SPOUDAI Journal, Vol. 62 (2012), Issue 3-4, pp. 30-53

University of Piraeus

SPOUDAI
Journal of Economics and Business
Σπουδαί
http://spoudai.unipi.gr

Connecting Island Regions – A Qualitative Approach to the European Experience

By

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Abstract

Island regions are generally dependent on transport services in order to retain cohesion with the mainland and for their socioeconomic development. Europe with its geography presents a number of island areas, with distinct characteristics, and transport needs. This paper focuses on the connectivity issue of these areas and attempts to address a number of questions concerning levels of service. By examining the general characteristics as well as the transport situation of these regions, the main factors affecting service levels are highlighted and possible general as well as specific policy options are considered.

JEL Classifications: R48, R58, R41, O18, L92, L93.
Keywords: Regional development, Cohesion policy, Regional transportation, Aviation, Ferries, Island regions.

1. Introduction

When one speaks of islands in Europe the usual image coming to mind, is one of holidays and sunshine. Even though largely true, it is not the whole picture. Looking at any map the great diversity of these regions as regards to size, geographical location and proximity to the mainland is immediately evident. In addition, being home to approximately 14 million people (3% of the EU population) they vary on resources, economic development and demographic trends. In the case of some European countries, such as Greece, Italy and Spain, they constitute up to 20% of the national territory and 12% of the population. A few countries, such as Cyprus, Ireland, Iceland, Malta and the United Kingdom are themselves islands.

The special characteristics, which distinguish island regions from mainland locations, bring a number of specific problems. For example, proximity to the mainland affects the quality and cost of access to the centres of economic and social activities. In other cases, low population density ensures the application of fundamental laws of economics, where low demand hinders the improvement of connection services, and restrains the growth of the local economies. And even though most of Europe's bigger islands are relatively well connected, this can't be always said for the smaller ones. Therefore transport accessibility becomes an important issue, especially when tourism is very often the main economic activity.

The need to ensure the economic and social cohesion and development of the island regions of Europe has been repeatedly recognised by the European Union (EU), and lately the Treaty of Lisbon reaffirmed the specific development needs of islands. In this respect, specific provisions for these regions (of legislative or financial nature) have been made both through the regional and transport policies of the EU. More recently, social and territorial cohesion is included among the priority areas set out in the EU's strategy for the 2020 (European Commission, 2010a).

This paper looks at the characteristics of the European island regions and their connectivity with the mainland. Thus, by observing the market state in a number of selected island regions this article attempts to obtain an overview of the European situation. Although the lack of detailed data does not allow for an in depth analysis, this paper proceeds in a descriptive analysis of the similarities and differences of these regions, in an effort to shed some light in the factors that affect transport services to and from these regions. Drawing on the findings of this analysis, the paper concludes with a discussion on possible policy considerations.

2. State of the Art

The 2011 transport White Paper (European Commission, 2011a) while emphasising the sustainability of the transport sector, recognised the vital importance of transport for all the European regions, and the need for them to be fully integrated. The Impact Assessment that accompanies the White Paper (European Commission, 2011b) includes an ex-post evaluation of the effects of the policies applied so far. Besides identifying a number of areas where improvements have been made (concerning safety, security and efficiency), areas where these policy measures have failed were also recognised. Among others, that the full external cost is often not reflected in prices, and that besides the air market all the other transport modes suffer from different degrees of fragmentation usually along national borders. It is notable that the Impact Assessment identifies in the

base scenario (no change in policy) that the peripheral (including island) regions would be faced with higher average transport costs (both in monetary and time terms) than the central regions.

Previous research has demonstrated the importance of transport services to insular economies. Passenger services, in particular, offer the means to connect with the mainland, but also help their development, by facilitating the movement of tourists, thus increasing their attractiveness as a destination (for example: Donzelli, 2010, Chlomoudis *et al.,* 2007, Jorgensen *et al*., 2004, Papatheodorou, 2002). Transport services are provided by air and sea modes, and their relationship ranges from complementary (Polydoropoulou, 2005, Sambracos, 2001) to competitive (Tsekeris, 2009, Rigas, 2007, and Spathi, 2005) depending on such factors as existence of infrastructure, demand levels and distance from the mainland, as well as service levels and previous experience. The choice behaviour of passengers and the specific factors affecting modal choice is examined by Rigas (2009) as well as by Polydoropoulou and Litinas (2007). In addition, Rigas *et al*. (2011) further examine the relationship of these two modes during the economic crisis. According to researchers, a competitive transport environment is expected to improve the quality of transport services, which in turn would have a positive impact on the development of island regions (Hernandez Luis, 2002). When the market forces are unable to offer the service levels required, the regulatory authorities intervene through the imposition of Public Service Obligations (PSO's) and Public Service Contracts (PSC's). An examination of the European aspects of this practice is offered by Chlomoudis *et al*. (2011) and Williams and Pagliari (2004).

European Commission market reports had examined the situation in the aviation and maritime cabotage markets in the EU, which however was done as separate modes. For the aviation area, the analysis of the European air transport market (European Commission, 2010b) shows a general decline in domestic and intra-EU traffic demand for the year 2009, which was also reflected in the supply side. With regard to the island regions, the study finds that domestic routes to the Spanish and Italian island regions are among the main routes in Europe in terms of flight frequency and amongst the most competitive in terms of number of players in the market.

On the other hand, for maritime cabotage, the latest report dates from 2002 (European Commission, 2002) and can be considered as outdated. However, some information can be gathered from industry reports focusing on the ferry market in Europe, where through a comparison of specific regions, the Mediterranean and most specifically the Balearic were identified as the most competitive of those examined (XTRC, 2007). In addition, a trend has been identified for ferry operators to focus less on passengers and more on cargo, due probably to competition from low cost airlines (Lloyds Register Fairplay, 2008).

An earlier attempt to examine the situation regarding competition between these two transport modes on a country scale on the side-lines of a study on the Greek market indicated a number of determinant factors, such as geography, demographics, operational framework and market maturity (Rigas, 2007).

3. Research toolkit and restrictions

This paper focuses on the connectivity problems of European island regions with the mainland and attempts to examine a number of questions such as:

- whether all the residents of the European island regions *enjoy the comparable transport services* to their mainland;
- what are the *differences* and what is their *origin*;
- whether there can be a *common policy* that addressing them, and if so
- which should its *elements* be.

To answer these questions, this paper first examines the general characteristics of these regions like geography, demographic and economic characteristics. Focus is given on the main island regions and selected major islands (served by both sea and air connections) representative of the geographical, demographical and economic variety. The existence of both air and sea connections with the national capital or major closest agglomeration is the common characteristic shared of these regions. Therefore, island regions such as the Ionian Islands (Greece), the Hebrides (UK) or the Estonian Islands have not been included, which however have similar characteristics with the regions examined. On the other hand an exception has been made with the inclusion of the Canary and Madeira Islands as it was felt that their exclusion from the analysis would lead to a restricted picture of the European situation. Furthermore, as domestic services become the centre of attention, island states like Cyprus or Ireland (or the UK as a whole) have not been included in the analysis, nor overseas territories like Martinique. Islands with bridge connections with the mainland (for example Zealand in Denmark where Copenhagen is situated) are assumed to be part of the mainland. In any case, the aim of this paper is to highlight the complexity of the island regions. As such, the current identified cases are considered a representative sample.

The regions are categorised based on the NUTS 2 classification of Eurostat, which is the main source of statistical information due to homogeneity and consistency of data at EU level. For the cases of Bornholm in Denmark, Gotland in Sweden and the Shetland & Orkney Islands in the UK data are collected in the NUTS 3 level to exclude mainland data included in the higher classification. Extensive use is made of the Eurostat database. Generally the data relating to the appropriate NUTS level from the relevant Eurostat databases are used in the analysis. Where such information is not directly available at the level needed,

this has been compiled through the closest available data (for example passenger transport figures shown for a region/island are sums from airports and ports in this region as reported by Eurostat) and indicated as own calculations in the respective tables and figures.

The paper looks also into the transport situation at the identified regions. Following an overview of the operational framework, attention is given first at the demand and then at the supply side of transport services.

Even though the Eurostat database contains transport information at EU level, this unfortunately does not always have sufficient detail and does not cover all the parameters required for a detailed analysis of this topic. While efforts have been taken to identify the missing information from individual sources, the problems encountered include the inconsistent collection and handling of the necessary data. Even though it is possible to locate historical data (under certain limitations) concerning the demand side on a European scale, it has not been possible to identify such a source for the supply side (especially concerning fares). This lack of available data limits the detail of the analysis.

Ideally, the researcher would have access to historical data concerning the fares in order to be able to identify how their evolution has affected demand. However, as earlier research has shown it has been quite difficult to obtain such data even for just one region (Spathi, 2005, Rigas, 2007). Similar difficulties were faced when expanding into more regions. Therefore, the only possible and valid approach is to attempt to obtain a snap-shot of the situation.

The data were collected from the web-sites of the respective companies and refer to journeys planned in the off-peak period, a month ahead of the booking time. The estimate has been obtained using the average of single journey economy fares (and air-type seats for ferries) stated by the transport companies. Various taxes and charges have been included in each case in an attempt to approximate the real price that passengers are faced with. On the other hand, the special price regimes reserved for specific passenger categories (for example reduced fees for permanent residents or students) have not been included in the estimation, neither has there been any allocation for the fact that some of these lines might fall under public subsidies. It should also be stressed here that due to the practice of yield management, the fares actually charged for passengers travelling on the same route can vary depending on a number of factors (such as time of booking, number of passengers, etc.). Therefore due to the complexity of the actual situation regarding fares, the prices presented should be considered as indicative. In order to allow for the effect of distance, the prices are presented per Nautical Mile (NM).

Therefore, this article does not provide an exhaustive analysis of the market situation. Rather, it makes an attempt to provide a snapshot of the existing situation concerning passenger services to the islands and the competition between modes.

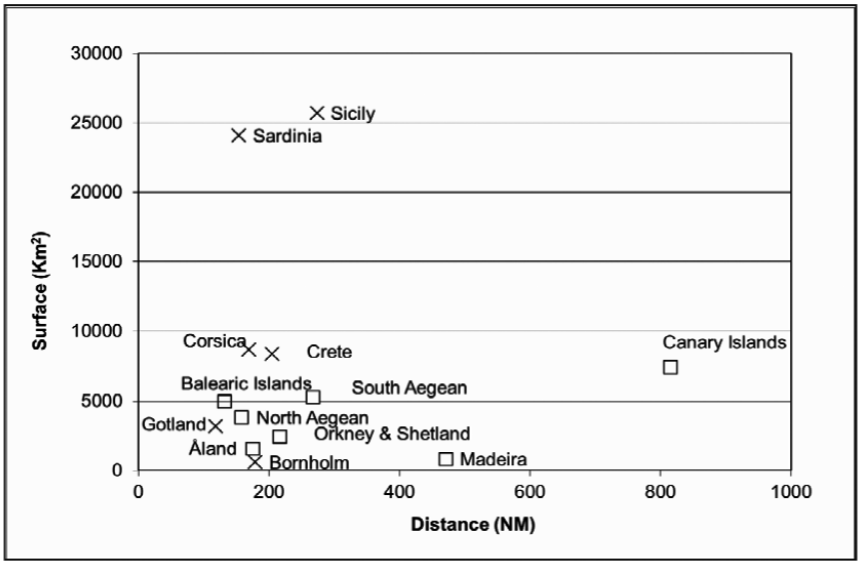
4. The characteristics of the islands regions – an interesting mosaic

4.1 Geographic location

Geography plays a key role in defining the situation faced by the inhabitants of the island regions. As already mentioned, proximity to the mainland can facilitate connections, while size can be linked in general with demand levels. Figure 1 presents an overview of the geographic characteristics of the identified regions, from which a number of distinct groups can be discerned.

FIGURE 1

Geographic characteristics



Note: Direct distance in Nautical Miles between the administrative centre/main agglomeration in each island region and the country's capita/closest main sea-side agglomeration in the mainland.

Type of Region: X indicates a single island; □ indicates a cluster of islands.

Source: EUROSTAT.

The first group to be identified includes the two Italian regions of Sardinia and Sicily, both being single islands of significant area. The Canary Islands and the Madeira, even though different in size, share same characteristics as they are both cluster island regions at significant distance from the mainland. Corsica and Crete appear quite similar, both being single islands of medium size at a medium distance from the mainland. The island clusters of the North and South Aegean,

the Åland, the Balearic Islands and Orkney & Shetland could form another geographic group, relatively comparable in surface area, with distance from the mainland in the close to middle range. Finally Bornholm and Gotland are single islands of small to medium size with close proximity to the mainland.

4.2 Demographic characteristics

Demographically the situation is comparable, with variations between the island regions of Europe. The main demographic characteristics of the selected regions are presented in Table 1.

TABLE 1

Demographic characteristics

	Population (2009)		Population density	
Island Region	**(in 000)**	**% of country**	**per km²**	**% of country average**
Bornholm	42.6	0.77%	72.1	58.01%
North Aegean	200.3	1.78%	52.3	60.67%
South Aegean	307.2	2.73%	58.3	67.63%
Crete	608.8	5.41%	73.2	84.92%
Balearic Islands	1070.1	2.33%	215.3	235.30%
Canary Islands	2076.6	4.53%	279.6	305.57%
Corsica	306.9	0.48%	35.1 *	34.62% *
Sicily	5037.8	8.39%	198.4	97.25%
Sardinia	1671.0	2.78%	70.0	34.31%
Madeira	247.2	2.33%	308.7	267.27%
Åland	27.5	0.52%	17.8	101.14%
Gotland	57.0	0.63%	24.3	107.05%
Orkney & Shetland	41.8 *	0.07% *	35.1*	13.90%*

*Note:** 2008 data.
Source: EUROSTAT.

The population of these regions appears relatively low, especially in respect to the total population in each country. Notable exceptions are Sicily followed by Crete and the Canary Islands. The picture changes when bearing in mind that there can be more than one island regions in a single country. This way the case

for Italy would reach 11%, for Greece almost 10% and Spain more than 6%. In absolute figures, three regions have more than a million inhabitants (Sicily, Sardinia and the Canary Islands), while the northern four regions have the lowest population with well below 100.000 inhabitants each.

There is an interesting diversity in population density findings. The Madeira has the highest density followed by the two Spanish island regions and Sicily. These three also show a higher density than the average of their respective country. In contrast the rest of the island regions have much less than 100 inhabitants per km^2. Gotland, Åland and Sicily have a density close to the country average. Finally Sardinia, Corsica and the Orkney & Shetland have the lowest densities in comparison.

4.2 Economic characteristics

The economic situation of the island regions appears slightly more homogenous as seen from the data presented in Table 2. The data relates to 2008, which is the latest year for which complete statistics were available.

TABLE 2

Economic characteristics

	GDP (2008)		Employment		
Island Region	**Purchasing Power Standard /inhabitant**	**PPS /inhabitant in % of EU average**	**Services**	**Industry**	**Agriculture, hunting, forestry and fishing**
Bornholm	23000	92.0%	75.00%	15.00%	5.00%
North Aegean	17900	80.0%	53.62%	11.98%	13.23%
South Aegean	25500	113.0%	56.24%	14.37%	6.45%
Crete	21100	94.0%	49.12%	14.26%	16.09%
Balearic Islands	25700	111.0%	74.23%	24.01%	1.77%
Canary Islands	20800	90.0%	77.23%	19.59%	3.18%
Corsica	23800	83.0%	73.20%	23.57%	2.15%
Sicily	16800	66.0%	73.04%	19.49%	7.47%
Sardinia	19900	79.0%	72.79%	20.99%	6.22%
Madeira	21400	103.0%	66.50%	23.21%	10.38%
Åland	42800	145.0%	77.63%	16.45%	5.92%
Gotland	23500	94.0%	75.18%	17.73%	7.09%
Orkney & Shetland	25350	101.0%	*n/a*	*n/a*	*n/a*

Source: EUROSTAT.

The regional Gross domestic product (GDP), measured through the Purchasing Power Standards (PPS) per inhabitant, is for most of the cases round €20.000. Notable exceptions are the Åland on the higher levels, and North Aegean and Sicily on the lower. An important finding is that for the majority of the island regions, the PPP per inhabitant is lower (and in some cases significantly) than the EU average (only five regions are above the EU average). This picture reflects the economic disparities that these regions face.

In all of the cases the main economic activity of the population is in services with less than a quarter being occupied in industry. Regarding the primary sector, only a small percentage of the population is employed there, with highest levels being recorded for Crete and the North Aegean.

Tourism, as already stated, is an important economic activity for these regions. An overview of its characteristics is presented in Table 3.

TABLE 3

Tourism characteristics

Island Region	Arrivals in hotels and similar establishments (2009)		Change arrivals 2009-2007 (%)	Average nights spent /arrival	Arrivals / inhabitant
	Total	**% non resident**			
Bornholm	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
North Aegean	310589	44.1%	-5.3%	5.3	155.1%
South Aegean	2180439	78.0%	2.4%	6.7	709.7%
Crete	2373267	81.4%	6.1%	6.6	389.8%
Balearic Islands	7075297	80.6%	-14.6%	6.5	661.2%
Canary Islands	6496228	64.6%	-11.5%	7.0	312.8%
Corsica	1286798	23.7%	3.4%	2.2	419.3%
Sicily	3541810	38.0%	-12.8%	3.3	70.3%
Sardinia	1821863	34.2%	1.9%	4.5	109.0%
Madeira	911345	71.6%	-6.0%	6.0	368.7%
Åland	135428	52.4%	-0.2%	1.8	493.3%
Gotland	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*
Orkney & Shetland	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*

Source: EUROSTAT.

The number of tourists (domestic and foreigners) that checked in hotels and similar establishments during 2009 differs considerably between the regions. Åland and North Aegean had the least number of visitors, while on the other side the Balearic and the Canary islands appear as the most popular tourist destinations. The profile of the tourists, however, is not homogenous in all the island regions. In the Spanish, the Portuguese and the Greek regions (with the exception of the North Aegean), the majority of the tourists are foreigners, while the Italian regions and Corsica seem to be favoured more by nationals. It should be highlighted that there appears to be a relation between tourist origin and length of stay (as measured in average nights per arrival), whereby foreign tourists tend to spend more nights in their destination. The Åland and North Aegean are the exceptions to this observation.

An indication on the significance of tourism can be observed when comparing the number of arrivals with the number of inhabitants, as for most island regions arrivals are over three times higher than the residents. For the North Aegean and Sardinia the number of tourists and inhabitants is almost the same and only in Sicily are tourists less than the inhabitants.

Given that in 2009, Europe was suffering the effects of the financial crisis, it is interesting to make a comparison with 2007, a year just before the economic crisis. The information from Table 3 shows a mixed picture. Crete, Corsica, the South Aegean and Sardinia show an increase. In contrast the Balearic, Sicily and the Canary islands present a significant decrease of more than 10%. For the Madeira and the North Aegean islands the decrease is between 5 and 6%. These changes seem to originate mainly from non-resident arrivals and there doesn't appear to be significant changes in the number of nights stayed.

5. An overview of the domestic passenger market

5.1 The operational framework

The operational framework for transport in Europe, in general, is defined through the European Union's Common Transport Policy, which recognizes the importance and ensures the supply of transport services. The aim of the EU's policies is to improve competitiveness and efficiency, to ensure fair charging and quality of working conditions, and to improve quality of services (environment, safety, etc.). This has formed the basis upon which policies defining the operational framework of aviation and maritime transport have developed during the past decades.

Air transport had been traditionally a highly regulated industry, dominated by national flag carriers and state-owned airports. However, the creation of the com-

mon market brought changes in the operational environment of the airlines in the 1990s, especially with the introduction of the so-called "Third Package" in 1992, which included a series of Regulations defining the operating conditions for airlines operating in European skies (licensing of operators, access to market). Drawing from the experience of more than a decade of deregulation, in 2008 a new Regulation (1008/2008/EC) was adopted laying down common rules for the operation of air transport services in the EU. It aimed to improve the previous legal environment by expanding on issues of passenger information, oversight on companies and co-operation between airports, while it removed the remaining restrictions in bilateral air service agreements between Member States.

Similar is the case in maritime transport, where Regulation 3577/92 set the provisions for maritime cabotage within Member States. Since 1993, the freedom to provide maritime transport services within an EU Member State applies to Community ship-owners, whose vessels fly the flag of a Member State provided that the vessels comply with all the provisions of that Member State. For reasons of socio-economic cohesion a number of temporary derogations were provided for, which led to the final opening of the market almost a decade later. Maritime services covered by the scope of the Regulation include: mainland cabotage, island cabotage, offshore supply services as well as cruising.

Both legal acts mentioned above foresee that EU Member States can establish Public Service Obligations (PSOs) in order to maintain appropriate transport services, and to guarantee citizens continuous quality service at affordable prices throughout their territory, on routes which are vital for the economic development of a remote region or an island. The legal framework developed, defines the conditions for imposing such measures, the procedure to be followed and the type of obligations to be imposed. In both cases two important general principles are set: a) the obligation shall be imposed only to the extent necessary to ensure on that route the minimum provision services, which the carriers would not assume if they were solely considering their commercial interest, and b) that the whole procedure and requirements should be set in a transparent and non-discriminatory way.

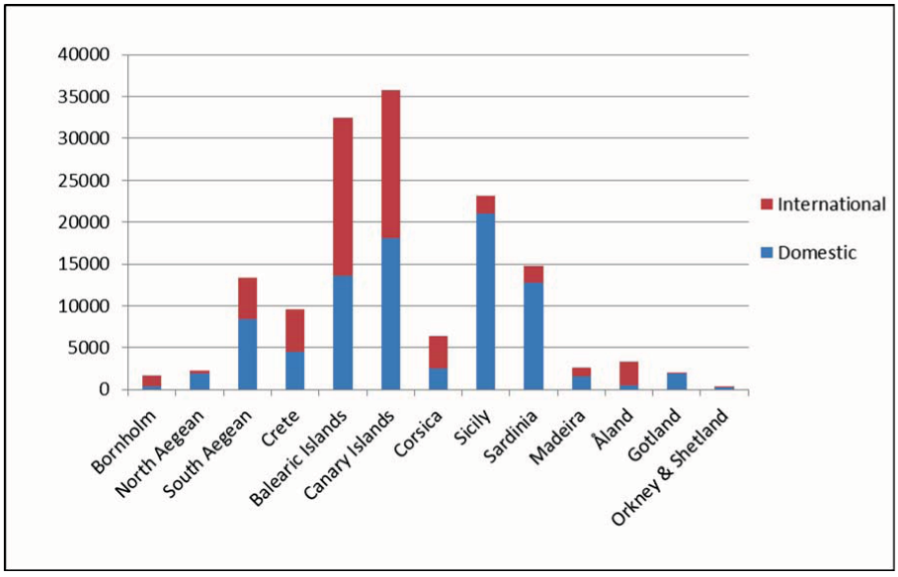
State aid within the EU is strictly controlled in order to guarantee a level playing field for all firms operating within the internal market. However, exceptions are allowed where the proposed aid may have a beneficial impact in overall Union terms. Therefore state aid is considered as a tool for achieving objectives of common interest, like services of general economic interest and social and regional cohesion and for correcting "market failures".

5.2 Demand Characteristics

This paper concentrates on traffic to and from islands served by both modes. Even though this would hardly have any effect in the case of single islands examined (like for the Italian regions), it would tend to understate the traffic (and especially the maritime one) in the regions composed by clusters of islands (such as the South Aegean), where a number of islands are not served by both modes. In these cases the importance of sea transport, being the only means of connection available, is self-evident.

FIGURE 2

Total passenger demand 2010 (in '000)



Source: EUROSTAT, Own calculations.

Figure 2, shows the total number of passengers that travelled with both modes through scheduled services to and from the main islands in these island regions both by air and sea in 2010. Domestic demand reflects the national demand (arrivals) as stated by Eurostat while international is the sum of intra-EU and external-EU demand.

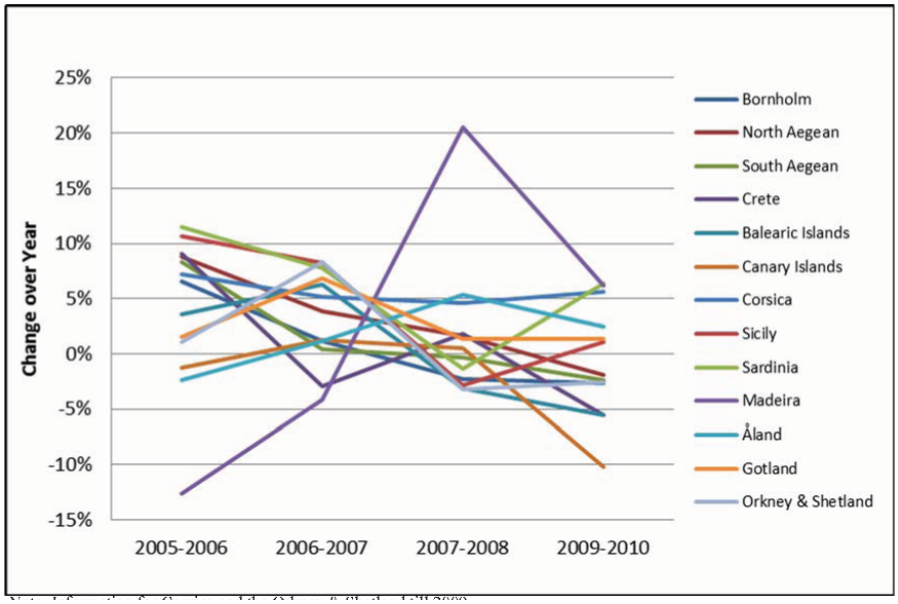
The Balearic and the Canary are by far the regions with the most traffic, followed by the Italian and Greek regions. This high demand for the south islands is obviously connected to their attractiveness as tourist destinations, as it is also evident from the data presented earlier in Table 3. What is interesting in this

case is the source of this demand, which appears to vary between the regions. While for the Canary Islands the demand is split roughly in half between domestic and international, the North and South Aegean, Sicily, Corsica, Sardinia have a strong presence of domestic demand, with Gotland and the Orkney & Shetland being almost exclusively domestic. On the other side, Crete, the Balearic and Madeira register higher levels of international demand, indicating that these regions are highly regarded by international tourists. Significantly high levels of international demand for Bornholm and Åland should be pointed out, which could be explained through geographical and social reasons. In all the cases the majority of international traffic is intra EU.

Another interesting case is to examine the impact of the economic crisis on demand. An attempt has been made to collect data from 2005 until 2010 from Eurostat, with Figure 3 presenting an overview of the yearly change in travel demand for the areas under examination.

FIGURE 3

Yearly change in demand (2005-2010)



Note: Information for Corsica and the Orkney & Shetland till 2009.
Source: EUROSTAT, Own calculations.

Judging from the information provided, two main conclusions can be drawn. The first is the clear negative trend which starts to appear after 2007 (though for

some regions the demand had started to decline even earlier). The second is the difference in development and reaction for each region. This can be explained not only through the specific characteristics of each region as described above but also through the specific characteristics of the demand in each region.

The importance of domestic and international demand differs not only among regions as seen before, but also between modes, as Table 4 shows.

TABLE 4

Domestic demand as percentage of total demand (2010)

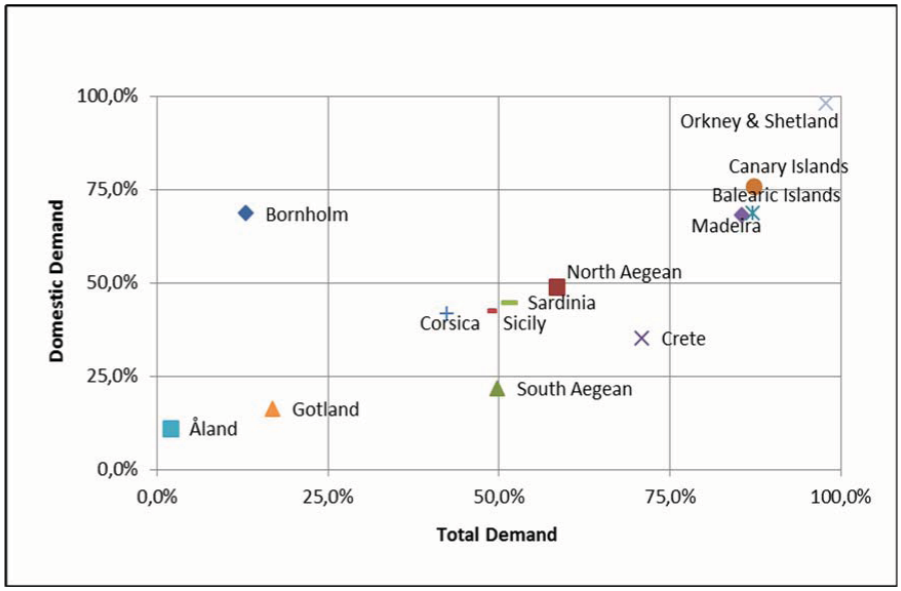
Island Region	Air	Sea
Bornholm	97.4%	6.0%
North Aegean	71.0%	100.0%
South Aegean	25.8%	100.0%
Crete	23.2%	100.0%
Balearic Islands	33.9%	100.0%
Canary Islands	43.0%	99.0%
Corsica	89.6%	89.0 % *
Sicily	75.8%	99.2%
Sardinia	73.4%	96.8%
Madeira	53.5%	97.6%
Åland	75.7%	13.9%
Gotland	94.4%	100.0%
Orkney & Shetland	99.4%	100.0%

*Note:** indicates 2008 data.
Source: EUROSTAT, Own calculations.

In maritime transport, the majority of demand is clearly domestic in origin, with the exception of Bornholm and Åland. Geographical position seems to play the most important role. Air transport, however, is not so dependent on this factor, and therefore this mode presents a more varied picture. For the northern island regions, the majority of air demand is domestic. On the other hand, southern destinations seem to be attracting a lot of international tourists. However, for the three islands of Corsica, Sicily and Sardinia, the majority of their air traffic demand appears to be of domestic origin.

FIGURE 4

Percentage of air demand (2010)



Note: Orkney & Shetland figure is for 2009.
Source: EUROSTAT, Own calculations.

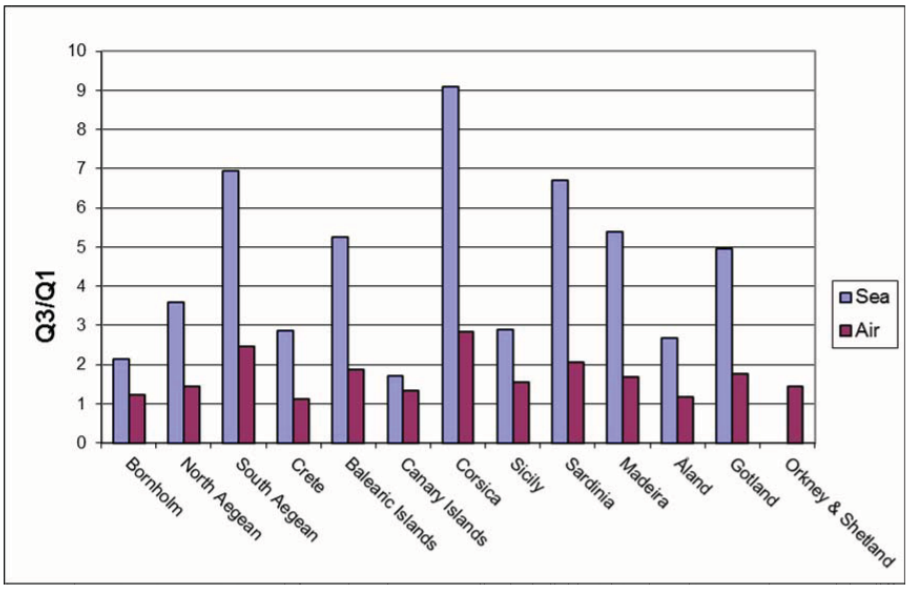
An overview of the modal split for the year 2010 is shown in Figure 4, which plots the percentage of total and domestic air demand. Here, some distinct groups can be identified. Passenger air services appear quite important for the Canary, the Balearic and the Madeira islands, both as far as domestic and total demand is concerned. This is mainly due to distance and tourism demand, as air travel offers direct link with the national capitals and other main agglomerations. Therefore, both modes appear to operate on a more complementary role. On the other hand, the market seems more competitive for the North Aegean, Sardinia, Sicily and Corsica. In this group, both modes have close presence in the domestic and international markets. The third group includes island regions where there is an important difference in the modal split between the domestic and international traffic. Such is the case of Crete and South Aegean (where air transport is more important in total compared to the domestic demand) as well as for Bornholm (where air traffic has a strong presence in the domestic market). Finally the Åland, Gotland and Orkney & Shetland Islands, register a strong dominance of one of the transport modes, possibly due to geographical reasons.

Given that international demand for travelling to islands is mainly due to tourism, a high seasonality effect is expected. Therefore, the seasonality for both

modes is examined in Figure 5, through the comparison of demand levels between the first and third quarter of 2010. Due to the low importance of international demand for the maritime sector, as already seen, the analysis is focused on the domestic demand.

FIGURE 5

Seasonality of demand (2010)



Note: Estimate based on total demand for each region. Seasonality in individual islands and/or ports-airports might differ. Figures for seasonality of sea demand for the Orkney & Shetland not available. Figures for Corsica relate to 2009.

Source: EUROSTAT, Own calculations.

As expected, the southern islands show generally higher seasonality due to the impact of tourism. Corsica has the highest seasonality for both modes, while the demand levels are much more uniform for the Canary Islands. Seasonality does not affect both modes the same way, having in general a stronger impact on maritime demand. For example, while domestic air traffic demand over the third quarter of 2010 was on average 1.7 times higher than the one for the first quarter of the same year, for the maritime demand this figure is round 4.5 times. If these figures are compared with those of 2007, we see that on average seasonality has decreased for both modes, which shows that the financial crisis had a higher impact in summer demand. Still when examining the data in detail we see that in some cases seasonality has increased for one mode only to decrease for the other.

5.3 Supply characteristics

Given the analysis so far, it is not surprising to find variations in the transport networks offering direct links of the island regions with the mainland. Table 5 attempts to present a picture of the existing domestic networks by looking at various characteristics, such as infrastructure, number of companies serving the domestic market and the number of mainland cities connected with direct links.

TABLE 5

Supply characteristics – general

	Infrastructure*		No of companies+		Mainland cities connected (direct)	
Island Region	**No of airports**	**No of ports**	**air**	**sea**	**air**	**sea**
Bornholm	1	1	1	1	1	1
North Aegean	6	10	2	2	2	3
South Aegean	12	12	2	6	2	1
Crete	3	4	2	3	2	1
Balearic Islands	3	1	6	2	15	3
Canary Islands	7	2	6	2	13	2
Corsica	4	4	3	3	4	3
Sicily	3	4	8	6	20	7
Sardinia	3	5	6	5	20	5
Madeira	2	1	4	1	2	1
Åland	1	1	3	3	2	2
Gotland	1	1	3	1	3	2
Orkney & Shetland	3	3	1	1	4	2

Note: * Number of ports and airports in the region for which EUROSTAT statistics are available.
+ Companies offering both seasonal and year-round services. Code-sharing airlines included.

Source: EUROSTAT and websites of ports, airports and transport companies.

The importance of geography in the development of the transport networks is expected, as clusters of islands, as well as a large number of main cities in the mainland, appear to favour the development of larger and more complex networks. Simultaneously, air networks appear more complex than the sea ones, as aircrafts have the ability to serve a larger number of connections with the mainland (for example the Italian regions), and have the advantage of faster connec-

tions over long distances (as is the case for the Canary Islands). On the other hand the sea networks appear more consolidated. Ferry lines connect quite often more than one island destinations with the mainland within the same itinerary (like the case of the North and South Aegean islands). The Mediterranean island regions (regions with generally high demand) show quite developed and competitive markets, especially when considering the number of companies serving each island region, and the number of connections they offer.

In order to get further information on such aspects of the supply of transport services such as fares, frequencies and capacity available, this paper focuses on the direct connections between the administrative centre/main agglomeration in each island region and the national capital/closest main sea-side agglomeration in the mainland. Evidently, this choice of city-pairs is by no means an exhaustive examination of the market, however, due to the importance of these specific city-pairs they can be considered as indicative of the existing situation. Information has not been included for two regions, the Canary Islands and the Madeira, as there is no city-pair linked by both transport modes. Findings presented in Table 6 are mainly compiled from published information on the websites of the relevant transport companies, ports and airports.

TABLE 6

Supply characteristics (2011) - Selected city-pairs – Off-peak period

		No of companies		Weekly frequency	Weekly seat supply		Trip duration	Indicative price per NM	
Island Region	**City-Pairs**	**air**	**sea**	**air/sea**	**air**	**sea**	**air/sea**	**air**	**sea**
Bornholm	Copenhagen - Rønne	1	1	7.1	55%	45%	11%	0.73	0.44
North Aegean	Athens - Mytilene	2	2	4.4	25%	75%	10%	0.55	0.25
South Aegean	Athens - Rhodes	2	2	6.2	42%	58%	7%	0.43	0.22
Crete	Athens - Heraklio	2	2	5.0	28%	72%	12%	0.47	0.22
Balearic Islands	Barcelona - Mallorca	4	2	6.9	63%	37%	12%	0.51	0.66
Corsica	Marseille - Ajaccio	2	2	3.5	63%	37%	8%	0.86	0.27
Sicily	Rome - Palermo	4	1	35.3	74%	26%	9%	0.26	0.23

(to be continued)

Sardinia	Rome - Cagliari	3	1	10.3	37%	63%	8%	0.40	0.23
Åland	Helsinki - Mariehamn	2	3	2.1	4%	96%	7%	0.49	0.23
Gotland	Stockholm - Visby	3	1	5.4	12%	88%	17%	0.81	0.23
Orkney & Shetland	Aberdeen - Lerwick	1	1	3.7	17%	83%	12%	0.69	0.19

Source: Websites of ports, airports and transport companies – own calculations.

The first notable observation is the number of companies serving these city-pairs, which are in most of the cases, fewer than the ones operating in the regions. In effect, this indicates that when one looks in more detail into specific lines it is possible to identify lines with monopoly characteristics. Therefore, this could be an indication that for specific city-pairs the passenger does not have as many alternatives as shown in the previous table.

The number of companies operating on a specific line is of course related to the frequency of services provided. As expected, air travel offers generally a higher frequency and therefore more alternatives for the passengers (subject to seat availability). The information provided in the table relates to the off-peak season periods within 2011 and shows the ratio between weekly air and sea frequency. The city-pairs in Sardinia and Sicily register a quite high difference in frequency, whereas for most of the other cases air frequency is between two and seven times higher.

This characteristic does not come as a surprise and it is strongly related to the capacity of the vessels, with airplanes reaching in the best of cases 180 seats, while ferries can accommodate up to 3000 passengers. Therefore a rough estimation of the split based on weekly seat supply is attempted. Here the picture is mixed, with some islands being offered better capacity by air and some by sea. Still, the nature of the sea network (lines serving more than one destinations) would tend to overestimate the offered capacity for certain city pairs (for example the Orkney & Shetland and the North and South Aegean). The ratio between trip duration presents more evidently the speed advantage of air transport. In most of the cases this approximately an hour (plus or minus 15 minutes) and it is more of less 10% of the time of a ferry. The latter was estimated using the average time published for the trips available (including fast ferries) and in some cases it includes intermediary stops.

As expected, ferry transport has the advantage of lower fares. Two notable exceptions seem to be the Balearic Islands and Sicily. There, the common characteristic is the large number of airlines competing for the market, which tends to

support the fact that competition would lead to reduced prices. It should, however, be taken into consideration that passengers traveling by boat, who would opt for a higher service level on-board (i.e. a cabin) or travel with a personal vehicle, would need to pay a higher rate, which in some case might be close or even higher than the economy air fare for the same route.

6. Conclusions and policy considerations

The above findings suggest that transport services to the islands, while not completely dissimilar, are far from being considered as homogenous. Some island regions profit from a wide and competitive transport network, while others are facing a reality of low service, single option and often monopolistic situations. Some are highly dependent on tourism, while others have mostly domestic connections. In some cases, the main option is the ferry, while for others aviation is taking the upper hand. At the same time, the relationship between these two transport options ranges from competitive to complementary. Variances between the fare levels among the island regions were also clear (especially for air fares). While the operating framework was set in such a way so as to promote competition and improvement of service levels many island destinations seem unable to benefit from that.

When considering why these differences in transport services to mainland appear, one is bound to place geography among the main reasons. As seen above, distance from mainland and number of islands has a key role, a fact that is also confirmed by the related bibliography. Level of demand is another element to consider. Naturally, higher demand would tend to attract higher service levels. This demand could either be of local (like for the larger sized islands with higher population levels which does not clearly relate to economic capacity) or external origin (high tourism demand) and in its turn would define the effects of seasonality on the service levels.

Infrastructure is another characteristic to focus on. While geography still plays a role, bigger islands profit from multiple ports/airports and as such are served by a wider network. Whereas the type of infrastructure and the specific characteristic differ among individual islands, it is safe to assume that smaller islands would be in a more disadvantaged situation as the existing infrastructure might not be able to accommodate higher levels of demand and/or different types of vessels. In addition, the operational characteristics of the two transport modes play their roles as well. The wider range of destinations offered by aviation translates to a higher possibility for a wider network, while on the other hand ferries, especially in multi-island regions follow a more linear itinerary (which also affects trip duration). Even though the aviation market becomes more and more European and

competitive, the ferry market seems more constrained (mainly due to geography) to being fragmented and with few exceptions remains national in nature. Still, there are cases where the system adapts to a more rational form bypassing national boundaries (for example the combined car-ferry trips to Bornholm from Copenhagen through Sweden). Finally, one has to note that the domestic ferry market appears more concentrated, reverting to oligopolies or even monopoly characteristics for some destinations. Therefore geography, demand levels and infrastructure tend to define whether the market for specific city pairs will be able to operate under competitive or natural monopoly characteristics.

Given the above, a question arises whether there can be a single policy to address the problems of the island regions. The answer, as in many areas of economics, is not that simple. Given that this paper focuses on transport and as transport is generally considered to be a derived demand, the options being discussed below will focus on policies to improve transport services to island regions and not general policies for the economic and social development of such regions.

So far, the general policy followed by the EU was to promote competition and to attempt to correct for market inefficiencies by allowing the provision of state support for specific cases and under specific conditions. In addition, these areas would be able to benefit from development funds in order to improve infrastructure and their social and economic conditions. The 2011 transport White Paper (European Commission, 2011a), gives an indication of the general direction the EU transport policy will follow in the next years, placing sustainability in the centre. Among the measures considered to have an economic impact on the island regions, are the proposals for the internalisation of external costs, as identified also in the accompanying Impact Assessment (European Commission, 2011b). At the same time, it is explicitly recognised that in order to connect isolated regions and contribute to their economic and social cohesion, public support for the transport sector or for infrastructure is justified.

Whereas these policies, as described above, will form the general framework, it is clear that customised policies will have to be developed to address of each individual region. These can be distinguished in three broad categories:

First of all, there should be measures to ensure the provision of services. Regions or specific islands with generally low demand level will need to continue to benefit from public funding in order to ensure that a minimum sufficient level of service is provided, which will guarantee territorial, social and economic cohesion. At the same time, efforts should be made to avoid disproportionately affecting, due to lack of transport alternatives, the inhabitants of regions with natural monopoly characteristics.

Secondly, measures related to the infrastructure should be considered. Improvements in infrastructure through investments are generally expected to have

positive impacts on service and demand levels. Still the link between infrastructure and demand reminds of the chicken and egg situation – increased demand can justify infrastructure investment, while infrastructure improvements can help raise demand. Expanded use of private finding can be explored on a case by case basis, while for other cases the use of public and European funding (regional or structural) might be necessary. Especially in a period of tight fiscal control, great care should be given so that measures leading at "bridge-to-nowhere projects" are avoided. In general, infrastructure investments should on the one hand aim to remove factors limiting the development of services and on the other to help generate new demand.

Last but not least, measures can be taken on the operational side. These could include the restructuring of networks (especially in the maritime side) in an effort to rationalise and improve service levels. In this respect the question of the development of inter-island traffic through hub and spoke networks comes again to surface. In addition, the reduction of the market fragmentation along national boundaries (where possible) should be encouraged. Finally efficient use of vessels and adoption of new technologies are two measures that could bring improvements in service levels and costs.

While not exhaustive, this brief analysis of policy measures, justified by the issues explained in this paper, provides an indication as to the steps that can be taken in order to address connectivity issues of the European island regions. The nature and mix of the policies to be followed in each case should vary, taking into consideration its special characteristics and requirements. Therefore, further research is encouraged not only for the islands and regions identified above, but also for those not included in the current analysis.

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