Analysis of the evolution of the inland traffic distribution and provincial hinterland share of the Spanish port system

Abstract

This paper proposes a methodology based on non-parametric statistical techniques to analyse whether the ordinal preferences in the port selection process are stable, and also the intensity of those preferences. We apply this methodology to the Spanish case from the landside perspective in order to answer the following question: Has the increase in inter-port competition changed the port preferences? The result obtained is that the port selection pattern of the provinces has changed slightly, leading us to the conclusion that the relative appeal of the ports remains quite stable from the spatial perspective, despite the reform of the port system.

Keywords: Port selection; ordinal preferences; stability; hinterland.

1. Introduction

Improvements in the transport sector have served to promote the role of ports as platforms in logistical chains. According to the United Nations Conference on Trade and Development (UNTAD, 1992), the process leading to the conversion of ports into logistic platforms has evolved following a model of several generations of ports. According to this model, the first generation survived until the 60s, when the traffic was still in bulk form; in the second, lasting between the 60s and 80s, the ports were converted into industrial and commercial centres; and in the third generation, which began in the 80s, the ports were oriented to international trade and logistics. The containerization of the maritime flows resulting from this evolution has reduced the market power of each port because it reduced the captive traffic, thereby increasing the range of choice available to their clients. This process of containerization has led to a concentration of traffic among the biggest installations (Rodrigue *et al.*, 1997; Loo and Hook, 2002); but it has also promoted the development of new inter-modal transport corridors and, consequently, the volume of activity in certain ports (see, for example, the new trends pointed out by Medda and Carbonaro, 2007).

The reasons why a particular port is chosen to channel a flow of cargo have been studied in many papers. These papers commonly use a static perspective and take into account the point of view of the shipping lines, and most consider that achieving scale economies or reducing the time necessary to offer a *door-to-door* service are more effective in attracting traffic than the actual location of the port (see, for example, Slack, 1985; Brooks, 1990; D'Este *et al.*, 1992; Lago *et al.*, 2001; Lirn *et al.*, 2004; Malchow and Kanafani, 2004; or Ugboma *et al.*, 2006). In this paper, we propose to analyse the evolution of the preferences in the port selection process, instead of studying its key

factors. The interest which this approach has in dealing with the port selection problem lies in knowing whether the development of logistic chains and the reinforcement of inter-port competition have led to a redistribution of cargo, because issues such as the design of the transport corridors or the definition of the port strategies should take into account the evolution of the inter-port traffic distribution.

In order to study the evolution of the port selection process, we propose to use non-parametric statistical techniques. Apart from the well-known Friedman's Q-test, Kendall's coefficient W and the Sign test, which are very useful for analysing ordinal data, we also consider two other statistical coefficients which are based on Spearman's rank correlation coefficient and Pearson's linear correlation coefficient respectively. The first of these two will provide information and insights into the rank correlation among the ordinal preferences observed over a period of time, and the second will provide us with information on the linear correlation in the traffic observed over a period of time. Both coefficients are complementary for the analysis of the evolution of the inter-port traffic distribution. Thus, while the coefficient based on rank correlation is useful for ordinal analysis, the coefficient based on linear correlation is useful for quantitative analysis. In this sense, the combination of both coefficients allows us to analyse the evolution of the port selection process from an indirect point of view; that is, we do not study the key factors in the port selection process, but we are able to analyse the observed consequences.

We illustrate the proposed methodology by analysing the Spanish case from the landside perspective. In particular, we analyse the evolution of the distribution of the provincial container traffic among the biggest peninsular ports from 1993 to 2004. The

port hinterland results from the freight flow distribution, but we use the provinces to determine the origin-destination of the cargo to perform the statistical analysis. Although the definition of *province* follows administrative criteria, we are obliged to use this as it is the only information available in our data source. The data used are obtained from the Foreign Trade database in the Spanish Treasury Department. This database collects all the operations of Spanish foreign trade, and reflects the characteristics of each cargo (weight and type), and its provincial origin and destination.

It is important to bear in mind that the Spanish ports compete basically among themselves to attract the Spanish peninsular traffic (Nombela and Trujillo, 1999), and that 80% of the cargo of the Spanish port system corresponds to external maritime flows. Thus, the database used allows us to get to know the actual inter-port distribution of the Spanish container flows every year and, consequently, to delimit the hinterland of ports and their evolution.

The paper is structured as follows: in Section 2 we describe the non-parametric statistical tools proposed to analyse the evolution of the preferences in the port selection process, and we explain their possible interpretations depending on their particular values. In Section 3, we apply the suggested framework to study the evolution of the inter-port container traffic distribution in the Spanish case from the landside perspective from 1993 to 2004; and, finally, in Section 4, we summarise our main conclusions, both for the methodology proposed and for the particular case study carried out.

2. Statistical techniques to analyse the evolution of the preferences in the port selection process

As previously stated, the reasons why a particular port is chosen to channel a flow of cargo have been studied in many papers from a static perspective and from the point of view of the shipping lines. We propose to use certain statistical tools to analyse the problem of port selection from the actual observed data over a period of time. In order to do this, we focus on the problem of port selection analysing the evolution of the ordinal preferences and their strength. Since we suggest working with the observed inter-port traffic distribution over a period of time, we do not study the key factors in the port selection problem but analyse the observed consequences of those factors. Therefore, our approach is an indirect way of analysing the port selection problem.

Perhaps, other statistical techniques which are more sophisticated than the statistical techniques included below could be used, but the purpose of this paper is to propose the use of certain statistical coefficients with two main properties: i) easy to compute and ii) easy to interpret. Since we are interested in analyzing (from the perspective of the observed traffic), if the different factors involved in the port traffic distribution have had an influence on the inter-port distribution of cargo over the years, it seems reasonable to use techniques related to two basic ideas: 1) the port preferences in an ordinal sense, i.e., how their clients rank the ports, and 2) the strength of these port preferences, in the sense of the volume of cargo channelled through each of them. The temporal analysis of the first idea provides us with answers regarding the evolution of the port preferences in a qualitative sense; and the analysis of the second idea, which is complementary to the first, provides us with answers regarding the evolution of the port preferences in quantitative terms. Obviously, the techniques used in both cases should have some kind of conceptual relationship in order to be comparable in some way or other.

2.1. Analysis of the stability of the ordinal preferences

In order to analyse the evolution of the ordinal preferences in the port selection process, we use a non-parametric statistical approach. In particular, we use Friedman's Q-test (Friedman, 1937), Kendall's coefficient (Kendall, 1970) and the Sign test.

Friedman's Q-test is used to check whether the ordinal preferences of the provinces are the same throughout the analysed period of time. This test is a rank sum test useful for studying several independent and related (or paired) samples with continuous ordinal data when we are interested in knowing whether they have been drawn from the same population. If we have k samples (in our particular case, the ports), and the size of the samples is n (the number of years under analysis), the Q-test ranks the units of choice (the ports) from lowest to highest for each individual of the sample (year). The statistic Q is given by (1):

$$Q = 3n(k+1) + \frac{1}{nk(k+1)} \sum_{i=1}^{k} R_i^2 \qquad (1)$$

where R_i is the rank sum for the i-th sample. Now, if the rank sums for each port are very similar then we cannot say that there are ports which are preferred more than others. Otherwise, we could say this. If ties occur when ranking the data then each tied data gets an average rank and the formula of the statistic Q has to be corrected dividing by $(1 - T/(n(k^3 - k))$, where $T = \sum_{i=1}^{k} \sum_{j} (t_j^3 - t_j)$ and t_i is the number of data tied in a value.

In this statistical test, in our context, the null-hypothesis reads “the ports studied are equally preferred along the analysed period of time” or “no port is preferred to any other along the analysed period of time”. Additional information can be obtained through Kendall’s coefficient *W* which can be easily computed from statistic *Q*, as shown in (2):

$$W = \frac{Q}{n(k-1)} \tag{2}$$

This coefficient is used to evaluate the level of concordance of the ordinal preferences along the analysed period of time as a complementary measure to the results obtained by applying the Q-test. The coefficient *W* ranges from 0 to 1. The meaning of the two extreme points of the interval is the following: $W = 0$ means that the order of preferences of the ports differs very much from one year to another and $W = 1$ means that the order of the ports is exactly the same every year over the analysed period of time. Therefore, this coefficient provides us with a quantitative measure of the degree of concordance in the order of preferences of the ports in the analysed period of time. Finally, if the Q-test is statistically significant, then the Sign test is used to evaluate which differences among the ports contribute more to the statistically significant result, and then we can obtain an order of preferences in the analysed period of time (for further details on Nonparametric Statistics see, for instance, Leach, 1979).

On the other hand, from the coefficient *W* we can easily compute the average of all possible coefficients of rank correlation of Spearman as shown in (3):

$$\rho_{avge} = \frac{(nW-1)}{(n-1)} \tag{3}$$

The coefficient of rank correlation is a measure of the correlation that exists between two sets of ranks. Therefore, ρ_{avge} will provide us with information on the rank correlation among the ordinal preferences observed along the studied period of time. Values of ρ_{avge} close to zero mean that the order of preferences of the ports differs very much from one year to another and values of ρ_{avge} close to one mean that the order of the ports is very similar every year along the period of time analysed. Furthermore, this coefficient is less sensitive to the number of samples (ports) than the Sign test in the sense that, if the number of samples (ports) increases, in the Sign test it is more difficult to reject the null hypothesis (A and B are equally preferred along the analysed period of time). Therefore, the coefficient ρ_{avge} provides sufficient information to be able to analyse the evolution of the port preferences and to check if a redistribution of the traffic is observed during a particular period of time.

2.2. Analysis of the stability in the intensity of the ordinal preferences

The previous analysis provides useful information and insights into the ordinal preferences but does not give us information about the strength of those preferences, which could also be an indicator of variations in the selection process. Discovering if the intensity of the ordinal preferences remains stable over time is equivalent to assessing if the port selection is homogenous from the temporal point of view. This homogeneity implies that the same ports will always be selected, and always in the same proportions.

In order to use a coefficient analogous to the previous ones, we introduce the average of all possible coefficients of linear correlation, r_{avge}, that we can compute among the 12

years under consideration. This coefficient is the quantitative counterpart of ρ_{avge} which is ordinal. The meaning of this new association measure is as follows. Low values of r_{avge}, close to zero, mean that the distribution of traffic channelled through the ports change considerably from one year to another and high values of r_{avge} (close to one), mean that the distribution of traffic channelled through the ports do not change too much from one year to another.

2.3. Interpretations of the pair of coefficients ρ_{avge} and r_{avge}

From the combination of the coefficients ρ_{avge} and r_{avge}, we have two complementary measures, one rank-based and another quantitative-based to analyse the evolution of the preferences in the port selection problem. Both coefficients provide relevant information on the stability of the ordinal preferences and the strength of these over a given period of time. At this point, taking into account coefficients ρ_{avge} and r_{avge}, we can obtain the following interpretations:

i) Low values of ρ_{avge} together with low values of r_{avge} means that both the ordinal preferences and the distribution of the traffic among the ports have been changing a lot along the studied period of time, thereby the preferred ports have changed and also the volume of traffic channelled through them.

ii) Low values of ρ_{avge} together with high values of r_{avge} means that, in all probability, the most preferred port(s) is always the same and it channels most of the traffic every year but the ordinal preferences over the remaining ports have been changing along the studied period of time. Another interpretation of this combination of values is that the traffic channelled through the different ports remains in the same proportions over a period of

time, but the differences between several (or many) ports are very small, and thus the ordinal preferences can change a lot from one year to another.

iii) High values of ρ_{avge} together with low values of r_{avge} means that the ordinal preferences are the same along the studied period of time but the distribution of the traffic has been changing significantly.

iv) Finally, high values of ρ_{avge} together with high values of r_{avge} means that both, the ordinal preferences and the distribution of the traffic are similar every year, and therefore a kind of stability in the preferences and distribution of the traffic exists.

We have considered four regions, but it is possible to distinguish more regions depending on the combination of values of both coefficients. In any case, these two coefficients provide complementary information and insights into the port selection problem. Thus, from this approach to the port selection problem we can analyse if the port preferences have changed over a period of time. We are unable to identify the key factors causing those changes, but this approach could be complementary to the studies that investigate the key variables in the port selection process.

3. A case study: The evolution of the Spanish port selection process from the provincial perspective

Authors such as Bergantino (2002), De and Park (2003) or Malchow and Kafanani (2004) consider that the evolution of port activity does not depend on the evolution of its hinterland (due to the development of intermodal transport). However, Bichou and Gray (2005) reintroduced the idea that each port belongs to a system, suggesting that the evolution of its activity is related to its economic, political and social environment.

Also, Yap and Lam (2006) associated the evolution of the activity of a port with the economic evolution of its province, and Medda and Carbonaro (2007) pointed out that the economic evolution of the hinterland is very important for the activity of the gateway ports.

The concept of *hinterland* has a double perspective, pointed out by Schutt (1977): as a location generating the bulk of the traffic of each port (*port perspective*) and as a territory particularly linked to it (*provincial perspective*). In this section, we propose to focus on the second perspective, and to analyse the port selection made at each Spanish peninsular province over a period of time. Specifically, we propose to investigate the evolution of the inter-port container traffic distribution from the landside perspective after the reform of the Spanish port system. With this in mind, we delimited the hinterland of the Spanish peninsular ports specialised in container traffic (Bahía de Algeciras –Algeciras-, Barcelona, Bilbao and Valencia) from 1993 to 2004.

3.1. The reform of the Spanish port system

The Spanish port system, which comprises almost 50 ports (see Figure 1), was reformed in 1992 (Law 27/1992, November 24th, *de Puertos del Estado y de la Marina Mercante*). The aim of this reform was to increase the efficiency of the sector by encouraging competition. To do this, the management of the ports was decentralised by creating 28 Port Authorities: A Coruña, Alicante, Almería, Avilés, Bahía de Algeciras, Bahía de Cádiz, Baleares, Barcelona, Bilbao, Cartagena, Castellón, Ceuta, Ferrol-San Cibrao, Gijón, Huelva, Las Palmas, Málaga, Marín-Pontevedra, Melilla, Motril, Pasajes, Santa Cruz de Tenerife, Santander, Sevilla, Tarragona, Valencia, Vigo and Vilagarcía. From then on, all of these have been managed autonomously and their activities are

restricted only by the control of the *Ente Público Puertos del Estado* (State Ports Public Body) which was set up to carry out the central government's port policy by the supervision of their respective competitive strategies.

With this model, the intention is to give a boost to inter-port competition but at the same time maintaining certain control by the State over the port activities. To this end, compliance with a set of basic principles was proposed: i) independent economic-financial management of the Port Authorities; ii) financial self-sufficiency of the system as a whole; iii) financial solidarity between all the organisations which make up the system; iv) to cover costs by means of charging the users of the facilities; and v) freedom to set the rates for the services provided by the Port Authorities in competition with private initiative. The result is a system in which the Port Authorities are responsible for setting up the infrastructure of their respective facilities and private initiative participates in the provision of the ports services.

3.2. Analysis of the evolution of the preferences in the port selection process

To assess whether the provincial port preferences remain stable, we analyse the problem from the point of view of the ordinal preferences in the provincial port selection process. These ordinal preferences are estimated by means of the volume (tons) of the provincial container traffic channelled through each port. Although the container port traffic is usually measured in TEUs, we analyse the evolution of the provincial container flows in terms of tons because that is the unit in witch the traffic is expressed in our data source. Interpreting in tons the measure of the inland agent's port preferences should not affect the validity of our results, as we use the same unit of measure to analyse the evolution of the appeal of all the ports studied.

In order to answer the question about the evolution of the ordinal preferences of the provinces with regards to the largest peninsular Spanish ports (Bahía de Algeciras -ALG-, Barcelona –BAR-, Bilbao –BIL- and Valencia –VAL-), we use the non-parametric statistical approach proposed in Section 2. In our particular case, i) the samples are the four above-mentioned ports plus another, called RES, which summarises the container traffic channelled through the rest of the Spanish peninsular ports; ii) the size of the samples is 12, the number of years studied.

The results obtained by applying the statistical analysis described above to the Spanish inter-port container traffic distribution from 1993 to 2004 are shown in Table 1 (see Figure 2 for details on the location of provinces and ports). The Q-test applied to every Spanish peninsular province shows in all cases that there are some ports which are preferred to others over the 12 years analysed, with significant statistical levels less than or equal to 0.001. Therefore, we can statistically conclude that ordinal preferences exist in all cases, and we can apply the Sign test to determine statistically the order of preferences.

The orders of port preferences for each province obtained with significant statistical level of 0.05 are shown in Column 5 of Table 1. {A, B} means that ports A and B have been preferred in equal measure over the given period of time (it could happen that A has been preferred to B many more times than B to A, but it is not sufficient to conclude statistically that A has been preferred more than B). The orders of the type {A, B} {B, C} mean that there are no statistical differences between A – B and B – C respectively, but there are statistical differences between A – C. Note that the ports A and B were

statistically considered *equally preferred* when each of them was preferred more than the other at least twice in the 12 years studied.

We observe from the results in Table 1 that in 32 out of 47 provinces the most preferred port has nearly always been the same over the 12 years under consideration. In 14 provinces two installations have been disputed to be the *most preferred port*, and only in one province (Soria) has the *most preferred port* been disputed among three. These 15 cases can be divided into two groups: interior provinces (9 cases) and provinces with their own port (6 cases). On the other hand, we can distinguish four groups of provinces depending on the stability of their port preferences over a period of time. The first group which consists of the provinces with at least the three most preferred ports are nearly always in the same order over the period of time under consideration. The second group which consists of the provinces with the two most preferred ports are nearly always in the same order over the period of time. The third group which consists of the provinces with the most preferred port is nearly always the same over the 12 years analysed. Finally, the fourth group consists of the remaining provinces.

The distribution of the Spanish peninsular provinces among the above four groups is the following: 8, 5, 19 and 15 respectively. Therefore, the redistribution of the container traffic in the Spanish port system has not led to a change as to which is the most preferred port in most cases. Nevertheless, there are changes in the three first preferred ports in 34 out of 47 cases. Therefore, we should give an affirmative answer to the question: Have the ordinal port preferences changed from 1993 to 2004? However, note that this classification of the provinces based on the stability of their port preferences is

only ordinal, which means that we do not take into account the strength of the preferences.

On the other hand, the obtained values of ρ_{avge} and r_{avge} are shown in Columns 3 and 4 in Table 1. At first sight, we observe that there are many more provinces (31) with very high values (above 0.900) of the coefficient r_{avge} than provinces (12) with very high values of the coefficient ρ_{avge}, which means that the distribution of the container traffic has been more stable than the ordinal port preferences over the period of time analysed. This implies that in many provinces where there are two or more ports with similar volumes of container traffic, their ordinal positions can easily change from one year to another, while the distribution of the cargo among the ports remains more or less stable. On the other hand, high values (above 0.800) of the coefficient ρ_{avge} imply high values of the coefficient r_{avge} (except in two cases, Ourense and Jaen). However, the converse is not true in general. Therefore, high levels of stability of the ordinal preferences imply high levels of stability in the distribution of the container traffic among the ports. Furthermore, if we compare these results with the results obtained in the application of the Sign test, we can observe that 29 of the 32 provinces with the most preferred port which are nearly always the same throughout the 12 years under consideration, have very high r_{avge} coefficients (the only three exceptions are Teruel, Lugo and A Coruña). This means that the most preferred port is very important in order to determine the stability in the distribution of the container flows.

Next, taking into account the obtained values of ρ_{avge} and r_{avge}, we are able to obtain another provincial classification by port selection homogeneity according to the degrees of rank/linear correlations. This new classification will summarise both the ordinal

preferences and their strength. There are different ways in which to combine both coefficients to obtain a provincial classification according to the stability of their port preferences. In this particular case we will use the minimum of both values (these values are shown in Column 2 in Table 1). This criterion is very demanding because we use the least favourable value to rank the provinces, and thereby consider a province to be more stable than another when its value is higher. Now, we distinguish the following levels (from the less stable to the most stable): very low (0.000 – 0.100); low (0.100 – 0.200); low-intermediate (0.200 – 0.300); intermediate (0.300 – 0.700); high-intermediate (0.700 – 0.800); high (0.800 – 0.900); and very high (0.900 – 1.000). These seven intervals are very usual in the analysis of (rank/linear) correlation.

The provinces in the group of very high rank/linear correlation generated 39.77% of the external maritime container flows in 2004; the provinces in the group of at least high rank/linear correlation, 29.16% of these flows; and the provinces included in the group of at least high-intermediate rank/linear correlation, 26.61%. The different combinations of rank and linear correlations can be observed graphically in Figure 3.

The provinces generating at least 3% of the Spanish foreign container traffic channelled through the national ports in 2004 are: Alicante, Barcelona, Castellón, Madrid, Murcia, Pontevedra, Valencia and Vizcaya. Their combined flows account for 71.45% of the foreign trade channelled through Spanish ports in 2004. Three of them (Alicante, Castellón and Madrid) are among the provinces with very high (rank/linear) correlation and then very stable during the analysed period of time; four (Murcia, Pontevedra, Valencia and Vizcaya) in the group with at least high (rank/linear) correlation and then stable during the analysed period of time; only Barcelona is included in the group of at

least high-intermediate (rank/linear) correlation and then high-moderate stable. Nevertheless, Barcelona channels 91% of its container traffic through its own port, and the r_{avge} coefficient shows that the intensity of the provincial preference for the local port is very high. We have a similar situation for Pontevedra, Valencia and Vizcaya: they channel, respectively, 96%, 98% and 83% of their container flows through the provincial port, and their r_{avge} coefficients are among the highest. Taking into account that the most of the remaining provinces also preferred the nearest port through which to channel their own container traffic, we can conclude that i) the inter-port distribution of the container flows was quite stable in Spain between 1993 and 2004, and that ii) the provincial choice of port usually is the nearest.

4. Conclusions

It is known that changes which have taken place in the transport sector, and especially the growth in the movement of containers, have favoured an increase in the inter-port competition process. Thereby, we can expect a certain redistribution of the cargo among ports as a consequence of the evolution of the supply chains. For example, the improvement of the infrastructures or the development of competitive strategies by the Port Authorities would be reflected through changes in the distribution of the port activity. Nevertheless, there is a lack of papers studying this topic.

In this paper, we propose to use some statistical tools to evaluate the temporal stability in the port selection process. In particular, the ρ_{avge} and r_{avge} coefficients which provide relevant information on the evolution of the ordinal port preferences and their strength over a period of time. We illustrate their application focusing on the Spanish case from 1993 to 2004, and using the perspective of the container traffic from the terrestrial point

of view. The obtained result is that the port selection pattern of the Spanish peninsular provinces has changed moderately after the reform of the Spanish port system. So, we can conclude that the relative appeal of the national ports remains quite stable from the inland perspective, despite the increase in competition among them owing to the liberalisation and decentralisation of their management in 1992.

It is possible that these results could be not extrapolated to other countries, because they are based on the particular circumstances of the Spanish maritime flows and port system. However, the framework developed in this paper can be useful to evaluate easily what is happening to the evolution of traffic distribution in any other country, taking only into account the actual choice of ports over a period of time. Also, the same framework could be useful to analyse the evolution of the distribution of traffic among different transport modes or logistical chains.

Figure 1. Detail of the Spanish port system

Source: Bulletin of *Ente Público Puertos del Estado* (2008).

Table 1. Statistical results for the Spanish case

Province	**Min**	ρ_{avge}	r_{avge}	**Order of preferences (Sign test)**
1 Alicante	0.983	0.9833	0.9922	VAL-RES-BAR-ALG-BIL
2 Castellón	0.965	0.9652	0.9987	VAL-RES-BAR-BIL-ALG
3 Tarragona	0.959	0.9593	0.9691	BAR-RES-VAL-{BIL-ALG}
4 Sevilla	0.959	0.9591	0.9653	{RES-ALG}-VAL-BAR-BIL
5 Navarra	0.954	0.9542	0.9924	BIL-BAR-VAL-{RES-ALG}
6 Madrid	0.947	0.9470	0.9655	VAL-{BIL-BAR}-ALG-RES
7 Burgos	0.942	0.9424	0.9892	BIL-VAL-BAR-{ALG-RES}
8 Palencia	0.936	0.9365	0.9448	VAL-BIL-BAR-{ALG-RES}
9 Guadalajara	0.928	0.9652	0.9280	VAL-BAR-BIL-ALG-RES
10 Malaga	0.905	0.9102	0.9057	{RES-ALG}-VAL-{BAR-BIL}
11 Cantabria	0.901	0.9015	0.9834	BIL-{BAR-RES}-{RES-VAL}-ALG
12 Toledo	0.892	0.8927	0.9981	VAL-{BIL-BAR}-ALG-RES
13 Cáceres	0.890	0.8906	0.9020	ALG-VAL-{BIL-BAR}-RES
14 Guipúzcoa	0.881	0.8812	0.9800	BIL-{BAR-VAL}-{VAL-RES}-ALG
15 León	0.876	0.8762	0.9937	VAL-BIL-{BAR-RES}-{RES-ALG}
16 Pontevedra	0.868	0.8688	0.9992	RES-{VAL-BIL}-{BAR-ALG}
17 Valencia	0.858	0.8588	0.9999	VAL-BAR-{RES-ALG-BIL}
18 Álava	0.858	0.8581	0.9972	BIL-BAR-VAL-{RES-ALG}
19 Granada	0.843	0.8886	0.8431	{VAL-ALG}-BAR-{BIL-RES}
20 Huesca	0.841	0.8411	0.9949	BAR-BIL-{VAL-RES}-{RES-ALG}
21 Zaragoza	0.829	0.8970	0.8295	{BAR-VAL}-BIL-{RES-ALG}
22 La Rioja	0.809	0.8091	0.9732	BIL-{BAR-VAL-ALG}-{ALG-RES}
23 Murcia	0.809	0.9106	0.8090	{VAL-RES}-BAR-{BIL-ALG}
24 Vizcaya	0.806	0.8064	0.9991	BIL-BAR-{VAL-ALG}-{ALG-RES}
25 Barcelona	0.797	0.7977	0.9944	BAR-{VAL-BIL}-{BIL-ALG}-RES
26 Huelva	0.794	0.7949	0.9416	ALG-{VAL-RES}-{RES-BIL}-{BIL-BAR}
27 Jaén	0.790	0.8292	0.7902	{VAL-ALG}-{BIL-BAR}-RES
28 Girona	0.779	0.7790	0.9990	BAR-{VAL-BIL}-{BIL-ALG-RES}
29 Córdoba	0.768	0.7684	0.9136	ALG-VAL-{RES-BAR-BIL}
30 Teruel	0.768	0.7682	0.8866	VAL-{BAR-BIL}-{BIL-RES}-{RES-ALG}
31 Ourense	0.751	0.8561	0.7519	{RES-BIL}-{VAL-BAR}-{BAR-ALG}
32 Cádiz	0.750	0.7506	0.9992	ALG-{VAL-BAR}-{BAR-BIL-RES}
33 Badajoz	0.745	0.7455	0.9336	ALG-{VAL-RES}-{RES-BAR-BIL}
34 Cuenca	0.745	0.7455	0.9843	VAL-{ALG-BAR-BIL}-{BIL-RES}
35 Segovia	0.742	0.7500	0.7421	{VAL-BIL}-{BAR-RES}-{RES-ALG}
36 Lugo	0.735	0.7356	0.8254	RES-{BIL-VAL-BAR}-ALG
37 Soria	0.731	0.7535	0.7315	{VAL-BAR-BIL}-{RES-ALG}
38 Zamora	0.728	0.7280	0.7564	{VAL-BIL}-{BAR-RES-ALG}
39 Salamanca	0.720	0.7204	0.7525	{VAL-BAR}-{BAR-BIL}-{BIL-RES}-{RES-ALG}
40 A Coruña	0.690	0.7326	0.6903	RES-{VAL-BIL-BAR}-ALG
41 Lleida	0.687	0.6877	0.9564	BAR-{BIL-VAL-RES}-{RES-ALG}
42 Asturias	0.687	0.7970	0.6874	{BIL-RES}-{RES-VAL}-{VAL-BAR}-ALG
43Almería	0.674	0.6742	0.7587	{VAL-RES}-{RES-ALG-BAR}-{BAR-BIL}
44 Valladolid	0.651	0.6515	0.6950	{BIL-VAL}-{VAL-BAR-ALG}-{ALG-RES}
45 Ciudad Real	0.624	0.6242	0.9074	VAL-{BAR-ALG-BIL}-{ALG-BIL-RES}
46 Ávila	0.563	0.7912	0.5636	{VAL-BAR}-{BAR-BIL}-{ALG-RES}
47 Albacete	0.461	0.4618	0.9983	VAL-{ALG-BAR-BIL-RES}

Figure 2. Location of provinces and ports

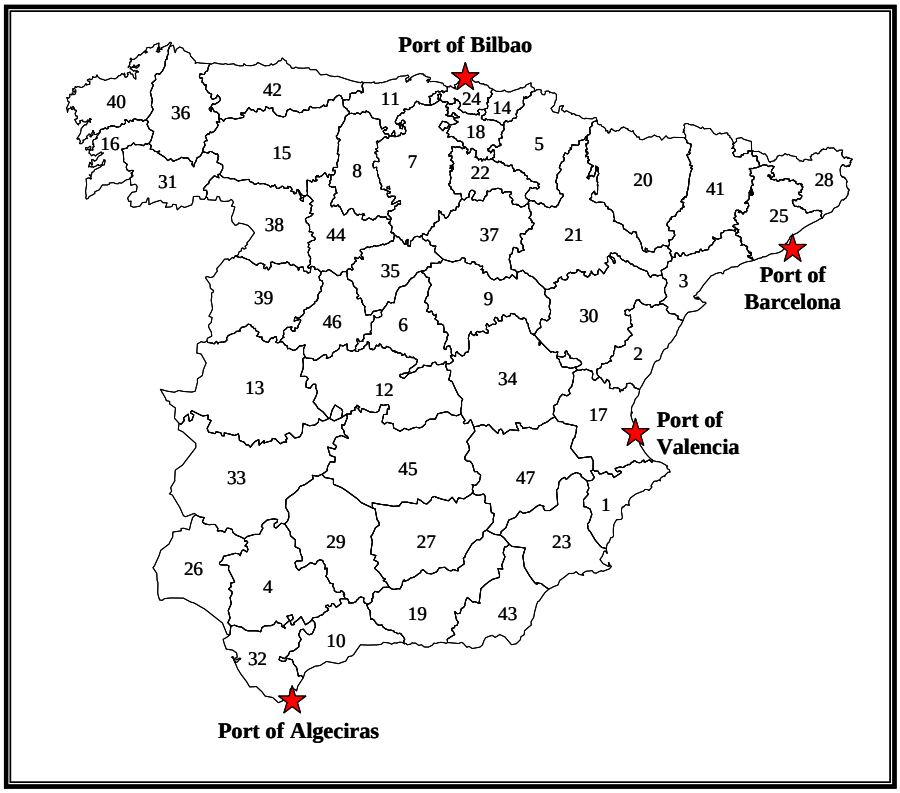
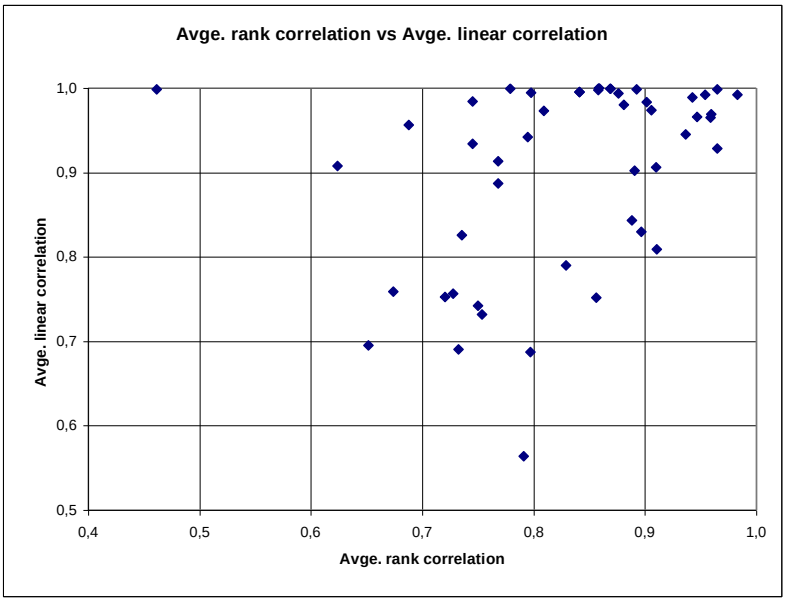


Figure 3. Observed combinations of rank and linear correlations



References

* Bergantino, A. S. (2002) The European Commission approach to Port Policy: some open issues, International Journal of Transport Economics, XXIX(3), pp. 337-379.

* Bichou, K. and Gray, R. (2005) A critical review of conventional terminology for classifying seaports, Transportation Research Part A, 39, pp. 75-92.

* Brooks, M.R. (1990) Ocean carrier selection criteria in a new environment, Logistics and Transportation Review, 26, pp. 339-355.

* D'Este, G. M. (1992) Carrier selection in a ro/ro ferry trade. Part 1, Decision factors and attitudes, Maritime Policy and Management, 19(2), pp. 115-126.

* De, P. and Park, R. (2003) Container Port System Concentration, Transportation Quarterly, 57(4), pp. 69-82.

* Ente Público Puertos del Estado (2008) Bulletin.

* Friedman, M. (1937) The use of ranks to avoid the assumption of normality implicit in the analysis of variance, Journal of the American Statistical Association, 32, pp. 675-701.

* Kendall, M. (1970) Rank correlation methods (4th edition, London: Griffin).

* Lago, A. and Malchow, M. and Kanafani, A. (2001) An analysis of carriers´schedules and the impact on port selection, Presentation at 2001 International Association of Maritime Economists Conference (Hong Kong).

* Leach, C. (1979) Introduction to Statistics: A Nonparametric Approach for the Social Sciences (John Wiley and Sons Ltd.).

* Lirn, T.C., Thanopoulou, H.A., Beynon, M.J. and Beresford, A. (2004) An Application of AHP on Transhipment Port Selection: A Global Perspective, Maritime Economics and Logistics, 6(1), pp. 70-91.

* Loo, B. and Hook, B. (2002) Interplay of international, national and local factors in shaping container port development: a case of Hong Kong, Transport Reviews, 22(2), pp. 219-245.

* Malchow, M. and Kanafani, A. (2004) A disaggregate analysis of port selection Transportation Research, Part E 40(4), pp. 317-337.

* Medda, F. and Carbonaro, G. (2007) Growth of container seaborne traffic in the Mediterranean basin: Outlook and policy implications for port development, Transport Reviews, 27(5), pp. 573-587.

* Nombela Merchán, G. and Trujillo Castellano, L. (1999) El sector portuario español: organización actual y perspectivas, Papeles de Economía Española, 82, pp. 71-84.

* Rodrigue, J.P., Comtois, C. and Slack, B. (1997) Transportation and spatial cycles: Evidence from maritime systems, Journal of Transport Geography, 5, pp. 87-98.

* Slack, B. (1985): Containerization, inter-port competition and port selection, Maritime Policy and Management, 12(4), pp. 293-303.

* Schut, M. (1977) Aspects of tracing hinterlands especially with regard to seaports, International Journal of Transport Economics, pp. 287-298.

* Ugboma, C., Ugboma, O. and Ogwude, I.C. (2006): An Analytic Hierarchy Process (AHP) Approach to Port Selection Decisions-Empirical Evidence from Nigerian Ports, Maritime Economics and Logistics, 8(3), pp. 251-266.

* UNCTAD (1992) Port Marketing and the Third Generation Port. (TD/B C.4/AC.7/14. UNCTAD, Geneva).

* Yap, W. Y., Lam, J. and Notteboom, T. (2006) Developments in container port competition in east Asia, Transport Reviews, 26(2), pp. 167-188.

Appendix

	Algeciras (x100 Tons)											
From	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Alava	9,63	2,38	2,40	1,97	6,64	6,07	7,58	2,37	7,39	0,81	3,58	10,60
Albacete	12,27	10,94	9,92	18,65	8,40	22,96	5,40	3,29	2,66	3,08	1,13	2,10
Alicante	84,57	59,83	43,81	41,24	51,70	68,63	93,21	36,51	41,98	62,23	107,57	76,91
Almeria	19,25	26,63	63,21	29,86	42,62	36,81	64,94	92,57	159,36	263,89	241,95	306,82
Avila	0,26	0,16	0,00	0,21	0,01	0,01	2,16	1,23	0,00	1,31	0,64	0,01
Badajoz	301,54	113,95	116,88	86,13	158,64	121,91	169,68	199,71	145,95	202,17	246,37	209,47
Baleares	0,29	0,55	1,88	0,00	0,11	0,89	3,20	2,00	1,86	0,92	0,00	1,09
Barcelona	171,01	96,45	106,53	103,48	128,77	186,06	166,69	803,77	1178,67	1051,97	541,37	462,84
Burgos	1,39	3,34	1,39	7,39	10,41	5,18	2,26	1,61	2,93	7,14	63,76	83,63
Caceres	56,18	67,16	32,40	48,51	38,56	65,37	68,37	95,01	116,09	117,70	138,07	168,12
Cadiz	1596,44	2014,05	1671,32	1762,90	1864,08	2496,26	2219,13	3666,02	3867,06	2186,78	4533,39	5587,26
Castellon	104,30	68,31	31,93	5,94	1,99	6,56	7,92	3,10	2,67	3,30	0,82	6,27
Ciudad Real	25,68	24,75	28,39	23,07	28,16	20,66	27,24	21,92	10,45	6,79	16,68	11,07
Cordoba	397,71	351,22	277,96	242,62	255,66	388,61	351,97	280,12	299,49	394,69	454,85	414,91
La Coruña	24,83	15,29	12,93	7,09	6,31	17,44	8,13	7,18	6,74	2,74	2,09	5,40
Cuenca	25,59	3,54	5,80	11,11	59,07	30,06	11,06	6,89	7,39	2,20	4,23	7,62
Girona	26,44	1,79	1,56	0,40	2,27	1,35	5,00	6,14	2,28	3,73	0,98	7,10
Granada	46,27	31,73	32,88	44,40	59,20	141,80	160,06	169,73	164,56	146,59	182,89	185,16
Guadalajara	4,58	3,08	5,50	2,10	0,69	1,53	1,19	0,52	1,50	8,90	3,56	1,55
Guipuzcoa	1,93	13,58	23,51	15,04	2,23	28,57	16,10	23,12	5,60	17,61	9,22	4,08
Huelva	348,80	502,17	376,71	560,69	382,69	405,02	502,60	627,29	597,78	514,19	670,65	1085,72
Huesca	0,00	0,09	3,90	1,04	1,19	0,50	0,11	0,04	0,34	0,07	0,28	0,27
Jaen	100,38	74,19	102,65	130,89	59,96	73,08	77,07	125,71	158,76	103,96	200,26	125,17
Leon	11,89	13,73	0,72	1,58	0,75	0,60	0,85	0,96	2,18	2,10	3,19	4,05
Lleida	1,60	0,57	5,44	9,88	10,18	4,87	10,95	14,58	35,13	16,67	27,54	15,20
La Rioja	35,31	60,38	51,85	70,87	69,40	37,11	33,91	44,38	31,29	2,36	7,34	1,44
Lugo	1,06	0,26	0,40	0,00	0,00	0,20	1,63	3,23	1,49	0,03	0,02	0,09
Madrid	311,55	306,70	299,76	336,54	558,22	756,06	657,33	1120,91	733,14	1648,25	1978,56	843,21
Malaga	100,46	82,34	90,70	92,01	130,97	159,84	202,21	237,58	230,39	294,79	348,12	427,72
Murcia	13,54	29,56	29,77	25,69	18,58	23,91	17,87	42,97	22,52	27,06	26,54	35,52
Navarra	11,97	4,60	2,88	4,42	11,28	4,12	4,86	4,87	11,71	2,38	7,91	17,06
Ourense	0,09	0,18	0,40	0,92	0,00	0,08	0,38	0,00	0,80	0,03	5,98	9,32
Oviedo	13,79	2,95	2,20	3,61	2,98	4,64	0,95	0,75	4,96	7,78	15,58	6,02
Palencia	0,79	0,35	0,21	1,46	0,70	0,80	0,61	0,34	0,18	0,15	0,10	0,00
Las Palmas	18,99	29,48	14,65	9,84	6,75	3,19	0,33	1,56	0,18	3,20	1,21	0,77
Pontevedra	8,19	18,91	8,85	17,71	26,45	21,24	24,42	19,77	15,51	18,53	33,78	32,49
Salamanca	0,21	0,27	0,68	0,00	0,05	1,21	0,01	0,04	0,22	0,28	3,09	2,89
S.C. Tenerife	0,00	0,00	0,22	0,00	0,03	0,00	0,17	0,00	0,26	0,00	1,02	0,10
Santander	3,30	4,35	5,56	5,16	1,57	1,08	1,51	0,28	8,42	1,78	1,16	5,96
Segovia	0,00	0,23	0,25	0,09	0,55	0,28	0,31	0,98	0,68	0,26	0,50	0,47
Sevilla	810,25	711,59	584,12	719,24	646,56	645,11	778,40	762,63	846,15	948,34	990,29	1203,58
Soria	0,00	0,22	0,43	0,00	0,00	0,53	0,49	0,00	0,00	0,00	0,03	0,00
Tarragona	0,65	1,13	1,79	6,94	17,26	15,53	14,95	17,10	13,07	28,99	15,75	1,15
Teruel	0,40	0,18	0,00	0,25	0,00	0,00	0,00	1,31	0,00	0,62	0,13	0,00
Toledo	6,32	6,37	7,26	7,47	9,58	36,74	20,26	45,80	8,59	7,48	10,10	7,84
Valencia	51,19	74,27	46,51	61,65	43,11	60,02	45,99	50,69	49,85	47,20	117,54	55,95
Valladolid	6,09	0,91	2,31	9,57	30,38	142,56	239,36	161,44	19,64	7,26	8,06	4,53
Vizcaya	30,29	49,17	59,65	49,11	28,42	123,38	100,38	43,78	30,07	51,40	86,20	118,97
Zamora	0,51	0,10	0,00	0,97	0,22	1,83	0,23	0,00	0,00	0,20	0,08	0,59
Zaragoza	2,98	5,63	3,76	7,47	7,34	40,99	4,67	8,41	23,53	7,12	7,10	14,97

	Barcelona (x100 Tons)											
From	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Alava	75,41	103,10	129,26	151,74	221,54	165,13	146,63	190,95	209,76	193,31	240,89	261,75
Albacete	7,74	6,01	8,22	7,15	4,18	11,65	4,21	7,44	15,47	14,39	11,83	10,80
Alicante	111,66	137,17	121,40	135,88	67,54	151,60	133,55	202,47	336,78	181,80	196,46	207,56
Almeria	19,30	18,32	16,27	12,32	14,74	9,06	1,96	22,73	32,17	15,23	6,93	20,58
Avila	1,06	14,10	0,33	2,36	1,32	9,50	40,81	38,70	32,74	28,96	25,36	29,86
Badajoz	7,76	10,45	7,93	6,29	3,47	5,25	5,78	10,50	10,15	9,54	10,78	11,01
Baleares	15,73	27,91	25,19	23,51	33,91	52,96	73,19	72,88	63,41	54,17	88,92	118,79
Barcelona	11860,96	13003,75	15885,57	17529,76	21043,00	23376,70	25568,97	29491,61	30465,52	30931,67	33432,65	36504,10
Burgos	47,89	49,88	43,29	43,11	69,97	76,66	87,90	116,54	157,81	133,91	170,72	221,25
Caceres	2,00	7,29	10,98	4,98	2,20	2,92	1,51	38,52	25,36	35,99	48,40	40,14
Cadiz	5,27	6,13	5,55	30,74	110,46	98,69	197,91	7,05	8,11	8,83	17,68	45,33
Castellon	938,17	716,70	1333,17	965,30	478,43	395,46	293,54	455,49	777,27	833,53	778,10	661,38
Ciudad Real	48,17	45,29	29,79	30,10	26,31	10,99	15,99	34,96	163,57	239,77	275,73	371,87
Cordoba	22,61	4,76	6,08	5,99	4,42	13,13	10,18	27,13	28,71	22,72	47,31	30,47
La Coruña	157,54	68,06	39,10	29,42	31,39	28,53	23,56	33,42	26,30	27,98	29,40	38,58
Cuenca	16,05	7,28	7,67	6,24	11,78	17,53	9,82	25,43	9,05	10,05	7,74	10,44
Girona	419,36	375,29	599,29	699,43	1051,34	969,02	712,67	740,07	748,13	805,23	1078,47	1281,00
Granada	7,02	8,60	12,05	15,03	27,06	22,53	34,98	39,07	38,73	60,93	52,72	44,17
Guadalajara	32,47	14,93	14,71	17,05	8,35	44,27	72,10	58,16	16,01	16,30	96,30	75,92
Guipuzcoa	261,89	349,78	348,06	368,59	518,75	415,80	417,60	426,00	275,18	244,59	229,20	314,08
Huelva	8,30	17,81	5,11	5,49	5,46	2,30	2,66	4,61	5,87	8,96	2,53	1,67
Huesca	284,85	307,31	364,45	355,78	534,38	599,13	646,33	682,13	1048,09	1013,05	902,32	911,45
Jaen	5,21	6,39	4,62	5,70	2,20	2,74	3,64	6,37	4,01	15,34	11,51	30,43
Leon	25,60	10,01	5,46	17,83	40,71	28,83	8,55	14,24	18,06	15,35	17,82	49,06
Lleida	88,50	123,80	210,82	409,39	401,41	380,69	312,38	359,33	626,56	1000,74	945,55	1147,94
La Rioja	48,09	65,99	53,35	64,40	65,78	95,31	120,59	108,42	98,11	204,62	240,97	259,26
Lugo	147,47	2,40	0,65	10,87	4,10	0,68	0,67	3,91	4,24	14,98	3,90	1,75
Madrid	1221,57	911,42	1253,01	1664,95	1813,94	1909,28	2050,42	2171,49	2011,72	1959,86	2367,30	2654,96
Malaga	6,68	10,54	7,30	6,43	5,73	6,85	11,45	19,58	17,15	18,04	11,05	13,76
Murcia	59,65	57,04	53,30	54,33	44,20	64,90	47,51	88,78	124,65	57,92	91,63	102,04
Navarra	232,81	297,74	255,57	348,65	408,24	499,44	415,84	626,98	687,13	779,05	812,73	1083,74
Ourense	15,88	2,83	5,61	7,18	4,39	1,93	1,77	5,63	5,29	8,44	5,56	7,12
Oviedo	42,28	42,11	38,59	37,52	67,98	66,63	97,47	155,21	170,17	118,91	71,93	82,19
Palencia	3,44	1,91	2,52	43,43	10,72	5,29	9,03	19,91	15,52	32,75	18,91	13,86
Las Palmas	2,54	1,52	2,36	6,36	1,87	0,74	2,08	5,42	7,45	2,93	3,35	2,58
Pontevedra	19,90	13,47	34,91	29,76	21,64	35,65	26,66	17,93	30,72	34,35	26,09	32,66
Salamanca	3,24	3,84	2,56	3,79	3,29	7,45	13,06	15,30	20,51	18,37	51,53	55,08
S.C. Tenerife	0,02	0,03	0,16	0,35	2,22	0,74	1,34	2,30	3,88	5,95	2,75	2,76
Santander	61,51	89,02	93,04	93,45	150,50	204,10	241,77	196,92	194,68	229,41	246,79	260,61
Segovia	0,38	0,75	1,50	0,86	3,13	2,85	6,27	2,17	2,12	9,86	2,50	11,00
Sevilla	25,17	21,60	13,82	13,51	18,37	28,32	31,38	37,17	56,35	67,11	86,00	96,94
Soria	16,42	17,49	20,60	2,73	7,20	6,79	6,09	6,12	12,59	15,38	13,67	20,99
Tarragona	856,80	1001,90	1121,58	1149,36	1272,11	1760,05	2188,19	2679,93	1934,72	2200,97	2849,63	3031,62
Teruel	5,05	3,26	6,59	0,92	0,62	1,20	2,51	6,48	4,69	18,93	7,46	9,69
Toledo	8,14	8,65	7,29	11,74	14,22	68,46	28,26	24,26	53,22	62,67	52,01	36,56
Valencia	256,56	282,52	289,41	321,71	242,51	329,26	398,74	422,92	440,58	413,71	325,19	242,90
Valladolid	11,68	8,30	11,26	15,19	9,20	17,86	23,93	66,97	100,43	110,12	90,01	64,11
Vizcaya	191,77	220,65	196,43	244,49	235,81	296,13	317,88	259,45	298,62	333,95	278,79	315,03
Zamora	0,51	0,52	0,59	1,56	0,66	0,58	0,13	1,27	1,54	6,87	11,74	6,33
Zaragoza	205,55	203,98	313,70	528,78	733,81	936,10	1385,51	1141,22	1377,40	1682,83	2117,25	3040,93

	Bilbao (x100 Tons)											
From	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Alava	589,73	964,38	1220,58	996,17	1258,13	1120,10	921,53	1277,11	1284,75	1384,14	1507,36	1739,69
Albacete	1,56	6,79	2,31	12,56	20,48	16,02	20,53	5,63	12,61	1,89	1,78	2,09
Alicante	30,51	33,13	28,16	19,37	26,13	32,24	57,82	35,63	51,30	35,55	41,70	36,69
Almeria	0,88	2,25	0,59	16,87	16,64	32,84	26,50	1,89	1,84	4,07	2,48	10,76
Avila	1,03	0,37	0,60	0,66	5,95	7,16	3,64	6,57	9,92	1,20	3,12	1,07
Badajoz	0,82	2,95	2,29	8,50	22,28	8,28	22,96	17,43	19,86	3,46	6,10	3,13
Baleares	1,13	1,18	2,10	3,09	1,28	3,69	4,89	8,54	5,72	4,62	5,79	3,54
Barcelona	409,97	854,24	491,81	536,74	429,55	551,51	870,52	721,13	763,94	796,73	662,82	606,56
Burgos	331,06	307,92	319,39	422,36	505,53	703,30	700,49	625,21	487,20	423,49	845,78	895,68
Caceres	9,70	7,15	3,20	6,67	13,66	10,81	5,12	6,84	8,52	13,42	54,59	4,78
Cadiz	3,79	7,53	5,76	13,26	17,50	19,55	20,86	29,97	25,99	25,09	33,08	20,08
Castellon	85,93	151,89	117,43	136,45	159,17	222,84	349,66	195,19	231,58	270,42	228,72	129,59
Ciudad Real	92,94	22,36	2,05	1,49	3,62	8,56	16,84	32,87	41,04	18,82	10,71	16,86
Cordoba	16,06	39,55	8,47	11,39	10,93	9,16	8,09	7,65	5,20	8,46	17,12	5,68
La Coruña	36,89	45,83	46,60	61,68	67,60	36,39	43,10	33,15	40,34	24,45	21,67	20,61
Cuenca	23,18	26,14	7,57	4,13	16,89	10,67	1,38	3,98	3,07	12,55	5,31	5,25
Girona	14,01	10,71	4,12	12,50	11,59	11,84	29,98	30,77	11,85	9,93	19,96	19,22
Granada	0,59	3,84	1,20	0,40	10,32	7,67	40,03	11,73	7,68	1,27	3,61	6,54
Guadalajara	9,47	13,29	6,98	7,37	5,63	5,90	9,24	5,20	2,41	2,97	4,71	8,68
Guipuzcoa	649,97	761,71	1381,41	2061,28	2291,24	2559,10	2575,54	2817,45	2159,75	2162,64	2106,78	2286,80
Huelva	1,78	3,08	3,30	17,15	8,85	7,83	2,92	6,52	2,56	0,01	6,41	33,96
Huesca	48,68	40,87	36,93	45,15	48,31	13,16	16,89	29,25	13,27	12,31	18,82	39,87
Jaen	6,96	5,05	10,52	10,72	9,99	10,23	3,70	2,27	2,46	11,48	15,31	11,18
Leon	91,25	96,76	132,53	69,61	113,54	96,12	114,16	71,05	64,17	77,75	81,83	118,25
Lleida	8,62	15,06	19,63	30,90	20,14	12,56	77,85	176,11	43,23	43,46	40,57	27,08
La Rioja	171,55	288,01	1996,15	329,21	377,97	356,87	445,41	474,92	501,99	473,53	607,82	594,22
Lugo	16,45	21,56	13,62	3,39	9,43	14,47	12,54	7,44	13,21	10,48	10,24	5,30
Madrid	934,83	1381,32	1705,82	1385,53	1544,76	1564,72	2186,64	2136,07	2857,65	3034,38	3052,73	3284,39
Malaga	1,39	2,68	3,00	2,32	5,22	8,57	6,32	7,99	8,37	21,05	24,00	9,91
Murcia	17,77	33,53	34,62	15,21	25,69	27,79	47,94	33,54	42,01	47,94	40,50	43,40
Navarra	368,67	573,31	637,00	690,56	844,87	974,38	1131,37	1225,78	1232,92	1385,89	1621,11	1614,47
Ourense	26,89	23,29	24,61	54,11	40,08	41,10	43,10	31,35	46,36	55,30	55,65	35,15
Oviedo	174,14	182,64	189,80	292,65	328,14	350,46	366,14	414,58	361,66	371,89	385,68	690,41
Palencia	14,17	15,02	25,08	21,26	37,99	29,12	17,02	29,02	28,65	34,57	51,98	81,06
Las Palmas	3,84	2,34	0,80	0,14	0,78	0,42	1,50	2,09	0,64	0,42	0,81	0,82
Pontevedra	39,74	58,82	87,42	54,82	39,61	46,08	28,62	39,20	44,52	41,23	40,94	42,26
Salamanca	1,06	3,68	4,23	4,35	5,66	7,21	4,65	3,78	5,35	6,69	4,95	16,62
S.C. Tenerife	0,00	0,00	0,00	0,36	1,16	1,05	0,10	0,98	0,73	0,39	0,32	6,23
Santander	286,11	406,37	569,42	643,45	649,39	760,41	839,22	853,34	969,89	1275,19	1615,17	1827,42
Segovia	21,60	13,55	13,49	13,13	15,60	26,53	16,95	11,60	16,09	12,84	18,47	9,78
Sevilla	3,74	16,09	10,08	5,83	9,29	47,79	29,40	15,51	15,78	27,82	29,04	38,62
Soria	1,36	1,61	2,98	6,16	6,54	7,51	17,70	7,28	9,13	16,40	15,20	13,51
Tarragona	28,98	22,44	8,45	2,64	3,12	17,63	9,20	21,24	23,79	29,76	135,49	47,93
Teruel	0,00	0,31	0,04	2,83	5,15	2,71	0,31	2,47	0,30	1,15	0,58	0,66
Toledo	31,14	29,88	32,47	20,66	25,93	64,43	41,64	46,22	31,66	22,62	29,90	26,85
Valencia	37,49	74,56	53,37	26,21	45,17	53,54	76,54	58,95	57,12	53,40	83,97	61,73
Valladolid	165,42	309,03	213,83	191,05	213,19	248,91	277,01	149,56	113,60	171,23	199,18	186,61
Vizcaya	2264,21	2852,85	3251,90	2780,34	3061,19	3344,64	3725,90	4074,55	3974,08	4315,13	4678,71	5673,58
Zamora	6,43	6,72	3,11	3,33	4,35	4,70	11,60	6,13	16,18	15,70	21,43	25,20
Zaragoza	58,37	132,95	119,40	198,71	312,03	244,51	225,49	216,58	205,05	186,95	158,89	190,17

	Valencia (x100 Tons)											
From	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Alava	36,50	42,20	36,95	31,56	44,13	66,92	67,08	61,00	58,22	70,83	65,74	98,21
Albacete	114,69	168,95	252,12	287,05	278,10	357,16	506,13	813,62	594,18	371,02	377,74	401,13
Alicante	2594,22	3366,11	2903,34	5347,56	4148,42	4560,51	5311,16	6518,91	6951,63	7609,58	8172,23	8625,55
Almeria	36,95	42,56	44,05	58,24	93,14	135,65	135,33	161,09	182,48	301,20	424,24	730,31
Avila	5,83	6,98	9,73	24,92	15,49	10,41	4,81	6,61	9,96	10,90	25,68	16,50
Badajoz	14,37	22,85	23,11	13,54	34,93	81,79	51,77	24,06	34,99	138,98	110,52	90,74
Baleares	31,02	30,51	49,82	45,89	53,27	65,95	64,91	102,56	101,58	115,26	146,10	148,06
Barcelona	404,54	459,83	567,84	4982,51	792,91	955,31	1570,18	2044,10	1559,63	1809,46	2242,34	2406,94
Burgos	71,31	51,37	77,97	88,18	93,04	94,09	114,26	137,14	168,92	169,56	213,41	214,75
Caceres	10,15	29,03	31,01	24,23	20,04	24,00	22,63	35,51	77,14	133,87	84,45	85,80
Cadiz	21,98	27,21	19,87	44,71	34,52	26,30	23,75	23,13	39,65	30,89	39,19	56,70
Castellon	10299,03	13160,37	13233,27	23746,05	21151,45	23422,54	24809,81	29695,33	33497,28	35788,01	33758,53	33255,45
Ciudad Real	116,58	172,31	563,21	400,49	398,82	625,43	426,39	542,73	556,01	493,29	627,58	600,22
Cordoba	22,59	38,90	61,88	91,48	133,75	122,26	119,57	203,36	219,50	292,74	393,54	351,25
La Coruña	25,54	22,89	43,94	28,63	45,17	86,01	80,14	63,63	62,09	114,05	183,59	364,54
Cuenca	131,81	120,27	443,15	280,29	170,95	189,43	178,53	159,40	112,37	97,02	150,09	271,97
Girona	9,49	9,33	19,16	21,67	50,97	30,22	55,24	47,76	60,78	55,44	86,62	100,03
Granada	148,57	111,82	157,94	130,02	161,72	180,56	208,42	173,28	115,36	112,06	136,81	129,80
Guadalajara	37,75	44,17	63,59	93,33	108,72	75,82	97,61	115,51	116,42	181,15	180,08	291,55
Guipuzcoa	85,08	206,09	310,52	421,12	365,63	336,31	309,16	353,77	403,04	420,82	402,93	315,96
Huelva	32,35	169,01	198,68	235,60	177,01	40,60	39,26	74,44	87,17	39,72	70,99	167,86
Huesca	3,31	51,36	38,31	23,90	10,10	11,15	6,04	6,97	9,04	6,54	4,37	12,81
Jaen	31,44	39,47	49,70	61,26	138,19	146,10	216,56	267,90	270,97	287,96	358,26	307,08
Leon	400,82	436,90	507,37	637,16	556,82	412,19	332,89	371,12	545,54	487,01	512,36	631,41
Lleida	14,09	7,27	6,01	20,24	20,33	38,76	49,77	15,32	46,46	47,83	34,11	60,30
La Rioja	32,63	64,53	67,09	56,59	79,81	88,33	95,30	100,71	100,22	87,98	133,37	137,43
Lugo	0,26	2,11	4,93	1,95	5,04	35,29	8,98	7,23	10,57	12,27	6,19	5,15
Madrid	1872,93	2037,94	2369,01	3072,09	3505,18	4239,01	4857,51	5272,40	5326,91	5628,27	6069,31	6868,86
Malaga	21,63	30,26	47,53	40,40	47,82	71,10	84,30	85,19	98,00	92,15	87,55	100,31
Murcia	777,97	1014,46	1606,77	5114,79	1859,46	2424,45	2489,80	2720,39	3198,13	3065,95	3752,64	4112,50
Navarra	51,07	40,19	73,78	117,90	132,31	143,39	148,17	143,82	162,31	194,06	195,63	236,47
Ourense	6,12	3,71	5,64	4,11	7,09	5,56	10,45	8,94	21,31	13,93	11,80	7,41
Oviedo	115,44	134,44	136,45	117,34	124,45	124,66	144,46	166,48	47,96	55,33	107,22	99,56
Palencia	32,12	75,17	56,34	81,22	68,56	52,31	86,15	99,25	92,66	96,84	107,79	121,77
Las Palmas	0,84	1,60	2,34	0,79	2,47	4,19	6,90	9,20	11,04	13,46	9,51	11,53
Pontevedra	16,70	21,74	51,70	44,12	46,84	126,87	77,44	122,42	125,72	112,40	114,63	122,41
Salamanca	15,04	16,32	27,44	39,35	41,23	42,53	32,89	23,37	25,31	30,31	30,81	39,82
S.C. Tenerife	0,65	1,00	0,24	1,55	0,03	0,52	0,90	0,89	1,27	4,95	1,39	0,97
Santander	27,66	36,27	27,88	25,44	21,86	80,58	154,99	108,79	78,73	31,48	24,22	122,29
Segovia	5,44	10,51	26,94	19,00	20,67	28,35	33,52	48,28	73,03	96,48	100,02	107,96
Sevilla	85,64	91,29	84,53	122,47	172,51	98,99	140,95	209,64	179,23	195,76	320,46	388,34
Soria	42,06	15,86	26,81	7,06	10,58	4,09	6,70	13,82	5,74	14,80	21,38	20,40
Tarragona	155,79	194,14	123,97	60,51	82,67	124,70	151,29	189,47	193,88	210,26	179,08	224,55
Teruel	5,38	5,32	8,67	11,16	14,41	19,28	41,70	60,06	61,41	71,09	141,07	290,56
Toledo	420,22	332,26	293,03	325,62	471,41	542,82	855,93	794,38	855,19	951,61	1048,15	1266,33
Valencia	4951,57	6937,86	8083,47	8461,93	10055,01	12531,36	13074,79	13688,31	15807,96	17664,81	18584,28	23301,11
Valladolid	82,55	45,23	84,14	97,83	118,56	107,47	141,30	155,51	166,14	166,65	305,87	208,90
Vizcaya	75,05	21,98	29,20	89,09	162,55	59,41	61,76	130,56	132,88	173,75	280,90	535,54
Zamora	2,94	8,88	6,11	10,47	6,61	6,74	7,27	9,42	5,95	11,60	13,89	15,72
Zaragoza	505,88	201,77	428,80	268,62	294,58	524,77	452,68	406,69	467,90	446,38	539,46	561,12

	Total (x100 Tons)											
From	**1993**	**1994**	**1995**	**1996**	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
Alava	749,25	1113,53	1553,82	1185,82	1535,09	1363,96	1144,96	1533,34	1564,04	1656,89	1822,63	2115,46
Albacete	140,51	195,95	274,86	331,24	317,34	422,76	543,83	838,13	629,06	410,96	400,92	425,04
Alicante	3276,55	4067,92	3902,27	6682,96	5699,71	6197,81	6847,75	7933,09	8305,86	8664,39	9291,68	9700,92
Almeria	87,83	101,55	147,71	133,42	227,88	285,17	294,87	436,36	595,33	899,34	1103,53	1621,05
Avila	8,22	21,93	10,66	28,63	23,36	27,14	51,45	53,11	52,61	42,37	54,79	47,44
Badajoz	327,91	150,69	150,53	115,86	234,94	266,09	294,47	290,50	261,10	423,93	426,25	353,78
Baleares	48,26	60,31	78,99	74,14	88,96	123,64	146,59	186,50	173,03	175,26	241,87	275,26
Barcelona	12874,67	14447,07	17084,11	23219,66	22663,78	25523,43	28410,36	34030,96	34754,41	35130,41	37177,70	40222,89
Burgos	452,43	413,05	448,79	562,30	680,17	880,52	905,63	890,72	821,91	737,83	1296,12	1417,58
Caceres	78,72	116,64	78,66	84,70	74,53	105,78	99,92	176,18	229,36	310,75	327,99	310,42
Cadiz	1634,00	2059,79	1709,36	1857,46	2029,43	2644,73	2465,97	3729,13	3945,28	2255,58	4641,66	5717,17
Castellon	12420,04	16025,60	16539,98	26714,33	24635,88	26830,53	27807,19	33284,06	37306,63	40172,57	38665,21	38250,50
Ciudad Real	304,95	268,69	659,29	459,27	458,79	672,23	502,13	636,68	788,91	849,60	997,87	1037,86
Cordoba	462,41	445,73	361,79	365,07	418,31	572,89	499,35	580,34	588,06	848,43	931,10	845,80
La Coruña	278,18	235,06	207,02	202,94	303,41	457,89	584,29	761,98	882,28	1667,21	1367,51	1975,80
Cuenca	197,65	157,32	464,18	302,00	259,82	249,69	204,78	200,03	131,93	123,20	169,12	296,70
Girona	469,46	397,41	624,12	734,42	1116,23	1012,50	807,10	826,17	838,89	888,36	1204,75	1418,24
Granada	202,60	156,32	204,08	190,14	258,59	355,58	456,98	398,57	330,38	326,58	390,18	385,54
Guadalajara	84,92	75,87	91,00	119,85	123,56	128,61	180,63	179,53	136,75	209,62	286,09	380,59
Guipuzcoa	1024,39	1565,57	2377,76	2912,38	3254,14	3416,50	3336,38	3663,99	2969,87	2932,14	2752,06	2950,12
Huelva	530,76	934,48	585,82	821,39	618,76	457,91	552,66	724,68	713,80	581,51	765,25	1302,21
Huesca	339,84	400,24	444,19	427,80	594,40	624,41	671,93	732,40	1072,04	1076,74	938,42	964,69
Jaen	146,52	125,51	168,85	210,71	212,08	235,83	303,89	405,20	439,26	421,49	586,67	474,82
Leon	530,52	558,46	646,62	727,60	719,19	544,79	477,08	476,09	683,16	597,41	634,72	820,82
Lleida	136,65	157,22	243,17	496,10	461,78	442,72	455,72	750,27	969,06	1262,53	1110,37	1278,43
La Rioja	292,18	482,32	2171,39	524,41	593,68	578,41	696,66	738,00	738,67	776,23	1006,60	1004,92
Lugo	225,13	100,98	88,11	106,63	110,70	120,21	117,54	159,81	157,82	211,24	203,40	289,93
Madrid	4478,66	4708,60	5744,92	6558,94	7628,11	8942,55	9961,75	10946,96	11288,03	13077,25	13810,81	13932,79
Malaga	254,15	245,39	260,46	265,69	337,05	427,29	559,75	513,76	520,36	570,06	631,29	746,10
Murcia	1850,55	2260,23	2719,31	5847,76	2798,28	3830,79	3958,34	10773,36	10207,85	14444,49	6974,44	6376,67
Navarra	682,94	918,76	972,53	1169,82	1406,63	1622,65	1704,61	2002,15	2156,76	2365,04	2638,61	2971,46
Ourense	80,89	44,53	48,26	76,85	81,16	91,61	113,93	225,18	257,69	136,68	189,76	297,01
Oviedo	394,73	398,77	680,20	774,02	625,81	1175,23	885,12	2749,71	1212,77	1035,74	1178,73	1466,20
Palencia	50,55	92,83	84,16	148,07	117,98	88,72	113,25	167,45	151,50	164,38	178,85	217,82
Las Palmas	32,37	39,21	20,15	22,49	12,69	8,56	31,21	23,49	26,01	32,34	28,56	34,34
Pontevedra	693,26	965,92	1062,01	1366,97	1872,16	2618,74	2626,13	3297,33	3452,02	3749,45	5209,64	6125,17
Salamanca	19,60	24,11	34,92	47,52	50,22	58,40	50,60	42,76	80,02	58,26	97,50	123,57
S.C. Tenerife	0,87	1,03	1,00	2,31	3,47	2,30	3,50	4,18	6,32	11,67	5,70	10,06
Santander	395,94	581,46	745,10	815,07	830,26	1058,43	1270,70	1469,21	1503,69	1638,24	1941,93	2244,00
Segovia	27,90	25,17	42,27	34,39	41,43	91,36	58,96	63,46	92,74	122,65	122,82	129,46
Sevilla	1572,00	1285,88	1386,80	1542,29	1815,67	1824,03	1928,26	2070,84	2169,74	2486,96	2789,75	3020,03
Soria	59,84	35,23	50,81	15,94	24,55	19,34	31,48	27,22	27,65	47,28	50,65	55,82
Tarragona	1470,02	1433,81	1750,12	2062,88	2104,06	2664,61	2957,93	3329,86	2827,02	3757,58	4513,10	4667,45
Teruel	10,94	9,19	15,76	15,80	20,64	23,63	44,62	71,32	68,14	93,73	149,75	302,86
Toledo	468,06	378,82	340,76	367,90	526,54	714,01	953,02	911,85	955,60	1048,68	1150,73	1350,12
Valencia	5323,59	7447,91	8495,94	8903,36	10433,39	13065,79	13764,82	14365,88	16470,27	18343,04	19338,42	23826,78
Valladolid	267,25	363,80	350,71	313,83	371,72	517,82	682,17	535,11	403,47	472,83	629,93	517,97
Vizcaya	2565,64	3147,86	3543,31	3168,25	3522,28	3846,78	4270,50	4530,85	4488,88	4985,11	5454,71	6801,99
Zamora	10,39	16,21	9,81	23,49	11,85	14,04	20,62	19,19	27,23	35,55	52,19	51,60
Zaragoza	773,12	550,66	867,15	1009,06	1364,34	1761,60	2088,80	1787,64	2086,90	2344,22	2858,94	3830,82