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Ane Elixabete Ripoll-Zarraga
Cecilio Mar-Molinero

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Spanish Airports: a Visual Study of Management Efficiency

Ane Elixabete Ripoll-Zarraga[a]*, Cecilio Mar-Molinero[b]

[a] *Faculty of Business and Economics (Business Department). Universitat Autònoma de Barcelona (UAB) 08193 Bellaterra (Spain)*

[b]*Kent Business School (Business Department). The University of Kent CT2 7FS Kent (United Kingdom)*

Abstract

In recent years the Spanish government has invested significantly in the infrastructure of airports. It is not clear if this investment has been efficiently applied. The Spanish airport system is centralised. Airports operate as independent profit centres but are under the control of a central authority, AENA. This means that, in Spain, non-profitable airports are subsided by profitable airports, and that non-profitable airports are a burden on financial resources. This calls for an assessment of the real reasons behind any inefficiency. We study airport efficiency using Data Envelopment Analysis (DEA). In standard studies, DEA summarises the efficiency of a unit by means of a single number. Here we go beyond the efficiency score by combining DEA with multivariate analysis techniques. In this way we are able to establish why a particular airport reaches a given efficiency level, and what is its approach to the use of resources and the achievement of results. The combined use of DEA and multivariate statistical analysis permits the visualisation of the results and the addition of qualitative information to the interpretation of the results.

Keywords: *Data Envelopment Analysis (DEA); Multidimensional Scaling (MDS); Visualisation; Technical Efficiency; Benchmarking; Spanish Airport-System*

*Corresponding author. Tel. +34693426050
E-mail addresses: ane_rz@yahoo.com (A.E. Ripoll-Zarraga); c.mar-molinero@kent.ac.uk (C. Mar-Molinero)

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1. Introduction

This paper focuses on visualising the technical efficiency of the Spanish airports in order to assess the effectiveness of public resources management. Spanish airports are government owned and managed through a public company (AENA) under a system where non-profitable airports are cross-subsidized by profitable airports. The European Commission in a recent report (European Court of Auditors, December 2014) has identified an excess of investment in public infrastructures in Europe, and has called for an investigation of (i) the impact of management decisions and (ii) the effectiveness of governments in managing public resources. Investigating these issues has been the motivation behind the research reported here.

Decision-making in Spanish airports is fully centralised. Spanish airports have no flexibility when negotiating with airlines or in managing airports' resources. AENA has the legal power to decide air fees to be charged to the airlines in each airport. Additionally, the Spanish airport industry does not have an independent regulatory body to ensure good practices and enhance competition in order to make the Spanish market attractive to airlines. It is, however, important to highlight inefficiency in the allocation of resources, in the process of price setting, and in the achievement of results in order to improve the management of the system. If inefficiencies are identified and their reasons exposed, the overall management body can take action in order to improve the overall system.

Historically, airports used to be considered as natural monopolies fully owned by governments and therefore treated as a public utility. In Spain there has been pressure from the part of local governments, professional bodies and the general public requesting the transfer of the individual airports' management to local control. This pressure met with some success. The government took some initial steps with the announcement on the 25th March 2009 of the creation of a subsidiary body (EGAESA). But the impact of the centralisation of decisions still remains an issue. There is evidence from other OECD countries with similar size airport networks and similar political structure that decentralisation and private management increases efficiency (Nombela, G. in Abertis, 2009). Airports are individually managed in most developed countries such as France, Italy, Germany and the UK, Canada and the United States. In some big cities with a high level of commuters and air travellers, airports may have a unique management form (public sector or private sector), this is to ensure competition in the airport market. Examples are London, Paris, Rome and Milan.

The ‘singular airport’ topic has been publicly discussed by the Spanish Government in January 2010 (Cambra de Comerç de Barcelona, 2010)

The Spanish airport-system ensures the transfer of financial resources from profitable to non-profitable airports (cross-subsidisation). Non profitable airports tend to have a low level of traffic, but they still remain open since they are financed by excess income in profitable airports. An airport-system similar to the Spanish is also found in Norway, but in Norway, airports must be kept open since air transport is the only travel-alternative for citizens who live in remotes areas.

Competition starts with rivalry within the industry. According to Porter (1979), markets are competitive when barriers to entry are low. Competition implies flexibility in the negotiation process with airlines with respect to prices and quality of the services. But Spanish airports do not compete against each other since managers do not have decision power in such variables as passenger choice; service provided and price. The Spanish National Board for Markets and Competition (CNMC, 2014) argues that some Spanish airports could compete if they had the ability to manage their own resources. This calls for an analysis of the efficiency of Spanish airports from the point of view of resources used and results obtained. In this paper we use Data Envelopment Analysis (DEA) in order to perform such an analysis. The DEA technique is fairly standard within the scientific management literature. Charner et al. (1993) and Cooper et al. (2000), amongst others, provide an extensive introductory literature regarding DEA and its applications.

In DEA a unit of assessment (UOA) uses inputs in order to generate outputs. A major problem in DEA is the specification of the model, this is to say, identifying which inputs and which outputs are to be included in the model. This issue has been long debated. For example, Farrell (1957) observed that input and output selection is a highly subjective matter. If not all the variables are included, important aspects of the problem may be omitted, but if many variables are included in the specification, some units may become efficient just because they are “special cases”. A further problem, known as the zero weights issue, appears when UOAs ignore a particular input or output in order to show themselves in a better light. Besides, DEA generates just a score, and we would like to know what is behind the score, how do the different units achieve a particular efficiency level. This problem was addressed Serrano-Cinca and Mar-Molinero (2004) who suggested that DEA specification search should be embedded within a multivariate analysis framework. This is done in the current paper. We estimate a variety of models and analyse the DEA efficiency obtained from each of model for each airport using Factor Analysis, Cluster Analysis, and Property Fitting techniques. All these are standard tools in Multivariate Statistical methods.

The next section presents a review of the literature on airport efficiency. This is continued with a discussion of data issues. The analysis and interpretation of the results follows next. The paper ends with a discussion of the findings.

2. Literature Review

Data Envelopment Analysis (DEA) originally developed by Charnes et al. (1978) and subsequently extended by Banker et al. (1984), is a non-parametric linear programming-based method that evaluates the comparative efficiency of a set of homogeneous UOAs.

DEA has been applied in multiple airport studies over the last 15 years. In DEA there are two fundamental approaches: radial and non-radial. Both approaches are related to the path that inefficient units have to follow in order to reach the competitive frontier, and so become efficient. The radial projections introduced by Debreu (1951) and Farrell (1957) are based on the proportional reduction in inputs (or increase in outputs) in order to improve the efficiency of the units analysed. Non-radial projections were introduced by Koopmans (1951) and Russell (1985). Charnes et al. (1985) were the first authors who proposed an additive model, non-oriented DEA, to estimate efficiency scores based on a proportional reduction (increase) of inputs (outputs). The basic model has been modified to propose improvements to the basic formulation (Brockett, 1997; Cooper et al, 1999; Tone, 2001; Asmild & Pastor, 2010; Fare & Grosskopf, 2000). The majority of studies of airport benchmarking using Data Envelopment Analysis have been based on radial models, sometimes with constant returns to scale (Bazarghan & Vasigh, 2003; Fund et al., 2008; Sarkis & Talluri, 2004) and sometimes with variable returns to scale (Adler & Berechman, 2001; Fernandes & Pacheco, 2002; Martin & Roman, 2006). Some other studies use both types of returns in order to estimate technical and scale efficiency levels in the airport operations (Abbot & Wu, 2002; Assaf, 2010; Martin & Roman, 2001). Table 1 gives details of some relevant studies and their findings.

Author/s	Outcome	Methodology	Findings
Murillo-Melchor (1999)	Technical Efficiency 33 Spanish airports (1992-1994)	Data Envelopment Analysis (DEA) Total Factor Productivity (Malmquist Index)	Airports with more passengers are more efficient
Salazar de la Cruz (1999)	Technical Efficiency 16 Spanish airports (1993-1995)	Data Envelopment Analysis (DEA)	Airports with more passengers are more efficient
Martin & Roman (2001)	Technical Efficiency 37 Spanish airports (1997)	Data Envelopment Analysis (DEA)	Airports with larger size are more efficient. Airports' geographical location affects efficiency
Martin & Roman (2006)	Technical Efficiency 34 Spanish airports (1997)	Different variations based on Data Envelopment Analysis (DEA)	Airports with more passengers are more efficient. Airports' geographical location affects efficiency
Martin-Cejas (2002)	Technical Efficiency 40 Spanish airports (1996-1997)	Deterministic Cost Frontier (DCF)	Airports with 1 to 3 million passengers show higher average of efficiency
Coto-Millan et al. (2007)	Economic Efficiency 33 Spanish airports (1992-1994)	Cost Stochastic Frontier Analysis (SFA)	Airports with more passengers are more efficient
Tapiador et al. (2008)	Technical Efficiency 29 Spanish airports (2006-2007)	Data Envelopment Analysis (DEA)	Larger and small airports are more geographically efficient
Martin et al. (2009)	Economic Efficiency 37 Spanish airports (1991-1997)	Cost Stochastic Frontier Analysis (SFA) Bayesian Inference	Larger airports are more efficient
Tovar & Martin-Cejas (2009)	Technical Efficiency 26 Spanish airports (1993-1999)	Stochastic Frontier Analysis (SFA) Distance Function	Airports outsourcing some services are more efficient
Tovar & Martin-Cejas (2010)	Technical Efficiency 26 Spanish airports (1993-1999)	Stochastic Frontier Analysis (SFA) Distance Function. Total Factor Productivity (Malmquist Index)	Hub airports are on average more efficient. Northern airports are more efficient
Lozano & Gutierrez (2011)	Technical Efficiency 39 Spanish airports (2006-2007)	Target-setting DEA Slack-Based Measure (SBM)	Passengers and Cargo are directly related with efficiency
Martin et al. (2011)	Economic Efficiency 36 Spanish airports (1991-1997)	Cost Stochastic Frontier Analysis (SFA)	Airports within the same catchment area are cost-inefficient unless congested
Lozano et al. (2013)	Technical Efficiency 39 Spanish airports (2008)	Network DEA	Network DEA shows higher discriminatory power to detect inefficiencies
Coto-Millan et al. (2014)	Technical Efficiency 35 Spanish airports (2009-2011)	Data Envelopment Analysis (DEA) Total Factor Productivity (Malmquist Index) Regression (Airport's size; LCCs)	Larger airports are more technically and scale efficient LCC increases scale efficiency
Coto-Millan et al. (2016)	Technical Efficiency 35 Spanish airports (2009-2011)	Data Envelopment Analysis (DEA) Tobit Regression (Airports' size; Cargo; LCCs)	Airports with more cargo are more technically and scale efficient.

Table 1: Summary of Spanish airports' studies

3. Methodology

The calculation of DEA efficiencies requires solving a set of linear programming problems. Linear Programming is not a statistical technique and, as such, there are no standard procedures, such as t-tests, in order to assess if a variable (an input or an output) should be included in the specification of the model. In general, model specification tends to depend on the personal choices made by the analyst. It is perfectly possible for two different modellers using the same data to arrive at different results just because they have included a different set of inputs and outputs in the model. DEA efficiencies may not be reliable if a relevant variable is omitted. Variable omission can take place in a subtle way: the UOA under evaluation can attach zero weight to one of the variables, thus removing it from the assessment set. On the other hand, the addition of irrelevant variables has consequences. The number of fully efficient units depends on the number of inputs and outputs in the specification (Pedraja Chaparro et al., 1999). A UOA can appear to be efficient if an extra input or output is added to the variable set. This is the case because some units of assessment become self-comparators, or special cases.

Specification searches in DEA have a long pedigree. Norman and Stoker (1991) suggested that a DEA model should be first estimated without a potentially important variable, and that the efficiencies calculated should be correlated with the values of the missing variable. If the correlation turns out to be high, the missing variable should be included in the model and the estimation process repeated. This procedure of re-estimating DEA models after the addition or removal of an input or an output was generalised by Pastor el al. (2002). A different approach to specification searches, based on the bootstrap, was proposed by Simar and Wilson (2000a, and b). Sirvent et al. (2005) published a comparison of specification searches.

In this paper we apply a different approach to model selection based on a combination of DEA and multivariate statistical techniques first proposed by Serrano-Cinca and Mar-Molinero (2004). An example of the application of this methodology can be found in Serrano-Cinca et al. (2016). The distinctive feature of the procedure is the visualisation of the main characteristics of the results. This procedure has the added advantages of making it possible to rank UOAs, even when they are fully efficient, and of explaining the reasons why a particular unit achieves a given level of efficiency.

Our procedure requires estimating efficiencies under a variety of specifications: combinations of inputs and outputs. This overcomes the “zero weight problem”. Imagine two UOAs: UOA_1 and UOA_2. Further imagine that both UOAs are compared on the basis of two inputs, I_1 and I_2, and three outputs, O_1, O_2, and O_3. It is possible for UOA_1 to give non-zero weights to all inputs and outputs, whilst UOA_2 gives non-zero weights to I_1 and I_2 but gives zero weights to O_2 and O_3. In fact, we are not comparing like with like, as the efficiency of UOA_1 is calculated on the basis of the specification I_1, I_2, O_1, O_2, and O_3 while the efficiency of UOA_2 is calculated on the basis of the specification I_1, I_2, and O_1. In the procedure presented here, both UOA will be compared on the basis of the more limited model I_1, I_2, O_1 as well as on the basis of the full I_1, I_2, O_1, O_2, O_3 model (that UOA_2 will simplify). The difference between the two UOAs will be highlighted by the graphical presentation of the results.

In theory, any combination of outputs and inputs can be contemplated but, in practice, some combinations will make no theoretical sense or will not be particularly interesting. In fact, “uninteresting” specifications have been omitted in this study. In this way we obtain a two-way table of specifications by units of assessment. Each cell in the table will contain the efficiency of the unit of assessment under the particular specification being contemplated. This two-way table of efficiencies is then analysed with the techniques of statistical multivariate analysis. In particular, Factor Analysis, Cluster Analysis and Property Fitting. The advantage of using this approach is that the results of the analysis can be presented graphically and interpreted with the addition of information not used in deriving the graphs (external analysis). Examples of this approach can be found in Gutierrez-Nieto et al. (2007) and Sagarra et al. (2015).

For modelling purposes, it is essential to understand what exactly are inputs and outputs. Additionally, DEA requires homogenous data for all the airports. . Homogeneity implies that all airports are well described by the same production function. Overall, Spanish airports differ in terms of infrastructure size as well as financial resources, but we do not consider this to be a source of heterogeneity. Some airports may be included in public services obligation routes (PSOs) where a minimum level of service is required by law.

4. Data description

The Spanish airport-system contains 49 civilian airports including four general aviation airports and two heliports. General aviation (GA) is all non-commercial civil aviation operations: scheduled and non-scheduled air transport operations (ICAO).

Spanish airports are government owned and managed through a public company (AENA). Table 2 lists the airports after grouping them in three categories according to size, and gives summary statistics for the different size groups. In Table 2 size is measured through the number of passengers in one year (PAX). Notice that the airports are classified in one category when there is consistency in the number of passengers across the years. Following this procedure, we have identified 14 large airports; 13 medium-sized ones and 22 small ones. It can be seen there is a high variability in terms of numbers of passengers. A wide variability is also found in the amount of cargo transported in one year (the statistic is not given here).

Airports	Size	Min PAX	Max PAX
LARGE AIRPORTS Alicante; Barcelona; Bilbao; Fuerteventura; Gran Canaria; Ibiza; Lanzarote; Madrid Barajas; Málaga; Palma de Mallorca; Sevilla; Tenerife-North; Tenerife-South; Valencia	> 3,500,000	3,524,470	39,735,618
MEDIUM SIZED AIRPORTS A Coruña; Almería; Asturias; Girona-Costa Brava; Granada; Jerez; La Palma; Menorca; Murcia; Reus; Santander; Santiago; Vigo	≤ 3,500,000 > 750,000	638,288	2,736,867
SMALL SIZED AIRPORTS Albacete; Algeciras; Badajoz; Burgos; Ceuta; Córdoba; El Hierro; Huesca-Pirineos; La Gomera; León; Logroño; Madrid 4 vientos; Madrid Torrejón; Melilla; Pamplona; Sabadell; Salamanca; San Sebastián; Son Bonet; Valladolid; Vitoria; Zaragoza	≤ 750,000	273	457,595

Table 2: Airports Size in terms of Passengers per year (Source: AENA, 2013)

Notice that the lowest level of passengers for medium sized airports corresponds to Granada in 2013. Nevertheless, this airport is considered medium due to consistency in terms of passengers across of the years.

After the revision of the literature, and taking into account data availability, three inputs and four outputs were selected for inclusion in the DEA model. The inputs are labelled with letters and the outputs with numbers. These are summarised in Table 3.

Inputs	Outputs
A Labour	1 Passengers
B Operating Costs	2 Air Traffic Movements
C Depreciation of Airside Assets	3 Cargo
	4 Commercial Revenues
	5 Percentage of Flights on time

Table 3: Inputs and Outputs in the DEA models

Financial data, except depreciation, were extracted directly from the AENA's annual reports for 2013. This was the most recent data set available at the time when this study was carried out. On the outputs side, annual number of passengers (PAX), air traffic movements (ATM), cargo, and commercial revenues are desirable outputs. Aeronautical revenues have not been included as an output because they were found to be highly correlated with PAX, ATM, and Cargo. Rather than using the number of flights delayed −a negative output−, which is the usual measure of punctuality, we used as output the percentage of number of flights arriving on time −a positive output. An aircraft is considered to arrive on time if it arrives with a maximum delay of four minutes.

There were four missing values in the variable percentage of flights on time. Instead of removing these airports from the database, we used a nearest neighbour imputation routine. Given an airport with a missing value, such as Ceuta, we found the airport (airports) with most similar data structure in the remaining variables. The value of flights on time for this nearest neighbour was used as the percentage of flights on time for the airport with the missing value. When several airports were found to be nearest neighbours an average was used. This procedure is not ideal, but we preferred to work with a small amount of measurement error rather than lose observations in the subsequent analysis.

Turning now to inputs, staff cost (labour) excludes the cost of air traffic control services. Operating costs depend on the level of activity of the airport. Depreciation measures the use of capital assets. An overall concept that summarizes airport capacity is the infrastructure.

Airport assets can be classified as airside or landside (Gillen and Lall, 1997; and Pels et al., 2001). The literature does not converge in defining capital measures, leading to their exclusion in some benchmarking analyses (Parker, 1999). The difficulties in obtaining the acquisition costs of airport assets is overcome by using capital proxy measures such as rent expenses (Parker, 1999); depreciation of fixed assets (Murillo et al. 1999; Martin et al. 2001, 2009 and 2011); capital expenses (Martin-Cejas 2002); or net book value (Pestana et al.

2004; Coto-Millan at al. 2014 and 2016). Physical measures have been also used such as the length of runways (Martin et al. 2011), airport surface area, and number of gates (Tovar et al. 2009 and 2010). Also, more specific assets that can be classified into those that are linked to aircraft movements (boarding gates; apron capacity and runways areas) and those linked to loading processes such as checking counters and baggage belts (Lozano et al. 2013). In this paper, we capture airport infrastructure utilisation by means of its depreciation. The importance of considering depreciation as an input is based on the reflection that the use of the infrastructure defines the potential capacity of an airport in its main operational activity. We note that depreciation is a fixed cost since it is an expense incurred even if an airport does not have any traffic. Airports not earning enough revenue to cover their depreciation annual charge will be inefficient in the sense that they become a burden on financial resources of the system. For this reason, when calculating efficiencies we use an output oriented version of the DEA model.

AENA publishes aggregated depreciation figures for all the airports as a whole. The depreciation expenses provided by AENA show an extremely high correlation with operating costs ($+0.9915$) suggesting that published depreciation and operating costs may contain similar information. In meetings with airport managers it was found that the accounting policies applied by AENA do not match standard accounting estimation procedures. Consequently, there is a question on the validity of the data published by AENA. This suggests that AENA's financial statements may not be a faithful representation of reality in Spanish airports. For this reason, an alternative measure of depreciation was adopted in this study.

In this study, the value of airport assets and their depreciation are calculated according to international financial reporting standards (IFRSs). The historical cost of the assets −understood as the initial infrastructure− was estimated using the construction certification disclosures published by AENA from 2000 to 2012. The standard depreciation coefficients used in the air transport sector were used to estimate the depreciation of each asset. The useful life of the assets was estimated following the current regulation in the transportation sector for buildings and structures (1993 to 2005 and from 2006 to date). According to international financial reporting standards (IFRSs) for property, plant and equipment (PPE, IAS16), any improvement made from 2001 will increase the historical cost of the specific asset, and such asset will depreciate accordingly from the moment when it is ready to be used. Table 4 gives summary statistics for the inputs and outputs used in the model.

Variable	Observations	Mean	Standard Dev.	Minimum	Maximum
Commercial Revenues (€)	49	12,865.36	30,805.75	9.01	161,391.76
Passengers	49	3,824,594.47	8,189,925.23	273	39,735,618
Air Traffic Movements	49	36,549.96	64,745.84	476	333,056.00
Cargo (t)	49	13,039,859.43	51,900,442.76	0	346,602,597.00
Labour Costs (€)	49	6,113.92	9,176.74	108.12	48,934.72
Operating Costs (€)	49	19,035.00	49,592.68	333.38	299,582.10
Depreciation AENA (€)	49	15,025.25	37,457.04	342.39	226,544.94
Depreciation Airside (€)	48	4,052.17	9,923.97	26.53	66,174.99
Depreciation Landside (€)	48	1,168.52	2,283.18	0	11,863.57

Table 4: Summary Statistics (Source: AENA, 2013 except for depreciation airside and landside)

5. Analysis and results

The methodology implemented requires estimating efficiencies for each airport using an output-oriented variable returns to scale (VRS) model. The decision to use the VRS formulation was taken after extensive talks with airport managers. Previous research by Adler (2013) also supports this decision, since it was established that small airports tend to work under increasing returns to scale. Efficiencies were estimated for 124 DEA specifications, a specification being a particular combination of inputs and outputs. Inputs were identified by means of capital letters, and outputs by means of numbers, following the notation introduced in Table 3. For example, the model AC24 contains as inputs Labour (A) and Depreciation (C) and as outputs Air Traffic Movements (2) and Commercial Revenues (4). Not all possible combinations of inputs and outputs were considered, as some did not make operating sense. Appendix 1 shows the efficiency scores achieved by each airport under each model specification.

The estimation procedure generates a table of 124 columns (specifications) by 49 rows (airports). Although some relevant characteristics can be discovered through visual inspection of Appendix 1, it is better to use the tools of multivariate analysis in order to reveal the important features of the data and represent them in a graphical form. Following the procedure suggested by Serrano-Cinca and Mar-Molinero (2004; 2005), the specifications have been treated as variables and airports have been treated as observations. The factors were orthogonal and un-rotated. Other forms of the Factor Analysis procedure were entertained, but there was no improvement with respect to the results presented here.

The first step in the procedure consists on reducing the dimensionality of the data. With this aim in mind, we performed and unrotated principal component analysis on the data in Appendix 1. The results are shown in Table 5. Eight principal components were found to be associated with an eigenvalue greater than one, using the standard Kaiser criterion, and nine under the more restrictive Jolliffe criterion (Jolliffe, 1972)

We notice that the first two factors account for just over 71% of the variability of the data, whilst the addition of the third factor increases this figure to 81%. It is clear that it is important to attach meaning to the first and the second factor in the analysis.

Component	Eigenvalue	% of Variance	Cumulative %
PC1	72.244	58.261	58.261
PC2	16.525	13.327	71.588
PC3	11.043	8.905	80.493
PC4	9.421	7.598	88.091
PC5	5.889	4.749	92.841
PC6	3.563	2.874	95.714
PC7	1.495	1.206	96.920
PC8	1.405	1.133	98.053

Table 5: Factor Analysis. Variance explained by factors under Kaiser criterion.

We can see in Table 5 that Factor 1 explains 72% of the variability in the data, making it by far the most important factor. Factor 2 adds 16% to the explanation of the variability. Factor 3 contributes a further 11%, and Factor 4 contributes a further 9%. Put together, these four factors explain just over 88% of the variability in the data, a high percentage in most studies of this kind.

In order to attach meaning to the factors we need to consider factor score. These are reproduced in Table 6. In order to facilitate interpretation, factor scores that have a value lower than 0.4 are not shown. We see that, with a small number of exceptions, correlations between the first factor and the various specifications are positive and high. When this is the case, Factor 1 is interpreted as an overall measure of activity. Since we are modelling efficiency in airports, Factor 1 is to be interpreted as an overall measure of efficiency under a variety of ways of defining what an efficient airport is. But it is measure of efficiency that ignores punctuality (output 5) while including all the measures of output that generate income for AENA. This suggests that Factor 1 is to be understood as an overall measure of efficiency in generating income. The ordering of airports in terms of the score in Factor 1 provides a raking of airports in terms of efficiency in generating income. We can see in Figure 2 that the main destinations, such as Madrid, Barcelona and Palma rank high in terms of Factor 1, and small airports with low traffic are situated on the negative side of Factor 1. That small airports are loss-making was also observed by the European Court of Auditors (2014).

Efficiency in dealing with Punctuality appears to be well captured by Factor 2. All the specifications that include Punctuality are associated with positive loadings in Factor 2, whilst all the specifications that exclude Punctuality are associated with negative loadings in this factor. Punctuality (output 5) along with cargo (output 3) also achieves higher and positive loadings in Factor 2. The specifications that load into Factor 3 include outputs 1 (Passengers) and 5 (Punctuality). It appears that Factor 3 is associated with efficiency in dealing with passengers. The specifications that load high on Factor 4 include output 3 (Cargo), suggesting that efficiency in handling cargo is captured by Factor 4 (for example: Zaragoza is a clearly cargo oriented airport). There are no high factor loadings for Factors 5, 6, 7, and 8 and no interpretation is put forward here for their meaning.

Airline punctuality is essential, but it is not always easy to achieve. Airport punctuality depends on the air traffic control restrictions imposed to the airlines operating in a specific moment of time. There are different air traffic control restrictions that airlines must follow: there are airports with low-level of coordination; partially coordinated, and fully coordinated airports (slots). It is assumed that airports of the first type satisfy current and potential airline demand; they are usually small airports with surplus capacity due to low traffic. The second group contains some airports that operate under restrictions during the summer, and of airports that operate under schedules during the whole year. These are usually medium size airports with significant seasonal effects (peaks of demand) that have difficulties in satisfying current and potential demand during specific periods (for example, Ibiza in the Balearic Islands during the summer). Their capacity is usually close to their actual demand. Other airports located in the neighbourhood may be used during congestion periods. Finally, "slots" are large airports with high demand and with a significant lower capacity compared to their current and forecast demands. These are busy airports highly restricted in terms of landing and taking off. In general, airports with less traffic will have less air traffic control restrictions compared to busy airports, usually large airports. On this basis, airports with low level of traffic tend to be more punctual compared to large and medium airports. Figure 1 shows the location of airports together with their classification in terms of air traffic control.

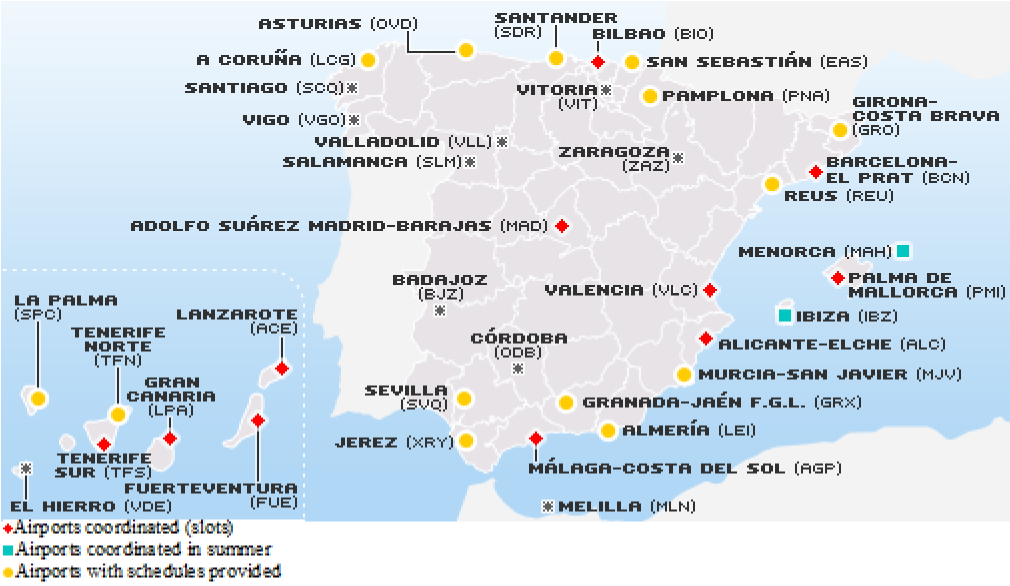

Figure 1: Air traffic control restrictions (Source AECFA, 2010)

Component Matrix[a]				
	PC1	PC2	PC3	PC4
ABC12345	.875			
A12345	.856			
AB12345	.874			
AC12345	.865			
A1234	.836			
AB1234	.798	-.441		
ABC1234	.789	-.410		
AC1234	.833			
A1235	.847			
AB1235	.856			
ABC1235	.856			
AC1235	.853			
A1245	.844			
AB1245	.841			-.419
ABC1245	.841			-.421
AC1245	.850			
A1345	.821			
AB1345	.779		.575	
ABC1345	.796		.551	
AC1345	.849			
A2345	.822			
AB2345	.875			
ABC2345	.887			
AC2345	.865			
A123	.828			
AB123	.787	-.421		
ABC123	.777			
AC123	.823			
A124	.822		-.413	
AB124	.758	-.522		
ABC124	.756	-.527		
AC124	.826			
A125	.831			
AB125	.813			-.441
ABC125	.812			-.442
AC125	.835			
A134	.820			
AB134	.724	-.478		
ABC134	.720	-.449		
AC134	.821			
A135	.747			
AB135	.706		.661	
ABC135	.727		.640	
AC135	.813			

Table 6: Factor loadings. Figures lower than 0.4 in absolute value have been removed. Factors 5; 6; 7 and 8 are not shown since factor loadings are lower than 0.4 or just marginally higher.

(continued)

Component Matrix[a]				
	PC1	PC2	PC3	PC4
A145	.830			
AB145	.758		.541	
ABC145	.774		.514	
AC145	.848			
A234	.825		-.407	
AB234	.855			
ABC234	.851			
AC234	.852			
A235	.725	.520		
AB235	.710	.560		
ABC235	.715	.556		
AC235	.752	.525		
A245	.822			
AB245	.854			
ABC245	.864			
AC245	.858			
A345	.775			
AB345	.802		.419	
ABC345	.847			
AC345	.855			
A12	.811		-.421	
AB12	.737	-.509		
ABC12	.736	-.511		
AC12	.814			
A13	.747			
AB13	.665	-.474	.479	
ABC13	.671	-.424	.459	
AC13	.786			.409
A14	.827			
AB14	.697	-.565		
ABC14	.702	-.570		
AC14	.830			
A15	.751			
AB15	.681		.621	
ABC15	.696		.606	
AC15	.809			
A23	.752		-.503	
AB23	.753			
ABC23	.745			
AC23	.774		-.456	
A24	.823		-.462	
AB24	.827			
ABC24	.831			
AC24	.853			

(continued)

Component Matrix[a]

	PC1	PC2	PC3	PC4
A25	.731	.425	-.406	
AB25	.697	.481		
ABC25	.701	.478		
AC25	.753	.438		
A34	.807			.456
AB34	.807			
ABC34	.817			
AC34	.847			
A35		.775		.401
AB35		.818		
ABC35		.805		
AC35		.791		
A45	.801			
AB45	.861			
ABC45	.835			
AC45	.861			
A1	.750	-.410		
AB1	.634	-.568	.437	
ABC1	.645	-.553	.425	
AC1	.793			
A2	.760		-.572	
AB2	.738		-.439	
ABC2	.742		-.436	
AC2	.789		-.534	
A3		.402		.697
AB3		.429		.589
ABC3		.422		.628
AC3	.443			.689
A4	.838			
AB4	.792			
ABC4	.812	-.421		
AC4	.865			
A5		.829		
AB5		.799		
ABC5		.786		
AC5		.817		

Figure 2 plots the airports in the space of Factor 1 and Factor 2, while Figure 3 plots the airports in the space of Factor 3 and Factor 4.

We need to remember that each airport is a point in a space with 124 dimensions− the number of specifications contemplated− although we have reduced the dimensionality of such a space to eight dimensions− the number of factors associated with a Kaiser value higher than unity− and we have only interpreted four factors. Only projections of the 124 dimensional spaces on two dimensions have been shown in Figure 2 and Figure 3. It is perfectly possible for two airports to appear located next to each other in Figure 2 and Figure 3 while being very far away in the space. For this reason, we have conducted a Cluster analysis of the table of airports by specifications. In order to conduct the cluster analysis we have not standardised the data, since efficiencies are naturally standardised between zero and one hundred. We have used the method proposed by Ward. This method is akin to the analysis of variance in that it attempts to simultaneously maximise homogeneity within clusters and heterogeneity between clusters. The dendogram for Ward's method is shown in Figure 4.

The number of clusters identified in Figure 4 is a decision to be taken by the analyst. Seven clusters have been identified in this case, and they are represented in Figures 2 and 3. There is a clear cluster of small and some medium airports from Granada to Melilla. This cluster is located on the left hand side of Figure 2, indicating that all the airports belonging to this cluster share the characteristic of being inefficient at generating income. Two clusters contain the airports with highest level of traffic, although these clusters differ in that one of them groups airports in touristic seaside areas, while the other one is dominated by Madrid, in the centre of the country. Both clusters are located on the right hand side of Figure 2, indicating high overall financial efficiency levels. Another cluster contains cargo oriented airports, such as Vitoria and Zaragoza (as previously discussed). Airports belonging to this cargo oriented cluster are located towards the top of Figure 2, indicating punctuality. Zaragoza and Vitoria can also be found towards the top of Figure 3, indicating efficiency in dealing with cargo. The cluster− formed by Madrid Cuatro Vientos, Sabadell, and Jerez− is mediocre from the point of view of overall efficiency, and from the point of view of punctuality, but becomes efficient when considering efficiency in dealing with passengers as its main objective. Madrid Cuatro Vientos and Sabadell are general aviation airports, whereas Jerez is a medium sized airport with air traffic control schedules for the whole year. No particular features can be discerned when examining the remaining clusters.

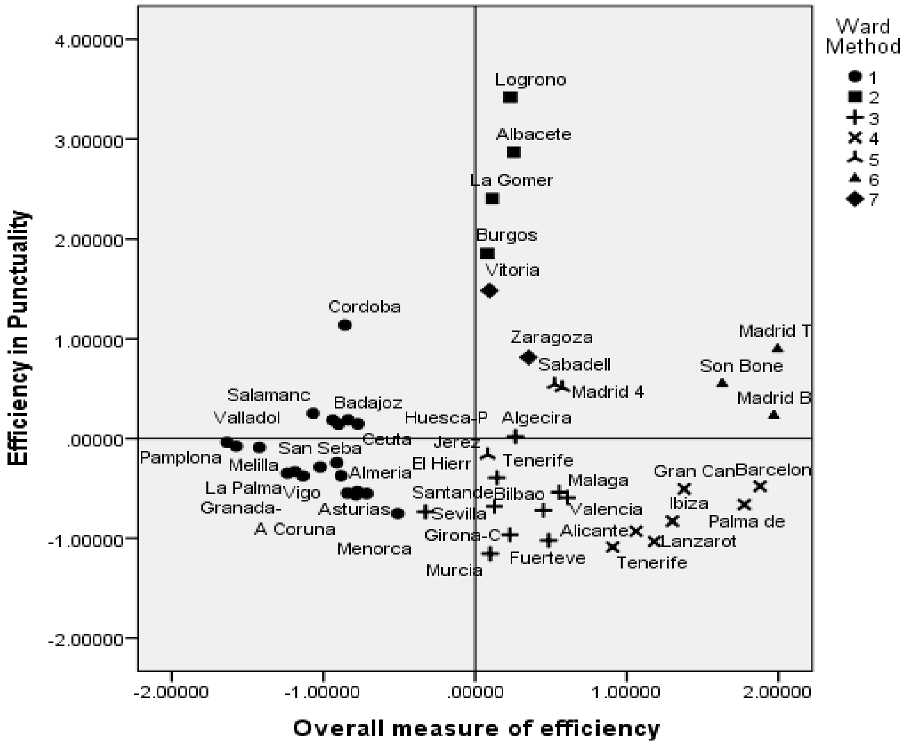

Figure 2: Plot of the airports in the space of the first and the second factors

Most large airports are located towards the South East of Figure 2, suggesting that although they are efficient from an overall point of view, they suffer from delay problems. Medium sized airports tend to be inefficient from an overall point of view, and many have few flights on time. The smallest airports tend to be inefficient from an overall point of view, but tend to have positive scores in the second factor indicating few delays. It appears that there is a trade-off between airport efficiency in generating income and punctuality. Large airports tend to make an efficient use of resources but they are inefficient when delays are included as an output. This is further confirmed by the observation that large touristic airports located in seaside areas, such as Barcelona, are located towards the lower part of the figure, indicating punctuality problems, while airports that are cargo oriented, such as Zaragoza and Vitoria, appear to be good from the punctuality point of view. In fact, Logrono is the airport with the highest proportion of flights arriving on time. This is clearly due to its low level of traffic that results in most aircrafts landing or taking off on time. A similar comment can be made in the cases of airports with low traffic and very low or even no cargo, such as La Gomera, Albacete, and Burgos. The different clusters are clearly visualised: small airports (cluster 1); small airports with zero cargo and very low number of passengers (cluster 2); cargo oriented airports (cluster 7); medium airports in terms of passengers (cluster 3); large airports (cluster 4); general aviation airports (cluster 5); outliers (cluster 6).

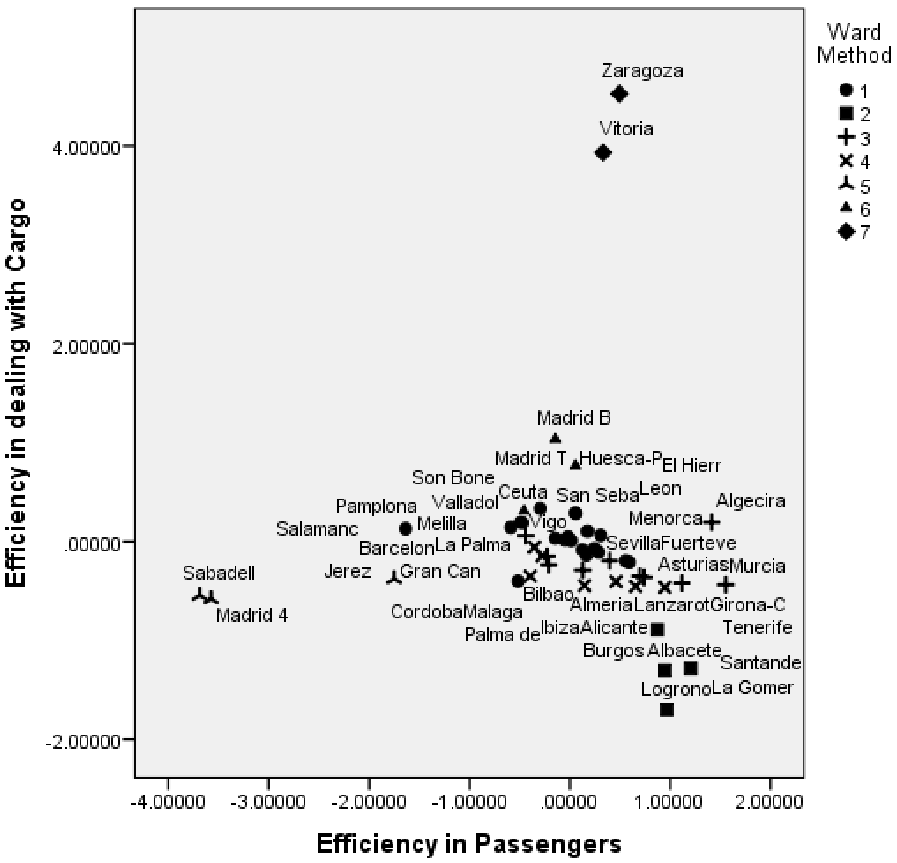

Figure 3: Plot of the airports in the space of the third and fourth factors

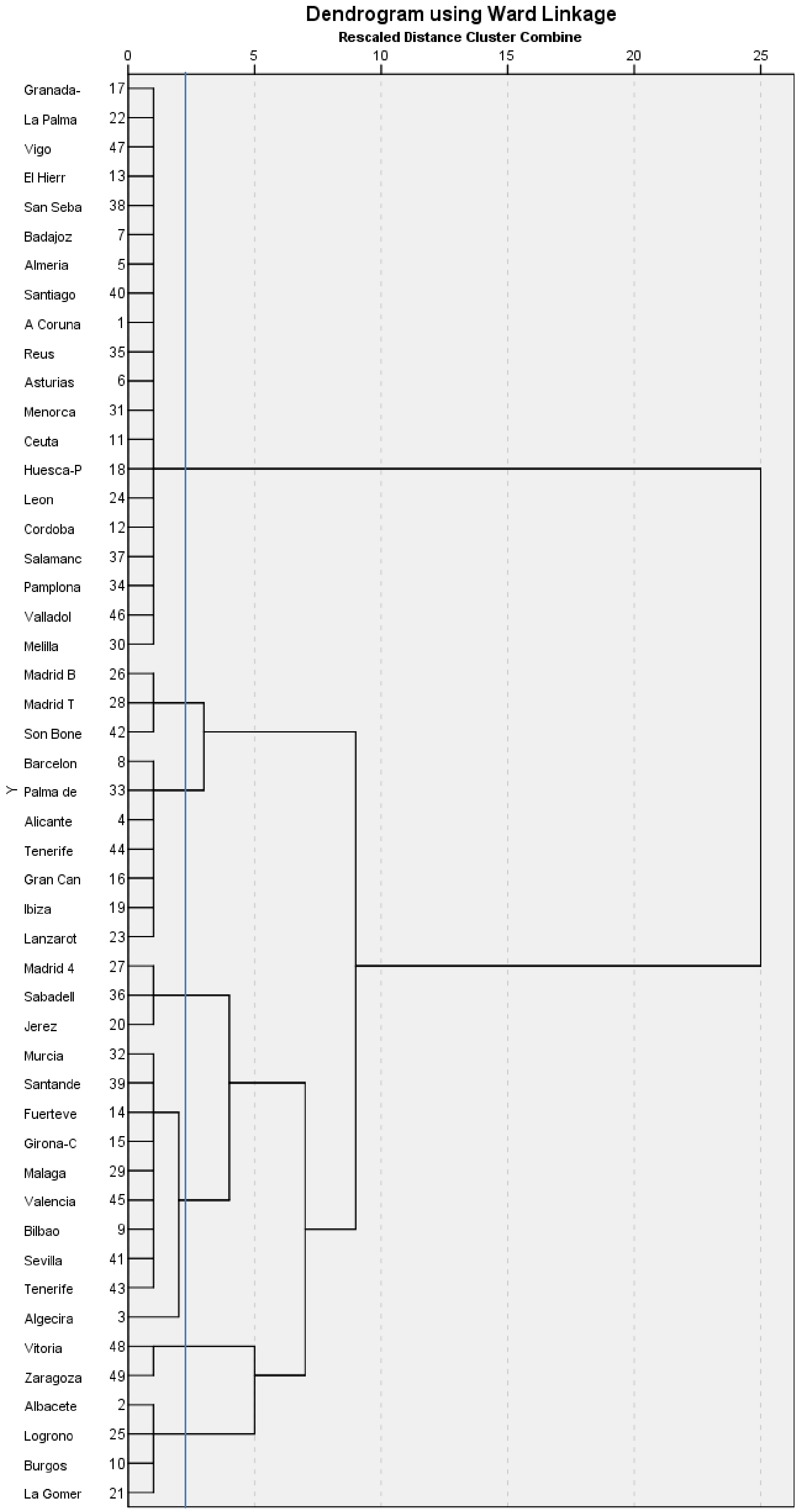

Figure 4: Dendogram of airport data using Ward's Agglomeration Method

It has been argued that the main strengths and weaknesses of an airport can be discerned by looking at Figures 2 and 3. Thus, Figures 2 and 3 summarise in a visual manner the results of a multivariate analysis. By representing the main features of the data in a graphical form we make the results of the analysis accessible to managers and decision makers, who are intelligent people but not necessarily well versed in multivariate statistics. Visualisation can be important when, for example, taking decisions about the future of an airport.

The use of multivariate analysis can be taken one step further. We can represent efficiencies under the various specifications in the same figure as airports. To do this we resort to Biplots (Gower and Hand, 1996), in particular to a technique known as Property Fitting (ProFit). A clear introduction to ProFit can be found in the book by Schiffman et al (1981). The mathematical method used to represent variables and specifications in the same space is described in Mar-Molinero and Mingers (2007).

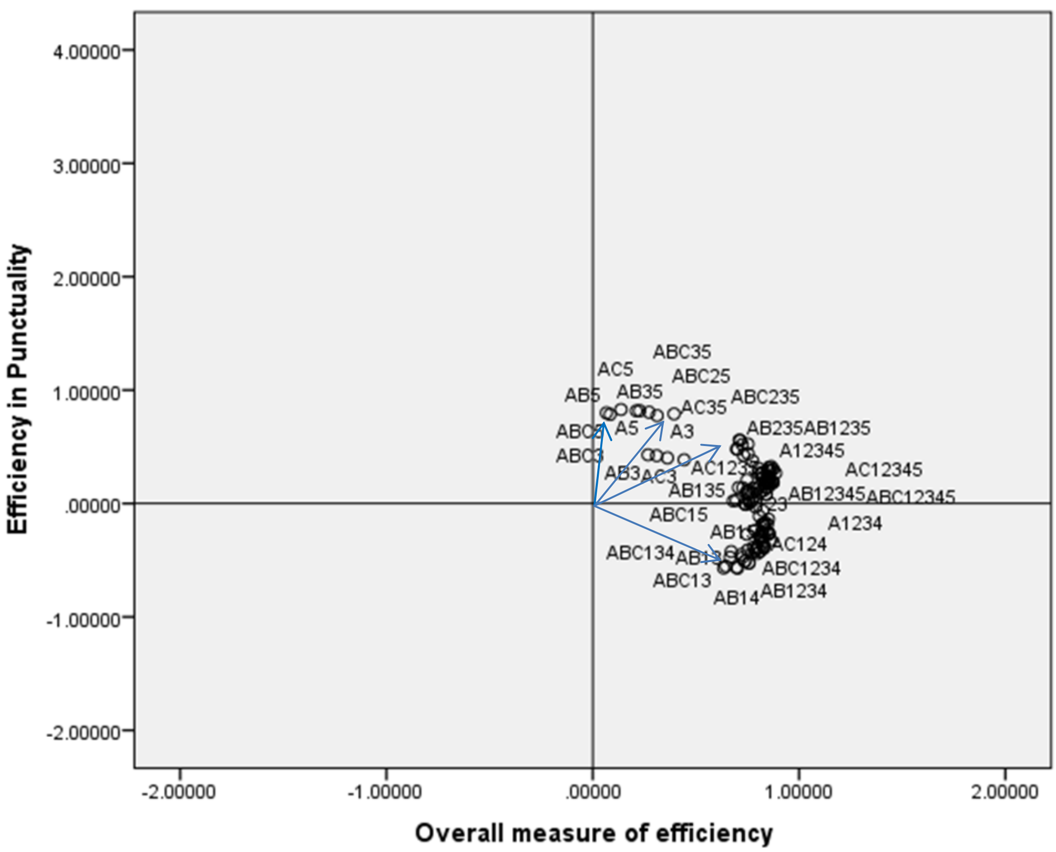

Figure 5: Property fitting vectors on the space of Factor 1 and Factor 2

Under the ProFit approach, each specification is represented by a vector starting at the origin of coordinates and pointing in the direction in which a particular feature of the data increases. The vectors are drawn in the space of the data; in this case an eight-dimensional space. Figure 5 shows only the projection of the end point of the vectors in the space of Factor 1 and Factor 2. Airport names have not been added to the figure in order not to clutter the representation, but interpretation only requires superimposing Figure 2 on Figure 5. Only a few vectors are represented in Figure 5. We can see, for example, that the vector associated with specification ABC3 points towards the top of the figure. This indicates that airports that use labour (A), operating costs (B) and depreciation (C) in an efficient way in order to deal with cargo (3) are located at the top of Figure 2. Figure 2 tells us that the most efficient airports from this point of view are Logrono, Albacete, La Gomera, Burgos, and Vitoria. It also tells us that the most inefficient airport under specification ABC3 is Murcia. This is reasonable since Logrono, Albacete, La Gomera, Burgos, and Vitoria have a low level of traffic. These airports have very low restrictions in terms of air traffic control and are unlikely to suffer from delays. On the other hand, Murcia is an airport with schedules provided during the whole year. Additionally, Vitoria and Zaragoza are air cargo-oriented airports, and this is reflected in Figure 3. Large airports may be more efficient in generating income, but it is difficult for them to achieve higher punctuality levels. The vector associated with the full model, ABC12345, points in the direction of the first principal component, confirming our interpretation of Factor 1 as an overall measure of efficiency.

Using the results in this way, it is possible to establish the strengths and weaknesses of each airport, as we have done with, for example, Logrono and Murcia, but discussing each individual airport in detail goes beyond the scope of this paper.

6. Discussion and Conclusions

Airports require large investment in infrastructure, and are expensive to run. For this reason, it is important to assess if the resources are used in the most efficient manner for the generation of revenue, the benefit of the local industry, and the satisfaction of users of the air services. But airports can be seen in many different lights, as satisfying tourist demand, or as support to main logistic centres. This is why the efficiency that we attach to an airport depends on how we see its role. In this paper we have estimated efficiencies under 124 different ways of contemplating the work of an airport, and we have used the term specification in order to refer to each combination of inputs and outputs. Since we had 49 airports in the data, the end result was a table with 49 rows and 124 columns. A data set like this one is difficult to comprehend, although some features may be evident by looking at the numbers. For example, no sophisticated analysis is required to discover that large airports, such as Madrid and Barcelona, are efficient from a global point of view, and that small and medium airports such as Burgos or Murcia are inefficient. This is clear in the results of the analysis, and it is also well known in the world of air transport. In fact, there has been much debate on whether all airports should be kept open or whether some of them should be closed and the system rationalised. This debate is highly political, as local communities would like to have the best infrastructures that are possible, and politicians are not always concerned about the opportunity cost of resources used. Take, for example, San Sebastian airport. This airport is not particularly efficient from the overall point of view, nor from the punctuality perspective, it does not appear to use resources efficiently for cargo purposes, and is not particularly efficient from the passenger perspective. Furthermore, it is not far from Bilbao, Santander, or Biarritz (within two hours driving distance). So, San Sebastian would be a clear target for rationalisation. In the same way, there are three airports within 150 kilometres from Valladolid (Burgos; Leon and Salamanca). The traffic from Valladolid (airport highly inefficient) could be transferred to Burgos. This might improve overall efficiency and punctuality with a minimum impact in connectivity. The efficiency of dealing with cargo would also improve since Burgos did not deal with any cargo in 2013. In the same way, Pamplona airport could be rationalised by transferring its traffic to either Logrono o Vitoria. Vitoria is efficient in dealing with cargo, and could become more efficient in terms of passengers after absorbing Pamplona's traffic.

These previous examples suggest that there is an excessive number of inefficient regional airports with less than 750,000 passengers per year located within a short distance of each other. The question is if the traffic of these airports could be transferred to larger airports to increase efficiency while, at the same time minimising the impact on connectivity.

Clearly, decisions about the future of an airport go beyond data discussion, there may other reasons to keep it open, but these must be stated clearly in the discussion. The European Commission (European Court of Auditors, December 2014) has identified an excess of investment in public infrastructures in Europe. This is at times due to some funded airports being located too close to each other. Infrastructures are sometimes built on the basis of forecasts that cannot be justified. This has resulted in some construction projects being excessive for the numbers of passengers and aircrafts involved. Cordoba is one of the clear examples. It was forecasted to have 179,000 passengers per year, but got only 7,000 in 2013. Other examples are Badajoz; Burgos; La Palma and Vigo which will also struggle to remain open unless it receives additional and constant public funding. The recommendations of the European Court of Auditors are clearly based on actual needs and on forecasts for 2030. It recommends that investment should only take place in profitable airports or in airports with demonstrable requirements. It further recommends that during 2014-2020, the European Commission should grant European Union funding money to airports infrastructure only when the investment needed has been properly assessed and demonstrated. It estimated that airports with less than 100,000 passengers lose 130 € per passenger and year. These airports are not financially self-sustainable and will struggle to remain in operation without more public money. It raises the question of why the Spanish government is determined to maintain open all the airports even when they operate inefficiently due to low level of traffic. Additionally, the report also suggests that there is little evidence of additional socio-economic benefits, such as regional employment, from keeping the airports open.

This study confirms the view that many Spanish airports are not efficient in generating income due to the low-level of traffic and idle infrastructure. Airports' over-capacity implies excessive fixed costs not justified by actual operating activity. All the smallest and medium airports (except Girona) are cross-subsidised by the large airports that not only are profitable, but that use better their infrastructure. The question is how to make the system more efficient. A possibility would be to increase the number of passengers by increasing the number of airlines that operate in each airport. This could be achieved, for example, by means of appropriate price structures, but this cannot be done under the existing centralised decision process, which does not enhance flexibility or competition. It has been suggested (CNMC, 2014) that Spanish airports need to become more attractive in terms of fair prices and quality of the services provided and that airports managers should be awarded flexibility in deciding decide commercial policies. But this implies decentralisation, and it is unlikely to take place. The inexistence of an independent regulator does not help either. Unless individual airport managers are granted decision power among commercial variables, Spanish airports will be suffering from low traffic and over-capacity. In a word, the Spanish airport-system will continue to be largely inefficient.

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Airports	ABC12345	A12345	AB12345	AC12345	A1234	AB1234	ABC1234	AC1234	A1235	AB1235	ABC1235	AC1235	A1245	AB1245	ABC1245	AC1245	A1345
A Coruna	60%	32%	60%	32%	32%	60%	60%	32%	32%	60%	60%	32%	32%	60%	60%	32%	27%
Albacete	100%	87%	100%	87%	26%	28%	28%	26%	87%	100%	100%	87%	87%	100%	100%	87%	87%
Algeciras	100%	24%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%
Alicante	100%	76%	100%	82%	76%	100%	100%	82%	71%	86%	86%	71%	76%	100%	100%	82%	76%
Almeria	52%	31%	52%	35%	31%	50%	50%	33%	31%	51%	51%	32%	31%	52%	52%	35%	27%
Asturias	63%	31%	63%	31%	29%	60%	60%	30%	30%	63%	63%	30%	31%	63%	63%	31%	29%
Badajoz	44%	34%	44%	34%	34%	44%	44%	34%	34%	44%	44%	34%	34%	44%	44%	34%	31%
Barcelona	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Bilbao	84%	69%	82%	73%	69%	81%	83%	73%	68%	75%	75%	68%	69%	81%	84%	73%	63%
Burgos	100%	62%	100%	62%	30%	46%	46%	30%	62%	100%	100%	62%	62%	100%	100%	62%	56%
Ceuta	50%	21%	50%	21%	21%	50%	50%	21%	21%	50%	50%	21%	21%	50%	50%	21%	19%
Cordoba	59%	46%	59%	46%	28%	30%	30%	28%	46%	59%	59%	46%	46%	59%	59%	46%	34%
El Hierro	58%	25%	55%	42%	25%	55%	58%	42%	25%	55%	58%	42%	25%	55%	57%	39%	20%
Fuerteventura	86%	71%	86%	72%	71%	86%	86%	72%	70%	85%	85%	70%	71%	86%	86%	72%	70%
Girona-Costa Brava	84%	64%	84%	64%	64%	84%	84%	64%	64%	84%	84%	64%	64%	84%	84%	64%	60%
Gran Canaria	100%	69%	100%	100%	69%	100%	100%	100%	69%	100%	100%	100%	69%	100%	100%	100%	66%
Granada-Jaen	45%	26%	45%	26%	26%	45%	45%	26%	26%	45%	45%	26%	26%	45%	45%	26%	21%
Huesca-Pirineos	53%	26%	53%	26%	26%	53%	53%	26%	23%	53%	53%	23%	26%	53%	53%	26%	23%
Ibiza	100%	77%	100%	100%	77%	100%	100%	100%	77%	100%	100%	100%	77%	100%	100%	100%	72%
Jerez	89%	59%	89%	61%	59%	89%	89%	61%	59%	87%	87%	61%	59%	89%	89%	61%	30%
La Gomera	100%	49%	100%	100%	18%	40%	40%	18%	48%	100%	100%	100%	49%	100%	100%	100%	47%
La Palma	43%	29%	43%	29%	29%	43%	43%	29%	29%	43%	43%	29%	29%	43%	43%	29%	24%
Lanzarote	100%	76%	98%	100%	76%	98%	100%	100%	76%	98%	100%	100%	76%	98%	100%	100%	75%
Leon	58%	20%	58%	20%	18%	51%	51%	18%	20%	58%	58%	20%	20%	58%	58%	20%	17%
Logrono	100%	100%	100%	100%	20%	20%	20%	20%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Appendix 1: Efficiency scores based on 124 DEA specifications

(continued)

Airports	ABC12345	A12345	AB12345	AC12345	A1234	AB1234	ABC1234	AC1234	A1235	AB1235	ABC1235	AC1235	A1245	AB1245	ABC1245	AC1245	A1345
Madrid Barajas	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Madrid 4 vientos	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	29%
Madrid Torrejon	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Malaga	84%	68%	82%	74%	68%	81%	83%	74%	66%	66%	66%	66%	68%	82%	84%	74%	68%
Melilla	33%	29%	33%	29%	29%	33%	33%	29%	29%	33%	33%	29%	29%	33%	33%	29%	21%
Menorca	69%	39%	69%	39%	39%	68%	68%	39%	39%	69%	69%	39%	39%	69%	69%	39%	37%
Murcia	100%	41%	100%	41%	41%	100%	100%	41%	40%	100%	100%	40%	41%	100%	100%	41%	40%
Palma de Mallorca	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Pamplona	27%	17%	27%	17%	17%	27%	27%	17%	17%	26%	26%	17%	17%	27%	27%	17%	12%
Reus	61%	38%	61%	38%	38%	61%	61%	38%	38%	61%	61%	38%	38%	61%	61%	38%	31%
Sabadell	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	30%
Salamanca	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%	19%
San Sebastian	49%	23%	47%	42%	23%	47%	49%	42%	23%	47%	48%	42%	23%	47%	49%	42%	18%
Santander	91%	40%	91%	40%	38%	86%	86%	38%	40%	91%	91%	40%	40%	91%	91%	40%	36%
Santiago	54%	35%	54%	35%	35%	54%	54%	35%	35%	54%	54%	35%	35%	54%	54%	35%	34%
Sevilla	82%	48%	80%	60%	48%	79%	80%	60%	48%	78%	78%	60%	48%	79%	81%	60%	44%
Son Bonet	100%	100%	100%	100%	100%	100%	100%	100%	86%	100%	100%	100%	100%	100%	100%	100%	59%
Tenerife North	78%	64%	78%	65%	64%	78%	78%	65%	64%	78%	78%	65%	61%	73%	73%	61%	56%
Tenerife South	100%	66%	100%	72%	66%	100%	100%	72%	64%	100%	100%	64%	66%	100%	100%	72%	66%
Valencia	92%	63%	92%	67%	63%	92%	92%	67%	63%	80%	80%	64%	63%	89%	89%	67%	56%
Valladolid	27%	21%	27%	21%	21%	27%	27%	21%	21%	27%	27%	21%	21%	27%	27%	21%	18%
Vigo	46%	26%	46%	27%	26%	46%	46%	27%	26%	46%	46%	26%	26%	46%	46%	27%	22%
Vitoria	100%	91%	100%	100%	74%	74%	100%	100%	91%	100%	100%	100%	25%	42%	42%	30%	91%
Zaragoza	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	19%	45%	45%	19%	100%

(continued)

Airports	AB1345	ABC1345	AC1345	A2345	AB2345	ABC2345	AC2345	A123	AB123	ABC123	AC123	A124	AB124	ABC124	AC124	A125	AB125
A Coruna	59%	59%	27%	25%	38%	38%	26%	32%	60%	60%	32%	32%	60%	60%	32%	32%	60%
Albacete	100%	100%	87%	87%	100%	100%	87%	25%	28%	28%	25%	26%	28%	28%	26%	87%	100%
Algeciras	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%
Alicante	100%	100%	82%	76%	100%	100%	81%	71%	85%	85%	71%	76%	100%	100%	82%	71%	86%
Almeria	51%	52%	35%	29%	43%	44%	35%	30%	49%	49%	30%	31%	50%	50%	33%	31%	51%
Asturias	63%	63%	30%	25%	47%	47%	28%	29%	60%	60%	29%	29%	60%	60%	30%	30%	63%
Badajoz	44%	44%	31%	31%	37%	37%	31%	34%	44%	44%	34%	34%	44%	44%	34%	34%	44%
Barcelona	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Bilbao	78%	82%	68%	62%	79%	84%	67%	68%	73%	73%	68%	69%	80%	83%	73%	68%	75%
Burgos	98%	98%	56%	60%	100%	100%	60%	30%	46%	46%	30%	30%	46%	46%	30%	62%	100%
Ceuta	50%	50%	19%	21%	49%	49%	21%	21%	50%	50%	21%	21%	50%	50%	21%	21%	50%
Cordoba	49%	49%	34%	46%	58%	58%	46%	28%	30%	30%	28%	28%	30%	30%	28%	46%	59%
El Hierro	54%	58%	42%	18%	30%	30%	18%	25%	55%	58%	42%	25%	55%	57%	39%	25%	55%
Fuerteventura	86%	86%	71%	58%	76%	80%	63%	70%	85%	85%	70%	71%	86%	86%	72%	70%	85%
Girona-Costa Brava	84%	84%	60%	49%	68%	68%	52%	64%	84%	84%	64%	64%	84%	84%	64%	64%	84%
Gran Canaria	89%	100%	100%	65%	100%	100%	100%	69%	100%	100%	100%	69%	100%	100%	100%	69%	97%
Granada-Jaen	44%	44%	21%	19%	25%	25%	20%	26%	45%	45%	26%	26%	45%	45%	26%	26%	45%
Huesca-Pirineos	53%	53%	23%	26%	53%	53%	26%	23%	53%	53%	23%	26%	53%	53%	26%	23%	53%
Ibiza	100%	100%	95%	57%	92%	98%	98%	77%	100%	100%	100%	77%	100%	100%	100%	77%	100%
Jerez	47%	49%	34%	59%	89%	89%	61%	59%	87%	87%	61%	59%	89%	89%	61%	59%	87%
La Gomera	100%	100%	100%	49%	100%	100%	100%	17%	40%	40%	17%	18%	40%	40%	18%	48%	100%
La Palma	43%	43%	24%	22%	26%	26%	22%	29%	43%	43%	29%	29%	43%	43%	29%	29%	43%
Lanzarote	98%	100%	100%	56%	79%	100%	100%	76%	98%	100%	100%	76%	98%	100%	100%	76%	98%
Leon	57%	57%	17%	19%	51%	51%	19%	17%	51%	51%	17%	18%	51%	51%	18%	20%	58%
Logrono	100%	100%	100%	100%	100%	100%	100%	19%	19%	19%	19%	20%	20%	20%	20%	100%	100%

(continued)

Airports	AB1345	ABC1345	AC1345	A2345	AB2345	ABC2345	AC2345	A123	AB123	ABC123	AC123	A124	AB124	ABC124	AC124	A125	AB125
Madrid Barajas	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Madrid 4 vientos	39%	45%	45%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Madrid Torrejon	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Malaga	81%	84%	74%	68%	82%	84%	72%	66%	66%	66%	66%	68%	81%	83%	74%	66%	66%
Melilla	32%	32%	21%	18%	19%	19%	18%	29%	33%	33%	29%	29%	33%	33%	29%	29%	33%
Menorca	69%	69%	37%	30%	54%	54%	31%	39%	68%	68%	39%	39%	68%	68%	39%	39%	69%
Murcia	100%	100%	41%	34%	75%	75%	36%	40%	100%	100%	40%	41%	100%	100%	41%	40%	100%
Palma de Mallorca	100%	100%	100%	93%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Pamplona	26%	26%	13%	16%	19%	19%	16%	17%	26%	26%	17%	17%	27%	27%	17%	17%	26%
Reus	60%	60%	31%	29%	43%	43%	30%	38%	61%	61%	38%	38%	61%	61%	38%	38%	61%
Sabadell	36%	38%	32%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Salamanca	20%	20%	19%	40%	40%	40%	40%	41%	41%	41%	41%	41%	41%	41%	41%	41%	41%
San Sebastian	46%	49%	42%	21%	28%	29%	27%	23%	47%	48%	42%	23%	47%	49%	42%	23%	47%
Santander	91%	91%	36%	27%	50%	50%	27%	38%	86%	86%	38%	38%	86%	86%	38%	40%	91%
Santiago	54%	54%	34%	30%	45%	45%	31%	35%	54%	54%	35%	35%	54%	54%	35%	35%	53%
Sevilla	76%	79%	60%	41%	73%	79%	60%	48%	75%	75%	59%	48%	78%	79%	59%	48%	77%
Son Bonet	100%	100%	100%	100%	100%	100%	100%	86%	100%	100%	100%	100%	100%	100%	100%	86%	100%
Tenerife North	69%	69%	56%	47%	72%	72%	49%	64%	78%	78%	65%	61%	73%	73%	61%	61%	73%
Tenerife South	100%	100%	72%	59%	100%	100%	71%	64%	100%	100%	64%	66%	100%	100%	72%	64%	100%
Valencia	80%	82%	61%	60%	92%	92%	64%	63%	80%	80%	64%	63%	89%	89%	67%	61%	76%
Valladolid	27%	27%	18%	16%	17%	17%	16%	21%	27%	27%	21%	21%	27%	27%	21%	21%	27%
Vigo	46%	46%	23%	22%	33%	33%	23%	26%	46%	46%	26%	26%	46%	46%	27%	26%	46%
Vitoria	100%	100%	100%	25%	100%	100%	100%	73%	73%	100%	100%	15%	19%	19%	16%	19%	32%
Zaragoza	100%	100%	100%	17%	100%	100%	100%	100%	100%	100%	100%	19%	45%	45%	19%	19%	45%

(continued)

Airports	ABC125	AC125	A134	AB134	ABC134	AC134	A135	AB135	ABC135	AC135	A145	AB145	ABC145	AC145	A234	AB234	ABC234	AC234	A235	AB235	ABC235
A Coruna	60%	32%	27%	59%	59%	27%	27%	59%	59%	27%	27%	59%	59%	27%	25%	38%	38%	26%	14%	16%	16%
Albacete	100%	87%	26%	28%	28%	26%	87%	100%	100%	87%	87%	100%	100%	87%	26%	28%	28%	26%	87%	100%	100%
Algeciras	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%
Alicante	86%	71%	76%	100%	100%	82%	71%	86%	86%	71%	76%	100%	100%	82%	76%	100%	100%	81%	44%	56%	56%
Almeria	51%	32%	27%	49%	50%	33%	27%	51%	51%	28%	27%	51%	52%	35%	28%	40%	41%	32%	13%	15%	15%
Asturias	63%	30%	28%	60%	60%	29%	29%	63%	63%	29%	29%	63%	63%	30%	24%	43%	43%	26%	10%	13%	13%
Badajoz	44%	34%	31%	44%	44%	31%	31%	44%	44%	31%	31%	44%	44%	31%	31%	37%	37%	31%	29%	37%	37%
Barcelona	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Bilbao	75%	68%	63%	77%	81%	68%	62%	72%	72%	62%	63%	78%	82%	68%	62%	78%	83%	67%	36%	40%	40%
Burgos	100%	62%	23%	44%	44%	23%	56%	98%	98%	56%	56%	98%	98%	56%	28%	41%	41%	28%	60%	100%	100%
Ceuta	50%	21%	19%	50%	50%	19%	19%	50%	50%	19%	19%	50%	50%	19%	21%	49%	49%	21%	21%	49%	49%
Cordoba	59%	46%	15%	20%	20%	15%	32%	48%	48%	32%	34%	49%	49%	34%	28%	30%	30%	28%	46%	58%	58%
El Hierro	57%	39%	20%	54%	58%	42%	20%	54%	58%	42%	20%	54%	57%	39%	18%	30%	30%	18%	17%	30%	30%
Fuerteventura	85%	70%	70%	86%	86%	71%	69%	85%	85%	69%	70%	86%	86%	71%	58%	76%	80%	63%	20%	20%	20%
Girona-Costa Brava	84%	64%	60%	84%	84%	60%	60%	84%	84%	60%	60%	84%	84%	60%	49%	68%	68%	52%	19%	21%	21%
Gran Canaria	97%	95%	66%	89%	100%	100%	66%	89%	100%	100%	65%	87%	100%	100%	65%	100%	100%	100%	65%	100%	100%
Granada-Jaen	45%	26%	21%	44%	44%	21%	21%	44%	44%	21%	21%	44%	44%	21%	19%	25%	25%	20%	12%	13%	13%
Huesca-Pirineos	53%	23%	23%	53%	53%	23%	18%	51%	51%	18%	23%	53%	53%	23%	26%	53%	53%	26%	23%	53%	53%
Ibiza	100%	100%	72%	100%	100%	94%	72%	100%	100%	95%	72%	100%	100%	95%	57%	92%	98%	98%	53%	77%	78%
Jerez	87%	61%	30%	47%	49%	34%	25%	39%	39%	25%	30%	47%	49%	34%	59%	89%	89%	61%	59%	87%	87%
La Gomera	100%	100%	16%	40%	40%	17%	46%	100%	100%	100%	47%	100%	100%	100%	18%	36%	36%	18%	47%	100%	100%
La Palma	43%	29%	24%	43%	43%	24%	24%	43%	43%	24%	24%	43%	43%	24%	22%	26%	26%	22%	13%	15%	15%
Lanzarote	100%	100%	75%	98%	100%	100%	75%	98%	100%	100%	75%	98%	100%	100%	56%	79%	100%	100%	35%	44%	50%
Leon	58%	20%	15%	50%	50%	15%	17%	57%	57%	17%	17%	57%	57%	17%	17%	43%	43%	17%	18%	51%	51%
Logrono	100%	100%	19%	19%	19%	19%	100%	100%	100%	100%	100%	100%	100%	100%	20%	20%	20%	20%	100%	100%	100%

(continued)

Airports	ABC125	AC125	A134	AB134	ABC134	AC134	A135	AB135	ABC135	AC135	A145	AB145	ABC145	AC145	A234	AB234	ABC234	AC234	A235	AB235	ABC235
Madrid Barajas	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Madrid 4 vientos	100%	100%	23%	31%	33%	29%	15%	23%	24%	24%	29%	39%	45%	45%	100%	100%	100%	100%	100%	100%	100%
Madrid Torrejon	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Malaga	66%	66%	68%	80%	83%	74%	65%	65%	65%	65%	68%	81%	84%	74%	67%	81%	83%	72%	56%	59%	59%
Melilla	33%	29%	21%	32%	32%	21%	21%	32%	32%	21%	21%	32%	32%	21%	18%	19%	19%	18%	18%	19%	19%
Menorca	69%	39%	37%	68%	68%	37%	37%	69%	69%	37%	37%	69%	69%	37%	30%	54%	54%	31%	12%	15%	15%
Murcia	100%	40%	40%	100%	100%	41%	40%	100%	100%	40%	40%	100%	100%	41%	34%	75%	75%	36%	12%	14%	14%
Palma de Mallorca	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	93%	100%	100%	100%	93%	100%	100%
Pamplona	26%	17%	12%	26%	26%	13%	12%	25%	25%	12%	12%	26%	26%	13%	16%	19%	19%	16%	11%	14%	14%
Reus	61%	38%	31%	60%	60%	31%	31%	60%	60%	31%	31%	60%	60%	31%	29%	43%	43%	30%	17%	19%	19%
Sabadell	100%	100%	23%	26%	27%	24%	20%	24%	24%	22%	30%	36%	38%	32%	100%	100%	100%	100%	100%	100%	100%
Salamanca	41%	41%	19%	20%	20%	19%	17%	17%	17%	17%	19%	20%	20%	19%	40%	40%	40%	40%	40%	40%	40%
San Sebastian	48%	42%	18%	46%	49%	42%	18%	45%	48%	42%	18%	46%	49%	42%	21%	28%	29%	27%	14%	19%	19%
Santander	91%	40%	34%	85%	85%	34%	36%	91%	91%	36%	36%	91%	91%	36%	25%	40%	40%	25%	15%	23%	23%
Santiago	53%	35%	34%	54%	54%	34%	34%	54%	54%	34%	34%	54%	54%	34%	30%	45%	45%	31%	11%	12%	12%
Sevilla	77%	55%	44%	75%	78%	59%	44%	75%	75%	58%	44%	75%	77%	59%	41%	73%	79%	60%	25%	43%	43%
Son Bonet	100%	100%	58%	100%	100%	100%	22%	81%	100%	100%	59%	100%	100%	100%	100%	100%	100%	100%	86%	100%	100%
Tenerife North	73%	61%	56%	69%	69%	56%	56%	69%	69%	56%	51%	66%	66%	51%	49%	72%	72%	49%	48%	72%	72%
Tenerife South	100%	64%	66%	100%	100%	72%	64%	100%	100%	64%	66%	100%	100%	72%	59%	100%	100%	71%	31%	50%	50%
Valencia	76%	61%	56%	80%	82%	61%	56%	72%	72%	57%	56%	77%	78%	61%	60%	92%	92%	64%	51%	75%	75%
Valladolid	27%	21%	18%	27%	27%	18%	18%	27%	27%	18%	18%	27%	27%	18%	16%	17%	17%	16%	11%	12%	12%
Vigo	46%	26%	22%	46%	46%	23%	22%	45%	45%	22%	22%	46%	46%	23%	22%	33%	33%	23%	12%	13%	13%
Vitoria	32%	25%	73%	73%	100%	100%	91%	100%	100%	100%	23%	39%	39%	30%	74%	74%	100%	100%	91%	100%	100%
Zaragoza	45%	19%	100%	100%	100%	100%	100%	100%	100%	100%	16%	45%	45%	17%	100%	100%	100%	100%	100%	100%	100%

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Airports	AC235	A245	AB245	ABC245	AC245	A345	AB345	ABC345	AC345	A12	AB12	ABC12	AC12	A13	AB13	ABC13	AC13	A14	AB14	ABC14	AC14	A15
A Coruna	14%	25%	38%	38%	26%	20%	38%	38%	22%	32%	60%	60%	32%	27%	59%	59%	27%	27%	59%	59%	27%	27%
Albacete	87%	87%	100%	100%	87%	87%	100%	100%	87%	25%	28%	28%	25%	25%	28%	28%	25%	26%	28%	28%	26%	87%
Algeciras	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%
Alicante	46%	76%	100%	100%	81%	76%	100%	100%	81%	71%	85%	85%	71%	71%	85%	85%	71%	76%	100%	100%	82%	71%
Almeria	14%	29%	43%	44%	35%	25%	43%	44%	35%	30%	49%	49%	30%	26%	49%	49%	26%	27%	49%	50%	33%	27%
Asturias	11%	25%	47%	47%	28%	23%	47%	47%	28%	29%	60%	60%	29%	28%	60%	60%	28%	28%	60%	60%	29%	29%
Badajoz	29%	31%	37%	37%	31%	28%	37%	37%	28%	34%	44%	44%	34%	31%	44%	44%	31%	31%	44%	44%	31%	31%
Barcelona	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Bilbao	37%	62%	78%	84%	67%	56%	73%	82%	62%	68%	73%	73%	68%	61%	70%	70%	61%	63%	77%	81%	68%	62%
Burgos	60%	60%	100%	100%	60%	54%	96%	96%	54%	30%	46%	46%	30%	23%	44%	44%	23%	23%	44%	44%	23%	56%
Ceuta	21%	21%	49%	49%	21%	19%	49%	49%	19%	21%	50%	50%	21%	19%	50%	50%	19%	19%	50%	50%	19%	19%
Cordoba	46%	46%	58%	58%	46%	34%	49%	49%	34%	28%	30%	30%	28%	12%	19%	19%	12%	15%	20%	20%	15%	32%
El Hierro	18%	18%	29%	29%	18%	13%	29%	29%	15%	25%	55%	57%	39%	20%	54%	58%	42%	20%	54%	57%	39%	20%
Fuerteventura	20%	58%	76%	80%	63%	54%	72%	79%	59%	70%	85%	85%	70%	69%	85%	85%	69%	70%	86%	86%	71%	69%
Girona-Costa Brava	19%	49%	68%	68%	52%	43%	63%	64%	47%	64%	84%	84%	64%	60%	84%	84%	60%	60%	84%	84%	60%	60%
Gran Canaria	100%	65%	100%	100%	100%	52%	80%	100%	100%	69%	97%	97%	95%	66%	89%	100%	100%	65%	87%	100%	100%	64%
Granada-Jaen	12%	19%	25%	25%	20%	15%	25%	25%	16%	26%	45%	45%	26%	21%	44%	44%	21%	21%	44%	44%	21%	21%
Huesca-Pirineos	23%	26%	53%	53%	26%	23%	53%	53%	23%	23%	53%	53%	23%	18%	51%	51%	18%	23%	53%	53%	23%	18%
Ibiza	78%	57%	92%	98%	98%	48%	72%	94%	92%	77%	100%	100%	100%	72%	100%	100%	94%	72%	100%	100%	94%	72%
Jerez	61%	59%	89%	89%	61%	30%	47%	49%	34%	59%	87%	87%	61%	25%	39%	39%	25%	30%	47%	49%	34%	25%
La Gomera	100%	49%	100%	100%	100%	47%	100%	100%	100%	17%	40%	40%	17%	15%	40%	40%	15%	16%	40%	40%	17%	46%
La Palma	13%	22%	25%	25%	22%	17%	26%	26%	18%	29%	43%	43%	29%	24%	43%	43%	24%	24%	43%	43%	24%	24%
Lanzarote	50%	56%	79%	100%	100%	50%	71%	100%	100%	76%	98%	100%	100%	75%	98%	100%	100%	75%	98%	100%	100%	75%
Leon	18%	19%	51%	51%	19%	17%	51%	51%	17%	17%	51%	51%	17%	14%	50%	50%	14%	15%	50%	50%	15%	17%
Logrono	100%	100%	100%	100%	100%	100%	100%	100%	100%	19%	19%	19%	19%	17%	17%	17%	17%	19%	19%	19%	19%	100%

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Airports	AC235	A245	AB245	ABC245	AC245	A345	AB345	ABC345	AC345	A12	AB12	ABC12	AC12	A13	AB13	ABC13	AC13	A14	AB14	ABC14	AC14	A15
Madrid Barajas	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Madrid 4 vientos	100%	100%	100%	100%	100%	29%	39%	45%	45%	100%	100%	100%	100%	9%	15%	15%	9%	23%	31%	33%	29%	15%
Madrid Torrejon	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Malaga	58%	68%	82%	84%	72%	67%	80%	84%	72%	66%	66%	66%	66%	65%	65%	65%	65%	68%	80%	83%	74%	65%
Melilla	18%	18%	19%	19%	18%	8%	11%	11%	8%	29%	33%	33%	29%	21%	32%	32%	21%	21%	32%	32%	21%	21%
Menorca	12%	30%	53%	53%	31%	26%	50%	50%	28%	39%	68%	68%	39%	37%	68%	68%	37%	37%	68%	68%	37%	37%
Murcia	12%	34%	75%	75%	36%	32%	75%	75%	35%	40%	100%	100%	40%	40%	100%	100%	40%	40%	100%	100%	41%	40%
Palma de Mallorca	100%	93%	100%	100%	100%	68%	93%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Pamplona	11%	16%	19%	19%	16%	12%	19%	19%	13%	17%	26%	26%	17%	12%	25%	25%	12%	12%	26%	26%	13%	12%
Reus	17%	29%	43%	43%	30%	21%	37%	37%	23%	38%	61%	61%	38%	31%	60%	60%	31%	31%	60%	60%	31%	31%
Sabadell	100%	100%	100%	100%	100%	30%	36%	38%	32%	100%	100%	100%	100%	12%	15%	15%	12%	23%	26%	27%	24%	20%
Salamanca	40%	40%	40%	40%	40%	19%	20%	20%	19%	41%	41%	41%	41%	17%	17%	17%	17%	19%	20%	20%	19%	17%
San Sebastian	15%	21%	28%	29%	27%	17%	28%	29%	27%	23%	47%	48%	42%	18%	45%	48%	42%	18%	46%	49%	42%	18%
Santander	15%	27%	50%	50%	27%	21%	48%	48%	23%	38%	86%	86%	38%	34%	85%	85%	34%	34%	85%	85%	34%	36%
Santiago	11%	30%	45%	45%	31%	28%	45%	45%	30%	35%	53%	53%	35%	34%	54%	54%	34%	34%	54%	54%	34%	34%
Sevilla	33%	41%	72%	79%	60%	35%	64%	76%	60%	48%	74%	74%	54%	44%	74%	74%	56%	44%	74%	77%	58%	43%
Son Bonet	100%	100%	100%	100%	100%	59%	100%	100%	100%	86%	100%	100%	100%	22%	81%	100%	100%	58%	100%	100%	100%	22%
Tenerife North	48%	47%	66%	66%	49%	37%	52%	54%	37%	61%	73%	73%	61%	56%	69%	69%	56%	51%	66%	66%	51%	51%
Tenerife South	33%	59%	100%	100%	71%	59%	100%	100%	71%	64%	100%	100%	64%	64%	100%	100%	64%	66%	100%	100%	72%	64%
Valencia	53%	60%	89%	89%	64%	53%	77%	82%	58%	61%	76%	76%	61%	56%	72%	72%	57%	56%	77%	78%	61%	54%
Valladolid	11%	16%	17%	17%	16%	13%	17%	17%	13%	21%	27%	27%	21%	18%	27%	27%	18%	18%	27%	27%	18%	18%
Vigo	12%	22%	33%	33%	23%	19%	33%	33%	20%	26%	46%	46%	26%	22%	45%	45%	22%	22%	46%	46%	23%	22%
Vitoria	100%	25%	42%	42%	30%	91%	100%	100%	100%	10%	11%	11%	10%	72%	72%	100%	100%	13%	19%	19%	14%	15%
Zaragoza	100%	17%	31%	31%	17%	100%	100%	100%	100%	19%	45%	45%	19%	100%	100%	100%	100%	16%	45%	45%	17%	16%

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Airports	AB15	ABC15	AC15	A23	AB23	ABC23	AC23	A24	AB24	ABC24	AC24	A25	AB25	ABC25	AC25	A34	AB34	ABC34	AC34	A35	AB35	ABC35	AC35
A Coruna	59%	59%	27%	14%	16%	16%	14%	25%	38%	38%	26%	14%	16%	16%	14%	20%	38%	38%	22%	3%	8%	8%	3%
Albacete	100%	100%	87%	25%	28%	28%	25%	26%	28%	28%	26%	87%	100%	100%	87%	26%	28%	28%	26%	87%	100%	100%	87%
Algeciras	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%
Alicante	86%	86%	71%	44%	56%	56%	46%	76%	100%	100%	81%	44%	56%	56%	46%	76%	100%	100%	81%	2%	2%	2%	2%
Almeria	51%	51%	28%	13%	14%	14%	13%	28%	40%	41%	32%	13%	15%	15%	14%	24%	40%	41%	32%	4%	10%	10%	5%
Asturias	63%	63%	29%	10%	11%	11%	10%	24%	43%	43%	26%	10%	13%	13%	11%	22%	43%	43%	25%	4%	10%	10%	5%
Badajoz	44%	44%	31%	29%	37%	37%	29%	31%	37%	37%	31%	29%	37%	37%	29%	28%	37%	37%	28%	25%	37%	37%	25%
Barcelona	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	23%	23%	23%	23%
Bilbao	71%	71%	62%	36%	40%	40%	37%	62%	78%	83%	67%	36%	37%	37%	37%	55%	72%	81%	61%	4%	4%	5%	4%
Burgos	98%	98%	56%	28%	41%	41%	28%	28%	41%	41%	28%	60%	100%	100%	60%	21%	40%	40%	21%	54%	96%	96%	54%
Ceuta	50%	50%	19%	21%	49%	49%	21%	21%	49%	49%	21%	21%	49%	49%	21%	19%	49%	49%	19%	18%	49%	49%	18%
Cordoba	48%	48%	32%	28%	30%	30%	28%	28%	30%	30%	28%	46%	58%	58%	46%	15%	19%	19%	15%	32%	48%	48%	32%
El Hierro	54%	57%	39%	17%	30%	30%	18%	18%	29%	29%	18%	16%	29%	29%	17%	13%	29%	29%	15%	9%	28%	28%	9%
Fuerteventura	85%	85%	69%	20%	20%	20%	20%	58%	76%	80%	63%	20%	20%	20%	20%	54%	72%	79%	59%	3%	3%	3%	3%
Girona-Costa Brava	84%	84%	60%	19%	21%	21%	19%	49%	68%	68%	52%	19%	21%	21%	19%	43%	63%	64%	47%	2%	4%	4%	2%
Gran Canaria	87%	88%	84%	65%	100%	100%	100%	65%	100%	100%	100%	65%	97%	97%	95%	52%	80%	100%	100%	6%	6%	27%	27%
Granada-Jaen	44%	44%	21%	12%	13%	13%	12%	19%	25%	25%	20%	12%	13%	13%	12%	15%	25%	25%	16%	3%	8%	8%	3%
Huesca-Pirineos	51%	51%	18%	23%	53%	53%	23%	26%	53%	53%	26%	23%	53%	53%	23%	23%	53%	53%	23%	18%	51%	51%	18%
Ibiza	100%	100%	95%	53%	77%	78%	78%	57%	92%	98%	98%	53%	77%	78%	78%	48%	72%	94%	92%	3%	3%	7%	7%
Jerez	39%	39%	25%	59%	87%	87%	61%	59%	89%	89%	61%	59%	87%	87%	61%	30%	47%	49%	34%	3%	6%	6%	3%
La Gomera	100%	100%	100%	16%	35%	35%	16%	18%	36%	36%	18%	47%	100%	100%	100%	16%	36%	36%	17%	44%	100%	100%	100%
La Palma	43%	43%	24%	13%	15%	15%	13%	22%	25%	25%	22%	13%	14%	14%	13%	17%	26%	26%	18%	4%	7%	7%	4%
Lanzarote	98%	100%	100%	35%	44%	50%	50%	56%	79%	100%	100%	35%	43%	49%	49%	50%	71%	100%	100%	3%	3%	7%	7%
Leon	57%	57%	17%	15%	43%	43%	15%	17%	43%	43%	17%	18%	51%	51%	18%	15%	43%	43%	15%	14%	49%	49%	14%
Logrono	100%	100%	100%	18%	18%	18%	18%	20%	20%	20%	20%	100%	100%	100%	100%	19%	19%	19%	19%	100%	100%	100%	100%

(continued)

Airports	AB15	ABC15	AC15	A23	AB23	ABC23	AC23	A24	AB24	ABC24	AC24	A25	AB25	ABC25	AC25	A34	AB34	ABC34	AC34	A35	AB35	ABC35	AC35
Madrid Barajas	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Madrid 4 vientos	23%	24%	24%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	23%	31%	33%	29%	15%	23%	24%	24%
Madrid Torrejon	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Malaga	65%	65%	65%	56%	59%	59%	58%	67%	81%	83%	72%	56%	59%	59%	58%	67%	80%	83%	72%	1%	1%	1%	1%
Melilla	32%	32%	21%	18%	19%	19%	18%	18%	19%	19%	18%	17%	19%	19%	17%	8%	11%	11%	8%	6%	11%	11%	6%
Menorca	69%	69%	37%	12%	15%	15%	12%	30%	53%	53%	31%	11%	15%	15%	11%	26%	50%	50%	28%	3%	4%	4%	3%
Murcia	100%	100%	40%	12%	14%	14%	12%	34%	75%	75%	36%	12%	14%	14%	12%	32%	75%	75%	35%	4%	11%	11%	4%
Palma de Mallorca	100%	100%	100%	93%	100%	100%	100%	93%	100%	100%	100%	93%	100%	100%	100%	68%	93%	100%	100%	3%	3%	9%	9%
Pamplona	25%	25%	12%	11%	14%	14%	11%	16%	19%	19%	16%	11%	14%	14%	11%	12%	19%	19%	13%	5%	12%	12%	5%
Reus	60%	60%	31%	17%	19%	19%	17%	29%	43%	43%	30%	17%	19%	19%	17%	21%	37%	37%	23%	3%	8%	8%	3%
Sabadell	24%	24%	22%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	23%	26%	27%	24%	20%	24%	24%	22%
Salamanca	17%	17%	17%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	40%	19%	20%	20%	19%	15%	15%	15%	15%
San Sebastian	45%	48%	42%	14%	19%	19%	15%	21%	28%	29%	27%	14%	19%	19%	15%	17%	28%	29%	27%	6%	16%	16%	6%
Santander	91%	91%	36%	14%	16%	16%	14%	25%	40%	40%	25%	15%	23%	23%	15%	19%	40%	40%	21%	5%	15%	15%	6%
Santiago	53%	53%	34%	11%	12%	12%	11%	30%	45%	45%	31%	10%	11%	11%	10%	28%	45%	45%	30%	3%	4%	4%	3%
Sevilla	75%	75%	52%	25%	43%	43%	33%	41%	72%	78%	59%	24%	38%	38%	26%	35%	64%	75%	59%	4%	4%	12%	12%
Son Bonet	81%	100%	100%	86%	100%	100%	100%	100%	100%	100%	100%	86%	100%	100%	100%	58%	100%	100%	100%	22%	80%	100%	100%
Tenerife North	66%	66%	51%	48%	72%	72%	48%	47%	66%	66%	49%	46%	59%	59%	48%	37%	52%	54%	37%	11%	11%	11%	11%
Tenerife South	100%	100%	64%	31%	50%	50%	33%	59%	100%	100%	71%	31%	50%	50%	33%	59%	100%	100%	71%	2%	2%	3%	3%
Valencia	71%	71%	54%	51%	75%	75%	53%	60%	89%	89%	64%	50%	68%	68%	53%	53%	77%	82%	58%	8%	8%	9%	9%
Valladolid	27%	27%	18%	11%	12%	12%	11%	16%	17%	17%	16%	11%	12%	12%	11%	13%	17%	17%	13%	6%	10%	10%	6%
Vigo	45%	45%	22%	12%	13%	13%	12%	22%	33%	33%	23%	11%	13%	13%	11%	19%	33%	33%	20%	4%	8%	8%	4%
Vitoria	27%	27%	22%	73%	73%	100%	100%	15%	19%	19%	16%	19%	32%	32%	25%	73%	73%	100%	100%	91%	100%	100%	100%
Zaragoza	44%	44%	16%	100%	100%	100%	100%	17%	31%	31%	17%	9%	12%	12%	9%	100%	100%	100%	100%	100%	100%	100%	100%

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Airports	A45	AB45	ABC45	AC45	A1	AB1	ABC1	AC1	A2	AB2	ABC2	AC2	A3	AB3	ABC3	AC3	A4	AB4	ABC4	AC4	A5	AB5	ABC5	AC5
A Coruna	20%	22%	38%	22%	27%	59%	59%	27%	14%	16%	16%	14%	3%	8%	8%	3%	20%	38%	38%	22%	3%	8%	8%	3%
Albacete	87%	87%	100%	87%	25%	28%	28%	25%	25%	28%	28%	25%	25%	28%	28%	25%	26%	28%	28%	26%	87%	100%	100%	87%
Algeciras	24%	24%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%	24%	100%	100%	24%
Alicante	76%	81%	100%	81%	71%	85%	85%	71%	44%	56%	56%	46%	2%	2%	2%	2%	76%	100%	100%	81%	1%	1%	1%	1%
Almeria	25%	35%	44%	35%	26%	49%	49%	26%	13%	14%	14%	13%	4%	8%	8%	4%	24%	40%	41%	32%	4%	9%	9%	5%
Asturias	23%	28%	47%	28%	28%	60%	60%	28%	10%	11%	11%	10%	3%	7%	7%	3%	22%	43%	43%	25%	4%	9%	9%	5%
Badajoz	28%	28%	37%	28%	31%	44%	44%	31%	29%	37%	37%	29%	25%	37%	37%	25%	28%	37%	37%	28%	25%	37%	37%	25%
Barcelona	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	23%	23%	23%	23%	100%	100%	100%	100%	0%	0%	0%	0%
Bilbao	56%	62%	82%	62%	61%	70%	70%	61%	36%	37%	37%	37%	4%	4%	4%	4%	55%	71%	81%	61%	2%	3%	3%	2%
Burgos	54%	54%	96%	54%	23%	44%	44%	23%	28%	41%	41%	28%	20%	40%	40%	20%	21%	40%	40%	21%	54%	96%	96%	54%
Ceuta	19%	19%	49%	19%	19%	50%	50%	19%	21%	49%	49%	21%	18%	49%	49%	18%	19%	49%	49%	19%	18%	49%	49%	18%
Cordoba	34%	34%	49%	34%	12%	19%	19%	12%	28%	30%	30%	28%	12%	19%	19%	12%	15%	19%	19%	15%	32%	48%	48%	32%
El Hierro	13%	15%	29%	15%	20%	54%	57%	39%	16%	29%	29%	17%	9%	28%	28%	9%	13%	29%	29%	15%	9%	27%	27%	9%
Fuerteventura	54%	59%	79%	59%	69%	85%	85%	69%	20%	20%	20%	20%	3%	3%	3%	3%	54%	72%	79%	59%	2%	3%	3%	2%
Girona-Costa Brava	43%	47%	64%	47%	60%	84%	84%	60%	19%	21%	21%	19%	2%	4%	4%	2%	43%	63%	64%	47%	2%	4%	4%	2%
Gran Canaria	52%	100%	100%	100%	64%	87%	87%	83%	65%	97%	97%	95%	6%	6%	27%	27%	52%	77%	100%	100%	1%	1%	1%	1%
Granada-Jaen	15%	16%	25%	16%	21%	44%	44%	21%	12%	13%	13%	12%	3%	8%	8%	3%	15%	25%	25%	16%	3%	8%	8%	3%
Huesca-Pirineos	23%	23%	53%	23%	18%	51%	51%	18%	23%	53%	53%	23%	18%	51%	51%	18%	23%	53%	53%	23%	18%	51%	51%	18%
Ibiza	48%	92%	94%	92%	72%	100%	100%	94%	53%	77%	78%	78%	3%	3%	7%	7%	48%	72%	94%	92%	1%	2%	2%	1%
Jerez	30%	34%	49%	34%	25%	39%	39%	25%	59%	87%	87%	61%	3%	6%	6%	3%	30%	47%	49%	34%	3%	6%	6%	3%
La Gomera	47%	100%	100%	100%	15%	40%	40%	15%	16%	35%	35%	16%	12%	34%	34%	12%	16%	36%	36%	17%	44%	100%	100%	100%
La Palma	17%	18%	25%	18%	24%	43%	43%	24%	13%	14%	14%	13%	4%	7%	7%	4%	17%	25%	25%	18%	3%	6%	6%	3%
Lanzarote	50%	100%	100%	100%	75%	98%	100%	100%	35%	43%	49%	49%	3%	3%	7%	7%	50%	71%	100%	100%	2%	3%	3%	2%
Leon	17%	17%	51%	17%	14%	50%	50%	14%	15%	43%	43%	15%	11%	42%	42%	11%	15%	43%	43%	15%	14%	49%	49%	14%
Logrono	100%	100%	100%	100%	17%	17%	17%	17%	18%	18%	18%	18%	16%	16%	16%	16%	19%	19%	19%	19%	100%	100%	100%	100%

(continued)

Airports	A45	AB45	ABC45	AC45	A1	AB1	ABC1	AC1	A2	AB2	ABC2	AC2	A3	AB3	ABC3	AC3	A4	AB4	ABC4	AC4	A5	AB5	ABC5	AC5
Madrid Barajas	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	0%	0%	0%	0%
Madrid 4 vientos	29%	45%	45%	45%	9%	15%	15%	9%	100%	100%	100%	100%	9%	15%	15%	9%	23%	31%	33%	29%	15%	23%	24%	24%
Madrid Torrejon	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Malaga	67%	72%	84%	72%	65%	65%	65%	65%	56%	59%	59%	58%	1%	1%	1%	1%	67%	80%	83%	72%	1%	1%	1%	1%
Melilla	8%	8%	11%	8%	21%	32%	32%	21%	17%	19%	19%	17%	6%	11%	11%	6%	8%	11%	11%	8%	6%	11%	11%	6%
Menorca	26%	28%	50%	28%	37%	68%	68%	37%	11%	15%	15%	11%	3%	4%	4%	3%	26%	50%	50%	28%	2%	4%	4%	2%
Murcia	32%	35%	75%	35%	40%	100%	100%	40%	12%	14%	14%	12%	4%	11%	11%	4%	32%	75%	75%	35%	4%	11%	11%	4%
Palma de Mallorca	68%	100%	100%	100%	100%	100%	100%	100%	93%	100%	100%	100%	3%	3%	9%	9%	68%	93%	100%	100%	0%	1%	1%	0%
Pamplona	12%	13%	19%	13%	12%	25%	25%	12%	11%	14%	14%	11%	5%	12%	12%	5%	12%	19%	19%	13%	5%	12%	12%	5%
Reus	21%	23%	37%	23%	31%	60%	60%	31%	17%	19%	19%	17%	3%	8%	8%	3%	21%	37%	37%	23%	3%	8%	8%	3%
Sabadell	30%	32%	38%	32%	12%	15%	15%	12%	100%	100%	100%	100%	12%	15%	15%	12%	23%	26%	27%	24%	20%	24%	24%	22%
Salamanca	19%	19%	20%	19%	17%	17%	17%	17%	40%	40%	40%	40%	15%	15%	15%	15%	19%	20%	20%	19%	15%	15%	15%	15%
San Sebastian	17%	27%	29%	27%	18%	45%	48%	42%	14%	19%	19%	15%	6%	16%	16%	6%	17%	28%	29%	27%	6%	16%	16%	6%
Santander	21%	23%	48%	23%	34%	85%	85%	34%	14%	16%	16%	14%	3%	10%	10%	3%	19%	40%	40%	21%	5%	15%	15%	6%
Santiago	28%	30%	45%	30%	34%	53%	53%	34%	10%	11%	11%	10%	3%	4%	4%	3%	28%	45%	45%	30%	2%	3%	3%	2%
Sevilla	35%	59%	76%	59%	43%	73%	73%	50%	24%	38%	38%	26%	4%	4%	12%	12%	35%	63%	75%	58%	1%	3%	3%	1%
Son Bonet	59%	100%	100%	100%	22%	81%	100%	100%	86%	100%	100%	100%	22%	80%	100%	100%	58%	100%	100%	100%	22%	80%	100%	100%
Tenerife North	34%	37%	48%	37%	51%	66%	66%	51%	46%	59%	59%	48%	11%	11%	11%	11%	34%	47%	48%	37%	2%	3%	3%	2%
Tenerife South	59%	71%	100%	71%	64%	100%	100%	64%	31%	50%	50%	33%	2%	2%	3%	3%	59%	100%	100%	71%	1%	2%	2%	1%
Valencia	53%	58%	78%	58%	54%	70%	70%	54%	50%	68%	68%	53%	8%	8%	9%	9%	53%	75%	78%	58%	1%	2%	2%	1%
Valladolid	13%	13%	17%	13%	18%	27%	27%	18%	11%	12%	12%	11%	6%	10%	10%	6%	13%	17%	17%	13%	5%	10%	10%	5%
Vigo	19%	20%	33%	20%	22%	45%	45%	22%	11%	13%	13%	11%	4%	8%	8%	4%	19%	33%	33%	20%	3%	8%	8%	3%
Vitoria	23%	30%	39%	30%	4%	9%	9%	4%	9%	11%	11%	9%	72%	72%	100%	100%	13%	19%	19%	14%	15%	27%	27%	22%
Zaragoza	14%	15%	31%	15%	16%	44%	44%	16%	9%	12%	12%	9%	100%	100%	100%	100%	14%	31%	31%	15%	3%	10%	10%	3%