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

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Abstract:

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

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

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

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1. Introduction

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

Two changes are particularly important. Globalization has brought a sharp increase in the demand for long distance flights, but non-stop long distance flights, such as intercontinental flights, are offered by few airports. Hence, a market has emerged for short distance flights from small and medium size airports to large facilities, where passengers can connect with non-stop long distance flights. The ability of airports and airlines to channel this flow is a central factor in determining the non-stop long distance flights offered from a particular airport (Bel and Fageda, 2005). Other factors, such as the increasing use of air transportation for leisure purposes, have also produced competition between airports to attract point-to-point low cost services, which can expand traffic at a very high rate.

At the same time, there has been a clear trend towards corporatization of airports since the late eighties. Like privatization, corporatization has been seen as a way to reform airports whose ownership and management have remained public. Competition has been seen as a powerful tool to stimulate efficiency, and corporatizated management is more focused on commercial policies. In

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this way, methods such as competitive tendering of commercial services and recruitment of flights to feed the most valuable airline offers have been given a growing role in airport management.

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

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

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

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

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

As far as social welfare maximization is concerned, it could potentially justify constraint of market mechanisms with the aim of progressive redistribution. This brings us to a traditional conundrum of public policy; the trade-off between efficiency and equity. However, if we accept that the behavior of public agents is guided to some extent by their own interest, some policies designed to prevent competition, while justified on the grounds of progressive redistribution, might actually be based on selfish motivations.[1] In such a case, those policies would advance neither efficiency nor equity.

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

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

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[1] In fact, un-fulfilment of electoral promises is a typical example of a distortion between policies announced and policies effectively implemented. See Haan (2004, p. 229), for a discussion about the literature focused on this issue.

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

High quality airport facilities foster intercity agglomeration economies and influence the location decision of firms, especially those in knowledge intensive sectors (Brueckner, 2003). Hence, the link between the quality of airport facilities and urban economic growth could provide a rationale for guaranteeing airport facilities in less developed regions. In a similar way, scale economies could provide a motivation to guarantee airport facilities in less populated regions, which can only generate a low demand of air traffic.

Indeed high fixed costs associated with airport operations may help explain the existence of a positive relationship (although no necessarily a lineal one) between air traffic and airport profitability –and so the amount of self-finance available for investments. Airports that generate a low volume of traffic may not be profitable. However, the expenditure needed to support small airports should not be high because several studies show that scale economies in airport operations are modest (European Commission, 2002).

Managing airports as an integrated national network arises as a, though by no means the only, possible strategy for regional development. 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, 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, Ireland, 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, Spanish Airports and Air Navigation (AENA) owns and manages more than 40 commercial airports in Spain. AENA is a public entity belonging to the Ministry in charge of transportation issues, and it enjoys an autonomous legal and economic status. Investment decisions are centralized and are financed through the surplus of the entire airport system. In effect, there is a system of non-transparent, cross-subsidization across Spanish airports. Importantly, politicians have justified centralized management on the grounds that it supports territorial cohesion. The possibility of competition between airports or the benefits of a differentiated commercial policy is not recognized.

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

In this way, table 2 shows the relationship between investment and passenger traffic for the Spanish airport network in period 1994-2003, and the corresponding relative position of each region in terms of population and per capita income. 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). This period of ten years is long enough to smooth out distortions from single projects in a particular period, although a complete cycle of airport investments is considered to last twenty years. Column (5) shows the relationship for every Spanish region between share of total investment and share of total passengers. Where the ratio is larger than one, relative investment in the region is larger than relative traffic. A ratio smaller than one, of course, indicates that relative investment in the region is lower than relative traffic.

Insert table 2 about here

In the period 1994-2003, the richest Spanish region, Madrid, accumulated about 60 per cent of total investment but only 20 per cent of total traffic. The ratio (investment share)/(traffic share) is certainly high: 2.66. Overall, airports in the less developed Spanish regions (Andalusia, Extremadura, Galicia, and Murcia) 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 guided by other motives.

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

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

In a similar fashion, de la Fuente (2005) develops a model to compare the welfare levels involved with different policies for the allocation of public investments across regions. His main goal is to examine whether it is economically sound to use public investment in infrastructure for redistributive purposes when governments have other instruments available, such as taxes and social expenditures. In a second-best scenario, where ex-post redistribution is limited, de la Fuente shows that it is justified to undertake a higher level of investments in less developed regions than required by a strict efficiency criterion. The reasoning underlying this result is that optimality conditions require equality across regions of the marginal contribution of public investment to welfare, not to output, which depends critically on disparities in the level of income. The model is tested using Spanish data on the infrastructure stock in 1995. Results indicate that the regional allocation of infrastructure investments in Spain has been too redistributive.

Other studies add to this literature by analyzing not just the efficiency-equity issue but also the role of political factors in explaining the regional allocation of public investment in infrastructure.[2] Kemmerling and Stephan (2002) analyze empirically the politico-economic determinants of local infrastructure investment decisions. Indeed, they estimate simultaneously a system of three equations for 87 large German cities in the years 1980, 1986 and 1988. The equation-system is composed of a production function, a local government investment function and a central government investment grant allocation function. Estimates show that the equity objective (measured by the influence of income on investments) matters much more than the efficiency one (measured by the influence of marginal productivity of public capital on investments). In addition, political support from citizens for the incumbent party in the central government is decisive in explaining the distribution of investment grants across cities, while the electoral productivity of each city (in terms of the number of votes that can be obtained from citizens indifferent between the two parties) does not seem to influence central government investment choices.

Closely related to the work of Kemmerling and Stephan (2002) is the study of Castells and Solé (2005). They analyze the possibility that political considerations promote differences in the attractiveness of regions to the central government in such a way that a deviation from the efficiency-equity rule can arise. The starting point of this study is a social welfare function, where the traditional trade-off of infrastructure stock allocation across regions is measured through a linear combination of population and income. Moreover, Castells and Solé include, as explanatory

[2] This literature is closely related to the one that analyses the political motivations with regard to grant allocations between different government levels. Empirical applications of this issue can be found, for example, in Worthington and Dollery (1998), Case (2001), Costa et al. (2003) and Johansson (2003).

determinants of public investment in infrastructure, variables for the electoral productivity of expenditures across regions (in terms of the marginal electoral gains that can be obtained) and the political support of the corresponding region for the incumbent party in the central government. The model is empirically implemented using Spanish data of public investment in transportation infrastructure in the period 1987-1996. Results are consistent with the expectations that both equity-efficiency considerations (in an apparently balanced way) and political factors influence the allocation choices of governments.

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

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

In order to obtain an equation that explains the allocation of airport investments across regions, we consider the case in which the central government maximizes a social welfare function. To this regard, we follow the approach of Bernham and Craig (1987). The welfare function of the central government is defined over infrastructure outcomes in region *i (i =1,.....15)* from a given country at period *t (t = 1,….10)* 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. 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:

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

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

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

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

The vector of regional characteristics can include several aspects, such as product per capita, total annual passengers carried in the airport, the proportion of international traffic with respect to the total traffic and political considerations. Indeed, where territorial cohesion criteria influence the airport investment decisions of the central government, regions with low product per capita should receive proportionally more investment than regions with high product per capita. In addition to this, airport investment across regions should generally be linked to economic needs, which, in turn, are strongly associated with the air traffic demand generated by both local populations and interconnections made by hub operations. Furthermore, the central government could try to maximize the surpluses of domestic rather than international passengers, since the latter are not incorporated in the social welfare function. Finally, the political clout of each region, due to the popularity of the central government's incumbent party in the corresponding region or due to the correspondence between the incumbent party in the central and regional governments, may play a central role in the allocation choice of public resources of the central government as we will see below.

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

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

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

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

In this equation, g is an increasing function. Our empirical model will use a linear approach, which could be justified as a first order Taylor approximation.

4.2. Economic factors

It is of central interest in our empirical analysis to analyze any type of cross-subsidization that can take place between the regional networks of the Spanish airport system. Hence equation (5) can we expressed four our empirical analysis in the following way:

$$\underline{INV}_{it} = \mu_1 + \beta_1 GDP_{it} + \beta_2 \underline{PAX}_{it} + \beta_3 INTERN_{it} + \varepsilon_{it}, \tag{6}$$

where $\underline{\text{INV}}_{it}$ 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[3], $\underline{\text{PAX}}_{it}$ 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 $INTERN_{it}$ refers to the percentage of international passengers carried in the airports from region *i* with respect to the total annual traffic in the regional airport network.

In order to estimate this model for Spain, we have constructed panel data for the period 1994-2003 for the 15 Spanish regions with airports. Data on the territorial allocation of investment have been obtained from the Ministry of Transport web page; 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 1 shows the descriptive statistics of the variables used for estimating our investment equation.[4]

Given that airports in Spain are managed on an integrated basis, the empirical analysis can be simplified in two ways. Firstly, the variable for the annual traffic at airports can be incorporated in the model as an exogenous variable because revenues from operations in the current year do not

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[3] 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).

[4] It is worth mentioning that in tables A-3 and A-4 of appendix 2 we present the results of a transformation of equation (6). In this transformation the dependent variable is investment per capita in region *i* at period ($INV_{c(it)}$), while the annual passengers carried in the airports from region *i* (PAX_{it}) appears as a transformed explanatory variable.

necessarily influence the level of investments that will be undertaken in the current and following years. This is so because investments in a specific airport do not necessarily depend on the revenues obtained in the same airport. Second, specific regional effects should not be relevant since regions do not have any role in the allocation of airport investments. Additionally, regional characteristics that influence infrastructure costs are not as relevant for airports as they are for ground transportation modes. So, any difference across regions should be based on factors affecting central government choices.

In this sense, our data set does not incorporate specific effects that should vary across regions but are time invariant. Such a fixed effects model would not be convenient because we do not have enough degrees of freedom. Furthermore, the Hausman specification test and the Breush and Pagan Lagrange Multiplier test reject the suitability of the random effects model.[5] Thus, our estimates are based on a pooled regression without regional dummy variables. As a baseline method, we use the Feasible Generalized Least Squares Estimator (FGLS).

We also undertake our estimations though the Prais-Winsten method (PW) in order to account for heteroscedasticity and correlation across the units of observation. In addition, we analyze a possible concern related to temporal inertia, as long as investment projects in airports are frequently multi-year efforts, by incorporating dynamics explicitly in the model. Such estimation is undertaken through the Prais-Winsten method in an instrumental variables regression (PW-IV). Finally, time specific effects are also incorporated in this regression. Table 3 shows the results of our estimates, while table 4 indicates the elasticities than can be inferred from them.

Insert table 3 about here

Insert table 4 about here

When dynamics is not explicitly incorporated into the estimation, 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

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[5] We undertake two specification tests of the random effects model for our more parsimonious specification. The Hausman test distributed with $\chi^2(2)$ takes a value of 17.92 and is rejected at 1 per cent, while the Breush-Pagan Lagrange Multiplier test distributed with $\chi^2(1)$ takes a value of 276.93 and is rejected at 1 per cent

relevant to the airport investment choice of the central government. Indeed, the percentage of total investments in a region seems to increase when product per capita of that region also increases. In addition to this, we do not find evidence that airport investments are guided by a scale economies argument in the more parsimonious specification of our investment equation. In fact, the percentage of total investments increases more than proportionally to the output generated for each regional airport network. In contrast, holding the other factors constant, the percentage of total investments is lower in regional airport networks with a higher proportion of international traffic.

Table A-2 in appendix 1 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.[6] 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 would be expected if scale economies controlled. Indeed, the most profitable airport has the highest traffic-investment ratio, while many of the non-profitable airports have traffic-investment rates lower than one. In fact, data from this table, along with the results of the investment equation estimates, allows us to infer a type of redistribution not mentioned by Spanish airport authorities. All profitable regional networks with low investment-traffic ratios (Balearic Island, Canary Islands, Andalusia and C. Valenciana) have a common feature. They all have, at least, one large tourist airport. This indicates cross-subsidization from international to domestic passengers.

Finally, it is worth noting that the test of serial correlation, using the modified Durbin-Watson test for panel data proposed by Bhargava et al. (1982), does not indicate a problem of that type. However, we prefer to include dynamics explicitly because, as we mentioned above, some degree of temporal inertia can be expected in our data. Instruments for the lagged dependent variable are the second, third and fourth lags (airport projects does not usually run for more than 4 years). Results of this additional estimation are not substantially different from the previous one, although the size

[6] 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.

of the coefficients for the rest of the variables is lower. In this sense, the elasticity of central government's investments with respect to the output generated in the regional airport networks is lower than one. However, the use of the lagged dependent variable as an explanatory variable distorts interpretation of individual coefficients. In any case, as table A-4 in the appendix show, investments per capita increases more than proportionally to output generated for each regional airport network regardless of the specification that we use. At last, incorporating time specific effects does not alter our basic conclusions.

4.3. Political factors

As long as 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.[7] Following Grossman (1994), the incumbent party in the central government may allocate public resources in order to buy the support of voters and political agents across regions. Ceteris paribus, more resources will be invested in those regions that have the most–and most valuable--political capital to offer. Such political capital will be greater where the support for the incumbent party in the central government is also greater, and it will be even more valuable where a correspondence exists between the incumbent party in the central government and the incumbent party in the regional government.

In order to capture these two political factors, we add to equation (6) the following political variables that are estimated separately to avoid multicollineality.[8]

[7] Where election systems are based on majority rule, politicians try to maximize the probability of winning a majority.

[8] Alternatively, it could be expected that the central government will invest more in the regions where the closeness in elections between the two main parties is higher. Under this hypothesis, the incumbent party tries to obtain higher rates of returns –in terms of votes- from its investments. An alternative specification that incorporates a variable for the

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

Correspondence: 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 these political variables have been obtained from the web site of the Ministry of Domestic Affairs (Ministerio del Interior). It is expected that the central government will invest more in regions where political support for the corresponding incumbent party in the central government is greater. In addition, it is expected that the central government will invest more in regions where a correspondence does exist between the incumbent party in the central government and the incumbent party in the regional government

Tables 5 and 6 show the results of our estimates when incorporating the variable incumbent, while tables 7 and 8 show the results when incorporating the variable correspondence.

Insert table 5 about here

Insert table 6 about here

Insert table 7 about here

Insert table 8 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, *Incumbent*, is statistically and economically significant. Thus, we find evidence that partisan support plays an important role in the investment allocation choices of the central government. Indeed, the incumbent party in the central government seems to compensate regions for partisan support in order to assure votes.

The dummy variable capturing the correspondence between the incumbent party in the central government and the incumbent party in the regional government is also statistically and economically significant. Thus, political affiliation seems to favor better coordination between decision-makers at different territorial levels of government.

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difference in the percentage of votes between the two main parties in the general elections across regions shows that such effect is, in our context, not relevant.

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

5.Concluding remarks

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

Through our empirical analysis of the determinants of airport investments in Spain across regions, we find that the choices of the central government have been directed by neither a progressive redistribution criterion nor the demands of scale economies. Indeed, ceteris paribus high-income regions receive relatively more public resources than low-income regions. In addition to this, we do not find evidence that investment increases less 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 take place. On the contrary, it seems to take place cross-subsidization 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 that the incumbent party in the central government tries to maximize support from regional citizens. Indeed, more public resources are invested in those regions where the support for the party in central government is greater. In addition to this, more public resources are invested in those regions where the incumbent party in the central government and the incumbent party in the regional government are the same.

When talking about the Spanish airports, rich guys do not pay to keep poor guys' airports working. According to our results, solidarity is merely a rhetorical excuse to prevent competition among Spanish airports. In reality, competition would constrain discretionary power of policy makers and bureaucrats over management and budgets. We are aware that the public choice paradigm for explaining policymaking is too simple and naïve, and policy processes are much more complex than can be explained by the self-interested policy maker alone. The problem here is that, 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.

References

Aschauer, D.A (1989) Is Public Expenditure Productive?. *Journal of Monetary Economics* 23: 177–200.

Bel, G. (2002) Infrastructures i Catalunya: Alguns Problemes Escollits. *Revista Econòmica de Catalunya* 0 (45): 11-25.

Bel, G., Fageda, X. (2005) Getting There Fast: Globalization, Intercontinental Flights and Location of Headquarters. Research Working Paper Series RWP05-04, Alfred Taubman Center for State and Local Government, Kennedy School of Government, Harvard University.

Berhman, J.R., Craig, S.G. (1987) The distribution of public services: An exploration of local government preferences. *American Economic Review* 77: 37–49.

Bhargava, A.L., Franzini, L., Narendranathan, W. (1982) Serial Correlation and Fixed Effects Model. *Review of Economic Studies* 49: 533–549.

Brueckner, J.K. (2003) Airline Traffic and Urban Economic Development. *Urban Studies* 40: 1455-1469.

Cadot, O., Roller, L., Stephan, A. (1999) A Political Economy Model of Infrastructure Allocation: An Empirical Assessment. *CEPR Discussion Paper* 2336: 1-33.

Castells, A., Solé A. (2005) The Regional Allocation of Infrastructure Investment: The Role of Equity, Efficiency and Political Factors. *European Economic Review* 49: 1165-1205.

Case, A. (2001) Election Goals and Income Redistribution: Recent Evidence from Albania. *European Economic Review* 45: 405–423.

Costa, J, Rodriguez E., Lunapla, D. (2003) Political Competition and *Pork-barrel* Politics in the Allocation of Public Investment in Mexico. *Public Choice* 116: 185-204.

de La Fuente, A. (2004) Second-best Redistribution through Public Investment: A Characterization, an Empirical Test and an Application to the Case of Spain. *Regional Science and Urban Economics* 34: 489-503.

Duffy-Deno, K.T., Eberts, R.W. (1991) Public Infrastructure and Regional Economic Development: A Simultaneous Equation Approach. *Journal of Urban Economics* 30: 329–343.

European Commission (2002) *Study on Competition between Airports and the Application of State Aid Rules*, Final report, Volumes I and II. European Commission, Brussels

Garcia-Mila, T., McGuire, T.J. (1992) The Contribution of Publicly Provided Inputs to States' Economies. *Regional Science and Urban Economics* 22: 229–241.

Grossman, P. (1994) A Political Theory of Intergovernmental Grants. *Public Choice* 78: 295-303

Haan, M.A (2004) Promising Politicians, Rational Voters, and Election Outcomes. *Spanish Economic Review* 6: 227-241.

Holtz-Eakin, D. (1994) Public-Sector Capital and the Productivity Puzzle. *Review of Economics and Statistics* 76: 12–21.

Johansson, E. (2003) Intergovernmental Grants as a Tactical Instrument: Empirical Evidence from Swedish Municipalities. *Journal of Public Economics* 87: 883-915.

Kemmerling, A., Stephan, A. (2002) The Contribution of Local Public Infrastructure to Private Productivity and its Political Economy: Evidence from a Panel of Large German Cities. *Public Choice* 113: 403-424

Munnell, A.H (1990) Why has Productivity Growth Declined? Productivity and Public Investment. *New England Economic Review*, January/ February: 3–22.

Niskanen, W. A. (1971) *Bureaucracy and Representative Government*. Aldine-Atherton, Chicago.

RVyT (1999), data in *Revista Viajes y Turismo*, 0 (65): 34.

Worthington, A.C., Dollery, B.E (1998) The Political Determination of Intergovernmental Grants in Australia. *Public Choice* 94: 299–315.

Yamano, N., Ohkawara, T. (2000) The Regional Allocation of Public Investment: Efficiency or Equity?. *Journal of Regional Science* 40: 205-229

Table 1. Major airports and air traffic of passengers in EU-25 countries.* 2002

Country	Number of Top 50 EU airports	Total passengers (10^3)	National passengers (10^3)	International passengers (10^3)	Airport management	Airport Ownership
National airport networks with total passengers > 100,000 (10^3)						
United Kingdom	8	168,742	22,617	146,125	Decentralized	private, regional gov.
Germany	8	114,383	20,402	93,981	Decentralized	private, regional gov. and national gov.
Spain	9	112,254	29,022	83,232	**Centralized**	national government
National airport networks with total passengers > 50,000 (10^3)						
France	6	96,526	27,921	68,605	Decentralized	national gov. (Paris), chambers of commerce (rest)
Italy	6	65,228	22,527	42,701	Decentralized	private, regional gov.
National airport networks with total passengers > 12,500 (10^3)						
Sweden	2	22,039	7,445	14,595	**Centralized**	national government
Portugal	2	17,382	2,930	14,451	**Centralized**	national government
Netherlands	1	40,828	204	40,625	Decentralized	private, national gov.
Denmark	1	19,930	1,684	18,246	Decentralized	private, national gov.
Ireland	1	18,235	659	17,576	**Centralized**	national government
Austria	1	14,944	530	14,414	Decentralized	private, national gov.
Belgium	1	14,316	1	14,315	Decentralized	private, regional gov.
National airport networks with total passengers < 12,500 (10^3)						
Finland	1	10,296	2,766	7,530	**Centralized**	national government
Czech Republic	1	6,579	148	6,432	**Centralized**	national government
Cyprus	1	6,205	Na	na	**Centralized**	national government
Hungary	1	4,469	Na	na	**Centralized**	national government
Poland	-	6,542	Na	na	**Centralized**	national government
Malta	-	2,640	47	2,593	**Centralized**	national government
Luxembourg	-	1,505	-	1,505	**Centralized**	national government
Slovenia	-	866	Na	na	Decentralized	private, national gov.
Lithuania	-	701	Na	na	**Centralized**	national government
Latvia	-	633	Na	na	**Centralized**	national government
Estonia	-	603	13	590	**Centralized**	national government
Slovakia	-	497	32	465	**Centralized**	national government

Note: Data for Greece is not available.
Source: Eurostat

Table 2. Spanish airport data. Annual mean values in period 1994-2003

Region	Airports	(1) Investment (10^6 euros)	(2) Share of total investment	(3) Total traffic passengers	(4) Share of total traffic	(5) Ratio Investment-traffic (2/4)	(6) Share of total population (Spain = 40,625,484.3)	(7) GDP per capita Index at 2003 (Spain=100)
Madrid	Madrid-Barajas, Madrid-Cuatro Vientos	489.97	58.63%	27,399,716	22.04%	**2.66**	**12.91%**	**133.58**
Catalonia	Barcelona, Girona, Reus, Sabadell	119.74	14.33%	18,156,802	14.54%	0.99	15.46%	118.37
Canarias	G. Canaria, Tenerife N., Tenerife S., Fuerteventura, Lanzarote, Palma, Hierro, Gomera	71.73	8.58%	27,643,609	22.70%	0.38	4.18%	88.03
Balears	Palma Majorca, Ibiza, Menorca	58.29	6.98%	23,639,799	19.37%	0.36	2.04%	107.10
Andalusia	Malaga, Almeria, Seville, Cordoba, Granada, Jerez	28.66	3.43%	11,984,349	9.65%	0.36	18.07%	76.62
Basque C.	Bilbao, San Sebastian, Vitoria	20,85	2.49%	2,515,530	2.03%	**1.23**	**5.19%**	**125.66**
Valencian C.	Alicante, Valencia	18.48	2.21%	7,421,601	5.97%	0.37	10.16%	94.93
Galicia	Santiago, Coruna, Vigo	10.71	1.28%	2,347,746	1.92%	0.67	6.78%	80.17
Asturias	Oviedo	5.23	0.63%	671,146	0.53%	**1.18**	**2.68%**	**86.26**
Castile&Leon	Valladolid, Salamanca, Leon	2.93	0.35%	242,742	0.20%	**1.75**	**6.17%**	**95.02**
Aragon	Saragossa	2.76	0.33%	238,766	0.21%	**1.57**	**2.95%**	**109.59**
Cantabria	Santander	1.54	0.18%	229,282	0.20%	0.92	1.32%	96.00
Navarra	Pamplona	1.20	0.14%	279,527	0.21%	0.69	1.34%	130.17
Murcia	Murcia	0.49	0.06%	192,530	0.15%	0.39	2.83%	85.96
Extremadura	Badajoz	0.13	0.01%	30,260	0.02%	0.63	2.65%	66.45

Note: Madrid-Cuatro Vientos and Sabadell are very small airports close to Madrid-Barajas and Barcelona, respectively. They do not support any significant commercial traffic.
Source: Own elaboration on information obtained from the web page of the Ministerio de Fomento (Spanish ministry of transports) and Spanish statistics Institut (INE)

Table 3. Investment equation estimates. N = 150

Dependent variable: INV				
	FGLS	**PW**	**PW (IV) without time specific effects**	**PW (IV) with time specific effects**
GDP	5.49e-06 (2.13e-06)***	5.49e-06 (1.19e-06)***	3.01e-06 (1.35e-06)**	4.31e-06 (1.73e-06)**
PAX	1.34 (0.12)***	1.34 (0.08)***	0.59 (0.29)**	0.58 (0.29)**
INTERN	-0.13 (0.037)***	-0.13 (0.01)***	-0.05 (0.02)**	-0.05 (0.02)**
INV_{-1}	-	-	0.50 (0.27)*	0.48 (0.27)*
1995	-	-	-	-0.006 (0.027)
1996	-	-	-	0.007 (0.028)
1997	-	-	-	-0.016 (0.028)
1998	-	-	-	-0.003 (0.021)
1999	-	-	-	-0.003 (0.021)
2000	-	-	-	-0.010 (0.021)
2001	-	-	-	-0.013 (0.023)
2002	-	-	-	-0.016 (0.02)
2003	-	-	-	-0.021 (0.02)
Intercept	-0.06 (0.03)*	-0.06 (0.02)***	-0.03 (0.01)**	-0.043 (0.02))**
Wald1	194.92***	1,229.21***	669.60***	1,375.46***
R^2	-	0.56	0.60	0.60
BP	498.65***	-	-	-
Wald2	67,199.38***	-	-	-
D_p	1.74	1.74	1.54	1.52

Note 1: Standard errors in parenthesis
Note 2: Significance at 1% (***), 5% (**), 10% (*)
Note 3: Wald1: Wald Test (χ^2) of joint significance
BP_ Breusch-Pagan LM test of cross-sectional correlation
Wald2: Wald test for groupwise heteroskedasticity
D_p: Bhargava et al. test for serial autocorrelation (modified Durbin-Watson test)

Table 4. Estimated elasticities (evaluated at sample means)

Dependent variable: INV				
	FGLS	**PW**	**PW (IV) without time specific effects**	**PW (IV) with time specific effects**
GDP	1.14 (0.46)**	1.14 (0.26)***	0.74 (0.35)**	1.04 (0.40)***
PAX	1.34 (0.19)***	1.34 (0.11)***	0.66 (0.31)**	0.64 (0.30)**
INTERN	-0.64 (0.19)***	-0.64 (0.11)***	-0.32 (0.14)**	-0.29 (0.12)**

Table 5. Investment equation estimates. N = 150

Dependent variable: INV				
	FGLS	**PW**	**PW (IV) without time specific effects**	**PW (IV) with time specific effects**
GDP	5.14e-06 (2.10e-06)**	5.14e-06 (1.50e-06)***	2.87e-06 (1.41e-06)**	6.74e-06 (2.42e-06)***
PAX	1.40 (0.13)***	1.40 (0.1)***	0.66 (0.30)***	0.67 (0.30)**
INTERN	-0.14 (0.04)***	-0.14 (0.02)***	-0.06 (0.03)**	-0.06 (0.02)**
Incumbent	0.16 (0.07)**	0.16 (0.06)**	0.11 (0.05)**	0.18 (0.07)**
INV_{-1}	-	-	0.47 (0.26)*	0.43 (0.27)
1995	-	-	-	-0.006 (0.025)
1996	-	-	-	-0.0006 (0.26)
1997	-	-	-	-0.025 (0.027)
1998	-	-	-	-0.012 (0.021)
1999	-	-	-	-0.017 (0.022)
2000	-	-	-	-0.004 (0.026)
2001	-	-	-	-0.04 (0.027)
2002	-	-	-	-0.048 (0.028)*
2003	-	-	-	-0.05 (0.029)*
Intercept	-0.11 (0.04)***	-0.12 (0.04)***	-0.08 (0.03)**	-0.13 (0.04)***
Wald1	207.02***	1,246.50***	617.62***	1,334.31***
R^2	-	0.58	0.61	0.62
BP	581.849***	-	-	-
Wald2	75,795.37***	-	-	-
D_p	1.75	1.75	1.54	1.52

Note 1: Standard errors in parenthesis
Note 2: Significance at 1% (**), 5% (*)
Note 3: Wald1: Wald Test of joint significance
BP_ Breusch-Pagan LM test of independence
Wald2: Wald test for groupwise heteroskedasticity
D_p: Bhargava et al. test for serial autocorrelation (modified Durbin-Watson test)

Table 6. Estimated elasticities (evaluated at sample means)

Dependent variable: INV				
	FGLS	**PW**	**PW (IV) without time specific effects**	**PW (IV) with time specific effects**
GDP	1.07 (0.45)**	1.07 (0.33)***	0.72 (0.37)*	1.63 (0.56)***
PAX	1.40 (0.19)**	1.40 (0.15)***	0.74 (0.31)**	0.74 (0.32)**
INTERN	-0.70 (0.19)***	-0.70 (0.12)***	-0.38 (0.15)**	-0.34 (0.14)**
Incumbent	1.02 (0.46)**	0.99 (0.48)**	0.77 (0.38)**	1.35 (0.53)**

Table 7. Investment equation estimates. N = 150

Dependent variable: INV				
	FGLS	**PW**	**PW (IV) without time specific effects**	**PW (IV) with time specific effects**
GDP	4.50e-06 (1.99e-06)**	4.50e-06 (9.04e-07)***	2.57e-06 (1.21e-06)**	3.31e-06 (1.67e-06)**
PAX	1.47 (0.12)***	1.47 (0.09)***	0.79 (0.28)***	0.80 (0.27)***
INTERN	-0.15 (0.03)***	-0.15 (0.02)***	-0.08 (0.03)***	-0.08 (0.03)***
Correspondence	0.07 (0.01)***	0.07 (0.02)***	0.05 (0.01)***	0.05 (0.015)***
INV_{-1}	-	-	0.44 (0.25)*	0.45 (0.27)
1995	-	-	-	-0.006 (0.025)
1996	-	-	-	-0.006 (0.025)
1997	-	-	-	-0.030 (0.025)
1998	-	-	-	-0.013 (0.019)
1999	-	-	-	-0.016 (0.020)
2000	-	-	-	-0.011 (0.020)
2001	-	-	-	-0.013 (0.020)
2002	-	-	-	-0.015 (0.021)
2003	-	-	-	-0.019 (0.021)
Intercept	-0.08 (0.03)***	-0.08 (0.02)***	-0.053 (0.016)***	-0.051 (0.022)***
Wald1	250.13***	761.99***	931.15***	1,688.71***
R^2	-	0.62	0.63	0.64
BP	302.803***	-	-	-
Wald2	2,094.30***	-	-	-
D_p	1.74	1.74	1.54	1.52

Note 1: Standard errors in parenthesis
Note 2: Significance at 1% (**), 5% (*)
Note 3: Wald1: Wald Test of joint significance
BP_ Breusch-Pagan LM test of independence
Wald2: Wald test for groupwise heteroskedasticity
D_p: Bhargava et al. test for serial autocorrelation (modified Durbin-Watson test)

Table 8. Estimated elasticities (evaluated at sample means)

Dependent variable: INV				
	FGLS	**PW**	**PW (IV) without time specific effects**	**PW (IV) with time specific effects**
GDP	0.94 (0.42)**	0.94 (0.19)***	0.64 (0.31)**	0.80 (0.39)**
PAX	1.48 (0.19)***	1.48 (0.13)***	0.89 (0.29)***	0.88 (0.28)***
INTERN	-0.73 (0.18)***	-0.73 (0.11)***	-0.46 (0.15)***	-0.45 (0.15)***
Correspondence	0.54 (0.12)***	0.54 (0.15)***	0.42(0.14)***	0.45 (0.14)***

Appendix 1

Table A-1. Descriptive statistics (Number of observations: 150)

Variable	Mean	Standard deviation	Minimum value	Maximum value
Total Investment (10^3 euros)	55,512.41	182,162.9	12	1,552,165
Percentage of total investment	0.07	0.130	0	0.707
Gross Domestic Product per capita	13,792.75	3,591.204	6,843	22,679
Total output (Annual passengers carried)	8,199,530	1.06e+07	18,386	3.54e+07
Percentage of total output	0.07	0.08	0	0.26
Percentage of International passengers	0.33	0.27	0	0.91
Incumbent	0.42	0.10	0.18	0.58
Correspondence	0.53	0.50	0	1

Table A-2. Spanish airports operating profits. Millions of euros

Region	Airports	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	Madrid-Barajas, Madrid-Cuatro Vientos	89.7	39.3%	45.7%	**2.66**
Canary Islands	Gran Canaria, Tenerife Norte, Tenerife sur, Fuerteventura, Lanzarote, La Palma, el Hierro, La Gomera	40.7	17.8%	20.8%	0.38
Catalonia	Barcelona, Girona, Reus, Sabadell	40.2	17.6%	20.5%	0.99
Balearic Islands	Palma Majorca, Ibiza, Menorca	41.8	18.3%	21.3%	0.36
Com. Valenciana	Alicante, Valencia	10.8	4.7%	5.5%	0.37
Andalusia	Malaga, Almeria, Seville, Cordoba, Granada, Jerez	5.1	2.2%	2.6%	0.36
Surplus in system		***228.3***	**100.0%**		
Extremadura	Badajoz	-0.6		-0.3%	0.63
Castile & Leon	Valladolid, Salamanca, Leon	-1.8		-0.9%	**1.75**
Murcia	Murcia	-2.0		-1.0%	0.39
Navarra	Pamplona	-2.1		-1,1%	0.69
Asturias	Oviedo	-2.6		-1.3%	**1.18**
Cantabria	Santander	-2.8		-1.4%	0.92
Aragon	Saragossa	-2.9		-1.5%	**1.57**
Galicia	Santiago, Coruna, Vigo	-6.9		-3.5%	0.67
Basque Country	Bilbao, San Sebastian, Vitoria	-7.6		-3.9%	**1.23**
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)].

Appendix 2

Table A-3. Investment equation estimates (investment per capita). N = 150

Dependent variable: INVc						
	FGLS	**PW**	**PW (IV)**	**PW (IV) with time specific effects (1)**	**PW (IV) with time specific effects (2)**	**PW (IV) with time specific effects (3)**
GDP	0.0017 (0.0006)***	0.0017 (0.0003)***	0.0014 (0.0004)***	0.0017 (0.0006)***	0.0029 (0.0009)***	0.0014 (0.0005)***
PAX	2.56e-06 (3.04e-06)***	2.56e-06 (4.20e-07)***	2.15e-06 (5.84e-07)***	2.21e-06 (5.83e-07)***	2.52e-06 (6.73e-07)***	2.60e-06 (6.83e-07)***
INTERN	-19.32 (10.82)*	-19.32 (9.61)**	-18.98 (9.45)**	-19.60 (9.14)**	-21.94 (9.89)**	-25.23 (11.12)**
$INV_{C(-1)}$	-	-	0.23 (0.17)	0.21 (0.18)	0.11 (0.18)	0.17 (0.17)
1995	-	-	-	3.03 (9.02)	2.95 (8.70)	2.89 (8.52)
1996	-	-	-	7.00 (9.88)	2.31 (10.28)	2.59 (9.78)
1997	-	-	-	-1.76 (9.62)	-6.74 (10.03)	-5.91 (9.53)
1998	-	-	-	-8.24 (7.40)	-14.69 (8.47)*	-12.62 (7.76)
1999	-	-	-	-10.79 (7.90)	-18.38 (9.34)*	-15.12 (8.31)*
2000	-	-	-	-10.83 (8.56)	-25.71 (12.09)**	-12.42 (8.51)
2001	-	-	-	-3.84 (8.78)	-19.47 (12.57)	-5.08 (8.67)
2002	-	-	-	1.76 (8.74)	-14.28 (12.66)	1.04 (8.55)
2003	-	-	-	-0.67 (8.81)	-17.05 (12.90)	-1..03 (8.57)
Incumbent	-	-	-	-	83.06 (28.95)***	-
Correspond.	-	-	-	-	-	13.75 (5.30)***
Intercept	-21.43 (9.32)**	-21.43 (4.91)**	-21.75 (10.21)**	-19.94 (8.40)**	-61.23 (19.91)**	-20.70 (8.49)**
Wald1	166.83***	96.02***	112.53***	14,505.59***	13,684.08***	12,003.08***
R^2	-	0.53	0.54	0.57	0.60	0.59
BP	461.435***	-	-	-	-	-
Wald2	39,066.68***	-	-	-	-	-
D_p	0.65	0.65	0.73	0.74	0.77	0.74

Note 1: Standard errors in parenthesis
Note 2: Significance at 1% (***), 5% (**), 10% (*)
Note 3: Wald1: Wald Test (χ^2) of joint significance
BP_ Breusch-Pagan LM test of cross-sectional correlation (χ^2)
Wald2: Wald test for groupwise heteroskedasticity
D_p: Bhargava et al. test for serial autocorrelation (modified Durbin-Watson test)

Table A-4. Estimated elasticities (evaluated at sample means)

Dependent variable: INVc						
	FGLS	**PW**	**PW (IV)**	**PW (IV) with time specific effects (1)**	**PW (IV) with time specific effects (2)**	**PW (IV) with time specific effects (3)**
GDP	1.40 (0.54)**	1.40 (0.29)***	1.20 (0.36)***	1.47 (0.51)***	2.38 (0.76)***	1.19 (0.43)***
PAX	1.22 (0.20)***	1.22 (0.16)***	1.004 (0.21)***	1.03 (0.27)**	1.17 (0.32)***	1.21 (0.32)***
INTERN	-0.37 (0.21)*	-0.37(0.18)**	-0.37(0.16)**	-0.38 (0.18)**	-0.43 (0.19)**	-0.49 (0.22)**
Incumbent	-	-	-	-	2.09 (0.73)***	-
Correspondence	-	-	-	-	-	0.42 (0.17)**