to the work of Kemmerling and Stephan (2002) is the study of Castells and Solé (2005). They analyze the possibility that political considerations promote differences in the attractiveness of regions to the central government in such a way that a deviation from the efficiency-equity rule can arise. The starting point of this study is a social welfare function, where the traditional trade-off of infrastructure stock allocation across regions is measured through a linear combination of population and income. Moreover, Castells and Solé include, as explanatory determinants of public investment in infrastructure, variables for the electoral productivity of expenditures across regions (in terms of the marginal electoral gains that can be obtained) and the political support of the corresponding region for the incumbent party in the central government. The model is empirically implemented using Spanish data of public investment in transportation

infrastructure in the period 1987-1996. Results are consistent with the expectations that both equity-efficiency considerations (in an apparently balanced way) and political factors influence the allocation choices of governments.

Certainly, the efficiency-equity trade-off relationship in infrastructure policies is a basic and relevant story. But it is not the sole story to be found in the regional allocation of public investments in infrastructure. Indeed, in some circumstances such policies may pursue neither efficiency nor equity. Budget-maximizing officials and vote-maximizing politicians can guide such allocation towards other objectives.

4. Empirical analysis: Determinants of the regional allocation of airport investments

In order to obtain an equation that explains the allocation of airport investments across regions, we consider the case in which the central government maximizes a social welfare function. To this regard, we follow the approach of Bernham and Craig (1987). The welfare function of the central government is defined over infrastructure outcomes in region *i (i =1,.....I)* from a given country at period *t (t = 1,….T)* and can be expressed through the following form:

$$W_t = \sum_i O_{it}\,, \tag{1}$$

where O_{it} is a vector of infrastructure outcomes. This expression implies that the central government maximizes infrastructure outcomes. The first derivative with respect to O_{it} is assumed to be positive ($\partial W_t / \partial O_{it} > 0$).

The central government's maximization problem is subject to two constraints. First, there is a resource constraint. This implies that total investments can not be higher than the total resources available for that purpose:

$$\sum_i INV_{it} \leq R_t\,, \tag{2}$$

where R_t are total resources available at period *t*, which are assumed to be fixed and constant across regions, and INV_{it} are airport investments across regions.

The second constraint specifies that infrastructure outcomes across regions depend on investments made on them weighted by a vector of regional characteristics, Z_i, at period t such that unequal concern of the central government about different regions can arise:

$$O_{it} = C_{it}(Z_i)h(INV_{it}),\ h'>0,\ h''<0 \quad (3)$$

First order conditions of the central government's maximization problem yield

$$h'(INV_{it})\ C_{it}(Z_i) = m,\ for\ all\ i \quad (4)$$

Here, m is the multiplier associated to the resource constraint, which necessarily binds. This means that if $C_{it}(Z_i)>C_{jt}(Z_j)$, then $h'(INV_{it})<h'(INV_{jt})$, and by concavity $INV_{it}>INV_{jt}$. This provides us with a general specification of the investment equation that is going to be tested in our empirical analysis:

$$INV_{it}/R_t = g[C_{it}(Z_i)] \quad (5)$$

In this equation, g is an increasing function. Our empirical model will use a linear approach, which could be justified as a first order Taylor approximation. In addition to this, it is needed to consider the elements of the vector of regional characteristics.

Gross Domestic Product per capita (*GDP*) should be included in this vector. Indeed, where territorial cohesion criteria influence the airport investment decisions of the central government, regions with low product per capita should receive proportionally more investment than regions with high product per capita. Air traffic (*PAX*) should also play a relevant role as long as airport investment across regions should generally be linked to economic needs, which, in turn, are strongly associated with such air traffic demand generated. In addition to this, the central government could try to maximize the surpluses of domestic rather than international passengers, since the latter are not incorporated in the social welfare function. Thus, the proportion of national traffic with respect to the total traffic (*NAC*) should be included in the vector of regional characteristics. Finally, the political clout of each region, due to the popularity of the central government's incumbent party in the corresponding region (*INCUM*) or due to the correspondence between the incumbent party in the central and regional governments (*CORRE*), may play a central role in the allocation choice of public resources of the central government as we will see below. Hence equation (5) can be expressed as follows:

$$INV_{it}/R_t = g[C_{it}(Z_i = GDP, PAX, NAC, INCUM, CORRE)] \quad (6)$$

4.1. Economic factors

It is of central interest in our empirical analysis to examine any type of cross-subsidization that can take place between the regional networks of the Spanish airport system. Hence equation (6) can be expressed for the empirical analysis in the following way:

$$\underline{INV}_{it} = \mu + \beta_1 GDP_{it} + \beta_2 \underline{PAX}_{it} + \beta_3 NAC_{it} + \varepsilon_{it}, \quad (7)$$

where $\underline{INV}_{it}$ refers to the percentage of investment made in airports from region *i* with respect to the total investment in the national airport network. GDP_{it} refers to Gross Domestic Product per capita[2], $\underline{PAX}_{it}$ refers to the percentage of annual passengers carried in the airports from region *i* with respect to the total annual traffic in the national airport network and NAC_{it} refers to the percentage of national passengers carried in the airports from region *i* with respect to the total annual traffic in the regional airport network. Fixed regional effects are also taken into account to consider unknown time-invariant effects that could not be captured by the vector Z_i of regional characteristics. The error term (ε_{it}) is assumed to be independent and identically distributed over regions and time, with mean 0 and variance σ^2_{ε}. However, we test (and correct if pertinent) these assumptions in the empirical analysis.

In order to estimate this model, we have constructed a panel data for the period 1992-2004 for the 15 Spanish regions with airports. This period captures the first year of activity of the current airport management system and it is long enough to smooth out distortions from single projects in a particular period. To this regard, as figure 1 shows, the huge amount of investments made in the last six years in comparison to the previous years allows claiming that initial conditions should not play a relevant role.

Insert figure 1 about here

Data on the territorial allocation of investment have been obtained from the Ministry of Transport; data for Gross Domestic Product per capita have been obtained from the Spanish Statistics Institute. Finally, data of airport traffic have been obtained from AENA. Table A-1 in Appendix shows the description and summary statistics of the variables used for estimating our investment equation.

Given that airports in Spain are managed on an integrated basis, the empirical analysis can be simplified in one way. The variable for the annual traffic at airports can be incorporated in the model as an exogenous variable because revenues from operations in the current year do not necessarily influence the level of investments that will be undertaken in the current and following years. This is so because investments in a specific airport do not necessarily depend on the revenues obtained in the same airport.

Table 3 shows the results of our estimates of the investment equation, while table 4 indicates the elasticities than can be inferred from them. In column 1, it can be seen the results of the estimates when using the Feasible Generalized Least Squares Estimator (FGLS). The tests about the validity of the error term assumptions indicate the existence of heteroskedasticity and cross-sectional correlation. A problem of serial autocorrelation does not seem to take place. In column 2, it can be seen the results of the estimates when using the Ordinary Least Squares Estimator with Panel Corrected Standard Errors (PCSE). In Table A-2 in Appendix, it can be seen the results of the estimates when using the latter estimator and regional fixed effects are included.[3]

Insert table 3 about here

Insert table 4 about here

All variables are significant and the overall explanatory power of the equation estimated is reasonably high, regardless of the econometric technique used. Our results show clear evidence that progressive redistribution is not relevant to the airport investment choice of the central government. Indeed, the percentage of total investments in a region seems to increase when product per capita of that region also increases. In addition to this, we do not find evidence that airport investments are motivated by a scale economies argument (in order to support regions with the smallest airports) because the percentage of total investments increases more than proportionally to the output generated for each regional airport network. Indeed, a 10 per cent increase in the share of the total traffic of the airport network implies about a 13 per cent increase in the share of the total investments made in the airport network. Holding the other factors constant, the percentage of total investments is higher in regional airport networks with a higher

proportion of national traffic. Finally, it is worth mentioning that results do not change substantially when regional fixed effects are included in the equation to be estimated.

Table A-3 in Appendix provides additional evidence of the results obtained in our estimates of the investment equation. In this way, table A-3 presents airport financial data for the last two years in which this information is available, 1997 and 1998.[4] From the data, it can be observed that cross-subsidization across Spanish airports does not take place from high-profitability to low-profitability regional networks, as expected if scale economies were controlled. Indeed, the most profitable airport has the highest traffic-investment ratio, while many of the non-profitable airports have traffic-investment rates lower than one. In fact, data from this table, along with the results of the investment equation estimates, allows us to infer a type of redistribution not mentioned by Spanish airport authorities. All profitable regional networks with low investment-traffic ratios (Balears Islands, Canary Islands, Andalusia and Valencian C.) have a common feature. They all have, at least, one large airport focused on tourist traffic. This fact seems to confirm that cross-subsidization from international to domestic passengers is taken place in the Spanish airport system.

4.2. Political factors

Since neither progressive redistribution nor scale economies seem to be the real objective of the centralization of the Spanish airport network, further analysis is needed to understand the objectives of Spanish airport authorities. Several studies [Cadot et al. (1999), Kemmerling and Stephan (2002), Castells and Solé (2005)] show that political motivations based on the self-interest of the public decision-makers can play a crucial role in the allocation of the stock of infrastructure across regions.

Where election systems are based on proportional rules, as is the case in Spain, politicians are motivated to maximize the number of votes their party obtains in highly populated electoral districts.[5] Following Grossman (1994), the incumbent party in the central government may allocate public resources in order to buy the support of voters and political agents across regions. Ceteris paribus, more resources will be invested in those regions that have the most - and most valuable - political capital to offer. Such political capital will be greater where the support for the incumbent party in the central government is also greater, and it will be even more valuable where a

correspondence exists between the incumbent party in the central government and the incumbent party in the regional government.

In order to capture these two political factors, we add to equation (7) the following political variables:

INCUM: Percentage of votes in the last general elections for the incumbent party in the central government in the corresponding regions of the sample

CORRE: Dummy variable that takes value 1 when there is a correspondence between the incumbent party in the central government and the incumbent party in the regional government.

Data for the political variables have been obtained from the web site of the Ministry of Domestic Affairs (Ministerio del Interior). It is expected a positive sign in the coefficient of these variables.

The two political variables are estimated separately in order to avoid multicollineality. Tables 5 and 6 show the results of our estimates of equation (7) with the addition of the political variables. In colums 1 and 2, we show the results when the political variable added is *INCUM*, while colum 3 and 4 show the results when the political variable added is CORRE. In Table A-2 in Appendix, it can be seen the results of the estimates when regional fixed effects are included. Regarding the econometric techniques used, we follow the same procedure to section 4.1.

Insert table 5 about here

Insert table 6 about here

Results for the economic variables do not change substantially in relation to those obtained in the specification without political variables. The variable capturing the influence of partisan support, *INCUM*, is statistically and economically significant. Thus, we find some evidence that partisan support could play an important role in the investment allocation choices of the central government. Indeed, the incumbent party in the central government seems to compensate regions for partisan support in order to assure votes.

The coefficient of the dummy variable capturing the correspondence between the incumbent party in the central government and the incumbent party in the regional government, *CORRE*, is

also economically and statistically significant. Thus, political affiliation seems to favor better coordination between decision-makers at different territorial levels of government.

The significance of the political variables lowers when regional fixed effects are included, particularly for the variable that captures the influence of partisan support. The fact that votes for the incumbent party just varies after each election explains that the influence of political variables is partially captured by time-invariant fixed regional effects.

Alternatively, it could be argued that the central government will invest more in the regions where the closeness in elections between the two main parties is higher. Under this hypothesis, the incumbent party tries to obtain higher rates of returns –in terms of votes- from its investments. An alternative specification that incorporates a variable for the difference in the percentage of votes between the two main parties in the general elections across regions shows that such effect is, in our context, not relevant.

Overall, our results suggest that politics mater in the allocation of airport investments across regions. Divergence between the policy announced and the policy effectively implemented could be explained, at least to some extent, by a desire to maximize the contribution of that policy to the re-election chances of the incumbent party.

5.Concluding remarks

The Spanish model of airport management and finance is singular among comparable developed countries. Spain is unique among countries with several large cities and important airports in that its system is strictly centralized and publicly owned. This peculiar institutional setting prevents competition among Spanish airports, and policy makers and bureaucrats in charge of the system rhetorically justify it on grounds of inter-territorial solidarity. Within this context, we have devoted this research to answering several questions: Is the allocation of investments in airports in Spain effectively motivated by redistributive purposes? Which factors have actually explained allocations? Is airport policy in Spain consistent with the objectives publicly announced?

Through our empirical analysis of the determinants of airport investments in Spain across regions, we find that the choices of the central government have been motivated by neither a

progressive redistribution criterion nor the demands of supporting smaller airports. Indeed, ceteris paribus high-income regions receive relatively more public resources than low-income regions. In addition to this, we find evidence that investment increases more than proportionally to the output generated by the regional airport networks, while our data shows that cross-subsidization from high-profitability airports to low-profitability regional networks does not seem to take place. On the contrary, we find that cross-subsidization arises from international to domestic passengers.

Given that economic factors do not explain the allocation of investments across regions, we pay attention to the influence of political motivations. We find some evidence that the incumbent party in the central government could try to maximize support from regional citizens. Indeed, more public resources seem to be invested in those regions where the support for the party in central government is greater. In addition to this, more public resources are invested in those regions where the incumbent party in the central government and the incumbent party in the regional government are the same.

When talking about the Spanish airports, rich guys do not pay to keep poor guys' airports working. According to our results, solidarity is merely a rhetorical excuse to prevent competition among Spanish airports. In reality, competition would constrain discretionary power of policy makers and bureaucrats over management and budgets. We are aware that the public choice paradigm for explaining policymaking is too simple and naïve, and policy processes are much more complex than can be explained by the self-interested policy maker alone. Nevertheless, when analyzing why the system of airport management and finance in Spain is different from any other comparable country, we do not find much more than rhetoric about solidarity to prevent competition in order to maximize power and budget.

Notes

1. This literature is closely related to the one that analyses the political motivations with regard to grant allocations between different government levels. Empirical applications of this issue can be found, for example, in Worthington and Dollery (1998), Case (2001), Costa et al. (2003) and Johansson (2003).
2. There is a possible simultaneity bias for the GDP variable as long as airport investment can be a determinant of economic growth. However, our units of measurement are flows rather than stocks so that annual investments in airports have a very low weight on the total stock of infrastructure, which must be one of the main determinants of economic growth. In addition, it is worth taking into account that airport effects on economic growth are particularly strong at a microeconomic level (greater market access, travel time reductions, attraction of high-tech firms and so on).
3. Note that results of the estimates of equation (7) with the regional fixed effects should be equivalent to those obtained using the within estimator when the time period considered is large. In this sense, it is worth mentioning that the Hausman specification test and the Breush and Pagan Lagrange Multiplier test reject the suitability of the random effects estimator.
4. Since the late nineties AENA and the Spanish Government have been extremely reluctant to provide financial information on individual airports. Indeed, one of the consequences of an integrated management is that it makes possible for governments to be less transparent and, thus, less subject to democratic control.
5. Where election systems are based on majority rule, as it happens in the USA and UK, for instance, politicians try to maximize the probability of winning seats in a unipersonal electoral district.

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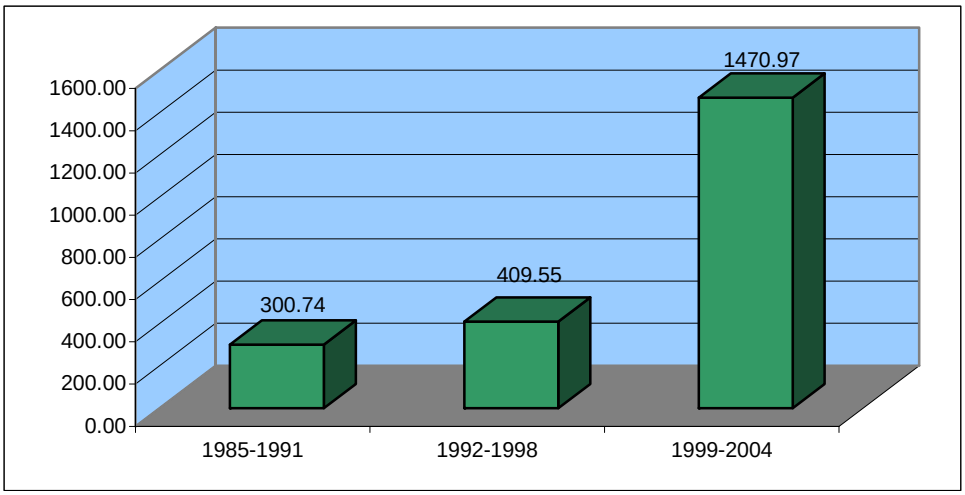
Figure 1. Total investments in the Spanish airport network, 1985-2004. Mean annual values over the period (milions of euros 2004)



Source: Own elaboration on information obtained from Ministerio de Fomento. Data in the period 1985-1993 is available at the web page of IVIE-FBBVA, while data in the period 1994-2004 is available at the web page of Ministerio de Fomento.

Table 1. Major airports and air traffic of passengers in EU-25 countries.

Country	Number of Top 50 EU airports. 2002	Total passengers (10^3). 2003	National passengers (10^3).2003	International passengers (10^3).2003	Airport management	Airport Ownership
United Kingdom	8	177,946	24,416	153,530	Decentralized	private, regional gov.
Germany	8	121,136	21,193	99,943	Decentralized	private, regional gov. and national gov.
Spain	9	120,248	31,324	88,925	**Centralized**	national government
France	6	96,296	26,712	69,584	Decentralized	national gov. (Paris), chambers of commerce (rest)
Italy	6	73,912	24,477	49,436	Decentralized	private, regional gov.
Netherlands	1	41,168	154	41,014	Decentralized	private, national gov.
Greece	1	28,237	5,030	23,207	Partially Decentralized	private (Athens), national gov. (rest)
Sweden	1	20,441	6,875	13,567	**Centralized**	national government
Ireland	1	20,010	812	19,197	Decentralized	national government
Denmark	1	19,575	1,606	17,969	Decentralized	private, national gov.
Portugal	2	17,739	2,853	14,886	**Centralized**	national government
Austria	1	15,799	548	15,251	Decentralized	private, national gov.
Belgium	1	15,087	2	15,085	Decentralized	private, regional gov.
Finland	1	10,516	2,701	7,816	**Centralized**	national government
Czech Republic	1	7,761	161	7,600	**Centralized**	national government
Poland	-	7,067	na	Na	**Centralized**	national government
Cyprus	1	6,077	1	6,076	**Centralized**	national government
Hungary	1	5,010	0	5,010	**Centralized**	national government
Malta	-	2,648	44	2,604	**Centralized**	national government
Luxembourg	-	1,449	0	1,449	**Centralized**	national government
Slovenia	-	920	na	Na	Decentralized	private, national gov.
Lithuania	-	722	1	721	**Centralized**	national government
Latvia	-	712	0	712	**Centralized**	national government
Estonia	-	710	15	695	**Centralized**	national government
Slovakia	-	626	32	594	**Centralized**	national government

Source: Eurostat

Table 2. Spanish airport and regional data, 1992-2004. Mean annual values over the period

Region*	(1) Share of total investment (Spain = 817,114 10^3 constant euros)	(2) Share of total traffic (Spain = 120,291,150 passengers)	(3) Ratio Investment-traffic (1/2)	(4) Share of total population (Spain = 38,617,092 inhabitants)	(5) Share of total GDP (Spain = 557,063,815 10^3 constant euros)	(6) Relative wealth index (5/4)
Madrid (1)	57.81%	22.36%	**2.60**	13.61%	17.72%	**1.30**
Catalonia (3)	14.60%	14.78%	0.99	16.31%	19.54%	**1.20**
Canary islands (8)	9.06%	22.31%	0.41	4.38%	4.12%	0.94
Balears islands (3)	6.62%	18.98%	0.35	2.14%	2.56%	**1.20**
Andalusia (6)	3.79%	9.81%	0.39	18.97%	14.10%	0.74
Basque C. (3)	2.44%	2.07%	**1.18**	5.46%	6.61%	**1.21**
Valencian C. (2)	2.15%	6.08%	0.35	10.69%	10.12%	0.95
Galicia (3)	1.33%	1.90%	0.70	7.13%	5.69%	0.80
Asturias (1)	0.54%	0.55%	0.98	2.82%	2.42%	0.86
Castille & Leon (3)	0.38%	0.21%	**1.82**	6.51%	6.05%	0.93
Aragon (1)	0.36%	0.20%	**1.82**	3.11%	3.34%	**1.07**
Cantabria (1)	0.20%	0.19%	**1.04**	1.39%	1.33%	0.95
Navarra (1)	0.15%	0.22%	0.69	1.41%	1.76%	**1.25**
Murcia (1)	0.15%	0.19%	0.80	2.51%	2.97%	0.85
Extremadura (1)	0.01%	0.03%	0.54	2.79%	1.84%	0.66

* In parenthesis, we indicate the number of airports of the region that provide commercial traffic.
Source: Own elaboration on information obtained from the web page of the Ministerio de Fomento (Spanish ministry of transports), the Spanish statistics Institut (INE) and the web page of IVIE-FBBVA.

Table 3. Investment equation estimates. N = 195

Dependent variable: INV		
	FGLS	**PCSE[θ]**
GDP	3.96e-06 (1.56e-06)**	3.96e-06 (8.58e-07)***
PAX	1.35 (0.10)***	1.35 (0.06)***
NAC	0.13 (0.03)***	0.13 (0.01)***
Intercept	-0.16 (0.03)***	-0.16 (0.02)***
Wald1	257.77***	1,373.81***
R^2	-	0.57
BP	453.986***	-
Wald2	1.15e+05***	-
D_p	1.18	-

[θ] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).
[1] Standard errors in parenthesis
[2] Significance at 1% (***), 5% (**), 10% (*)
[3] Wald1: Wald Test (χ^2) of joint significance; BP_ Breusch-Pagan LM test of cross-sectional correlation; Wald2: Wald test for groupwise heteroskedasticity; D_p: Bhargava et al. test for serial autocorrelation (modified Durbin-Watson test)

Table 4. Estimated elasticities (evaluated at sample means)

Dependent variable: INV		
	FGLS	**PCSE[θ]**
GDP	0.80 (0.32)**	0.80 (0.19)**
PAX	1.35 (0.16)***	1.35 (0.09)***
NAC	1.31 (0.33)***	1.31 (0.20)***

Table 5. Investment equation estimates. N = 195

Dependent variable: INV				
	FGLS (1)	**PCSE[θ] (2)**	**FGLS (3)**	**PCSE[θ] (4)**
GDP	3.65e-06 (1.55e-06)**	3.65e-06 (9.44e-07)***	3.66e-06 (1.47e-06)**	3.66e-06 (7.54e-07)**
PAX	1.40 (0.10)***	1.40 (0.08)***	1.44 (0.09)***	1.44 (0.08)***
NAC	0.14 (0.031)***	0.14 (0.01)***	0.15 (0.02)***	0.15 (0.01)***
INCUM	0.13 (0.06)**	0.13 (0.05)**	-	-
CORRE	-	-	0.06 (0.01)***	0.06 (0.01)***
Intercept	-0.225 (0.04)***	-0.225 (0.04)***	-0.21 (0.03)***	-0.21 (0.03)***
Wald1	267.88***	1,231.96***	315.70***	1,373.81***
R^2	-	0.58	-	0.62
BP	431.464***	-	410.422***	-
Wald2	64,081.13***	-	7,097.68***	-
D_p	1.47	-	1.45	-

[θ] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).

[1] Standard errors in parenthesis

[2] Significance at 1% (***), 5% (**), 10% (*)

[3] Wald1: Wald Test (χ^2) of joint significance; BP_ Breusch-Pagan LM test of cross-sectional correlation; Wald2: Wald test for groupwise heteroskedasticity; D_p: Bhargava et al. test for serial autocorrelation (modified Durbin-Watson test)

Table 6. Estimated elasticities (evaluated at sample means)

Dependent variable: INV				
	FGLS (1)	**PCSE[θ] (2)**	**FGLS (3)**	**PCSE[θ] (4)**
GDP	0.74 (0.32)***	0.74 (0.21)***	0.74 (0.30)***	0.74 (0.15)***
PAX	1.40 (0.16)***	1.40 (0.13)***	1.44 (0.16)***	1.44 (0.12)***
NAC	1.44 (0.34)***	1.44 (0.23)***	1.51 (0.32)***	1.51 (0.19)***
INCUM	0.82 (0.40)**	0.82 (0.34)**	-	-
CORRE	-	-	0.46 (0.10)***	0.46 (0.13)***

Appendix

Table A-1. Description of the variables and summary statistics (Number of observations: 195)

Variable	Description	Mean	Standard deviation	Minimum value	Maximum value
INV	Total investment in airports of the region (10^3 euros)	54,181.31	184,457.3	10.22	1,552,165
$\underline{\text{INV}}$	The share of investment of each region over total investment	0.07	0.130	0	0.707
GDP	Gross Domestic Product per capita in each region (euros)	13,368	4,054	6,408	23,889
PAX	Total output (number of annual passengers carried in airports of the region)	8,001,865	1.05e+07	15,547	3.81e+07
$\underline{\text{PAX}}$	The share of output of each region over total traffic	0.07	0.08	0	0.26
NAC	Percentage of national passengers over total traffic in airports of each region	0.66	0.27	0.08	1
INCUM	Percentage of votes in the general elections for the incumbent party in each region	0.41	0.10	0.18	0.58
CORRE	Correspondence between incumbent party in the central and regional government in each region	0.52	0.50	0	1

Table A-2. Investment equation estimates. N = 195

Dependent variable: INV			
	PCSE[0] with regional effects (1)	**PCSE[0] with regional effects (2)**	**PCSE[0] with regional effects (3)**
GDP	1.63e-06 (6.14e-07)***	1.01e-06 (5.72e-07)*	1.52e-06 (6.02e-07)**
PAX	1.26 (0.24)***	1.29 (0.26)***	1.27 (0.24)***
NAC	0.10 (0.031)***	0.10 (0.032)***	0.10 (0.03)***
INCUM	-	0.05 (0.07)	-
CORRE	-	-	0.01 (0.006)*
Madrid	0.22 (0.07)***	0.22 (0.07)***	0.21 (0.07)***
Catalonia	-0.03 (0.03)	-0.02 (0.03)	-0.02 (0.03)
Balears islands	-0.06 (0.02)***	-0.05 (0.02)***	-0.06 (0.02)***
Valencian C.	0.01 (0.01)	0.01 (0.01)	0.005 (0.01)
Canary islands	-0.07 (0.04)*	-0.07 (0.04)*	-0.07 (0.04)*
Andalusia	-0.006 (0.01)	-0.005 (0.01)	-0.007 (0.01)
Asturias	0.007 (0.003)*	0.01 (0.006)*	0.006 (0.004)
Aragon	0.001 (0.004)	0.008 (0.008)	-0.0007 (0.005)
Cantabria	0.04 (0.01)*	0.04 (0.01)*	0.04 (0.01)**
Castille & León	0.01 (0.005)***	0.01 (0.007)**	0.01 (0.005)**
Galicia	0.009 (0.007)	0.01 (0.008)	0.007 (0.009)
Navarra	-0.008 (0.006)**	0.008 (0.01)	-0.01 (0.007)
Basque C.	0.029 (0.009)***	0.04 (0.02)*	0.034 (0.01)***
Murcia	0.061 (0.019)***	0.063 (0.02)***	0.05 (0.02)***
Intercept	-0.116 (0.036)***	-0.13 (0.05)**	-0.12 (0.03)***
Wald1	1.29e+06***	177,669.39***	33,078.45***
R^2	0.81	0.81	0.81
BP	-	-	-
Wald2	-	-	-
D_p	-	-	-

[0] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).

[1] Standard errors in parenthesis

[2] Significance at 1% (***), 5% (**), 10% (*)

[3] Wald1: Wald Test (χ^2) of joint significance; BP_ Breusch-Pagan LM test of cross-sectional correlation; Wald2: Wald test for groupwise heteroskedasticity; D_p: Bhargava et al. test for serial autocorrelation (modified Durbin-Watson test)

Table A-3. Spanish airports operating profits. Millions of euros

Region	Operating results (Yearly average 1997-98)	Share of the total surplus generated by regions with surplus	Share of the net surplus of the network	Ratio Investment-traffic
Madrid (1)	89.7	39.3%	45.7%	**2.64**
Canary Islands (8)	40.7	17.8%	20.8%	0.38
Catalonia (3)	40.2	17.6%	20.5%	**1.02**
Balears Islands (3)	41.8	18.3%	21.3%	0.33
Valencian C. (2)	10.8	4.7%	5.5%	0.34
Andalusia (6)	5.1	2.2%	2.6%	0.37
Surplus in system	***228.3***	**100.0%**		
Extremadura (1)	-0.6		-0.3%	0.52
Castile & Leon (3)	-1.8		-0.9%	**1.82**
Murcia (1)	-2.0		-1.0%	0.78
Navarra (1)	-2.1		-1,1%	0.67
Asturias (1)	-2.6		-1.3%	0.97
Cantabria (1)	-2.8		-1.4%	**1.02**
Aragon (1)	-2.9		-1.5%	**1.80**
Galicia (1)	-6.9		-3.5%	0.65
Basque C.(1)	-7.6		-3.9%	**1.11**
Losses in system	-32.2			
Network surplus	***196.1***		100.0%	

Note: 1998 is the last year for which financial data on operating results for individual airports has been made available by AENA. See footnote 11 above.
Source: Own elaboration on AENA information [published in Bel (2002) and RVyT (1999)].