



DEMAND-INCOME ELASTICITY OF LEISURE BOATS

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ABSTRACT

Demand-income models for recreational sailing can explain the evolution of the recreational fleet using the evolution of income for a specific country, region and period. These models are useful in that their logarithmic transformations allow the value of the demand-income elasticity to be obtained for recreational crafts in the region considered. Moreover, under the hypothesis of the maintenance of the value of this elasticity, the expected variation in the fleet can be determined from the expected income data.

The aim of this work is to formalise a model for the recreational fleet of a country or region which will allow the evolution of the fleet to be determined with respect to the changes in income taking place in the region, both in absolute and in relative terms. Results are obtained for the demand-income elasticity of recreational crafts for the various recreational fleets of Spain grouped into seven geographic regions.

Keywords: Nautical tourism, recreational fleet, income elasticity.

INTRODUCTION

General Framework

Recreational sailing is one of the fastest-growing areas of nautical tourism in modern societies, particularly over the last three decades (Favro & Glamuzina, 2005; Horak,

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Marusic, & Favro, 2006; Miller & Auyong, 1991). Nautical tourism is a segment of the tourist industry (Xiao & Smith, 2006), made up of a wide variety of activities that take place in the marine environment. These include both sea-based leisure activities such as cruises, angling, scuba diving, sailing, windsurfing, rowing, yachting, boat trips, marine ecotourism, tourist submarines, equipment hire, etc., (Miller, 1993) and also the development of infrastructures such as recreational ports, marinas, sea-sports installations, sailing clubs, etc. (Kovačić, Gržetić, & Dundović, 2006; Lee, 2001). Nautical tourism is also closely related to other activities that make up coastal tourism (restaurants, hotels, sports installations, second homes, renting of property, etc.). Recent years have seen an increase in the literature on these matters, especially as regards environmental aspects and the sustainable development of the so-called ocean and coastal tourism (C. M. Hall, 2001).

Recreational sailing can be defined as a tourist activity that takes in a wide range of services and infrastructures (Cerit & İçöz, 2006; Luković, 2007), whose main direct consumer is the craft. Thus, while the tourist is the unit of consumption of the various tourist products and services in general tourist activity, it is the crafts that make up the unit of consumption of the various services and infrastructures offered by the tourist activity in recreational sailing. According to the terminology established by the World Tourism Organisation (WTO), recreational sailing corresponds, for any specific country or region, to the category of domestic tourism which, in turn, includes inbound and receptor tourism. In the developed countries, the domestic tourism is clearly greater than receptor tourism while the opposite is true of the under-developed countries.

Leisure activities such as those of recreational sailing are essential in today's society but they are, paradoxically, subject to a permanent contradiction. On the one hand, there is an increasing social demand for such activities (Baine, Howard, Kerr, Edgar, & Toral, 2007; D. Hall, 2000; D. R. Hall, 1998; Hawkins & Roberts, 1994; Kovačić, Bošković, & Favro, 2006; Nijkamp & Verdonkschot, 1995; Pearce, 1988; Smith & Jenner, 1995; Taïeb & Verdière, 1990; Wong, 1998; Wrangham, 1999), but there is also a lack of social acceptance due to the possible negative effects (Archer, 1985; Baines, 1987; Beekhuis, 1981; Hanna & Wells, 1992; Hawkins & Roberts, 1994; Marchand & Skračić, 2006; Phillips & Jones, 2006). When the problem is not addressed globally, but rather in a self-interested non-objective way, a negative picture is painted which is not founded on any scientific principle (Buckley & Panell, 1992; Charlier, Haulot, & Veryheyden, 1978; Meyer-Arendt, 2002; Milne, 1990; Wong, 1998).

It is a fact, however, that there has been an increase in nautical recreation activity which requires an organised development. Thus, the challenge facing society is not to deprive itself of such an important source of leisure but rather to develop and promote it in a sustainable way from an economic, social and environmental viewpoint.



Aims and Objectives

The present work focuses on the evolution of the fleets of recreational crafts of a country or region with respect to the behaviour of the consumers or demanders of recreational sailing services or infrastructures.

The aim of the present work is twofold: first, to formalise a model for the recreational fleet of a country or region which will allow the evolution of the fleet to be determined with respect to the changes in income taking place in the region, both in absolute and in relative terms; and then to apply this model to the recreational fleet of a specific country or region.

This model will form a tool which may prove useful both to the public and the private sector in a specific spatial domain. Knowledge of the evolution of the fleet in response to the changes in income of a region will provide demand-income elasticity values for recreational crafts in this spatial domain. For a specific elasticity value, the expected magnitude of the fleet could be predicted in response to variations in income, assuming that the rest of the variables remained constant. This would enable the regional government with authority in this sector to plan and organise the sector on the basis of the expected magnitude of the fleet. At the same time, knowledge of the evolution of the magnitude of the fleet would guide operators and companies working in the sector in the development of strategies based on the foreseeable types and volumes of business of the fleet of a specific region.

To this end, the following sections describe the methodology, its application to the Spanish recreational fleet, the results obtained from the estimates made and some discussion and overall conclusions of the research.

METHODOLOGY

The methodology is divided into two clearly distinct stages. In the first stage, a theoretical model is built of the demand for recreational crafts and the concept of demand-income elasticity of recreational crafts is formalised. These are aspects which are used as reference elements in the empirical modelling process.

In the second stage, the econometrics model of the evolution of the recreational crafts fleet is formalised as a function of the regional income, which will be used in the empirical estimation.

Theoretical demand for recreational craft model.

What variables might condition or determine the behaviour of the evolution of the recreational fleet of a country or region? The magnitude or size of the recreational fleet of a country or region i in a period t will be determined by the crafts existing in the period $t-1$ plus the difference between new additions and withdrawals. The new incorporations will depend on demand variables. The withdrawals will be the result mainly of losses and sales to other countries/regions. In the developed seafaring

countries, the withdrawals usually make up a very small percentage with respect to the incorporations, so that the difference is positive and fleets are on the increase.

Thus, the demand for recreational crafts is a vital component in the evolution of the fleet, and the demand model may prove to be a useful theoretical framework with which to address the search for the explicative variables for the evolution of the fleet. In this context, the classic economics model of supply and demand would indicate that the demand for recreational crafts varies according to the tastes and preferences for such goods, on prices and related goods and on levels of income. This model of the theoretical demand for recreational crafts for a country or region i in a period t can thus be expressed as:

$$N_{i,t} = f(L_{i,t}, P_{i,t}, P_{s_{i,t}}, P_{c_{i,t}}, I_{i,t}) \quad (1)$$

where:

$N_{i,t}$ = is the demand for recreational crafts of a region or country i in a period t .

$L_{i,t}$ = tastes or preferences of region i for recreational crafts in period t .

$P_{i,t}$ = prices of recreational crafts in region i in the period t .

$P_{s_{i,t}}$ = prices of goods substituting recreational crafts (other crafts) in region i in period t .

$P_{c_{i,t}}$ = prices of complementary goods of recreational crafts (fuel, mooring, insurance, etc.) in region i in period t .

$I_{i,t}$ = regional income of the population region i in the period t .

The decisive demand variables outlined above can be used to guide the selection of the explicative variables of the empirical models of behaviour of the evolution of the recreational fleet. Of all of these variables, the present work focuses its attention on that of income, since data is available for regions or countries drawn up and published by public and private organisms providing solvent statistical series for the elaboration of empirical models.

The behaviour of demand for recreational crafts in response to income variations, when the rest of the variables remain constant, is given by the following equation:

$$\frac{\partial N_{i,t}}{\partial I_{i,t}} > 0 \quad (2)$$

The demand for recreational crafts and the income of a region i in a period t , vary in the same direction. Increases in income raise the demand for recreational crafts and vice-versa.

Demand-income elasticity for recreational crafts

Now that the qualitative relation between the demand for recreational crafts and the income of a region has been established, the next step is to verify the response of the



demand for recreational crafts in response to variations in income; that is, the quantitative relation.

In general, when the income increases/decreases, certain goods receive a greater/smaller proportion of the consumers' budget. The demand-income elasticity measures the response of the demand for goods to changes in income, that is, the percentage change in the quantity demanded with respect to the percentage change in income. This measurement of the sensitivity of demand is determined by the following equation.

$$\lambda(Q)_{i,t} = \left(\partial Q_{i,t} / Q_{i,t} \right) / \left(\partial I_{i,t} / I_{i,t} \right) \quad (3)$$

where:

$\lambda(Q)_{i,t}$ = Demand-income elasticity of a goods Q in a region i in a period t.

$\partial Q_{i,t}$ = Variation in the quantity demanded of a goods Q in a region i in a period t.

$Q_{i,t}$ = Quantity demanded of a goods Q in a region or country i in a period t.

$I_{i,t}$ = Income of the population in a region or country i in a period t.

$\partial I_{i,t}$ = Variation in income of the population of a region i in a period t.

The response of the consumers to changes in income differs according to the type of goods considered. Thus, the elasticity values will indicate which type of goods we are dealing with. Table 1 shows the elasticity values of different types of goods and their interpretation.

Table1. Demand-income elasticity of the various goods.

Type of goods	Condition	Interpretation
Basic goods	$\lambda(Q)_{i,t} < 0$	These are goods whose demand falls when income increases. The elasticity of these goods is always negative.
Normal goods with unsatisfied demand	$\lambda(Q)_{i,t} > 0$	These are goods whose demand increases when income increases. The elasticity of these goods is always positive.
Necessary goods	$0 > \lambda(Q)_{i,t} < 1$	These are normal goods whose demanded quantity increases proportionally less than the increases in income. As the income increases, the participation of necessary goods in the consumer's budget decreases.
Luxury goods	$\lambda(Q)_{i,t} > 1$	These are normal goods whose demanded quantity increases proportionally more than the increases in income. As the income increase, the participation of luxury goods in the consumer's budget will also increase.
Normal goods with satisfied demand	$\lambda(Q)_{i,t} = 0$	These are goods whose demand remains unaltered when the income increases. The elasticity of these goods always equals zero.

In accordance with the formalisation established in Table 1, recreational crafts are identified as luxury goods. Thus, the following hypothesis is proposed for use in the estimation of the empirical model.

HYPOTHESIS 1: Recreational crafts are luxury goods whose income elasticity must be greater than the unit.

Empirical econometrics model of the evolution of the recreational crafts fleet.

The aim is to model in both absolute and relative terms the evolution of the recreational fleet of a region using the income data for that region and the linear regression technique. Thus, the number of recreational crafts (N) of a region or country using the income data (I) of that region will respond to a mathematical equation as:

$$N_{i,t} = \alpha_i + \beta_i I_{i,t} \quad (4)$$

where:

$N_{i,t}$ = number of crafts of the recreational fleet of the zone i in period t .

α_i = constant of the model of zone i .

$I_{i,t}$ = income or added value of zone i in period t .

β_i = coefficient of the added value variable of zone i . Represents for the region i –in absolute terms– the increase in the number of crafts when the added value increases by one unit.

t = Period t (year t)

i = Geographic zone, region or country

Equation 4 has been denominated ‘absolute evolution model’ or Type 1, as the regression coefficient represents the increase in the number of crafts when the corresponding explicative variable – the income – increases by one unit.

If neperian logarithms are applied to the N and I variables of equation (4), the new adjustment, which would be a logarithmic transform, will correspond to the following expression:

$$\ln(N_{i,t}) = \theta_i + \lambda_i \ln(I_{i,t}) \quad (5)$$

where:

$\ln(N_{i,t})$ = neperian logarithm of the number of the number of crafts of the recreational fleet of zone i in period t

θ_i = constant of the model of zone i

λ_i = Coefficient representing income elasticity of zone i

$\ln(I_{i,t})$ = Logarithm of income of zone i in period t

t = Period t (year t)

i = Geographic zone



Equation 5 has been denominated ‘relative evolution’ or Type II model, as the regression coefficient represents the elasticity, that is, the percentage increase in the number of recreational crafts when the corresponding explicative variable, the income, increases by one per cent.

Thus, if equation (5) is derived, we get $\frac{\partial N_{i,t}}{N_{i,t}} = \lambda_i \frac{\partial I_{i,t}}{I_{i,t}}$; from which the following equation is obtained:

$$\lambda_i = \frac{\partial N_{i,t} / N_{i,t}}{\partial I_{i,t} / I_{i,t}} \quad (6)$$

where λ_i is the demand-income elasticity for recreational crafts in zone i, indicating the percentage variation in the number of recreational crafts in zone i in response to the percentage variation in the added value of zone i.

One important aspect that should be noted is the interpretation of the regression coefficients. In the case of the regressions in absolute terms, or Type 1 models, the coefficients represent the increase in the number of recreational crafts in zone i when the corresponding explicative variable increases by one unit. However, if the variable to explicate, and the explicative variable, are expressed in logarithms, the adjusted coefficients represent elasticities, that is, percentage increases in the number of crafts when the explicative variable increases by one per cent. These latter ones are Type II models.

Case Study: Spain

Nautical tourism in Spain, both outbound and domestic, is highly dynamic. There is substantial nautical activity in and among the Spanish coastal regions. According to the Spanish Institute of Tourism (Turespaña), outbound nautical tourism in Spain generates important annual revenues, the average expenditure per nautical holiday trip is higher than that of conventional tourism and the average stay is 11.37 days. Turespaña has signed an agreement with the Autonomous Communities to promote and develop this type of tourism.

Spain disposes of official statistics on its recreational fleets and the income of each of its regions. The recreational fleet is distributed over base ports through 10 coastal Autonomous Communities (Basque Country, Cantabria, Asturias, Galicia, Andalusia, Murcia, Valencia, Catalonia, The Balearic Islands, The Canary Islands) and two Autonomous Cities (Ceuta and Melilla). The recreational craft statistics are drawn up by the regional harbour masters and are sent to the Head Office of the Merchant Navy of the Ministry of Public Works, which is where the new statistics are generated. As for the regional income statistics, the added value data of the Autonomous Communities and of Spain can be obtained from the data bases, “IneBase” and “Tempus” and from the “Regional Accountancy of Spain” of the National Statistics Institute (INE),

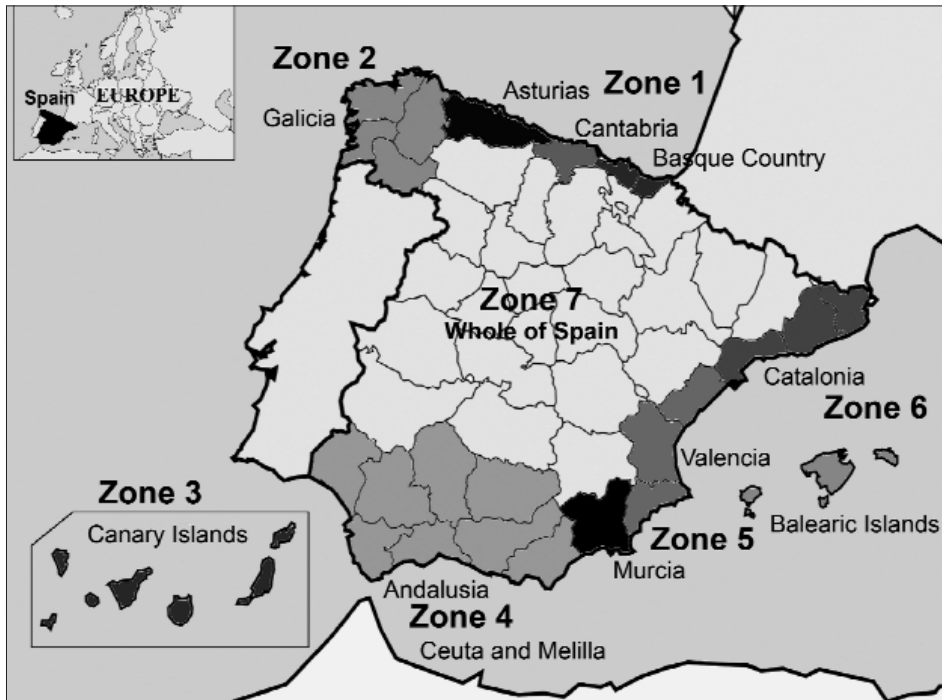


Fig.1. Coastal Regions of Spain. Regions: 1. Basque Country, Cantabria and Asturias; 2. Galicia; 3. Canary Islands; 4. Andalusia, Ceuta and Melilla; 5. Valencia and Murcia; 6. Catalonia and Balearic Islands; 7. Whole of Spain.

and from the Hispadat data base, which is drawn up using information from the Regional Accountancy of Spain by researchers on the Hispalink project.

For the purposes of the empirical estimation of the present work, the regions have been grouped into six zones which correspond to the various sea faces and a seventh representing the whole of Spain, as indicated in the following list (see Figure 1):

- Zone 1. Basque Country, Cantabria and Asturias
- Zone 2. Galicia
- Zone 3. Canary Islands
- Zone 4. Andalusia, Ceuta and Melilla
- Zone 5. Valencia and Murcia
- Zone 6. Catalonia and Balearic Islands
- Zone 7. Whole of Spain

RESULTS

The estimation of all of the Type I and II models for all of the zones mentioned was made by applying the linear regression technique by ordinary least squares for the



period 1994–2005, for which there were data available. Thus, 12 observations were made in total. The software used was the E-views programme.

Type 1 Model Estimations

For the estimation of the Type I Model, or absolute evolution model, the number of recreational crafts of the various geographic zones have been used as the endogenous variables and the Gross Added Value of each geographic zone at basic prices in millions of euros based on 1995 as the exogenous variables. The results of the estimation of the coefficients and the individual significance of the variables of the Type I models analysed are shown in Table 2. The statistics for the joint significance of the Type I models are shown in Table 3. Graphs showing the real, estimated and residual series are illustrated in Figure 2.

Table 2. Coefficients and individual significance of the Type I model variables of the number of recreational crafts per geographic zone.

GEOGRAPHIC ZONE	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Zone 1	α_1	-961.2454	2546.95	-0.37741	0.7138
	I_1	0.000522	5.45E-05	9.591873	0.0000
Zone 2	α_2	-7259.263	2835.549	-2.56009	0.0284
	I_2	0.001315	0.00011	11.95186	0.0000
Zone 3	α_3	-8947.89	2704.297	-3.308767	0.0079
	I_3	0.001521	1.48E-04	10.30513	0.0000
Zone 4	α_4	-13223.24	3872.276	-3.414849	0.0066
	I_4	0.000781	0.000058	13.37313	0.0000
Zone 5	α_5	-16198.54	10359.06	-1.563708	0.1490
	I_5	0.001046	1.82E-04	5.751119	0.0002
Zone 6	α_6	-73623.53	11860.08	-6.207677	0.0001
	I_6	0.001746	0.000121	14.40808	0.0000
Zone 7	α_7	-108066	13313.75	-8.116874	0.0000
	I_7	0.000755	2.82E-05	26.7639	0.0000

Table 3. Joint significance statistics for the Type I models of the number of recreational crafts per geographic zone.

Statistics	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7
R-squared	0.9019	0.9345	0.9139	0.94704	0.76784	0.95404	0.9862
Adjusted R-squared	0.8921	0.9280	0.9053	0.94175	0.74463	0.94944	0.9848
Durbin-Watson stat	2.3483	2.1621	1.2289	2.28503	0.76805	1.31383	3.0156
Mean dependent var	23338.4	26483	18724.4	38184.0	42951.6	96499.5	246181.1
S.D. dependent var	2771.8	3416.1	3603.0	6695.48	8476.56	17190.7	40441.8
F-statistic	92.004	142.84	106.19	178.84	33.0753	207.592	716.31
Prob(F-statistic)	0.0000	0.0000	0.0000	0.0000	0.00018	0.00000	0.0000



Number of recreational crafts per geographic zone. Real, estimated and residual series of Type I models

Fig. 2. Basque Country, Cantabria and Asturias.

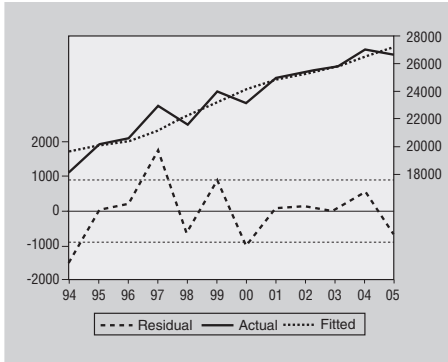


Fig. 3. Galicia.

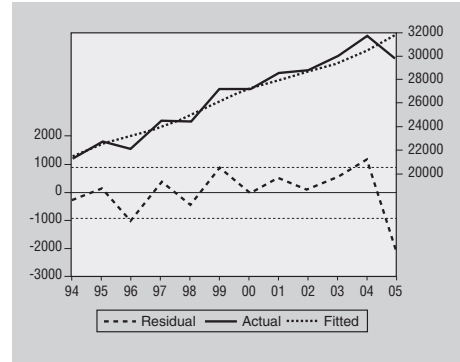


Fig. 4. Canary Islands,

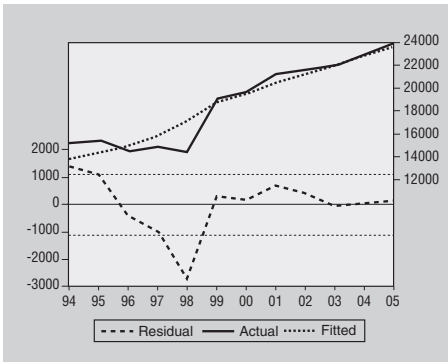


Fig. 5. Andalusia, Ceuta and Melilla.

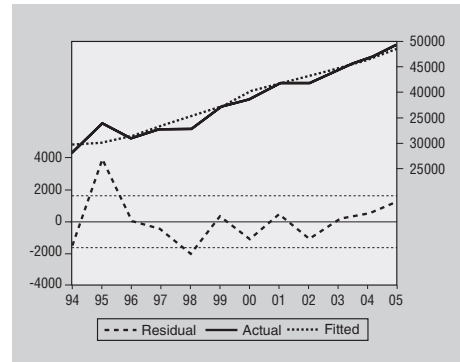


Fig. 6. Valencia and Murcia.

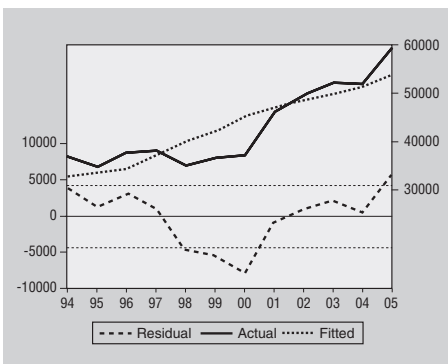


Fig. 7. Catalonia and Balearic Islands.

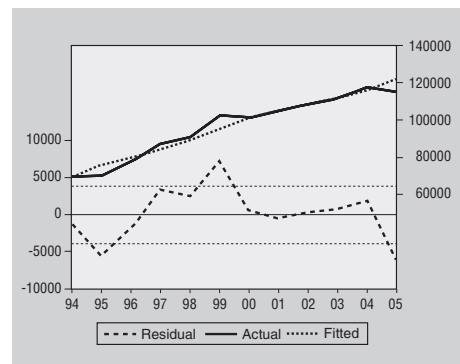
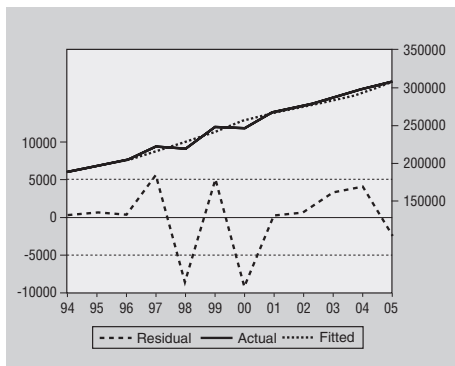




Fig. 8. Whole of Spain.



Type II Models Estimations

In the Type II, or relative evolution, models, the endogenous variable is the neperian logarithm of the number of recreational crafts in the zone and the exogenous variable is the neperian logarithm for the Gross Added Value of the zone at basic prices in constant millions of euros based on 1995. All of the models have been adjusted for the period 1994–2005 with 12 observations. The results for the estimation of the coefficients and the individual sig-

nificance of the variables for the Type II models analysed are shown in Table 4. The joint significance statistics for the Type II models are shown in Table 5. The graphs showing the real, estimated and residual series are shown in Figure 3.

Table 4. Coefficients and individual significance Type II Model variables of the logarithm of the number of recreational crafts per geographic zone.

GEOGRAPHIC ZONE	Variable	Coefficient	Std. Error	t-Statistic	Prob.
Zone 1	Θ_1	-8.669091	2.04655	-4.235953	0.0017
	$\text{Ln}(I_1)$	1.060652	0.115952	9.147357	0.0000
Zone 2	Θ_2	-11.97373	1.721015	-6.957365	0.0000
	$\text{Ln}(I_2)$	1.298673	0.100902	12.8706	0.0000
Zone 3	Θ_3	-14.66524	2.743298	-5.345844	0.0003
	$\text{Ln}(I_3)$	1.465366	0.164172	8.925777	0.0000
Zone 4	Θ_4	-13.52168	2.023182	-6.683372	0.0001
	$\text{Ln}(I_4)$	1.336901	0.112427	11.89127	0.0000
Zone 5	Θ_5	-12.1836	4.23798	-2.87486	0.016
	$\text{Ln}(I_5)$	1.279733	0.237506	5.388208	0.0003
Zone 6	Θ_6	-22.46254	2.544734	-8.827071	0.0000
	$\text{Ln}(I_6)$	1.844694	0.138373	13.33128	0.0000
Zone 7	Θ_7	-16.47438	1.068589	-15.41695	0.0000
	$\text{Ln}(I_7)$	1.446586	0.053533	27.02258	0.0000

Table 5. Statistics on joint significance of Type II models of logarithm of the number of recreational crafts per geographic zone.

Statistics	Zone 1	Zone 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7
R-squared	0.89325	0.94307	0.88848	0.93395	0.74381	0.94673	0.98649
Adjusted R-squared	0.88257	0.93738	0.87733	0.92735	0.71819	0.94140	0.98514
Durbin-Watson stat	2.20506	2.21674	1.23986	2.46201	0.77648	1.10420	3.23144
Mean dependent var	10.0511	10.1764	9.82019	10.5359	10.6510	11.4616	12.4012
S.D. dependent var	0.12273	0.13159	0.19595	0.17647	0.18892	0.18901	0.16666
F-statistic	83.6741	165.652	79.6695	141.402	29.0328	177.723	730.220
Prob(F-statistic)	0.00000	0.00000	0.00000	0.00000	0.00031	0.00000	0.00000



Logarithm of number of recreational crafts per geographic zone. Real, estimated and residual series of Type II models.

Fig. 9. Basque Country, Cantabria and Asturias.

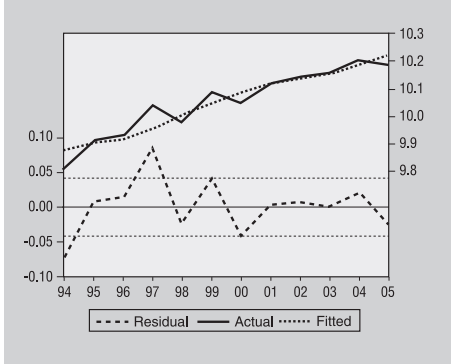


Fig. 10. Galicia.

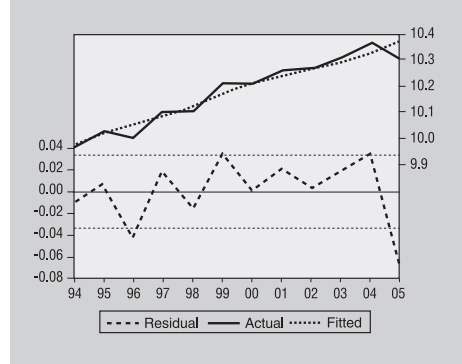


Fig. 11. Canary Islands.

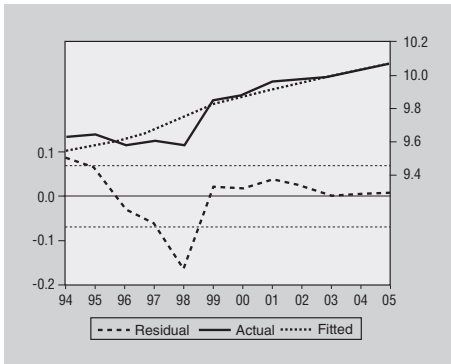


Fig. 12. Andalusia, Ceuta and Melilla.

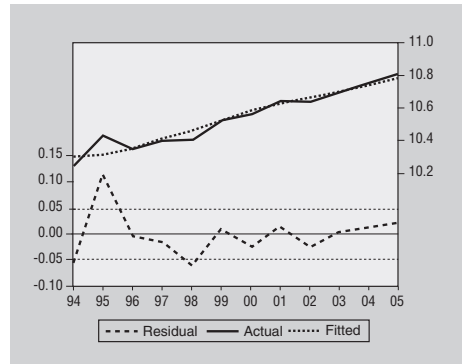


Fig. 13. Valencia and Murcia.

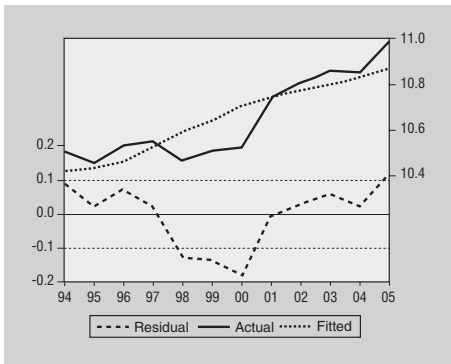


Fig. 14. Catalonia and Balearic Islands.

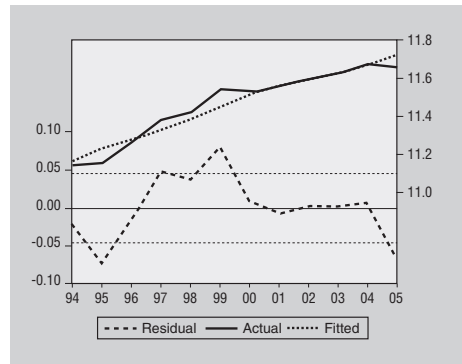
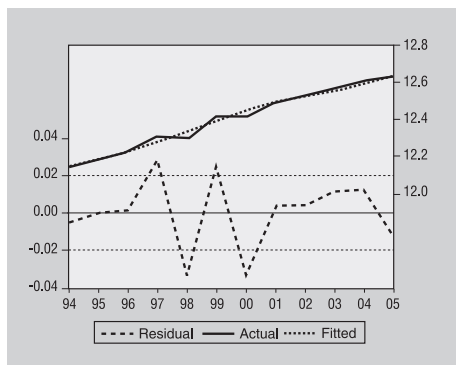




Fig. 15. Whole of Spain.



Analysis of results of estimations

The results for the individual significance of the variables, both regarding statistic t and Prob, show a high significance of the variables, both in the value and in the logarithm models for all of the zones analysed. The only two exceptions which show a higher significance correspond to parameters α_1 and α_5 , which are the constants of the Type I models of zones 1 and 5, respectively.

All of the β_i and λ_i parameters estimated show positive signs. Thus, all of

the models indicate that the recreational fleet of a zone for a specific period depends on the evolution of the Added Value of that zone. In all cases, the relation is direct: the higher the added value (profits and salaries) the greater the fleet will be in the future.

The λ_i , coefficients corresponding to the logarithmic model are the elasticities. These values, ordered from high to low, are grouped in Table 6. The elasticities indicate the percentage variation in the fleet of the zone in response to a percentage variation in the added value for this zone. In all of the models, the elasticity is greater than 1, which is consistent with the identification of recreational crafts with the luxury goods category. However, the value of this elasticity shows great differences between some zones and others. As can be observed, the greatest response takes place in Catalonia and The Balearic Islands (1.84) and in the Canary Islands (1.46) which are the ones with elasticities above the Spanish average (1.44). The lowest value is for zone 1, slightly higher than the unit (1.06).

Table 6. Income-Elasticity of the number of recreational crafts per geographic zone.

Geographic Zone	λ_i
Zone 6 Catalonia and Balearic Islands	1.844694
Zone 3 Canary Islands	1.465366
Zone 7 Whole of Spain	1.446586
Zone 4 Andalusia, Ceuta and Melilla	1.336901
Zone 2 Galicia	1.298673
Zone 5 Valencia and Murcia	1.279733
Zone 1 Basque Country, Cantabria and Asturias	1.060652

The results for the joint significance of Type I and II models mostly present high determination coefficients, both R-squared and adjusted with two degrees of freedom (Adjusted R-squared), which, together with the high value of the Snedecor

F, makes it possible to confirm that the joint significance is high. The worst results correspond to zone 5, Valencia and Murcia, with an R-squared value of 0.76 and 0.74 for Type I and II models respectively.

Similarly, the values of the Durbin-Watson *d* statistic make it possible to reject the existence of autocorrelation with a significance of 1% in all cases, except for two which arise in areas of doubt, that of zone 5, Valencia and Murcia and zone 7, Spain.

These models, for zone 5 and especially for zone 7, improve significantly if a mobile average for the period is added, gathering the influence of the pre-existing stock on the fleet size of a certain period (that is, the existing fleet level or initial fleet size). In this case, the doubt related to the autocorrelation disappears and the R-squared value increases substantially up to 0.99 in the case of Spain). It was preferred to keep the same model for all zones for the purposes of coherence when it comes to comparing results and elasticity values, and also because, to a certain extent, the initial fleet level can be registered in the constant term of the equation.

DISCUSSION AND CONCLUSIONS

From the economics point of view, recreational sailing takes in goods termed luxury goods, as these are normal consumer goods with unsatisfied demand of an income elasticity greater than the unit. However, apart from these general economics considerations, two types of country or region can be distinguished, according to the social and taxation treatment applied to these goods.

There are countries or regions that consider recreational sailing as a leisure activity which, at the same time, allows certain values and traditions to be maintained. These offer a committed institutional support, do not consider recreational crafts as luxury goods from the taxation point of view and promote the development of recreational ports. These countries or regions show high elasticity-income values, as small variations in income lead to great variations in the demand for recreational crafts.

In contrast, other countries and regions do not offer institutional support to all of the recreational sailing activities, though they may do so partially. Thus, although they may agree that this is a leisure activity which is socially desirable in part (for example, sailing and rowing), they consider that from the taxation point of view, the crafts must be considered as luxury goods and recreational ports are not to be promoted by the public sector. These countries or regions present elasticity-income values slightly greater than the unit, as great variations in income are required to produce great variations in the demand for recreational crafts.

The income-demand models for recreational sailing can explain the evolution of the recreational fleet from the evolution of the income for a specific country, or region and period. These models have the further advantage that their logarithmic transforms allow the value of the income elasticity of the evolution of recreational crafts in this region to be obtained. Thus, under the hypothesis of the maintenance



of the value of this elasticity, the expected variation in the fleet can be determined from the data on the current fleet and that of current and predicted income. There are several public and private organisms that elaborate income predictions in the developed countries. With the above tools and resources, the governments of a country or region can foresee the evolution of their fleets and carry out a planning of their port infrastructures that responds to the real needs.

The results obtained for the income elasticities of the demand for recreational crafts confirm that in Spain, recreational crafts are considered luxury goods. These values place Spain in the group of countries in which nautical activities are given only partial support. The average response of the Spanish recreational fleet to income variations is 144.66%, that is for every increase of 1% in the national income, the demand for recreational crafts will increase by 1.44%. Thus, under the hypothesis of invariability of this elasticity, and taking into account an annual growth in the national income of 3%, the recreational crafts will increase by 4.32%. This, in compliance with the census figures for Spain (see Section 3), means a rhythm of growth of around 13,261 crafts per year. However, not all regions respond with the same elasticity. The Mediterranean regions of Catalonia and The Balearic Islands (zone 6) present the highest values with a response of 18446%, so that for income increases of 3%, the crafts will increase by 5.52%, that is, 6386 crafts/year. In contrast, the northern regions of the Basque Country, Cantabria y Asturias (zone 1), show demand-income elasticity values for recreational crafts of 106.06% almost at the threshold of the values of luxury goods. For predicted income increases of 3%, similar variations are expected for the fleet, around 3.18%.

In normal situations, port planning responds to increases in recreational craft fleets. Otherwise, their development usually springs from speculative movements. Thus, the ordered development of nautical tourism requires an appropriate development of these infrastructures to allow the existing excess of demand to be satisfied. Hence, apart from any other considerations, the regional authorities should promote the development of recreational ports and infrastructures in order to position the crafts and avoid a disordered expansion of the sector.

Moreover, the possibility of having these predictions available allows the various business agents working in the nautical sector of each region to plan their activities on the basis of the predicted volume of business. Thus, the companies who carry out their activity in the field of recreational sailing will have more information available to devise their policies of production, employment, investment and renovation of equipment.



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ELASTICIDAD RENTA DE LA DEMANDA DE EMBARCACIONES DE RECREO

Los modelos de demanda-renta de la náutica de recreo pueden explicar la evolución de la flota de recreo a partir de la evolución de la renta, para un país o región y período determinados. Dichos modelos tienen la utilidad de que sus transformaciones logarítmicas permiten obtener el valor de la elasticidad renta de la demanda de embarcaciones de recreo en dicha región. Además bajo la hipótesis de mantenimiento del valor de dicha elasticidad, se puede determinar la variación esperada de la flota en base a datos previstos de la renta.

El objetivo del presente trabajo es doble. Por un lado formalizar un modelo de la flota de recreo de un país o región que permitan determinar la evolución de la flota con respecto a los cambios de renta originados en la región, tanto en términos absolutos como relativos. Se obtienen resultados de elasticidades-renta de la demanda de embarcaciones de recreo para las diferentes flotas de recreo de España agrupadas en 7 zonas geográficas.

OBJETIVOS

El presente trabajo centra su atención en la evolución de las flotas de embarcaciones de recreo de un país o región, en relación con el comportamiento de los consumidores o demandantes de servicios e infraestructuras de la náutica de recreo.

El objetivo del presente trabajo es doble. Por un lado formalizar un modelo de la flota de recreo de un país o región que permitan determinar la evolución de la flota con respecto a los cambios de renta originados en la región, tanto en términos absolutos como relativos. Por otro, aplicar dicho modelo a la flota de recreo de un país o región concreta.

Se pretende disponer de una herramienta que pueda ser útil tanto al sector público como al privado, en un ámbito espacial determinado. En tal sentido, el conocimiento de la evolución de la flota en respuesta a los cambios de la renta de una región supondría disponer de valores de la elasticidad renta de la demanda de embarcaciones de recreo en dicho ámbito espacial. Para un valor determinado de la elasticidad se podría conocer la magnitud esperada de la flota ante variaciones de la renta suponiendo el resto de variables constantes. Ello permitiría, por un lado, a la administración regional con competencias en dicho sector planificar y ordenar el sector en base a una magnitud esperada de la flota. Por otro, orientaría a los operadores y empresas del sector sobre las estrategias a desarrollar en base a los tipos y volúmenes de negocio esperados en torno a la flota de una región determinada.



METODOLOGÍA

La metodología se desarrolla en dos fases claramente diferenciadas. En la primera se construye un modelo teórico de demanda de embarcaciones de recreo y se formaliza el concepto de elasticidad renta de la demanda de embarcaciones de recreo: Se trata de aspectos que son utilizados como elementos de referencia en el proceso de modelización empírico. En la segunda fase se formaliza el modelo econométrico, de la evolución de la flota de embarcaciones de recreo en función de la renta regional, que se utilizará en la estimación empírica.

HIPÓTESIS

Las embarcaciones de recreo son bienes de lujo por lo que su elasticidad renta debe ser mayor que la unidad.

Análisis de los resultados de las estimaciones

Los resultados de la significación individual de las variables, tanto atendiendo al estadístico t como al Prob, muestran una alta significación de las variables, tanto en los modelos en valor como para los logarítmicos, de todas las zonas analizadas. Las dos únicas excepciones, que presentan menor significación, corresponden a los parámetros α_1 y α_5 , que son las constantes de los modelos tipo I de las zonas 1 y 5 respectivamente.

Todos los parámetros β_i y λ_i estimados presentan signos positivos. Por tanto, todos los modelos nos indican que la flota de recreo de una zona en un período concreto depende de la evolución del Valor añadido de la zona. En todos los casos la relación es directa, cuanto mayor sea el valor añadido (beneficios y salarios) mayor será la flota en el futuro.

Los coeficientes λ_i , correspondientes a los modelos logarítmicos, son las elasticidades. Estos valores, ordenados de mayor a menor, se agrupan en la tabla 5. Las elasticidades indican la variación porcentual de la flota de la zona en respuesta a una variación porcentual del valor añadido de dicha zona. En todos los modelos la elasticidad es mayor que 1 lo que es consistente con la identificación de las embarcaciones de recreo con la categoría de bienes de lujo. Sin embargo, el valor de dicha elasticidad presenta diferencias acusadas de unas zonas a otras. Como puede apreciarse la mayor respuesta se produce en Cataluña y Baleares (1.84) y en Canarias (1.46) que son las que presentan elasticidades superiores a la media española (1.44). El menor valor lo presenta la zona 1, ligeramente superior a la unidad (1.06).

Los resultados de la significación conjunta de los modelo tipos I y II, en su mayoría presentan altos coeficientes de determinación, tanto R-squared como el ajustado con los grados de libertad (Adjusted R-squared), lo que junto con el valor elevado de la F de Snedecor permite afirmar que la significación conjunta es alta. Los peores resultados corresponden a la zona 5 Valencia y Murcia, con R-squared de 0.76 y 0.74 para los modelos tipo I y II respectivamente.



Asimismo los valores del estadístico d de Durbin-Watson permiten rechazar la existencia de autocorrelación con una significación del 1% en todos los casos, excepto en dos que cae en zona de duda, los correspondientes a la zona 5 Valencia y Murcia y a la zona 7 España.

Estos modelos, para la zona 5 y especialmente para la 7, mejoran sensiblemente si se añade en la ecuación del modelo una media móvil de un período, que recoge la influencia que sobre el nivel de flota en un período tiene el stock preexistente. Es decir el nivel de flota existente o el tamaño de la flota de partida. En este caso desaparece la duda relativa a la autocorrelación e incrementa sensiblemente el R -squared (hasta 0.99 en el caso de España). Se ha preferido mantener para todas las zonas el mismo modelo por coherencia a la hora de comprar resultados y valores de elasticidad. Y porque en cierta medida, el nivel de flota de partida puede recogerse en el término constante de la ecuación.

DISCUSIÓN Y CONCLUSIONES

Desde el punto de vista económico la náutica de recreo aglutina bienes económicos denominados de lujo, ya que se trata de bienes de consumo normales de demanda insatisfecha de elasticidad renta superior a la unidad. Sin embargo, al margen de tal consideración económica de carácter genérico, se pueden distinguir dos tipos de países o regiones dependiendo del tratamiento social y fiscal dado a dichos bienes.

Hay países o regiones que consideran la náutica de recreo como una actividad de ocio que al mismo tiempo permite mantener valores y tradiciones. Por ello, apoyan institucionalmente la actividad de forma decidida, no consideran desde el punto de vista fiscal a las embarcaciones bienes de lujo y fomentan el desarrollo de puertos de recreo. Dichos países o regiones presentarían valores altos de la elasticidad renta debido a que pequeñas variaciones de la renta originan grandes variaciones de la demanda de embarcaciones de recreo.

En cambio otros países o regiones no apoyan institucionalmente toda la actividad de la náutica de recreo, aunque lo hagan parcialmente. Por ello, aunque pueden estar de acuerdo en que se trata de una actividad de ocio socialmente deseable en parte (por ejemplo la práctica de la vela y el remo), consideran que desde el punto de vista fiscal las embarcaciones deben ser consideradas bienes de lujo y los puertos de recreo no deben ser fomentados desde el sector público. Dichos países o regiones presentarían valores de la elasticidad-renta algo superiores a la unidad, debido a que se necesitan grandes variaciones de la renta para que se originen grandes variaciones de la demanda de embarcaciones de recreo.

Los modelos de demanda-renta de la náutica de recreo pueden explicar la evolución de la flota de recreo a partir de la evolución de la renta, para un país o región y período determinados. Dichos modelos tienen la utilidad de que sus transformaciones logarítmicas permiten obtener el valor de la elasticidad renta de la evolución de las



embarcaciones de recreo en dicha región. Bajo la hipótesis de mantenimiento del valor de dicha elasticidad, se puede determinar la variación de la flota esperada en base a datos de la flota actual y datos de la renta actuales y previstos. En tal sentido, existen diversos organismos públicos y privados que elaboran previsiones sobre renta en los países desarrollados. Con las herramientas y recursos indicados las Administraciones de un país o región pueden prever la evolución de sus flotas y realizar una planificación de infraestructuras portuarias de acuerdo con las necesidades reales.

Los resultados obtenidos –de las elasticidades renta de la demanda de embarcaciones de recreo– permiten afirmar que en España las embarcaciones de recreo son consideradas bienes de lujo. Dichos valores sitúan a España en el grupo de países en los que las actividades de la náutica de recreo son apoyadas sólo parcialmente. La respuesta media de la flota de recreo española ante variaciones de la renta es del 144,66%, es decir, por cada un 1% de incremento de la renta nacional la demanda de embarcaciones de recreo se incrementará un 1,44%. En tal sentido, bajo la hipótesis de invariabilidad de dicha elasticidad, teniendo en cuenta un crecimiento anual de la renta nacional del 3%, las embarcaciones de recreo crecerían al 4,32%. Ello supone, de acuerdo con las cifras del censo de España (ver sección 3) un ritmo de crecimiento en torno a 13261 embarcaciones al año. Sin embargo no todas las regiones responden con la misma elasticidad. Las regiones mediterráneas de Cataluña y Baleares (zona 6) presentan los valores más altos con una respuesta del 184,46%, por lo que para incrementos esperados de la renta del 3% las embarcaciones crecerían un 5,52%, es decir, 6386 embarcaciones/año. En cambio las regiones del norte del País Vasco, Cantabria y Asturias (zona 1), presentan valores de la elasticidad renta de la demanda de embarcaciones de recreo del 106,06% casi en el límite de los valores propios de los bienes de lujo. Para incrementos esperados de la renta del 3% se esperan variaciones similares de la flota en torno al 3,18%.

En situaciones normales, la planificación de los puertos responde al crecimiento de las flotas de embarcaciones de recreo. En caso contrario su desarrollo suele originarse por movimientos especulativos. En tal sentido, el desarrollo ordenado del turismo náutico precisaría de un desarrollo suficiente de tales infraestructuras que permitiese satisfacer el exceso de demanda existente. Por ello, al margen de otras consideraciones de diversa índole las autoridades regionales deberían potenciar el desarrollo de puertos e infraestructuras de recreo con el fin de ubicar las embarcaciones y evitar una expansión desordenada del sector.

Además la posibilidad de disponer de tales previsiones permite a los diferentes agentes empresariales del sector náutico de cada región planificar su actividad en base al volumen de negocio previsto. En tal sentido, las empresas que desarrollan su actividad en el ámbito de la náutica de recreo podrían disponer de mayor información para establecer con menor riesgo sus políticas de producción, empleo, inversión y renovación de equipos.

