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

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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 as one of the relevant features of airports. Nowadays there exists a clear trend towards corporatization of airports. 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.

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 air travel remains organized 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, politicians in charge and bureaucrats have regularly claimed that inter-territorial solidarity is the main rationale for their choice. Their story goes as follows: less developed areas in Spain must have airports for regional development. However, such areas cannot sustain airports costs. In this way, it is said that centralized management and allocation of funds would allow 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 would be paying for keeping poor airports working. Is this what is actually happening?

As far as social welfare maximization is concerned, there could be a potential justification for constraining market mechanisms with the aim of progressive redistribution.[1] 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.

Through our analysis we will empirically contrast two competing 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 would be consistent with the standard explanation by politicians and bureaucrats we have summarized above. However,

[1] 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. We do not go with detail into this, since this departs from the central questions in our paper.

our results show that choices of governments have been motivated by neither a progressive redistribution criterion nor the claim of supporting smaller airports.

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 (Niskanen, 1971). Our results provide evidence that governments distribute investment in airports so that they can increase their electoral support.

The idea of this work is related with the recent literature on regional allocation of public investments. Some recent works in this literature focus the attention on the traditional trade-off between equity and efficiency in public policies (Yamano and Ohkawara, 2000; de la Fuente, 2005). Our paper is more closely related to the literature that analyzes not just the efficiency-equity issue but also the role of political factors in explaining the regional allocation of public investment in infrastructure.[2] Kemmerling and Stephan (2002) show that, along with the equity objective, political support from citizens for the incumbent party in the central government is crucial in explaining the distribution of investment grants across cities. Castells and Solé (2005) find 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.

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

[2] Another similar strand of literature but less related to our work is that focused on 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).

public investments in infrastructure. This paper adds to the literature by analyzing a scenario where infrastructure policy may pursue neither efficiency nor equity.

Indeed, 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. 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 (Button et al., 1999; 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.[3] 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

3. Investment decisions are taken as follows: The Budget proposed by the Spanish Government to the Parliament displays in an annex the investments that AENA intends to implement during the fiscal year. The Spanish Parliament can either approve or reject this proposal, which cannot be modified. It is worth mentioning that there is no allocation of funds from the budget, since all AENA investment is financed with aeronautical fees and commercial revenues.

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.

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: 2.60. 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. 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 that policy makers of the central government maximize an objective function. Such objective function could be aimed to social purposes and/or political interests since both aspects could affect the utility of those agents.

To this regard, we follow the approach of Bernham and Craig (1987). The objective function of the central government is defined over infrastructure outcomes in region i ($i = 1,.....I$) from a given country at period t ($t = 1,\ldots.T$) 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 at period t, Z_{it}. Additionally, each element of the vector of regional characteristics is weighted by a parameter, a_Z, such that unequal concern of the central government about different regions can arise:

$$O_{it} = C_{it}(a_Z Z_{it}) h(INV_{it}), \tag{3}$$

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

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

Here, m is the multiplier associated to the resource constraint, which necessarily binds. This provides us with a general specification of the investment equation that is going to be tested in our empirical analysis:

$$INV_{it}/R_t = g[C_{it}(a_Z Z_{it})] \qquad (5)$$

Our empirical model will consider g as a linear function, which could be justified as a first order Taylor approximation:

$$INV_{it}/R_t = \sum_i a_Z Z_{it}\,, \qquad (6)$$

where $Z_{it} = GDP_{it}, PAX_{it}, NAC_{it}, INCUM_{it}, CORRE_{it}$ (See definitions below).

Given the value of R_t, $a_Z > 0$ implies that $\partial INV_{it} / \partial Z_{it} > 0$, while $a_{Z'} < 0$ implies that $\partial INV_{it} / \partial Z'_{it} < 0$. In this context, we must consider the elements of the vector of regional characteristics.

Gross Domestic Product per capita (GDP) and air traffic (PAX) are 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 more investment than regions with high product per capita. Furthermore, where airport investments are aimed to support small airports those investments in a region should increase less than proportionally to the traffic generated for the airports of that region.

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 its objective 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 (6) can be expressed as follows:

$$INV_{it}/R_t = \mu + a_{GDP}GDP + a_{PAX}PAX + a_{NAC}NAC + a_{INCUM}INCUM + a_{CORRE}\,CORRE \quad (7)$$

From our analysis the following hypotheses can be established, which we test in further sections:

Hypothesis I: Consistently with claims of progressive redistribution, regions with low product per capita should receive more investment than regions with high product per capita. According to this hypothesis, a_{GDP} in equation (7) should take a value lower than 0.

Hypothesis II: If investments are aimed to support small airports, those investments in a region should increase less than proportionally to the traffic generated for the airports of that region. According to this hypothesis, a_{PAX} in equation (7) should take a value lower than 1.

Hypothesis III: Government looks after cross-subsidies from international passengers to national travelers. Consistently with this, investments should be higher in regions with higher ratios domestic traffic/total traffic. According to this hypothesis, a_{NAC} in equation (7) should take a value greater than 0.

Hypothesis IV: Investment allocations are used to enhance political support. Consistently with this, investments should be higher in regions where the ruling party has strong electoral support and/or the regional government is held by the same party holding national government. According to this hypothesis, a_{INCUM} and a_{CORRE} in equation (7) should take a value greater than 0.

Hypothesis I, II are consistent with an objective funcion of policymakers of the central government that fits a social welfare function, while hypothesis IV is consistent with a welfare funcion of policymakers that fits with a political rent-seeking behaviour. Hypothesis III is consistent with an objective funcion of policymakers that fits both with a social welfare function and a political rent-seeking behaviour.

3.1 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:

$$\underline{INV}_{it} = \mu + \alpha_{GDP} GDP_{it} + \alpha_{PAX} \underline{PAX}_{it} + \alpha_{NAC} NAC_{it} + \varepsilon_{it}, \quad (8)$$

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, $\underline{PAX}_{it}$ 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. 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.[4]

Table 3 shows the results of our estimates of the investment equation, while table 4 indicates the elasticities than can be inferred from them. Column 1 presents 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. Column 2 displays the results of the estimates when using the FGLS estimator with the error term corrected for heteroskedasticity and cross-sectional correlation. In this setting, Betz and Katz (1995) show that FGLS estimator involves an underestimation of standard errors. In column 3, we present the results of the estimates when using the Ordinary Least Squares Estimator with Panel Corrected Standard Errors (PCSE). This latter estimator corrects both for heteroskedasticity and cross-sectional correlation in the error-term and for underestimation of standard errors.

As could be expected, the three estimators provide similar values of the estimated coefficients but different standard errors. Correction for heteroskedasticity and cross-sectional correlation using the FGLS estimator reduces the standard errors (see columns 1 and 2 of table 3). The estimation with the PCSE estimator is more efficient than that using FGLS without correcting for heteroskedasticity and cross-sectional correlation (see columns 1 and 3 of table 3) but tends to increase the standard errors obtained with the FGLS estimator with robust standard errors (see columns 2 and 3 of table 3). In any case,

4. 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). Additionally, we argue that the *PAX* variable should not be endogenous either. Indeed, air traffic in a year can be dependent on airport capacity as a stock but not on the contemporaneous annual investments in the airport, which influences only partially that stock for the following years.

statistical significance of all explanatory variables is not affected for the calculation of the standard errors.

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, which is not consistent with hypothesis I above.

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. These results are consistent with our hypothesis III above but not with our hypothesis II.

Table A-2 in Appendix provides additional evidence of the results obtained in our estimates of the investment equation. In this way, table A-2 presents airport financial data for the last two years in which this information is available, 1997 and 1998.[5] 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. Actually, the most profitable airport has the highest traffic-

5. 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.

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 (Balearic Islands, Canary Islands, Andalusia and C. Valenciana) 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.

3.2. 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.[6] 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.

[6] 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.

Alternatively, some studies argue that the central government could invest more in the regions where the closeness in elections between the two main parties is higher (Dalhberg and Johansson, 2002; Johansson, 2003). Under this hypothesis, the incumbent party tries to obtain higher rates of returns –in terms of votes- from its investments.

In order to capture these political factors, we add to equation (8) 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.

SWING: The difference in the percentage of votes between the two main parties in the general elections across regions.

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 variables *INCUM* and *CORRE*, as especified in our hypothesis IV above, while it is expected a negative sign in the coefficient of the variable *SWING*.

The political variables are estimated separately in order to avoid multicollineality. Tables 5 and 6 show the results of our estimates of equation (8) with the addition of the political variables. In columns 1 and 2, we show the results when the political variables added are *INCUM* and SWING, respectively. In column 3, we show results when the political variable added is CORRE. Regarding the econometric techniques used, we follow the same procedure to section 3.1. As in the previous estimation without political variables, the tests about the validity of the error term assumptions indicate the existence of heteroskedasticity and cross-sectional correlation but not a problem of serial autocorrelation. In order to clarify the exposition, we just present the results when using the Ordinary Least Squares Estimator with Panel Corrected Standard Errors (PCSE). As in the previous estimation without political variables, the values of the coefficients and its statistical significance are similar to those obtained when using the Feasible Generalized Least Squares Estimator (FGLS).

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.

Results for the variable that captures the difference in the percentage of votes between the two main parties in the general elections across regions, SWING, show that such effect is, in our context, not relevant. We believe this is not surprising in our analysis, since swing voters are of paramount importance within the framework of one-seat elections systems, where one vote gives the majority. This is not the case in Spain, where jurisdictions are multi-seat and seats are assigned by means of a proportional system (with d'Hont correction). Because of this, maximization of absolute number of votes fits better than marginal changes due to swing voters.

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.

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.

4. 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.

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.

Rich and big airports do not pay to keep poor and small airports working. According to our results, solidarity seems to be merely a rhetorical excuse to prevent competition among Spanish airports. In fact, 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.

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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
SWING	The difference in the percentage of votes between the two main parties in the general elections across regions	0.08	0.12	-0.21	0.32
CORRE	Correspondence between incumbent party in the central and regional government in each region	0.52	0.50	0	1

Table A-2. 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%	**2.60**
Canary Islands (8)	40.7	17.8%	20.8%	0.41
Catalonia (3)	40.2	17.6%	20.5%	0.99
Balears Islands (3)	41.8	18.3%	21.3%	0.35
Valencian C. (2)	10.8	4.7%	5.5%	0.35
Andalusia (6)	5.1	2.2%	2.6%	0.39
Surplus in system	**228.3**	**100.0%**		
Extremadura (1)	-0.6		-0.3%	0.54
Castile & Leon (3)	-1.8		-0.9%	**1.82**
Murcia (1)	-2.0		-1.0%	0.80
Navarra (1)	-2.1		-1,1%	0.69
Asturias (1)	-2.6		-1.3%	0.98
Cantabria (1)	-2.8		-1.4%	**1.04**
Aragon (1)	-2.9		-1.5%	**1.82**
Galicia (1)	-6.9		-3.5%	0.70
Basque C.(1)	-7.6		-3.9%	**1.18**
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).

Acknowledgements

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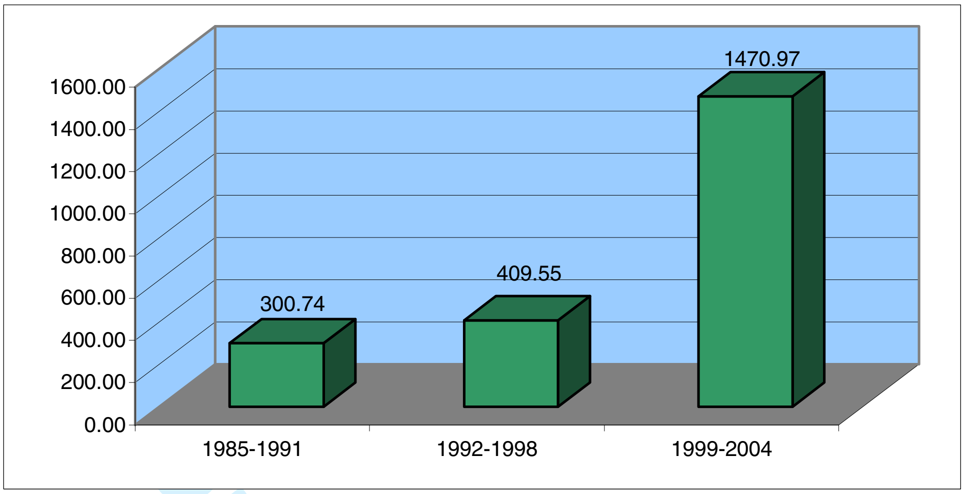
Tables and figures

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 (1)	**FGLS[1] (2)**	**PCSE[2] (3)**
GDP	3.96e-06 (1.56e-06)**	3.93e-06 (4.03e-08)***	3.96e-06 (8.58e-07)***
PAX	1.349 (0.10)***	1.342 (0.01)***	1.349 (0.06)***
NAC	0.130 (0.03)***	0.128 (0.002)***	0.130 (0.01)***
Intercept	-0.163 (0.03)***	-0.161 (0.003)***	-0.163 (0.02)***
Wald1	257.77***	69,350.32***	1,373.81***
R^2	-	-	0.57
BP	453.986***	-	-
Wald2	1.15e+05***	-	-
D_p	1.18	-	-

[1] Standard errors robust to heterocedasticity and contemporaneous correlation.
[2] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).
[3] Standard errors in parenthesis
[4] Significance at 1% (***), 5% (**), 10% (*)
[5] 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 (1)	**FGLS[1] (2)**	**PCSE[2] (3)**
GDP	0.80 (0.32)**	0.79 (0.01)***	0.80 (0.19)**
PAX	1.35 (0.16)***	1.34 (0.02)***	1.35 (0.09)***
NAC	1.31 (0.33)***	1.29 (0.03)***	1.31 (0.20)***

[1] Standard errors robust to heterocedasticity and contemporaneous correlation.
[2] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).
[3] Standard errors in parenthesis
[4] Significance at 1% (***), 5% (**), 10% (*)

Table 5. Investment equation estimates. N = 195

Dependent variable: INV			
	PCSE[1] (1)	PCSE[1] (2)	PCSE[1] (3)
GDP	3.65e-06 (9.44e-07)***	3.81e-06 (8.37e-07)***	3.66e-06 (7.54e-07)**
PAX	1.40 (0.08)***	1.36 (0.07)***	1.44 (0.08)***
NAC	0.14 (0.01)***	0.13 (0.02)***	0.15 (0.01)***
INCUM	0.13 (0.05)**	-	-
SWING	-	0.0002 (0.0004)	-
CORRE	-	-	0.06 (0.01)***
Intercept	-0.22 (0.04)***	-0.16 (0.02)***	-0.21 (0.03)***
Wald	1,231.96***	1,291.71***	1,373.81***
R^2	0.58	0.57	0.62

[1] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).
[2] Standard errors in parenthesis
[3] Significance at 1% (***), 5% (**), 10% (*)

Table 6. Estimated elasticities (evaluated at sample means)

Dependent variable: INV			
	PCSE[1] (1)	PCSE[1] (2)	PCSE[1] (3)
GDP	0.74 (0.21)***	0.77 (0.18)***	0.74 (0.15)***
PAX	1.40 (0.13)***	1.36 (0.10)***	1.44 (0.12)***
NAC	1.44 (0.23)***	1.33 (0.20)***	1.51 (0.19)***
INCUM	0.82 (0.34)**	-	-
SWING	-	0.02 (0.05)	-
CORRE	-	-	0.46 (0.13)***

[1] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).
[2] Standard errors in parenthesis
[3] Significance at 1% (***), 5% (**), 10% (*)

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

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Abstract:

From a public interest perspective, there could be a justification for constraining market mechanisms with the aim of progressive redistribution. However, some policies might be based on selfish motivations of government agents. In this paper, we empirically contrast if the infrastructure policy is based only on public interest motivations or if it is also based on the private motivations of policy makers. In this way, Spain infrastructure policy provides a useful policymaking field to test hypothesis about the behavior of policy makers. We find some evidence regarding the strength of political motivations in explaining such behavior. In fact, results from our analysis show that political motivations can eventually play a more relevant role than social welfare maximization.

Key words: Public Enterprise, Legal monopolies, Air Transportation, Models with Panel Data
Jel Codes: L32, L43, L93, C23:

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

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From a public interest perspective, there could be a justification for constraining market mechanisms with the aim of progressive redistribution. However, some policies might be based on selfish motivations of government agents. In this paper, we empirically contrast if the infrastructure policy is based only on public interest motivations or if it is also based on the private motivations of policy makers. In this way, Spain infrastructure policy provides a useful policymaking field to test hypothesis about the behavior of policy makers. We find some evidence regarding the strength of political motivations in explaining such behavior. In fact, results from our analysis show that political motivations can eventually play a more relevant role than social welfare maximization.

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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 as one of the relevant features of airports. Nowadays there exists a clear trend towards corporatization of airports. 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.

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 air travel remains organized as a totally integrated network: airports are exclusively owned and managed by a State Owned Enterprise, 'AENA'. Thus, competition among airports does not exist. The market has no role in issues such as pricing or resource allocation. Some of the more relevant features of airport management, such as investment decisions or prices policy, are decided on bureaucratic basis and approved by the Spanish Parliament together with the National Budget.[1]

Why is the Spanish system such an exception? No matter the political affiliation of the ruling party, politicians in charge and bureaucrats have regularly claimed that inter-territorial solidarity is the main rationale for their choice. Their story goes as follows: less developed areas in Spain must have airports for regional development. However, such areas cannot sustain airports costs. In this way, it is said that centralized management and allocation of funds would allow 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 would be paying for keeping poor airports working. Is this what is actually happening?

As far as social welfare maximization is concerned, there could be a potential justification for constraining market mechanisms with the aim of progressive redistribution.[2] 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.

Through our analysis we will empirically contrast two competing 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 would be consistent with the

[1] Another relevant feature of airport management, slots' assignment to airlines, is decided by a commission made of 'AENA' top managers and direct representatives of the Ministry of Transport (Ministerio de Fomento).

[2] 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. We do not go with detail into this, since this departs from the central questions in our paper.

standard explanation by politicians and bureaucrats we have summarized above. However, our results show that choices of governments have been motivated by neither a progressive redistribution criterion nor the claim of supporting smaller airports.

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 bureaucrats, in this case 'AENA' top managers, 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 bureaucrats (Niskanen, 1971). Our results provide evidence that governments distribute investment in airports so that they can increase their electoral support.

The idea of this work is related with the recent literature on regional allocation of public investments. Some recent works in this literature focus the attention on the traditional trade-off between equity and efficiency in public policies (Yamano and Ohkawara, 2000; de la Fuente, 2005). Our paper is more closely related to the literature that analyzes not just the efficiency-equity issue but also the role of political factors in explaining the regional allocation of public investment in infrastructure.[3] Kemmerling and Stephan (2002) show that, along with the equity objective, political support from citizens for the incumbent party in the central government is crucial in explaining the distribution of investment grants across cities. Castells and Solé (2005) find 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.

[3] Another similar strand of literature but less related to our work is that focused on 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).

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. This paper adds to the literature by analyzing a scenario where infrastructure policy may pursue neither efficiency nor equity.

Indeed, 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. 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 (Button et al., 1999; Brueckner, 2003).[4] 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

[4] In a more general context, a great number of studies have analyzed the impact of public capital stock on private sector productivity [e.g. Aschauer's (1989), Duffy-Deno and Ebberts (1991), Garcia-Milà and McGuire (1992), Holtz-Eakin (1994), Flores de Frutos et al. (1998), Miller and Tsoukis (2001), Milbourne et al. (2003)]. In general terms, such impact is considered to be relevant although there is no agreement on the precise elasticities estimated.

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 individual 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.[5] 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

[5] Investment decisions are taken as follows: The Budget proposed by the Spanish Government to the Parliament displays in an annex the investments that AENA intends to implement during the fiscal year. The Spanish Parliament can either approve or reject this proposal, which cannot be modified. It is worth mentioning that there is no allocation of funds from the budget, since all AENA investment is financed with aeronautical fees and commercial revenues.

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.

Insert table 2 about here

In the period 1992-2004, the richest Spanish region with the largest airport, Madrid, accumulated almost 60 per cent of total investment but only 22 per cent of total traffic. The ratio (investment share)/(traffic share) is certainly high: 2.60. 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. 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 that policy makers of the central government maximize an objective function. Such objective function could be aimed to social purposes and/or political interests since both aspects could affect the utility of those agents.

To this regard, we follow the approach of Bernham and Craig (1987). The objective function of the central government is defined over infrastructure outcomes in region i $(i = 1,\ldots,I)$ from a given country at period t $(t = 1,\ldots,T)$ and can be expressed through the following form:

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

where O_{it} is a vector of infrastructure outcomes.[6] 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 a resource constraint. This implies that total investments can not be higher than the total resources available for that purpose:

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

where R_t are total resources available at period t and INV_{it} are airport investments across regions.

[6] For simplicity, henceforth the vector of infrastructure outcomes is defined as a variable.

Infrastructure outcomes across regions depend on investments made on them, as well as on specific factors such as the intensity of use. Additionally, infrastructure outcomes will also depend on the objectives of the central government since it is needed to consider not only the aggregate effect of infrastructure policies but also its impact on different regions, for example on regions with different income levels.

In this way, the allocation of investments in infrastructures across regions should depend on a vector of regional characteristics at period t, Z_{it}. Additionally, each element of the vector of regional characteristics may be weighted by a parameter, a_Z, such that unequal concern of the central government about different variables (Z), which values may be different –or not- from one region to another, can arise.

Hence we can derive a general specification of the investment equation that is going to be tested in our empirical analysis:

$$INV_{it}/R_t = \sum_i a_Z Z_{it} \,, \qquad (3)$$

where $Z_{it} = GDP_{it}, PAX_{it}, NAC_{it}, INCUM_{it}, CORRE_{it}$ (See definitions below).

Given the value of R_t, $a_Z > 0$ implies that $\partial INV_{it} / \partial Z_{it} > 0$, while $a_{Z'} < 0$ implies that $\partial INV_{it} / \partial Z'_{it} < 0$. In this context, we must consider the elements of the vector of regional characteristics.

Gross Domestic Product per capita (*GDP*) and air traffic (*PAX*), which in the empirical analysis refers to the percentage of passengers carried in the airports from a region with respect to the total traffic in the national network, are 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 more investment than regions with high product per capita. Furthermore, where airport investments are aimed to support small airports those investments in a region should increase less than proportionally to the traffic generated for the airports of that region.

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 its objective 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. It is worth noting that in the empirical analysis *INCUM* refers to the percentage of votes in the last general elections for the incumbent party in the central government in the corresponding regions of the sample, while *CORRE* is a 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.

Hence equation (3) can be expressed as follows:

$$INV_{it}/R_t = \mu + a_{GDP}GDP + a_{PAX}PAX + a_{NAC}NAC + a_{INCUM}INCUM + a_{CORRE}CORRE + \varepsilon_{it}, \quad (4)$$

where ε_{it} is a random error term. From our analysis the following hypotheses can be established, which we test in further sections:

Hypothesis I: Consistently with claims of progressive redistribution, regions with low product per capita should receive more investment than regions with high product per capita. According to this hypothesis, a_{GDP} in equation (4) should take a value lower than 0.

Hypothesis II: If investments are aimed to support small airports, those investments in a region should increase less than proportionally to the traffic generated for the airports of that region. According to this hypothesis, a_{PAX} in equation (4) should take a value lower than 1.

Hypothesis III: Government looks after cross-subsidies from international passengers to national travelers. Consistently with this, investments should be higher in regions with higher ratios domestic traffic/total traffic. According to this hypothesis, a_{NAC} in equation (4) should take a value greater than 0.

Hypothesis IV: Investment allocations are used to enhance political support. Consistently with this, investments should be higher in regions where the ruling party has strong electoral support and/or the regional government is held by the same party holding national government. According to this hypothesis, a_{INCUM} and a_{CORRE} in equation (4) should take a value greater than 0.

Hypothesis I, II are consistent with an objective function of policymakers of the central government that fits a social welfare function, while hypothesis IV is consistent with a welfare function of policymakers that fits with a political rent-seeking behaviour. Hypothesis III is consistent with an objective function of policymakers that fits both with a social welfare function and a political rent-seeking behaviour.

3.1 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 (3) can be expressed for the empirical analysis in the following way:

$$INV_{it}/R_t = \mu + \alpha_{GDP}GDP_{it} + \alpha_{PAX}PAX_{it} + \alpha_{NAC}NAC_{it} + \varepsilon_{it}, \quad (5)$$

where INV_{it}/R_t refers to the percentage of investment made in airports from region i with respect to the total investment in the national airport network. The explanatory variables are defined as follows:

1. GDP_{it}: Gross Domestic Product per capita of region *i.*
2. PAX_{it}: Percentage of annual passengers carried in the airports from region i with respect to the total annual traffic in the national airport network.

3. NAC_{it}: Percentage of national passengers carried in the airports from region *i* with respect to the total annual traffic in the regional airport network.

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.[7]

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.[8]

Table 3 shows the results of our estimates of the investment equation, while table 4 indicates the elasticities than can be inferred from them. Column 1 presents the results of the estimates when using the Feasible Generalized Least Squares estimator (FGLS). The

[7] The allocation of investments across regions in period 1985-2004 is similar to that obtained in period 1992-2004. Data for traffic is not available before 1992 so that the empirical analysis is restricted to period 1992-2004.

[8] 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). Additionally, we argue that the *PAX* variable should not be endogenous either. Indeed, air traffic in a year can be dependent on airport capacity as a stock but not on the contemporaneous annual investments in the airport, which influences only partially that stock for the following years.

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. Column 2 displays the results of the estimates when using the FGLS estimator with the error term corrected for heteroskedasticity and cross-sectional correlation. In this setting, Betz and Katz (1995) show that FGLS estimator involves an underestimation of standard errors. In column 3, we present the results of the estimates when using the Ordinary Least Squares Estimator with Panel Corrected Standard Errors (PCSE). This latter estimator corrects both for heteroskedasticity and cross-sectional correlation in the error-term and for underestimation of standard errors.

As could be expected, the three estimators provide similar values of the estimated coefficients but different standard errors. Correction for heteroskedasticity and cross-sectional correlation using the FGLS estimator reduces the standard errors (see columns 1 and 2 of table 3). The estimation with the PCSE estimator is more efficient than that using FGLS without correcting for heteroskedasticity and cross-sectional correlation (see columns 1 and 3 of table 3) but tends to increase the standard errors obtained with the FGLS estimator with robust standard errors (see columns 2 and 3 of table 3). In any case, statistical significance of all explanatory variables is not affected for the calculation of the standard errors.

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, which is not consistent with hypothesis I above.

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, 10 percentage points increase in the share of the total traffic of the airport network implies about 13 percentage points 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. These results are consistent with our hypothesis III above but not with our hypothesis II.

Table A-2 in Appendix provides additional evidence of the results obtained in our estimates of the investment equation. In this way, table A-2 presents airport financial data for the last two years in which this information is available, 1997 and 1998.[9] 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. Actually, 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 (Balearic Islands, Canary Islands, Andalusia and C. Valenciana) 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.

[9] 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.

3.2. 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.[10] 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.

Alternatively, some studies argue that the central government could invest more in the regions where the closeness in elections between the two main parties is higher (Dalhberg and Johansson, 2002; Johansson, 2003). Under this hypothesis, the incumbent party tries to obtain higher rates of returns –in terms of votes- from its investments.

In order to capture these political factors, we add to equation (5) the following political variables:

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

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[10] 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.

2. SWING: The difference in the percentage of votes between the two main parties in the general elections across regions.

3. *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 variables *INCUM* and *CORRE*, as specified in our hypothesis IV above, while it is expected a negative sign in the coefficient of the variable *SWING*.

The political variables are estimated separately in order to avoid multicollineality. Tables 5 and 6 show the results of our estimates of equation (5) with the addition of the political variables. In columns 1 and 2, we show the results when the political variables added are *INCUM* and SWING, respectively. In column 3, we show results when the political variable added is CORRE. Regarding the econometric techniques used, we follow the same procedure to section 3.1. As in the previous estimation without political variables, the tests about the validity of the error term assumptions indicate the existence of heteroskedasticity and cross-sectional correlation but not a problem of serial autocorrelation. In order to clarify the exposition, we just present the results when using the Ordinary Least Squares Estimator with Panel Corrected Standard Errors (PCSE). As in the previous estimation without political variables, the values of the coefficients and its statistical significance are similar to those obtained when using the Feasible Generalized Least Squares Estimator (FGLS).

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. Indeed, 10 percentage points increase in the percentage of votes of the incumbent party in a region implies about 8 percentage points increase in the share of the total investments made in the airport network. 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.

Results for the variable that captures the difference in the percentage of votes between the two main parties in the general elections across regions, SWING, show that such effect is, in our context, not relevant. We believe this is not surprising in our analysis, since swing voters are of paramount importance within the framework of one-seat elections systems, where one vote gives the majority. This is not the case in Spain, where jurisdictions are multi-seat and seats are assigned by means of a proportional system (with d'Hont correction). Because of this, maximization of absolute number of votes fits better than marginal changes due to swing voters.

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. Indeed, such correspondence implies almost 4 percentage points increase in the share of the total investments made in the airport network. Thus, political affiliation seems to favor better coordination between decision-makers at different territorial levels of government.

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.

4. 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.

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.

Rich and big airports do not pay to keep poor and small airports working. According to our results, solidarity seems to be merely a rhetorical excuse to prevent competition among Spanish airports. In fact, 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.

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APPENDIX

(Insert Table A-1)

(Insert Table A-2)

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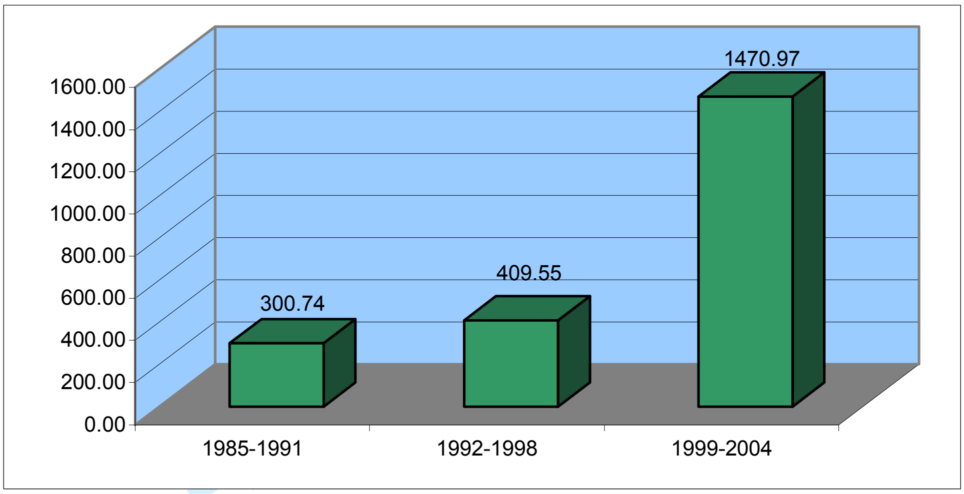
Tables and figures

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	Individual	private, regional gov.
Germany	8	121,136	21,193	99,943	Individual	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	Individual	national gov. (Paris), chambers of commerce (rest)
Italy	6	73,912	24,477	49,436	Individual	private, regional gov.
Netherlands	1	41,168	154	41,014	Individual	private, national government
Greece	1	28,237	5,030	23,207	Individual	private (Athens), national go. (others)
Sweden	1	20,441	6,875	13,567	**Centralized**	national government
Ireland	1	20,010	812	19,197	Individual	national government
Denmark	1	19,575	1,606	17,969	Individual	private, national government
Portugal	2	17,739	2,853	14,886	**Centralized**	national government
Austria	1	15,799	548	15,251	Individual	private, national gov.
Belgium	1	15,087	2	15,085	Individual	private, regional gov.
Finland	1	10,516	2,701	7,816	**Centralized**	national government
Czech Republic	1	7,761	161	7,600	Individual	national gov. (Prague) / regional gov. (others)
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	**Individual**	private
Malta	-	2,648	44	2,604	**Individual**	private
Luxembourg	-	1,449	0	1,449	**Centralized**	national government
Slovenia	-	920	Na	Na	Individual	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, European Commission (2002, 2006) and airports web pages.

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 (1)	**FGLS[1] (2)**	**PCSE[2] (3)**
GDP	3.96e-06 (1.56e-06)**	3.93e-06 (4.03e-08)***	3.96e-06 (8.58e-07)***
PAX	1.349 (0.10)***	1.342 (0.01)***	1.349 (0.06)***
NAC	0.130 (0.03)***	0.128 (0.002)***	0.130 (0.01)***
Intercept	-0.163 (0.03)***	-0.161 (0.003)***	-0.163 (0.02)***
Wald1	257.77***	69,350.32***	1,373.81***
R^2	-	-	0.57
BP	453.986***	-	-
Wald2	1.15e+05***	-	-
D_p	1.18	-	-

[1] Standard errors robust to heterocedasticity and contemporaneous correlation.
[2] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).
[3] Standard errors in parenthesis
[4] Significance at 1% (***), 5% (**), 10% (*)
[5] 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 (1)	**FGLS[1] (2)**	**PCSE[2] (3)**
GDP	0.80 (0.32)**	0.79 (0.01)***	0.80 (0.19)**
PAX	1.35 (0.16)***	1.34 (0.02)***	1.35 (0.09)***
NAC	1.31 (0.33)***	1.29 (0.03)***	1.31 (0.20)***

[1] Standard errors robust to heterocedasticity and contemporaneous correlation.
[2] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).
[3] Standard errors in parenthesis
[4] Significance at 1% (***), 5% (**), 10% (*)

Table 5. Investment equation estimates. N = 195

Dependent variable: INV			
	PCSE[1] (1)	PCSE[1] (2)	PCSE[1] (3)
GDP	3.65e-06 (9.44e-07)***	3.81e-06 (8.37e-07)***	3.66e-06 (7.54e-07)**
PAX	1.40 (0.08)***	1.36 (0.07)***	1.44 (0.08)***
NAC	0.14 (0.01)***	0.13 (0.02)***	0.15 (0.01)***
INCUM	0.13 (0.05)**	-	-
SWING	-	0.0002 (0.0004)	-
CORRE	-	-	0.06 (0.01)***
Intercept	-0.22 (0.04)***	-0.16 (0.02)***	-0.21 (0.03)***
Wald	1,231.96***	1,291.71***	1,373.81***
R^2	0.58	0.57	0.62

[1] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).
[2] Standard errors in parenthesis
[3] Significance at 1% (***), 5% (**), 10% (*)

Table 6. Estimated elasticities (evaluated at sample means)

Dependent variable: INV			
	PCSE[1] (1)	PCSE[1] (2)	PCSE[1] (3)
GDP	0.74 (0.21)***	0.77 (0.18)***	0.74 (0.15)***
PAX	1.40 (0.13)***	1.36 (0.10)***	1.44 (0.12)***
NAC	1.44 (0.23)***	1.33 (0.20)***	1.51 (0.19)***
INCUM	0.82 (0.34)**	-	-
SWING	-	0.02 (0.05)	-
CORRE	-	-	0.46 (0.13)***

[1] OLS with panel corrected standard errors (Standard errors robust to heterocedasticity and contemporaneous correlation).
[2] Standard errors in parenthesis
[3] Significance at 1% (***), 5% (**), 10% (*)

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
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
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
SWING	The difference in the percentage of votes between the two main parties in the general elections across regions	0.08	0.12	-0.21	0.32
CORRE	Correspondence between incumbent party in the central and regional government in each region	0.52	0.50	0	1

Table A-2. 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%	**2.60**
Canary Islands (8)	40.7	17.8%	20.8%	0.41
Catalonia (3)	40.2	17.6%	20.5%	0.99
Balears Islands (3)	41.8	18.3%	21.3%	0.35
Valencian C. (2)	10.8	4.7%	5.5%	0.35
Andalusia (6)	5.1	2.2%	2.6%	0.39
Surplus in system	**228.3**	**100.0%**		
Extremadura (1)	-0.6		-0.3%	0.54
Castile & Leon (3)	-1.8		-0.9%	**1.82**
Murcia (1)	-2.0		-1.0%	0.80
Navarra (1)	-2.1		-1,1%	0.69
Asturias (1)	-2.6		-1.3%	0.98
Cantabria (1)	-2.8		-1.4%	**1.04**
Aragon (1)	-2.9		-1.5%	**1.82**
Galicia (3)	-6.9		-3.5%	0.70
Basque C.(3)	-7.6		-3.9%	**1.18**
Losses in system	-32.2			
Network surplus	**196.1**		**100.0%**	

Note 1: 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.
Note 2: Numbers in parenthesis indicate the number of commercial airports in each region.
Source: Own elaboration on AENA information (published in Bel, 2002 and RvyT, 1999).