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TESIS DOCTORAL

TOURISM: LOW-COST AIRLINES, CLIMATE AND ECONOMIC CRISIS

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El Director, El Doctorando,

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“A mis padres,

a mi familia

y a mis amigos que también son familia.”

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Agradecimientos

Esta parte la escribo en español pues son españoles a los que dedico estas palabras. Resulta paradójico que las primeras palabras que se leen en una tesis hayan sido las últimas en escribirse. Los prefacios se suelen caracterizar por su previsibilidad y la casi imposiblidad de no no caer tópicos, pero no por ello, es menos cierto y sentido lo que aquí se escribe. Es más, con toda seguridad, y más versando sobre economía, estas sean las palabras más precisas, creíbles y menos dadas al debate de toda la tesis.

Cómo no, mis padres han sido los grandes hacedores y mecenas de esta tesis. Sin ellos, esta tesis no se hubiera escrito. Y no lo digo por haberme traído a éste mundo ni por haberme procurado todo tipo de atenciones, cariños y comodidades que sin duda hicieron, sino porque, literalmente, me apoyaron y financieron durante este proceso. De igual modo quiero y debo agradecer a dos enormes mujeres que me educaron pese a no ser profesoras, me quisieron como su hijo pese a que no lo era y me enseñaron lo fundamental de esta vida sin ellas saberlo. Ana y Pilar han sido igual de importantes y determinantes en mi vida que mis padres. Seguidamente se encuentra el resto de mi familia: los que ya no están como mis abuelos o mi tía Rosa, y los que siguen aquí y que sobra citar pues son legión y ya se sentirán señalados con estas palabras.

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En Las Palmas de Gran Canaria a 8 de Junio de 2014.

"A continuación te dejo con mi yo,

conmigo,

con el que fui y ahora está contigo."

Federico Inchausti Sintes.

CHAPTER 1

Does low-cost travelling imply higher tourism expenditure in the destination?

1.1 Introduction

One key for success of tourism sector as an economic growth generator is the capacity to provide added value. Amongst some other aspects, tourism expenditure is central to measure gross added value of tourism destinations. However, tourism expenditure is not only disbursed in the destination but also in the country of residence. Such decomposition is not trivial in terms of added value. For instance, tour operators located in origin are an open door for channeling tourists, but at the same time, they also detract, as deserved, part of the potential added value of the destination. Generally speaking, the result of the negotiations between tour operators and hoteliers determine the share of the added value between the origin country and the destination. Arguments against the tour operators' empowerment are usually stated by hoteliers and local government.

Nevertheless, tourism market structure has changed and it keeps changing dramatically. Traditionally, most tourists opted for comprehensive packages which were paid in travel agencies. The advent of Internet has shortened the 'distance' between origins and destinations. It has opened up new alternatives to the tourists, allowing for more customized services. There has been a shift towards decomposing tourism packages, such that travel, accommodation, meals, or excursions can be booked separately. Under this new market structure, tourism service products can be distributed either by direct sales on the internet or by cheaper internet intermediaries.

However, it should be noted that its success depends on tourists' confidence on the system. Production costs of tourist products arranged on the internet are likely to decrease. Such efficiency gain implies lower prices and or higher profits depending on market competition. In any case, lower prices increase consumer surplus and higher profits increase producer surplus, so that social welfare increases. Additionally, a lower price implies an increase in the number of tourists, even when such price decrease is homogeneous for all destinations because it can generate additional traffic from tourists who, under lower prices, can afford travelling. Hence, added value at the destination is expected to increase either due to a higher number of tourists or due to higher profits.

Controversial discussions have arisen concerning the convenience of the new market structure. In particular, special attention has focused on the presence of low-cost carriers (LCCs), which have boosted recently due to the new situation. Tourism destination policymakers wonder about the consequences for the whole market and the best strategy to deal with it. The consequences are multiple. First, the presence of LCCs may attract new tourists to the destination because they may afford travelling at lower prices. Such competitiveness gain is more or less effective depending on how alternative destinations are also dealing with it. Second, airline market is also affected by LCC entrance. Flagship companies are likely to lose market share and they may even stop flying to the destination at all. All this may affect the share of the profile of the tourists at the destination. Such market share redistribution has an impact on tourism expenditure in the destination. Third, tourists usually face two kinds of constraints for holiday taking. On the one hand, the number of available days for tourism is limited. Even if a tourist can afford paying for a three months holidays, he or she also faces a time constraint.

On the other hand, tourists may spend a limited amount of money on holidays, which represents a tourism budget constraint. Both constraints are key elements to understand tourism destination choice. The tourism budget constraint is distributed between travelling, accommodation, meals and other expenditure. It is interesting to explore how the presence of LCCs may contribute to a redistribution of such budget. Household savings from cheaper travel tickets may be transferred, fully or partially to higher tourism expenditure in the destination. Testing and quantifying this hypothesis is the purpose of this paper:

Hypothesis:

> *Low-cost travelling savings from the origin are transferred, at least partially, to higher tourism expenditure in the destination.*

Testing this hypothesis is relevant to understand one key impact of the presence of LCCs in tourism markets. Quantifying such impact is relevant for policymaking, especially to understand the degree of support that LCCs should receive by destinations. Current literature has focused on the traffic generated by LCCs and the market share redistribution, but it has not dealt with added value redistribution between origin and destination. This paper explores such relationship. The dichotomy between expenditure in origin and destination and their reciprocal relations and causality permits to analyze these hypothetical situations fostered by LCCs. One methodology that is able to estimate this relationship is a Simultaneous System of Equations. Amongst some alternative models considered, the one estimated by Three Stages Least Squares (3SLS) (Zellner and Theil, 1962) is chosen.

1.2 State of the art

1.2.1. LCCs characteristics

According to the Civil Aviation Authority in UK (CAA, 2006), the words "low cost" should be kept to charter carriers; and use the words "no-frills" instead of "low cost" to what public opinion define as a "low cost" carrier. However, in this paper, the term "low cost" is used in its popular sense. According to Lawton (2002) and Doganis (2006), the characteristics of LCCs can be described from a flyer and operational point of view. From a flyer perspective, LCCs offer single-class service, with high density seating and food or beverages payable on board. On the ground, LCCs do not provide special check-in services or frequent flyers programs. From an operational point of view, LCCs operate with a single aircraft type which reduces maintenance and pilot training. They also operate with fast turnaround times, so that it increases aircraft utilization. Sorenson (1991) and Caves, Christensen and Tretheway (1984) link this last issue to the achievement of economies of density in LCCs. They usually operate in secondary airports allowing quicker operations and lower airport fees. LCCs are focused on shorter routes to maximize the number of trips in both directions. They sell tickets directly to customers and they do not offer connection flights. All the aspects mentioned above are focused on reducing cost and thus offering lower ticket prices. Literature coincides in supporting this issue. Generally speaking, Malighetti, Paleari and Redondi (2009), Fu, Dresner and Oum (2011), Ben Abda, Belobaba and Swelbar (2012), Rosselló and Riera (2012), Alderighi, Cento and Piga (2011) or Alderighi, Cento, Nijkamp and Rietveld (2012) agree that, for their respective cases, the entry of LCCs has decreased ticket prices. Windle and Dresner (1999) provide a further literature review on this issue for the case of The United States of America during the nineties.

1.2.2. Main consequences of the presence of LCCs in a destination

The literature in regards to LCCs has been more focused on the transportation sector. Nonetheless, and at least from a tourism sector perspective, some questions mutually related bloom as soon as it gets LCCs into consideration: Have the presence of LCCs increased the flow of tourism to a destination? Have LCCS passengers' got different preferences/profiles with respect to the traditional carrier passengers? Are LCCs passengers' savings in the origin transferred to higher tourism expenditure at the destination? Has LCCs' presence promoted economic growth in the region they travel to? The first two of these research inquiries have been considered in the literature but the last two have not been explored sufficiently yet.

1.2.3. Have LCCs increased the flow of tourism?

The presence of LCCs traveling to destinations may increase the flow of tourists. However its success depends on many factors. Some key determinants are the coexistence of similar routes, the connectivity of the destination airport with the tourist destination, the behavior of competing destinations in regards to the presence of LCCs and the sensitivity of the passengers to lower fares together with passengers' willingness to accept LCCs service quality. Obviously, the answer to this question varies with each case study. For this reason, it is not surprising that the literature shows a wide range of results in this sense.

The Civil Aviation Authority (2006) conducted a report concerning LCCs in the UK. It concludes that there is not plausible evidence of an increase in the flow of passengers due to LCCs beyond the natural stationary growth in the sector. However, the report shows little evidence of an increase in the traffic flow of some routes in comparison with the usual traffic flow of these routes. However, in general, the report concludes that LCCs have succeeded in increasing its market share rather than increasing new passengers flow. Young and Whang (2011) differ from the previous report and affirm that LCCs stimulated new demand to the tourist island of Jeju in South Korea. Graham and Dennis (2010) remark that the flow of tourists to Malta has increased due to LCCs. Rey, Myro and Galera (2011) state that, on average, a 10% increase in the number of visitors traveling with LCCs, increases the average number of tourists traveling from EU-15 countries to Spain by a 0.2%. According to Davison and Ryley (2010), LCCs have increased the demand for short breaks from regional airports such as East Midlands region in the UK to cultural destinations such as Prague or Berlin, whereas destinations such as Faro or Alicante remain as week-long holidays. In the case of Australia, Forsyth (2003) concludes that the entrance of LCCs have had little impact in the transport sector and thus, in the flow of tourists. Finally, Pulina and Cortés-Jiménez (2010) conclude that LCC carriers have boosted the tourism demand in Alghero (Italy) in the last decade.

1.2.4. Have LCC passengers got a different behaviour with respect to traditional carrier passengers?

After any LCC entrance at a destination, according to their behavior, there may be three sets of tourists: a) new tourists who fly due to the presence of LCCs, b) current tourists who are willing to accept the trade-off between lower prices and new air transport service quality and c) current tourists who keep booking with non-LCCs. Such different behavior may also be correlated with their budget constraint and it may have an impact on their tourism expenditure at the destination. O´Connell and Williams (2005), Mason (2005) and; Graham and Dennis (2010) use a descriptive analysis in their papers. O´Connell and Williams (2005) affirm that LCC passengers focus their decision on price. Whereas, traditional carrier passengers take into account a wider set of attributes to make their decision such as reliability, quality, flight schedules, connections, frequent flyer programmes and comfort. Mason (2005) and Martínez-Garcia, Ferrer-Rosell and Coenders (2012) analyse the demand of business travelers and leisure travelers. According to Mason (2005), the advent of internet and low cost airlines are the main factors behind the change in demand of these two travelers profile. On the one hand, leisure travelers are taking holidays more frequently but with shorter stays. On the other hand, business travelers are also shifting towards LCCs, especially in short-haul route. According to Donzelli (2010) LCCs are reducing the seasonality in Southern Italy. In the case of Malta, Graham and Dennis (2010) state that LCCs tourist preferences seem different from non-LCCs ones. Especially, they point out that LCC tourists do not show so much interest in the cultural heritage, which represent the traditional tourist attractions of the islands. They also conclude that LCCs operate on some routes to the island with the same frequency as the preexisting companies.

Additionally, LCCs may have provided new opportunities to travel during off-peak periods or to undertake short-breaks holidays. Again, the nature of the destination and its dependence on the climatic conditions for attracting tourists make a difference on this issue. Thus, different answers are expected to be obtained for different destinations. Young and Whang (2011) use a time series regression analysis with tourism demand as a dependent variable. They conclude that LCCs have no influence in changing seasonal pattern. According to them, LCCs have just overtaken the preexisting schedule flights to the island. On the contrary, Pulina and Cortés-Jiménez (2010) analyze the relationship between tourism demand and supply in Alghero (Italy). They state that LCCs have changed the seasonal pattern of foreign tourists whereas national tourists (Italians) have not changed their preferences and they keep travelling to the island in August, mainly. They also conclude that LCCs have boosted the tourism demand to the island in the last decade.

1.2.5. Have LCCs presence promoted economic growth in the region where they travel to?

The literature in regard to tourism and economic growth is diverse, but it lays on any of the tourism-led growth hypotheses (Balassa, 1978). The literature about LCCs and economic growth does not follow any of these hypotheses, and the approach is more general and scattered. Moreover, the advent of LCCs is a recent phenomenon and probably, the time series available are not long enough to shed light on any of the tourism-led growth hypotheses mentioned above.

1.2.6. Are LCCs passengers' savings in the origin transferred to higher tourism expenditure at the destination?

So far, there is any kind of research carried out concerning this issue. As commented below, this paper is the first one to explore it. However, research on modeling expenditure has been more protracted.

1.2.7. Modeling tourism expenditure

Tourism expenditure modeling has been analyzed from macroeconomic and microeconomic perspectives. The macroeconomic perspective is usually employed in forecasting analysis. It is a complementary study to the analysis of arrivals, especially when price changes over time are relevant. Such data is usually easier and cheaper to obtain, but its averaging nature loses its powerful by the time of analyzing heterogeneous individual behaviour. The microeconomic approach is usually more appropriate for these cases. Generally speaking, research has developed two issues. On the one hand, it has focused on models that explain how sensitive tourism expenditure is under changes in socioeconomic variables such as income. Sample selection models are a popular methodology to deal with this issue. On the other hand, current state of research has explored how expenditure is distributed either with respect to other goods and services or amongst tourism goods and services. This issue is usually analyzed with a system of equations in order to tackle endogeneity and correlation. Additionally, a wide set of models have been employed depending on the purposes of the study. Some of these papers are briefly commented below.

1.2.7.1. Sample selection models

Tourism expenditure is conditioned by several previous decisions. Among these, the decision of whether to travel or not is key to model the tourism expenditure (Eugenio-Martin, 2003). This decision has to be taken into account in the tourism expenditure decision to avoid potential biased results (Heckman, 1976). Hageman (1981) represents a pioneer study on this issue. The study employs a Tobit model to determinate the probability to travel and the expenditure. Van Soest and Kooreman (1987) analyze the decision to go on vacation or not, the choice of the destination and the vacation expenditure (Working-Leser Engel curves) simultaneously. In the same line, Melenberg and Van Soest (1996) carry out an analysis to explain the budget share that Dutch families spend on vacations, using both, a Tobit model and a conditional regression. Coenen and Van Eekeren (2003) carry out a two-stage model. In the first stage, the household chooses between going on a trip or not (domestic tourism) (probit model). In the second stage, an AIDS (Almost Ideal Demand System) is used to explain the expenditure on domestic tourism, i.e. household budget share for: accommodation, groceries, restaurants, shopping and transportation. A Heckit model (two-stage framework) is chosen by Nicolau and Más (2005a) to study the decision to travel or not and the total travel cost.

1.2.7.2. System of equations

A system of equations provides a suitable framework to model tourism decisions beyond econometric issues such as endogeneity or correlation. It also allows for combining several tourism decisions into one single model. As it was shown above, sample selection models allows for combining two decisions (participation decision/equation (categorical dependent variable) and output decision/equation (continuous dependent variable). Nonetheless, a system of equations allows for several output decisions. For instance, Mak, Moncur and Yonamine (1997) explain the expenditure per person and night and the length of stay in

Hawaii using a system of equations. It is estimated by 2SLS (Two stage least squares). Alternatively, The AIDS (Almost Ideal Demand System) is also a functional form widely used in a system of equations context. Such functional form is adopted by O´Hagan and Harrison (1984), Papatheodorou (1999), De Mello, Pack and Sinclair (2002), Divisekera (2003) and Divisekera (2010).

1.2.7.3. Other methodologies

There are also a myriad of papers which cope with tourism expenditure form different perspectives using other econometric tools, but they cannot be classified in the methodologies above. Those papers are summarising as follows:

Mok and Iverson (2000) conduct a segmentation analysis using the total expenditure at destination. In the same year, Aguiló and Juaneda (2000) consider the dichotomy between expenditure in origin and destination per tourist and day, and estimate each equation by Ordinary Least Squares. From another perspective, an expenditure segmentation analysis (decision tree) is the methodology conducted by Díaz-Pérez and Bethencourt (2005) to analyse the daily expenditure per tourist in the Canary Islands. On the other hand, Palmer, Beltrán and Cortiñas (2006) apply a descriptive statistical analysis of the average daily expenses per tourist. Dolnicar, Crouch, Devinney, Huybers, Louviere and Oppewal (2008) assess, through a stated preference experiment and a posterior cluster analysis, the tourism expenditure in the context of other households' expenditures and how they are allocated. Alegre, Cladera and Sard (2011) analyse the influence of motivations on tourism expenditure. An Ordered Logit model is used to study the effect of the explanatory variables on each of three endogenous variables: total tourism expenditure, expenditure in origin and in destination. The endogenous variables are classified using the quartiles of the distributions and converted into discrete variables. Alegre and Pou (2008) study the tourism expenditure related to all-inclusive packages. For this purpose, they assess, through a descriptive statistical analysis, the tourist expenditure per tourist and day by type of board and the same for the expenditure outside the hotels. In some cases, they distinguish between expenditure in origin and in destination. Wu, Gang and Song (2012) estimate a TVP-EC-AIDS (Time-Varying Parameter combined with an AIDS and a continuing adjustment parameter (EC)) model. Finally, Cheng and Chang (2012) use a quantile regression to explain the tourist expenditure by individual.

1.3 Methodology

For pedagogical reasons, the methodology is explained with three consecutive approaches. Each approach improves and it is built upon the previous one.

1.3.1. First approach: Descriptive analysis

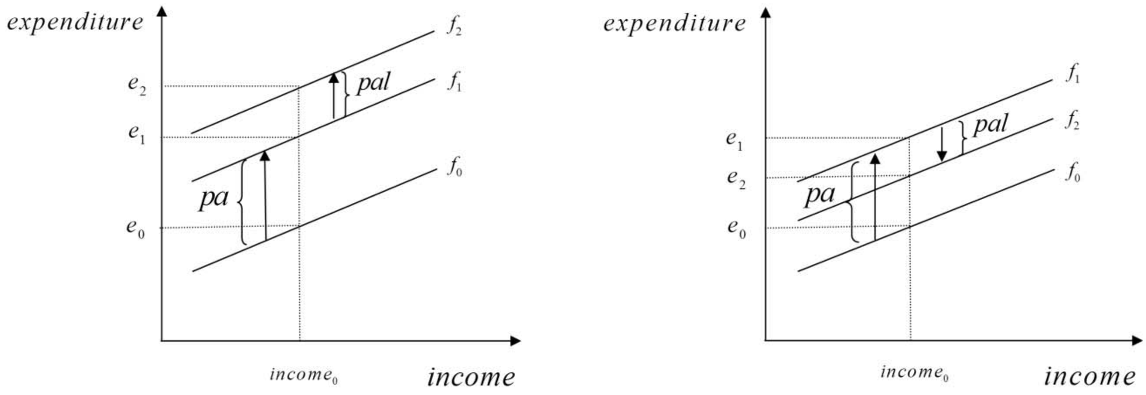
A first and natural approach to this issue is to compare tourism expenditure in the destination by LCC tourists vis-à-vis Non-LCC tourists. However, it is necessary to set up a basis for comparison. It is a mistake to compare the whole set of tourists because, for instance, some of them may have arranged all-inclusive accommodation packages, whereas other tourists may have just paid for self-catering accommodation. At the same time, the kind of accommodation matters because, for instance, apartments usually provide kitchen facilities, whereas hotels provide catering services. Such difference also matters in terms of expenditure in the destination. For that reason, it is necessary to distinguish tourists according to such two discriminating categories, i.e. kind of package holiday (denoted by p) and kind of accommodation (denoted by a). Thus two-entry tables will show tourism expenditure differences between LCC tourists and Non-LCC tourists. Setting up the basis for comparison requires some additional adjustments, such as party size and the length of stay. Hence, final figure should be tourism expenditure per night and per party size. The results of this approach are a good approximation, but the implicit assumption is that all the individuals are identical.

However, they are not identical and such differences matter in tourism expenditure. If they do matter, the differences between tourism expenditure disbursed by LCC tourists and Non-LCC tourists respond to additional variables different than just travelling with LCCs or not. Thus it is likely that the descriptive analysis will not provide a 'true' value of the LCC effect.

1.3.2. Second approach: Regression analysis

As stated earlier, socioeconomic variables may have a significant impact on the tourism expenditure. For instance, variables such as income, country of origin, age, motivations for travelling (e.g. playing golf, as compared to relaxing), or the kind of party, i.e. travelling with the family as compared to travelling with working colleagues or friends may vary tourism expenditure patterns. Descriptive analysis may take into account some of these effects, but again the results will be biased unless all the variables are considered simultaneously. Unfortunately, the number of possible combinations of these variables is so high that descriptive analysis is unfeasible for this purpose. Appropriate econometric analysis may isolate the LCC effect though. However, its application is not straightforward. Econometric models usually have got a constant term and some explicative variables weighted by estimated parameters. When all the variables take value zero, the endogenous variable equals the constant term. It is important to estimate how much higher or lower such constant term shifts if the tourists are travelling with different package holidays or accommodation. One way to estimate such differences is employing multiplicative dummy variables (denoted by *pa*). Thus, for each combination of package holidays and accommodation, the model estimates a shift from the constant term. The significance of these dummy variables can be tested, and consequently, the hypothesis of heterogeneous behavior between different tourist profiles may be refuted. Once each shift is estimated, an additional shift that distinguishes if the tourist is travelling with LCCs or not may be incorporated (denoted by *pal*). Such shift represents the isolated effect of travelling with LCCs (see Figure 1). It can also be tested and hence, the hypothesis of different tourism expenditure can also be refuted and quantified.

Figure 1. Effect of the variables pa and pal



1.3.3. Third approach: Simultaneous system of equations

The second approach is missing a relevant part of the tourism expenditure disbursed in origin. Some tourists may spend more or less money in the destination depending on how much they have already spent in advance in their places of origin. For instance, it is obvious that tourists who have booked and paid excursions in origin will spend less money in the destination with respect to 'identical' tourists who pay in the destination. Hence, the tourism expenditure in the destination depends on how much tourists have already disbursed in origin. However, ordinary least squares regression will be biased under the presence of such endogeneity. In order to deal with this issue, an appropriate simultaneous system of equations is required. In order to illustrate this approach, a microeconomic model is introduced followed up by the simultaneous equations econometric model.

1.3.4. Theoretical microeconomic motivation

A household minimizes its tourist expenditure per night and person subject to a given utility and according to a given destination, nights and party size. The dual minimizing problem may be represented as:

$$Min\;\; P_o Q_o + P_d Q_d$$

$$s.t:$$

$$\left(\delta_o Q_o^{\rho} + \delta_d Q_d^{\rho}\right)^{1/\rho} = \bar{U} \quad \text{(CES utility function)}$$

$P_o Q_o = \sum_{j=1}^{n} P_{o,j} Q_{o,j}$ and $P_d Q_d = \sum_{j=1}^{n} P_{d,j} Q_{d,j}$; and represent the total tourist expenditure per night and person at origin and the total tourist expenditure at destination, respectively. More precisely, $P_{o,j}$ and $Q_{o,j}$ are the prices and quantities of goods/services j at origin o per night and person. In the same manner, $P_{d,j}$ and $Q_{d,j}$ are the prices and quantities of the goods/services j at destination d per night and person.

$\rho = \frac{\sigma - 1}{\sigma}$ and σ is the elasticity of substitution between the expenditure in origin and destination per night and person. δ_o and δ_d represents the share of utility provided by tourism expenditure in origin and destination per night and person. A higher share in destination implies a higher preference towards expenditure in destination with respect to the origin.

The solution to this problem yields the quantities consumed in origin and destination per night and person. The marginal rate of substitution (MRS) is expressed as follows:

$$\frac{P_o}{P_d} = \frac{\delta_o}{\delta_d}\left(\frac{Q_o}{Q_d}\right)^{\rho - 1}$$

Rearranging Q_o and Q_d, multiplying by P_o and P_d on both sides and substituting ρ, the MRS between expenditure in origin and destination (per night and person) is obtained:

$$P_o Q_o = \left(\frac{P_d}{P_o}\right)^{\sigma-1} \left(\frac{\delta_d}{\delta_o}\right)^{\sigma} P_d Q_d$$

Let $\Omega = \left(\frac{P_d}{P_o}\right)^{\sigma-1} \left(\frac{\delta_d}{\delta_o}\right)^{\sigma}$, so that $P_o Q_o = \Omega P_d Q_d$. Thus Ω represents the share between tourism expenditure in origin with respect to tourism expenditure in destination. It is a key parameter for the understanding of this issue, as it is explained below. Finally, it should be noted that for elasticities $|\sigma|$ lower than one, an increase in the prices in destination decreases the expenditure in origin per night and person. For elasticities $|\sigma|$ higher than one, an increase in the prices in destination increases the expenditure in origin per night and person.

1.3.5. Econometric approach to the microeconomic motivation

Expenditure in origin and destination are functions of exogenous explanatory variables (Z_n), endogenous explanatory variables (E_o, E_d, where $E_o \equiv P_o Q_o$ and $E_d \equiv P_d Q_d$) and error terms (ξ_o, ξ_d) that gather up all the information not included in the explanatory variables.

$$E_o = f(Z_n, E_d, \xi_o)$$

$$E_d = f(Z_n, E_o, \xi_d)$$

$$E_o = \phi_0 + \sum_n \kappa_n Z_n + \chi E_d + \xi_o \qquad (1)$$

$$E_d = \mu_0 + \sum_n \tau_n Z_n + \upsilon E_o + \xi_d \qquad (2)$$

Where ϕ_0, κ, χ, μ_0, τ, υ are parameters associated to each explanatory variable.

Given that $E_o = \Omega E_d$ and substituting (1) and (2):

$$E_o = \left(\frac{\phi_0 - \Omega\mu_0}{\Omega\upsilon}\right) + \sum_n \left(\frac{\kappa_i - \tau_i\Omega}{\Omega\upsilon}\right) Z_n + \frac{\xi_o - \Omega\xi_d}{\Omega\upsilon} \qquad (3)$$

$$E_d = \left(\frac{\Omega\mu_0 - \phi_0}{\chi}\right) + \sum_n \left(\frac{\Omega\tau_i - \kappa_i}{\chi}\right) Z_n + \frac{\Omega\xi_d - \xi_o}{\chi} \qquad (4)$$

An important theoretical result is that $\frac{\xi_o - \Omega\xi_d}{\Omega\upsilon}$ in (3) and $\frac{\Omega\xi_d - \xi_o}{\chi}$ in (4) show the presence of error correlation between the expenditure in origin and expenditure in destination for a given household. Such error correlation needs to be tackled with simultaneous equations. For the purpose of this research, *pa* and *pal* multiplicative dummies also need to be part of the model. Thus, the equations can be specified as follows:

$$E_{i,o} = \beta_0 + \sum_p \beta_p Z_{i,p} + \beta_e E_{i,d} + \sum_q \beta_q Pa_{i,q} + \sum_s \beta_s Pal_{i,s} + u_i \qquad (5)$$

$$E_{i,d} = \gamma_d + \sum_p \gamma_z Z_{i,z} + \gamma_e E_{i,o} + \sum_q \gamma_q Pa_{i,q} + \sum_s \gamma_s Pal_{i,s} + e_i \qquad (6)$$

where subscript i denotes households or individuals and the assumptions taken into account are the following ones:

$Var(u_i) = \sigma^2$; $Var(u_i u_j) = 0$	(a1)	Homokedasticity and non-autocorrelation in equation (5).
$Var(e_i) = \sigma^2$; $Var(e_i e_j) = 0$	(a2)	Homokedasticity and non-autocorrelation in equation (6).
$E(u_i e_i) = \sigma_i$	(a3)	Contemporary correlations between errors in equations (5) and equations (6).
$E(u_i Z_i) = 0$	(a4)	Exogenous explanatory variables in equations (5) are

non-correlated with the error term.

$E(e_i Z_i) = 0$	(a5)	Exogenous explanatory variables in equations (6) are non-correlated with the error term.
$E(u_i E_{o,i}) \neq 0$	(a6)	Endogenous explanatory variable ($E_{o,i}$) correlated with the error term in equation (5).
$E(e_i E_{d,i}) \neq 0$	(a7)	Endogenous explanatory variable ($E_{d,i}$) correlated with the error term in equation (6).

1.4 Case study

The methodology is applied to the Canary Islands (Spain), which is an ideal destination for tourism research because arrivals and departures are well documented since air travelling is the main mean of transportation to the islands. Additionally, Instituto Canario de Estadística (ISTAC) provides a very good set of surveys that describe the tourism sector appropriately. Every term, ISTAC conducts a large Tourist Expenditure Survey, which is the basis of the dataset used in this paper.

Canary Islands emerged as a tourism destination in the sixties of the last century. Since then, tourism sector has increased its relevance in the economy providing economic development along the way. Nowadays, Canary Islands is a well-known tourism destination that attracts about 12 million tourists every year. Traditionally, most tourists arrived in charter flights. They used to book their holidays in travel agencies in origin. Such bookings comprised the whole package, i.e. flight, accommodation, transits and excursions in some cases. Some other tourists were coming with scheduled flights, but it was not until 2002 when independent traveling with low cost emerged strongly. According to ISTAC time series data, low cost traveling to Canary Islands has increased during the last ten years. For instance, in 2006Q1, the share of low cost traveling represented 19.88%. In 2012Q1, it reached 29.50% and in 2014Q1, it increased up to 38.53%. These figures reveal that the presence of LCCs represents an important share of the current market that seems to keep growing. It proves that the market structure has changed and it keeps changing.

Dataset

The period chosen for the dataset starts in 2009 and it finishes in the second term of 2011. The survey is a cross section study that includes questions related with expenditure in origin and destination, socio-economic attributes, motivations in choosing Canary Islands, impression about the holidays, length of stay or previous visits to the islands, among other variables that are explained below. It should be noted that not all the passengers that travel to the Canary Islands are 'true' tourists, because some of them are foreigners that reside in the islands. In order to avoid potential biases in terms of the length of stay or expenditure in the destination, only passengers who stay a maximum of thirty one nights are finally considered. Thus, the dataset is comprised of 53,608 observations.

Variables

During the research of this paper, many variables and alternative specification models were considered. Final endogenous and exogenous variables that are estimated in the model are shown below:

Endogenous variables: *Exporigin* (Expenditure in origin per person and night), *expdestination* (Expenditure in destination per person and night).

Exogenous variables: *income* (yearly income divided by 12 months), *term* (term), *year* (year), *p* (kind of tourist package: flight, flight + accommodation, flight + accommodation + Breakfast, flight + accommodation + half board, flight + accommodation + full board + flight

+ accommodation + all inclusive), *a* (category of accommodation: 5* hotel, 4* hotel, 3*, 2* or 1* hotel, apartment, house of friends or relatives, others (e.g. timesharing), *pa* (multiplicative dummy between package and category of accommodation), *pal* (*pa* multiplied by a low cost dummy), *destination* (island visited: La Palma, El Hierro, Tenerife, Gran Canaria, Fuerteventura and Lanzarote), *party* (it has got members with age lower than 2 years, between 2 and 12, between 13 and 65 years, older than 65 years), *people* (alone, with couple, with family, friends and relative or coworkers), *motivation* (main reason to travel to Canary Islands: climate, beaches, landscape, environmental quality, quietness, active tourism, health tourism, theme park, golf, other sports, nightlife, shopping, new place, ease of traveling, prices, for kids), and *previous visits* (from 1 to more than 10 times).

1.5 Methodology

Simultaneous equations model

A simultaneous equations model provides a suitable framework to model the dichotomy and mutual relationship between expenditure in origin and expenditure in destination. However, some tests have to be taken into account in order to accept this model and its estimation as a suitable characterization of the hypothesis outlined in this paper. The first question to answer is the presence of simultaneity (Gujarati, 2003); additionally, it is required to fulfill the identification condition or full rank, so that the number of exogenous variables (K) in the system minus the number of exogeneous variables in equation (k) need to be greater or equal than the number of endogeneous variables in a equation minus one: $K - k >= m - 1$. Thus, the presence of simultaneity depends on the acceptance of two of the hypotheses shown above: endogeneity ((a6) and (a7)) and contemporary correlations among error terms (a3).

1.5.1. Endogeneity

Durbin-Wu-Hausmann test is conducted to test the presence of endogeneity between both endogenous variables, since they also belong to the explanatory variables in the other equation. In both cases, the existence of endogeneity is not rejected. Thus the econometric method needs to deal with endogeneity. Some methods that are able for this purpose are: IOLS (Indirect Ordinary Least Squares (exactly identified equations)), IV (Instrumental Variables) or 2SLS (Two-Stages Ordinary Least Squares (overidentified equations)). These methods belong to the family of the limited information methods because each equation is estimated independently of the others as there is not relationship among them.

1.5.2. Contemporary correlations among error terms

The second step is to check contemporary correlation between the error terms of the two equations. Two approaches are calculated. First, equations (5) and (6) are estimated by OLS but considering only all the exogenous variables of their respective equations. Second, the correlation of the residuals of the two equations are calculated (correlation=0.1537). An alternative to this process might be to estimate a SUR model, where the endogenous variables are excluded as explanatory variables from each other equations as in the first approach. After that, a correlation among residuals and Breusch–Pagan test of independence are calculated. The correlation is -0.1537 and Breusch-Pagan test is not rejected. Under the presence of contemporary correlations, SUR estimation is able to deal with this problem. This estimation belongs to the family of the complete information method and it takes into account the simultaneity. The acceptance of endogeneity and error correlations between the two equations support the suitability of this methodology to treat with the hypothesis outlined in this paper. The econometric method able to estimate this kind of model is 3SLS (Three-Stages Last Squares) (Zellner and Theil, 1962). 3SLS gathers up 2SLS (endogeneity) and SUR (contemporary correlations among equations). Nonetheless, there is another issue to deal with, i.e. heteroskedasticity.

1.5.3. Heteroskedasticity

Such issue generally affects the efficiency of the estimator and thus the individual significance of the estimates. Firstly, both equations are estimated separately by OLS. Secondly, Breusch-Pagan/Cook-Weisberg test for heteroskedasticity is applied on the residuals of equations (5) and (6). The null hypothesis (homoskedasticity) is rejected.

1.5.4. Estimation under the presence of endogeneity, contemporary correlation error terms and heteroskedasticity.

Endogeneity, contemporary correlation and heteroskedasticity can be treated by the generalized method of moments (GMM). GMM (Hayashi, 2000) can be seen as a general framework in which any other estimator is a particular case of it (either of the two methods: limited information or completed information can be modeled within a GMM context). One advantage is that it permits robust estimation under the presence of heteroskedasticity, which implies efficiency gains (Greene, 1997). A disadvantage is that it requires as many instruments as equation moments and each explanatory variable requires one equation moment. However, as Cameron and Trivedi (2005) remark, the exogenous variables can be instrumented by themselves. In regards to the system shown in equations (5) and (6), a robust 3SLS estimation is carried out but it did not achieve a solution due to the non-positive semidefinite residual covariance matrix.

The exclusion of some dummy variables permits robust 3SLS GMM estimation but, at the same time, it produces a misspecification problem. At this time, a non-robust 3SLS estimation is chosen. The 3SLS satisfies the requirement for an IV estimator and thus it is consistent. Additionally, for normally distributed disturbances, the 3SLS estimator is asymptotically efficient (Greene, 1997). In 3SLS, the first two steps are equal to 2SLS (deal with endogeneity), the last step calculates the variance and covariance matrix of the residuals from step 2 and re-estimates the equations by SUR (deal with correlations among residuals in both equations). On the one hand, the 2SLS estimation will be less efficient under the presence of contemporary correlation of the error terms of each equation (Schmidt, 2005). On the other hand, the SUR estimation will be biased and inconsistent (Schmidt, 2005), under the presence of endogeneity. The non-resolved question of heteroskedasticity produces an efficiency loss in the 3SLS estimation. In contrast, 3SLS permits a good specification model in regards to the robust 3SLS GMM estimation.

The non-presence of some explanatory variables in some equations (excluded variables) such as *motivation* in the expenditure in origin equation or *years* in the expenditure in destination equation help to avoid the identification problem. The first equation is just identified and the second one is over identified. Summarizing the hypotheses: (a1) and (a2) are not held. From (a1) to (a5) are necessary conditions for SUR estimations. These assumptions plus assumptions (a6) and (a7) are necessary conditions to apply 3SLS estimation.

1.5.5. The reduced form

This form expresses the endogenous variables as a function of exogenous explanatory variables. This form has three important implications in a simultaneous equations model: it allows for the identification of the models (alternatively to the condition: $K - k >= m - 1$, already explained), estimators such as 3SLS or IOLS, among others, use the reduced form to figure out the system and, it permits to evaluate the direct impact of any exogenous explanatory variable in any endogenous variable. The equations model in reduced form are the following ones:

$$
\begin{aligned}
exporigin_i &= [(\beta_1\gamma_2+\beta_2)/(1-\beta_1\gamma_1)]income_i + \sum_{t=1}^{4}[(\beta_1\gamma_{3t}+\beta_{3t})/(1-\beta_1\gamma_1)]term_{it} \\
&+ \sum_{y=2009}^{2011}[(\beta_1+\beta_{4y})/(1-\beta_1\gamma_1)]year_{iy} + \sum_{h=1}^{31}[(\beta_1\gamma_{5h}+\beta_{5h})/(1-\beta_1\gamma_1)]pa_{ih} \\
&+ \sum_{h=1}^{31}[(\beta_1\gamma_{6h}+\beta_{6h})/(1-\beta_1\gamma_1)]pal_{ih} + \sum_{d=1}^{7}[(\beta_1\gamma_{7d}+\beta_{7d})/(1-\beta_1\gamma_1)]destination_{id} + \\
&\sum_{d=1}^{19}[(\beta_1\gamma_{8c}+\beta_{8c})/(1-\beta_1\gamma_1)]country_{ic} + + \sum_{r=1}^{4}[(\beta_1\gamma_{9r}+\beta_{9r})/(1-\beta_1\gamma_1)]party_{ir} \\
&+ \sum_{o=1}^{5}[(\beta_1\gamma_{10r}+\beta_{10r})/(1-\beta_1\gamma_1)]people_{io} + \sum_{m=1}^{16}[\beta_1\gamma_{11m}/(1-\beta_1\gamma_1)]motivation_{im} \\
&+ [(\beta_1\gamma_{12}+\beta_{11})/(1-\beta_1\gamma_1)]previous_i + [\beta_1/(1-\beta_1\gamma_1)]e_i + [1/(1-\beta_1\gamma_1)]u_i
\end{aligned}
\tag{7}
$$

$$
\begin{aligned}
expdestination_i &= [(\gamma_1\beta_2+\gamma_2)/(1-\beta_1\gamma_1)]income_i + \sum_{t=1}^{4}[(\gamma_1\beta_{3t}+\gamma_{3t})/(1-\beta_1\gamma_1)]term_{it} \\
&+ \sum_{y=2009}^{2011}[(\gamma_1\beta_{4y})/(1-\beta_1\gamma_1)]year_{iy} + \sum_{h=1}^{31}[(\gamma_1\beta_{5h}+\gamma_{5h})/(1-\beta_1\gamma_1)]pa_{ih} \\
&+ \sum_{h=1}^{31}[(\gamma_1\beta_{6h}+\gamma_{6h})/(1-\beta_1\gamma_1)]pal_{ih} + \sum_{d=1}^{7}[(\gamma_1\beta_{7d}+\gamma_{7d})/(1-\beta_1\gamma_1)]destination_{id} + \\
&\sum_{d=1}^{19}[(\gamma_1\beta_{8d}+\gamma_{8d})/(1-\beta_1\gamma_1)]country_{ic} + \sum_{r=1}^{4}[(\gamma_1\beta_{9r}+\gamma_{9r})/(1-\beta_1\gamma_1)]party_{ir} \\
&+ \sum_{o=1}^{5}[(\gamma_1\beta_{10r}+\gamma_{10r})/(1-\beta_1\gamma_1)]people_{io} + \sum_{m=1}^{16}[\gamma_{11m}/(1-\beta_1\gamma_1)]motivation_{im} + \\
&[(\gamma_1\beta_{11}+\gamma_{12})/(1-\beta_1\gamma_1)]previous_i + [\gamma_1/(1-\beta_1\gamma_1)]u_i + [1/(1-\beta_1\gamma_1)]e_i
\end{aligned}
\tag{8}
$$

Equations (7) and (8) are the origin and destination equations in reduced form, respectively.

1.6 Results

1.6.1. Reweighting effect

This study has considered six different kinds of accommodation, i.e. five* hotel; four* hotel; three, two or one star hotel; apartment; friends or relatives accommodation; and other. It has also taken into account six different kinds of package holidays, i.e. only flight; flight, accommodation and self-catering; flight, accommodation and breakfast; flight, accommodation and half board; flight, accommodation and full board; flight, accommodation and all-inclusive. It results in 31 different tourist profiles. However, not all of them are equally relevant. In terms of volume, for Non-LCC tourists, three of them are particularly relevant: four* and all-inclusive (18.92%), four* and half board (18.57%) and apartment and self-catering (14.61%).

It is interesting to note that the profile distribution of LCC tourists is different than Non-LCC tourists. Indeed, those tourists who only pay for their flight and stay in relatives or friends accommodation increase its relevance up to a share of 9.38%. Some other profiles of tourists are also affected, but not all of them in the same proportion or direction. Details of such reweighting effect are shown in Table 1. On the one hand, LCC profiles with the highest gain with respect to non-LCCs, i.e. net effects, are: flight and accommodation with friends or relatives (+5.28%) and flight with accommodation in apartments (+9.68%). On the other hand, the LCC profiles with the highest loss with respect to non-LCCs passengers are: "flight + accommodation + half board" in "4* hotels" (-9.78%) and "flight + accommodation + all inclusive" in "4* hotels" (-7.94%). By categories, there is a clear redistribution from "4* hotels" (-18.35%) to "apartments" (+14.02%) and "friends or relatives" (+5.28%). By tourist packages, LCC travelers increase the use of "only flight" and "flight + accommodation" options with respect to non-LCC travelers by +10.41% and +12.52%, respectively. The packages that experience the higher loss are: "flight + accommodation + half board" and "flight + accommodation + all-inclusive" which represent a decrease with respect to non-LCC tourists of -13.64% and -7.79% respectively.

Table 1. Distribution of tourist profiles and the reweighting effect

		5 *	4 *	3,2,1*	Apartment	Family or friends	Other	Total
Only flight (F)	LCC	0.52	1.41	1.37	4.16	**9.38**	2.15	18.99
	NLCC	0.34	1.01	0.66	1.6	4.1	0.88	8.58
	Net	0.18	0.40	0.71	2.56	5.28	1.27	**10.41**
(F) + Accommodation (A)	LCC	0.6	3.26	4.29	**24.29**	0	2.03	34.47
	NLCC	0.39	3.03	2.94	**14.61**	0	0.98	21.95
	Net	0.21	0.23	1.35	9.68	0	1.05	**12.52**
(F+A) + Breakfast	LCC	1.72	2.39	1.06	1.04	0	0.07	6.27
	NLCC	1.51	2.77	1.42	1.28	0	0.01	6.98
	Net	0.21	-0.38	-0.36	-0.24	0	0.06	-0.71
(F+A)+Half Board	LCC	1.57	**8.78**	2.64	1.83	0	0.09	14.91
	NLCC	3.09	**18.57**	4.55	2.27	0	0.06	28.55
	Net	-1.52	-9.79	-1.91	-0.44	0	0.03	**-13.64**
(F+A)+Full Board	LCC	0.26	1.51	1	0.68	0	0.1	3.54
	NLCC	0.41	2.37	0.98	0.34	0	0.23	4.33
	Net	-0.15	-0.86	0.02	0.34	0	-0.13	-0.79
(F+A)+ All-inclusive	LCC	0.87	**10.98**	5.01	4.72	0	0.24	21.82
	NLCC	0.97	**18.92**	6.82	2.6	0	0.3	29.61
	Net	-0.10	-7.94	-1.81	2.12	0	-0.06	**-7.79**
Total net effect		-1.16	**-18.35**	-1.99	**14.02**	**5.28**	2.22	

Note: Bold font means top four most relevant profile

Table 2 displays the mean length of stay of LCC travelers with respect to non-LCC travelers. For the profiles highlighted in Table 1, the advent of LCC travelers decrease the mean length of stay, with respect to non-LCC travelers, in about two days for “Only flight” – “friends or relatives”, and in one day, for “flight + accommodation + half board” and “flight + accommodation + all-inclusive”.

Table 2. Length of stay by LCC and Non-LCC tourists

		5 *	4 *	3,2,1*	Apartment	Family or friends	Other
Only flight (F)	LCC	6.69	8.91	7.63	12.20	**12.42**	10.66
	NLCC	6.74	8.29	9.36	16.49	14.20	11.32
(F)+Accommodation (A)	LCC	7.20	7.85	8.44	**9.49**		10.16
	NLCC	7.28	9.00	9.89	**10.87**		11.36
(F+A)+Breakfast	LCC	6.51	6.96	6.75	7.82		9.42
	NLCC	7.58	7.77	8.39	9.35		8.00
(F+A)+Half Board	LCC	7.71	**8.23**	8.51	8.63		9.22
	NLCC	8.49	**9.16**	9.27	9.94		10.54
(F+A)+Full Board	LCC	7.10	7.62	8.82	10.12		8.98
	NLCC	7.57	8.55	8.37	10.00		7.78
(F+A)+All-inclusive	LCC	7.23	**7.94**	8.26	8.71		9.73
	NLCC	8.42	**8.80**	9.13	9.65		8.35

Note: Bold font means top four most relevant profile

For the variable mean party size there are not significant statistical differences between LCC and non-LCC travelers. The mean party size for the four main profiles is: “flight + friends or relatives” (1.84 people), “flight + accommodation + apartment” (2.44 people), “flight + accommodation + half board + 4* hotel” (2.20 people) and “flight + accommodation + all-inclusive + 4* hotel” (2.43 people).

1.6.2. Results from the structural form

The results of the 3SLS estimation are shown in Table 3. These results correspond to the structural form of the model. Hence, only signs and significance of the parameters can be analyzed. The interpretation requires of the employment of the reduced form, as shown in equations (7) and (8).

Most of the parameters estimated are highly significant. Both expenditure in origin and expenditure in destination are positive and below 1, as expected. It shows the interrelationship between both variables. Income is positive as suggested by the economic theory and the number of previous visits has a different impact for each kind of expenditure. Tourists more experimented decrease their expenditure in origin but increase it in destination. It may be related with the level of knowledge of the destination, since tourists are more familiar with the destination and they feel more confident to find out the services and products that suit their needs at an accepting price. Leaving aside all other variables, the country of origin makes a difference and it is necessary to control for such differences. It is also relevant to distinguish the island of destination, because they are not homogeneous neither in terms of the variety of supply nor the level of competition in these markets. The party composition clearly affects expenditure. Despite the analysis considers expenditure in per capita terms, the number of people who go along the tourists will affect total expenditure. For instance, concerning accommodation expenditure, a single traveler is expected to spend more in per capita terms than a couple because sharing accommodation is usually cheaper. Each tourist behaves differently in the destination depending on their preferences and motivations for the travelling. For that reason, the model takes into account the main motivations and the significant ones are shown in Table 3.

Table 3. Structural form results of 3SLS estimation (part I)

	Origin equation		Destination equation	
	Parameter	Std. desv	Parameter	Std. desv
Expenditure in origin	-	-	0.182***	(0.068)
Expenditure in destination	0.585***	(0.050)	-	-
Income	0.002***	(0.000)	0.001***	(0.000)
Previous visits	-0.044***	(0.006)	0.021***	(0.005)
Time				
Term 2	-3.379***	(0.434)	1.421***	(0.364)
Term 3	-3.807***	(0.498)	1.122***	(0.418)
Term 4	-2.830***	(0.476)	1.078***	(0.375)
Year 2010	3.322***	(0.360)	-	-
Year 2011	3.015***	(0.442)	-	-
Destination				
Lanzarote	0.337***	(0.095)	-0.315***	(0.070)
Fuerteventura	-0.014	(0.102)	0.210***	(0.075)
Gran Canaria	-0.505***	(0.101)	-0.489***	(0.090)
Tenerife	0.318***	(0.102)	-0.762***	(0.066)
La Gomera	-0.146	(0.183)	-0.196	(0.133)
La Palma	-0.900***	(0.152)	0.769***	(0.112)
El Hierro	0.187	(0.589)	0.368	(0.426)

*** p<0.01, **p<0.05, *p<0.10

Table 3 (continues). Structural form results of 3SLS estimation (part I)

	Origin equation		Destination equation	
	Parameter	Std. desv	Parameter	Std. desv
Origin				
Germany	-5.854***	(1.655)	-11.063***	(1.453)
Austria	8.264***	(2.141)	-9.813***	(1.507)
Belgium	2.926	(1.825)	-6.408***	(1.295)
Denmark	3.651**	(1.847)	-9.607***	(1.287)
Spain	-12.961***	(1.485)	2.920**	(1.398)
Finland	2.921	(1.864)	-10.471***	(1.299)
France	0.611	(1.870)	-6.430***	(1.330)
The Netherlands	-6.554***	(1.735)	-9.525***	(1.496)
Ireland	-21.804***	(1.670)	7.710***	(1.732)
Italy	-2.706	(1.954)	-1.754	(1.430)
Norway	-5.809***	(1.733)	-1.842	(1.361)
Poland	-12.047***	(2.241)	-0.266	(1.855)
Portugal	-12.064***	(2.569)	-2.097	(2.075)
United Kingdom	-14.945***	(1.581)	-6.932***	(1.772)
Czech Republic	-1.369	(2.952)	-11.989***	(2.189)
Russia	-9.452***	(2.836)	19.822***	(1.917)
Sweden	2.931	(1.802)	-12.080***	(1.247)
Switzerland	9.407***	(1.958)	-8.523***	(1.420)
Luxembourg	16.346***	(3.792)	-8.791***	(2.851)

*** p<0.01, **p<0.05, *p<0.10

Table 3 (continues). Structural form results of 3SLS estimation (part I)

	Origin equation		Destination equation	
	Parameter	Std. desv	Parameter	Std. desv
Party composition				
Lower than 2 years	-9.590***	(1.018)	-7.047***	(1.244)
2 and 12 years	-2.203***	(0.425)	-5.113***	(0.463)
13 and 65 years	1.109***	(0.336)	-4.725***	(0.201)
Older than 65 years	0.599	(0.560)	-7.466***	(0.418)
Couple	-10.341***	(0.501)	0.202	(0.823)
Family	-1.947***	(0.632)	1.201***	(0.464)
Friends	-10.488***	(0.620)	2.227***	(0.760)
Coworkers	20.195***	(1.980)	3.939*	(2.026)
Main motivation				
Climate	-	-	-3.066***	(0.621)
Beaches	-	-	-1.702***	(0.404)
Landscape	-	-	-1.345***	(0.375)
Environmental quality	-	-	-0.931*	(0.507)
Quietness	-	-	-2.067***	(0.283)
Active tourism	-	-	-4.173***	(0.606)
Helth tourism	-	-	2.825**	(1.116)
Theme park	-	-	1.643**	(0.765)

*** p<0.01, **p<0.05, *p<0.10

Table 3 (continues). Structural form results of 3SLS estimation (part I)

	Origin equation		Destination equation	
	Parameter	Std. desv	Parameter	Std. desv
Main motivation				
Theme park	-	-	1.643**	(0.765)
Golf	-	-	9.846***	(1.014)
Other sports	-	-	-1.840*	(1.023)
Nightlife	-	-	4.274***	(0.633)
Shopping	-	-	5.169***	(0.628)
New place	-	-	-1.311***	(0.454)
Ease of traveling	-	-	-2.916***	(0.409)
Price			-4.663***	(0.888)
For kids			-1.893***	(0.529)
Observations	53,608		53,608	
R^2	0.842		0.718	
Chi^2	2.89e+05		1.37e+05	

*** p<0.01, **p<0.05, *p<0.10

Table 4 shows the estimates of the dummy variables that are used to identify each tourist profile. These estimates belong to the same estimation of Table 3 but they are shown in a separate table for the ease of presentation. As shown in Figure 1, it is important to distinguish between Non-LCC and LCC estimates. The first ones correspond to a shift from the benchmark and 60 out of 62 estimates are significant, which prove the relevance of such distinction. However, LCC dummies are an additional shift from non-LCC shift. Their significance is critical, because it tests if LCC travelers spend differently than Non-LCC travelers, and hence they test the hypothesis enquired in this paper. The table shows that 35 out of 62 estimates are significant, which means that LCC travelers for these combinations of accommodation and food regime are different than Non-LCC travelers. Nevertheless, the results from the structural form cannot be used to measure the direct impact of each dummy, but to test direction of the impact and significance. In order to measure the impact, it is necessary to obtain these results by the reduced form as shown in Table 5.

Table 4. Structural form results of 3SLS estimation (Part II)

Non-LCC	Origin equation		Destination equation	
	Parameter	Std. desv	Parameter	Std. desv
Flight only				
5 stars hotel	-7.606	(8.862)	130.161***	(6.950)
4 stars hotel	14.800**	(6.825)	90.253***	(6.651)
3,2 or 1 stars hotel	17.171***	(6.458)	73.906***	(6.276)
Apartment	16.103***	(5.680)	65.531***	(5.709)
Friends and family	25.071***	(4.992)	44.614***	(5.398)
Other	27.826***	(5.406)	49.915***	(5.872)
Flight and Accommodation				
5 stars hotel	102.242***	(7.306)	72.965***	(12.194)
4 stars hotel	75.679***	(5.402)	47.179***	(9.028)
3,2 or 1 stars hotel	56.268***	(5.353)	49.695***	(7.786)
Apartment	53.837***	(5.216)	48.885***	(7.576)
Other	51.411***	(5.431)	46.114***	(7.297)
Flight, accommodation and breakfast				
5 stars hotel	114.416***	(6.140)	57.306***	(12.255)
4 stars hotel	89.794***	(5.544)	49.033***	(10.086)
3,2 or 1 stars hotel	70.638***	(5.504)	47.437***	(8.704)
Apartment	66.021***	(5.388)	46.611***	(8.391)
Other	83.573***	(13.895)	30.455**	(12.910)
*** p<0.01, **p<0.05, *p<0.10				

Table 4 (continues). Structural form results of 3SLS estimation (Part II)

Non-LCC	Origin equation		Destination equation	
	Parameter	Std. desv	Parameter	Std. desv
Flight, accommodation and half board				
5 stars hotel	127.901***	(5.373)	35.821***	(12.315)
4 stars hotel	90.219***	(5.014)	35.368***	(9.572)
3,2 or 1 stars hotel	71.111***	(5.075)	38.490***	(8.404)
Apartment	72.649***	(5.097)	37.799***	(8.478)
Other	77.778***	(9.290)	38.801***	(10.334)
Flight, accommodation and full board				
5 stars hotel	129.789***	(5.914)	29.751**	(12.363)
4 stars hotel	92.318***	(5.056)	31.847***	(9.567)
3,2 or 1 stars hotel	80.284***	(5.354)	33.219***	(8.897)
Apartment	71.242***	(5.676)	34.092***	(8.427)
Other	129.932***	(5.687)	22.668*	(12.160)
Flight, accommodation and all inclusive				
5 stars hotel	125.542***	(5.194)	21.548*	(11.597)
4 stars hotel	99.646***	(4.724)	22.534**	(9.727)
3,2 or 1 stars hotel	89.705***	(4.792)	25.560***	9.171)
Apartment	82.958***	(4.923)	29.942***	(8.891)
Other	136.551***	(5.551)	14.949	(12.291)
*** p<0.01, **p<0.05, *p<0.10				

Table 4 (continues). Structural form results of 3SLS estimation (Part II)

LCC	Origin equation		Destination equation	
	Parameter	Std. desv	Parameter	Std. desv
Flight only				
5 stars hotel	1.156	(5.086)	-11.154***	(3.652)
4 stars hotel	-1.386	(3.192)	-12.686***	(2.316)
3,2 or 1 stars hotel	3.858	(3.731)	-8.354***	(2.664)
Apartment	-2.086	(1.908)	-1.446	(1.379)
Friends and family	-4.040***	(1.239)	2.127**	(0.907)
Other	-4.443*	(2.559)	1.667	(1.850)
Flight and Accommodation				
5 stars hotel	-0.897	(5.161)	-16.616***	(3.726)
4 stars hotel	-8.813***	(2.112)	0.878	(1.623)
3,2 or 1 stars hotel	-9.360***	(1.782)	2.416*	(1.380)
Apartment	-7.815***	(0.721)	1.704**	(0.690)
Other	-3.971	(2.607)	1.119	(1.888)
Flight, accommodation and breakfast				
5 stars hotel	-10.057***	(2.732)	2.299	(2.054)
4 stars hotel	-10.735***	(2.151)	1.717	(1.701)
3,2 or 1 stars hotel	-6.020*	(3.226)	5.539**	(2.318)
Apartment	-10.409***	(2.749)	-0.433	(2.117)
Other	-24.301	(16.176)	24.828**	(11.634)
*** p<0.01, **p<0.05, *p<0.10				

Table 4 (continues). Structural form results of 3SLS estimation (Part II)

LCC	Origin equation		Destination equation	
	Parameter	Std. desv	Parameter	Std. desv
Flight, accommodation and half board				
5 stars hotel	-9.156***	(2.639)	1.914	(1.981)
4 stars hotel	-8.990***	(1.085)	3.986***	(0.909)
3,2 or 1 stars hotel	-2.623	(2.001)	0.427	(1.444)
Apartment	-9.585***	(2.265)	5.225***	(1.681)
Other	-3.286	(11.397)	-8.374	(8.212)
Flight, accommodation and full board				
5 stars hotel	-14.699**	(7.224)	10.954**	(5.222)
4 stars hotel	-3.556	(2.693)	-0.034	(1.953)
3,2 or 1 stars hotel	-2.614	(4.199)	-0.471	(3.028)
Apartment	-4.008	(4.300)	7.506**	(3.083)
Other	-8.843	(7.152)	5.843	(5.171)
Flight, accommodation and all inclusive				
5 stars hotel	-10.666***	(3.727)	0.679	(2.770)
4 stars hotel	-8.748***	(1.036)	3.123***	(0.873)
3,2 or 1 stars hotel	-13.828***	(1.557)	4.150***	(1.370)
Apartment	-14.490***	(1.773)	5.059***	(1.491)
Other	-20.593***	(5.716)	7.985*	(4.276)
*** p<0.01, **p<0.05, *p<0.10				

1.6.3. Results from the reduced form

Reduced form results are a convenient transformation from the structural form results that deal with the system iterations in order to reveal the "true" direct impact of each exogenous variable. Such transformation is applied to key dummies presented in Table 4 and shown in Table 5. Income elasticities can be obtained from the reduced form. In particular, income elasticity with respect to expenditure in origin is 1.74, whereas in destination such elasticity is 1.98.

Table 5 shows how much more or less each LCC profile is spending in origin and destination. This result is weighted by mean nights and mean party size in order to obtain a figure closer to the one faced by each tourist. For the four most relevant profiles the results are similar. All of them save money in origin with respect to Non-LCC tourists. In particular, saving figures vary between 179.97 euros and 70.97 euros per mean party and nights. The key enquiry of this paper is to test if such savings are transferred into higher expenditure in the destination. It proves that for the most popular profiles LCC tourists spend more money than Non-LCC tourists. Such higher expenditure varies between 48.11 euros and 7.52 euros per mean party and nights. This figure proves the hypothesis that LCC tourists' savings in origin are transferred, at least partially, as higher expenditure in the destination.

Table 5. Reduced form results: The impact of LCC with respect to non-LCC by mean nights and mean party size (euros)

	Origin-Destination	5 *	4 *	3,2,1*	Apartment	Family or friends	Other
Only flight (F)	O	-92.36	-187.05	-16.46	-84.81	**-70.97***	-99.72*
	D	-188.27*	-274.78*	-52.78	-52.78	**35.38***	24.74
(F) + Accommodation (A)	O	-196.67	-167.03*	-173.60*	**-179.97***		-106.30
	D	-310.80*	-14.54	15.64*	**7.52***		12.76
(F+A) + Breakfast	O	-145.82*	-159.24*	-40.22*	-208.11*		-195.27
	D	7.91	-3.81	64.31*	-45.35		407.73*
(F+A)+Half Board	O	-169.31*	**-136.13***	-47.31	-146.99*		-168.91
	D	5.30	**48.11***	-0.99	78.45*		-185.13
(F+A)+Full Board	O	-138.67*	-66.16	-54.47	9.38		-112.71
	D	138.56*	-12.58	-17.83	165.83*		88.01
(F+A)+ All-inclusive	O	202.91*	**-152.33***	-248.29*	-285.26*		-362.25*
	D	-24.86	**33.78***	35.68*	60.04*		96.59*

* Means that the original dummy variable from Table 4 is significant
Bold font means top four most relevant profile

1.6.4. Savings transfer ratios

It is interesting to calculate the percentage of savings in the origin that is transferred as additional expenditure in the destination. Out of the four most relevant profiles, the one of tourists who book only the flight and stay in friends or relatives accommodation transfer 49.8%, which represents the highest transfer value. On the contrary, tourists who book flight and apartment with self-catering transfer only 4.1% of their savings. Tourists who stay in four* hotel with half board transfer 35.3%, whereas those who stay in four* hotel with all-inclusive transfer 22.1%. Thus, it is clear that despite the hypothesis is true, there is net savings, so that not all the savings are transferred as additional expenditure in the destination.

1.7 Conclusions and further research

Canary Islands as many other tourism destinations around the world have faced a relevant market structure change. Tourists are traveling more often with LCC airlines and it has an impact on the destination. On the one hand, LCC tourists' perception of saving money with cheaper air fares may encourage them to spend more money in the destination. On the other hand, LCC airlines may increase air traffic towards a particular destination. This paper tests if the former hypothesis is true. For that purpose, a system of equations of expenditure in origin and expenditure in the destination is considered. Within all econometric methods that may estimate such system, 3SLS model is chosen because it is able to deal with endogeneity and contemporary error correlation appropriately.

Another issue for the destination is related with a redistribution of the relevance of each tourist profile due to the presence of LCCs. LCC travelers may be willing to stay on different kind of accommodation or to enjoy simple meal packages with respect to traditional Non-LCC travelers. Hence, it may imply a redistributing effect of tourist profiles within a destination. In Canary Islands, the tourist profiles that experience significant growth are "Only flight + Staying with friends or relatives", "Flight + Staying in apartment with Self-catering", whereas the tourist profiles that reduce its presence are "Flight + Staying in 4* hotel with Half-board" and "Flight + Staying in 4* hotel with All-inclusive". It is also relevant to note that the average length of stay is also different between LCC tourists and Non-LCC tourists. For instance, for the case of "Only flight + Staying with friends or relatives", LCC tourists stay, on average, 2 days less than Non-LCC tourists. However, for the rest of relevant tourist profiles, LCC tourists stay, on average, 1 day less than Non-LCC tourists. Finally, it should be noted that the mean party size hardly varies between LCC and Non-LCC tourists.

Identifying the role of LCC with an econometric model is not straightforward. It is necessary to compare *vis-a-vis* the expenditure of LCC tourists and Non-LCC tourists. For that purpose, the set of tourist products (i.e. package and accommodation) needs to be exactly the same and the only difference between these two needs to be just the air company chosen (i.e. if the tourist travels with LCC or not). It makes sense for large samples. The way of distinguishing between tourist products and the kind of air company chosen is employing dummy variables. The significance of the dummy variables is necessary to test the significance of the model specification. Provided that the dummy variables are significant, the focus is the value of the difference between dummies associated with LCC tourists and Non-LCC tourists. Such differences will determine, ceteris paribus, how much or less is every kind of tourist spending at the destination.

The results of the econometric model are appropriate because they are significant and they show the expected signs and values. More precisely, the results show that, on average, the hypothesis is true. It means that, ceteris paribus, tourists who travel with LCCs are spending more money at the destination per night and party size than those tourists who did not travel with LCCs. Nevertheless, such transfer ratios are usually lower than fifty per cent, although they differ by tourist profiles. Amongst the most popular tourist profiles, the highest savings transfer rate belongs to "flight + stay with friends or relatives" tourist profile, which reaches 49.8%. For the rest of the relevant tourist profiles the percentages are lower. For instance, "flight + apartment with self-catering" case has got a transfer rate of 4.1%, "flight + 4* hotel with half-board" case has got a savings transfer rate of 35.3% and finally, "flight + 4* with

All-inclusive" has got a savings transfer rate of 22.1%. It proves that savings transfer is heterogeneous by tourist profiles and that not all the savings are finally transferred, but some are net savings for the tourist. It should be taken into account that, despite the existence of such LCC savings transfers, LCC tourists also stay less nights in the destination. Thus, it is an interesting issue to explore its consequences in terms of total expenditure and economic growth of the destinations.

It should be noted that the same methodology can be applied to test the hypothesis to any origin airport, destination airport or route. The model can also focus on specific airlines, if required. However, it only takes into account a part of the story because the flow of tourists is not measured. Hence, this analysis requires the complementary study of forecasting LCC and Non-LCC tourist arrivals. Both studies together provides light on final added value and hence on GDP growth and employment. Such results are relevant to assess the entrance of LCCs at the destination. Future research may also focus on related issues, such as the role of expenditure in origin and how it is converted into added value in the destination. Additionally, it is interesting to explore the nationality issue of the LCCs and how it affects the control on frequency and air fares, which may be a sensitive issue for a destination.

Understanding tourists´economising strategies during the global economic crisis

2.1 Introduction

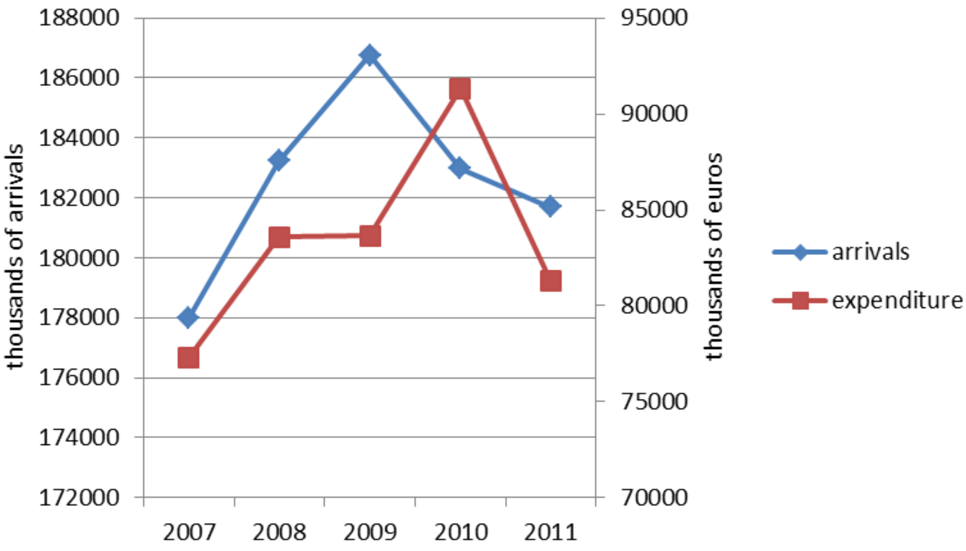
Since 2008, the EU-27 has been in an economic downturn. Between 2008 and 2012, real GDP growth decreased on average by 0.16% and the unemployment rate increased from 7.6% in 2008 to 10.6% in 2012. The effect and consequences of the crisis differed according to country. On the one hand, between 2008 and 2012, countries like Germany grew by an average of 0.8% and even reduced its unemployment rate from 7.5% in 2008 to 5.9% in 2012. On the other hand, countries like Spain or Greece experienced a strong crisis (a reduction in real GDP from -0.92% in 2008 to -4.34% in 2012) and have shown high unemployment rates during these four years (from 11.3% in 2008 to 25% in 2012 and from 7.7% in 2008 to 24.3% in 2012 for Spain and Greece, respectively). The crisis also triggered debt-crises in Greece and Portugal and banking-crises in Spain, Ireland, and Cyprus.

At the microeconomic level, this downturn had a strong effect on individual disposable income and thus on total consumption. Under these circumstances, tourism consumption is especially sensitive to tourism expenditure cutback decisions because of its high income elasticity (Lanza, Temple, & Urga, 2003). According to Riley, Ladkin and Szivas (2001), tourism activity relies on forecasting changes in demand to correctly match supply decisions. Thus, anticipation is key to success in tourism activity. Tourism managers and policymakers need more information on how to react during economic crises. Nonetheless, there is a lack of suitable indicators and information about tourism behaviour during economic crises (Sheldon

& Dwyer, 2010; Smeral, 2010; and Bronner & Hoog, 2012). The consequences of this lack have already been studied in the literature. According to Okumus and Karamustafa (2005), neither the Turkish government nor tourism enterprises were able to deal with the economic crisis they experienced in 2001. O´Brien (2012) pointed out that the lack of interaction between the government and the private sector explains why the tourism sector in Ireland is not growing, whereas other European destinations have already returned to growth despite the economic crisis.

To date, tourism managers and policymakers have mainly based their analysis on arrivals and expenditure. As shown in Figure 2, in 2008, tourists immediately adjusted their expenditure to the crisis, whereas the number of arrivals continued to grow. As the crisis persisted, tourists began to cut back on arrivals but increased expenditure. Finally, since 2010, both arrivals and expenditure have fallen sharply. Although arrivals and expenditure depend on each other, the majority of studies have not simultaneously analysed the relationship between arrivals and expenditure. Thus, a better understanding and analysis of the mutual relationship between demand and supply could help to determine which aspects of the changes in tourism expenditure are due to changes in arrivals and which are due to changes in prices.

Figure 2. Tourism arrivals and expenditure



Source:Eurostat and World Tourism Organisation

Thus, this paper provides a detailed analysis of the issue of arrivals and expenditure at a microeconomic level, thereby providing an approach to macro variables. This paper focuses on the factors that underlay household tourism expenditure cutback decisions and how these decisions were implemented during the global economic crisis in the European Union in 2009. Thus, cutbacks in tourism expenditure were divided into two mutually related decisions: whether or not the tourists had decided to cut back and, if so, what cutback strategy they had used. Regarding the former, household expenditure could be the natural variable to use (for example, see Melenberg & Van Soest, 1996). However, tourism household expenditure could have varied for several reasons, some of which may have been unrelated to the economic crisis. To avoid this potential bias, a binary response variable was used as an endogenous variable: firstly, individuals were asked if they had decided to cut back on tourism expenditure because of the crisis; and secondly, if they had cut back, they were asked to provide information on which of six options they had employed as their cutback strategy: "fewer holidays", "reduced length of stay", "cheaper means of transport", "cheaper accommodation", "travel closer to home" or "change the period of travel". Table 6 shows how these alternatives could have affected arrivals and tourism expenditure. For instance, the decision to cut back by taking "fewer holidays" may affect both arrivals and expenditure, but "cheaper transport" or "cheaper accommodation" may only affect expenditure.

Few studies have investigated how tourists redistribute their tourism expenditure during an economic crisis. For instance, Eugenio-Martin and Campos-Soria (2014) analyzed cutback tourism decisions but not the way these decisions were distributed. Alegre, Mateo and Pou (2013) divided tourism decisions into two aspects — tourism participation and tourism expenditure — but did not distinguish between different kinds of tourism expenditures. From a macroeconomic perspective, Frechtling (1982) analyzed vacation travel by trips and travel characteristics during the crisis in the USA in the 1980s. Variables such as "duration", "round trip distance" or "logging nights" were analyzed. As far as we know, the study by Bronner and Hoog (2012) is the only one to address cutback tourism decisions from a microeconomic perspective according to the geographical range of the crisis and its depth. They characterized thirteen different expected responses such as "giving up vacation", "booking cheaper accommodation" or "taking another means of transport". As Sheldon and Dwyer (2010, p. 4) stated: "…Our lack of knowledge about possible consumer responses to the crisis places great impediments in the way of forecasting its effects on the industry. Thus, consumers may spend less, and travel less, but to what extent they shift to other products, reduce debt, or save more is not known. Typically estimates of income elasticities of tourism demand are based on long-term upward trended data and are not applicable to longer and very deep recessions. The degree to which tourists switch to closer destinations, domestic destinations, shorter lengths of stay, or "trade down" (e.g., lower-cost carriers, lower-standard hotels, business class to economy) are also an important research areas."

In order to solve this issue, this paper disentangles the arrivals and expenditure discussion in more explicit arguments at microeconomic level. It is a way to approach macro variables such as arrivals and expenditure by micro-founded analysis.

Table 6. Relationships between the kind of cutback with the arrivals and expenditure

Economising strategies	Arrivals	Expenditure
Fewer holidays	X	X
Reduced length		X
Cheaper transport		X
Cheaper accommodation		X
Closer to home	X	X
Period of travel		X

The econometric model used to address the simultaneous decisions "cut back" and "how-to-cut-back" is an adaptation of the Heckman model (Heckman, 1976, 1979) within a generalized structural equations modelling approach. This methodology controls for sample selection bias and correlations between equations at the micro level. As Prideaux (1999) stated, micro-approaches control for socioeconomic characteristics and macroeconomic indicators, thereby significantly improving the results. Additionally, the attributes of the place of origin can be incorporated in the analysis since they play a key role in understanding tourism cutback decisions. In this sense, Eugenio-Martin and Campos-Soria (2014) identified "push" factors, such as climate, region on the coast, and size of the community, on the outbound tourism demand associated with the attractiveness of the place of residence. For this purpose, the econometric model was constructed using a survey conducted by the European Union in September 2009 at regional level (NUTS 2 regions of EU-27). It included macrodata concerning the region of origin, which included attributes regarding the place of residence, and economic indicators, such as changes in GDP.

2.2 State of the art

The effects of tourism on economic and employment growth in destinations have been well documented in the literature. The tourism industry is highly sensitive to economic cycles because, on average, outbound, inbound and domestic tourism flows may be affected more than the consumption of other goods and services. Thus, during an economic crisis, the consumption of luxury goods and services, such as tourism, are expected to significantly decrease, which affects arrivals and tourism receipts in destinations (Lanza, Temple, & Urga, 2003; Smeral, 2003; Eugenio-Martin & Campos-Soria, 2011). Destinations need to anticipate such downward shifts in demand by reducing prices or identifying *add value* demand strategies in an attempt to maintain or improve their market share (Sheldon & Dwyer, 2010), or by devaluing their currencies in relation to the main countries of origin (Prideux, 1999). To date, most of these decisions by policy makers have been based on macroeconomic indicators to evaluate the impact of economic crisis on destinations. Macroeconomic variables, such as arrivals, receipts or expenditure, are readily available over time and so are more likely to be used in applied studies. Figures related to these variables can be used for forecasting and for making homogeneous comparisons between destinations. However, as pointed out by different researchers, microeconomic approaches are also required to effectively manage crisis (Bronner & de Hoog, 2012; or Smeral, 2009). Ideally, policymakers should combine macro and micro indicators. In fact, they need linkages between changes in GDP and arrivals or receipts in order to manage the crisis, while taking into account consumer responses to the crisis (Eugenio-Martin & Campos-Soria, 2014).

2.1. Macroeconomic indicators

In recent decades, tourism demand analysis has addressed the issue of the impact of different kinds of crises, such as economic crisis (Smeral, 2010; Hall, 2010; Page, Song & Wu, 2012), terrorist attacks (Blake & Sinclair, 2003; Araña & León, 2008), or natural disasters, such as epidemics or earthquakes (Eugenio-Martin, Sinclair & Yeoman, 2005; Carlsen & Hughes, 2008; or Mao, Ding & Lee, 2010). However, one of the driving forces of tourism demand is the economy. A review of the literature on tourism and crisis suggests that economic and financial crises receive the most attention, although these crises are often linked to other crises such as terrorism (Wang, 2009; Hall, 2010). The first main economic crisis studied in the tourism literature was the Asian financial crisis of mid-1997. The crisis was analyzed by Henderson (1999), Prideaux (1999) and Law (2001). Okumus, Altinay and Arasli (2005) investigated the impact of the February 2001 economic crisis in Turkey on the tourism sector in Northern Cyprus, while O´Brien (2012) analyzed the tourism policies implemented to address the Irish crisis of 2008, during which the Irish tourism industry collapsed dramatically. Thereafter, the global economy crisis triggered in the United States in 2007 was the most widely studied crisis due to its profound negative impact on the world economy in general and on tourism activity in particular (Song & Lin, 2010; Brent-Ritchie, Amaya-Molinar & Frechtling, 2010; Page, Son & Chenguang-Wu, 2012).

Different studies have stressed the importance of advance planning and coordination between public and private agents in a context of minimizing the effects of the crisis. However, estimations and predictions that focus on macro indicators only partially help policy makers to evaluate the impact of the tourism crisis. There are to main reasons for this. On the one hand, changes in arrivals do not necessarily mean that tourism receipts also decrease by the same proportion; in fact they can increase. For instance, Bronner and Hoog (2012) stated that the number of holidays increased and expenditure decreased in the Netherlands in 2009. These kinds of studies do not take into account the fact that downward demand shifts could also be an effect of reducing prices or devaluing the exchanges rates between origin and destination countries. Thus, arrivals and receipts need to be simultaneously analysed, otherwise the impact of the economic crisis on tourism leads to biased results. On the other hand, as stated by Sheldon and Dwyer (2010), investment and marketing strategies, the development of new products, and action plans for maintaining business viability are not well understood. A wider microeconomic perspective is needed to obtain insight into tourist behaviour during crises in order to further explore these issues.

2.2. Microeconomic indicators

Sheldon and Dwyer (2010) stated that the final impact of an economic crisis cannot be approached from a macroeconomic point of view alone, since the crisis may affect the firms' strategies and the tourists' behaviour. Thus, a microeconomic approach based on individuals or households is required. This approach often deals with participation decisions, expenditure, or any other experimental observation of tourist behaviour as endogenous variables. However, few studies have investigated how tourists redistribute their tourism expenditure during an economic crisis. Bronner and Hoog (2012) proposed a general framework to investigate the consequences of the global economic crisis on individual tourist behaviour and on tourists' economizing strategies. They addressed the kind of cutback decision by taking into account the geographical range of the crisis and its depth, and characterized different expected responses. They included thirteen different cutback decisions (*cheese-slicing strategies*) such as "expending fewer days on vacations", "booking cheaper accommodation" or "taking another means of transport". Some of these strategies may affect travel expenditure, whereas others may affect expenditure at the destination. Fleischer, Peleg and Rivlin (2011) suggested that most studies on vacation expenditure do not distinguish between these expenditures. To the best of our knowledge, few studies have analyzed cutback decision strategies. Alegre et al. (2013) studied the consequences of the economic crisis on Spanish households and particularly focussed on the role of employment. Thus, they differentiated between two mutually related decisions: tourism participation and tourism expenditure. Finally, Eugenio-Martin and Campos-Soria (2014) studied how European tourists reacted during the economic crisis by modelling the tourism expenditure cutback decision. This study reinforces the idea that households that cut back on tourism expenditure in 2009 were more likely to spend their holidays closer to home. However, neither of these studies explicitly investigated how these tourists cut back their budget.

Tourists may react by shorting the length of stay, travelling by lower-cost carriers, or staying in cheaper accommodation establishments. Papatheodorou, Rossello and Xiao (2010) stated that travelling closer to home is one of the most important strategies to reduce expenditure, while Harris Interactive (2009) suggested that a shorter length of stay during summer is an important cutback decision. Some studies have investigated these issues in economic crisis scenarios, as we have already shown, but most of them have not done so. For instance, following the ETC (2009) report, in economically difficult times tourists tend to minimize product prices and quality, prefer destinations closer to home than long-distance destinations, scale back their expenditure per night, and economize on the duration of their stay. Olive Research (2009) reported that 64% of visitors from the United States, Spain, Ireland, and France were likely to cut back on holidays by changes in duration and spending. However, these are descriptive approaches that did not deeply analyze how tourists cut back tourism expenditure. This is the main focus of this paper.

2.3 Methodology

2.3.1. Econometric modeling

Modelling tourism expenditure and how households adjust their tourism expenditure during economic crisis is problematic. Firstly, cutback decisions do not depend on income variations alone, but also depend on other individual characteristics. Since household tourism expenditure may vary due to circumstances not related to the economic crisis, biased results may be obtained. This paper avoids this potential bias since the decision to make a cutback was directly affirmed by the interviewee. Secondly, the "how-to-cut-back" decision was observed only when the individuals had cut back their tourism expenditure. Thus, there was a sample selection bias: tourists who decided not to cut back were not included in the next stage ("how-to-cut-back"). Finally, the "cut back" and "how-to-cut-back" decisions form a simultaneous decision, because the decision to cut back affects the decision of "how-to-cut-back". Based on an econometric point of view, both decisions are modelled using a two-step approach. Simultaneity is captured by assuming correlation between the error terms of both equations.

The econometric model used to address this two-step decision is an adaptation of the Heckman model (Heckman, 1976, 1979). The endogenous variable in the first step cb_i is a binary response variable that takes value 1 if the tourist decides to cut back and zero otherwise, where i denotes individuals. The endogenous variable of the second step is a multinomial response variable. "How-to-cut-back" is a discrete variable denoted by hcb_{ij}, which takes values between one and six according to different alternatives: "fewer holidays", "reduced length of stay", "cheaper means of transport", "cheaper accommodation", "travel closer to home" or "change the period of travel", where j denotes these alternatives.

This model is based on random utility models: Let cb_i^* be the latent variable of cutback decision and hcb_i^* the latent variable of "how-to-cut-back", which depend on exogenous variables z_i and x_{ij}, respectively. In structural equations format, the Heckman model is conducted using a latent variable l_i that represents correlation between both equations (Skrondal & Rabe-Hesketh, 2004). The adapted Heckman model in structural equations format is shown below:

The model specification for the cutback decision is expressed according to the following equations:

$$cb_i^* = z_i\gamma + l_i + \xi_i \qquad \xi_i \sim N(0,1) \tag{9}$$

$$cb_i = \begin{cases} 1 & if \quad cb_i^* > 0 \\ 0 & if \quad cb_i^* \le 0 \end{cases} \tag{10}$$

where γ denotes a vector of unknown parameters, and ξ_i represents the error term.

Taking into account equations (9) and (10) we have:

$$P(cb_i = 1) = P(z_i\gamma + l_i + \xi_i \; > 0) = P(-\xi_i \; > z_i\gamma + l_i) = F(z_i\gamma + l_i) \tag{11}$$

Equation (11) is a logit distribution function that obtains the probability of cutting back in tourism expenditure.

The model specification for the "how-to-cut-back" decision expresses the utility provided by each alternative *j*, as shown in the following equation:

$$hcb_{ij}^* = x_{ij}\beta_j + l_i\eta_j + e_{ij} \qquad e_{ij} \sim iid(0,\sigma^2) \tag{12}$$

where β_j and η_j denote vectors of unknown parameters, and e_{ij} represents the error term. Thus, the probability of the "how-to-cut-back" decision is obtained in equation (12), for each alternative *j*.

$$P(hcb_{ij} = j) = P_{ij} = \frac{\exp\left(x_{ij}\beta_j + l_i\eta_j\right)}{\sum_{j=1}^{6}\exp\left(x_{ij}\beta_j + l_i\eta_j\right)} \qquad j = 1,.......,6 \tag{13}$$

Equations (11) and (13) are the adapted version of the Heckman model in structural equations. Equation (11) is a probit model and equation (13) is a multinomial logit model, so both are estimated simultaneously. In order to make the identification process of the structural equation model easier, the variance of the latent variable is set equal to one.

3.2. Model specification

The exogenous variables z_i considered in the specification of the cutback equation (equation (11)) can be divided into socioeconomic variables and regional variables. The set of socioeconomic variables are gender (male = 1), education, employment, age, and age squared; the latter variable captures the non-linear effect of age on the cutback decision. These variables are used as a proxy for personal income. Education is a continuous variable that takes the value of the age at which the individual stopped full-time education. Employment can be any of the following: Farmer, forester or fisherman; shop owner or craftsman; professional, such as a lawyer, medical practitioner, accountant, or architect; manager of a company; professional, such as an employed doctor, lawyer, accountant, or architect; general manager, director or top management; middle management; civil servant; office clerk; employees, such as salesman or nurse; supervisor (foreman) or team manager; manual worker; unskilled manual worker; homemaker; student (full time); retired; unemployed; and sets of other occupations within different professional categories.

The set of regional variables were taken into account because tourism preferences are affected by the place of residence of the household. As pointed out by Hung, Shang and Wang (2013), households that belong to the same region have a similar tourism expenditure pattern. Therefore, if tourism expenditure estimations ignore factors related to the geographical location of the tourists, biased results are likely. In particular, climate, per capita GDP in Purchansing Power Standards (PPS), and GDP growth have been included. Climate in the region of origin is one of the most important "push" factors in the outbound tourism demand (Agnew & Palutikof, 2006) and explains asymmetries in the willingness to travel between regions (Madison, 2001). Eugenio-Martín and Campos-Soria (2014) showed that households located in regions with a "good climate" are more likely to cut back on their tourism expenditure than those located in regions with a poorer climate. The definition of climate is based on the double-hurdle climate index introduced by Eugenio-Martin and Campos-Soria (2010). The double-hurdle climate index ranges from 0 to 12 depending on the number of months that pass each hurdle. The climatic variables considered were temperature, rainfall, and days with rainfall. The thresholds that determine each hurdle are based on Mieczkowski´s (1985) tourism climatic comfort conditions. On the other hand, per capita GDP in PPS is taken into account as a proxy for personal income as well as the socioeconomic variables. Finally, GDP growth captures expectations regarding personal income variations. Consumption theories predict that changes in demand may be due not only to changes in current income but also to expectations regarding future income. Hong-bumm, Jung-Ho, Seul and SooCheong (2012) analyzed this effect on international tourism demand.

Similarly, the exogenous variables x_{ij} considered in the "how-to-cut-back" equation are socioeconomic and regional variables. Tourist preferences and how households take decisions on tourism expenditure cutbacks depend on age and gender. These variables are defined in the same way as in the cutback model specification. At the regional level, climate, length of the coast, and the presence of airports are considered relevant in household cutback strategies. The variable coast represents an index of how relevant the length of the coast is compared to the size of the region, and airport is a dummy variable that takes unitary value if the region has at least one airport.

2.4 Case study

This study used a survey conducted at the household level and macrodata concerning the region of origin. Microdata were obtained from the "Attitudes of Europeans Towards

Tourism" survey conducted in 2009 in EU-27 regions and was part of *Flash Eurobarometer* 281 (European Commission, 2010). It contains information on the socioeconomic characteristics of 23,606 households and information on their decisions on outbound tourism demand, such as destination choice and cutback decisions. The macrodata considered in this study was collected for 165 regions of EU-27 countries. Eurostat was the data source for GDP in PPS and GDP growth and the data on climate index were obtained from the World Meteorological Organization. Average per capita GDP in PPS was 22,942.44$ in 2009 for the whole sample, reaching a maximum value of 62,500$ for Luxembourg and a minimum value of 6,400$ in Severozapaden (Bulgaria). It should be pointed out that 95.7% of the regions had negative GDP growth in 2009. Groningen (The Netherlands) reached the lowest growth rate at -17.01%, while Północny (Poland) was one of the few regions that had a positive value of 1.64%.

2.5 Results

2.5.1. Economising strategies by country

The results of the descriptive analysis of the dataset are striking. They show that 46.32% of the interviewees had to cut back on tourism expenditure in 2009. Of these, 26.76% opted for "reduced length of stay", whereas 21.84% chose "cheaper accommodation", 18.87% opted for "closer to home", 16.15% chose "fewer holidays", 8.89% opted for "period of travel" and 7.48% chose "cheaper transport".

The literature has shown regional differences in the probability of cutbacks. Eugenio-Martin and Campos-Soria (2014) showed that there were marked differences between North-European and Mediterranean regions due to differences in climate and GDP. An analysis of the relative frequencies of the economizing strategies by country (Table 7) shows that most of the countries did not conform to the ranking in relative frequencies described in the previous paragraph. Countries such as Austria, France, Greece, Malta, Romania, and Slovenia conformed to the ranking in relative frequency at the aggregated level, but this was not the case for the remaining countries. Thus, there was regional heterogeneity in the pattern of cutbacks. In any case, "reduced length of stay" and "cheaper accommodation" were the most frequently chosen economizing strategies, independently of the cited ranking and the country considered.

Table 7. Tourists' economising strategies during an economic crisis by country (EU-27)

Country	P(reduced length of stay)	P(cheaper accommodation)	P(closer to home)	P(fewer holidays)	P(period of travel)	P(cheaper transport)
Austria	31.84	22.9	17.31	14.52	11.17	2.23
Belgium	24.65	19.17	13.69	16.43	15.06	10.95
Bulgaria	36.52	24.65	10.04	13.24	7.76	7.76
Cyprus	22.07	19.48	22.72	21.42	5.84	8.44
Czech Republic	22.4	29.46	21.57	14.1	4.14	8.29
Denmark	21.95	23.57	15.44	17.07	8.94	13.01
Estonia	21.55	19.16	20.95	17.36	6.58	14.37
Finland	31.03	14.77	19.21	19.21	8.37	7.38
France	37.78	23.28	12.97	12.21	7.63	6.1
Germany	31.4	18.59	16.94	11.57	14.46	7.02
Greece	35.36	21.73	15.94	15.36	6.08	5.5
Hungary	20.76	25.23	13.41	24.28	8.94	7.34
Italy	33.33	21.28	12.85	14.05	14.45	4.01
Ireland	22.6	20.65	26.73	13.69	10	6.3
Latvia	19.1	24.2	16.56	18.47	3.82	17.83
Lithuania	30.92	18.55	25.25	16.49	5.15	3.6
Luxembourg	19.38	22.44	23.46	14.28	10.2	10.2
Malta	25	23.61	22.22	11.11	6.94	11.11
Poland	27.72	18.18	20	11.36	11.36	11.36
Portugal	20.57	22.01	24.4	18.18	11.48	3.34
Romania	26.05	22.4	18.48	15.4	9.52	8.12
Spain	29.77	26.86	13.26	19.41	6.14	4.53
Slovakia	20.13	24.3	23.61	15.27	8.33	8.33
Slovenia	35.38	25.38	15.38	13.84	7.69	2.3
Sweden	33.33	13.19	18.75	19.44	5.55	9.72
The Netherlands	13.63	18.18	27.84	21.02	10.79	8.52
UK	18.93	21.92	23.58	16.94	10.63	7.97

2.5.2. Estimation

The results of the estimation of the two-step econometric model proposed in section 2.3 are shown in Table 8. These estimates take into account the simultaneity and sample selection issues. Table 8 depicts odd-ratios for both decisions. A parameter higher than one means that the variable has a positive effect on the probability in relation to the base category, whereas parameters lower than one indicates a negative effect. It should be noted that in any choice model estimated with a random utility framework, the omitted alternative should be taken into account in the analysis of results. Thus, every parameter needs to be interpreted in relation to such base category. Regarding the "cutback" equation, the base category is not to cut back, whereas in the "how-to-cut-back" equation, the omitted alternative is "fewer holidays".

In the cutback equation, per capita GDP in PPS and GDP growth are key determinants. GDP has a negative effect on the cutback decision. A 1-dollar increase in the GDP decreases the probability of cutback by 0.1% (0.999-1). In order to provide more precise estimates of income effects on tourism expenditure, changes in GDP are required. Positive GDP growth has a negative impact on the cutback decision. A 1-percentage point increase in GDP growth decreases the probability of cutback by 3.7% (0.963-1). Similar to previous findings such as those reported by Eugenio-Martin and Campos-Soria (2014), households consequently react by cutting back their expenditure when they have negative future expectations regarding GDP. Occupation is a highly relevant determinant of the probability of cutback and plays the expected role. Occupations such as *General manager* involve a decrease in the probability of cutback by 51.6% (0.484-1). *Homemaker* also decreases the probability of cutting back by 19.1% (0.809-1), but such reduction is the lowest of the employment variables. Young individuals are more likely to cut back than older ones, although this variable has a non-linear effect on tourism expenditure, as suggested by Alegre and Pou (2004). Education also has a negative impact. One more year of education decreases the probability of cutting back by 1.4% (0.986-1). Some noteworthy results are provided by the regional variables. In particular, regions with a good climate are more likely to cut back than those with a poor climate. On average, when the *climate index* increases by one point, the probability of cutback increases by 7.96%. This result corroborate the idea that climate in the region of origin is one of the most important "push" factors in outbound tourism demand (Agnew & Palutikof, 2006; Eugenio-Martin & Campos-Soria, 2014).

Table 8. The determinants of the cutback decision and economising strategies (odd-ratios)

Variable	Cutback	How do you cutback?				
		Reduced length of stay	Cheaper transport	Cheaper accommodation	Closer to home	Period of travel
GDP pc (PPS)	0.999***					
Growth	0.963***					
Socieconomic variables						
Employment variables:						
Farmer, Forester. Fisherman	0.491***					
Owner of a shop	0.660***					
Professional self employee	0.614***					
Manager	0.525***					
Other self employed	0.666***					
Professional employee	0.598***					
General manager	0.484***					
Middle manager	0.542***					
Civil servant	0.544***					
Office clerk	0.666***					
Salesman. nurse	0.636***					
Other employee	0.551***					
Supervisor	0.915					
Manual worker	0.950					
Unskilled manual worker	1.002					
Other manual worker	0.512***					
Looking after home	0.809**					
Student	0.622***					
Retired	0.658***					
Other not working	0.710**					
Age	1.039***	1.003	0.986***	0.987***	0.997	0.992**
Age squared	0.999***					
Gender (male = 1)	0.871***	1.214**	1.016	1.088	1.204*	0.872
Education	0.986***					
Regional variables						
Climate	1.079***	1.024**	0.951***	1.031**	0.965*	0.964**
Coast		1.049	0.908	0.975	1.091	0.767**
Airport		0.898	0.940	1.003	1.133	0.840
Latent variable:						
L	1(constrained)	1.440	1.142	2.753***	1.449	1.349
Log likelihood	-18633.156					
Number of observations	13851					

***Level of significance 1%. **Level of significance 5%. *Level of significance 10%.
Notes: Base outcome in multinomial logit is: "Fewer holidays". Omitted occupation dummy variable is: "Seeking a job".

In the "how-to-cut-back" equation, age negatively affects "cheaper transport", "cheaper accommodation", and "period of travel". In the latter case, an increase in age decreases the probability of travelling in the non-high season by 0.8%. In other words, younger people are more willing than older individuals to travel in the non-high season, use cheaper transport, and book lodging deals. Nevertheless, age does not have a significant influence on "reduced length of stay" and "closer to home". Gender has a positive effect on "reduced length" and "closer to home[1]", but does not have a significant influence on the other alternatives. Men are 20.4% more likely to cut back on tourism by using the "closer to home" strategy than women. The literature shows that women are keener than men to participate in domestic and international travel (Mergoupis & Steuer, 2003). On the other hand, it should be noted that as soon as climate improves in the place of residence, the probability of choosing "reduced length of stay" and "cheaper accommodation" increases. For instance, if there is a unit increase in the *climate index*, individuals are 2.4% (1.024-1) more likely to reduce the length of stay than to take fewer holidays. This is because households in regions with better climatic conditions have a higher probability of travelling within the region (Martin & Campos-Soria, 2010), which makes it easier for them to reduce the number of days spent on tourism. There is a 3.1% (1.031-1) increased probability of choosing "cheaper accommodation". In summary, individuals who live in regions with a good climate prefer to reduce the length of stay or book cheaper accommodation rather than opting for fewer holidays. The probability of employing the remaining cutback alternatives decreases when climatic conditions in the country of origin improve. For instance, when the climate improves, individuals are 3.6% less likely to cut back on non-high season travel. The presence of a coast in the place of residence only has an influence on decisions regarding the "period of travel", whereas there are no significant

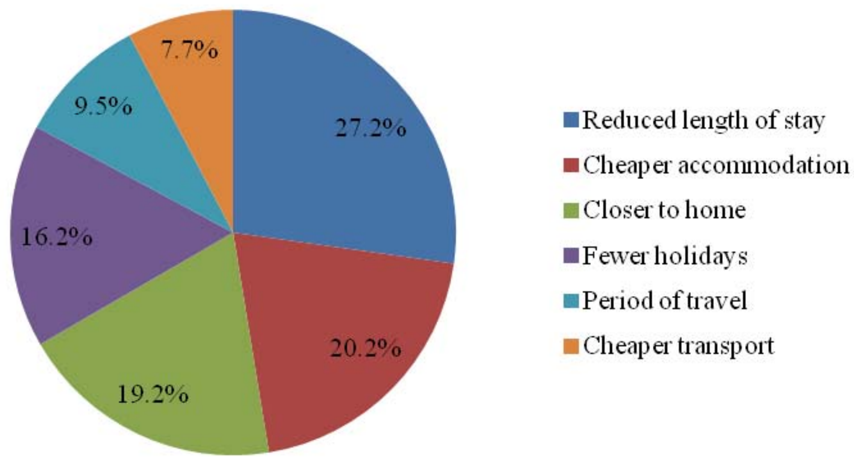
[1] Closer to home does not necessarily mean domestic travel. In fact, 33% of people who traveled closer to home went abroad.

differences between the other alternatives. The presence of a coast makes it 23.3% (1-0.767) more likely to cut back on the period of travel.

2.5.3. Post-estimation analysis

Post-estimation analysis was conducted employing the probabilities of the "how-to-cut-back" decision on tourism expenditure. An analysis of the probabilities of the economizing strategies shown in Figure 3 suggests that the most likely cutback decision is "reduced length of stay" (27.2%) followed by "cheaper accommodation" (20.2%), "closer to home" (19.2%), "fewer holidays" (16.2%), "period of travel" (9.5%), and "cheaper transport" (7.7%). These estimated probabilities are in line with the relative frequencies shown in section 2.5.1. According to Papatheodorou et al. (2010) travelling closer to home is one of the most important cutback decisions (the third most important in our case). Moreover, this ranking in cutback decisions is in line with Bronner and Hoog (2012), albeit with some exceptions. According to these authors, cheese-slicing strategies (economizing on aspects of the holiday), such as "reduced length of stay", "cheaper accommodation" or "closer to home" in our case, are preferred to pruning strategies (fewer holidays). Thus, our results are in line with their results and also corroborate Sheldon and Dwyer´s (2010) idea that, on average and in a context of economic crisis, tourists prefer to economize on holiday expenditure rather than take fewer holidays.

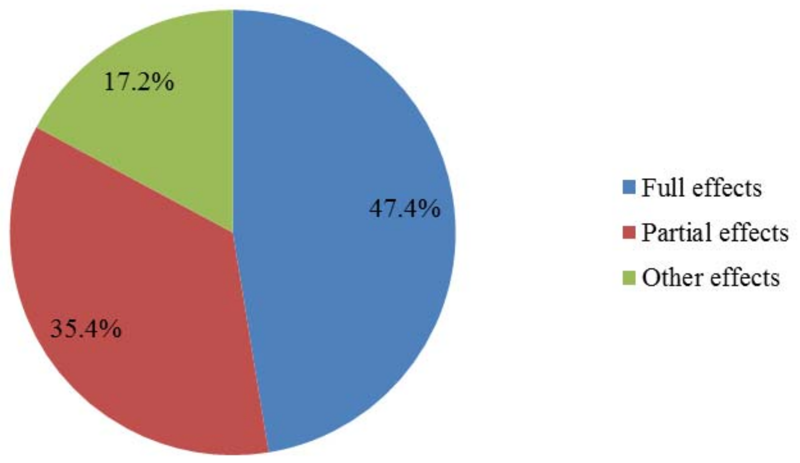
Figure 3. Probabilities of the economising strategies



Destinations should take into account different tourist profiles regarding their cutting back patterns, since some alternatives may affect expenditure during the journey (for instance, "cheaper transport"), while other alternatives explicitly affect destination expenditures ("reduced length of stay" or "cheaper accommodation"). In this sense, Fleischer, Peleg and Rivlin (2011) suggest that expenditure on travel should be differentiated from expenditure at the destination. Regarding tourism expenditure at the destination, economizing strategies have varying impacts. For example, some have a direct impact, such as "reduced length of stay" or "cheaper accommodation". In these cases, the destination fully absorbs the impact of the crisis. Thus, these effects are categorized as "full effects" of the crisis. However, other cutback alternatives, such as "fewer holidays" and "closer to home", may or may not affect expenditure at a particular destination, but in aggregate terms it does affect them to different degrees. Thus, these effects are categorized as "partial effects" of the crisis. For instance, a Portuguese tourist may have travelled to three different international destinations (Spain, Russia, and Australia) before the economic crisis. Nevertheless, due to the crisis, he may decide to substitute one of the destinations for a closer one, eg, choosing to visit France instead of Australia. Finally, "cheaper transport" and "period of travel" have a fuzzy effect on destinations and are considered as "other effects".

As shown in Figure 4, the full effects reach the highest probability (47.4%), followed by partial effects (35.4%) and then by other effects (17.2%). This information could be used by policymakers and tourism firms to minimize the effects of the economic crisis on destinations, since tourists are more willing to cutback by using economizing strategies at the destination (full effects). Destinations can anticipate downward demand by suitably adapting their strategies. For instance, suppliers of tourism services need to know if the reduction in tourism expenditure is going manifest as fewer holidays, fewer days of vacation, or as lower quality services, such as tourists booking lodging deals. Gokovali, Bahar and Kozak (2007) stated that lower tourism expenditure does not necessarily mean fewer vacation days, since service quality may also change, and thereby affecting tourism expenditure. Thus, destinations should sometimes reduce prices, but not always. They need to identify added-value demand strategies, such as offering more flexible packages.

Figure 4. Final effects on the destination



Additionally, a post-estimation analysis shows how the estimated probabilities change according to some key determinants, such as climate index and age of the head of the household. Figure 5 shows the moving median of these probabilities in relation to the climate index. According to this figure, there is a clear effect on the probability of cutback alternatives by climate. Firstly, the probabilities of "reduced length of stay" and "cheaper accommodation" are the highest of the six alternatives and steadily increase in line with increases in the *climate index*. Secondly, "period of travel" and "cheaper transport" show the lowest probabilities and steadily decrease in line with increases in the *climate index*. Finally, "closer to home" and "reduced number of trips" remain almost constant. However, if we analyze the rate of change of the probabilities of the alternatives by climate in the country of origin, the changes are significant. On the one hand, households located in regions with the best climatic conditions for tourism (*climate index* = 12) show a 32% higher probability of cutting back using "reduced length" than households located in regions with the worst climate (*climate index* = 0). In the case of "cheaper accommodation", the change is less marked. Households with the best *climate index* are 1.05% more likely to cut back using this option than those with the worst *climate index*. On the other hand, tourists with the highest climate index are 2% less likely to cut back using the option "period of travel" than tourists with the lowest one. These results indicate that differences in the place of origin have a strong effect on these probabilities.

Additionally, post-estimation analysis let analyse how the estimated probabilities change with some key determinants, such as climate index and age of the head of the household. Figure 5 plots the moving median of these probabilities in relation to climate index. According to such figure, there is a clear effect on the probability of cutback alternatives by climate. Firstly, the probabilities of “reduced length” and “cheaper accommodation” are the highest of the six alternatives and grow smoothly with the *climate index*. Secondly, “period of travel” and “cheaper transport” show the lowest probabilities and decrease steadily with the *climate index*. Finally, “closer to home” and “reduced number of trips” remain almost constant. However, if we analyse the rate of change of the probabilities of the alternatives by climate in origin, the changes are pretty significant. On the one hand, households located in regions with the best climate conditions for tourism (*climate index* = 12) show a 32% higher probability to cut back with "reduced length" than those households located in regions with the worst climate (*climate index* = 0). In the case of “cheaper accommodation”, the change is not so sharp. It is 1.05% more likely to cut back with this cutback option for those households with the best *climate index* rather than those with the worst *climate index*. On the other hand, it is 2% less likely to cut back changing “the period of time” for those tourists with the highest climate index than tourists with the lowest one. These results indicate that differences in the place of origin play an important role on those probabilities.

Figure 5. Moving median probability of economising strategies by climate

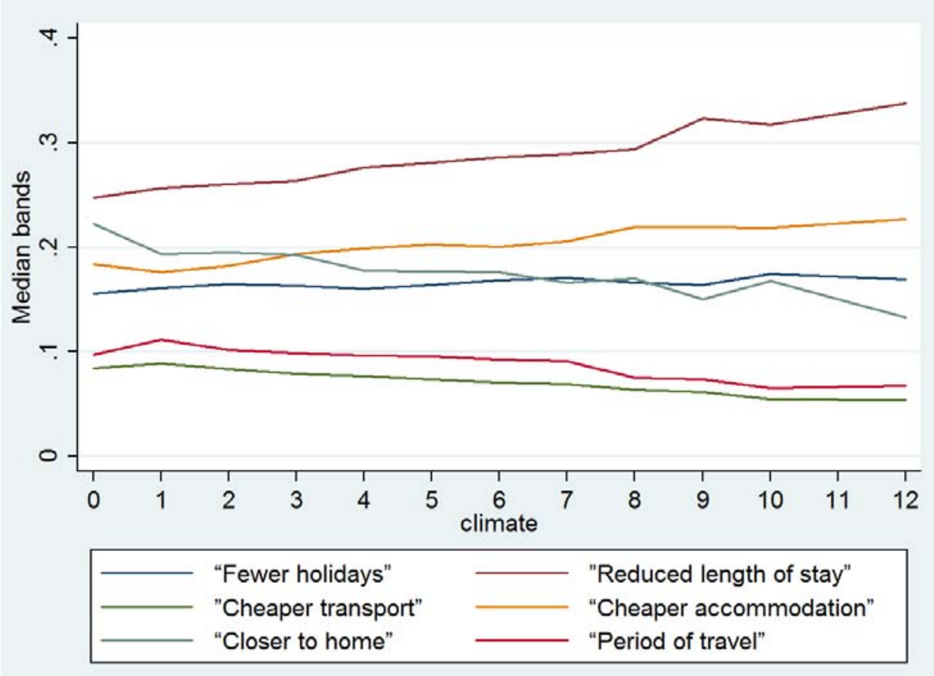
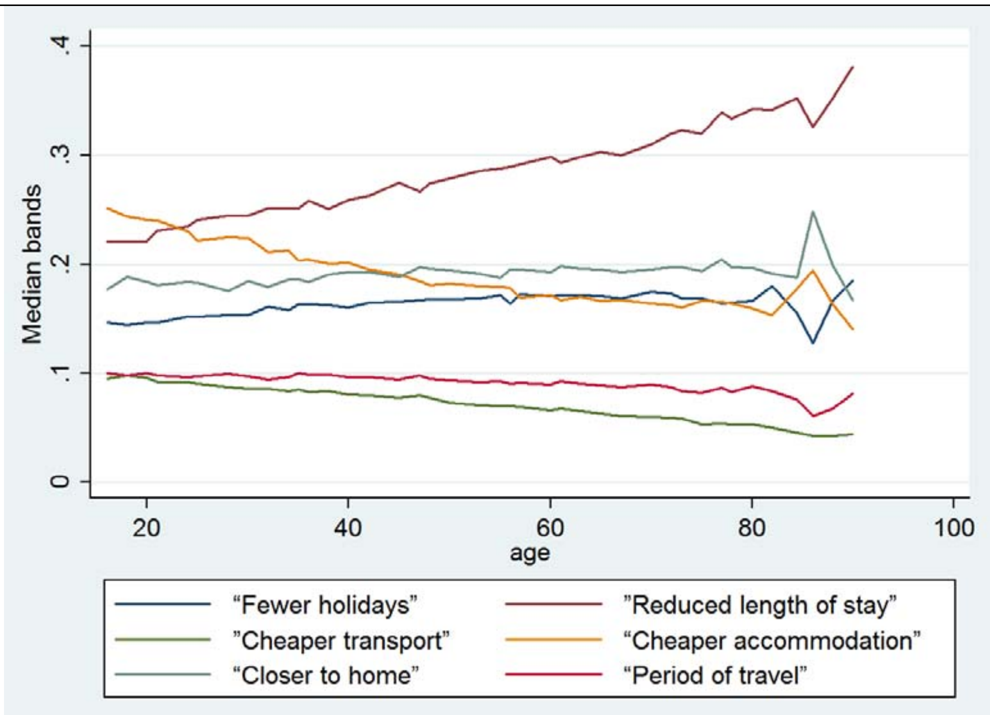


Figure 6. Moving median probability of economising strategies by age



The age of the head of the family offers some new insights. Figure 6 is constructed according to the median probabilities of each alternative of cutback by age moving bands. An analysis of the rate of change of probabilities by age shows that individuals 65 years old have a 34.78% higher probability of choosing "reduced length" than individuals 20 years old. Regards "cheaper accommodation", individuals 65 years old have a 33.33% lower probability of choosing this option than people 20 years old.

2.6 Conclusions and further research

The paper investigated the economizing strategies followed by European tourists during the global economic crisis in 2009. To date, most of the literature has addressed this issue from a macroeconomic perspective. Thus, given a GDP shock, this kind of analysis indicates the sensitivity of outbound or inbound tourism demand. However, some tourist profiles within a population undergo different affects. Some tourist profiles may be more or less sensitive to the GDP shock. This information is relevant to tourism and hospitality management strategies, because agents can anticipate this kind of behaviour within a population and define a suitable set of marketing strategies to deal with the shock. Public policymakers are also interested in absorbing impacts such that any negative effects on employment and tourism added value are minimized. For this reason, this paper combines micro and macro perspectives. This enriches the analysis, although it also increases its complexity.

The analysis employed an econometric model, but its specification is not straightforward. The main purpose of the study was to understand the choice of the economizing strategy or strategies used by the tourists. However, the model should take into account a simultaneous decision taken by all the tourists, i.e. a cutback decision as well as a "how-to-cut-back" decision. This kind of decomposition is needed to isolate the determinants of each simultaneous decision. Otherwise, the results of the latter will be biased. To address this issue, an adapted model of the 2-stage Heckman model was applied within a generalized structural equations modelling approach.

The results have implications for tourism and hospitality management. Firstly, age matters. In particular, older tourists are more likely to reduce their length of stay under a GDP shock. Second, climate in the country of origin also matters. Tourists who live in regions with a good climate are more likely (32%) to reduce their length of stay than tourists who live in regions with a poorer climate. Third, the preferred economizing strategies for most regions are clearly to reduce the length of stay followed by booking cheaper accommodation. The average probabilities of using these strategies are 27% and 20%, respectively. However, there is heterogeneity among regions. This information could be employed to build flexible packages that could suit the needs of different tourist profiles during periods of economic crises. This kind of flexibility should be based on a combination of micro and macroeconomic variables, i.e. age, gender, climate in the regions of origin, severity of the crisis (GDP shock), and expectations regarding GDP growth.

Destination managers should understand which economizing strategies involve full effects, partial effects, or any effect on the destination. On the one hand, economizing strategies that have full effects on the destination are "reduced length of stay" and "cheaper accommodation". On the other hand, "fewer holidays" and "closer to home" may or may not directly affect the destination (partial effects). Finally, "cheaper transport" and "period of travel" are fuzzier than the partial effects regarding their impact on the destination (other effects). According to the results, there is a 47.4% probability of cutting back by using economizing strategies which directly affect destinations (full effects), whereas the probabilities are 35.4% and 17.2% for partial effects and other effects, respectively.

Ideally, hospitality sector and tourism destination policymakers should coordinate their marketing campaigns. They should take into account the different sensitivities of tourist profiles during GDP shocks and create flexible packages that could minimize the impact of crisis. Further research on other issues is needed. The results presented in this paper could be improved by using methodologies that can address the issue of the severity of cutbacks.

Tourism: economic growth, employment and *Dutch Disease*.

3.1 Introduction

Since 2008, Spain is under a strong economic recession (0.92% reduction in the real GDP from 2008 to 2012 and unemployment rate of 24.3% in 2012). The main causes and effects of the actual downturn situation are: high private debt (fed it after years of low interest rates that spurred a real estate bubble), high unemployment rate, lower wages, low private consumption, credit shrinkage (banking crisis) and higher interest rate for public bond emissions.

Beyond this brief diagnosis, the Spanish crisis has two characteristic factors: the membership to the European currency (euro) and, as a consequence, a public control deficit to fulfill the EU deficit commitment. The first factor acts as if Spain had a fix exchange rate forcing interior devaluation through lower salaries to earn exterior competitiveness. The second factor does not permit to fall into persistent public budget deficit and reduce the possibility to carry out demand policies to foster the economy. The interior devaluation is already reducing the deficit and the salaries, but it is also making falter the domestic demand. And Spain, as most of the developed economies, relies strongly on the domestic demand to boost the economy.

In parallel with the economic situation described above, Spain has been receiving a high arrival of inbound tourism since 2010 as a consequence of the Arab Spring that began on December of 2010 in Tunisia and rapidly spread to other Arab countries of the region. The United Nations World Tourism Organisation (United Nations World Tourism Organisation, 2013) does not share this point of view and affirms that the rise in tourist arrivals to Spain over the regional average (Mediterranean area) obey to internal improvement such as the modernisation of supply, the human resource training, quality improvement or marketing and promotion. This new situation, together with more optimistic economic forecasts (International Monetary Fund, 2013), has fed the idea that tourist arrivals could substitute the weakened domestic demand and revitalize the economy.

The success of some Asian countries in the eighties promoting economic growth through export-oriented industries (World Bank, 1993) and the export orientation of the tourism, has guided the studies about tourism and economic growth around the export-led hypothesis (Balassa, 1978). Authors such as Sequeira and Maças (2008) or Dritsakis (2004) support the capacity of tourism, a non-technology-intensive sector, to promote economic growth and enhance capital accumulation. These conclusions contradict Solow (1956) and some other authors findings such as Aghion and Howitt (1998); or Grossman and Helpman (1991) about the relations between high-technology sector and long term growth. Lanza, Temple and Urga (2003) affirm that the lower growth in productivity in tourism-based economy could be overcome by a progressive specialisation on tourism that could improve the terms of trade and compensate the lost in productivity. Moreover, they also highlight the importance of the high price elasticity and income elasticity of demand for tourism that may compensate the loss in productivity in the long term.

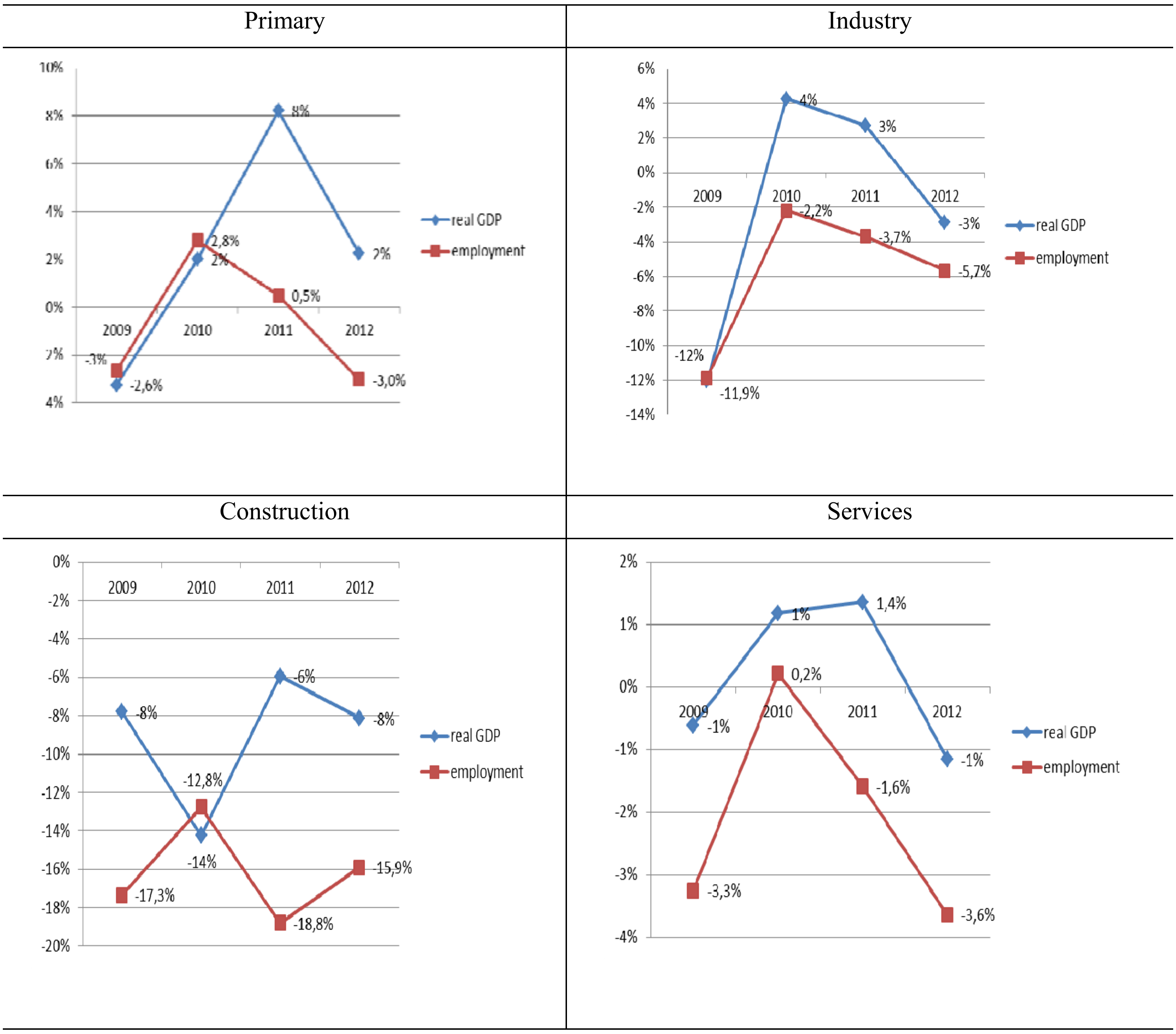
Additionally, there are more profound consequences in the relationship between tourism and the economy beyond the growth enhanced or the productivity gained that should not be neglected. The differences in the intensive use of capital and labour have also important implications at sectorial level. Copeland (1991) and Chao, Hazari, Laffargue, Sgro and Yu (2006) underscore the importance of non-tradable goods in tourism-based economies. According to them, tourism enhances the consumption of non-tradable goods and improves the terms of trade, although it could produce capital *decumulation* from the manufacturing sector (capital intensive) to the non-tradable ones (labour intensives). Moreover, the appreciation of the real exchange rate because of tourist arrivals can also undermine the exterior competitiveness of the traditional exports. Both, the displacement in capital and labour endowment from traditional sectors to the non-tradable ones and the appreciation of the real exchange rate can generate an economic "*illness*" known as Dutch Disease by which the positive effect of tourism on the economy in the short term could ends up in an economic shrinking in the long term (Corden & Neary, 1982). Tourism-led countries are especially sensitive to the Dutch Disease due to the entrance of foreign money.

The use of recursive-dynamic CGE models permit to work at these two levels. On the one hand, they allow quantifying the impact of tourist arrivals on GDP and unemployment. On the other hand, they also permits to analyse the effect of such shock on the resource reallocation (capital and labour) among sectors, the lost in competitiveness and, consequently, to test the existence of the Dutch Disease in the economy at micro level over time. To such aims, a recursive-dynamic model with two scenarios and five periods is developed. The first scenario is based on the International Monetary Fund projections (International Monetary Fund, 2013) and in the Economic bulletin of the Bank of Spain (Bank of Spain, 2013), i.e., *post-crisis* scenario. The second is a *pre-crisis* scenario (buoyant situation) based on the Spanish economy performance in the five years previous to the economic crisis. Additionally, the model is based on three datasets: Input-Output Table (IOT), the Tourism Satellite Account (TSA) and National Account for Spain. According to Blake, Durbarry, Sinclair and Sugiyarto (2001), the Input-Output framework overestimates the total GDP effect and underestimates the total effect on tourism sector. The TSA is the dataset able to fill the lack of tourism information in the IOT. Thus, the IOT and the TSA are combined to get a deeper representation of the tourism sector that the IOT is not able to provide it. The two scenarios and the combination of the datasets try to provide a wider perspective of the true potential of tourism to promote economic growth and reduce unemployment.

3.1.1. GDP and employment in Spain at a glance

The fall in GDP and employment by sectors has been severe in Spain in 2009 and in 2011 (Figure 7). The construction sector suffered the sharpest fall in 2010 with a lost in real GDP of about 12.8%. On average, the fall in employment has been higher than the fall in real GDP. Once again, the construction sectors gather up the highest fall with 18.8% in 2011.

Figure 7. Real GDP growth rate (2008=100) and employment growth rate by sectors (%)

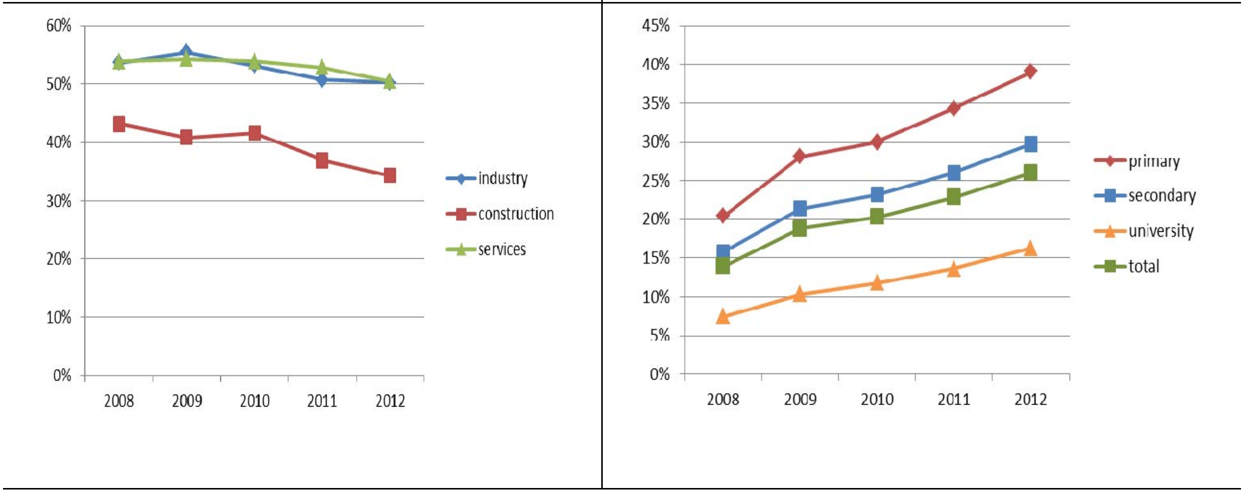


Source: Contabilidad regional de España (CRE), INE

The unitary labour cost has been decreasing in all sectors in Spain since 2007, whilst the unemployment rate has been growing sharply (Figure 8). The falls in salaries and employment have been higher in sector such as construction because of the bubble (Fernández-Kranz & Hon, 2006), but the fall has affected all sectors. Moreover, the unemployment rate has deeply affected all educational level as show Figure 8. The unemployment in people with university degree has slightly grown above 15%.

Figure 8. Unitary labour cost and unemployment rate

Unitary labour cost	Unemployment rate by educational level



Source: Encuesta población activa (EPA), Contabilidad regional de España (CRE), Encuesta trimestral de coste laboral (ETCL), Índice de precios al consumo (IPC), INE.

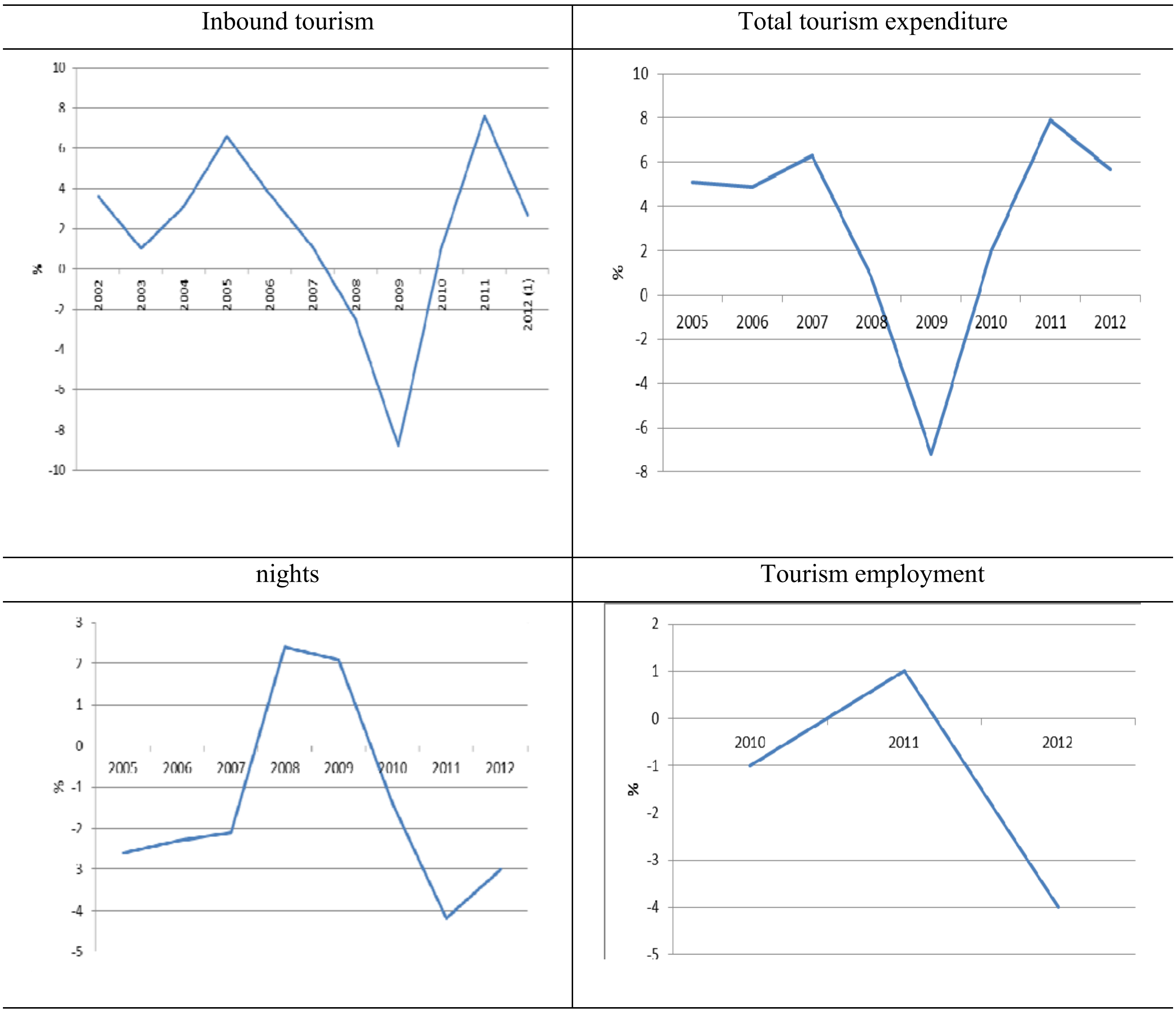
3.1.2. Inbound Tourism in Spain at a glance

Smeral (2009) forecasts significant drop in real tourism imports in Europe in 2009 and 2010. Smeral (2010) also forecasts a decline in foreign travel of 11% to 15% in the five source markets (Australia, Canada, United States, Japan and EU-15) in 2009 and 2010. Papatheodorou, Rosselló and Xiao (2010) use a descriptive analysis to forecast a serious drop in tourist demand in Europe in 2010.

In contrast with the scenario described above, as it can be seen in Figure 9, from 2009 to 2011 inbound tourism in Spain has been growing sharply after five years of depletion.

According to the media, the *Arab spring* seems to be behind of these good results. The United Nations World Tourism Organisation (United Nations World Tourism Organisation, 2013) does not share this point of view and affirms that the rise in tourism arrivals to Spain over the regional average (Mediterranean area) obey to internal improvement such as the modernisation of supply, the human resource training, quality improvement or marketing and promotion. Total tourism expenditure has been growing in parallel to inbound tourism arrival. On the contrary, the number of nights has been decreasing for the same period. The overall net effect is an average rate growth of 3.2% in tourists from 2005 to 2012. The effect on employment of such good data have been positive (1%) between 2010 and 2011 and negative (-4%) between 2011 and 2012. The cause of this bad result of tourism employment could be due to a rise of 5% in VAT in Spain from 2008 to 2012 (European Commission, 2013), among other factors.

Figure 9. Inbound tourism in Spain from 2002 to 2012



Source: FRONTUR, EGATUR and EPA.
(1) provisional

According to United Nations World Tourism Organisation (2013), France, Italy and Spain will continue to be the top three destinations in the Mediterranean region. Spain is expected to keep a 2% average growth in tourism arrivals up to 2020. This forecast will be used in the simulation as the minimum tourism arrival growth expected.

3.2 State of the art

3.2.1. Economic growth theories

Theories and studies about the source of economic growth are not new in economy. Adam Smith (1776), Marx (1867) and Keynes (1936) are well-known examples of famous first attempts. Moreover, economic depletion contexts such as the great depression or the post Second World War period were also a source of inspiration for many other economic theories concerning the possible causes of economic growth. The most remarkable ones are Fisher (1933), Domar (1946), Lewis (1954) or Rostow (1960). All these theories spin around the assumption of the importance of capital accumulation, the presence of unlimited supply of labour and the existence of industries with high demand of low-qualification workers such as manufacturing. Solow (1956) refuses the importance of capital accumulation and focus on the technological change in the long term to explain a steady economic expansion. The Great depression also propitiated the advent of two economic policies widely applied in developing countries: imports substitution and export-oriented policies (Krugman & Obstfeld, 2006). The success of some Asian countries in the eighties promoting economic growth through export-oriented industries (World Bank, 1993) and the export orientation of the tourism (tourism-led), has guided the studies on tourism and economic growth around the export-led hypothesis (Balassa, 1978).

3.2.2. Tourism and economic growth

The export-led growth hypothesis has to be adapted to the tourism-led growth hypothesis. Thus, tourism should give answer to the next mutually related aspects:

- The strength of tourism, a non-technology-intensive sector, to promote long term growth.
- The capacity of tourism to generate enough flow of capital to ensure capital accumulation.

- Efficiency improvement with increasing international competition in the tourism enterprises.
- The promotion of increasing returns to scale (scale economies or economies of density) (Sinclair & Stabler, 1997).

This chapter is focused on the first two aspects.

3.2.2.1. Tourism and economic growth by countries

The first question tries to answer Solow's conclusion (Solow, 1956) and some other author findings such as Aghion and Howitt (1998); and Grossman and Helpman (1991), about the relationship between high-technology sector and long term growth. Ghali (1976), Sequeira and Maças (2008), Dritsakis (2004), Durbarry (2004), Gunduz and Hatemi-J (2005) Kim, Chen and Jang (2006) or Tang and Abosedra (2012) apply their respective studies in specific countries. All of them hold that tourism generates economic growth in long term, despite the low technological intensity. However, not all studies find a positive causal relationship between tourism and economic growth. For instance, Oh (2005) concludes that the tourism-led hypothesis is not supported in the case of South Korea. Tourism has played a key role in the Spanish economy, Balanger and Cantavella (2002) conclude that tourism has fostered the economic growth in the last three decades and it has also brought positive effects on income and external competiveness. On the other hand, Capó, Riera and Rosselló (2007) reinforce the importance of tourism on the Spanish economy, but they are more skeptical about the productivity gains and the economic growth in the long term.

3.2.2.2. Tourism and economic growth by regions

Other authors such as Lanza et al. (2003), Lee and Chang (2008), Brau, Lanza and Pligiaru (2007), Eugenio-Martín, Morales-Martín and Scarpa (2004) or Di Liberto (2013) also analyse the impact of tourism on the economic growth but they base their studies on wider dataset. Brau et al. (2007) analyse the small tourism countries case and conclude that tourism specialisation generates economic growth and that these countries grow faster than other larger countries. This conclusion is in accordance with a more general one by Easterly and Kraay (2000). They conclude that, on average, small countries have higher GPD per capita, although they are more vulnerable to international trade shocks. Lanza et al. (2003) analyse the OCDE countries. According to them, the lower growth in productivity in tourism-based economy could be overcome by a progressive specialisation on tourism that improve the terms of trade and compensate the lost in productivity relative to other sectors. Moreover, they also highlight the importance of the high price elasticity and income elasticity of demand for tourism that may compensate the loss in productivity in the long term. Lee and Chang (2008) expand their analysis to include both OECD and non-OECD countries. They find a long-run relationship between the tourism and real GDP per capita. Eugenio-Martín et al. (2004) conclude that countries on lower and medium income in Latin America benefits from the tourism and the economic growth generated by it.

3.2.2.3. Tourism and capital accumulation

In general, the literature has followed a theoretical perspective regarding to the capital accumulation process in tourism. The motivation of such process has been based on the distinction between tradable and non-tradable goods. The tradable goods are more capital intensive and can be exported. On the contrary, the non-tradable goods are more labour intensive and can only be consumed within the country. The existence of tourism in the country increases the consumption of non-traded goods. Thus, tourism produces a reallocation of resources from tradable to non-tradable sectors (capital decumulation). At the same time, the appreciation in the real exchange rate because of the tourist arrivals erodes the exterior competitiveness of the tradable goods. This is the theoretical reasoning followed by Copeland (1991) and Chao et al. (2006), although for Copeland (1991) the de-industrialisation is not necessarily harmful, unless external economies are important in the industry. The consequences of the capital decumulation described by these authors can be considered as a symptom of the *Dutch Disease*. Hazari and Sgro (1995) and Albadalejo and Martínez-García (2013) develop a dynamic model to explain the capacity of tourism to enhance economic growth and capital accumulation. The latter authors affirm that tourism allows the imports of foreign capital. Moreover, the model can endogenously increase the tourism attraction in reaction to tourism demand. Thus, tourism enhances economic growth and capital accumulation. Nowak, Shali and Cortes-Jiménez (2007) and Poirier (1995) carry out an empirical analysis of the capital accumulation process promoted by the tourism in Spain and Tunisia, respectively. Nowak et al. (2007) combine both theoretical and empirical results. They develop a theoretical proof of the so called EKIG hypothesis (exports-capital imports-growth) and confirm, with econometrics tools, its positive and significant impact in Spain due to the capital imports. Finally, Poirier (1995) follows a more descriptive analysis, its study points out the positive effect of tourism on capital accumulation, deficit reduction and the balance of trade.

3.2.3. Tourism and employment

According to Riley, Ladkin and Szivas (2001) tourism requires lower qualification and pay lower wages rather than other more capital-intensive activities (hypothesis also followed by the authors of tourism and economic growth previously adduced). Such description is common in practically all literature about the topic: Mathieson & Wall (1982) or Jafari, Pizam & Przeclawski (1990). This conclusion is in line with the kind of industry described by Lewis (1954). The assumption of the low technological use in the tourism sector should imply a higher demand of lower-qualified workers. However some authors are more skeptical about the link between tourism and employment. Riley et al. (2001) question the relationship between increasing tourism and increasing employment. Tourism activities are more outputs-driven (outputs rule over inputs) than other activities. "*If demand varies in the short term, then supply inputs need to match that variation in the cause of productivity*" (Riley et al., 2001, p. 30). Thus, according to them, the forecast of tourism demand, the standardisation of services and products and flexible resources are crucial to match increasing tourism and increasing employment.

3.2.4. Tourism and CGE models

Most of the state of the art about tourism and CGE models has been focused on the analysis of the effect of increasing tourism demand (new tourist arrivals or higher tourism spending) and /or the effect of indirect taxes on tourism and the economy. But the impact of such shocks over time has not been well explored yet. Copeland (1991) develops a theoretical CGE framework to analyse the effect of tourism on the economy. Many of his conclusions have been tested by others researchers such as Adams and Parmenter (1995) or Narayan (2004) among others. Authors such as Adams and Parmenter (1995), Zhou, Yanagida, Chakravorty and Leung (1997) or Narayan (2004) have guided their studies to quantify the impact of increasing tourism demand on the economy. A quite general conclusion of the effect of a rise in tourism (new arrivals or increase in spending) on the economy is that: a positive tourism shock produces an appreciation of the exchange rate that erodes traditional exports and increase imports. Nonetheless, the tourism shock overcomes the decline in traditional exports and the rise in imports; and thus, it improves the terms of trade.

The impact of taxes on tourism has also been a recurrent topic. Gooroochurn and Thea Sinclair (2005) focus their studies on the impact of taxes on tourism and the economy. According to them, tourism taxes can bring welfare gains since international tourists bear most of the taxes. Meng, Siriwardana and Pham (2013) combine both the increase in total tourism demand and change in taxes in their study about Singapore.

The CGE modeling can be also combined with other methodologies to provide a more precise insight of the shock considered. In this sense, Blake, Durbarry, Eugenio-Martin, Gooroochurn, Hay, Lennon, Sinclair and Yeoman (2006) combine econometric estimations based on tourism indicators with a CGE model. In a first step a structural equations model is used to forecast the tourism spending. In the second step, a CGE model is carried out to quantify the shock predicted in the first step. In their study applied to Scotland, they calculate that an increase of a 10% in tourism spending will increase GDP between 25.3 million pounds and 42.6 million pounds in the short and long-run, respectively. This boost in GDP will also generate 3,326-4,455 more employments.

Gago, Labandeira, Picos and Rodriguez (2009) and Blake (2000) are one of the few that include the tourism sector in a CGE model about Spain. Previous CGE studies of Spain such as Polo and Sancho (1993) or Kehoe, Polo and Sancho (1995) did not include tourism. Gago et al. (2009) and Blake (2000) assess the impact of indirect taxes on tourism and in the economy. Moreover, Gago et al. (2009) also study the impact of such shocks on the employment rate. The negative effect of increasing VAT rate on employment varies from 0.88% to 3.36% depending on the shock considered.

The shock assumed in any CGE model has deeper effects on the economy beyond the GDP or the unemployment. It also produces changes in the income distribution within households which, depending on the goal chased, should not be neglected. The impact of tourism on the economy has also been extended to poverty relief analysis, and, under these circumstances, the inclusion of different households is vital. Blake, Arbache, Sinclair, and Teles (2008) conduct an analysis of the consequences of tourism on poverty relief in Brazil. Their main conclusion is that tourism benefits all kinds of households but low income classes benefit most. In the same topic, Wattanakuljarus and Coxhead (2008) examine the effect of tourism on poverty in Thailand. According to them, and assuming full employment, tourism is not a pro-poor activity due to that low income households work on agriculture and other tradable sectors not especially related to tourism activities. In any case, the boost in tourism affects positively all kinds of households but high income classes are the most benefited.

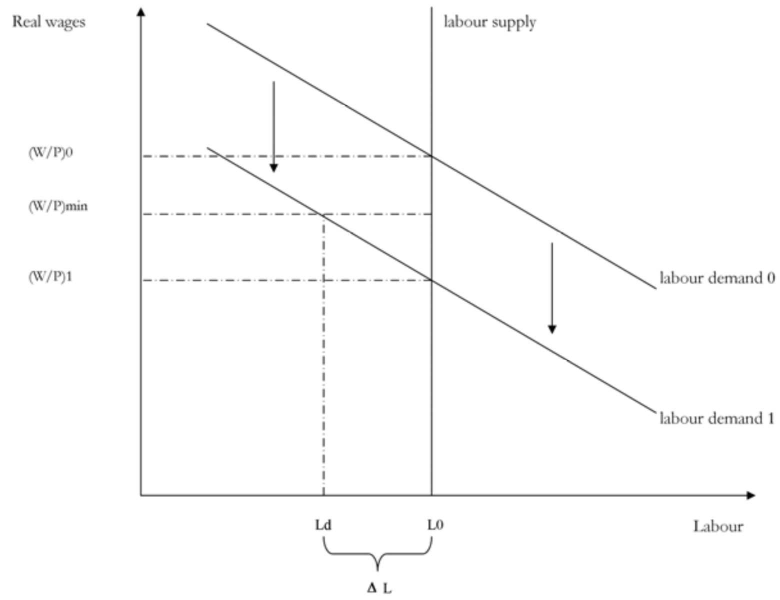
Some authors have also followed a wide perspective in regards to the impact of tourism on the economy. Blake and Sinclair (2003) quantify the impact of the terrorist attack of September 11th in USA. They highlight the importance of the US government intervention to relief the negative impact of 11-S crisis on the tourism activity, albeit their decisions lacked of suitable cost-effective analysis. Without the government response the employment lost would have been around 383.000 (full time employment), due to such interventions the employment saved are around 60% of the previous 383.000. In terms of GDP, the government response keeps the fall of GDP in 10 billions of dollar, instead of a fall of 30 billions of dollar without the intervention. Dwyer, Forsyth, Spurr and VanHo (2006) assess the impact of Iraq war and SARS on the tourism and in the economy in Australia. Their main finding is that inbound tourism falls as well as outbound tourism due to the crisis. As a result, savings, domestic tourism and other non-tourism consumption increase, although the net effect on GDP is negative. Blake, Sinclair and Sugiyarto (2003) study the economic impact of the accession of Malta and Cyprus to EU, both rely strongly on tourism to grow. Malta and Cyprus will increase their GDP about 4% and 3.5% in the long term, respectively, after the accession to the EU. In terms of employment, Malta will be able to generate 3,559 more full time employments; and Cyprus 8,543 full time employments. Sugygarto, Blake and Sinclair (2003) assess the effect of globalisation and foreign tourism in Indonesia through different tariff reduction scenarios. Their main conclusion is that tourism eases the globalisation process in Indonesia. In fact, tourism can reduce the domestic prices, improves their terms of trade and, in last term, it can improve their macroeconomic performance especially the government accounts. Precisely, according to Mabugu (2002) the lack of good macroeconomic performance is the root of the turmoil in the Zimbabwean economy that erodes the benefit from tourism. The paper simulates five different scenarios from currency devaluation to fiscal deficit in Zimbaue. The conclusions are wide, but in general, the effects on employment, fiscal deficit and GDP are positive.

Finally, the use of CGE models has also been extended to study the relationships between tourism and environment. Alavalapati and Adamowicz (2000) develop a simple two sector (resource and tourism sector) and two factor CGE models to quantify the interaction between tourism and environment. According to them, the effect of an environmental tax varies depending on the sector levied. For instance, an increase in an environmental tax in the resource sector improves the economy if the environmental damage occurs in the resource sector. Finally, some authors have also studied the interaction between climate change and tourism. Berrittella, Bigano, Roson and Tol (2006) study the world impact of climate change on tourism. Dwyer, Forsyth, Spurr and Hoque (2010) focus their study in Australia and examine the impact of greenhouse gas reduction on tourism. The latter study is the only one that uses dynamic CGE models applied to tourism.

3.2.5. Unemployment in CGE models

There are several ways to model unemployment in CGE models depending on the aim chased. One of the first approaches includes wage rigidity (minimum wage) in order to avoid that marginal labour productivity equal real wage as classical labor market theory affirms. Figure 10 depicts the unemployment with minimum wage. Assuming an inelastic labour supply, the minimum wage produces a downward shifting of the labour demand from an equilibrium wage of (w/p)0 to (w/p)1, this new equilibrium ensure labour market clears. Nonetheless the minimum wage forces a new equilibrium in (w/p)min in which the labour supply exceeds labour demand producing involuntary unemployment. Minimum wages hypothesis assumes a positive correlation between wages and qualification.

Figure 10. Unemployment (minimum wage)

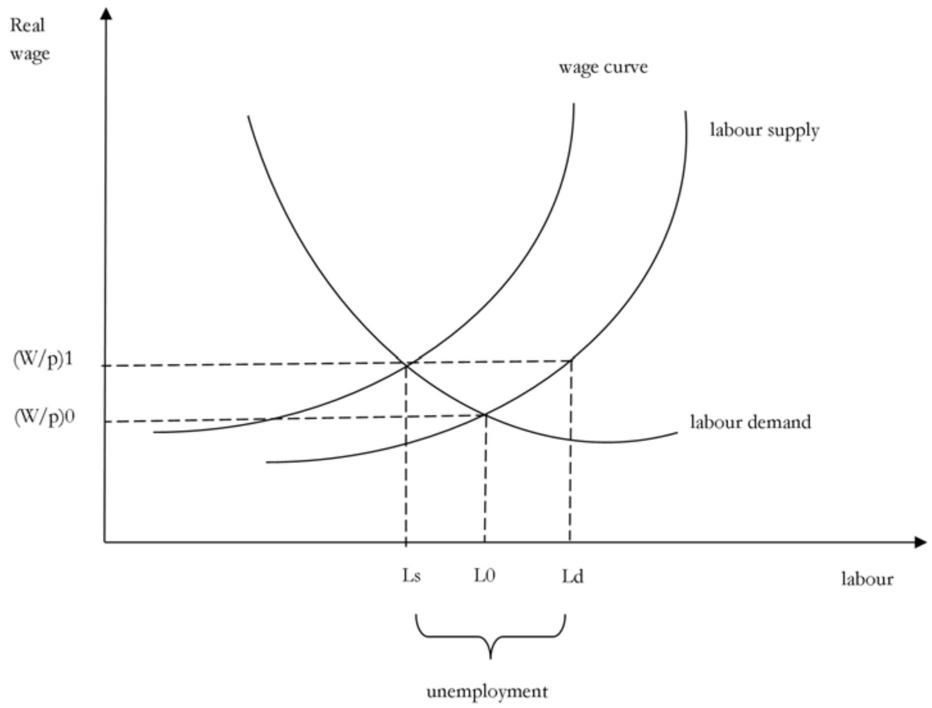


A natural extension of the wage rigidity is the wage curve (Figure 11). Such curve have been formulated and tested by Blanchflower and Oswald (1995). Rutherford and Light (2002) show the way to implement it in CGE format. Quoting Küster, Ellersdorfer, and Fahl (2007, p. 15):*"A wage curve captures the relationship between the level of unemployment and the level of real wages and describes how the price of labor is affected by the unemployment rate"*. A wage curve assumes a negative relationship between wages and unemployment. If the unemployment rate is high, firms offer lower wages.

From the standpoint of modeling, any of these unemployment models tries to break with classical postulate about the labour market clearance condition. In the literature, the minimum wage has been more oriented to model unskilled workers, whilst the wage curve has been used to model skilled workers. An alternative is to assume both kinds of workers in one simple framework. Lögfren (2001) assume four different skill categories depending on the educational level. Another possibility is to consider different and persistence wage differences among sectors (Katz and Summers, 1989).

The existence of labour union can also be considered. There are two basic approaches in this regards. One is considering a situation where the union has the bargaining power over wages and firms decide over the employment level demanded (monopoly union model). Another is to assume that both parties have bargaining power (efficient bargaining model). Devarajan, Ghanem and Thierfelder (1997) model the unemployment assuming the existence of labour unions. This approach could be useful to analyse inflationary process under indexed wages regime such as Brazil in the eighties or Israel in the nineties.

Figure 11. Unemployment (wage curve)



There are other alternatives to model unemployment in CGE framework that are far from classical postulates. Harris and Todaro (1970) develop a model to explain the migration between rural and urban areas. According to them, rural workers could be willing to migrate to urban areas, despite a high unemployment rate in such urban area. The explanation to this apparent contradiction comes from the positive expectation that rural workers have about the real wage in the urban area. This new postulate goes again the classical intuition behind the two previous unemployment models by which unemployment is caused by wages above the marginal productivity. Rutherford and Light (2002) implement the Harris-Todaro hypothesis in CGE format. This kind of unemployment model is especially thought for developing countries to explain the transition from the countryside to the city.

3.3 Theoretical framework of the impact of tourism on an economy: TNT-T model

In this section a new version of the TNT model (Sachs & Larrain, 1994) is developed to include the influence of tourism on the production and consumption of tradable and non-tradable goods as well as the existence of a new possible equilibrium due to the underutilisation of labour and the capital accumulation process (named TNT-T model).

There are goods that are tradable (goods that can be exported) and non-tradable goods (goods that cannot be exported such as, accommodation, catering services or a haircut). This simple difference in the kind of goods has important consequences on the economy. For instance, the economies tend to consume more tradable goods than they can produce in a boom situation, so that imports grow. In graphical terms (Figure 12), the economy consumes tradable goods in A (Ct0) and produce tradable goods in B (Qt0), the difference between A and B are the net imports. The consumption of non-tradable goods is Cnt0 and, given the characteristics of such goods, it coincides with the production (Pnt0). AD means aggregate demand, PPF possibilities production frontier, NT are non-tradable goods and T tradable goods. When the economy drifts into a degrowth situation, the economy moves downward along AD0 to D. During this process both the consumption of tradable and non-tradable goods decline. The lower consumption of tradable goods can be compensated by an increase in net exports (difference between D and C). But, the fall in the production of non-tradable goods can only be borne by the domestic demand.

Tourism sector is export intensive in the consumption of non-tradable goods such as accommodation, catering services and so on. The inclusion of tourism consumption in the model shifts the aggregate demand from AD0 to AD1 (the rise in the slope represents the higher propensity of tourists to consume non-tradable goods). Under these new circumstances, initially, the consumption of non-tradable goods increases from D to E. As soon as the tourism sector demands non-tradable goods and the economic degrowth passes away, the production and the demand increase. Thus, the total consumption goes from E to G. The difference between G (demand with tourism) and G1 (demand without tourism) represents the exports of non-tradable goods. So now, the necessary equivalence between domestic production and domestic consumption for the non-tradable goods no longer holds. On the other side, as it can be appreciated in Figure 12, the movement from E to G can only be achieved by reducing the production (and exports) of tradable goods (from C to H), although the demand increases from D to G. The difference between G and H represents the net exports.

To conclude, the model demonstrates that the inclusion of tourism alleviates the fall in non-tradable goods in degrowth scenarios and can act as a substitute of the domestic demand. Secondly, the model also shows that, to increase the production of non-tradable goods, the production of tradable goods has to decrease (win-lose situation). In consequence the exports of tradable goods decline. The TNT-T model here explained assumes full use of labor and capital. Now the TNT-T model will be relaxed to include more realistic assumption such as unemployment and capital accumulation that best described the current situation in Spain.

Figure 12. TNT-T model

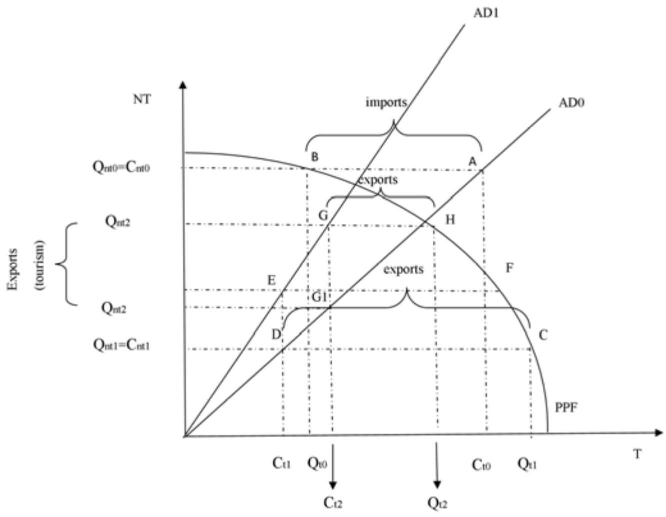
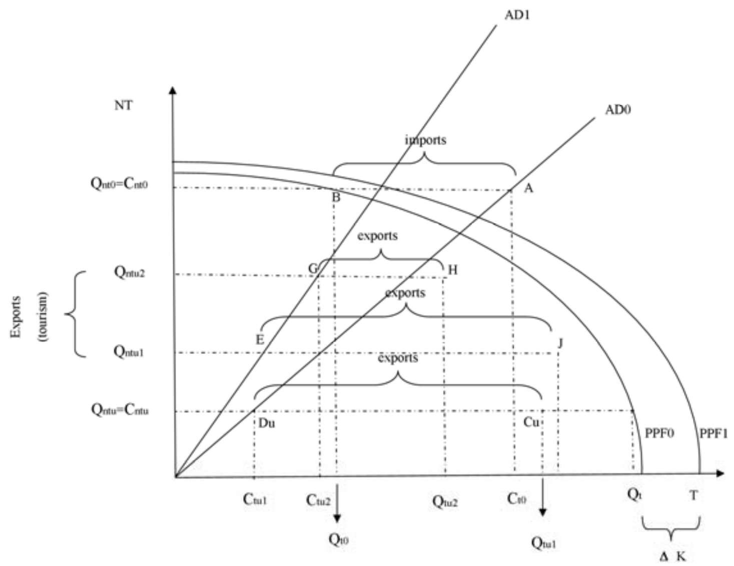


Figure 13 shows the TNT-T model but allowing unemployment and capital accumulation. These softer assumptions allow for the consideration of another equilibrium that was not affordable under the more restricted assumptions of the previous model. The reasoning is similar to Figure 12, but now, when the economy drifts into a degrowth situation, the lower demand generates unemployment. Thus, the equilibrium is achieved at a lower point (Cu) (interior point of the PPF) instead of D as in Figure 12 (Cu<D). As in Figure 12, the tourism consumption shifts the aggregate demand upwards from AD0 to AD1. The growth in tourism demand increases more the consumption of non-tradable goods which increases the production (and it increases the employment demand) to meet the increase in demand. The increase in the capital generated in the economy pushes the PPF upwards from PPF0 to PPF1. However, and despite the increase in employment, the economy remains in an interior point. Under these new circumstances, both sectors (tradable and non-tradable) may increase their endowment of labour and capital and increase their production (win-win situation) in contrast with Figure 12. This new possibility is represented by E and J where E>Du and J>Cu. Moreover, the tradable sector can rise their exports (difference between E and J) instead of decline them as in Figure 12. This equilibrium will be only affordable under low tourism consumption conditions and thereby the real exchange rate would not be expected to grow sharply. Moreover, the growth in tradable goods production will also depend on the technology used and thus, the trade-off between labour and capital that can be achieved.

The win-lose situation is also affordable under these new assumptions. In Figure 13, this equilibrium is represented by G and H where the traditional exports reduce and non-tradable goods grow despite the shift upward in the PPF from PPF1 to PPF2.

Figure 13. TNT-T model with unemployment and capital accumulation



3.4 Case study

This study is based on three datasets[2]: Input-Output table (IOT), Tourism Satellite account (TSA) and National Accounts for Spain in 2006. The first two datasets are combined to construct a new IOT whose main purpose is to disentangle between tourism and non-tourism

[2] Spanish Statistical Office: www.ine.es

categories. As a result, the new IOT has all the commodities disentangled in tourism and non-tourism categories and between tourism and non-tourism sectors. Finally, the new IOT is combined with data from the national accounts to construct the Spanish Social Accounting matrix (SAM) following the criteria of Fernández and Manrique de Lara (2006). The SAM is composed by seventeen commodities and activities.

The disentangling of all goods in tourism and non-tourism categories allows for distinguishing the impacts in both categories and avoiding potential biases. For instance, according to the TSA, the tourism and non-tourism category of the catering services represents 28% and 72% of the production in this sector. Thus, 28% of the production of catering services in the catering services sector has a tourism purpose. In a standard IOT (without tourism categories) this differentiation is not included. So, any change in the catering service is considered as a whole; and the tourism side vanishes without taking into account the potential effect on the economy. The SAM tries to prevent such biases and all goods and services are disentangled into tourism and non-tourism categories. The elaboration of the SAM is explained in Annex 3.1.

3.5 Methodology

3.5.1. Recursive-dynamic CGE model (BLOVIFIS model)

The *BLOVIFIS*[3] model is written as a mixed complementarity problem (Rutherford, 1999). The model is programmed in MPSGE language (Rutherford, 1994) using Generalised Algebraic Modelling System (GAMS) software (Brooke, Kendrick & Meeraus, 1988). The economic structure assumed in this model is depicted on Figure 14:

[3] *BLO* is blondy, my dog. *VI* is victoria, my donkey. And *FIS* is me, Federico Inchausti Sintes.

Figure 14. General structure of the blovifis model.

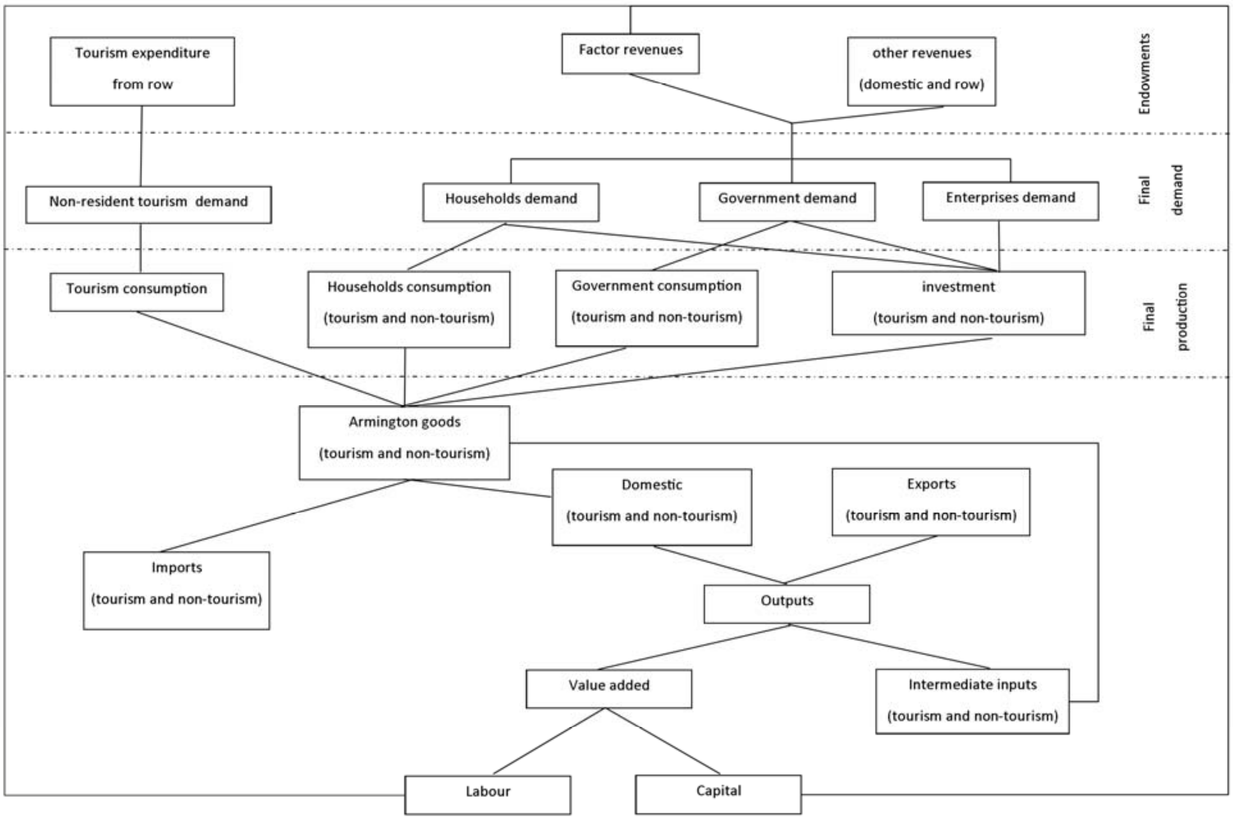


Figure 14 depicts the general structure of the blovifis model in which taxes, elasticity and capital accumulation have been omitted for purpose of clarity. Labour and capital are combined to form a composite good (value added). This composite good and the intermediate inputs (Armington goods) are used by the activities to produce the outputs. This output is divided into domestic and export outputs. The domestic goods combined with the imports goods form the Armington goods (composite goods). The Armington goods are used to satisfy final consumption (non-resident households (tourists), resident households and government), investment (gross fixed capital formation and change of inventories) and intermediate demand that is demanded by the activities to produce their outputs.

Non-resident tourists consume with the endowment of tourism expenditure. The households consume (household consumption) and save according to their endowment of primary factors and other incomes (saving, foreign saving or government transfers). The government also consumes (government consumption) and saves with the endowment of primary factors (gross operating surplus), taxes collected and other incomes (saving or foreign saving). The enterprises invest in change of inventories and gross fixed capital formation according to their endowment of primary factors (gross operating surplus) and other incomes (saving or foreign saving).

The main assumption behind a recursive-dynamic CGE models lies on the agent behaviour (the behaviour depends on past and current states). A CGE models as a mixed complementary problem is based on three conditions: zero profit condition, market clearance condition and balance income condition. The equations shown below are in static form for the sake of clarity. Subindex a represents activities, Subindex c represents goods and services and subindex t represents tourism and non-tourism categories.

3.5.1 Main equations

$$A_{c,t} = \left(\alpha_{c,t} M_{c,t}^{(1-\frac{1}{\sigma_{dm}})} + \left(1-\alpha_{c,t}\right) D_{c,t}^{(1-\frac{1}{\sigma_{dm}})} \right)^{\frac{\sigma_{dm}}{\sigma_{dm}-1}} \qquad (14)$$

Import commodities ($M_{c,t}$) and domestic commodities ($D_{c,t}$) are both used to produce the Armington goods (equation 1) (CES production function). Such composite good tries to reflect the imperfect substitution between domestic and import production (Armington, 1969). σ_{dm} is the domestics-import elasticity. $\alpha_{c,t}$ is the benchmark value share. The Armington goods ($A_{c,t}$) are used to satisfy final consumption (non-resident households (tourists), resident households and government), investment (gross fixed capital formation and change of inventories) and intermediate demand that is demanded by the activities to produce their outputs.

$$actv_a = \min\left\{\min\left(\frac{ii_{a,c,t}}{a_{a,c,t}}\right), \frac{va_a}{b_a}\right\} \qquad (15)$$

$$va_a = \gamma_a\left(\beta_a L_a^{\rho} + (1-\beta_a)K_a^{\rho}\right)^{\frac{1}{\rho}}; \text{ being } \rho = \frac{\sigma_{va}-1}{\sigma_{va}} \qquad (16)$$

According to equation 15, in the first nest, labour (L) and capital (K) are combined through a CES production function to produce the composite goods (va_a) being σ_{va} the elasticity of substitution between labour and capital (equation 16). In the second nest, intermediate inputs ($ii_{a,c,t}$, level of $A_{c,t}$ used in sector a) are combined according to a Leontief production function. In the top nest (Leontief production function), both intermediate inputs and composite goods are combined to produce the industry output ($actv_a$). $a_{a,c,t}$ b_a and β_a are distribution parameters, and γ_a is a scale parameter. Each industry divides its output amongst products and services according to equation 17.

$$Y_{c,t} = \sum_{a=1}^{17} \varphi_{a,c,t} actv_a \qquad (17)$$

Finally, products and services from equation 17 are disentangled into domestic ($D_{c,t}$) and exports goods/services ($E_{c,t}$) (equation 18). $\varphi_{a,c,t}$ and $\delta_{c,t}$ are distribution parameters, $\chi_{c,t}$ is a scale parameter and T is the elasticity of transformation.

$$Y_{c,t} = \chi_{c,t}\left(\delta_{c,t} D_{c,t}^{(1+T)} + (1-\delta_{c,t}) E_{c,t}^{(1+T)}\right)^{1/(1+T)} \qquad (18)$$

Finally, the capital accumulation process is as shonw in equation 19:

$$Capital_{hh,time} = (1-\delta_{hh}) * Capital_{hh,time-1} + gos_{hh,time=1} + inv_{time-1} * invendow_{hh} * (r+\delta_{hh}); \quad Capital_{hh,time} \geq 0; \ \forall hh, time \quad (19)$$

In this case, the $time$ subindex is included to appreciate the way the capital accumulation works. The variable $Capital_{hh,time}$ represents the capital accumulation by institutions (hh) (households, government and enterprises) and year ($time$). The capital accumulated at any time is formed by the capital of the previous year less the depreciation of capital $[(Capital_{hh,time-1})*(1-\delta_{hh})]$ plus the gross operating surplus ($gos_{hh,time=1}$) in the first year plus the investment generated in the economic process $(inv_{time-1} * invendow_{hh} * (r+\delta_{hh})$,the investment in the previous year is multiplied by the investment endowment by institutions ($invendow_{hh}$) and it is multiplied by the economic growth rate (r) plus the depreciation of capital (δ_{hh})). All elasticities used in the *BLOVIFIS* model have been taken from Hertel (1998).

3.5.2. Model closure

The equations shown above are a brief summarise of the main equations of the *BLOVIFIS* model[4]. Other equations related to market clearance conditions and income balance conditions have been omitted as well as those related to the behaviour of households, government, enterprise and tourists. However, there are other equations whose assumptions have a deep impact on the results and they have to be highlighted. These equations compose the *model closure* and are related to government balance, investment-savings, unemployment and balance of payment.

- Government balance: income equals expenditure (zero deficit).

[4] The *BLOVIFIS* model is explained in detail in Annex 3.2

- Investment-savings: total savings (domestic and abroad) equals investment. Additionally, any change in total savings in financed through capital flows (changes in capital account).
- Unemployment: A wage curve is chosen to model unemployment.
- Balance of payment: Current account equals Capital account. Changes in the Current account deficit are allowed. Spain is considered a small open economy. Thus, world prices are fixed exogenously.

3.5.3. Shock, scenarios and calibration path

The shocks simulated are:

- 2% increase in tourist arrivals
- 10% increase in tourist arrivals

The 2% increase in tourist arrivals comes from the United Nations World Tourism Organisation projections (United Nations World Tourism Organisation, 2013). On the other hand, the second shock tries to test the strength of tourism to provide economic growth and to reduce the unemployment rate assuming an unlikely tourist arrivals increase of 10%.

A dynamic model is based on future projections of economic growth, interest rate and capital depreciation. These projections are used as stationary state of the economy over time. The scenarios projected are:

- *post-crisis:* 5% interest rate, 0.7% GDP and 5% capital depreciation.
- *pre-crisis:* 4% interest rate, 3% GDP and 5% capital depreciation.

Both scenarios form the *business as usual* situation (BAU). The interest rate and the growth rate of the *pre-crisis* scenario are the average of the spread of the public debt and the average economic growth between 2008 and 2012. In regards to the *post-crisis* scenario, the projections are based on International Monetary Fund projection (International Monetary

Fund, 2013) and in the Economic Bulletin of the Bank of Spain (Bank of Spain, 2013). None of the scenarios projected match with the datasets. Hence, an *"estibration"* is applied to calibrate the data base according to the scenario projected (Balistreri & Hillberry, 2003).

3.6 Results

3.6.1. Unemployment

A wage curve is the functional form chosen to model unemployment. This curve needs an elasticity of employment as input. Blanchflower and Oswald (1995) estimate an elasticity of employment but it is estimated under a normal economic situation context which is far from the current economic situation. Thus, two elasticities of employment are assumed to provide a better insight into the change in the unemployment rate depending on the elasticity considered: the elasticity obtained from Blanchflower and Oswald (1995) (0.1%) and a much more elastic one of 0.001% (*elast*) which may be more in accordance with the current unemployment situation in Spain.

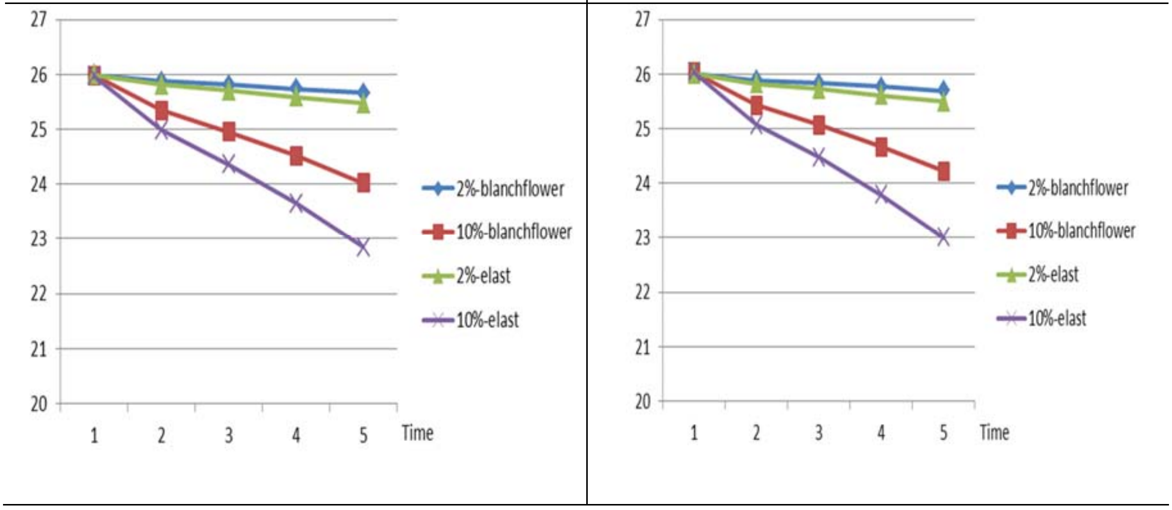
As it can be seen in Figure 15, *elast* allows for a higher reduction in unemployment as it was expected. With the 2% shock in tourist arrivals, both elasticities have a very similar effect on the unemployment rate in both scenarios. In a post-crisis situation, the impact on unemployment is very small. In the last year, the unemployment rate reduces 1.30% (25.74%) and 2.03% (25.47%) for Blanchflower´s elasticity and *elast*, respectively. This means around 76,651 and 119,948 new employments, respectively. In a pre-crisis situation, the unemployment rate reduces 1.15% (25.70%) and 1.92% (25.61%) for the fifth year, respectively. This means around 67,807 and 113,208 new employments, respectively.

With the 10% shock in the tourist arrivals, the differences in unemployment are higher with the elasticities and scenarios. In a post-crisis situation, in the last year, the unemployment rate reduces 7.53% (24.04%) and 12.03% (22.87%) for Blanchflower´s elasticity and *elast*, respectively. This means around 443,991 and 709,324 new employments, respectively. In a pre-crisis situation, the unemployment rate reduces 6.84% (24.22%) and 11.50% (23.01%) for the fifth year, respectively. This means around 403,306 and 678,074 new employments, respectively. Thus, none of both shocks mean a strong reduction in the unemployment rate, though it is a relief. The rest of the results of the paper are based on the *elast* elasticity.

The post-crisis situation achieves better unemployment rates than a pre-crisis one. The apparent contradiction can be explained by the higher appreciation in the real exchange rate in the pre-crisis scenario than in the post-crisis one.

Figure 15. Unemployment rate with change in employment elasticity’s respect to the BAU situation (%)

Post-crisis	Pre-crisis



3.6.2. Gross real added value (GRAV), foreign account deficit and capital accumulation

According to Figure 16 and focusing on post-crisis situation, the increase in 2% in tourist flows boosts the GRAV from 0.05% in the first year to 0.44% in the fifth year. The unlikely 10% increase means a strong fostering to the economy from 0.25% in the first year to 2.58%

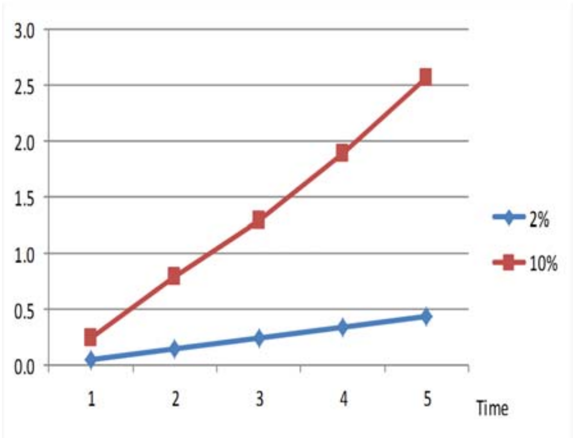
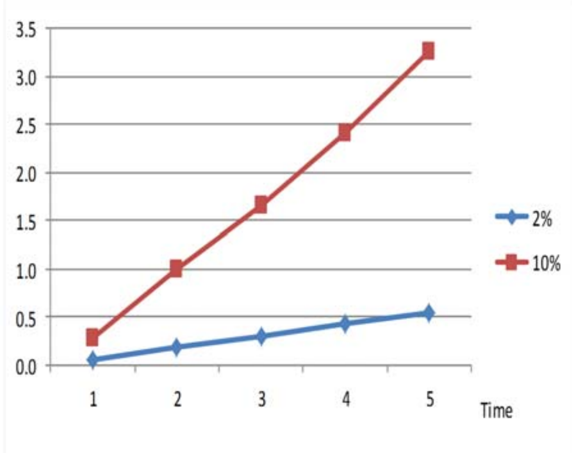
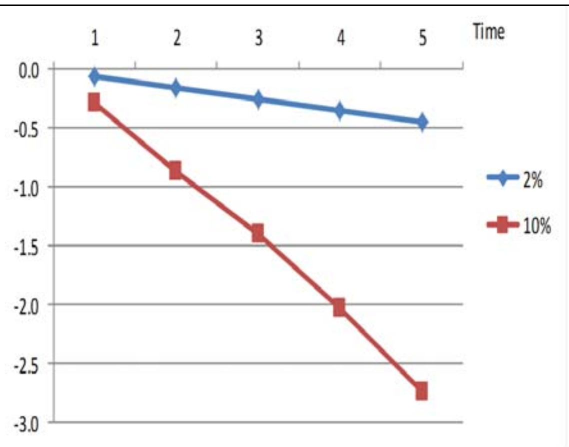
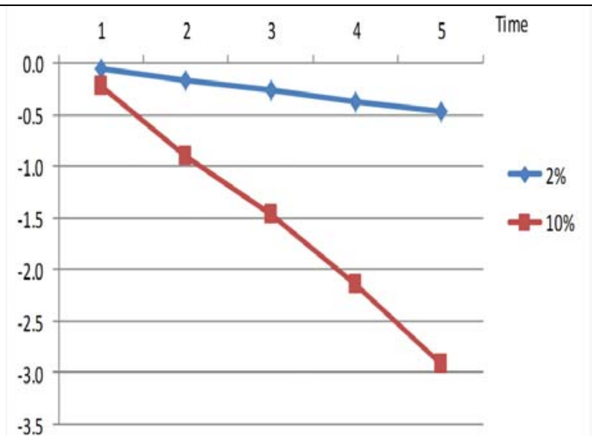
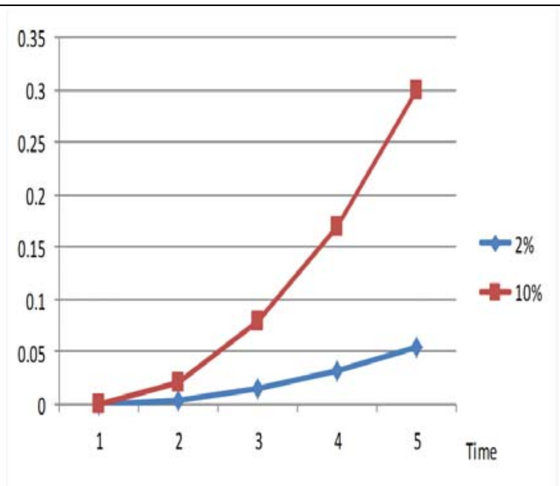
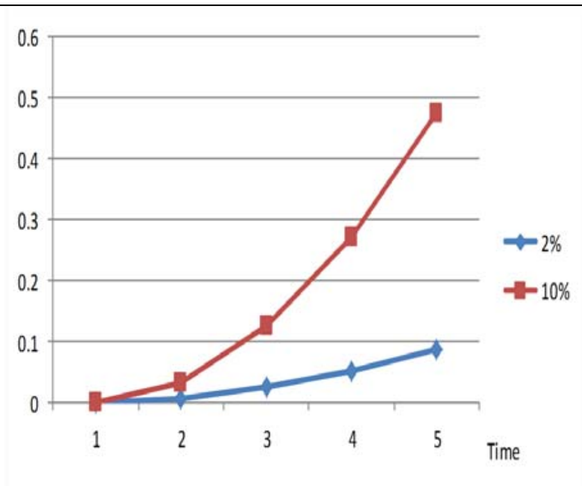
in the fifth year. During the five years, the accumulative growth of the GRAV is 1.21% and 6.81% for the 2% and the 10% case, respectively. On the other hand, the improvement in the current account deficit is similar to the change in GRAV. In the case of the 2% increase, the deficit reduces up to 0.06 % in the first year and up to 0.45% in the last year. In the 10% case, the reduction in the deficit goes from 0.28% to 2.75% in the last year. At the end of the fifth year, the deficit accumulates a reduction of about 1.27% and 7.35% for the 2% and the 10% shock, respectively.

Regarding to the pre-crisis situation, the increase in tourist arrivals in 2% boosts the GRAV from 0.06% in the first year up to 0.55% in the last year. As in the post-crisis scenario, the 10% increase means a strong fostering to the economy; it goes from 0.28% in the first year to a 3.28% in the fifth year. During the five years, the accumulative growth of the GRAV is 1.53% and 8.63% for the 2% and 10% case, respectively. On the other hand, the improvement in the current account deficit is similar to the change in GRAV. In the case of the 2% shock, the deficit reduces 0.04% in the first year and 0.48% in the last year. These changes in the current account are slightly lower than in the post-crisis scenario. For the 10% case, the reduction in the deficit goes from 0.23% to 2.91% in the last year. At the end of the fifth year, the deficit accumulates a reduction of 1.32% and 7.66% for the 2% and 10% shock, respectively.

The change in GRAV due to the increase in tourist arrivals is significant but modest for the 2% case in both scenarios. Nonetheless, the unlikely 10% increase produces a strong impulse to the economy. The increase in tourist arrivals boosts the real exchange rate which declines traditional exports and raises imports. The overall effect in the terms of trade (deficit reduction) is positive because of tourism. This result is in accordance with Adams and

Parmenter (1995), Copeland (1991) or Narayan (2004). This general improvement in the terms of trade is especially useful in the current economic situation in Spain in which the country has to repay the money borrowed during the economic boom. To sum up, the increase in GRAV reinforces the first hypothesis highlighted in the state of the art by which tourism is able to promote economic growth, despite of the lower technological use. On the other hand, tourism also enhances capital accumulation (Figure 16) but in modest rates which reinforces the conclusion of Capó et al. (2007) about the low productivity gains generated by tourism in the long term.

Figure 16. Change in gross real added value, current account deficit and capital accumulation respect to the BAU situation (%)

Post-crisis	Pre-crisis
Gross real added value	Gross real added value
	
Current account (deficit)	Current account (deficit)
	
Capital accumulation	Capital accumulation
	

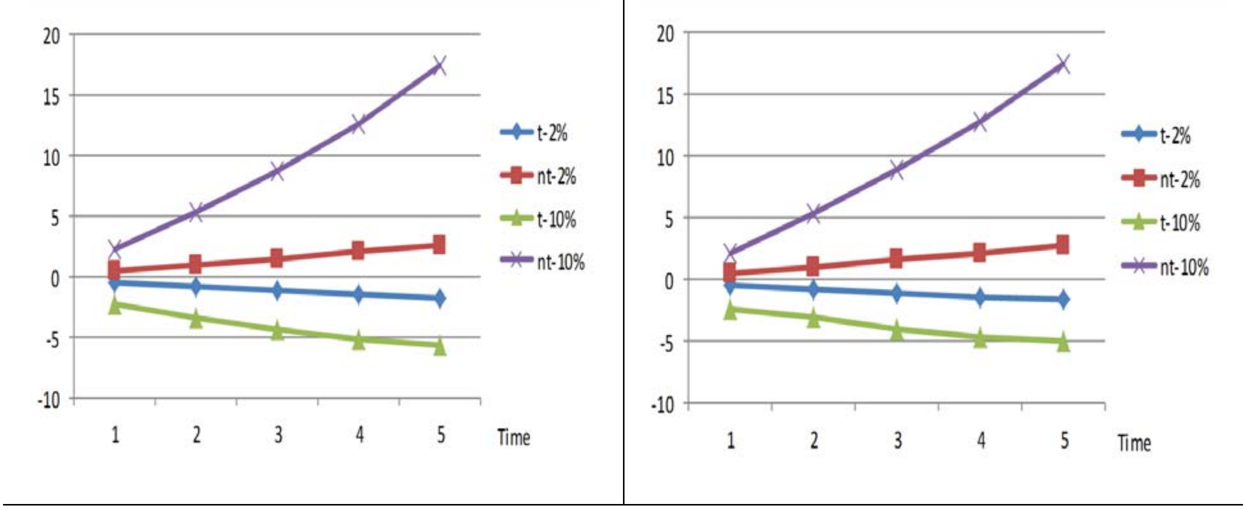
3.6.3. Domestic demand

The disentangling in tourism and non-tourism categories allows for a more accurate insight of the tourism effect on the economy as it is depicted on Figure 17. The tourism side -t- of the domestic demand (resident consumption, government consumption and investment) declines due to the rise in domestic prices produced by the tourist arrivals. Although, at the same time, the economic boosting and the reduction in employment eased by tourist flows increase the domestic non-tourism -nt- demand. The change in domestic demand is very similar in both scenarios. The lower employment effect of tourist arrivals in the pre-crisis scenario because of the higher appreciation of the real exchange rate is compensated by a higher increase in investment due to a more optimistic economic growth. As a result, domestic demand practically converges in both scenarios. More precisely, in the case of the 2% shock, domestic tourism demand falls 0.48% in the first year and 1.79% in the last year in the post-crisis situation. On the contrary, domestic non-tourism demand increases 0.44% in the first year and 2.64% in the last year. These results begin to show the less positive side of the flow of tourist arrivals which will be explained in more detail in the next section.

Up to now, the 10% shock has been used as a hypothetical upper bound scenario to provide a better insight into the strength of tourism to generate economic growth. Hereafter, The rest of sections are focused on the most likely 2% shock.

Figure 17. Changes in domestic demand respect to the BAU situation (%)

Post-crisis	Pre-crisis



3.6.4. Winners and losers: "Dutch Disease"

From a macroeconomic perspective, the positive effect of the tourist arrivals in the economy has been already highlighted in the previous sections. However, at sectoral level, the tourism shock has diverse effects depending on the goods produced or the services provided, which, in last term, produces a reallocation of resources among the economic sectors. More precisely, tourism sector has two remarkable effects on the economy: it increases the demand of non-tradable goods and, at the same time, it boosts the foreign exchange rate that undermines the exterior competitiveness of traditional exports. These results can be seen as a general consequence of the *Dutch Disease*. The term *Dutch Disease* was first used by the magazine *"The Economist"* in 1977 to explain the effect of the oil discovered in the sixties in the North Sea on the Dutch economy. Corden and Neary (1982) and Corden (1984) are the first that model it in academic terms. These papers differentiate among three sectors: booming sector, lagging sector and non-tradable sector. The booming sector begins to produce and export strongly. Such sector demand workers and capital from other sectors (lagging sectors and non-tradable sectors) to keep producing (resource effect). At the same time, the foreign income generated by the booming sector increases the real exchange rate that erodes the exterior competitiveness of traditional exports; and, together with the increase in the demand of non-tradable goods produced by the income generated in the booming sector, cause the expenditure effect. This rise in non-tradable goods also increases the demand of workers and capital in such sector in disfavor of the lagging sector (another resource effect). As a result, it produces a *de-industrialisation* (lagging sector), a strong increase in domestic prices and in the real exchange that, eventually, falters the competitiveness and shrinks the economy.

The *Dutch Disease* has been traditionally associated with oil exports countries such as Saudi Arabia, Qatar, Venezuela or Norway. Many of them avoid changing most of the revenues obtained from their oil exports into local currency to prevent the *Dutch Disease*. However, this *economic illness* can be generalised to any situation in which a country begins to receive an important amount of foreign money that trigger the consequences explained above. For instance, Laplagne, Treadgold and Baldry (2001), Usui (1996), VanWijnbergen (1986) and White (1992) show how developing countries can suffer from this illness due to the external aid received.

Van Wijnbergen (1986) argues that the negative connotation of the term *Dutch Disease* should not hide an important trade theory behind it by which an economy tend to produce those goods that require an intensive use of the most abundant factor in the country (Heckscher-Ohlin trade theory). According to Roca (1998) the diagnosis of the *Dutch Disease* can be checked following four hypotheses: appreciation of the real exchange rate, decline in the exports of the lagging sector, decline in the outputs of the lagging sector and a likely increase in the outputs of the non-tradable sector. The first two hypotheses compose the expenditure effect, and the last two, the resource effect. Additionally, a fifth hypothesis should be added in regards to the resource effect: the likely increase in employment in the booming and non-tradable sectors and the respective likely declines in the lagging sectors (win-lose situation).

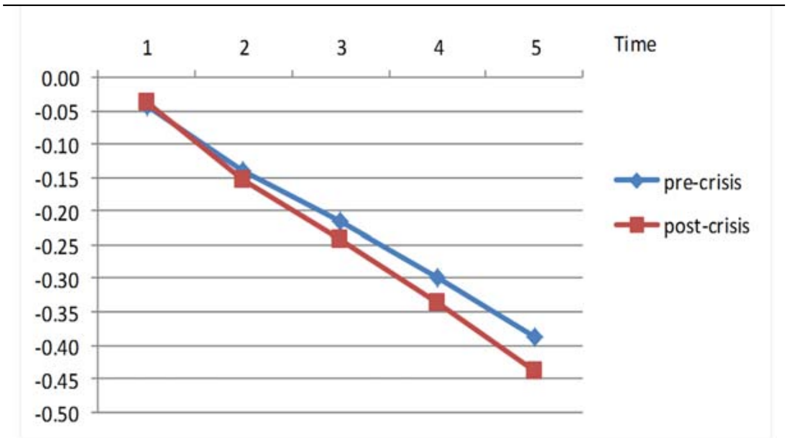
3.6.4.1. Expenditure effect

Appreciation of the real exchange rate

It should be remarked that the exchange rate does not account for nominal, but real exchange rate. The exchange rate in a CGE model adjusts to the change between domestic and world prices (Burfisher, 2011). Thus, the exchange rate ensures that the same amount of goods/services can be bought both domestically and abroad.

As depicted on Figure 18, a 2% increases in the tourist arrivals appreciate the real exchange rate almost 0.4% and 0.45 in the fifth year in scenario 1 and 2 respectively.

Figure 18. Change in the real exchange rate (%)



Decline in the exports of the lagging sectors

The lagging sectors are associated with Agriculture, energy and mining, and industry. As shown in Table 9, the exports in the lagging sectors decline in both scenarios in spite of the high unemployment rate. The appreciation of the real exchange rate, and the less labour-intensive structure of these activities, overcomes the positive effect of the lower salaries due to the high unemployment rate. The decline in traditional exports is especially considerable in the tourism side and, more precisely, in the agriculture commodities with a fall in 7.52% and

7.93% in the last year in the post-crisis and pre-crisis scenarios, respectively. The exports of the lagging sectors account for 70% approximately of total exports in Spain. Thus, any negative impact on them will severely affect the current account.

Table 9. Change in exports in the lagging sectors (%)

Goods\time		Post-crisis 1	2	3	4	5
Agriculture	**t**	-1.68	-3.08	-4.58	-6.06	-7.52
	nt	-0.50	-0.80	-1.19	-1.58	-1.95
Energy and mining	**t**	-	-	-	-	-
	nt	-0.45	-0.70	-1.04	-1.37	-1.70
Industry	**t**	-0.65	-1.11	-1.65	-2.19	-2.71
	nt	-0.24	-0.31	-0.44	-0.57	-0.70
		Pre-crisis 1	**2**	**3**	**4**	**5**
Agriculture	**t**	-1.87	-3.27	-4.86	-6.41	-7.93
	nt	-0.65	-0.95	-1.41	-1.86	-2.29
Energy and mining	**t**	-	-	-	-	-
	nt	-0.56	-0.77	-1.14	-1.49	-1.83
Industry	**t**	-0.70	-1.10	-1.62	-2.13	-2.63
	nt	-0.29	-0.29	-0.42	-0.53	-0.62

3.6.4.2. Resource effect

Decline in outputs of the lagging sector

The outputs in the lagging sector (agriculture, energy and mining and industry) fall slightly during the five year in both scenarios as shown in Table 10. The higher decline occur in “Energy and mining” in both scenarios. Thus, the win-win equilibrium described in the TNT-T model is not achieved. The tourist arrivals bypass the win-win equilibrium and move the economy towards a win-lose equilibrium.

Table 10. Change in production in the lagging sectors (%)

Sectors\ time	Post-crisis				
	1	**2**	**3**	**4**	**5**
Agriculture	-0.24	-0.35	-0.53	-0.69	-0.85
Energy and minery	-0.31	-0.48	-0.72	-0.95	-1.18
Industry	-0.16	-0.20	-0.29	-0.38	-0.46
	Pre-crisis				
	1	**2**	**3**	**4**	**5**
Agriculture	-0.31	-0.40	-0.58	-0.76	-0.93
Energy and minery	-0.37	-0.52	-0.77	-1.01	-1.25
Industry	-0.19	-0.18	-0.26	-0.33	-0.39

An increase in the outputs of the non-tradable sectors

As it can be appreciated in Table 11, output by activities increase in the booming (B) and non-tradable sectors (N) in both scenarios. The accommodation sector, air transport sector and the travel agencies sector are the most benefited from the tourism arrivals with an increase of 5.29%, 3.01% and 14.67% in the post-crisis scenario and 5.26%, 3.14% and 13.04% in the pre-crisis scenario for the fifth year, respectively. This result is also in accordance with the TNT-T model by which tourism demand boosts the aggregate demand towards non-tradable goods.

Table 11. Change in production in the booming and non-tradable sectors (%)

Sectors\ time	Post-crisis				
	1	**2**	**3**	**4**	**5**
Construction (N)	0.07	0.19	0.30	0.42	0.55
Trade (B)	0.01	0.13	0.20	0.28	0.36
Accommodation (B&N)	0.99	2.06	3.12	4.20	5.29
Catering services (B&N)	0.22	0.56	0.86	1.17	1.49
Railways transport (B)	0.49	1.08	1.63	2.20	2.78
Road transport (B)	0.04	0.19	0.29	0.41	0.53
Maritime transport (B)	0.07	0.27	0.41	0.56	0.72
Air transport (B)	0.54	1.18	1.78	2.39	3.01
Other transport services (B)	-0.01	0.09	0.14	0.20	0.27
Travel agencies (B&N)	2.67	5.35	8.08	10.85	13.65
Real estate (B&N)	0.03	0.17	0.26	0.36	0.47
Rent a car (B&N)	0.13	0.36	0.55	0.75	0.96
Entertainment (B&N)	0.08	0.25	0.38	0.52	0.67
	Pre-crisis				
	1	**2**	**3**	**4**	**5**
Construction (N)	0.07	0.23	0.37	0.51	0.67
Trade (B)	-0.01	0.16	0.26	0.36	0.48
Accommodation (B&N)	0.96	2.04	3.09	4.17	5.26
Catering services (B&N)	0.20	0.59	0.91	1.24	1.59
Railways transport (B)	0.47	1.09	1.65	2.23	2.83
Road transport (B)	0.01	0.20	0.32	0.44	0.59
Maritime transport (B)	0.02	0.24	0.38	0.52	0.68
Air transport (B)	0.53	1.22	1.85	2.49	3.14
Other transport services (B)	-0.05	0.09	0.16	0.23	0.32
Travel agencies (B&N)	2.56	5.12	7.72	10.36	13.04
Real estate (B&N)	0.01	0.21	0.32	0.45	0.59
Rent a car (B&N)	0.11	0.37	0.57	0.78	1.00
Entertainment (B&N)	0.07	0.29	0.45	0.62	0.81

A likely increase/decrease in the employment in the booming-non-tradable sectors/lagging sector

The lagging sectors (L) reduce the employment rate in spite of the high unemployment rate and increase in tourist arrivals (Table 12) with the exception of the industry which increase the employment from the second to the fifth year in both scenarios. On the other hand, the booming and non-tradable sectors increase their demand of labour. The most benefited sectors from the high unemployment rate are accommodation, catering services, railway transport, air transport and travel agencies which increase their demand of workers by 6.12%, 2.33%, 3.45%, 3.8% and 14.67% in the post-crisis situation and 6.28%, 2.64%, 3.65%, 4.12% and 14.31% in pre-crisis situation, respectively.

Perhaps, and assuming the appreciation in the real exchange rate, a higher increase in the capital accumulation process could allow the lagging sectors to absorb it and, consequently, also increase their employment demand. Unfortunately, the tourism sector does not seem to provide such increase in the capital accumulation.

Table 12. Change in employment by sectors (%)

Sectors\ time	**Post-crisis**				
	1	**2**	**3**	**4**	**5**
Agriculture (L)	-0.20	-0.17	-0.24	-0.30	-0.35
Energy and mining (L)	-0.26	-0.31	-0.45	-0.58	-0.70
Industry (L)	-0.11	0.05	0.09	0.14	0.21
Construction (N)	0.11	0.49	0.76	1.05	1.36
Trade (B)	0.05	0.44	0.69	0.94	1.22
Accommodation (B&N)	1.04	2.36	3.58	4.83	6.12
Catering services (B&N)	0.27	0.87	1.34	1.82	2.33
Railways transport (B)	0.54	1.32	2.01	2.72	3.45
Road transport (B)	0.08	0.53	0.82	1.13	1.45
Maritime transport (B)	0.12	0.65	1.00	1.36	1.75
Air transport (B)	0.58	1.47	2.23	3.01	3.80
Other transport services (B)	0.03	0.39	0.60	0.83	1.08
Travel agencies (B&N)	2.72	5.70	8.64	11.63	14.67
Real estate (B&N)	0.07	0.56	0.87	1.19	1.52
Rent a car (B&N)	0.18	0.69	1.05	1.44	1.84
Entertainment (B&N)	0.12	0.39	0.61	0.84	1.08
	Pre-crisis				
	1	**2**	**3**	**4**	**5**
Agriculture (L)	-0.27	-0.18	-0.25	-0.30	-0.33
Energy and mining (L)	-0.33	-0.31	-0.45	-0.57	-0.68
Industry (L)	-0.14	0.12	0.21	0.31	0.43
Construction (N)	0.11	0.50	0.77	1.07	1.39
Trade (B)	0.03	0.56	0.87	1.20	1.55
Accommodation (B&N)	1.00	2.41	3.66	4.96	6.28
Catering services (B&N)	0.24	0.98	1.51	2.06	2.64
Railways transport (B)	0.51	1.38	2.11	2.87	3.65
Road transport (B)	0.05	0.63	0.97	1.34	1.73
Maritime transport (B)	0.06	0.72	1.12	1.54	1.98
Air transport (B)	0.57	1.57	2.40	3.25	4.12
Other transport services (B)	-0.01	0.47	0.73	1.01	1.32
Travel agencies (B&N)	2.60	5.56	8.42	11.33	14.31
Real estate (B&N)	0.05	0.70	1.09	1.50	1.93
Rent a car (B&N)	0.15	0.78	1.20	1.64	2.11
Entertainment (B&N)	0.11	0.46	0.71	0.98	1.27

To conclude this section, the tourist arrivals unleash the *Dutch Disease* although its degree varies depending on the effect considered. On the one hand, the expenditure effect is quite reduced. Traditional exports decline because of the appreciation of the real exchange rate, but, with the exception of the tourism side of the agriculture commodities, the fall is not remarkable.

On the other hand, the resource effect has remarkable and positive consequences on the production and the employment in the non-tradable sectors. The most tourism-oriented sectors such as accommodation, air transport or travel agencies are the most benefited from tourist arrivals. By contrast, traditional sectors decline their production.

3.7 Conclusions and further research

Both the disentangling of the IOT into tourism and non-tourism categories and the recursive-dynamic CGE model provide a detailed insight into the effect of the tourist arrivals on the Spanish economic. Besides, the recursive-dynamic CGE model also allows analysing the linkages among sectors and their consequences in the economic growth over time.

In this ever-changing world, the relationship between tourism and economic growth is so fuzzy and complex that any conclusion in this regards should be taken cautiously. For instance, the advent of internet and new technology has converted some non-tradable goods in tradable ones such as accounting services. Countries such as India are already taking advantage of this new situation. These constant and unanticipated changes will make reconsider many theories and conclusions previously settled in the field. Keeping this in mind and based on the assumptions and projections established here, this paper affirms that tourism provides economic growth, reduces the unemployment rate, improves the terms of trade and boosts the domestic demand in the medium term in Spain. The effect on those macroeconomic variables varies in intensity. For highly indebted countries like Spain, the improvement in the current account deficit is very beneficial in the short and medium term. The effect on real gross added value and employment is also positive. Albeit the effect on unemployment is not a solution, it is, however, a relief. The tourist arrivals have a double effect on the domestic demand. On the one hand, the domestic demand grows in its non-tourism side due to the increase in the employment demand. On the other hand, the tourism side of the domestic demand declines due to the rise in domestic prices produced by the tourist arrivals.

Nonetheless, at microeconomic level, the positive effects of the tourism sector are not as clear and positive as at macroeconomic level. Tourism sector seems to be a zero sum game. The assumption of unemployment and capital accumulation in the TNT-T model allows for the existence of a new equilibrium in which both tradable and non-tradable sectors win with tourism (win-win situation). Nonetheless, the posterior results show that tourism is guided towards a zero sum game rather than a non-zero one (win-lose situation). The tourist arrival fosters strongly the appreciation of the real exchange rate that erodes the potential advantages of the existence of a high unemployment and the capital accumulation generated by tourism. Thus, tourism-led growth undermines traditional sectors such as agriculture, energy and minery, and industry in a clear consequence of the *Dutch Disease* despite the economy is far from its production possibility frontier. In the medium term, its effects vary and are not especially harmful. Its negative consequences are overcome by the positive ones. However, in the long term, following this path, it could happen that the lasting erosion of traditional sectors may end up in a shrinking economic situation. Moreover, this potential vicious circle can be boosted by the low capital accumulation promoted by the labour intensive sectors in which tourism is based. Additionally, the empirical results support that a rise in tourism demand alleviates the fall in non-tradable goods that occur when an economy goes from a booming situation towards a low growth situation in which the demand of non-tradable goods declines strongly because of its dependency of domestic demand.

Further research may be oriented to improve the expectation in dynamic CGE models. For instance, the combination of both forward-looking and backward-looking behaviour in the same framework. Additionally, the forward looking behaviour should base their future decision in suitable economic indicators such as inflation index. Finally, there is a potential cause of economic depletion that should be taken into account in future research. The environment acts as a pull factor and its sustainability in the long term is vital for the economic growth in tourism-led countries. The lack of a suitable management in this regards could be as harmful as the Dutch Disease. Thus, both economic revenues and environmental sustainability are necessary for a steady and balanced economic growth.

The role of climate and the tourism destination choice

4.1 Introduction

The destination choice is the last step in a complex decision making process in which two kind of explanatory variables has to be combined: those related to individual characteristics (also known as choice invariant variables) and to destination characteristics (choice variant variables). In regards to the last one, the success of a tourist destination depends on many characteristics. Amongst them, climate is one of the most important factors (De Freitas, 2003). For some destinations, like those based on sun and beach, the reliability on the climate is so important that the climate conditions are vital (Capó, Riera & Rosselló, 2007) especially when such destinations rely on outdoor activities (cycling, fishing or walking), whereas for other destinations this is considered as a complement asset instead (Gómez-Martín, 2005). In this regard, the climate change means an increasing concern that should be addressed promptly. According to the Intergovernmental Panel on Climate Change (2007), the temperature is expected to rise up to 1.8ºC on average (scenario B1) during 21st century. This global increase in temperature could affect the current tourism flows toward traditional sun and beach destinations. Additionally, a tourism destination also relies on other attributes beyond climate endowments that cannot be neglected. One of these is the level of social and economic development of the country which is also positively perceived by the tourists (Table 13). For policymakers, the understanding and management of both climate and socioeconomic factors is key to become a successful tourism destination.

Table 13.Top ten most visited countries

	Millions of	Ranking	human
France	83	24º	Very high
USA	67	6º	Very high
China	57.7	93º	Medium
Spain	57.7	29º	Very high
Italy	46.4	30º	Very high
Turkey	35.7	68º	High
Germany	30.4	17º	Very high
UK	29.3	21º	Very high
Russia	25.7	58º	High
Malaisia	25	59º	High

Source: World Tourism Organisation, International Monetary Fund and United Nations.

On the other hand, the way that a tourist perceives the destination attributes is also conditioned by individual characteristics in the region of residence. The distance is one of these variables that is not equally perceived by individuals. Curiously, there is no consensus in the literature whether it affects positively or not to the destination choice. For some authors, the distance is seen as a restriction for the individual (Taylor & Knudson, 1976). On the contrary, for some others is perceived as a source of utility in itself (Baxter, 1979). But perhaps, the most conditioned variables by the region of residence is the climate. To tourists in cold regions, the climate in destination is seen as a push factor (tourists from colder regions tend to travel to warmer regions). On the contrary, climate can also act as a pull factor to tourists in warmer regions who tend to travel domestically (Eugenio-Martín & Campos-Soria, 2010). At the same time, individuals from colder regions may be willing to accept colder optimal climate conditions in destination in contrast to individual from warmer regions. These kinds of asymmetries in climate perceptions have to be suitably addressed in order to explain the destination choice of individuals. So far, literature has been not very prolific on climate and destination choice issues. The destination choice has been mainly based on aggregate data (Bigano, Lize & Tol, 2006a; or Madison, 2001) neglecting the differences in the climate perceptions that occurs at individual levels. On the contrary, those who do it focus on few destinations or regions (Bujosa & Rosselló, 2013; Nicolau & Más, 2006). So, the destination choice process has not been addressed yet taking into account a wider set of destinations and combining both individuals and destinations characteristics.

This paper estimates a random parameter logit model (mixed logit) where the assumption of individual random parameters permits a better and more accurate insight into the individual perception of the climate conditions. At the same time, individual and destination attributes are combined in the same framework in order to choose a sun and beach destination. Finally, two scenarios are simulated based on the temperature projections of the Intergovernmental Panel on Climate Change (2007).

4.2 State of the art

4.2.1. Destination choice: the last step in a complex decision process

The destination choice is the last step within a complex individual decision process. Eugenio-Martin (2003) bases the decision process on five stages: participation choice, tourism budget constraint, frequency and length of stay, kind of destination and destination and transportation mode choice. The four first stages mainly depend on socioeconomic characteristics of the individuals whereas the last step relies on attributes of the destination. Despite the fact that two kinds of explanatory variables affect different decision levels and thus, they may be perceived separately, the five stages are part of a mutually related holistic decision. So far, none current methodology is able to combine the five stages in one single simultaneous decision making because of the difficulty of including both kind of explanatory variables in the same framework. So far, the literature has focused the research on each stage independently (Train, 1998; or Alegre & Pou, 2006) or combining several (Eymann & Ronning, 1992; or Eymann, 1995). Eugenio-Martín and Campos-Soria (2010) explain the participation choice (first, whether travel or not and travel domestically or abroad) using socioeconomic attributes such as income, age or climate in the regions of residence. Nicolau and Más (2005b) model three tourism decisions: whether take a vacation or not, travel domestically or abroad and finally, taking single or multi-destination vacations.

The literature in destination choice has been mainly based on aggregate data (Lize & Tol, 2002, Madison, 2001, Rosselló & Santana, 2014 or Bigano et al., 2006a), however this aggregate approach lacks of an accurate individual description of key destinations variables in which individuals mainly base their destination choice on (Gösslig & Hall, 2006). Moreover, they have been mainly focused on time series analysis (forecasting) (Song & Li, 2009; Smeral, 2009, 2010 or Bigano, Hamilton, Maddison & Tol, 2006b). At micro level, the destination choice process have been addressed by Haider and Ewing (1990), Morley (1994b), Bujosa and Rosselló (2013), and Nicolau and Más (2006).

Among the myriad of attributes that affect the individual destination choice, certain mutually related variables have an outstanding importance and are key for the destination in order to attract tourism flows: Climate and distance.

4.2.1.1. The role of climate

For instance, sun and beach destinations rely strongly on climate conditions. From a tourist´s perspective, people are likely to differ on the perceptions of such climate attributes and, moreover, it may be affected by climate conditions in their regions of residence (Eugenio-Martin & Campos-Soria, 2010). According to them, a warmer climate in the region of residence acts as a "pull factor" to travel domestically whereas a colder one acts as a "push factor" to travel abroad. Bigano et al. (2006a) also highlight the possible existence of asymmetric preferences depending on the climate of residence in the sense that, people from different regions share the same perception about the optimal temperature in destination but they differ in the intensity of such climate sensitivity. The advent of the climate change has brought up a renewed interest in the role of climate in tourism (Rosselló-Nadal, 2014). The climate change may influence current tourism patterns. According to Bujosa and Rosselló (2013), Spain´s colder Northern provinces could benefit from a rising in temperature in detrimental of Southern provinces. The same shift in tourism flows is perceived by Moreno and Amelung (2009) due to the global warming, albeit they point out that Mediterranean regions will maintain an outstanding position over the next decades as tourism destination.

The most common way to include the climate in tourism models has been through annual average data (Bigano et al. 2006a; Hamilton et al, 2005a,b; Hamilton and Tol, 2007). But, such dataset lacks of suitable information on individual perceptions about climate attributes which, in last term, influence the destination choice by the individual. Alternatively, other authors have used tourism climate index (TCI) (Mienczkowski, 1985) such as Nicholls and Amelung (2008), Amelung, Nicholls and Viner (2007), Amelung & Viner (2006) or Eugenio-Martín and Campos-Soria (2010) but they are not destination choice models. These kinds of indices are based on revealed preferences and gives subjective weights to the terms included in the index. The last approach to climate variables consist in micro data based on stated preferences in which climate attributes are included as explanatory variables (Bujosa & Rosselló, 2013 and Nicolau & Más, 2006).

4.2.1.2. The role of distance

For some authors, the distance affects negatively the destination choice (Mckercher & Lew, 2003). According to them, there are tourism exclusion zones (ETEZ) where little or no tourism occurs. Greer and Wall (1979) argue that the higher the distance, the higher the supply of recreational activities to compensate it. Moreover, the price has a deterrent effect and it is negatively correlated with the distance (Nicolau & Más, 2006) but its effect varies depending on the purpose of the study. According to them, good climate and cultural attributes alleviate the negative effect of prices and distance. This finding shows that the perception of the distance varies among individuals and the aim pursued. On the contrary, other authors suggest that the distance may be a source of utility. According to Baxter (1979), the travel itself is part of the tourism utility and thus, it provides satisfaction. In the same line, Wolfe (1970) and Wolfe (1972) hold that, after passing a certain threshold, distance becomes a positive attribute.

There is also a complementary way to describe the role of distance. The importance of the distance between markets and suppliers was first remarked by von Thünen (1826). According to him, suppliers follow a spatial pattern around a market depending on the characteristic of the goods provided. According to Von Thünen´s findings, perishable goods such as vegetables are closer to the market, whereas grain foods such as wheat are further from it. The factor behind this spatial pattern is known as Von Thünen rent or spatial rent (rents that can only be enjoyed in specific geographical places). In the case of tourism, tourists (market) may be more willing to travel further to enjoy better spatial rent (better climate) which is in accordance with Greer and Wall (1979) or Nicolau and Más (2006). Thus, a negative relationship between distance and climate should be expected. For a sun and beach destination, this means that the warmer the destination, the further the potential target markets that can be achieved. In this sense, the climate change could be also seen as a spatial rent generator. This relationship between climate and distance is also shaped by the influence of socioeconomic variables such as income. In the sense that, the distance that the individual is willing to assume can be boosted by higher incomes.

4.2.1.3. Destination choice methodologies: all roads guide to mixed logit

As it has been already highlighted in the beginning of the section, the destination choice is a complex decision process which is mainly based on two kinds of variables that not many current methodologies are able to appropriately deal with. On the one hand, people choose their destination based on destination variables (choice variant variables) such as temperature, precipitation, distance, recreational amenities, natural recreational resources or level of social and economic development. On the other hand, personal variables (choice invariant variables) such as temperature and precipitation in origin or income may also influence the destination choice. Moreover, some of these attributes such as temperature or precipitations are differently perceived by tourists. Quoting Nicolau and Más (2005, p. 56): *"…it is highly unlikely that the whole sample (….) has the same set of parameter values which implies the need to consider unobserved heterogeneity of tourist in parameter estimation"*. Such climate attributes are intimately linked by the existence of a certain trade-off between both; which, lastly, shape the apprehension of the climate by the individual. So, it reflects the existence of a balance in which temperature and precipitation cannot change independently of each other to achieve higher welfare levels (overriding effect). Other climate attributes such as sunny days, humidity or windy days may be also important in the destination choice but vary randomly during the day and thus, they cannot be accurately anticipated.

Among the set of methodologies, discrete choice models (microeconometric modeling) allow for a closer insight into individual behavior decision (Train, 2009). The logit/probit model is the first model within the discrete choice family. This is the methodology chosen by Seddighi and Theocharous (2002) and Morley (1994a) to model the decision of revisiting Cyprus and visiting Sydney, respectively. Nevertheless, this approach is not enough when several destination choices are taken into account. Under these circumstances, the destination choice can be modeled assuming a multinomial logit model in which each destination has a categorical value (Morley, 1994b). On the side of the explanatory variables, the existence of both individuals (choice invariant) and destinations (choice variant) explanatory variables reduces the possibilities to the conditional multinomial logit model. Nonetheless, the conditional multinomial logit cannot suitably deal with many alternatives (destinations) and choice invariant variables at the same time. Another drawback is that it assumes that each individual weigh up the explanatory variables in the same way in the utility function (same β for all individuals) and thus, the individual heterogeneous preferences are not captured. Finally, the model imposes the restriction of the independence of irrelevant alternatives (IIA).

Alternatively, there is the possibility to combine the destination choice with other tourist decisions. For instance, the destination choice could also be modeled simultaneously with stage one (participation choice) and five (destination choice) through an adapted version of the heckman model (Skrondal & Rabe-Hesketh, 2004). This simultaneous equations model allows for correlation between both equations and different explanatory variables can be included in each equations but, all have to be choice invariant variables and random individual parameters (β_i) are not allowed. Additionally, according to Eugenio-Martín (2003) a nested multinomial logit could be used to combine the kind of destination (stage four) and destination choice (stage five). Nevertheless, it also has the same inconvenient already explained in regards to the conditional logit models except for the restriction of IIA. Following with stage four and five, both stages could also be modeled using latent class models which relax the hypothesis of fixed parameters. The dependent variable would be the destination choice (discrete variables) but different parameters are assumed depending on the kind of travel chosen. By relaxing the hypotheses of the latent class (allowing a more individual heterogeneity beyond the classes considered), the mixed logit model is reached.

4.3 Case study

The dataset of socio-economic characteristics was obtained from a stratified weighted survey of 16,183 households carried out for the countries of the European Union (EU-15) in 1997. Amongst various issues, the survey covers information concerning holidays taken and socioeconomic variables such as income, gender, age, education, the number of children, the number of adults, marital status and employment. Unfortunately, not all the interviewees provided their income level. This implies a potential sample selection problem if the behaviour of the households that do not respond to the income question is different from those who respond. Indeed, sample selection test (Eugenio-Martin, 2008) shows significant differences between the two. Two-step Heckman procedure is applied to minimise this problem (Eugenio-Martin, 2008). For the individuals who did not state their income, it is estimated according to techniques that deal with grouped data (since income is grouped in 12 intervals) and taking into account the sample selection problem (Eugenio-Martin, 2008).

4.4 Methodology

According to Fiebig, Keane, Louviere and Wasi (2009) the mixed logit is a special case of a generalised multinomial logit model (equation (20)).

$$U_{ij} = \beta_i x_{ij} + \varepsilon_{ij} \; ; \quad \varepsilon_{ij} \sim iid \qquad (20)$$

Where U_{ij} is the utility to individual i from choosing alternative j and now each individual has its own individual random parameter β_i that varies according to equation (21), where β is a vector of utility weights, η_i is the individual specific heterogeneity, σ_i is a scale factor and γ is a parameter between 0 and 1.

$$\beta_i = \beta\sigma_i + \gamma\eta_i + (1-\gamma)\sigma_i\eta_i \; ; \quad \eta_i \sim N(0,1) \qquad (21)$$

If γ=0 and $\sigma_i = \sigma$, the model collapses to a mixed logit (equation (22)) and the random parameter distributes according to equation (23).

$$U_{ij} = \beta_i x_{ij} + \varepsilon_{ij} \; ; \quad \varepsilon_{ij} \sim iid \qquad (22)$$

$$\beta_i = \beta + \eta_i \qquad (23)$$

The mixed logit model can be also generalised to include correlation among random parameters (Hensher, Rose & Greene, 2005) (equation 24). The correlation among random parameters is captured assuming non-zero values in the off-diagonal matrix of Γ. Thus, the standard deviation of the parameters is no longer independent.

$$\beta_i = \beta + \Gamma \eta_i \ ; \quad \text{var}\left[\beta_i \mid x_i\right] = \Sigma = \Gamma\Gamma' ; \ \ \eta_i \sim N\left(0,1\right) \qquad (24)$$

η_i is distributed according to a normal distribution but several other distributions can be also assumed.

In regards to destination choice modeling, the mixed logit models fulfill the requirements needed in order to best capture the asymmetric characteristics of individuals already highlighted in this section. Equation (24) allows capturing the individual heterogeneity of climate attributes (β_i), the overriding effect among such attributes (Γ) and, the non-anticipated effects of the climate attributes (η_i).

In the field of destination choice, the mixed logit models have been applied by Bujosa and Rosselló (2013) and Nicolau and Más (2006).

4.5 Results

Table 14 briefly summarise the explanatory variables of the model.

Table 14. Explanatory variables

Random parameters:	
Precipitations (mm)	$\beta_{prec} = \beta_{prec}^{mean} + \Gamma \eta_i$
Temperature (ºC)	$\beta_{temp} = \beta_{temp}^{mean} + \beta_{temp}^{origin} temperature_{origin} + \Gamma \eta_i$
Temperature squared	$\beta_{temp2} = \beta_{temp2}^{mean} + \beta_{temp2}^{origin} temperature \wedge 2_{origin} + \Gamma \eta_i$
Distance (thousands of km)	$\beta_{dist} = \beta_{dist}^{mean} + \beta_{income} \log(income_{origin}) + \Gamma \eta_i$
Non-random parameters:	
Road paved	% of total of roads
Life expectancy	Life expectancy in destination
Secondary school	Years of secondary schools achieved in destination
ppp_rate	Purchasing power parity rate between destination and origin

According to Table 14, the model allows for random parameters of the climate variables (temperature and precipitations). In the case of the temperature and temperature squared, it varies in mean with respect to their respective counterpart in the regions of residence. Moreover, the distance also varies in mean with respect to the logarithm of the income. The precipitations and the distance assume a linear relationship between them and the utility rather than a non-linear one as in the case of temperature. Cubic relationships may also be reasonable because it would mean that, at certain turning point, the utility would decrease more sharply when the precipitations and the distance rise. However, it was not statistically significant. On the other hand, a simple quadratic relationship would imply that, at a certain turning point, the utility rises when precipitations or distance also rise, which has no sense. In relation to the state of the art regarding the role of distance developed in this paper, this assumption could be a source of conflicting opinions. On the other hand, a quadratic effect is reasonable in the case of temperature (the cubic effect was not statistically significant). The rest of the explanatory variables are assumed as non-random.

Table 15. Determinant variables of the tourism destination choice

	Model	
	Parameter	St.dev
Random parameters:		
Precipitations	-0.02484***	0.00110
Temperature	2.43831***	0.09074
Temperature^2	-0.09977***	0.00308
Distance	-7.12421***	0.20619
Non-random parameters:		
Road paved	0.01732***	0.00095
Secondary education	0.01832***	0.00229
Life expectancy	0.11228***	0.00847
ppp_rate	-0.06550***	0.00202
Heterogeneity in mean:		
Temperature: temperature in origin	0.14276***	0.00403
Temperature^2: (temperature in origin)^2	-0.45548D-4***	0.2911D-05
Distance: Log(income)	0.76293***	0.02648

Table 15 (continues). Determinant variables of the tourism destination choice

	Model	
	Parameter	St. dev
Diagonal values in Cholesky matrix:		
Sd. precipitation	0.01632***	0.00073
Sd. temperature	0.62423***	0.06736
Sd. temperature^2	0.01162***	0.00093
Sd. distance	0.92091***	0.02336
Off-diagonal values in Cholesky matrix:		
Cov(temperature, precipitation)	-0.01920***	0.00122
Cov(temperature^2,precipitation)	-0.74488D-4***	0.1896D-04
Cov(temperature^2, temperature)	0.00459***	0.00152
Cov(distance, precipitation)	-0.00231***	0.00030
Cov(distance, temperature)	0.20065***	0.2440
Cov(distance, temperature^2)	0.98583***	0.00059
Standard deviation of parameter distribution		
Precipitations	0.01632***	0.00073
Temperature	1.33174***	0.05757
Temperature^2	0.02025***	0.00147
Distance	0.98583***	0.2200
Mc fadden pseudo R-squared:	0.2966	
AIC	32,312	
Log likelihood function	-16,135.267	

Table 15 depicts the result of the model. All the explanatory variables have the expected sign and are highly significant. Moreover, the standard deviations of the random parameters are also highly significant which supports the assumption of random parameter for these variables. The precipitations in destination negatively affect the individual utility (-0.02484). On the other hand, the temperature in destination positively affects the individual utility (2.43831) and this effect is increased by the temperature in origin (0.14276). Thus, individuals from warm regions prefer warm temperature in destination. Nevertheless, the temperature squared represents a turning point in the utility achieved in destination. In these circumstances, people will tend to travel domestically if the temperature in destination is above their optimal temperature. These results show the asymmetric perceptions of climate attributes depending on the climate attributes in origin. Thus, if current cold regions become warmer due to the climate change, people from these regions will be more sensitive to temperature as people from current warm regions. This relationship is in accordance with other authors findings such as Bigano et al. (2006a), although they reduce the asymmetric effect to the temperature squared only. The distance negatively affects the tourism destination choice but the income (logarithm of the income) reduces the negative impact of the distance (0.76293).

As it was already explained in the previous section, the standard deviation is no longer independent because of the correlations assumed among the random parameters. Thus, the larger the covariance, the greater the relationship between the parameters. In the case of precipitations, the share of the total standard deviation explained by itself is 0.01632, the rest of the total standard deviation is explained by the interaction with temperature (-0.01920), temperature squared (-0.74488D-4) and distance (-0.00231). In the case of precipitation and temperature, this standard deviation means that the individuals with larger sensitivities to precipitations are likely to have lower sensitivities to temperature, until the optimal temperature is achieved (temperature squared). In the case of temperature and distance, the individuals with larger sensitivities to the temperature are less concerned about the distance in their utility function up. This relationship between distance and climate reinforces the hypothesis of Von Thünen (1826) by which people are willing to assume higher distance in order to enjoy higher spatial rents (warmer sun and beach destinations). The relationship between distance and temperature and precipitations is also in accordance with Nicolau and Más (2006).

Variables such as road paved, secondary education, life expectancy and ppp_rate reflect that tourists prefer more developed countries but, at the same time, cheaper than their regions of residence. These results are important for policymakers because, in contrast to climate variables, the destination can act over these variables in order to attract tourism (Eugenio-Martin, Martin-Morales & Sinclair, 2008).

Table 16 shows the changes in the tourism flows for the main tourism destinations produced by the increase in 1.8ºC in the temperature (Intergovernmetal Panel on Climate Change, 2007). According to scenario A, with a 1.8ºC increase in temperature in the main outbound tourism countries (Germany and UK), all current sun and beach destinations decrease their share in total tourism flows. For instance, France and Spain decrease their share 5.76% and 6.70%, respectively. In scenario B, all main destinations increase their share, but UK and Germany benefit most from such general increase in temperature.

Table 16. Changes in tourism flows produced by changes in temperature in the destination

		Scenario A: +1.8 ºC in Germany and UK	Scenario B: +1.8 ºC in all destinations
	Base share (%)	Change in share (%)	Change in share (%)
Croatia	1.88	-1.77	0.76
Cyprus	2.67	-1.01	0.93
France	7.56	-5.76	4.96
Greece	10.09	-4.94	0.40
Italy	8.04	-7.78	2.96
Malta	4.39	-3.17	1.15
Middle east	2.59	-1.47	2.52
Portugal	4.31	-2.82	1.84
Spain	9.46	-6.70	1.05
UK	6.89	24.99	7.07
Germany	6.52	36.81	6.55

4.6 Conclusions and further research

The modelling of the destination choice is challenging. All methodologies have their pros and cons, but, as far we know, mixed logit is probably the model that best fits the destination choice because it combines both origin and destination attributes. The asymmetric climate perceptions by individuals have been tested and confirmed. People from colder regions are more willing to travel abroad than those from warmer regions. People are expected to change their tourism pattern due to the Climate Change. Current outbound tourism countries will benefit most from such increase in temperature.

Attributes related to the level of development (road paved, year of education or life expectancy) are positively perceived by the tourist. These variables are more manageable by policymakers although the "revenues" come in the long term. This result demonstrates that sun and beach destinations are more than environmental endowments. Thus, tourism-led growth may require a certain level of economic development to really take advantage of it.

As it was mentioned in the paper, the way that climate is included in the tourism model often lacks of a suitable representation. Neither aggregate data, nor current climate indices properly capture the climate effect. As soon as society takes more concern about the impact of climate and environment, more micro data will be available. Despite that, aggregate data are expected to keep maintaining an outstanding position in tourism research. Under these circumstances, the development of a new tourism climate index based on objective weights and in stated preferences will help to have a closer insight into the response of tourists to the climate. In consequence, the use of this climate index as variable in macro data will also help to better capture the climate change impact.

Annex 3.1. TSA-IOT and SAM

A.3.1.1 Introduction

This chapter is oriented to explain the elaboration of the dataset necessary to be used in the computable general equilibrium (CGE) model (chapter 3). The methodology is based on the Social Accounting matrices (SAMs). At the same time, the SAM is formed by the input-output tables (IOT) and the national accounts (Annual Accounts by Institutional Sectors (AAISSS)). The IOT gather up the information related to the economic flows in the economy for one single year. While the AAIISS collect information on how the resources are generated and used in the economic process (IOT) and how they are subsequently distributed among institutions. However, the aim pursued in the chapter devoted to the CGE model requires a deeper representation of the tourism sector that the IOT is not able to provide. Quoting Dwyer, Forsyth and Dwyer (2010, p. 239): *"the problem with measuring the economic significance of tourism spending is that "tourism" does not exist as a distinct sector in any system economic statistic or of national accounts"*. In other words, there is not an industry named "tourism". According to Blake, Durbarry, Sinclair and Sugiyarto (2001), the IOT framework overestimates the total GDP effect and underestimates the total effect on the tourism sector. The Tourism Satellite account (TSA) is the dataset able to fill the lack of tourism information in the IOT. Thus, one of the aims of this chapter is to combine the IOT and the TSA to form a new IOT.

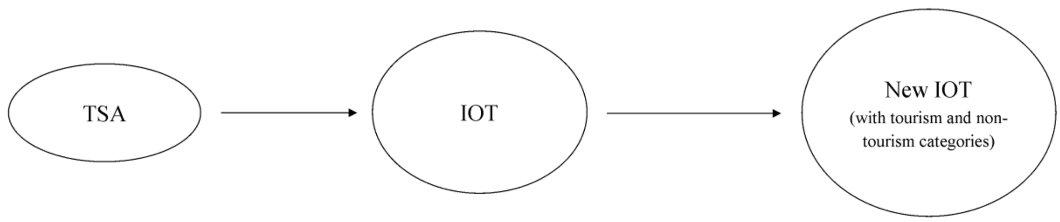
On the other hand, and as it was already mentioned, a SAM requires also information about the income distribution by institutions. The AAIISS provide such information but it has to be managed and organised in a suitable manner to create a SAM.

This chapter is divided in two parts: first, the TSA and the IOT are combined to create the new IOT. Second, the information gathered up in the AAISSS is also included with the new IOT to elaborate the SAM.

A.3.1.2 Integration of the IOT and the TSA

This study is based on two datasets: the Input-Output table (IOT) and the Tourism Satellite Accounts (TSA) for Spain in 2006. These two datasets are combined to construct a new IOT whose main purposes are: first, to differentiate between the tourism sector and the rest of the economy and second, to disentangle all goods and services between tourism and non-tourism categories. The IOT is the framework in which the TSA is included. Figure 19 shows the scheme followed in the elaboration of the data base.

Figure 19. Scheme of the datasets



A.3.1.2.1. Input-Output Table accounting framework

"The IOT are double entry matrices which represent the economic relations or flow of goods of an economy during a period of time" (Requeijo, Iranzo, Martínez de Dios, Pedrosa & Salido, 2007). The Spanish IOT accounting framework is adapted to the European System of Accounts (ESA-95). The IOT can be considered an extension of the national accounts (Muñoz, Iráizoz & Rapún, 2008). The IOT accounting framework provided by the Spanish Statistical Institute (INE) is formed by the following inputs-outputs tables:

Supply table at basic and purchase prices:

The Supply table gathers up data about production by goods and activities and imports, trade margins, transport margins and tax on products. The sum of production by activities and imports provides the total supply at basic prices. Including trade margins, transport margins and tax on products, so that the supply table at purchase prices is obtained.

Use table at basic and purchase prices:

The use table gathers up data about intermediate demand by goods and activities and final demand: final consumption demand (households, non-profit private institutions and government), Gross capital formation (GCF) (gross fixed capital formation (GFCF) and inventory changes (CHINV)) and exports by products. The sum of intermediate demand by activities, final demand and exports provides the total uses. If the net taxes on products are included, the use table at purchase prices is obtained, otherwise, the use table is at basic prices.

Domestic use table at basic prices:

The domestic table is equal to the use table but it includes information about domestic origin goods only.

Imported use tables at basic prices:

The domestic table is equal to the use table but it includes information about imported goods only.

In order to keep the accounts balanced, any IOT keeps certain equivalences:

$$\sum_{a=1}^{75} prod_{a,i}^{st} + \sum_{wld=1}^{2} imports_{i,wld}^{st} + \sum_{m=1}^{2} margins_{m,i}^{st} + nettaxes_{i}^{st} = \sum_{a=1}^{75} intermediate_{a,i}^{utp} + \sum_{h=1}^{3} finalconsumption_{h,i}^{utp} + \sum_{f=1}^{2} GCF_{f,i}^{utp} + \sum_{wld=1}^{2} exports_{i,wld}^{utp} \quad \text{(iot.1)}$$

$$\sum_{i=1}^{118} prod_{a,i}^{st} = \sum_{i=1}^{118} intermediate_{a,i}^{ut} + othertaxes_{a}^{ut} + \sum_{j=1}^{4} VA_{a,j}^{ut} \quad \text{(iot.2)}$$

$$\begin{aligned} intermediate_{a,i}^{ut} &= intermediate_{a,i}^{mut} + intermediate_{a,i}^{dut} \\ finalconsumption_{h,i}^{ut} &= finalconsumption_{h,i}^{mut} + finalconsumption_{h,i}^{dut} \\ GCF_{f,i}^{ut} &= GCF_{f,i}^{mut} + GCF_{f,i}^{dut} \\ exports_{i,wld}^{ut} &= exports_{i,wld}^{dut} \end{aligned} \quad \text{(iot.3)}$$

being:

st, utp, ut, dut, mut	Index for supply table, use table at purchased prices, use table, domestic use table and import use table respectively
a	Index for activities from 1 to 81
i	Index for commodities from 1 to 118
j	Index for gross wages, social contributions, net taxes on products and gross operating surplus
$prod_{a,i}^{st}$	Production by activity a and commodity i (supply table)
$imports_{i,wld}^{st}$	Imports from the European Union (EU) and rest of the world (ROW) by commodities (supply table)
$margins_{m,i}^{st}$	Trade and transport margins by commodities (supply

	table)
$nettaxes_i^{st}$	Net taxes on products by commodities (supply table)
$intermediate_{a,i}^{ut}$	Intermediate demand by activities and commodities (use table)
$intermediate_{a,i}^{mut}$	Intermediate demand by activities and commodities (import use table)
$intermediate_{a,i}^{dut}$	Intermediate demand by activities and commodities (domestic use table)
$finalconsumption_{h,i}^{utp}$	Final consumption by households, private non-profit institutions and national government by commodities (use table)
$finalconsumption_{h,i}^{mut}$	Final consumption by households, private non-profit institutions and national government by commodities (import use table)

$finalconsumption_{h,i}^{dut}$	Final consumption by households, private non-profit institutions and national government by commodities (domestic use table)
$GCF_{f,i}^{ut}$	Gross capital formation (GFCF) + change of inventories (CHINV) by commodities (use table)
$GCF_{f,i}^{mut}$	Gross capital formation (GFCF) + change of inventories (CHINV) by commodities (import use table)
$GCF_{f,i}^{dut}$	Gross capital formation (GFCF) + change of

	inventories (CHINV) by commodities (domestic use table)
$exports_{i,wld}^{ut}$	Exports from the European Union (EU) and rest of the world (ROW) by commodities (use table)
$exports_{i,wld}^{dut}$	Exports from the European Union (EU) and rest of the world (ROW) by commodities (domestic use table)
$othertaxes_{a}^{ut}$	Net taxes on products by activities (use table)
$VA_{a,j}^{ut}$	Value added (wages, other taxes on products, gross operating surplus) by activities (use table)

Equation (iot.1) means that the total sums by columns of the supply table have to be equal to the total sum by the columns of the use table (at basic prices and purchase prices). Equation (iot.2) means that the total sums by rows of the production block (supply table) have to be equal to the total sum by rows of the intermediate demand block (use table) plus net taxes on production plus primary payments. Equation (iot.3) means that each cell of the total use table has to be equal to the equivalent cell of the import use table plus that of the domestic use table.

A.3.1.2.2. Tourism Satellite Account (TSA)

According to the Spanish Statistical Office (INE) (2004, p. 3): *"The CST can be described as a set of accounts and tables, based on the methodological principles of national accounts (SEC-95), which presents the tourism economic parameters in a interrelated manner to a reference date given"*. The TSA also follows an international methodology supported by the United Nations World Tourism Organisation (United Nations World Tourism Organisation, 2008) known as "TSA: Recommended Methodological framework". For a deeper understanding of the TSA see Dwyer, Forsyth and Dwyer (2010).

In Spain, the INE elaborates the TSA according to United Nations World Tourism Organisation (2008) and follows the next procedure (INE, 2004):

First, adaptation of the IOT to the estimation of the TSA.

Second, estimation of the TSA based on step one and additional statistical sources such as EGATUR (tourism consumption survey), FRONTUR (border tourism flows survey), occupancy survey in tourist accommodation, FAMILITUR (tourist movements of residents) or ECPF (family budget survey), annual survey of industrial companies on travel expenses, survey of building companies on travel expenses, annual survey of services companies on travel expenses and survey of mobility of residents in Spain.

As a result, the Spanish TSA is organised in five frameworks with their respective tables. Nevertheless, only two tables are suitable to match with the IOT. The tables used from the TSA are:

- supply-demand Tables: Share of tourism production by products, type of indicator and industries.

It shows the production disentangled into the tourism and non-tourism side by goods: characteristics goods (accommodation, real state, catering services, road passenger transport, air passenger transport, rail passenger transport, maritime passenger transport, travel agency service, services incidental to transport, Rental of transport equipment, Cultural, recreational and sports services, Cultural, recreational and sports services non-market) and an aggregated non-characteristic good. And by activities: characteristic activities (accommodation, real state, catering services, road passenger transport, air passenger transport, rail passenger transport, maritime passenger transport, travel agency service, services incidental to transport, Rental of transport equipment, Cultural, recreational and sports services, Cultural, recreational and sports services non-market) and a single aggregated non-characteristic activity.

- Supply tables: Current costs (intermediate consumption) of the characteristics activities by type of input:

It shows the intermediate consumption by groups of commodities (agricultural goods, energy goods, industrial goods, building goods, trade and transport and other services) and activities (characteristic activities (mentioned in the previous paragraph) and aggregated non-characteristic activity).

A.3.1.3 TSA and IOT

The purpose of this research is to introduce the tourism effect gathered up in the TSA, into the IOT. So that, each good, in the IOT, is disentangled into tourism and non-tourism categories. To this aim, an equivalence between goods/services and activities from the TSA and IOT has to be established to correctly disentangle the IO products between tourism and non-tourism categories (Tables 17 and 18). Goods/services and activities with the word "part" in brackets are those that are in part characteristic and in part non-characteristic. I.e., in the IOT, there is the activity: "service of air transport and space". But, in the TSA, this activity is disentangled in two different activities: "air transport passenger" and "Other non-characteristic activity" which includes many other activities. Thus, the new IOT will have such goods/services and activities divided in two separated parts.

Table 17. Equivalence among products in the TSA and IOT

TSA code	Products TSA framework 2006	IOT code	Products IOT Framework 2006	NACE
1	Accommodation	69	Accommodation	551, 552
2	Property rental service	86	Property rental service	70(p)
		87	Property rental service (non-market)	70(p)
3	Catering services	70	Catering services	553-555
4	Road passenger transport	73	other land transport market(part)	602(p), 603(p)
		74	Other land transport (non-market) (part)	602(p), 603(p)
5	Rail passenger transport	71	Rail transport market service(part)	601(p)
		72	Rail transport service (non-market) (part)	601(p)
6	Maritime passenger transport	75	Maritime transport service(part)	61
7	Air passenger transport	76	Air transport and space(part)	62

Table 17 (continues). Equivalence among products in the TSA and IOT

TSA code	Products TSA framework 2006	IOT code	Products IOT Framework 2006	NACE
8	Travel agency services	79	Travel agency services	633(p)
		80	Non-market travel agency services	633(p)
9	Services incidental to transport	79	Other incidental to transport	631(p), 632(p), 634(p)
		80	Other incidental to transport (non-market)	631(p), 632(p), 634(p)
10	Rental of transport equipment	88	Rental of transport equipment	711
11	Cultural, recreational and sports services	112	Artistic services and news agencies	(921-924)(p)
		114	Cultural, recreational and sports services	925(p), 926(p)
		116	Other recreational services	927
12	Cultural, recreational and sports services non-market	113	Non-market artistic services and news agencies	(921-924)(p)
		115	Non-market cultural, recreational and sports services	925(p), 926(p)
13	Other non-characteristic products		Rest of products	

Table 18. Equivalence among activities in the TSA and IOT

TSA code	Activities TSA framework 2006	IOT code	Activities IOT Framework 2006	NACE
1	Accommodation	44	Accommodation	551, 552
2	Real estate rental activities	56	Real estate rental activities	70
3	Catering services	45	Catering services	55.3, 55.4, 55.5
4	Road passenger transport	47	Land and pipeline transport (part)	602, 603
5	Rail passenger transport	46	Rail transport (part)	601
6	Maritime passenger transport	75	Maritime transport (part)	61
7	Air passenger transport	76	Air transport and space(part)	62

Table 18 (continues): Equivalence among activities in the TSA and IOT

TSA code	Activities TSA framework 2006	IOT code	Activities IOT Framework 2006	NACE
8	Travel agency services	79	Travel agency services	633(p)
		80	Non-market travel agency services	633(p)
9	Services incidental to transport	79	Other incidental to transport	631(p), 632(p), 634(p)
		80	Other incidental to transport (non-market)	631(p), 632(p), 634(p)
10	Rental of transport equipment	88	Rental of transport equipment	711
11	Cultural, recreational and sports services	112	Artistic services and news agencies	(921-924)(p)
		114	Cultural, recreational and sports services	925(p), 926(p)
		116	Other recreational services	927
12	Cultural, recreational and sports services non-market	113	Non-market artistic services and news agencies	(921-924)(p)
		115	Non-market cultural, recreational and sports services	925(p), 926(p)
13	Other non-characteristic activities		Rest of Activities	

To summarise, the Spanish IOT for 2006 is formed by 118 commodities and 75 activities/sectors. The new IOT will be formed by 123 commodities (118 + 5 "part" commodities) disentangled in tourism and non-tourism categories and 81 activities (75 + 11 "part" activities).

Besides the equivalences among goods/services and activities in both TSA and IOT, there are methodological differences that make impossible a direct comparison between them. Tourism consumption is one example of such differences.

Tourism consumption in the TSA and in the IOT

From a tourist perspective: tourism consumption, household consumption, imports and exports are mutually related. According to the TSA, the SEC-95 uses a wider definition about imports and exports. For instance, in the IOT, the imports include the consumption of resident unit abroad. At the same time, the exports in the IOT include elements that, in the TSA, are included as non-resident tourism consumption. Thus, the TSA uses a different and wider concept of resident unit. Table 19 provides a general a view of the differences between the TSA and the IOT regarding to tourism consumption.

Table 19. Tourism consumption in the TSA and in the IOT

	TSA	IOT
Resident tourism consumption	It appears disaggregated for certain goods (characteristic goods)	One part is included within the household final demand. Another part is considered an import (resident tourism consumption from abroad provided by resident units)
Non-resident tourism consumption	It appears disaggregated for certain goods (characteristic goods)	One part is included within the household final demand. Another part is included within the exports
Central government tourism consumption	It appears disaggregated for certain goods (characteristic goods)	It is included within the government final demand
Enterprise tourism consumption	It appears disaggregated for certain goods (characteristic goods). (business trips only)	It is included within the intermediate consumption. Enterprises do not consume final demand in the IOT by definition
Total	**Interior tourism consumption**	**Tourism consumption**

The comparison shown in Table 19 does not ensure an exact equivalence in quantities among tourism consumption categories in the TSA and in the IOT (at least, not for all blocks). In the next sections, each block will be explained separately following the structure of the IOT, although for some blocks, as those explained in this section, the adjustment has been done simultaneously.

Once the equivalence between both frameworks has been established and the methodological differences highlighted, we can proceed to explain how the data from the TSA has been incorporated in the IOT.

A.3.1.3.1 Supply Table

The supply table includes the production of each activity by goods, as well as imports (from the European Union and the Rest of the World), trade margins, transport margins and net taxes on products by goods.

A.3.1.3.1.1 Production block

The production block from the TSA is used to include the tourism component in the production block. The TSA arranges the production by goods with tourism and non-tourism categories; and activities as shown in Table 20. The labels for the characteristic activities are: accommodation (Ac), real estates (Rs), catering services (Cs), road passenger transport (Rp), air passenger transport (Ap), rail passenger transport (Rlp), maritime passenger transport (Mp), travel agency services (Ta), services incidental to transport (Sit), Rental of transport equipment (Rte), Cultural, recreational and sports services (Csrm), Cultural, recreational and sports services non-market (Csrnm).

All goods in the IOT will be disentangled into tourism and non-tourism categories following the structure in Table 20. E.g., the service "Catering services" in the activity "Accommodation" represents a production share of 0.75% and 0.25% for the tourism category and the non-tourism category, respectively. Thus, in the supply table these services in this activity, which accounts for 2,976.4 millions of euros, can be divided into 2,232.2 million of euros in the tourism category and 744.2 millions of euros in the non-tourism category.

Table 20. Production share (%) (TSA, table 4.1)

		Ac	Rs	Cs	Rp	Ap	Rlp	Mp	Ta	Sit	Rte	Csrm	Csrnm	Other non-characteristic Activities
Accommodation	tourism	98												42
	non-tourism	2												58
Property rental service	tourism		10											
	non-tourism	100	90		100	100	100	100	100	100	100	100	100	100
Catering services	tourism	75		27			100			0		12		
	non-tourism	**25**		73						100		88	100	100
Road passenger transport	tourism				28						100			
	non-tourism				72									100
Rail passenger transport	tourism					77								
	non-tourism					23								
Maritime passenger transport	tourism						70							
	non-tourism						30				100			
Air passenger transport	tourism							0						
	non-tourism							100						

Table 20 (continues): Production share (%) (TSA, table 4.1)

		Ac	Rs	Cs	Rp	Ap	Rlp	Mp	Ta	Sit	Rte	Csrm	Csrnm	Other non-characteristic Activities
Travel agency services	tourism							100	100	100			100	100
	non-tourism													
Services incidental to transport	tourism	100						35		12				2
	non-tourism				100	100	100	65		88				98
Rental of transport equipment	tourism										38			
	non-tourism				100					100	62			100
Cultural, recreational and sports services	tourism	75		33								6		1.5
	non-tourism	25		67		100		100		100		94	100	98.5
Cultural, recreational and sports services non-market	tourism												7	0
	non-tourism												93	100
Other non-characteristic goods	tourism	95	11	27	28	61	69	90	99	12	36	6	6	**1**
	non-tourism	5	89	73	72	39	31	10	1	88	64	94	94	**99**

However, as it can be appreciated in Table 20, the TSA does not provide disaggregated data for the non-characteristic goods/services and/or activities. Therefore, goods/services such as "agriculture", "energy products", "postal services" or the part of air transport not included in the characteristic goods "air passenger transport", are all aggregated into "non-characteristic goods". This aggregation generates difficulties when trying to use the shares of the TSA in the IOT. Under these circumstances, the way to proceed was as follows:

For instance, in the IOT, the production of agricultural goods (non-characteristic goods) in the agricultural sector (non-characteristic activity) accounts for 21,870.8 millions of euros. In the TSA, the production share for non-characteristic goods and activities is 1% and 99% for tourism and non-tourism categories, respectively (Table 20). Thus, in the IOT, the production of 218.7 millions of euros of the agricultural goods by the agricultural activity is considered touristic and 21,652.1 millions of euros as non-touristic. Such production share for non-characteristic goods and activities (1% and 99% for tourism and non-tourism categories respectively) is applied to all the non-characteristic goods and activities of the IOT.

In regards to the production share of non-characteristics goods in characteristic activities, we use the production share for the other non-characteristic goods of the characteristic activities (last row Table 20): Accommodation (95% tourism, 5% non-tourism), property rental service (11% tourism, 89% non-tourism) and so on.

A.3.1.3.1.2 Imports

The production account from the TSA also gathers up information related to import tourism consumption which contains the same inconveniences as the ones observed in the production block explained above. The way to disentangle between tourism categories is as follows:

Firstly, imports are divided into tourism categories based on the production shares: equation (ps).

$$production\_share_{i,t} = \frac{\sum_{a=1}^{81} prod_{a,i,t}^{nst}}{\sum_{a=1}^{81}\sum_{t=1}^{2} prod_{a,i,t}^{nst}} \qquad \text{(ps)}$$

Equation (ps) provides the production shares by commodities and tourism categories, where $prod_{a,i,t}^{nst}$ is the new production block by activities (a), goods (i) and tourism (t) categories in the new supply table (nst). $\sum_{a=1}^{81} prod_{a,i,t}^{nst}$ gives the total production by goods and tourism categories. $\sum_{a=1}^{81}\sum_{t=1}^{2} prod_{a,i,t}^{nst}$ gives the total production by goods .

Secondly, imports are re-adjusted using the mathematical program of section A.3.1.3.2.5. Table 21 depicts the new supply table at basic prices and aggregated by characteristic and non-characteristic goods. A more disaggregated new supply table is shown at the end of this annex.

Table 21. New supply table at basic prices

		Non-tourism Activities	Tourism Activities	Imports
Characteristic goods	tourism	51.25	81,437.60	9,692.38
	non-tourism	18,304.05	237,094.07	6,660.27
Non-characteristics goods	tourism	16,994.32	9,905.50	7,943.51
	non-tourism	1,528,052.38	65,890.74	301,046.84

The final new supply table at basic prices can be consulted at the end of this annex.

A.3.1.3.2 Use Table

The use table includes intermediate consumption by products and activities, as well as final consumption (including, household final consumption, government consumption and private non-profit organisation consumption, gross fixed capital formation (GFCF) -which includes Gross fixed capital formation and inventory change- and exports (to the European Union and to the Rest of the World)). Moreover, the use table is divided into the import and domestic use table.

A.3.1.3.2.1 Intermediate demand

The TSA provides aggregated information about intermediate consumption in six categories: agricultural products, energy products, industrial products, construction products, trade and transport, and other services. The activities are labelled and arranged as in Table 20. Table 22 shows the intermediate consumption from the TSA. As it can be appreciated, the information is not disentangled in tourism categories as in Table 20. The total intermediate consumption at purchase prices in the TSA (1,058,095.2 millions of euros) is lower than the total intermediate consumption at purchase prices in the IOT (1,062,644 millions of euros). This is due to the different methodologies used. For instance, in the TSA, "the business trips" is considered final demand, whereas in the IOT this concept is included in the intermediate demand.

Table 22. Intermediate consumption (TSA) (millions of euros)

	Ac	Rs	Cs	Rp	Ap	Rlp	Mp	Ta	Sit	Rte	Csrm	Csrnm	other non-characteristic Activities
total intermediate consumption at purchase prices	7,760	28,897	38,157	3,822.4	1,260	4,17.2	6,485	1,990.2	20,926	1,914.4	12,777	6,259	927,430
agricultural products	267.5	5.6	1,173.2	0	0	0.5	0	0	0.1	0.1	455.1	3.5	26,817.1
energy products	359.1	529.4	1,091.4	622.4	240.4	126.5	2,167.6	119.4	846.5	91	100.1	335.5	91,532.7
industrial products	2,013.1	716.6	20,590.8	362.4	293.5	33.5	543.7	308.1	2,015.5	323,9	3,705.5	744.1	339,395.4
construction products	921.4	11,379	607.2	13	54.1	4.1	58.9	73.4	1,303	43,1	275.5	527.5	137,705.9
trade and transport	335	435.8	5,343.3	1,849.4	458.8	176.7	1,913.6	495.9	14,169.9	380,2	978.6	760.4	107,695.6
other services	3,659.9	12,283.9	7,960.1	748	204.3	72.2	1,784.1	933.8	2,362.3	1,037,3	7,000.6	3,374.5	208,619.5
taxes on products (minus subsidies)	204	3,546.7	1,391	227.2	8.9	3.7	17.1	59.6	228.7	38,8	261.6	513.5	15,663.8
gross value added at basic prices	13,230	80,613	51,959	5,333.7	1,159	260	3,185	2,826	12,203	1,988.9	16,752	5,081	682,235.4

Certain calculations and assumptions have been done to suitably divide the intermediate demand (IOT) data using the TSA which will be better illustrated with the following example.

For the characteristic activity "Road passenger Transport" the TSA registers an intermediate consumption of the energy products block of 622.4 million of Euros. This amount is disentangled among the different energy products taking into account the production shares of section 3.1.3.1.1, Table 20. More precisely, the energy products in the use table account for 0.3, 4,123.6, 79.7, 101.3, 281.3 millions of Euros for "Minerals and quarrying products", "Coke, refined petroleum and nuclear fuel", "Production and distribution of electricity", "Production and distribution of gas" and "Collection, purification and distribution of water", respectively. Applying the production shares shown in Table 20, the result is: 0 (tourism category) and 0.04 (non-tourism category) millions of Euros for "Minerals and quarrying products", 6 (tourism category) and 553.62 (non-tourism category) millions of Euros for

“Coke, refined petroleum and nuclear fuel”, 0.116(tourism category) and 10.7 (non-tourism category) millions of Euros for “Production and distribution of electricity”, 0.14 (tourism category) and 13.6 (non-tourism category) millions of euros for “Production and distribution of gas”, 0.4 (tourism category) and 37.766 (non-tourism category) millions of euros for “Collection, purification and distribution of water”. The rest of the products and activities are calculated in the same way. For the non-characteristic activities, the matching process consists of assigning the intermediate consumption provided by the TSA according to the production shares of Table 20. Finally, a last global adjustment is carried out to keep the new IOT balanced (mathematical adjustment section A.3.1.3.2.5).

A.3.1.3.2.2 Final demand

The TSA framework provides information in regards to final tourism consumption, but this information presents methodological drawbacks with respect to the IOT framework as it was already explained in section A.3.1.3. Such differences and several others make impossible to get a direct equivalence between the TSA and the IOT. Table 23 depicts the final demand in the TSA.

Table 23. Final demand in the TSA (millions of euros).

	Inbound tourism consumption	Household tourism consumption	Intermediate tourism consumption	Government tourism consumption	Total internal tourism consumption
Accommodation	9,128	5,797	3,161	71.7	18,157.7
Property rental service	2,114.7	9,401.8	0	0	11,516.5
Catering services	12,257.6	13,377.5	623.2	1.9	26,260.2
Road passenger transport	437.6	1,111.5	690.5	382.7	2,622.3
Rail passenger transport	265.8	930.2	243.1	65.9	1,505
Maritime passenger transport	153.2	328.7	111.5	35.4	628.8
Air passenger transport	5,294.4	3,806.4	2,391.9	335.8	11,828.5
Travel agency services	393.6	2,507.7	2,565.4	433.3	5,900
Services incidental to transport	3,043.7	299.3	683.1	0	4,026.1
Rental of transport equipment	570	260.7	574	0	1,404.7

Table 23 (continues): Final demand in the TSA (millions of euros).

	Inbound tourism consumption	Household tourism consumption	Intermediate tourism consumption	Government tourism consumption	Total internal tourism consumption
Cultural, recreational and sports services (market)	1,032.1	1,246.4	0	0	2,278.5
Cultural, recreational and sports services (non-market)	31.9	19.,9	0	613.1	664.9
Cultural, recreational and sports services from Government (non-market)	0	0	0	63.8	63.8
Total characteristic goods	34,722.6	39,087.1	11,043.7	2,003.6	86,857
Goods	5,534.7	4,231.8	0	0	9,766.5
Margins	2,782.8	1,560.5	0	0	4,343.3
Other goods	1,942.9	2,470.8	188.9	0	4,602.6
Total non- characteristic goods	10,260.4	8,263.1	188.9	0	18,712.4
Total goods at basic prices	44,983	47,350.2	11,232.6	2,003.,6	105,569.4

For instance, in the TSA, the government tourism consumption vector shows a value of 71.7 million of euros for the service “Accommodation”. However, in the IOT, “Accommodation” is zero in the vector of government consumption.

Non-resident tourism consumption (inbound tourism)

According to the INE, the non-resident tourism consumption (44,983 million of euros) in the TSA is equal to the inbound tourism consumption in the IOT (40,815 million of euros) plus some quantities included as exports in the IOT (transport services especially (rail, maritime, road and air passenger transport)). In other words, in the IOT, 40,815 million of euros have to be subtracted from the household final demand and 4,168 million of euros from the exports to match with the non-resident tourism consumption in the TSA. However, none of those quantities (40,815 and 4,168) are disaggregated by commodities in the IOT. So, once again, the information given in the TSA and in the IOT does not coincide.

At first, an abortive attempt was done to split up the quantities according to the relative frequency of the non-resident tourism consumption in the TSA, but the values obtained did not fully respect the values in the IOT. Finally, the way to proceed is the following manner to distribute the non-resident tourism consumption vector and keeping the IOT balanced:

Firstly, 40,815 millions are divided according to the production shares by goods (equation (ps)) and subtracted from the household final demand in the IOT.

Secondly, 4,168 millions are subtracted from the export and assigned to the non-resident tourism consumption vector according to the next system of equations:

$$\sum_{i=1}^{123}\sum_{wld=1}^{2} Vexcons_{i,'t',wld} = 4{,}168 \qquad \text{(exp.1)}$$

$$\sum_{i=1}^{123}\sum_{t=1}^{2}\sum_{wld=1}^{2} Vexport_{i,t,wld} < \sum_{i=1}^{123}\sum_{t=1}^{2}\sum_{wld=1}^{2} export^{ut}_{i,t,wld} \qquad \text{(exp.2)}$$

$$\sum_{wld=1}^{2} Vexport_{i,t,wld} + \sum_{wld=1}^{2} Vexcons_{i,t,wld} = \sum_{wld=1}^{2} export^{ut}_{i,t,wld} \qquad \text{(exp.3)}$$

$$\sum_{wld=1}^{2} Vexcons_{i,'nt',wld} = 0 \qquad \text{(exp.4)}$$

$$\sum_{c=1}^{19}\sum_{wld=1}^{2} Vexcons_{i,'t',wld} + \sum_{c=1}^{19}\sum_{wld=1}^{2} nonresidentimp_{c,'t',wld} + \sum_{c=1}^{19}\sum_{wld=1}^{2} nonresidentdom_{c,'t',wld} = 44{,}983 \qquad \text{(exp.5)}$$

The systems of equations above allow moving the 4,168 millions from the export block to the non-resident tourism consumption to get the 44,983 millions given in the TSA.

$Vexport_{i,t,wld}$ denotes the exports by goods i, tourism and non-tourism category t and origin wld (from the EU or the rest of the world). $Vexcons_{i,t,wld}$ denotes the part of the non-resident consumption included in the exports by goods i, tourism and non-tourism category t and origin wld (from the EU or Rest of the Worlds) . $Vexcons_{i,t,wld}$ has to be added to the 40,815 millions in the first step to get the non-resident tourism consumption vector . The parameter $export^{ut}_{i,t,wld}$ represents the exports by goods i, tourism and non-tourism category t and origin wld (from the EU or Rest of the World) balanced from the IOT (explanation in section A.3.1.3.2.4).

Equation exp.1 holds that the total sum of the non-resident tourism consumption considered as exports for the tourism category (variable: $\sum_{i=1}^{123} \sum_{wld=1}^{2} Vexcons_{i,'t',wld}$) has to be equal to the part of non-resident consumption not included in the household final demand but in exports (4,168).

Equation exp.2 holds that, as a consequence of the subtraction of the exports that belong to non-resident tourism consumption, the total sum of ($\sum_{i=1}^{123} \sum_{t=1}^{2} \sum_{wld=1}^{2} Vexport_{i,t,wld}$) has to be lower than the total sum of the exports of the IOT ($\sum_{i=1}^{123} \sum_{t=1}^{2} \sum_{wld=1}^{2} export^{ut}_{i,t,wld}$).

Equation exp.3 permits to keep the IOT balanced. $Vexport_{i,t,wld}$ plus $Vexcons_{i,t,wld}$ have to be equal to the exports previously balanced $export^{ut}_{i,t,wld}$.

Equation exp.4 holds that the sum of $Vexcons_{i,t,wld}$ by origin for the non-tourism category ($\sum_{wld=1}^{2} Vexcons_{i,'nt',wld}$) has to be zero (all the non-resident consumption is considered tourism).

Equation exp.5 holds that the sum of the non-resident tourism consumption considered as exports for the tourism category ($\sum_{i=1}^{123}\sum_{wld=1}^{2} Vexcons_{c,'t',wld}$) plus the sum of the non-resident import demand for the tourism category ($\sum_{c=1}^{19}\sum_{wld=1}^{2} nonresidentimp_{c,'t',wld}$) plus the sum of the non-resident domestic demand for the tourism category ($\sum_{c=1}^{19}\sum_{wld=1}^{2} nonresidentdom_{c,'t',wld}$) has to be equal to 44,983 millions of euros (40,815 (tourism non-resident consumption in the IOT) + 4,168 (exports in the IOT that are considered non-resident tourism consumption in the TSA as already explained in this section)).

Finally, a second and last global adjustment is carried out to keep the new IOT balanced (final mathematical adjustment described in section A.3.1.3.2.5).

A direct comparison in absolute term between both the non-resident tourism consumption in the TSA and its corresponding amount in the new IOT is not possible due to the methodological drawbacks already highlighted in this section. So, Table 24 shows the distribution of the resident consumption in the TSA and in the new IOT. The main discrepancies are appreciated in the real estate, catering services, other transport services and travel agencies. For the rest of items the similarities are significant.

Table 24. Distribution of non-resident tourism consumption in the TSA and in the new IOT (% of total)

	Non-resident tourism consumption (TSA)	Non-resident tourism consumption (new IOT)
accommodation	20.3	17.5
catering services	27.2	36.5
railways transport	0.6	1.2
road transport	1	3.8
maritime transport	0.3	0.4
air transport	11.8	9
other transport services	6.8	0.3
travel agencies	0.9	5.3
real estate	4.7	13.7
rent a car	1.3	0.5
Total at basic prices	**44,983**	**44,983**

Households consumption (Private non-profit institution consumption included)

According to INE, there are certain methodological differences between IOT and TSA in regard to the resident consumption that make a direct comparison impossible. For them, one of the main differences comes from the holidays packages. In the National Spanish Account, such packages are perfectly accounted, but in the TSA, the holidays packages are divided among accommodation, catering services, transport and so on.

The household final demand includes: household consumption (486,869.7 millions) (minus 40,815 that belong to non-resident tourism consumption), resident consumption abroad by resident unit (10,893 millions) and private non-profit institutions final demand (8,548 millions).

In the IOT, the household consumption and the private non-profit institutions are classified by goods (use table). But the resident consumption abroad is aggregated at the bottom of the use table in the IOT. The private non-profit institutions are included within household final demand for two reasons: firstly, the TSA does not provide any information about these institutions and, secondly, although the IOT differentiates between household final demand and private non-profit institutions final demand, the Spanish National Accounts include the private non-profit institutions within the household final demand.

At first, the quantities are again split up according to the relative frequency of the resident tourism consumption in the TSA but the values obtained did not fully respect the values in the IOT. Finally, the next steps were followed, so that, the non-resident tourism consumption vector was distributed keeping the IOT balanced.

Firstly, the resident consumption abroad, the private non-profit institution and household final demand are disentangled in tourism categories according to equation (ps). Secondly, the household final demand (the resident tourism demand from abroad, the private non-profit institution and household final demand) is re-adjusted using the system of equations of section A.3.1.3.2.5.

As in the case of the non-resident consumption, a direct comparison in absolute terms between both the resident tourism consumption in the TSA and its corresponding amount in the new IOT is not possible due to the methodological drawbacks already highlighted in this section. Thus, Table 25 shows the distribution of the resident consumption in the TSA and in the new IOT. The main discrepancies are appreciated in the real estate and catering services. For the rest of items the similarities are not remarkable.

Table 25. Distribution of resident tourism consumption in the TSA and in the new IOT (% of total)

	Resident tourism consumption (final demand for the tourism category) (TSA)	Resident tourism consumption (final demand for the tourism category) (new IOT)
accommodation	12.2	14.5
catering services	28.3	23.7
railways transport	2	0.7
road transport	2.3	2.1
maritime transport	0.7	0.5
air transport	8	10.3
other transport services	0.6	0.1
travel agencies	5.3	5.2
real estate	19.9	8.9
rent a car	0.6	0.34
Total at basic prices	**47,350.2**	**42,893.52**

Government consumption (public administrations)

According to TSA, the government tourism consumption accounts for 2003.6 million of euros (Table 23). Government consumption is adjusted as follows:

Firstly, the government final demand is disentangled according to the production shares (equation (ps)). Secondly, the government final demand is re-adjusted using the system of equations of section A.3.1.3.2.5.

A.3.1.3.2.3 Gross Capital Formation

This block includes: gross fixed capital formation (GFCF) and the change of inventories (CHGINV). The information related to gross capital formation (GCF) is gathered in the TSA in a similar way as it is presented in the intermediate consumption block in the IOT. Now, the products are arranged in eight groups: “motor vehicles”, “shipbuilding”, “rail material”, “aerospace construction”, “others goods”, “dwellings”, “non-residential dwellings”, “civil engineering”, “other products”. Nevertheless, in contrast with the intermediate consumption case, we are not able to distinguish which products are included. Summarising, the TSA does not provide useful information about the gross capital formation (GFCF and CHGINV).

The distribution is as follows:

Firstly, GFCF and CHGINV are disentangled according to the production shares (equation (ps)). Secondly, GFCF and CHGINV are re-adjusted using the system of equations of section A.3.1.3.2.5.

A.3.1.3.2.4 Exports

Tourism is an export; however, the TSA does not provide information about any exports. According to the TSA, the exports include non-resident consumption that was already explained above.

The exports are adjusted as follows:

Firstly, the exports are disentangled according to the production shares (equation (ps)). Secondly, exports are re-adjusted using the mathematical program of section A.3.1.3.2.5. Table 26 depicts the new use table aggregated by characteristic and non-characteristic goods. A more disaggregated new supply table is shown at the end of this annex.

Table 26. New Use table at basic prices (millions of euros)

		Non-tourism Activities	Tourism Activities	Final demand (households and government)	Non-resident final demand	GCF (GFCF and CHGINV)	Exports
Characteristic-goods	Tourism	6,308.12	6,511.04	35,152.23	39,052.25	1,579.01	3,451.21
	Non-tourism	64,397.35	28,586.66	143305.60	-	15,372.38	202,653.02
Non-characteristic goods	Tourism	9,798.29	3,470.45	9,744.62	5,930.75	1,645.07	2,512.53
	Non-tourism	806,446.34	133,222.05	495,135.05	-	16,774.53	8,934.24

The final new use table at basic prices can be consulted at the end of this annex.

A.3.1.3.2.5 Mathematical adjustment

This section explains the simultaneous adjustment for certain blocks of the use table, already highlighted in section A.3.1.3 (and explained in their respective section), using a system of equations. The aim is to achieve a better representation of the data shown in the TSA keeping the IOT balanced. The blocks under consideration are: Imports, final demand (resident and government consumption) and exports. For those blocks, the TSA provides useful information that the simple application of the production shares (equation (ps)) does not capture.

According to TSA, the imports, the resident tourism consumption and the government tourism consumption account for: 6,133.8, 47,350.2 and 2,003.6 million euros respectively. The system of equations tries to fix such data in the new IOT.

$$\sum_{i=1}^{123} Vgovd_{i,'t'}^{ut} <= 2,003.6 \qquad \text{(eg.1)}$$

$$\sum_{t=1}^{2} Vgovd_{i,t}^{ut} = \sum_{t=1}^{2} govd_{i,t}^{ut} \qquad \text{(eg.2)}$$

$$\sum_{i=1}^{123} Vhhd_{i,'t'}^{ut} + \sum_{i=1}^{123} Rtabroad_{i,'t'}^{ut} <= 47,350.2 \qquad \text{(eg.4)}$$

$$\sum_{t=1}^{2} Vhhd_{i,t}^{ut} = \sum_{t=1}^{2} hhd_{i,t}^{ut} - \sum_{t=1}^{2} NRt_{i,t}^{ut} \qquad \text{(eg.5)}$$

$$\sum_{i=1}^{123} Vimport_{i,'t',wld}^{ut} <= 6,742.89 \qquad \text{(eg.6)}$$

$$\sum_{t=1}^{2} Vimport_{i,t,wld}^{ut} = \sum_{t=1}^{2} import_{i,t,wld}^{ut} \qquad \text{(eg.7)}$$

$$\sum_{t=1}^{2} Vchginv_{i,t}^{ut} = \sum_{t=1}^{2} chginv_{i,t}^{ut} \qquad \text{(eg.8)}$$

$$\sum_{t=1}^{2} Vgfcf_{i,t}^{ut} = \sum_{t=1}^{2} gfcf_{i,t}^{ut} \qquad \text{(eg.9)}$$

$$\sum_{t=1}^{2} Vexports_{i,t,wld}^{ut} = \sum_{t=1}^{2} exports_{i,t,wld}^{ut} \qquad \text{(eg.10)}$$

$$\sum_{t=1}^{2} Vintermediate_{i,t}^{ut} = \sum_{t=1}^{2} intermediate_{i,t}^{ut} \qquad \text{(eg.11)}$$

$$\begin{aligned} &Vimport_{i,t,wld}^{st} + prod_{i,t}^{st} = Vintermediate_{i,t}^{ut} + Vhhd_{i,t}^{ut} + npd_{i,t}^{ut} + \\ &NRt_{i,t}^{ut} + Vgovd_{i,t}^{ut} + Vchginv_{i,t}^{ut} + Vgfcf_{i,t}^{ut} + Vexports_{i,t,wld}^{ut} \end{aligned} \qquad \text{(eg.14)}$$

$$\begin{aligned} &Vimport_{i,t.wld}^{ut} = Vintermediate_{i,t}^{mt} + Vhhd_{i,t}^{mt} + npd_{i,t}^{mt} + \\ &NRt_{i,t}^{mt} + Vgovd_{i,t}^{mt} + Vchginv_{i,t}^{mt} + Vgfcf_{i,t}^{mt} \end{aligned} \qquad \text{(eg.15)}$$

$Vgovd_{i,t}^{ut}$ denotes the government consumption by goods i and tourism categories t in the use table (ut).

$Vhhd_{i,t}^{ut}$ denotes the household consumption by goods i and tourism categories t in the use table.

$Vimport_{i,t,wld}^{st}$ denotes the imports by goods i, tourism categories t and from the European Union (EU) and rest of the world (ROW) (wld) in the supply table.

$Vchginv_{i,t}^{ut}$ denotes the change of inventories by goods i and tourism categories t in the use table.

$Vgcf_{i,t}^{ut}$ denotes the gross capital formation by goods i and tourism categories t in the use table.

$Vexports_{i,t,wld}^{ut}$ denotes the exports by goods i, tourism categories t and from the European Union (EU) and rest of the world (ROW) (wld) in the use table.

$Vexports_{i,t,wld}^{ut}$ denotes the intermediate demand by goods i and tourism categories t in the use table.

Parameter $govd_{i,t}^{ut}$ denotes the government consumption by goods i and tourism categories t in the use table.

Parameter $hhd_{i,t}^{ut}$ denotes the household consumption by goods i and tourism categories t in the use table.

Parameter $npd_{i,t}^{ut}$ denotes the private non-profit institution consumption by goods i and tourism categories t in the use table.

Parameter $Rtabroad_{i,'t'}^{ut}$ denotes the resident consumption from abroad by goods i and tourism categories t in the use table.

Parameter $NRt_{i,t}^{ut}$ denotes the non-resident consumption by goods i and tourism categories t in the use table.

Parameter $import_{i,t,wld}^{st}$ denotes the imports by goods i, tourism categories t and from the European Union (EU) and Rest of the World (ROW) (wld) in the supply table (st).

Parameter $chginv_{i,t}^{ut}$ denotes the change of inventories by goods i and tourism categories t in the use table.

Parameter $gcf_{i,t}^{ut}$ denotes the gross capital formation by goods i and tourism categories t in the use table.

Parameter $exports_{i,t,wld}^{ut}$ denotes the exports by goods i, tourism categories t and from the European Union (EU) and Rest of the World (ROW) (wld) in the use table (st).

$intermediate_{i,t}^{ut}$ denotes the parameter for the intermediate demand by goods i and tourism categories t in the use table.

The general idea pursued in this system of equations is briefly summarised in the next manner:

Equations eg.1, e.g 4 and e.g 6 ensure that the respective total values of the imports (tourism category), the resident consumption (tourism category) and the government consumption (tourism category) in the new IOT are equal to the values in the TSA.

Equations eg.2, e.g 7, e.g 8, e.g.9, e.g.10 and e.g.11 hold that, independently of the disentangling between tourism categories, the values of the government consumption, the imports, the change of inventories, the gross capital formation, the exports and the intermediate demand in the new IOT have to be equal to their respective cell in the original IOT, respectively.

Equation e.g.5 fits the value of the resident consumption (left side) taking into account that the household final demand in the IOT includes the non-resident tourism consumption. Thus, such last vector already adjusted in section A.3.1.3.2.2, is taken from the household final demand in the IOT. Finally, equations e.g.14 and e.g.15 ensure a balanced new IOT.

The technical aspects of the equations are explained below:

Equation eg.1 holds that the sum of the government final demand variable for the tourism category ($\sum_{i=1}^{123} Vgovd_{i,'t'}^{ut}$) has to be lower or equal to 2,003.6 millions (government tourism demand in the TSA).

Equation eg.2 holds that the sum of the government final demand variable ($\sum_{t=1}^{2} Vgovd_{i,t}^{ut}$) for the tourism categories of each good have to be equal to the sum of the government final demand of the use table ($\sum_{t=1}^{2} govd_{i,t}^{ut}$) for the tourism categories of each good.

Equation eg.3 holds that the sum of the household (resident) final demand variable for the tourism category ($\sum_{i=1}^{123} Vhhd_{i,'t'}^{ut}$) plus the resident final demand from abroad for the tourism category ($\sum_{i=1}^{123} Rtabroad_{i,'t'}^{ut}$) has to be lower or equal to 47,350.2 millions (resident tourism demand in the TSA).

Equation eg.5 holds that the sum of the households final demand variable ($\sum_{t=1}^{2} Vhhd_{i,t}^{ut}$) for the tourism categories of each good have to be equal to the total sum of the household final demand of the use table ($\sum_{t=1}^{2} hhd_{i,t}^{ut}$) for the tourism categories of each goods minus the total sum of the non-resident tourism demand ($\sum_{t=1}^{2} NRt_{i,t}^{ut}$) for the tourism categories of each good.

Equation eg.6 means that the total sum of the imports variable for the tourism category ($\sum_{i=1}^{123} Vimport_{i,'t'}^{ut}$) has to be lower or equal than 6472.89 millions (imports in the TSA). This quantity is 9% higher than the one provided by the TSA (6133.8), but the program cannot achieve a closer result.

Equation eg.7 holds that the sum of the imports variable ($\sum_{t=1}^{2} Vimport_{i,t}^{ut}$) for the tourism categories of each good has to be equal to the sum of the imports of the use table ($\sum_{t=1}^{2} import_{i,t}^{ut}$) for the tourism categories of each good.

Equation eg.8 holds that the sum of the change of inventories variable ($\sum_{t=1}^{2} Vchginv_{i,t}^{ut}$) for the tourism categories of each good have to be equal to the sum of the change of inventories of the use table ($\sum_{t=1}^{2} chginv_{i,t}^{ut}$) for the tourism categories of each good.

Equation eg.9 holds that the sum of the gross fixed capital formation variable ($\sum_{t=1}^{2} Vgfcf_{i,t}^{ut}$) for the tourism categories of each good has to be equal to the sum of the gross fixed capital formation of the use table ($\sum_{t=1}^{2} gfcf_{i,t}^{ut}$) for the tourism categories of each good.

The inclusion of the change of inventories and gross fixed capital formation as variables ensures a better convergence to the data of the TSA.

Equation eg.10 holds that the sum of the exports variable ($\sum_{t=1}^{2} Vexports_{i,t,wld}^{ut}$) for the tourism categories of each good has to be equal to the sum of the exports of the use table ($\sum_{t=1}^{2} exports_{i,t,wld}^{ut}$) for the tourism categories of each good.

Equation eg.11 holds that the sum of the intermediate demand variable ($\sum_{t=1}^{2} Vintermediate_{i,t}^{ut}$) for the tourism categories of each good has to be equal to the sum of the intermediate demand of the use table ($\sum_{t=1}^{2} intermediate_{i,t}^{ut}$) for the tourism categories of each good.

Equation eg.14 ensures that the balance between the supply table (at basic prices) and the use table (at basic prices). The imports variable ($Vimport_{i,t}^{st}$) plus the production ($prod_{i,t}^{st}$) has to be equal to the intermediate demand variable ($Vintermediate_{i,t}^{ut}$) ,plus household final demand variable $Vhhd_{i,t}^{ut}$, plus private non-profit institution final demand ($npd_{i,t}^{ut}$), plus non-resident tourism demand ($NRt_{i,t}^{ut}$), plus government final demand variable $Vgovd_{i,t}^{ut}$, plus change of inventories variable $Vchginv_{i,t}^{ut}$, plus gross capital formation variable $Vgcf_{i,t}^{ut}$ and plus exports variable $Vexports_{i,t,wld}^{ut}$.

Equation eg.15 ensures that the total imports from the use table ($Vimport_{i,t}^{ut}$) are equal to the sum of each block of the imports use table.

Finally, The Spanish IOT for 2006 is formed by 118 commodities and 75 activities/sectors. The new IOT is formed by 123 commodities (118 + 5 “part” commodities) disentangled in tourism and non-tourism categories and 81 activities (75 + 11 “part” activities). Due to the size of the tables, the New IOT aggregated in 16 commodities and 16 Activities is shown at the end of this annex.

A.3.1.4 New IOT: comparison and conclusion

The TSA is based on the IOT and both coincide in certain aspects, but the use of additional datasets such as EGATUR, FRONTUR or ECPF make a direct comparison between the TSA and the IOT impossible. Table 27 and Table 28 show the aggregated accuracy of the combination of the TSA and the IOT for the new supply table and the new use table, respectively.

Table 27. Accuracy between the TSA and the new supply table

	production	imports	margins and taxes
t	8% higher than the TSA	7% higher than the TSA	None information to compare with
nt	0.18% lower than the TSA	None information to compare with	None information to compare with

Table 28. Accuracy between the TSA and the new use table

	Intermediate consumption	Resident final demand	Non-resident final demand	Government final demand	Gross capital formation	Exports
t	No information to compare	9.4% lower than the TSA	Equal	Equal	No information to compare with	No information to compare with
nt	No information to compare with	No information to compare with	No information to compare with	No information to compare with	No information to compare with	No information to compare with

The highest aggregated difference is in the resident consumption (9.4% lower than the TSA), but in general, all blocks from the new IOT have an accuracy in relation to the TSA above 90%.

To conclude, the new IOT (NIOT) table improves the representation of the effects of tourism with respect to the traditional IOT. However, it is not as precise as the TSA. Therefore, the precision of the new IOT can be placed in the middle of both tables: $IOT < NIOT < TSA$.

The lack of suitable information and the methodological discrepancies between both datasets it is the main reason behind the lack of accuracy of this new IOT. From my point of view, until the TSA provides supplementary information that eases the combination of these two data frameworks, better results are difficult to obtain.

A.3.1.5 SAM

A SAM is an extension of an IOT which include data about income distribution (primary distribution, secondary distribution and disposable income); and financial assets and capital flows. Thus, a SAM provides a complete view of the economic flows of a country or region in a given year (Pyatt & Round, 1985; provide a description of the SAMs). The sum of each row is equal to the sum of its respective column in any SAM. Table 29 shows the SAM for Spain for 2006. Cells in blue in Table 29 come from the new IOT previously described. Red cells are taken from Spanish Annual Account 2006 provided by EUROSTAT (Annual Account by Institutional Sector (AAISS) (millions of euros)). The rest of cells are empty. The symbol: SAM (row, column) will be used to refer to the cells of the SAM according to the numeration of Table 29 in this section. E.g. SAM(2,1) means: row 2, column 1 from Table 29 (Supply table at basic prices). Additionally, when the Spanish Annual Account is used the symbol is employed: AAISS -account position (uses/resources) plus the name of the account will be used to refer to the cells of the AAISS 2006. E.g. AAISS -D.4 (uses): property income by institutions, allocation of primary income account means: Annual Account by Institutional Sector, cell D.4 (property income by institutions), account: allocation of primary income account. This paper follows up Fernández and Manrique de Lara (2006) methodology for the elaboration of the SAM.

Some cells in the SAM (red cells) need some kind of distribution among institutions but, in most of the cases, the AAISS does not provide information in such a way. I.e., the AAISS provides information by institutions (household (non-profit private institutions included), central government and enterprises (financial and non-financial corporations)) but, in some cases, the institutions use, receive or send flows from and to the ROW, but such flows are not disaggregated by institutions. Moreover, some cells in the SAM are matrices that gather up flows among institutions that are not depicted on this way in the AAISS (the AAISS only provides total values). Figure 20 depicts a stylised example of the previous explanation. The AAISS provides both the total amount by rows and columns by institutions for all the red cells. But such totals have to be distributed among institutions ($V_{hh,h}$, where h and hh are indices for institutions by rows and columns, respectively) (two institutions in this figure and four in the real SAM). Thus, several mathematical adjustments need to be carried out to fix the cells and to keep the SAM balanced.

Figure 20. Disentangling AISS values into the SAM

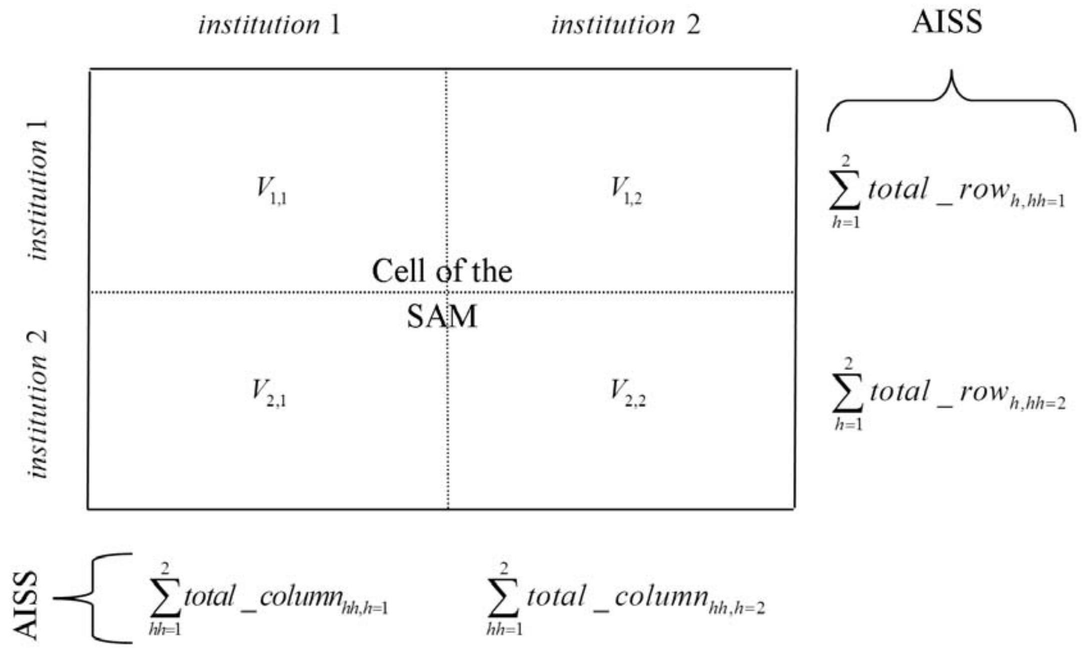


Table 29. SAM Spain 2006

			Commodities and services	Activities	Generation of income	Income primary distribution	Income secondary distribution	Use of income	Capital	GCF	Financial	Current ROW	Capital ROW
			1	2	3	4	5	6	7	8	9	10	11
			t nt										
Commodities and services	1	t / nt		Intermediate demand at purchase prices				Final consumption at purchase prices	Inventory changes at purchase prices	Groos fixed capital formation		Export at purchase prices	
Activities	2		Supply table at basic prices										
Primary inputs	3			Primary Payment								Compensation of employees from row	
Income primary distribution	4		Net taxes on products		Net income distribution	Property income						Property income and net taxes from row	
Secondary distribution income	5					Net income distribution	Current taxes on income and current transfers					Current taxes on income and current transfers from row	
Use of income	6						Net disposable income	Adjustment for change in net equity					

Table 29 (continues). SAM Spain 2006

		Commodities and services	Activities	Generation of income	Income primary distribution	Income secondary distribution	Use of income	Capital	GCF	Financial	Current ROW	Capital ROW
		1	2	3	4	5	6	7	8	9	10	11
Capital	7							Net saving	Capital transfers		Borrowing	
GKF	8		Consumption of fixed capital						Investment (net fixed capital formation)			
Financial	9								Lending			Net lending of row
Current ROW	10	Imports		Compensation of employees to row	Property income and net taxes to row	Current taxes on income and current transfers to row	Adjustment for change in net equity					
Capital ROW	11							capital transfers to row			Current external balance	

A.*3.1.5.1. Allocation of primary income account:*

This account is composed by:

- Net income distribution [SAM(4,3)].

- Net taxes on products [SAM(4,1)] can be obtained from IOT and also from AAISS [D.21-D.31 (resources): taxes minus subsidies on products, production account]

- Property income [SAM(4,4)], [AAISS-D.4 (uses): property income by institutions, allocation of primary income account, minus D.4 (resources): property income to the ROW, allocation of primary income account].

- Net national income [SAM(5,4)], [NA-B. 5n/B.5*n (uses): net national income by institutions, allocation of primary income account].

- Property income and net taxes on products from the ROW [SAM(4,10)] [AAISS-D.4 (uses): property income from ROW, allocation of primary income account].

- Property income and net taxes on products to the ROW [SAM(10,4)] [AAISS-D.4 (resources): property income to the ROW, allocation of primary income account and D.2 (resources): net taxes on production and imports to the ROW, allocation of primary income account].

Net taxes on products and net national income are directly obtained from IOT and AIISS, respectively; and they are shown in Table 30 and Table 31. The rest of the cells need some kind of adjustment that will be explained below.

Table 30. Net national income (millions of euros)

	Households	Government	Enterprises
Households	668,332		
Government		103,267	
Enterprises			43,228

Table 31. Net taxes on products (millions of euros)

Government	107,458

Net income distribution

This cell [SAM(4,3)] provides the distribution of primary payments (gross wages (compensation of employees), gross operating surplus (GOS) and other net taxes on intermediates inputs used in the production process (use table, IOT)). This account is obtained taking into consideration the payment to primary factors at basic prices by activities [SAM(3,2)] plus the compensation of employees from the rest of the world [SAM(3,10)] minus compensation of employees to the rest of the world [SAM(10,3)]. The Annual Accounts by Institutional Sector, in the allocation of primary income account, in its epigraph AAISS-B.2.g and D.1 (resources), provides disaggregated information by institutions about gross operating surplus and gross wages respectively. The data of other net taxes on production comes from the use table of IOT. Additionally, epigraph AAISS-D.1 (resources to the ROW), in the allocation of primary income account, and AAISS-D.1 (uses from the ROW), in the generation of income account, provides information about compensation of employees to and from the ROW, respectively. Table 32 depicts the final net income distribution:

Table 32. Net income distribution (millions of euros)

	Gross wages	Net taxes on production	Net Operating Surplus
Households	464,266		166,544
Government		1,915	
Enterprises			90,737

In Table 32, the gross wages (464,266) are formed by 464,548 millions euros (use table) plus 1,205 millions of euros from the rest of the world minus 1,487 millions of euros to the rest of the world. Taxes are all collected by the government. According to AAISS, the net operating surplus (gross operating surplus (257,281) minus fixed capital consumption (153,082)) is shared as follows: 166,544 to households and 90,737 to enterprises.

Property income; and net taxes on products from and to the ROW.

Property income gathers up data about bonds, shares or revenues from enterprises [SAM(4,4)]. Additionally, some property income comes from or is sent to the ROW [SAM(4,10) and SAM(10,4), respectively]. According to the AAISS, the property income used by institutions [SAM(4,4)] is: 18,586, 16,170 and 196,519 million for households, government and enterprises respectively [AAISS -D.4 (uses): property income, allocation of primary income account]. At the same time, the resources of property income by institutions [AAISS -D.4 (resources): property income, allocation of primary income account] are: 56,108, 7,798 and 149,010 for households, central government and enterprises, respectively. Nonetheless, 67,349 millions are resources to the ROW [AAISS -D.4 (resources): property income to the ROW, allocation of primary income account] and they have to be subtracted from the institutions in the property income matrix [SAM(4,4)]. Nonetheless, the AAISS does not provide property income from the ROW distributed by institutions.

In a similar way, the AAISS does not provide disaggregated information in regards to 48,990 million of property income from the ROW [SAM(4,10)] [AAISS-D.4 (uses): property income from the ROW, allocation of primary income account] and 65,083 millions of property income and net taxes on products to the ROW [SAM(10,4)]. The 65,083 millions of property income come from:

- 67,349 million of resources of property income to the ROW (AAISS D.4 (resources): property income to the ROW, allocation of primary income account).

- plus 3,272 million of taxes on production and imports from resources to the ROW [AAISS D.2 (resources): taxes on production and imports to the ROW, allocation of primary income account].
- minus 5,538 million of subsidies to the ROW [D.3: subsidies (uses) to the ROW, allocation of primary income account].

These values are not distributed by institutions either.

As it was already mentioned in the introduction of this annex, in the AAISS, the epigraph referred to the ROW (uses or resources) in each account is not divided among institutions (the AAISS only provide the total value), but the AAISS provides the interior datum by institutions. So, firstly, the property income from the ROW (48,990) and property income and net taxes on products to the ROW (65,083 millions) among institutions are distributed according to the share of the property income of each institution: 0.08, 0.07 and 0.85 for households, central government and enterprises, respectively [AAISS-D.4 (uses): property income by institutions divided by "total economy" property income , allocation of primary income account]. I.e, the 48,990 million of property income from ROW [SAM(4,10)] are disentangled as follows: 3,919.2 (0.08*48,990) for households, 3,429.3 (0.07*48,990) for central government and 41,641.5 (0.85*48,990) for enterprises. The same is done with SAM(10,4). It should be noted that, SAM(4,4) is a double entry matrix that reflects the payments and revenues among institutions, but the AAISS only provides data for final uses and resources by institutions and it does not show how they are distributed among them. Moreover, 67,349 million of property income to the ROW (it is not disentangled among institutions) has to be subtracted. Thus, two steps are applied to fix SAM(4,4): firstly, the SAM(4,4) is fixed according to the system of equations (MP1). Secondly, another mathematical adjustment is carried out but including SAM(4,4), SAM(4,10) and SAM(10,4) to achieve a balanced SAM.

The system of equations MP1 is as follows:

$$\sum_{h=1}^{3}\left(coef_{h,hh} * totuses_{h}\right) = totresources_{hh} \qquad (o.1)$$

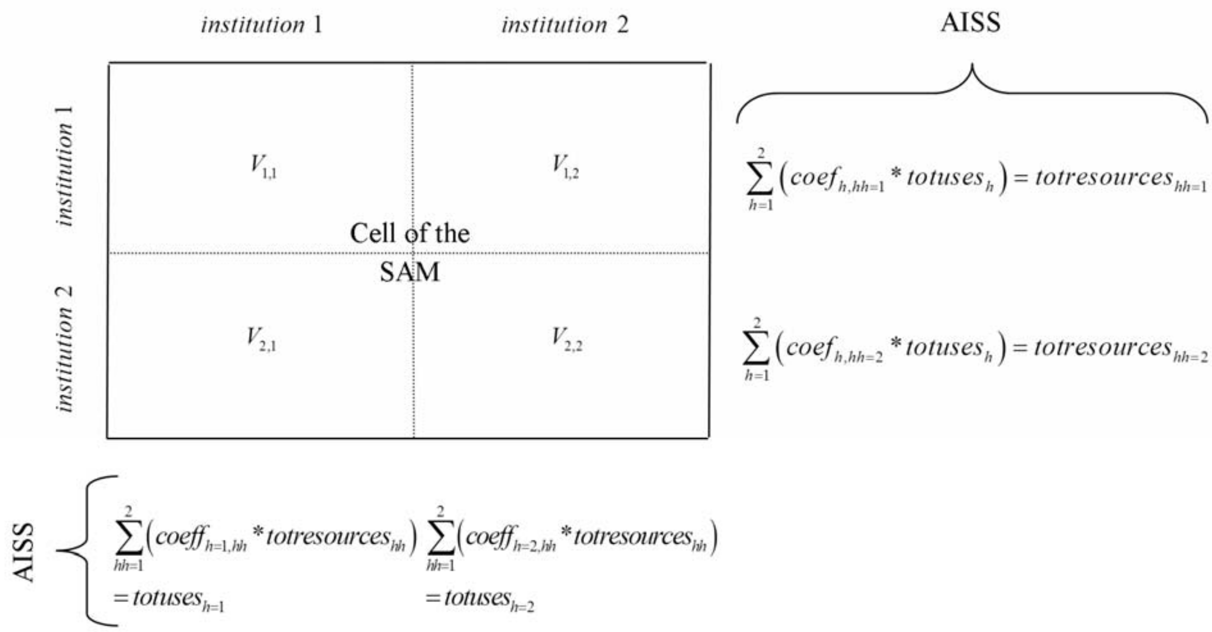
$$\sum_{hh=1}^{3}\left(coeff_{h,hh} * totresources_{h}\right) = totuses_{h} \qquad (o.2)$$

$$coeff_{h,hh} = \mathrm{V}_{h,hh} / totresources_{h} \qquad (o.3)$$

$$coef_{h,hh} = \mathrm{V}_{h,hh} / totuses_{h} \qquad (o.4)$$

The system of equations MP1 is a general model to fix data in a double entry matrix when only the total of rows and columns of such matrix is available. Figure 21 briefly depicts the general purpose behind this system of equations assuming two institutions. The total values by institutions from the AISS have to be distributed among institutions ($\mathrm{V}_{h,hh}$) fulfilling the equations o.1, o.2, o.3 and o.4.

Figure 21. Disentangling the AISS values into the SAM according to the system of equation (mp1)



$V_{h,hh}$ denotes the variable that represents the matrix to fix. h and hh denotes the indices for institutions by rows and columns respectively. $totresources_{hh}$ denotes the total sum of the row (that is equal to the sum of the column) by institutions hh. $totuses_h$ denotes a vector that represents the total of the row by institutions h. $totresources_h$ denotes a vector that represents the total of the column by institutions h. $coef_{h,hh}$ and $coeff_{h,hh}$ denotes the variables that allow assign the $totuses_h$ and the $totresources_h$ within $V_{h,hh}$, respectively.

Equation (o1) allows disentangling the uses by institutions ($coef_{h,hh} * totuses_h$) but ensuring that the disentangling has to be equal to the resources by institutions ($totresources_h$). Equation (o2) is the same than equation (o1), but disentangling the resources by institutions. Equations (o3) and (o4) hold that $coef_{h,hh}$ and $coeff_{h,hh}$ assign the values proportional to $V_{h,h} / totuses_h$ and $V_{h,h} / totresources_h$, respectively.

In this case, $V_{h,h}$ denotes the variable that represents the SAM(4,4). tot denotes the total sum of the epigraph: AAISS-D.4 property income. In this case, the total sum of property income is 280,265 (institutions and ROW included). This total sum is equal for uses and resources. $totresources_h$ is a fixed vector that represents the sum of property income (resources) by institutions (56,108 for households, 7,798 for central government and 149,010 for enterprises). $totuses_h$ is a fixed vector that represents the sum of property income (uses) by institutions (18,586 for households, 16,170 for central government and 196,519 for enterprises). $coef_{h,hh}$ and $coeff_{h,hh}$ are two index level variables that allow assigning $totresources_h$ and $totuses_h$ among institutions.

This system of equations only takes into account one cell [SAM(4,4)]. However, the row number 4 and the column number 4 of the SAM are also composed by other cells such as: SAM(4,1), SAM(4,3), SAM(4,10), SAM(5,4) and SAM(10,4). All these cells have to be taken into account in order to adjust the values of the account; (balanced SAM). Thus, another mathematical adjustment is carried out to define the final disaggregation by institutions of the cells of this account and to keep the SAM balanced. The system of equations (api) is as following one:

$$\sum_{i=1}^{123}\sum_{t=1}^{2} taxes_{h,i,t} + \sum_{va=1}^{3} netincomedist_{h,va} + \sum_{h=1}^{3} Vprim_{h,hh} + Vprimrow_h = \sum_{h=1}^{3} Vprim_{hh,h} + \sum_{h=1}^{3} second_{hh,h} + Vrowprim_h \qquad \text{(api 1)}$$

$$\sum_{h=1}^{3}\sum_{hh=1}^{3} Vprim_{h,hh} = \sum_{h=1}^{3}\sum_{hh=1}^{3} prim_{h,hh} \qquad \text{(api 2)}$$

$$\sum_{h=1}^{3} Vprimrow_h = \sum_{h=1}^{3} primrow_h \qquad \text{(api 3)}$$

$$\sum_{h=1}^{3} Vrowprim_h = \sum_{h=1}^{3} rowprim_h \qquad \text{(api 4)}$$

$Taxes_{h,i,t}$ denote taxes by commodities i and tourism categories t paid by institutions h [SAM(4,1)] as already explained above. $Netincomedist_{h,va}$ denote the sum of net income distribution from section 3.1 already explained [SAM(4,3)]. $Vprim_{h,hh}$ denotes a two index level variable that represents the property income distribution by institutions h [SAM(4,4)]. Thus, $Vprim_{h,hh}$ reflects the payments and revenues among institutions. $Vprimrow_h$ denotes a variable for the allocation of primary income by institutions h from the ROW [SAM(4,10)]. $Vrowprim_h$ denotes a variable for the allocation of primary income by institutions h to the ROW [SAM(10,4)]. $Second_{h,hh}$ denotes the net national income by institutions h [SAM(5,4)] [AAISS-B. 5n/B.5*n (uses): net national income, allocation of primary income account], it is a diagonal matrix and it will also be used in the next section.

Equation (api 1) holds that the sum of the row by institutions has to be equal to the sum of the column by institutions (for the allocation of the primary income account). The total payments of each institution (columns) has to be equal to their respective total revenues (rows). Thus, this equation will assign a value to each cells ($Vprim_{h,hh}$, $Vprimrow_h$, $Vrowprim_h$) but keeping the total by rows equal to the total by columns. In other words, this equation ensures the global balance among all rows and columns of account 4. The cells affected by this balance are: SAM(4,1), SAM(4,3), SAM(4,4), SAM(4,10), SAM(5,4) and SAM(10,4).

The rest of the equations simply ensure that the total sum of each individual cell (SAM(4,1), SAM(4,3), SAM(4,4), SAM(4,10), SAM(5,4) and SAM(10,4) match with their respective totals in the AAISS.

Equation (api 2) holds that the total sum of the variable $Vprim_{h,hh}$ (variable that represents the SAM(4,4)) has to be equal to the total sum of the property income by institutions ($\sum_{h=1}^{3}\sum_{hh=1}^{3} prim_{h,hh}$ =18,586 + 16,170 + 196,519 millions for households, government and enterprises respectively[AAISS-D.4 (uses): allocation of primary income]; and minus 67,349 million from the ROW [AAISS-D.4 (resources): allocation of primary income].

Equation (api 3) means that the total sum of the variable $Vprimrow_h$ [SAM (4, 10)] has to be equal to the total sum of property income from the ROW ($\sum_{h=1}^{3} primrow_h$ = 48,990 million [AAISS-D.4 resources): allocation of primary income].

Equation (api 4) holds that the total sum of $Vrowprim_h$ (SAM (10, 4)) has to be equal to the sum of property income and net taxes on products to the ROW ($\sum_{h=1}^{3} rowprim_h$ =65,083 millions) (67,349 millions from the ROW [AAISS-D.4 resources): allocation of primary income] plus 3,272 millions of taxes on products [AAISS-D.2 resources): allocation of primary income] minus 5,538 subsidies to the ROW [AAISS-D.3 uses): allocation of primary income]).

The results for these three variables ($Vprim_{h,h}$, $Vprimrow_h$ and $Vrowprim_h$) are shown in Table 33, Table 34 and Table 35, respectively. Property income from and to the ROW (Table 34 and Table 35, respectively) appears distributed by institutions.

Table 33. Property income (minus property income to the ROW) (millions of euros)

	Households	Government	Enterprises
Households	-	18,743.019	-
Government	-	3,534.705	-
Enterprises	-	-	141,648.276

Table 34. Property income from the ROW (millions of euros)

	ROW
Households	18,778.981
Government	12,637.018
Enterprises	17,574

Table 35. Property income and net taxes on products to the ROW (millions of euros)

	ROW
Households	-
Government	-
Enterprises	65,083

A.3.1.5.2 Secondary distribution of income account:

This account is composed by:

- Net national income [SAM(5,4)], [AAISS-B.5n (uses): net national income by institutions, allocation of primary income account]. It was already explained in section A.3.1.

- Current taxes on income and current transfers [SAM(5,5)], [AAISS-D.5 (uses): current taxes on income and wealth by institutions, D.61 (uses): social contributions by institutions, D. 62 (uses): social benefits other than social transfer in kind by institutions and D.7 (uses): other current transfer by institutions, minus the same epigraph (D.5, D.61, D.62 and D.7) (resources) to ROW].

- Net disposable income [SAM(6,5)] [B.6n (uses): net disposable income, secondary distribution income account].

- Current taxes on income and current transfers from ROW [SAM(5,10)], [D.5 (uses): current taxes on income and wealth from ROW, D.61 (uses): social contributions from ROW, D. 62 (uses): social benefits other than social transfer in kind from ROW and D.7 (uses): other current transfer from ROW].

- Current taxes on income and current transfers to ROW [SAM(10,5)], [D.5 (resources): current taxes on income and wealth to ROW , D.61 (resources): social contributions to ROW, D. 62 (resources): social benefits other than social transfer in kind to ROW and D. (resources): other current transfer to ROW].

The net national income and the net disposable income are diagonal matrices directly obtained from the AAISS. Nonetheless, the rest of cells [SAM(5,5), SAM(5,10) and SAM(10,5)] have to be disentangled by institutions.

Current taxes on income and current transfers, current taxes on income and current transfers from and to ROW.

These cells have a lack of institutional disaggregation. In this case, the cells are:

- Current taxes on income; and current transfers [AAISS-D.61 (uses): social contributions, D.62 (uses): social benefits other than social transfer in kind, D.7 (uses): other current transfer by institutions],

- minus the same epigraph (D.61, D.62 and D.7) (resources) to the ROW.

- and the current taxes on income and current transfers from and to the ROW (D.6.1, D.6.2, D.7 (uses and resources) from and to the ROW, respectively).

Thus, the way to proceed is the following one. SAM(5,10) (transfers from the ROW) and SAM(10,5) (transfers to the ROW) are vectors by institutions, so the disentangling among institutions is done according to the share of the "Current taxes on income; and current transfers of each institutions" [D.5 (uses): current taxes on income and wealth by institutions].

SAM(5,5) is a double entry matrix by institutions and it takes this structure according to the system of equations (MP1); based on the total rows (resources) and columns (uses) by institutions (D.5, D.61, D.62 and D.7 for uses and resources, secondary distribution of income account). Finally, and as in the previous account, the secondary distribution of income account [SAM(5,4), SAM(5,5), SAM(5,10), SAM(6,5), SAM(10,5)] is balanced according to the next system of equations (sdi):

$$\sum_{h=1}^{3} second_{h,hh} + \sum_{h=1}^{3} Vsecondsecond_{h,hh} + Vsecondrow_{h} = \sum_{h=1}^{3} Vsecondsecond_{hh,h} + \sum_{h=1}^{3} incomesecond_{hh,h} + Vrowsecond_{h} \tag{sdi1}$$

$$\sum_{h=1}^{3}\sum_{hh=1}^{3} Vsecondsecond_{h,hh} = \sum_{h=1}^{3}\sum_{hh=1}^{3} secondsecond_{h,hh} \tag{sdi2}$$

$$\sum_{h=1}^{3} Vsecondrow_{h} = \sum_{h=1}^{3} secondrow_{h} \tag{sdi3}$$

$$\sum_{h=1}^{3} Vrowsecond_h = \sum_{h=1}^{3} rowsecond_h \qquad \text{(sdi4)}$$

The aim of the system of equations is to correctly assign the quantities among cells, as in the previous system of equations (api) keeping a balanced SAM. In this case, the system includes the cells of the 5th row and 5th column from the SAM: SAM(5,4), SAM(5,5), SAM(5,10), SAM(6,5), SAM(10,5).

$Second_{h,hh}$ denotes a diagonal matrix for the net national income by institutions h, also used in the previous section. $Vsecondsecond_{h,hh}$ denotes a two index level variable by institutions h related to the cell [SAM(5,5)]. $Vsecondrow_h$ denotes a variable that represent the flow of transfers by institutions h from the ROW [SAM(5,10)] and $Vrowsecond_h$ denotes a variable that represents the flow of transfers by institutions h to the ROW [SAM(10,5)]. $Incomesecond_{h,hh}$ denotes a diagonal matrix by institutions h, that represents the net disposable income [SAM(6,5)].

Equation (sdi1) ensures the balance among all rows and columns of account 5. The cells affected by this balance are: SAM(5,4), SAM(5,5), SAM(5,10), SAM(6,5), SAM(10,5).

More precisely, equation (sdi1) holds that the sum of the rows by institutions has to be equal to the sum of the columns by institutions (for the allocation of the secondary income account). The total payments of each institution (columns) have to be equal to their respective total revenues (rows). Thus, this equation will assign a value to each cell ($Vsecondsecond_{h,hh}$, $Vsecondrow_h$, $Vrowsecond_h$) but keeping the total by rows equal to the total by columns.

The rest of equations simply ensures that the total of each individual cell SAM(5,4), SAM(5,5), SAM(5,10), SAM(6,5), SAM(10,5) matches with their respective totals in the AAISS.

Equation sdi2 holds that total sum of $Vsecondsecond_{h,h}$ has to be equal to the total sum $secondsecond_{h,hh}$ ($\sum_{h=1}^{3}\sum_{hh=1}^{3} secondsecond_{h,hh} =$ 459.104 millions) (262.761 millions for households, 128,522 millions for government and 88,571 millions for enterprises [sum of AAISS-D.61, D. 62, D.7 (uses) by institutions: secondary distribution of income] minus 20,750 millions [sum of AAISS-D.61, D. 62, D.7 (resources) to the ROW: secondary distribution of income].

Equation sdi2 holds that the sum of $Vsecondrow_h$ has to be equal to the sum of $secondrow_h$ ($\sum_{h=1}^{3} secondrow_h$ =11,064 millions) (the total sum of AAISS-D.61, D. 62, D.7 from the ROW: secondary distribution of income).

Equation sdi3 holds that total sum of $Vrowsecond_{w,h}$ has to be equal to the sum $rowsecond_h$ ($\sum_{h=1}^{3} rowsecond_h$ = 20,750 millions) (the total sum of AAISS-D.61, D. 62, D.7 to the ROW: secondary distribution of income).

The results for these three variables ($Vsecondsecond_{h,hh}$, $Vsecondrow_h$ and $Vrowsecond_h$) are shown in Table 36, Table 37, and Table 38, respectively:

Table 36. Current taxes on income and current transfers (minus Current taxes on income and current transfers to the ROW) (millions of euros)

	Households	Government	Enterprises
Households	145,110	204,900	
Government	112,260		10,706.971
Enterprises	159,620	-19,970	26,201.565

Table 37. Current taxes on income and current transfers from the ROW by institutions (millions of euros)

	ROW
Households	7,961
Government	3,103
Enterprises	-

Table 38. Current taxes on income and current transfers to the ROW by institutions (millions of euros)

	ROW
Households	20,750
Government	-
Enterprises	-

A.3.1.5.3 Use of disposable income account:

This account is composed by:

- Final consumption expenditure [SAM(1,6)] (data from the use table of IOT and AAISS- P.3 (uses): final consumption expenditure by institutions, use of disposable income account).

- Net disposable income [SAM(6,5)], [AAISS-B.6n (uses): net disposable income by institutions, secondary distribution of income account],

- Adjustment for change in net equity [SAM(6,6)], [AAISS- D 8.n (uses): adjustment for the change in net equity of households in pension funds reserves. minus D.8n (resources): adjustment for the change in net equity of households in pension funds reserves to the ROW, use of disposable income account].

- Net savings [SAM(7,6)], [AAISS- B.8n (uses): net savings by institutions, use of disposable income account].

All these data are taken directly from the AAISS (or IOT) and they are shown in Tables 39, 40 and 41:

Table 39. Net disposal income (millions of euros)

	Households	Government	Enterprises
Households	588,558		
Government		224,128	
Enterprises			-7,545

Table 40. Adjustment for change in net equity (millions of euros)

	Enterprises
Households	892

Table 41. Net savings (millions of euros)

	Households	Government	Enterprises
Households	24,854		
Government		46,592	
Enterprises			-8437

A.3.1.5.4 Capital account

The Capital Account is composed by:

- Changes of inventories [SAM(1,7)] (data by commodities from the use table of the IOT) and disaggregated by institutions in epigraph: [AAISS-P.52 (uses): change in inventories, acquisition of non-financial assets account].

- Gross capital formation [SAM(1,8)], [AAISS-P.5 (uses): gross capital formation, acquisition of non-financial assets account] .

- Net saving [SAM(7,6)], (explained in previous section).

- Capital transfer [SAM(7,7)] , [AAISS-D.91 (uses): capital transfers by institutions. Minus D.91 (resources): capital transfers to the ROW, Acquisitions minus disposals of non-produced non-financial assets].

- Borrowing [SAM(7,9)], [AAISS-B.9 (uses): net borrowing by institutions (except financial corporations), acquisition of non-financial assets account].

- Capital transfer from the ROW [SAM(7,11)], [AAISS-D.91 (uses): capital transfers from the ROW, minus K.2 (uses): Acquisitions minus disposals of non-produced non-financial assets from the ROW, change in net worth due to savings and capital transfer account and acquisition of non-financial assets account].

- Net fixed capital formation [SAM(8,7)], [AAISS-P.5 (uses): gross capital formation by institutions, minus K.1 (resources): consumption of fixed capital by institutions, acquisition of non-financial assets account].

- Lending [SAM(9,7)], [AAISS-B.9 (uses): net lending (financial corporations), acquisition of non-financial assets account].

- Capital transfer to the ROW [SAM(11,7)], [AAISS-D.9 (resources): capital transfers to the ROW, change in net worth due to savings and capital transfer account].

Interior capital transfers and capital transfer to and from the ROW need to be disentangled among institutions, the other cells are directly taken from AAISS and they are shown in Tables 42, 43, 44, 45, 46 and 47 (net savings was shown above).

Table 42. Change in inventories by institutions (millions of euros)

Households	528
Government	-
Enterprises	3,271

Table 43. Borrowing (millions of euros)

Households	18,464
Government	-19,844
Enterprises	91,149

Table 44. Lending (millions of euros)

Households	-
Government	-
Enterprises	7,218

Table 45. Gross fixed capital formation (millions of euros)

Households	96,428
Government	36,604
Enterprises	168,137

Table 46. Net fixed capital formation (millions of euros)

Households	50,431
Government	20,248
Enterprises	77,408

Table 47. Consumption of fixed capital formation (millions of euros)

Households	45,997
Government	16,356
Enterprises	90,729

Capital transfers and Capital transfers from and to the ROW.

The capital transfers and Capital transfers from and to the ROW need to be disaggregated among institutions. Firstly, Capital transfers from and to ROW are distributed among institution based on the capital transfers share by institutions (epigraph: AAISS-D.91: capital transfers by institutions, the change in net worth due to saving and the capital transfers account). Secondly, SAM(7,7) is split up according to the system of equation (MP1). Finally, another system of equations (ca) is applied to the all cells of this account in order to balance the SAM [SAM(7,6), SAM(7,7), SAM(7,9), SAM(7,11), SAM(8,7), SAM(9,7), SAM(11,7)].

$$\sum_{h=1}^{3} capincome_{h,hh} + \sum_{h=1}^{3} Vcapcap_{h,hh} + \sum_{h=1}^{3} capfinan_{h,hh} + Vcaprow_h = chginv_h + \sum_{h=1}^{3} Vcapcap_{hh,h} + financap_h + \sum_{h=1}^{3} fbkh_{hh,h} + Vrowcap_h \tag{ca 1}$$

$$\sum_{h=1}^{3}\sum_{hh=1}^{3} Vcapcap_{h,hh} = \sum_{h=1}^{3}\sum_{hh=1}^{3} capcap_{h,hh} \tag{ca 2}$$

$$\sum_{h=1}^{3} Vcaprow_h = \sum_{h=1}^{3} caprow_h \tag{ca 3}$$

$$\sum_{h=1}^{3} Vrowcap_h = \sum_{h=1}^{3} rowcap_h \tag{ca 4}$$

The aim of this system of equations is to correctly assign the quantities among cells like in the system of equations api and sdi, taking into account that the sum of rows has to be equal to the sum of columns. In this case, the system includes the cells of the 7th row and 7th column from the SAM: SAM(7,6), SAM(7,7), SAM(7,9), SAM(7,11), SAM(8,7), SAM(9,7), SAM(11,7).

$Capincome_{h,hh}$ denotes a double entry matrix by institutions h (hh denotes also a index for institutions) associated to SAM(7,6) (net saving cell). $Vcapcap_{h,hh}$ denotes a two index level variable by institutions h associated to SAM(7,7) (capital transfer cell). $Capfinan_{h,hh}$ denotes a double entry matrix by institutions h associated to SAM(7,9) (borrowing cell). $Vcaprow_{h}$ denotes a two index level variable by institutions h from the ROW associated to SAM(7,11) (capital transfer from row cell). $Chginv_{h}$ denotes a double entry matrix by institutions h associated to SAM(1,7) (change in inventories cell). $Financap_{h}$ denotes a double entry matrix by institutions h associated to SAM(9,7) (lending cell). $Fbkh_{h,hh}$ denotes a double entry matrix by institutions h associated to SAM(1,8) (gross fixed capital formation cell). $Vrowcap_{h}$ denotes a two index level variable by institutions h to ROW associated to SAM(11,7) (capital transfer cell).

Equation (ca 1) holds that the sum of the rows by institutions has to be equal to the sum of the columns by institutions (for the allocation of the capital). The total payments of each institution (columns) has to be equal to their respective total revenues (rows). Thus, this equation assigns a value to each cells ($Vcapcap_{h,hh}\ Vcaprow_{h}, Vcapcap_{hh,h}, Vrowcap_{h}$) but keeping the total sum by rows equal to the total sum by columns. In other words, this equation ensures the equilibrium among all the cells in row 7 and column 7: SAM(7,6), SAM(7,7), SAM(7,9), SAM(7,11), SAM(8,7), SAM(9,7), SAM(11,7).

The rest of equations simply ensure that the total of each individual cell SAM(7,6), SAM(7,7), SAM(7,9), SAM(7,11), SAM(8,7), SAM(9,7), SAM(11,7) match with their respective totals in the AAISS.

Equation (ca 2) means that the sum of the cell of the variable capital transfer ($Vcapcap_{h,hh}$) [SAM(7,7)] ($\sum_{h=1}^{3}\sum_{hh=1}^{3} Vcapcap_{h,hh}$) has to be equal to the sum of the cell $capcap_{h,h}$ ($\sum_{h=1}^{3}\sum_{hh=1}^{3} capcap_{h,hh}$),[SAM(7,7)], (18,293 millions, that is equal to 19,316 (sum of the capital transfer by institution (AAISS-D.9 (use), change in net worth due to saving and capital transfer account) minus 1023 (AAISS-D.9 (resource from the ROW), change in net worth due to saving and capital transfer account).

Equation (ca 3) holds that the sum of the variable $Vcaprow_h$ ($\sum_{h=1}^{3} Vcaprow_h$)[SAM(7,11)] has to be equal to the sum of the variable $\sum_{h=1}^{3} caprow_h$ [SAM(7,11)] (7870 million (AAISS-D.9: capital transfers (uses to the ROW), change in net worth due to saving and capital transfer account) plus -521 (K.2 (uses to the ROW): acquisitions minus disposals of non-produced non-financial assets, acquisition of non-financial assets account).

Equation (ca 4) holds that the sum of the variable $Vrowcap_h$ ($\sum_{h=1}^{3} Vrowcap_h$) has to be equal to the sum of the cell $rowcap_h$ [SAM(11,7)] ($\sum_{h=1}^{3} rowcap_h$ is equal 1,023 millions (D.9: capital transfers (resources from ROW), change in net worth due to saving and capital transfer account).

Tables 48, 49 and 50 show the results for the variables: $Vcapcap_{h,h}$, $Vcaprow_h$ and $Vrowcap_h$, respectively.

Table 48. Capital transfers (millions of euros)

	Households	Government	Enterprises
Households	-6,930.86	11,026.731	1,676.385
Government	4,741.231		
Enterprises	6,861.385		

Table 49. Capital transfers from the ROW(millions of euros)

Households	7,349
Government	-
Enterprises	-

Table 50. Capital transfers to the ROW(millions of euros)

Households	808.5
Government	214.5
Enterprises	-

A.3.1.5.5 Capital ROW account

This account is composed by the cells from other accounts:

- Capital transfer to the ROW [SAM (11, 7)] [AAISS-D.9 (resources): capital transfers to the ROW, change in net worth due to savings and capital transfer account]. It was explained in section A.3.4.

- Current external balance [SAM(11,10)], [AAISS-B.12 (uses): current external balance, external account].

- Capital transfer from the ROW [SAM(7,11)], [AAISS-D.91 (uses): capital transfers from the ROW, minus K.2 (uses): Acquisitions minus disposals of non-produced non-financial assets from the ROW, change in net worth due to savings and capital transfer account and acquisition of non-financial assets account]. It was explained in section A.3.4.

- Net lending to ROW [SAM(9,11)], [AAISS-B.9 (uses): net lending/net borrowing to ROW, acquisition of non-financial assets account].

Cells: SAM(7,11) and SAM(11,7) were already adjusted in the previous section and they are shown in Tables 49 and 50, respectively.

The cell SAM(9,11) accounts for 82,551 millions, while the cell SAM(11,10) accounts for 88,877 millions. Once again, a system of equations (fa) is used to distribute 82,551 from the ROW and 88,877 to the ROW among institutions and keep the SAM balanced:

$$capcaprow_h + Vfinancaprow_h = Vcaprowrow_h + caprowcap_h \qquad \text{(fa 1)}$$

$$\sum_{h=1}^{3} Vfinancaprow_h = \sum_{h=1}^{3} financaprow_h \qquad \text{(fa 2)}$$

$$\sum_{h=1}^{3} Vcaprowrow_h = \sum_{h=1}^{3} caprowrow_h \qquad \text{(fa 3)}$$

The aim of the system of equations is to correctly assign the quantities among cells like in the system of equations api, sdi and ca, taking into account that the sum by rows has to be equal to the sum by columns. In this case, the system includes the cells of the row number 11 and the column number 11 from the SAM: SAM(11,7), SAM(11,10), SAM(9,11), SAM(7,11).

$capcaprow_h$ is a vector that represents the flow of capital transfer minus the acquisition minus disposals of non-produced non-financial assets to the ROW. On the other hand, $caprowcap_h$ is also a vector that represents the capital transfer from the ROW. $Vfinancaprow_h$ and $Vcaprowrow_h$ is the variable that represent the net lending/borrowing and the current external balance respectively.

Equation (fa 1) holds that the sum of the row by institution has to be equal to the sum of the column by institutions. The total payments of each institution (columns) have to be equal to their respective total revenues (rows). Thus, this equation assigns a value to each cells ($Vfinancaprow_h$,$Vcaprowrow_h$) but keeping the total sum by rows equal to the total sum by columns. In other words, this equation ensures the equilibrium among all the cells in row 11 and column 11: SAM(11,7), SAM(11,10), SAM(9,11), SAM(7,11).

The rest of equations simply ensure that the total of each individual cell SAM(11,7), SAM(11,10), SAM(9,11), SAM(7,11) match with their respective totals in the AAISS.

Equation (fa 2) holds that the total sum of the variable $Vfinancaprow_h$ ($\sum_{h=1}^{3} Vfinancaprow_h$) has to be equal to the total sum of the cell $financaprow_h$ [SAM(7,11)] ($\sum_{h=1}^{3} financaprow_h$ =7,349) [AISS-D.9 (uses): change in net worth due to saving and capital transfers account, minus K.2 (uses:): acquisition of non-financial assets account].

Equation (fa 3) holds that the total sum of the variable $Vcaprowrow_h$ ($\sum_{h=1}^{3} Vcaprowrow_h$) has to be equal to the total sum of the cell $caprowrow_h$ [SAM(7,11)] ($\sum_{h=1}^{3} caprowrow_h$ =88,877) [AISS-D.9 (uses):external account].

Tables 51 and 52 show the results for the variables: $Vfinancaprow_h$ and $Vcaprowrow_h$, respectively:

Table 51. Net lending from the ROW (millions of euros)

Households	82,551
Government	-
Enterprises	-

Table 52. Current external balance(millions of euros)

Households	88,877
Government	-
Enterprises	-

A.3.1.6 Supply and use table with tourism categories

The new supply and use table (at basic prices) are shown in this annex. The 75 Activities and 118 commodities have been gathered in 17 activities and commodities.

Aggregated activities:

A1 "Agriculture": from activity 1 to 3 in the IOT

A2 "Energy and mining": from activity 4 to 11 in the IOT

A3 "Industry": from activity 12 to 39 in the IOT

A4 "Construction": activity 40 in the IOT

A5 "Trade": from activity 41 to 43 in the IOT

A6 "Accommodation": activity 44 in the IOT

A7 "Catering services": activity 45 in the IOT

A8 "Railways transport": activity 46 in the IOT

A9 “Road transport”: activity 47 in the IOT

A10 “Maritime transport”: activity 48 in the IOT

A11 “Air transport”: activity 49 in the IOT

A12 “Other transport services”: activity 50 in the IOT

A13 “Travel agencies”: activity 51 in the IOT

A14 “Real estate”: activity 56 in the IOT

A15 “Rent a car”: activity 57 in the IOT

A16 “Entertainment”: from activity 71 to 73 in the IOT

A17 “Other services”: rest of activities in the IOT

Aggregated goods:

C1 “Agriculture”: from commodities 1 to 6 in the IOT

C2 “Energy and mining”: from commodities 7 to 15 in the IOT

C3 “Industry”: from commodities 16 to 60 in the IOT

C4 “Construction”: from commodities 61 to 64 in the IOT

C5 “Trade”: from commodities 65 to 68 in the IOT

C6 “Accommodation”: commodity 69 in the IOT

C7 “Catering services”: commodity 70 in the IOT

C8 “Railways transport”: commodities 71 and 72 in the IOT

C9 “Road transport”: commodities 73 and 74 in the IOT

C10 “Maritime transport”: commodity 75 in the IOT

C11 “Air transport”: commodity 76 in the IOT

C12 “Other transport services”: commodities 77 and 78 in the IOT

C13 “Travel agencies”: commodities 79 and 80 in the IOT

C14 “Real estate”: commodities 86 and 87 in the IOT

C15 “Rent a car”: commodity 88 in the IOT

C16 “Entertainment”: from commodities 112 to 116 in the IOT

C17 “Other services”: rest of commodities in the IOT

New supply table at basic prices

Production block:

		A1	A2	A3	A4	A5	A6	A7	A8	A9
C1	t	424.78	10.17		1.22	0.65				
C1	nt	39194.32	938.03		112.68	60.35				14.10
C2	t	0.04	951.60	6.22	2.13					
C2	nt	4.06	87804.60	573.78	196.37					0.20
C3	t	13.45	1.61	5007.49	5.81	44.10				
C3	nt	1241.45	148.49	462043.51	535.69	4068.90			33.10	3.10
C4	t	4.08	7.37	0.00	3338.08	8.13	18.33	140.75		
C4	nt	376.92	679.73	0.10	308006.12	749.97	2.07	430.45	0.90	153.60
C5	t	3.72	3.93	132.22	5.24	1682.76	203.90	89.47		
C5	nt	343.48	362.47	12199.88	483.06	155268.84	23.00	273.63		73.30
C6	t					0.76	17054.70			
C6	nt					1.04	182.00			
C7	t						2232.20	23971.30		
C7	nt		1.20		35.70	191.20	744.20	63555.60		0.90
C8	t								1485.70	
C8	nt								796.50	
C9	t									2546.30
C9	nt		441.40		390.20	379.40				41268.70
C10	t									
C10	nt									
C11	t									
C11	nt									
C12	t		1.01			6.02	15.80			
C12	nt		43.99			261.18			38.30	531.60
C13	t									2.3
C13	nt									
C14	t		44	352.4	6933.1	3292.8	101		0.1	422.4
C14	nt									2.3
C15	t									
C15	nt					172.70				1.80
C16	t	0.07	14.71	90.59	17.35	7.96	334.47	35.38		
C16	nt	6.23	1357.69	8358.81	1601.25	777.84	37.73	1120.52	58.10	504.70
C17	t					0.00	30.50	498.90		
C17	nt	886.40				6.40	10.10		6.30	

Production block (continues):

		A10	A11	A12	A13	A14	A15	A16	A17
C1	t		0.01					1.96	
C1	nt		0.39	0.50			6.90	180.44	
C2	t							7.25	
C2	nt							669.15	
C3	t		5.49					9.06	
C3	nt	0.1	226.01	10.50			97.00	835.74	101.90
C4	t							18.28	
C4	nt			731.90		11.40	84.60	1686.92	0.70
C5	t		0.41					25.16	
C5	nt		16.89	55.50			345.20	2321.84	24.40
C6	t							27.24	
C6	nt							37.16	
C7	t	17.3							39.40
C7	nt			11.90				407.60	277.80
C8	t								
C8	nt							478.60	
C9	t						18.20		
C9	nt			22.10				74.20	
C10	t	451.8							
C10	nt	2691.2		3.40			0.80		
C11	t		8426.50						
C11	nt		459.90						
C12	t		140.70	3843.40				1.18	
C12	nt	19.5	260.30	27246.40				411.42	
C13	t		87.9	0.3	4783			434	12.5
C13	nt					11516.5			
C14	t	69.5	24.3	709.4		97978.9	334	2534.9	69.5
C14	nt		87.9	0.3	4783			434	12.5
C15	t						1404.70		
C15	nt			64.30			2207.30		
C16	t		0.50					4704.91	
C16	nt	3.3	20.50	428.90	4582.00	3.20	6725.30	434147.09	10310.87
C17	t							23.25	10946.80
C17	nt	0.3	0.20	0.50				1643.65	19085.13

Imports

01c16	t	219.54
01c16	nt	9538.61
02c16	t	1088.10
02c16	nt	45562.87
03c16	t	4494.36
03c16	nt	212610.40
05c16	t	0.50
05c16	nt	17.37
06c16	t	37.58
06c16	nt	1459.26
07c16	t	2400.74
07c16	nt	59.00
08c16	t	38.19
08c16	nt	18.27
09c16	t	130.08
09c16	nt	2777.00
10c16	t	341.37
10c16	nt	55.00
11c16	t	6402.94
11c16	nt	1252.26
12c16	t	
12c16	nt	2804.00
13c16	t	1300.11
13c16	nt	
14c16	t	
14c16	nt	26.40
15c16	t	18.95
15c16	nt	14.61
16c16	t	803.32
16c16	nt	29054.33
17c16	t	360.12
17c16	nt	2397.73

New use table at basic prices

Intermediate demand block:

		A1	A2	A3	A4	A5	A6	A7	A8	A9
C1	t	25.13	20.25	244.11	0.25	18.82	2.87	12.59		
C1	nt	2323.47	1868.55	22533.29	22.75	1738.88	265.13	1161.71		
C2	t	17.45	543.16	252.23	30.43	61.08	3.87	11.69	2.58	49.17
C2	nt	1610.55	50118.04	23273.37	2808.27	5636.32	357.13	1078.61	237.82	4537.03
C3	t	104.19	49.25	2329.07	625.83	105.91	21.55	220.73	3.11	19.20
C3	nt	9613.91	4551.05	214916.83	57758.37	9776.19	1989.15	20370.07	290.39	1782.30
C4	t	3.14	9.25	24.76	1338.46	29.70	10.71	7.14	0.69	0.75
C4	nt	265.36	797.25	2100.64	118807.64	2579.10	910.69	600.06	53.41	63.85
C5	t	29.76	14.70	237.99	121.91	76.03	3.21	61.85	0.00	36.01
C5	nt	2516.44	1308.00	20224.91	10223.79	6757.27	271.79	5089.45	0.20	3238.39
C6	t	12.00	62.10	475.10	285.70	203.02	0.12	11.50	2.60	24.20
C6	nt					16.88	10.78			
C7	t						13.95	5.26		
C7	nt	5.90	22.40	152.70	42.60	106.50	4.65	13.94	18.50	15.10
C8	t	4.34	29.39	236.10	14.86	57.60	0.08	0.50	5.15	9.85
C8	nt	0.86	5.81	46.70	2.94	11.40	0.02	0.10	22.85	1.95
C9	t									4.47
C9	nt	284.30	1068.40	15376.30	2449.20	5333.80	13.60	118.00	9.20	490.73
C10	t	6.81	12.22	89.69	7.87	28.94	0.04	0.55	0.02	2.06
C10	nt	26.59	47.68	350.11	30.73	112.96	0.16	2.15	0.08	8.04
C11	t	3.41	41.44	278.97	44.95	186.43	0.19	0.47	0.19	1.90
C11	nt	0.19	2.26	15.23	2.45	10.17	0.01	0.03	0.01	0.10
C12	t		5.48			93.23	1.30			
C12	nt	359.50	585.02	5440.90	204.50	4047.47		3.40	363.00	8343.70
C13	t	1.50	51.77	72.00	265.59	167.24	7.83	18.73	19.19	0.73
C13	nt									
C14	t									
C14	nt	53.30	586.00	4391.00	3191.40	12031.70	1381.60	3670.90	1.70	308.50
C15	t	0.11	8.86	98.64	284.68	111.33	7.37	15.69		212.74
C15	nt	0.19	15.44	171.76	495.72	193.87	12.83	27.31		370.46
C16	t	13.89	85.39	469.59	133.45	264.29	25.13	47.51	2.24	40.14
C16	nt	1247.00	6930.44	39994.71	14741.36	23038.35	2048.62	4040.24	213.47	3533.44
C17	t		2.31	63.77		6.34	14.54	13.54	0.33	
C17	nt		32.29	865.83		60.28	177.08	162.28	4.37	

Intermediate demand block (continues):

		A10	A11	A12	A13	A14	A15	A16	A17
C1	t	0.08		0.03		0.10	0.01	3.42	4.96
C1	nt	7.02		3.17		9.20	0.49	315.48	457.74
C2	t	6.83	23.24	9.12	1.30	5.65	2.80	85.43	4.70
C2	nt	629.87	2144.36	841.78	120.20	521.15	258.80	7882.47	433.50
C3	t	1.98	6.06	21.51	3.28	7.66	9.98	379.85	47.55
C3	nt	183.02	537.64	1986.49	302.72	707.84	921.52	35071.25	4395.35
C4	t	0.23	0.68	14.16	0.85	124.29	1.57	69.52	9.68
C4	nt	19.37	58.22	1288.84	72.55	11254.71	122.23	5713.78	793.32
C5	t	0.33	0.17	3.28	0.76	3.53	9.39	89.09	10.47
C5	nt	27.07	14.83	278.92	62.84	307.37	785.71	7324.21	862.63
C6	t	0.30	16.10	53.40	2543.5	34.50	10.50	1671.33	225.20
C6	nt							36.67	
C7	t	1.28							5.31
C7	nt	5.92	14.60	5.40	94.50	14.10	13.00	1496.40	165.69
C8	t	3.76	6.18	13.86	53.60	3.92	14.53	138.50	7.43
C8	nt	0.74	1.22	2.74	10.60	0.78	2.87	27.40	1.47
C9	t						14.29		
C9	nt	66.10	12.40	5832.00	157.80	4.10	182.91	1198.80	186.30
C10	t	0.45	0.49	35.28	22.82	0.16	1.69	19.19	2.98
C10	nt	2.05	1.91	137.72	89.08	0.64	6.61	74.91	11.62
C11	t	4.17	363.27	99.66	967.31	8.44	47.13	1300.90	87.14
C11	nt	0.23	19.83	5.44	52.79	0.46	2.57	71.00	4.76
C12	t		473.82	940.51				15.11	
C12	nt	837.40	876.58	6667.39	9.70	49.40		885.89	26.90
C13	t	22.36	58.20	48.92	468.16	4.36	1.04	290.34	73.19
C13	nt								
C14	t					84.30			
C14	nt	9.20	61.00	445.10	283.70	717.20	993.10	8642.40	1003.00
C15	t	0.04	1.50	65.04	15.39	14.99	50.05	146.39	27.76
C15	nt	0.06	2.60	113.26	26.81	26.11	87.15	254.91	48.34
C16	t	3.77	6.87	17.96	7.33	126.16	17.81	929.22	41.36
C16	nt	375.67	1736.43	1766.32	1044.3	11319.19	1672.3	78533.79	4308.72
C17	t	0.20	2.09		4.50		11.46	374.84	440.98
C17	nt	2.70	27.61		63.00		151.84	4981.01	4572.86

Final demand block:

		Tourism consumption	Households consumption	Government consumption	GCF	Exports
C1	t	143.02	159.21		4.31	19.17
C1	nt		10469.93		452.79	8414.12
C2	t	264.71	674.97		4.92	
C2	nt		19693.18		541.88	12082.99
C3	t	1478.54	3041.53	32.30	315.83	756.22
C3	nt		104687.85	7114.10	64378.47	140578.07
C4	t	31.99	19.56		1838.40	
C4	nt		4696.92		162727.90	6.91
C5	t	877.36	469.61	56.48	82.44	
C5	nt		87345.62	4074.72	8657.96	13874.37
C6	t	7849.15	6003.12		8657.96	
C6	nt		155.87			
C7	t	16438.52	9795.88			
C7	nt		63093.20			
C8	t	559.83	317.16	34.05	13.22	
C8	nt		716.19	397.85	7.08	31.78
C9	t	1746.14	876.16	42.86	10.66	
C9	nt		5679.37	723.64	176.84	5987.36
C10	t	185.60	219.37	4.41	3.80	148.69
C10	nt		354.40	26.29	22.70	1443.52
C11	t	4093.96	4241.50	299.55		2757.61
C11	nt		1240.56	27.44		256.55
C12	t	152.58	45.16	360.00		2280.22
C12	nt					2555.14
C13	t	2406.67	2154.27	488.02		2555.14
C13	nt					
C14	t	6192.65	3688.21		1551.34	
C14	nt		59640.57	282.00	15165.76	33.56
C15	t	220.89	142.19			
C15	nt		613.88			
C16	t	970.54	1383.52	1220.27	202.85	
C16	nt		102266.64	154425.83	20774.75	25079.00
C17	t	1370.85	7965.70	1522.08	66.05	
C17	nt		4459.41	5894.92	1402.15	1178.71

Value added:

	Wages	Gross operating surplus
A1	5613	14244.5209
A2	5642	10667.0897
A3	79966	33375.5644
A4	60501	27803.148
A5	48719	27836.3769
A6	6021	4412.54128
A7	20517	19837
A8	864	194.357459
A9	9079	6716.61761
A10	354	430.094248
A11	1951	778.056796
A12	6263	2913.69766
A13	1250	1853.70272
A14	6539	43457.0739
A15	1874	2388.08891
A16	197746	54066.4834
A17	11649	6306.58607

Annex 3.2 Recursive-dynamic CGE model

The equations written in the next section are in calibrated share form. This form converts the free parameters of the functional forms (coefficient form) into benchmark value shares (calibrated share form). According to Boehringer, Rutherford and Wiegard (2003. p. 8): *"The so-called calibrated share form eases the calculation of free parameter of functional form. because there is no need to invert demand functions (as opposed to the coefficient form approach)"*. Boehringer, Rutherford and Wiegard (2003) provide examples in this regards. A CGE model in a mixed complementarity format (mcp) is based on three main conditions: zero profit. market clearance and income constraint. The equations explained below omit the time index as well as taxes for purpose of clarity.

A.3.2.1 Zero profit conditions

The first class of inequality condition ensures that, in equilibrium, the value of inputs per activity must be equal to or greater than the value of outputs. I.e., the revenue must be equal or lower than the cost of producing it. The zero profit condition can be written as:

$$\prod_j(p) = R_j(p) - C_j(p) \geq 0 \quad \forall j$$

Where $\prod_j(p)$ represent the profit by activity j and $R_j(p)$ and $C_j(p)$ are the unit revenue function and the unit cost function by activity j respectively.

$$C_j(p) \equiv min\left\{\sum_i p_i x_i \mid f_j(x) = 1\right\}$$

$$R_j(p) \equiv max\left\{\sum_i p_i y_i \mid g_j(x) = 1\right\}$$

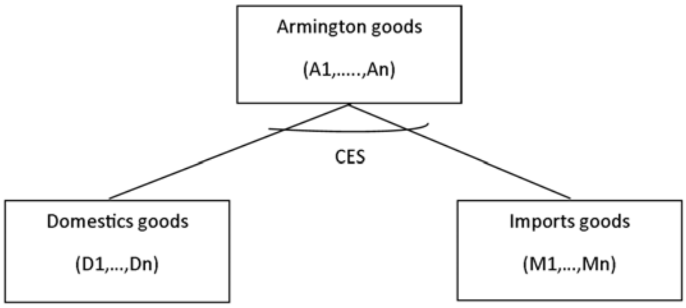
The mixed complementarity condition is as follows:

$$\sum_{j=1} y_j \prod_j (p) = 0; \quad \forall j$$

Armington production

Figure 22 depict the structure of the armington goods.

Figure 22. Armington structure



According to Figure 22, domestic and import are both used to produce the Armington goods (composite good). Such goods try to reflect the imperfect substitution between domestic and import production (Armington, 1969).

$$arm_{c,t}\left[Pa_{c,t} - \left(\left(\alpha_{c,t}(Pfx)^{(1-\sigma_{dm})}\right) + \left(\beta_{c,t}(Pd_{c,t})^{(1-\sigma_{dm})}\right)\right)^{1/(1-\sigma_{dm})}\right] = 0 \quad ; arm_{c,t} \geq 0 \quad \forall c,t \qquad \text{(zp\_arm)}$$

Equation (zp_arm) depicts the structure of Figure 22 on mathematical term (mcp format). ($\left(\left(\alpha_{c,t}(Pfx)^{(1-\sigma_{dm})}\right) + \left(\beta_{c,t}(Pd_{c,t})^{(1-\sigma_{dm})}\right)\right)^{1/(1-\sigma_{dm})}$) is the unit CES cost function. Indices c and t mean goods and services (from 1 to 17) and tourism categories (tourism and non-tourism). respectively. $arm_{c,t}$ and $Pa_{c,t}$ are the armington production and armington price variables. respectively. Pfx is the real exchange rate (the role of the real exchange rate will be explained in more detail below). $Pd_{c,t}$ is the domestic price variable . $\alpha_{c,t}$ is the benchmark value share of domestic goods and services ($\alpha_{c,t} = \frac{\overline{Pd}_{c,t}\,\overline{d}_{c,t}}{\overline{Pa}_{c,t}\,\overline{arm}_{c,t}}$) (the symbol – above a variable implies initial values). $\beta_{c,t}$ is the benchmark value share of imported inputs ($\beta_{c,t} = \frac{\overline{Pfx}\,\overline{m}_{c,t}}{\overline{Pa}_{c,t}\,\overline{arm}_{c,t}}$) and σ_{dm} is the domestics-import elasticity. The intermediate unit domestic and imported demand functions are, respectively:

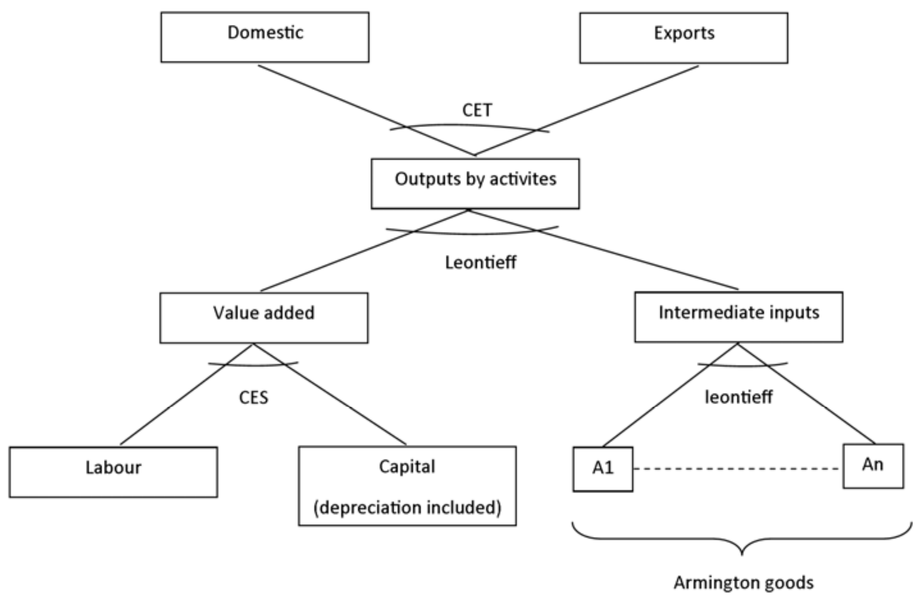
$$d_{c,t} = arm_{c,t}\left(\frac{Pa_{c,t}}{Pd_{c,t}}\right)^{\sigma_{dm}} \qquad \text{(id\_arm\_d)}$$

$$m_{c,t} = arm_{c,t}\left(\frac{Pa_{c,t}}{Pfx}\right)^{\sigma_{dm}} \qquad \text{(id\_arm\_m)}$$

Activity production

Figure 23 shows the production structure by activities.

Figure 23. Activities structure



$$actv_a\left[\sum_{c=1}^{17}\sum_{t=1}^{2}Pactv_{c,t}-\left(\zeta_a^{va}\left(\sum_{c=1}^{17}\sum_{t=1}^{2}\zeta_{c,t}^{id}Pa_{c,t}\right)+\left(1-\zeta_a^{va}\right)\left(\sum_{f=1}^{2}\phi_{f,a}(Pf_{f,a})^{(1-\sigma_{va})}\right)^{1/(1-\sigma_{va})}\right)\right]=0\ \ ;actv_a\geq 0\ \ \forall a \qquad \text{(zp\_actv)}$$

Equation (zp_actv) depicts the zero profit condition by activities in complementarity form. In the first nest, $\left(\sum_{f=1}^{2}\phi_{f,a}(Pf_{f,a})^{(1-\sigma_{va})}\right)^{1/(1-\sigma_{va})}$, capital and labour by activities ($Pf_{f,a}$. where f represents gross operating surplus. capital and labour) are combined according to a unit CES cost function to produce the composite goods (value added (va)), where $\phi_{f,a}=\dfrac{\overline{Pf_{f,a}}\ \overline{f_{f,a}}}{\sum_{f=1}^{3}\overline{Pf_{f,a}}\ \overline{f_{f,a}}}$ is the benchmark value share of primary factors. Index a means activities (from 1 to 17). $actv_a$ is the production variable by activities and tourism categories and $Pactv_{c,t}$ is the prices variable by goods and tourism categories variables. σ_{va} is the elasticity of substitution between capital and labour. In the same level, but in a different nest, the armington goods ($Pa_{c,t}$) are combined through a unit Leontieff cost function ($\sum_{c=1}^{17}\sum_{t=1}^{2}\zeta_{c,t}^{id}Pa_{c,t}$) where $\zeta_{c,t}^{id}$ is the benchmark value share of armington goods and services ($\zeta_{c,t}^{id}=\dfrac{\overline{Pa_{c,t}}\ \overline{arm_{c,t}}}{\sum_{c=1}^{17}\sum_{t=1}^{2}\overline{Pa_{c,t}}\ \overline{arm_{c,t}}}$). In the top level, the activities use a unit leontieff cost function ($\zeta_a^{va}\sum_{c=1}^{17}\sum_{t=1}^{2}\zeta_{c,t}^{id}Pa_{c,t}+\left(1-\zeta_a^{va}\right)\left(\sum_{f=1}^{2}\phi_{f,a}(Pf_{f,a})^{(1-\sigma_{va})}\right)^{1/(1-\sigma_{va})}$) to produce their outputs; where ζ_a^{va} is the value share of the composite goods (value added)($\zeta_a^{va}=\dfrac{\sum_{f=1}^{2}\overline{Pf_{f,a}}\ \overline{f_{f,a}}}{\sum_{c=1}^{16}\sum_{t=1}^{2}\overline{Pa_{c,t}}\ \overline{arm_{c,t}}+\sum_{f=1}^{2}\overline{Pf_{f,a}}\ \overline{f_{f,a}}}$) in the top level. The activities demand intermediate demand according to next equations:

$$f_{f,a} = actv_a \left(\frac{\left(\sum_{f}^{2} \left(Pf_{f,a} \right)^{\sigma_{va}} \right)^{1/(1-\sigma_{va})}}{Pf_{f,a}} \right)^{\sigma_{va}} \qquad \text{(id\_factor)}$$

$$arm_{c,t} = actv_a \left((1-\zeta_a^{va})\zeta_{c,t}^{id} \right) \qquad \text{(id\_activity)}$$

The Supply of domestic and export goods and services is as follows:

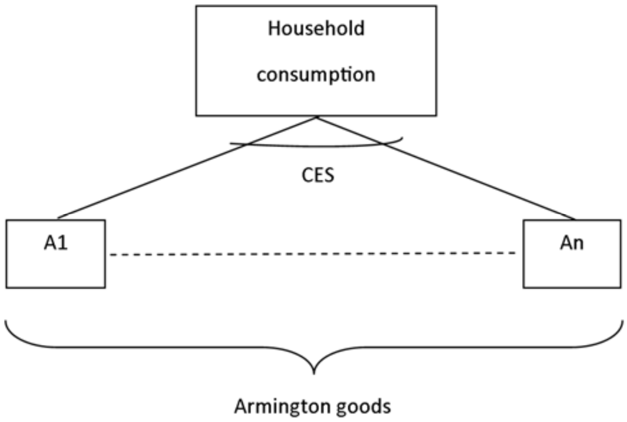
$$d_{c,t} = actv_{c,t} \left(\frac{Pd_{c,t}}{\left(\gamma_{c,t} \left(Pd_{c,t} \right)^{(1+\sigma_{de})} + \delta_{c,t} \left(Pfx \right)^{(1+\sigma_{de})} \right)^{1/(1+\sigma_{de})}} \right)^{\sigma_{de}}$$

$$e_{c,t} = actv_{c,t} \left(\frac{Pfx}{\left(\gamma_{c,t} \left(Pd_{c,t} \right)^{(1+\sigma_{de})} + \delta_{c,t} \left(Pfx \right)^{(1+\sigma_{de})} \right)^{1/(1+\sigma_{de})}} \right)^{\sigma_{de}}$$

Household (Resident) consumption

Figure 24 shows the household consumption structure.

Figure 24. Household consumption structure



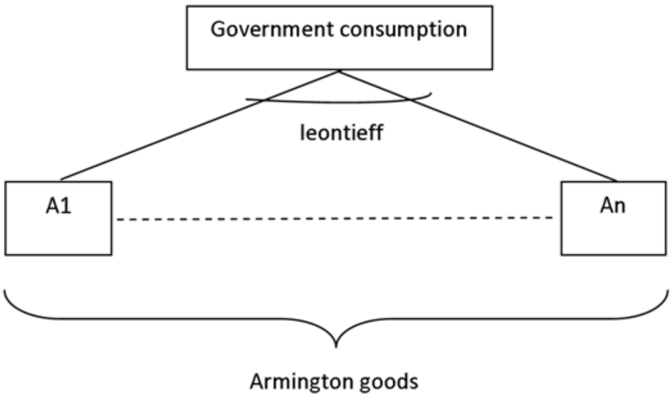
$$Hhld\left[Ph-\left(\sum_{c=1}^{17}\sum_{t=1}^{2}v_{c,t}\left(Pa_{c,t}\right)^{(1-\sigma_h)}\right)^{1/(1-\sigma_h)}\right]=0 \quad ; \; Hhld\geq 0 \quad ; \; \forall Hhld \qquad \text{(zp\_hh)}$$

Equation (zp_hh) represents the Household consumption structure (utility). The household combines intermediate inputs (Armington goods) ($Pa_{c,t}$) with a unit CES cost function ($\left(\sum_{c=1}^{17}\sum_{t=1}^{2}v_{c,t}\left(Pa_{c,t}\right)^{(1-\sigma_h)}\right)^{1/(1-\sigma_h)}$), where $v_{c,t}=\frac{\overline{Pa_{c,t}}\;\overline{arm_{c,t}}}{\sum_{c=1}^{16}\sum_{t=1}^{2}\overline{Pa_{c,t}}\;\overline{arm_{c,t}}}$ is the benchmark value share of armington goods in households consumption. Ph is the household price variable and $Hhld$ is the household production variable . σ_h is the household consumption elasticity. In consequence, the residents demand armington goods as consumption goods according to a CES function: $arm_{c,t}=Hhld\left(\frac{Ph}{Pa_{c,t}}\right)^{\sigma_h}$.

Government consumption

Figure 25 shows the government consumption structure.

Figure 25. Government structure



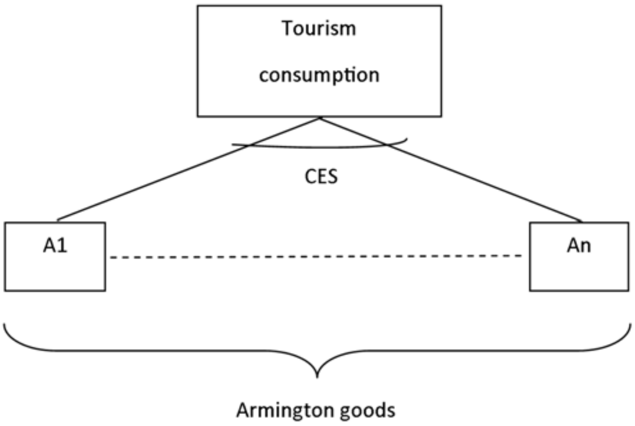
$$gov\left[Pgov-\sum_{c=1}^{17}\sum_{t=1}^{2}\tau_{c,t}Pa_{c,t}\right]=0 \quad ; \; gov\geq 0 \; ; \; \forall gov \qquad \text{(zp\_gov)}$$

Equation (zp_gov) represents the government consumption structure (utility). The government () combines intermediate inputs (Armington goods) ($Pa_{c,t}$) with a unit Leontieff cost function ($\sum_{c=1}^{17}\sum_{t=1}^{2}\tau_{c,t}Pa_{c,t}$) where $Pgov$ is the government price variable and gov the government production variable and $\tau_{c,t}=\frac{\overline{Pa_{c,t}}\ \overline{arm_{c,t}}}{\sum_{c=1}^{17}\sum_{t=1}^{2}\overline{Pa_{c,t}}\ \overline{arm_{c,t}}}$ the benchmark value share of armington goods and services in the government consumption. In consequence, the final demand of armington goods is also a Leontieff one: $arm_{c,t}=gov\tau_{c,t}$.

Tourism (non-resident) consumption

Figure 26 shows the tourism consumption structure.

Figure 26. Tourism structure



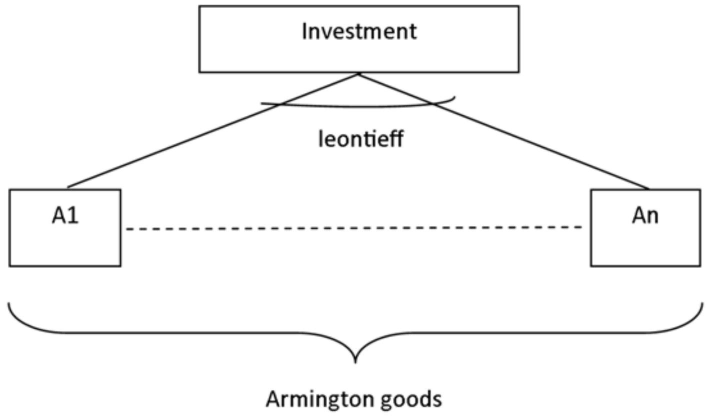
$$tourist\left[Ptourist-\left(\sum_{c=1}^{17}\sum_{t=1}^{2}\psi_{c,t}\left(Pa_{c,t}\right)^{(1-\sigma_{tourism})}\right)^{1/(1-\sigma_{tourism})}\right]=0 \quad ; \; tourist\geq 0 \qquad \text{(zp\_tour)}$$

Equation (zp_tour) represents the tourism consumption structure (utility). The non-residents combine intermediate inputs (Armington goods) ($Pa_{c,t}$) with a unit CES production function ($\left(\sum_{c=1}^{17}\sum_{t=1}^{2}\psi_{c,tou}\left(Pa_{c,t}\right)^{(1-\sigma_{tourism})}\right)^{1/(1-\sigma_{tourism})}$), where $\psi_{c,t}=\frac{\overline{Pa_{c,t}}\;\overline{arm_{c,t}}}{\sum_{c=1}^{17}\sum_{t=1}^{2}\overline{Pa_{c,t}}\;\overline{arm_{c,t}}}$ is the benchmark value share of armington goods in the tourism consumption. $Ptourist$ is the tourism price variable and $tourist$ is the tourism production variable. $\sigma_{tourism}$ is the tourism elasticity of consumption. The final demand is also a CES function: $arm_{c,t}=tourist\left(\frac{Ptourist}{Pa_{c,t}}\right)^{\sigma_{tourism}}$.

Investment

Figure 27 shows the investment structure.

Figure 27. Investment structure



$$inv\left[Pinv-\sum_{c=1}^{17}\sum_{t=1}^{2}\rho_{c,t}Pa_{c,t}\right]=0 \quad ; \; inv \geq 0 \qquad \text{(zp\_inv)}$$

Equation (zp_inv) represents the zero profit condition for the investment. $Pinv$ is the investment price variable (unit revenue function). inv is the production investment variable. The investment is produced by a unit Leontieff cost function ($\sum_{c=1}^{17}\sum_{t=1}^{2}\rho_{c,t}Pa_{c,t}$); where $\rho_{c,t}$ is the benchmark value share form of armington goods in the investment ($\rho_{c,t}=\frac{\overline{Pa_{c,t}}\;\overline{arm_{c,t}}}{\sum_{c=1}^{17}\sum_{t=1}^{2}\overline{Pa_{c,t}}\;\overline{arm_{c,t}}}$). The final demand associated to the zero profit condition is $arm_{c,t}=inv\rho_{c,t}$.

A.3.2.2. Market clearance conditions

The second class of inequality condition holds that the supply of any commodity must equal or exceed demand by consumer. This condition is expressed as:

$$\sum_j y_j \frac{\partial \Pi_j(p)}{\partial p_i} + \sum_h \omega_{i,h} \geq \sum_h d_{i,h}(p, M_h)$$

Where:

$\sum_j y_j \frac{\partial \Pi_j(p)}{\partial p_i}$ represents the supply of good i by activity j. $\sum_h \omega_{i,h}$ represents the initial endowment of good i by institution h (household. government and tourists). $\sum_h d_{i,h}(p, M_h)$ represents the final demand for good i by institutions h given prices p and income M. $d_{i,h}(p, M_h)$ is the final demand obtained from the maximisation problem of institutions:

$$d_{i,h}(p, M_h) \equiv argmax \left\{ U_h(x) \mid \sum_i p_i x_i = M_h \right\}$$

$U_h(x)$ is the utility function of household h.

The mixed complementarity condition is as follows:

$$p_i \left(\sum_j y_j \frac{\partial \Pi_j(p)}{\partial p_i} + \sum_h \omega_{i,h} - \sum_h d_{i,h}(p, M_h) \right) = 0; \quad \forall i$$

Armington market

The production of Armington goods ($Arm_{c,t}$) (outputs) are demanded as intermediate demand (inputs) by the tourism, the activities ($Actv_a$) and the institutions (households, government and non-resident households (tourists)) and the investment (inv). Equation mkt_pa shows the market clearance conditions for the Armington goods.

$$Pa_{c,t}\left[Arm_{c,t} - \left(actv_a \left((1-\zeta_a^{va})\zeta_{c,t}^{id} \right) + Hh\left(\frac{Ph}{Pa_{c,t}} \right)^{\sigma_h} + gov\tau_{c,t} + inv\rho_{c,t} + Tourist_t \left(\frac{Pt_{c,t}}{Pa_{c,t}} \right)^{\sigma_{tourism}} \right) \right] = 0 \quad ; \; Pa_{c,t} \geq 0 \quad ; \; \forall c,t \qquad \text{(mkt\_pa)}$$

Domestic market and balance of payment (foreign market)

The production of goods ($y_{c,t}$) produces domestic and export goods (Figure 23). Both productions are demanded according to equations mkt_pd and mkt_pfx, respectively. The domestic supply is demanded by the Armington sector according to a CES demand function ($d_{c,t} = arm_{c,t}\left(\frac{Pa_{c,t}}{Pd_{c,t}}\right)^{\sigma_{dm}}$).The production by origin supplies domestic goods according to a CET function: $d_{c,t} = y_{c,t}\left(\frac{Pd_{c,t}}{\left(\gamma_{c,t}\left(Pd_{c,t}\right)^{(1+\sigma_{de})} + \delta_{c,t}\left(Pfx\right)^{(1+\sigma_{de})}\right)^{1/(1+\sigma_{de})}}\right)^{\sigma_{de}}$.

$$Pd_{c,t}\left[\left(y_{c,t}\left(\frac{Pd_{c,t}}{\left(\gamma_{c,t}\left(Pd_{c,t}\right)^{(1+\sigma_{de})} + \delta_{c,t}\left(Pfx\right)^{(1+\sigma_{de})}\right)^{1/(1+\sigma_{de})}}\right)^{\sigma_{de}}\right) - \left(arm_{c,t}\left(\frac{Pa_{c,t}}{Pd_{c,t}}\right)^{\sigma_{dm}}\right)\right] = 0 \quad ; Pd_{c,t} \geq 0 \quad ; \forall c,t \qquad \text{(mkt\_pd)}$$

The production supplies the export productions according to a CET function ($e_{c,t} = y_{c,t}\left(\frac{Pfx}{\left(\gamma_{c,t}\left(Pd_{c,t}\right)^{(1+\sigma_{de})} + \delta_{c,t}\left(Pfx\right)^{(1+\sigma_{de})}\right)^{1/(1+\sigma_{de})}}\right)^{\sigma_{de}}$). At the same time, the institutions (households, government and enterprises) are endowed with foreign endowments: $\overline{fsav_{hhld}}$, $\overline{fsav_{gov}}$, $\overline{fsav_{enter}}$, respectively (endowment that represent the foreign saving (deficit of the balance of payment)). $\overline{}$ means fix values. $\overline{Touristabroadendow}$ is the endowment of non-resident households. The demand of import goods as intermediate demand comes from the Armington sector according to a CES demand function ($m_{c,t} = arm_{c,t}\left(\frac{Pa_{c,t}}{Pfx}\right)^{\sigma_{dm}}$). Equation mkt_pfx depicts the balance of payment.

$$Pfx\left[\begin{array}{l}\left(\begin{array}{l} y_{c,t}\left(\dfrac{Pfx}{\left(\gamma_{c,t}\left(Pd_{c,t}\right)^{(1+T)}+\delta_{c,t}\left(Pfx\right)^{(1+T)}\right)^{1/(1+T)}}\right)^{T} \\ +Pfx\ \overline{Touristabroadendow} \\ +Pfx\ \overline{fsav_{hhld}}\ capflow_{hhld} \\ +Pfx\ \overline{fsav_{gov}}\ capflow_{gov}+Pfx\ \overline{fsav_{enter}}\ capflow_{enter}\end{array}\right) \\ -\left(arm_{c,t}\left(\dfrac{Pa_{c,t}}{Pfx}\right)^{\sigma_{dm}}\right)\end{array}\right]=0\ \ ;\ Pfx\geq 0 \qquad \text{(mkt\_pfx)}$$

$capflow_h$ is a variable that allow changing in the foreign saving of the institutions (households ($hhld$). government (gov) and enterprises($enter$)). Thus, the deficit of the current account can change. Pfx represents real exchange rate (cge models do not deal with financial assets). More precisely, pfx is equal to $\frac{p_i^e}{p_i^{we}}$ (although none of these prices are explicitly included in the model); where p_i^e are the export prices (in local currency) of good/service i and p_i^{we} is the world price of good/service i. pfx adjusts to ensure the purchasing power parity between local and international prices. In other words, the exchange rate ensures that the same amount of goods/services can be bought both domestically and abroad. The Spanish economy is considered as a small open economy. Thus, it does not have any influence on the world prices (p_i^{we} is exogenous). For instance, a decrease in the exchange rate (appreciation of the local currency) implies that less local currency is needed to any given quantity of exports. So, local producers will shift the production towards the domestic markets instead of exportation.

Foreign capital

$$capflow_h\ pfx = fsaving_h\ pinv\ \ ;\ \ capflow_h \geq 0 \qquad \text{(fcap\_constraint)}$$

fcap_constraint ensures that any change in foreign saving is financed through capital flows.

Foreign savings

$$fsaving_h \ \overline{fsav_h} \ pinv - \left(\overline{borrowing_h} \ pfx + \overline{lending_h} \ pinv \right) = 0 \ ; \quad fsaving_h \geq 0 \quad \text{(fsav\_constraint)}$$

The equation fsav_constraint ensures the way that the foreign saving of institutions change. $\overline{borrowing_h}$ means the amount of money that is borrowed to the rest of the world while $\overline{lending_h}$ is the amount that is lent to the rest of the world. $\overline{fsav_h}$ is the endowment of foreign saving by institutions explained above.

Investment-savings

The institutions are endowed with savings ($\overline{hhinvendow}.\overline{govinvendow}.\overline{enterinvendow}$ for households, government and enterprises, respectively). Additionally, the institutions are also endowed with the foreign saving introduced above ($\overline{fsav_h}$). Beyond the endowments of savings, households, government and enterprises save according to a CD function. Equation mkt_inv depicts the market clearance conditions in mcp format for the investment-savings condition.

$$Pinv\begin{bmatrix} inv + Pinv\ \overline{hhinvendow} \\ +Pinv\ \overline{govinvendow} + \\ Pinv\ \overline{enterinvendow} + Pinv\ \left(-\overline{fsav_{hhld}}\right) fsaving_{hhld} \\ +Pinv\ \left(-\overline{fsav_{gov}}\right) fsaving_{gov} + \\ Pinv\ \left(-\overline{fsav_{enter}}\right) fsaving_{enter} \\ -\left(\begin{matrix} \dfrac{households}{Pinv} \\ +\dfrac{government}{Pinv} \\ +\dfrac{enterprises}{Pinv} \end{matrix}\right) \end{bmatrix} = 0 \quad ; \ Pinv \geq 0 \qquad \text{(mkt\_inv)}$$

The variable $fsaving_h$ is included in equation mkt_inv to ensure the balance between foreign savings and the current account deficit.

Tourism markets

According to equation mkt_tour, tourism supply ($tourist$) is demanded by the tourism demand (inbound tourism ($touristd$)) with a CD demand function ($\frac{touristd}{Pt}$).

$$Pt_{c,tou}\left[tourist - \left(\frac{touristd}{Pt_{c,t}}\right)\right] = 0 \quad ; \ Pt_{c,t} \geq 0; \ \forall c,t \qquad \text{(mkt\_tour)}$$

Household and government markets

The households and the governments demand their respective outputs through a CD demand function by households ($\frac{households}{Ph}$) and government ($\frac{government}{Pgov}$). The endowments of government goods are related to direct taxes collected by the government ($\overline{govgovendow}$) and transferences done to households ($\overline{hhgovendow}$) or enterprises ($\overline{entergovendow}$). Equations mkt_gov and mkt_hh are the market clearance conditions for the households and government goods, respectively.

$$Pgov\left[\begin{array}{l} gov+Pgov\ \overline{hhgovendow}+Pgov\ \overline{govgovendow} \\ +Pgov\ \overline{entergovendow} \\ -\left(\dfrac{government}{Pgov}\right) \end{array}\right]=0 \quad ;\ Pgov\geq 0 \qquad \text{(mkt\_gov)}$$

$$Ph\left[Hhld-\left(\frac{household}{Ph}\right)\right]=0 \quad ;\ Ph\geq 0 \qquad \text{(mkt\_hh)}$$

Factor markets

Factor goods (capital and labour) are demanded by activities according to a nested demand function. Equation mkt_factor is the market clearance condition for factor goods

$$Pf_f\left[u\sum_{a=1}^{17}Factor_{j,a}-Actv_a\left(\frac{\left(\sum_{a=1}^{17}\left(Pf_{f,a}\right)^{\sigma_{va}}\right)^{1/(1-\sigma_{va})}}{\sum_{a=1}^{17}Pf_{f,a}}\right)^{\sigma_{va}}\right]=0 \quad ;Pf_f\geq 0 \quad ;\ \forall f \qquad \text{(mkt\_factor)}$$

u is a variable that represents the unemployment rate. This variable is explained below.

Unemployment

Equation (u_constraint) is the wage curve constraint for the employment. u_0 represents the actual unemployment rate (26%) in Spain. u is the variable for the unemployment rate. Pf_{wages} is the wage for labor and Ph the final demand price. un is the complementary variable and σ_u is the elasticity of annual labor earning (Blanchflower & Oswald, 2005).

$$u\left[\frac{Pf_{wages}}{Ph}-\frac{1}{\left(u_0{}^{(-0.1)}\right)}u^{(-\sigma_u)}\right]=0 \quad ; \; un \geq 0 \qquad \text{(u\_constraint)}$$

Capital accummulation

In a recursive-dynamic model, the capital accumulation is endogenized as follows:

$$Capital_{hh,time} = (1-\delta_{hh})*Capital_{hh,time-1} + gos_{hh,time=1} + inv_{time-1}*invendow_{hh}*(r+\delta_{hh}); \quad Capital_{hh,time} \geq 0; \; \forall hh, time$$

In this case, the $time$ subindex is included to appreciate the way the capital accumulation works. The variable $Capital_{hh,time}$ represents the capital accumulation by institutions (hh) (households. government and enterprises) and year ($time$). The capital accumulated at any time is formed by the capital of the previous year less the depreciation of capital [($Capital_{hh,time-1}$)*($1-\delta_{hh}$)] plus the gross operating surplus ($gos_{hh,time=1}$) in the first year; plus the investment generated in the economic process ($inv_{time-1}*invendow_{hh}*(r+\delta_{hh})$. The investment in the previous year is multiplied by the investment endowment by institutions ($invendow_{hh}$) and it is multiplied by the economic growth rate (r) plus the depreciation of capital (δ_{hh})).

A.3.2.3. Income balance (budget constraint)

The third condition in a cge model implies that the total income (value of the endowments) of each institution h must be equal or exceed to the total final demand.

$$\sum_i p_i \omega_{i,h} = M_h \geq \sum_i p_i d_{i,h}$$

$\sum_i p_i \omega_{i,h}$ represents the value of the endowment for the institution h and $\sum_i p_i d_{i,h}$ represents the value of the final demand of institution h.

The mixed complementarity condition is as follows:

$$M_h\left(\sum_i p_i\omega_{i,h}-\sum_i p_i d_{i,h}\right);\quad \forall h$$

Household

The Household representative agent (RA) ensures the income balance condition according to the next equation:

$$household\left[household-\left(\begin{array}{l} u\sum_{f=1}^{3}Pfactor_f\,Factor_{f,household} \\ +Pfx\ \overline{fsav_{hhld}} \\ +Pinv\ \overline{hhldinvendow} \\ +Pinv\left(-\overline{fsav_{hhld}}\ \right) \\ +Pgov\ \overline{hhldgovendow} \\ \end{array}\right)\right]=0\quad ;\ household\geq 0$$

The households' endowments are formed by: primary factor ($Pfactor_f\,Factor_{f,household}$) (labour and net operating surplus), foreign savings ($\overline{fsav_{hhld}}$), savings ($\overline{hhldinvendow}$) and government transfers ($\overline{hhldgovendow}$). u is simply the unemployment rate variable (u) already explained

Government

The government RA ensures the income balance condition according to the next equation:

$$government\left[\begin{array}{l} government \\ -\left(\begin{array}{l} Pfactor_{gos}Factor_{gos,government}+itaxes+Pfx\ \overline{fsav_{gov}} \\ +Pgov\ \overline{govgovendow}+Pinv\ \overline{govinvendow}+pinv\left(-\overline{fsav_{gov}}\right) \end{array}\right) \end{array}\right]=0\quad ;\ government\geq 0$$

The government's endowments are formed by: primary factor ($Pfactor_{nos} Factor_{nos,government}$) (net operating surplus). indirect taxes ($itaxes$), foreign savings ($\overline{fsav_{gov}}$), savings ($\overline{govinvendow}$) and government transfers ($\overline{govgovendow}$).

Enterprises

The enterprise RA ensures the income balance condition according to the next equation:

$$enterprises\left[\begin{array}{l} enterprises \\ -\left(\begin{array}{l} Pfactor_{nos} Factor_{nos,enterprises} + Pfx\ \overline{fsav_{enter}} \\ +Pinv\ \overline{enterinvendow} + Pgov\ \overline{entergovendow} + pinv\left(-\overline{fsav_{enter}}\right) \end{array}\right) \end{array}\right] = 0 \quad ; \ enterprises \geq 0$$

The enterprise's endowments are formed by: primary factor ($Factor_{nos,enterprise}$) (net operating surplus), foreign savings ($\overline{fsav_{enter}}$), savings ($\overline{enterinvendow}$) and government transfers ($\overline{entergovendow}$).

Tourism household

The tourism RA ensures the income balance condition according to the next equation:

$$tourism\left[tourism - \left(Pfx\ \overline{touristabroadendow}\right)\right] = 0 \quad ; \ tourism \geq 0$$

The tourism's endowment is formed by income devoted to consumption ($\overline{touristabroadendow}$).

Turismo: Aerolíneas de bajo coste, clima y crisis económica

Capítulo 1: ¿Gastan más los turistas de líneas de bajo coste en el destino por viajar más barato?

Introducción y objetivos

Una de las claves para el éxito del sector del turismo como generador de crecimiento económico es la capacidad de proporcionar un valor añadido. Entre otros aspectos, el gasto turístico es fundamental para medir el valor añadido bruto de los destinos turísticos. Sin embargo, el gasto turístico no sólo es desembolsado en el destino, sino también en el país de residencia. Esta descomposición no es trivial en términos de valor añadido. Por ejemplo, los operadores turísticos ubicados en origen son una puerta abierta para la canalización de los turistas, pero al mismo tiempo, también reciben, como así lo merecen, parte del valor añadido potencial del destino. En términos generales, el resultado de las negociaciones entre los operadores turísticos y hoteleros determina la proporción del valor añadido entre el país de origen y el de destino.

Sin embargo, la estructura del mercado turístico ha cambiado y sigue cambiando dramáticamente. Tradicionalmente, la mayoría de los turistas optaban por paquetes turísticos distribuidos en agencias de viajes. El advenimiento de Internet ha acortado la "distancia" entre orígenes y destinos; y ha abierto nuevas alternativas a los turistas lo que permite servicios más personalizados. Se ha producido un cambio hacia la descomposición de los paquetes turísticos, de tal manera que los viajes, Alojamiento, comidas o excursiones se pueden reservar por separado. Bajo esta nueva estructura del mercado, los productos de servicios turísticos pueden ser distribuidos; ya sea por venta directa en Internet o por los intermediarios de Internet más baratos.

Sin embargo, debe tenerse en cuenta que su éxito depende de la confianza de los turistas en el sistema. Los costos de producción de los productos turísticos organizados en Internet son probables que disminuyan. Tal aumento de la eficiencia implica precios más bajos y/o beneficios más altos en función de la competencia del mercado. En cualquier caso, los precios más bajos aumentan el excedente del consumidor y las mayores ganancias aumentan el excedente del productor, por lo que el bienestar social aumenta. Adicionalmente, un precio más bajo implica un incremento en el número de turistas, incluso en el caso que ese descenso sea homogéneo para todos los destinos, ya que puede generar tráfico adicional de turistas que. en virtud de los precios más bajos, pueden permitirse viajar. Por lo tanto, se espera que el valor añadido en el destino aumente ya sea debido a un mayor número de turistas o a mayores ganancias.

Algunas discusiones han surgido en relación con la conveniencia de la nueva estructura del mercado. En particular, las compañías de bajo coste (CBC) han acaparado una especial atención en esta nueva situación. Los políticos en los destino turísticos se preguntan acerca de las consecuencias para el conjunto del mercado y la mejor estrategia para tratar con este nuevo fenómeno. Las consecuencias a este respecto son múltiples. En primer lugar, la presencia de aerolíneas de bajo costo puede atraer nuevos turistas al destino debido a unos precios más baratos. Dicha ganancia de competitividad es más o menos eficaz en función de cómo los destinos alternativos reaccionan ante este mismo fenómeno. En segundo lugar, el mercado de línea aérea también se ve afectada por la entrada de CBC. Las compañías de bandera pueden perder participación en el mercado e incluso dejar de volar al destino. Todo esto puede afectar al perfil del turista que viaja al destino. Tal redistribución de la cuota de mercado tiene un impacto en el gasto turístico en el destino.

En tercer lugar, los turistas suelen enfrentarse a dos tipos de restricciones para tomar vacaciones. Por un lado, el número de días disponibles para el turismo es limitado. Incluso si un turista puede permitirse pagar por unos tres meses de vacaciones, él o ella también se enfrenta a una restricción de tiempo. Por otro lado, los turistas disfrutan de una cantidad limitada de dinero en vacaciones, lo que representa una restricción presupuestaria. Ambas restricciones son elementos clave para entender la elección de destino turístico. La restricción presupuestaria se distribuye entre el viaje, alojamiento, comidas y otros gastos. Es interesante explorar cómo la presencia de CBC puede contribuir a una redistribución de tales presupuestos. El ahorro de los hogares en billetes de avión más baratos se puede transferir, total o parcialmente, a un mayor gasto turístico en el destino. Comprobar y cuantificar esta hipótesis es el propósito de este trabajo:

Los ahorros de viaje en origen por unos billetes más baratos se transfieren. al menos parcialmente, a un mayor gasto turístico en el destino.

La comprobación de esta hipótesis es relevante para entender uno de los impactos clave de la presencia de aerolíneas de bajo coste en los mercados turísticos. Especialmente para la formulación de políticas, sobre todo para entender el grado de apoyo que deben recibir. La literatura actual se ha centrado en el tráfico generado por aerolíneas de bajo coste y la redistribución de cuota de mercado, pero no se ha ocupado de la redistribución de valor añadido entre origen y destino. Este artículo explora esta relación. La dicotomía entre el gasto en origen y destino y sus relaciones recíprocas y causales permiten analizar estas situaciones hipotéticas fomentadas por aerolíneas de bajo coste. Una metodología que es capaz de estimar esta relación es un sistema de ecuaciones simultáneas. La estimación por Mínimos Cuadrados en tres etapas (MC3E) (Zellner y Theil, 1962) es la elegida para tal fin.

Metodología

Un modelo de ecuaciones simultáneas proporciona un marco adecuado para modelar la dicotomía y la mutua relación entre el gasto en origen y en destino. Las ecuaciones (1) y (2) representar a la demanda de gasto en origen y destino, respectivamente. Las hipótesis para estimar el modelo y la explicación de las variables se muestran a continuación las ecuaciones.

$$gastoorigen_i = \beta_1 gastodestino_i + \beta_2 ingreso_i + \sum_{t=1}^{4} \beta_{3t} trimestre_{it} + \sum_{y=2009}^{2011} \beta_{4y} año_{iy} + \sum_{h=1}^{31} \beta_{5h} pa_{ih} + \sum_{h=1}^{31} \beta_{6h} pal_{ih}$$
$$+ \sum_{d=1}^{7} \beta_{7d} destino_{id} + + \sum_{c=1}^{19} \beta_{8c} país_{ic} + \sum_{r=1}^{4} \beta_{9r} grupo_{ir} + \sum_{o=1}^{5} \beta_{10o} personas_{io} + \beta_{11} vprevias_i + u_i \qquad (1)$$

$$gastodestino_i = \gamma_1 gastoorigen_i + \gamma_2 ingreso_i + \sum_{t=1}^{4} \gamma_{3t} trimestre_{it} + \sum_{h=1}^{31} \gamma_{5h} pa_{ih} + \sum_{h=1}^{31} \gamma_{6h} pal_{ih}$$
$$+ \sum_{d=1}^{7} \gamma_{7d} destino_{id} + + \sum_{c=1}^{19} \gamma_{8c} destino_{ic} + \sum_{r=1}^{4} \gamma_{9r} grupo_{ir} + \sum_{o=1}^{5} \gamma_{10o} personas_{io} + \sum_{m=1}^{16} \gamma_{11m} motivo_{im} + \gamma_{12} vprevias_i + e_i \qquad (2)$$

Variables endógenas: *gastoorigen* (gasto en origen por persona y noche). *gastodestino* (gasto en destino por persona y noche).

Variables explicativas: *ingreso* (ingreso mensual), *trimestre* (trimestre que realiza el viaje). *año* (año que viaja), *p* (paquete: vuelo, vuelo + alojamiento, vuelo + alojamiento +desayuno. vuelo + alojamiento + media pensión, vuelo + alojamiento + pension completa, vuelo + alojamiento + todo incluído), *a* (categoría del alojamiento: Hotel 5*, Hotel 4*, Hotel 3*, 2* o

1*. Apartmento, hogar (amigos o familiares), otros (*timesharing*, alojamiento rural). *Pa* (variable multiplicativa entre paquete y categoría del alojamiento), *Pal* (pa multiplicada por bajo coste (1 si el turista viaja en aerolínea de bajo coste y cero el resto)), *destino* (isla visitada: La Palma, El Hierro, Tenerife, Gran Canaria. Fuerteventura and Lanzarote). *grupo* (menores de 2 años, entre 2 y 12, entre 13 and 65. mayor de 65). *personas* (solo, en pareja. con familiares. amigos y conocidos o compañeros de trabajo), *motivo* (razón principal para viajar a las islas: clima, playas, paisaje, calidad medioambiental, tranquilidad, turismo activo, turismo de salud, parques temáticos, golf, otros deportes, vida nocturna, compras, visitar nuevos lugares, facilidad para viajar, precios, por los niños). *vprevias* (visitas previas realizadas: desde una visita hasta más de 10 visitas previas a la isla).

Las hipótesis del sistema de ecuaciones se muestran a continuación:

$Var(u_i) = \sigma^2$; $Var(u_i u_j) = 0$	(a1)	Homocedasticidad y no autocorrelación en la ecuación (1).
$Var(e_i) = \sigma^2$; $Var(e_i e_j) = 0$	(a2)	Homocedasticidad y no autocorrelación en la ecuación (2).
$E(u_i e_i) = \sigma_i$	(a3)	Correlación contemporánea entre los errors de la ecuación (1) y ecuación (2).
$E(u_i x_i) = 0$	(a4)	Las variables exógenas en la ecuación (1) no están correlacionadas con el término de error.
$E(e_i x_i) = 0$	(a5)	Las variables exógenas en la ecuación (2) no están correlacionadas con el término de error.
$E(u_i, expdestino_i) \neq 0$	(a6)	Variable endógena explicativa ($gastodestino_i$) correlacionada con el término de error de la ecuación (1).
$E(e_i, gastoorigen_i) \neq 0$	(a7)	Variable endógena explicativa ($gastoorigen_i$) correlacionada con el término de error de la ecuación (2).

Resultados y conclusiones

Efecto reponderación

Este estudio ha tenido en cuenta seis tipos diferentes de alojamiento,es decir, hotel de cinco estrellas, de cuatro estrellas, de tres, de dos o de una; apartamento; alojamiento en familia o con amigos, y otros.También ha tenido en cuenta seis diferentes tipos de viajes combinados, es decir: sólo vuelo; vuelo y alojamiento en apartamento; vuelo, alojamiento y desayuno; vuelo, alojamiento y media pensión; vuelo, alojamiento y pensión completa; vuelo, alojamiento y todo incluido. Sin embargo, no todos ellos son igualmente relevantes. Para los turistas no CBC, en términos de volumen, tres de ellos son particularmente relevantes: cuatro estrellas y todo incluido (18,92%). cuatro estrellas y media pensión (18,57%) y apartamentos (14,61%).

Es interesante observar que la distribución de perfiles de turistas CBC es diferente de los turistas no CBC. De hecho, los turistas que sólo pagan por su vuelo y se hospedan en un alojamiento familiar o con amigos aumentan su importancia hasta una participación del 9,38%. Algunos otros perfiles de turistas también se ven afectados, pero no todos ellos en la misma proporción o dirección. Por un lado, los perfiles de CBC con la ganancia más alta con respecto a los no CBC, es decir, los efectos netos son: "vuelo y alojamiento con amigos y familia" (5,28%), y "vuelo con alojamiento en apartamentos" (9,68%). Por otro lado, los perfiles de CBC con la pérdida más alta con respecto a los pasajeros no CBC son: " vuelo + alojamiento + media pensión", "vuelo + 4 estrellas " (-9,78 %) y " vuelo + alojamiento + todo incluido 4 estrellas" (-7,94 %). Por categorías, hay una clara transferencia de " hoteles de 4 estrellas " (-18,35 %) a "apartamentos" (14,02 %) y " familiares y amigos" (5,28 %). Por paquetes turísticos, los viajeros de CBC aumentan el uso de "solo vuelo" y "vuelo + alojamiento" con respecto a los viajeros no CBC un 10,41 % y un 12,52 %, respectivamente.

Los paquetes que experimentan la mayor pérdida son: " vuelo + alojamiento + media pensión " y " vuelo + alojamiento + todo incluido " que representa una disminución con respecto a los turistas de no CBC del -13,64 % y -7,79 % respectivamente.

En cuanto a la duración media de la estancia de los viajeros de CBC con respecto a los viajeros no LCC. Para los perfiles resaltados en el párrafo anterior, la llegada de los viajeros de LCC disminuye la estancia media, con respecto a los viajeros no CBC, en unos dos días para el perfil "Sólo vuelo + alojamiento con amigos y/o familia", y en un día para "vuelo + alojamiento + media pensión" y "vuelo + alojamiento + todo Incluido". En lo referente al tamaño del grupo, no existen diferencias estadísticamente significativas entre los viajeros de CBC y no CBC. El tamaño del grupo de los cuatro perfiles principales es: "amigos y familia" (1.84 personas), "vuelo + alojamiento" y "apartamentos" (2,44 personas), "vuelo + alojamiento + media pensión" y "4 estrellas" (2.20 personas) y "vuelo + alojamiento + todo incluido" y "4 estrellas" (2,43 personas).

Resultado de la forma estructural

Los resultados de la estimación MC3E se muestran en la Tabla 1.1. Estos resultados corresponden a la forma estructural del modelo. Por lo tanto, sólo los signos y la significación de los parámetros pueden ser analizados.

La mayoría de los parámetros estimados son altamente significativos. Tanto el gasto en origen como en destino son positivas y por debajo de 1, como se esperaba. El ingreso es positivo como lo sugiere la teoría económica y el número de visitas previas tiene un impacto diferente para cada tipo de gasto. Los turistas más experimentados disminuyen su gasto en origen, pero lo aumentan en destino. Este tipo de turistas están más familiarizados con el destino y se sienten más seguros para averiguar los servicios y productos que se adapten a sus necesidades sin necesidad de contratar en origen. Dejando a un lado todas las demás variables, el país de origen supone una diferencia signicativa en lo que al gasto se refiere. También es importante distinguir la isla de destino ya que no son homogéneos ni en términos de variedad de la oferta ni en nivel de competencia en estos mercados. La composición del grupo afecta claramente los gastos. Por ejemplo, en relación con los gastos de alojamiento, se espera que un viajero individual gaste más en términos per cápita que una familia. Cada turista se comporta de manera diferente en el destino en función de sus preferencias y motivaciones para el viaje. Por esa razón, el modelo tiene en cuenta las motivaciones y se muestran en la tabla 1.1.

Tabla 1.1: resultados forma estructural (parte I)

	Ecuación en origen		Ecuación en destino	
	Parámetros	Desv. std	Parámetros	Desv. std
Gasto en origen	-	-	0,182***	(0,068)
Gasto en destino	0,585***	(0,050)	-	-
Ingresos	0,002***	(0,000)	0,001***	(0,000)
Visitas previas	-0,044***	(0,006)	0,021***	(0,005)
Tiempo				
Primer trimestre	-3,379***	(0,434)	1,421***	(0,364)
Tercer trimestre	-3,807***	(0,498)	1,122***	(0,418)
Cuarto trimestre	-2,830***	(0,476)	1,078***	(0,375)
Año 2010	3,322***	(0,360)	-	-
Año 2011	3,015***	(0,442)	-	-
Isla de destino				
Lanzarote	0,337***	(0,095)	-0,315***	(0,070)
Fuerteventura	-0,014	(0,102)	0,210***	(0,075)
Gran Canaria	-0,505***	(0,101)	-0,489***	(0,090)
Tenerife	0,318***	(0,102)	-0,762***	(0,066)
La Gomera	-0,146	(0,183)	-0,196	(0,133)
La Palma	-0,900***	(0,152)	0,769***	(0,112)
El Hierro	0,187	(0,589)	0,368	(0,426)

Tabla 1.1 (continuación): resultados forma estructural (parte I)

	Ecuación en origen		Ecuación en destino	
	Parámetros	Desv. std	Parámetros	Desv. std
origen				
Alemania	-5,854***	(1,655)	-11,063***	(1,453)
Austria	8,264***	(2,141)	-9,813***	(1,507)
Bélgica	2,926	(1,825)	-6,408***	(1,295)
Dinamarca	3,651**	(1,847)	-9,607***	(1,287)
España	-12,961***	(1,485)	2,920**	(1,398)
Finlandia	2,921	(1,864)	-10,471***	(1,299)
Francia	0,611	(1,870)	-6,430***	(1,330)
Países Bajos	-6,554***	(1,735)	-9,525***	(1,496)
Irlanda	-21,804***	(1,670)	7,710***	(1,732)
Italia	-2,706	(1,954)	-1,754	(1,430)
Noruega	-5,809***	(1,733)	-1,842	(1,361)
Polonia	-12,047***	(2,241)	-0,266	(1,855)
Portugal	-12,064***	(2,569)	-2,097	(2,075)
Reino Unido	-14,945***	(1,581)	-6,932***	(1,772)
República Checa	-1,369	(2,952)	-11,989***	(2,189)
Rusia	-9,452***	(2,836)	19,822***	(1,917)
Suecia	2,931	(1,802)	-12,080***	(1,247)
Suiza	9,407***	(1,958)	-8,523***	(1,420)
Luxemburgo	16,346***	(3,792)	-8,791***	(2,851)

Tabla 1.1 (continuación): resultados forma estructural (parte I)

	Ecuación en origen		Ecuación en destino	
	Parámetros	Desv. std	Parámetros	Desv. std
Grupo de viaje				
Menores de 2 años	-9,590***	(1,018)	-7,047***	(1,244)
Entre 2 y 12	-2,203***	(0,425)	-5,113***	(0,463)
Entre 13 y 65	1,109***	(0,336)	-4,725***	(0,201)
Mayores de 65	0,599	(0,560)	-7,466***	(0,418)
Pareja	-10,341***	(0,501)	0,202	(0,823)
Familia	-1,947***	(0,632)	1,201***	(0,464)
Amigos	-10,488***	(0,620)	2,227***	(0,760)
Compañeros de trabajo	20,195***	(1,980)	3,939*	(2,026)
Motivo principal				
Clima	-	-	-3,066***	(0,621)
Playas	-	-	-1,702***	(0,404)
Paisaje	-	-	-1,345***	(0,375)
Calidad medioambiental	-	-	-0,931*	(0,507)
tranquilidad	-	-	-2,067***	(0,283)
Tourismo activo	-	-	-4,173***	(0,606)
Turismo de salud	-	-	2,825**	(1,116)
Parques temáticos	-	-	1,643**	(0,765)

Tabla 1.1 (continuación): resultados forma estructural (parte I)

	Ecuación en origen		Ecuación en destino	
	Parámetros	Desv. std	Parámetros	Desv. std
Motivo principal				
Parque Temático	-	-	1,643**	(0,765)
Golf	-	-	9,846***	(1,014)
Otros deportes	-	-	-1,840*	(1,023)
Vida nocturna	-	-	4,274***	(0,633)
Compras	-	-	5,169***	(0,628)
Visitar nuevos lugares	-	-	-1,311***	(0,454)
Facilidad de viajar	-	-	-2,916***	(0,409)
Precio			-4,663***	(0,888)
Niños			-1,893***	(0,529)
Observaciones	53.608		53.608	
R^2	0,842		0,718	
Chi^2	2,89e+05		1,37e+05	

*** p<0,01. **p<0,05. *p<0,10

La tabla 1.2 muestra las estimaciones de las variables ficticias que se utilizan para identificar el papel de cada combinación de alojamiento y paquete turístico. Estas estimaciones pertenecen a la misma estimación de la Tabla 1.1, pero se muestran en una tabla separada para facilitar la presentación. Los turistas CBC suponen un cambio desde el punto de referencia siendo 60 de las 62 estimaciones significativas, lo que demuestra la importancia de tal distinción. A su vez, las variables dicotómicas de CBC suponen además un desplazamiento adicional respecto a los no CBC. Su importancia es fundamental, porque pone a prueba si los viajeros CBC gastan de manera diferente que los viajeros no CBC, que no es sino la pregunta a responder en este artículo. La tabla muestra que 35 de las 62 estimaciones son significativas, lo que significa que los viajeros CBC, para estas combinaciones de alojamiento y régimen de comidas, son diferentes de los viajeros no CBC. Sin embargo, los resultados de la forma estructural no se pueden utilizar para medir el impacto directo de cada perfil, sino para probar la dirección del impacto y la significatividad. Con el fin de medir el impacto directo, es necesario obtener estos resultados mediante la forma reducida como se muestra en la tabla 1.3.

Tabla 1.2: resultados forma estructural (Parte II)

No CBC	Ecuación en origen		Ecuación en destino	
	Parámetros	Desv. std	Parámetros	Desv. std
Sólo vuelo				
Hotel 5 estrellas	-7,.606	(8,862)	130,161***	(6,950)
Hotel 4 estrellas	14,800**	(6,825)	90,253***	(6,651)
Hotel de 1.2 o 3	17,171***	(6,458)	73,906***	(6,276)
Apartmento	16,103***	(5,680)	65,531***	(5,709)
Familia y amigos	25,071***	(4,992)	44,614***	(5,398)
Otros	27,826***	(5,406)	49,915***	(5,872)
Vuelo y alojamiento				
Hotel 5 estrellas	102,242***	(7,306)	72,965***	(12,194)
Hotel 4 estrellas	75,679***	(5,402)	47,179***	(9,028)
Hotel de 1, 2 o 3	56,268***	(5,353)	49,695***	(7,786)
Apartmento	53,837***	(5,216)	48,885***	(7,576)
Familia y amigos	51,411***	(5,431)	46,114***	(7,297)
Vuelo, alojamiento y desayuno				
Hotel 5 estrellas	114,416***	(6,140)	57,306***	(12,255)
Hotel 4 estrellas	89,794***	(5,544)	49,033***	(10,086)
Hotel de 1, 2 o 3	70,638***	(5,504)	47,437***	(8,704)
Apartmento	66,021***	(5,388)	46,611***	(8,391)
Familia y amigos	83,573***	(13,895)	30,455**	(12,910)

Tabla 1.2 (continuación): resultados forma estructural (Parte II)

No CBC	Ecuación en origen		Ecuación en destino	
	Parámetros	Desv. std	Parámetros	Desv. std
Vuelo, alojamiento y media pensión				
Hotel 5 estrellas	127,901***	(5,373)	35,821***	(12,315)
Hotel 4 estrellas	90,219***	(5,014)	35,368***	(9,572)
Hotel de 1, 2 o 3	71,111***	(5,075)	38,490***	(8,404)
Apartmento	72,649***	(5,097)	37,799***	(8,478)
Familia y amigos	77,778***	(9,290)	38,801***	(10,334)
Vuelo, alojamiento y pensión completa				
Hotel 5 estrellas	129,789***	(5,914)	29,751**	(12,363)
Hotel 4 estrellas	92,318***	(5,056)	31,847***	(9,567)
Hotel de 1, 2 o 3	80,284***	(5,354)	33,219***	(8,897)
Apartmento	71,242***	(5,676)	34,092***	(8,427)
Familia y amigos	129,932***	(5,687)	22,668*	(12,160)
Vuelo, alojamiento y todo incluído				
Hotel 5 estrellas	125,542***	(5,194)	21,548*	(11,597)
Hotel 4 estrellas	99,646***	(4,724)	22,534**	(9,727)
Hotel de 1, 2 o 3	89,705***	(4,792)	25,560***	(9,171)
Apartmento	82,958***	(4,923)	29,942***	(8,891)
Familia y amigos	136,551***	(5,551)	14,949	(12,291)

Tabla 1.2 (continuación): resultados forma estructural (Parte II)

CBC	Ecuación en origen		Ecuación en destino	
	Parámetros	Desv. std	Parámetros	Desv. std
Sólo vuelo				
Hotel 5 estrellas	1,156	(5,086)	-11,154***	(3,652)
Hotel 4 estrellas	-1,.386	(3,192)	-12,686***	(2,316)
Hotel de 1, 2 o 3	3,858	(3,731)	-8,354***	(2,664)
Apartmento	-2,086	(1,908)	-1,446	(1,379)
Familia y amigos	-4,040***	(1,239)	2,127**	(0,907)
Hotel 5 estrellas	-4,443*	(2,559)	1,667	(1,850)
Vuelo y alojamiento				
Hotel 5 estrellas	-0,897	(5,161)	-16,616***	(3,726)
Hotel 4 estrellas	-8,813***	(2,112)	0,878	(1,623)
Hotel de 1, 2 o 3	-9,360***	(1,782)	2,416*	(1,380)
Apartmento	-7,815***	(0,721)	1,704**	(0,690)
Familia y amigos	-3,971	(2,607)	1,119	(1,888)
Vuelo, alojamiento y desayuno				
Hotel 5 estrellas	-10,057***	(2,732)	2,299	(2,054)
Hotel 4 estrellas	-10,735***	(2,151)	1,717	(1,701)
Hotel de 1, 2 o 3	-6,020*	(3,226)	5,539**	(2,318)
Apartmento	-10,409***	(2,749)	-0,433	(2,117)
Familia y amigos	-24,301	(16,176)	24,828**	(11,634)

Tabla 1.2 (continuación): resultados forma estructural (Parte II)

CBC	Ecuación en origen		Ecuación en destino	
	Parámetros	Desv. std	Parámetros	Desv. std
Vuelo. alojamiento y media pensión				
Hotel 5 estrellas	-9,156***	(2,639)	1,914	(1,981)
Hotel 4 estrellas	-8,990***	(1,085)	3,986***	(0,909)
Hotel de 1, 2 o 3	-2,623	(2,001)	0,427	(1,444)
Apartmento	-9,585***	(2,265)	5,225***	(1,681)
Familia y amigos	-3,286	(11,397)	-8,374	(8,212)
Vuelo, alojamiento y pensión completa				
Hotel 5 estrellas	-14,699**	(7,224)	10,954**	(5,222)
Hotel 4 estrellas	-3,556	(2,693)	-0,034	(1,953)
Hotel de 1, 2 o 3	-2,614	(4,199)	-0,471	(3,028)
Apartmento	-4,008	(4,300)	7,506**	(3,083)
Familia y amigos	-8,843	(7,152)	5,843	(5,171)
Vuelo, alojamiento y todo incluído				
Hotel 5 estrellas	-10,666***	(3,727)	0,679	(2,770)
Hotel 4 estrellas	-8,748***	(1,036)	3,123***	(0,873)
Hotel de 1, 2 o 3	-13,828***	(1,557)	4,150***	(1,370)
Apartmento	-14,490***	(1,773)	5,059***	(1,491)
Familia y amigos	-20,593***	(5,716)	7,985*	(4,276)

Resultados de la forma reducida

Los resultados en forma reducida son una transformación conveniente de los resultados de la forma estructural con el fin de obtener el "verdadero" impacto directo de cada variable exógena. Dicha transformación se aplica a las variables dicotómicas referentes a CBC y no CBC que se mostraron en las tablas anteriores. Las elasticidades ingreso se puede obtener de la forma reducida. En particular. la elasticidad del ingreso con respecto al gasto en origen es de 1.74, mientras que en destino tal elasticidad es de 1.98.

Tabla 1.3: Resultados forma reducida: El impacto de las CBCs con respecto a las no CBC por estancia media y tamaño medio del grupo (euros)

	Origen - Destino	5 *	4 *	3, 2, 1*	Apartmento	Familia y amigos	Otros
Sólo vuelo (F)	O	-92,36	-187,05	-16,46	-84,81	**-70,97***	-99,72*
	D	-188,27*	-274,78*	-52,78	-52,78	**35,38***	24,74
(F) + Alojamiento (A)	O	-196,67	-167,03*	-173,60*	**-179,97***		-106,30
	D	-310,80*	-14,54	15,64*	**7,52***		12,76
(F+A) + desayuno	O	-145,82*	-159,24*	-40,22*	-208,11*		-195,27
	D	7,91	-3,81	64,31*	-45,35		407,73*
(F+A)+ media pensión	O	-169,31*	**-136,13***	-47,31	-146,99*		-168,91
	D	5,30	**48,11***	-0,99	78,45*		-185,13
(F+A)+ pensión completa	O	-138,67*	-66,16	-54,47	9,38		-112,71
	D	138,56*	-12,58	-17,83	165,83*		88,01
(F+A)+ todo incluído	O	202,91*	**-152,33***	-248,29*	-285,26*		-362,25*
	D	-24,86	**33,78***	35,68*	60,04*		96,59*

* Significa que la variable dicotómica original de la table 1.2 es significativa.
Los valores en negrita representan a los perfiles más significativos

La Tabla 1.3 muestra cuánto de más o de menos está gastando cada perfil CBC en origen y destino. Este resultado se pondera por las noches media y la composición media del grupo con el fin de obtener una cifra más cercana a la que se enfrenta cada turista. Para los cuatro perfiles más relevantes los resultados son similares. Todos ellos ahorran dinero en origen con respecto a los turistas no CBC. En particular, las cifras de ahorro varían entre € 179,97 y € 70,97 en media por grupo y noche. Esto demuestra que para los perfiles más populares, los turistas CBC gastan más dinero que los turistas no CBC. Este gasto superior varía en media entre € 48,1 y € 7,52 por grupo y noche. Esta cifra confirma la hipótesis de que el ahorro de los turistas CBC en origen es transferido, al menos parcialmente, a un mayor gasto en destino.

Las Islas Canarias, como muchos otros destinos turísticos de todo el mundo, se han enfrentado a un cambio de la estructura del mercado relevante. Por una parte, la percepción de ahorrar dinero con las tarifas aéreas más baratas de compañías CBC puede animarles a gastar más dinero en el destino. Por otra parte, las aerolíneas CBC pueden aumentar el tráfico aéreo hacia un destino en particular. Este documento prueba si la primera hipótesis es verdadera. A tal efecto, se considera un sistema de ecuaciones de gasto en origen y en destino. Dentro de todos los métodos econométricos que pueden estimar dicho sistema, se elige el modelo MC3E porque es capaz de hacer frente a la endogeneidad y correlación contemporánea de los errores apropiadamente.

Otro tema para el destino está relacionado con una redistribución de la relevancia de cada perfil turístico debido a la presencia de aerolíneas de bajo coste. Los viajeros CBC pueden estar dispuestos a permanecer en diferentes tipos de alojamiento o disfrutar de paquetes turísticos más simples con respecto a los viajeros tradicionales (no CBC). Por lo tanto, puede implicar un efecto de redistribución de perfiles turísticos dentro de un destino. En las Islas Canarias, los perfiles de turistas CBC que experimentan un crecimiento significativo son "Sólo vuelo + alojarse con amigos o familiares", "Vuelo + Estancia en apartamento", mientras que los perfiles de turistas que reducen su presencia son "Vuelo + Alojarse en 4 estrellas con media pensión" y "Vuelo + Alojarse en hotel 4 estrellas con todo incluido". También es importante tener en cuenta que la duración media de la estancia también es diferente entre los turistas CBC no CBC. Por ejemplo, para el caso de " Sólo vuelo + alojarse con amigos o familiares", los turistas CBC se quedan, en promedio, 2 días menos que los turistas no CBC.

Sin embargo, para el resto de perfiles turísticos relevantes, los turistas CBC se quedan, en promedio, 1 día menos que los turistas no CBC.

Capítulo 2: La decisión de recorte de los turistas en tiempos de crisis económica

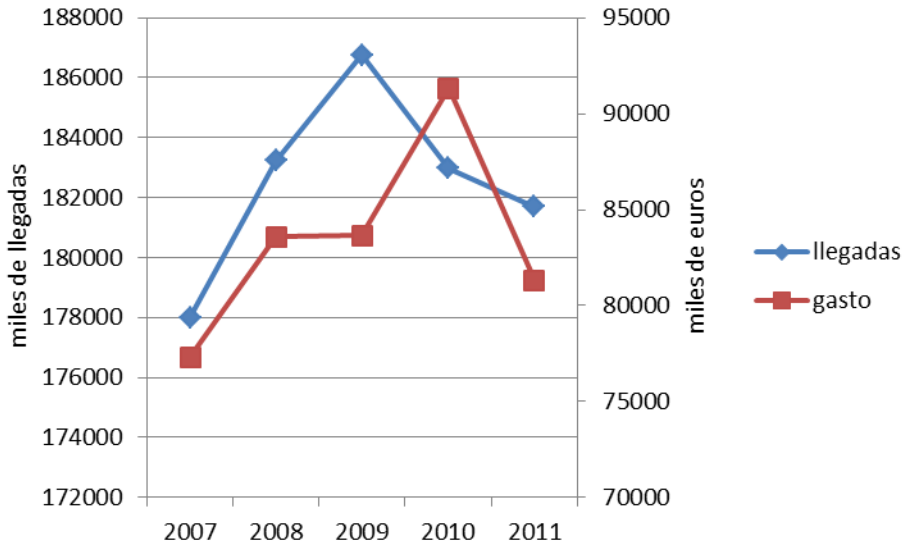
Introducción y objetivos

Desde 2008, la UE-27 se encuentra en una situación económica de recesión. En promedio, el crecimiento del PIB real ha disminuido un 0,16 % entre 2008 y 2012 y la tasa de desempleo ha aumentado del 7,6 % en 2008 hasta el 10,6 % en 2012. El efecto y las consecuencias de la crisis han sido diferentes según los países. Por un lado, un país como Alemania ha crecido un 0,8 % en promedio entre 2008 y 2012 e incluso ha reducido su tasa de desempleo del 7.5 % en 2008 al 5,9% en 2012. Por otro lado, países como España o Grecia han sufrido una crisis aguda (una reducción del -0,92 % y -4,34 % en el PIB real desde 2008 hasta 2012. respectivamente) y han mostrado tasas de desempleo durante los últimos cuatro años de 11,3% en 2008 al 25% en 2012 y del 7,7 % en 2008 al 24,3% en 2012 para España y Grecia, respectivamente). La crisis también ha provocado una crisis de deuda en Grecia y Portugal, y bancaria en España. Irlanda y Chipre.

A nivel microeconómico, esta situación de crisis tiene un efecto profundo sobre la renta disponible individual y, por tanto, en el consumo total. Bajo estas circunstancias, el consumo turístico es especialmente sensible al recorte en el gasto turístico debido a su alta elasticidad renta (Lanza, Temple y Urga, 2003). Según Riley, Ladkin y Szivas (2001), la actividad turística necesita de una correcta previsión de la demanda para hacerla coincidir con la oferta. Por tanto, la anticipación es clave para el éxito en la actividad turística. Los gestores turísticos y políticos necesitan más información sobre cómo reaccionar en situaciones de crisis económicas. No obstante, hay una falta de indicadores y de información adecuados sobre el comportamiento del turismo en situaciones de crisis económica (Sheldon y Dwyer, 2010; Smeral, 2010; y Bronner y Hoog, 2012). Las consecuencias de esa falta de conocimiento han sido ya estudiadas en la literatura. Según Okumus y Karamustafa (2005), ni el gobierno ni las empresas turísticas de Turquía fueron capaces de hacer frente a la crisis económica que sufrieron en 2001. O'brien (2012) señala que la falta de interacción entre el gobierno y el sector privado explica que el sector del turismo en Irlanda no esté creciendo todavía, mientras que otros destinos europeos ya han vuelto a crecer a pesar de la crisis económica.

Hasta el momento, los gestores turísticos y políticos han basado principalmente su análisis en las llegadas y el gasto. Como se puede observar en la Figura 2.1, en 2008 los turistas ajustan inmediatamente su gasto ante el inicio de la crisis, mientras que el número de llegadas sigue creciendo. A medida que la crisis continúa, los turistas empiezan a reducir las llegadas y aumentar el gasto. Por último, desde 2010, llegadas y gasto caen abruptamente. Si bien las llegadas y el gasto muestran una relación clara, si bien la mayor parte de la literatura no las has analizado conjuntamente. Por lo tanto, una mejor comprensión y análisis de la relación mutua entre la demanda y la oferta podría permitir aclarar qué parte del cambio en el gasto turístico se debe a cambios en las llegadas y qué es debido a cambios en los precios.

Figura 2.1: Llegada de turistas y gasto



Fuente:Eurostat y Organización Mundial del Turismo

Para resolver este problema, en este trabajo se separan las llegadas y el gasto en argumentos más explícitos a nivel microeconómico. Este documento se centra en los fundamentos de la decisión de recorte en gasto turístico de los hogares y cómo se lleva a cabo esta decisión durante la crisis económica mundial surgida en 2009 en la Unión Europea. Para tal fin, la decisión de recorte se divide en dos niveles. En primer lugar, los turistas deciden si recortar o no. En este punto, el gasto de los hogares podría ser la variable natural para ser utilizada (véase, por ejemplo, Melenberg y Van Soest, 1996). Sin embargo, el gasto de los hogares puede variar por varias razones no todas relacionadas con la crisis económica. Para evitar este sesgo potencial, una variable de respuesta binaria se utiliza como variable endógena, en la cual se pregunta si han tenido que recortar en gasto turístico o no a causa de la crisis. En segundo lugar, para los turistas que efectivamente recortaron, se les pregunta por su estrategia de recorte de acuerdo a seis alternativas: "menos vacaciones", "reducción de la estancia", "medio más barato de transporte", "alojamiento más barato", "viajar más cerca de casa" o "cambiar el período de viaje". La Tabla 2.1 muestra cómo estas alternativas podrían afectar a la llegada y al gasto turístico. Por ejemplo, la decisión de recortar teniendo "menos vacaciones" afecta tanto a las llegadas como al gasto. Por el contrario, "el transporte más barato" o "alojamiento barato" afecta al gasto solamente.

Tabla 2.1: Relación entre el tipo de recorte con la llegada y gasto de los turistas

Estrategias de recorte	Llegadas	Gasto
Menos vacaciones	X	X
Reducir la estancia		X
Transporte más barato		X
Alojamiento más barato		X
Viajar cerca de casa	X	X
Cambiar el periodo de viaje		X

La literatura es bastante escasa sobre cómo redistribuyen los turistas su gasto turístico en virtud de una crisis económica. Por ejemplo. Eugenio-Martín y Campos-Soria (2014) analizan la decisión de recorte en el turismo, pero no la forma de distribuir dicha decisión (estrategia de recorte). Alegre, Mateo y Pou (2013) separan la decisión del turismo en dos partes: la participación y el gasto, sin embargo, no distinguen entre estrategias de gasto turístico. Desde una perspectiva macroeconómica. Frechtling (1982) analiza los viajes de vacaciones por tipo y características de viaje durante la crisis de los años ochenta en EE.UU. Analiza variables como la "duración". "distancia entre origen y destino" o "noches de alojamiento". Por lo que sabemos. Bronner y Hoog (2012) son los únicos que abordan las estrategias de recorte desde una perspectiva microeconómica, teniendo en cuenta la severidad de la crisis económica y su variabilidad regional. Dichos autores asumen trece respuestas posibles tales como "renunciar a las vacaciones". "reserva de alojamiento más barato" o "tomar otro medio de transporte". Como Sheldon y Dwyer (2010, p. 4) afirman: "... Nuestra falta de conocimiento acerca de las posibles reacciones de los consumidores ante la crisis plantea grandes obstáculos en el camino de la previsión de sus efectos en la industria. Por lo tanto, los consumidores puede que gasten menos y viajen menos, pero hasta qué punto cambian a otros productos. reducen la deuda o ahorran más no se conoce. Las estimaciones de las elasticidades renta de la demanda turística normalmente se basan en los datos a largo plazo y no son aplicables a largas recesiones como la que se está produciendo. El grado en que los turistas cambian a destinos más cercanos o estancias más cortas (…) son también una importante áreas de investigación."

El modelo econométrico capaz de tener en cuenta ambas decisiones (recortar o no. y tipo de recorte) es una adaptación del modelo de Heckman (Heckman, 1976, 1979) en forma de ecuaciones estructurales generalizadas. Esta metodología permite controlar por el sesgo de selección de la muestra y tiene en cuenta las correlaciones entre las ecuaciones a nivel micro. Como bien señala Prideaux (1999), los enfoques micro permiten controlar tanto por las características socioeconómicas como por los indicadores macroeconómicos, lo cual mejora los resultados de manera significativa. Además, los atributos del lugar de origen se pueden incorporar en el análisis ya que juegan un papel clave para entender la decisión de recorte turístico. En ese sentido. Eugenio-Martín y Campos-Soria (2014) identifican los factores de "empuje" de la demanda de turismo asociado con el atractivo del lugar de residencia tales como el clima. la existencia de litoral o el tamaño de la comunidad. El modelo econométrico que utilizan se basa en la encuesta realizada en la Unión Europea en septiembre de 2009 a nivel regional (regiones NUTS 2 de la UE-27) junto con datos macro de las regiones de origen que incluyen atributos del lugar de residencia e indicadores económicos como el cambio en del PIB.

Metodología

Como se mencionó en el apartado anterior, el modelo econométrico que aquí se emplea es una adaptación del modelo de Heckman. La variable endógena en el primer paso (primera ecuación) es una variable de respuesta binaria que toma valor 1 si el turista decide recortar y cero en caso contrario. La variable endógena de la segunda etapa (segunda ecuación) es una variable de respuesta multinomial que recoge los seis tipos de recorte explicados en el párrafo anterior y que aquí nuevamente se muestran: "menos vacaciones", "reducción de la estancia", "medios de transporte más baratos", "alojamiento más barato", "viajar más cerca de casa" o "cambiar el período de viaje".

En un entorno de ecuaciones estructurales generalizadas, el modelo de Heckman se lleva a cabo utilizando una variable latente que recoge correlación entre ambas ecuaciones (Skrondal y Rabe-Hesketh, 2004).

Las variables exógenas consideradas en la especificación de la ecuación de recorte se pueden dividir en socioeconómicas y regionales. El conjunto de variables socioeconómicas consideradas son la edad y la edad al cuadrado, por lo que este último pueda capturar el efecto no lineal de la edad sobre la decisión de recorte. el género (masculino = 1), la educación y el empleo. Todas estas variables se utilizan como sustituto de los ingresos personales. La educación es una variable continua que toma el valor de la edad en que el individuo dejó la educación. El empleo puede ser uno de los siguientes: Agricultor, guarda bosques o pescador, propietario de una tienda, profesional autónomo, gerente de una empresa (jefe), otro tipo de autoempleo, profesionales empleados, mando superior (alta dirección), mando intermedio, funcionario, empleado de oficina, vendedor, supervisor (capataz), trabajador artesano, trabajador srtesanal no cualificado, otro trabajo artesanal, ama de casa, estudiante (tiempo completo), Jubilado, desempleado y finalmente, un grupo de otras ocupaciones dentro de las diferentes categorías profesionales.

El conjunto de variables regionales se consideran debido a que las preferencias para el turismo están condicionadas por el lugar de residencia de la familia. Como señala Hung. Shang y Wang (2013) los hogares que pertenecen a la misma región tienen un patrón de gasto turístico similar. Por lo tanto, si las estimaciones de gasto del turismo ignoran los factores relacionados con la ubicación geográfica de los turistas, se podrían obtener resultados sesgados. En particular, el clima, el producto interior bruto (PIB) per cápita en paridad de poder adquisitivo (PPA) y el crecimiento del PIB se incluyen como variables. El clima en la región de origen es uno de los factores más importantes en la demanda de turismo de salida (Agnew y Palutikof, 2006) que explica las asimetrías en la disposición a viajar entre las regiones (Madison, 2001). Eugenio-Martín y Campos-Soria (2014) muestran que los hogares ubicados en las regiones con "buen clima" son más propensos a reducir su gasto turístico que los situados en regiones con no tan buen clima. La definición de la variable clima se basa en el índice de clima de doble valla presentado por Eugenio-Martín y Campos-Soria (2010). Tal índice toma valores de 0 a 12 dependiendo del número de meses de buen clima que existan en dicha región. Las variables climáticas que se consideran son la temperatura, las precipitaciones y días con lluvia. Los umbrales que determinan cada valla se basan en Mieczkowski (1985). Por otra parte, el PIB per cápita en PPA es considerado, junto con las variables socioeconómicas, como sustituto de los ingresos personales. Por último, el crecimiento del PIB refleja la expectativa de las variaciones de la renta personal. De acuerdo a las teorías de consumo los cambios en la demanda pueden deberse no sólo a cambios en los ingresos actuales, sino también a las expectativas de ingresos futuros. Hong-bumm, Jung-Ho, Seul y SooCheong (2012) analizan precisamente este efecto en la demanda turística internacional.

Por otro lado, las variables exógenas consideradas en la ecuación del tipo de recorte son variables socioeconómicas y regionales. La edad y el género son dos variables que suelen influir en la decisión de recorte. Una vez más, estas variables se definen de la misma manera que en la especificación de la ecuación anterior. A nivel regional, el clima, la longitud de la costa y la presencia de aeropuertos son considerados como relevantes para las estrategias de recorte de los hogares. La variable costa es un índice que representa cuan significativa es la longitud de la costa en relación al tamaño de la región, la variable aeropuerto es una variable ficticia que toma valor unitario si la región tiene por lo menos un aeropuerto.

Resultados y conclusiones

La tabla 2.2 muestra los resultados que a continación se comentan. En la ecuación de recorte. El PIB y el crecimiento del PIB son factores determinantes. El PIB tiene un efecto negativo en la decisión de recorte. Con un incremento de 1.000 millones de dólares en el PIB, la probabilidad de recortar es un 0,1 % (1 menos 0.999) menor. Las expectativas futuras sobre la evolución del PIB tienen un mayor impacto en la probabilidad de recorte que el PIB. Un crecimiento positivo del PIB tiene un impacto negativo en la decisión de recorte. Con un aumento de un punto porcentual en el crecimiento del PIB, la probabilidad de recorte es un 3,7 % inferior. En otras palabras, los hogares reaccionan reduciendo sus gastos cuando tienen expectativas del PIB negativas. Así mismo, la ocupación es un factor determinante de gran relevancia en la probabilidad recorte. Por ejemplo, un gerente general muestra la probabilidad de recorte más baja. Para un gerente general, la probabilidad de recortar es un 51,6% (1 menos 0.484) menor. Además, este trabajo muestra que las personas jóvenes son más propensas a recortar que los mayores.

Por otro lado, Las estimaciones muestran que hay un efecto no lineal de la edad sobre la decisión recorte. Las personas de 20 años son un 1,83% más propensas a reducir su consumo (recortar). Sin embargo, para personas de 65 años es un 2,64% menos probable que recorten. La educación tiene también un impacto negativo sobre la probabilidad de recorte. Los individuos con un año más de educación reducen la probabilidad de recortar un 1,4% en promedio. Las variables regionales también muestran algunos resultados interesantes. En particular, las regiones con buen clima son más propensas a recortar que aquellos con no tan buen clima. En promedio, cuando el índice climático aumenta en un punto, la probabilidad de recorte aumenta un 7,96%. Este resultado corrobora la idea de que el clima en la región de origen es uno de los factores más importantes a la hora de hacer turismo fuera de la región de residencia (Agnew y Palutikof, 2006; Eugenio-Martín y Campos-Soria, 2014).

Tabla 2.2: Determinantes de la decision de recorte (odds-ratios)

Variable	Recorte	¿Cómo se recorta?				
		Reducir estancia	Tranporte más barato	Alojamiento más barato	Viajar cerca de casa	Cambiar periodo de viaje
PIB pc (PPA)	0,999***					
Crecimiento	0,963***					
Socieconomic variables						
Variables de empleo:						
Agricultor, guardabosque, pescador	0,491***					
Dueño de una tienda	0,660***					
Autónomo	0,614***					
Jefe	0,525***					
Otro tipo de autoempleo	0,666***					
Profesionales empleados	0,598***					
Mando superior	0,484***					
Mando intermedio	0,542***					
Funcionario	0,544***					
Oficinista	0,666***					
vendedor	0,636***					
Otros empleados	0,551***					
Supervisor	0,915					
Artesano	0,950					
Trabajo artesanal no cualificado	1,002					
Otro trabajo artesanal	0,512***					
Ama de casa	0,809**					
Estudiante	0,622***					
Jubilado	0,658***					
Otros no empleados	0,710**					
Edad	1,039***	1,003	0,986***	0,987***	0,997	0,992**
Edad al cuadrado	0,999***					
Género (masculino = 1)	0,871***	1,214**	1,016	1,088	1,204**	0,872
Nivel de educación	0,986***					
Variables regionales						
Clima	1,079***	1,024**	0,951***	1,031**	0,965***	0,964**
Costa		1,049	0,908	0,975	1,091	0,767**
Aeropuerto		0,898	0,940	1,003	1,133	0,840
Variable latente:						
L	1(restringido)	1,440	1,142	2,753***	1,449	1,349

En relación a la ecuación del tipo de recorte, la edad influye negativamente sobre las decisiones de: "transporte más barato", "reducir la estancia" y "cambiar el período de viaje". En este último caso, es un 0,8% menos probable reducir los viajes fuera de temporada alta, cuando aumenta la edad respecto a tomar “menos vacaciones” (categoría de referencia). En otras palabras, las personas más jóvenes están más dispuestas a viajar fuera de temporada alta, utilizar el transporte más barato o alojamientos más económicos que las personas mayores. Para las otras dos alternativas, la edad no tiene ninguna influencia significativa en comparación con la categoría de referencia "menos vacaciones". Un razonamiento similar se podría hacer sobre el género. Éste afecta positivamente a la "reducción de la estancia" y "viajar cerca de casa", pero no tiene una influencia significativa en las otras alternativas. Dado que recorta, es un 20,4 % más probable viajar "cerca de casa" para un hombre que para una mujer.

Por otra parte, es interesante observar que en cuanto mejora el clima en el lugar de residencia, la probabilidad de elegir "reducir la estancia" y "alojamiento barato" aumenta sobre la probabilidad de "menos vacaciones". Por ejemplo, con una unidad de incremento en el índice de clima, es un 2,4% (1,024 menos 1) más probable reducir la duración de la estancia en lugar de optar por un menor número de días de vacaciones. Esta reducción puede ser explicada porque los hogares ubicados en las regiones con mejores condiciones climáticas tienen una mayor probabilidad de viajar a nivel nacional (Eugenio-Martín y Campos-Soria, 2010) de modo que pueden reducir el número de días más fácilmente. En el caso de "un alojamiento más barato", es 3,1 % más probable (1,031 menos 1) elegir esta opción en lugar de tomar “menos vacaciones”. En resumen, las personas que viven en regiones con buen clima prefieren la reducción de la duración de la estancia o reservar un alojamiento más barato en lugar de optar por un menor número de días de vacaciones. Para el resto de las alternativas de recorte, las probabilidades disminuyen cuando las condiciones climáticas de origen mejoran.

Por ejemplo, tan pronto como mejora el clima es un 3,6% menos probable recortar viajando fuera de temporada alta en vez de tener un menor número de días de vacaciones. La presencia de la costa en el lugar de residencia sólo tiene influencia en la decisión de cambiar el "período de viaje", mientras que para las otras alternativas no existen diferencias significativas en comparación con tomar menos vacaciones. La presencia de la costa hace un 23,3 % (1 menos 0.767) más probable recortar a través de la duración del viaje que optando por un menor número de vacaciones.

El análisis posterior de la estimación permite analizar cómo las probabilidades estimadas cambian con algunos determinantes clave como el índice de clima o la edad del cabeza de familia. La figura 2.2 muestra la media móvil de la probabilidad del tipo de recorte en relación al índice de clima. De acuerdo con dicha figura, existe un claro efecto del clima sobre la probabilidad de las alternativas de recorte. En primer lugar, las probabilidades de "longitud reducida de la estancia" y " alojamiento más barato" son los más altas de las seis alternativas y crecen con el índice de clima. En segundo lugar, "cambiar el período de viaje" y elegir un "transporte más barato" muestran las probabilidades más bajas y disminuye de manera constante con el índice de clima. Por último, viajar "cerca de casa" y "reducir el número de viajes"(menos vacaciones) permanecen casi constantes. No obstante, si se analiza la tasa de cambio de las probabilidades de las alternativas por el clima en origen, los cambios son bastante significativos. Por un lado, los hogares ubicados en las regiones con las mejores condiciones climáticas para el turismo (índice de clima = 12) muestran una probabilidad de recortar un 32% a través de "reducir la estancia" que los hogares ubicados en las regiones con peor clima (índice de clima = 0). En el caso de "un alojamiento más barato", el cambio no es tan agudo. Es un 1,05% más probable recortar con esta opción para los hogares con el mejor índice de clima en lugar de los que tienen el índice de clima peor. Por otro lado, es un 2% menos probable reducir "el período de viaje" para aquellos turistas con el índice de clima más alto que los turistas con el más bajo. Estos resultados indican que las diferencias en el lugar de origen juegan un papel importante en las probabilidades.

Figura 2.2: Medias moviles de la probabilidad por clima

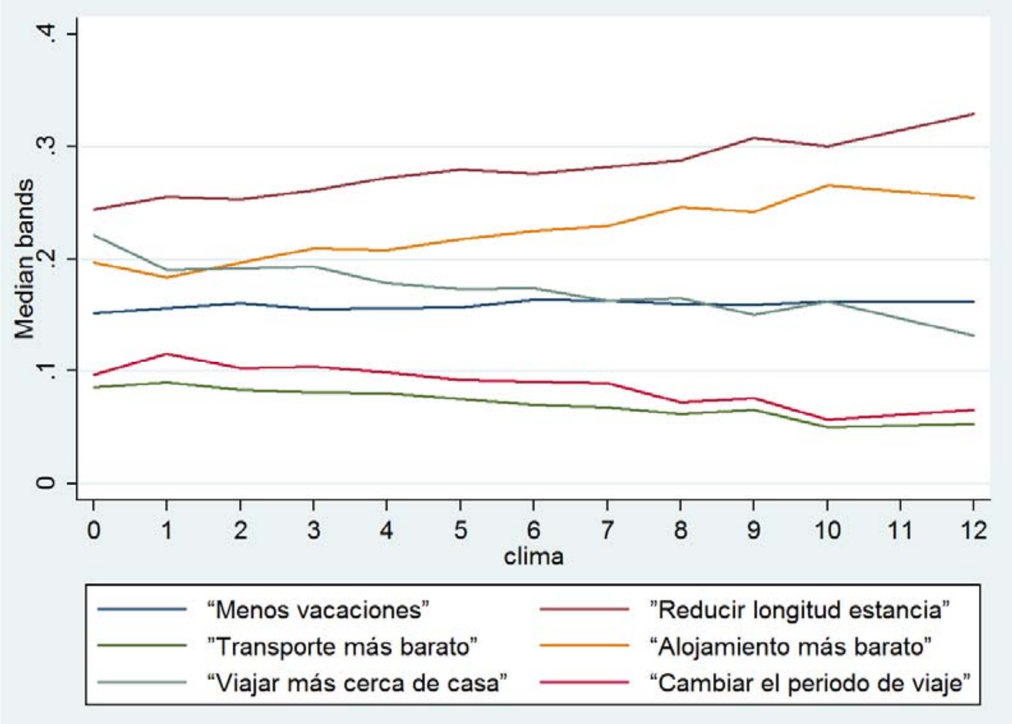
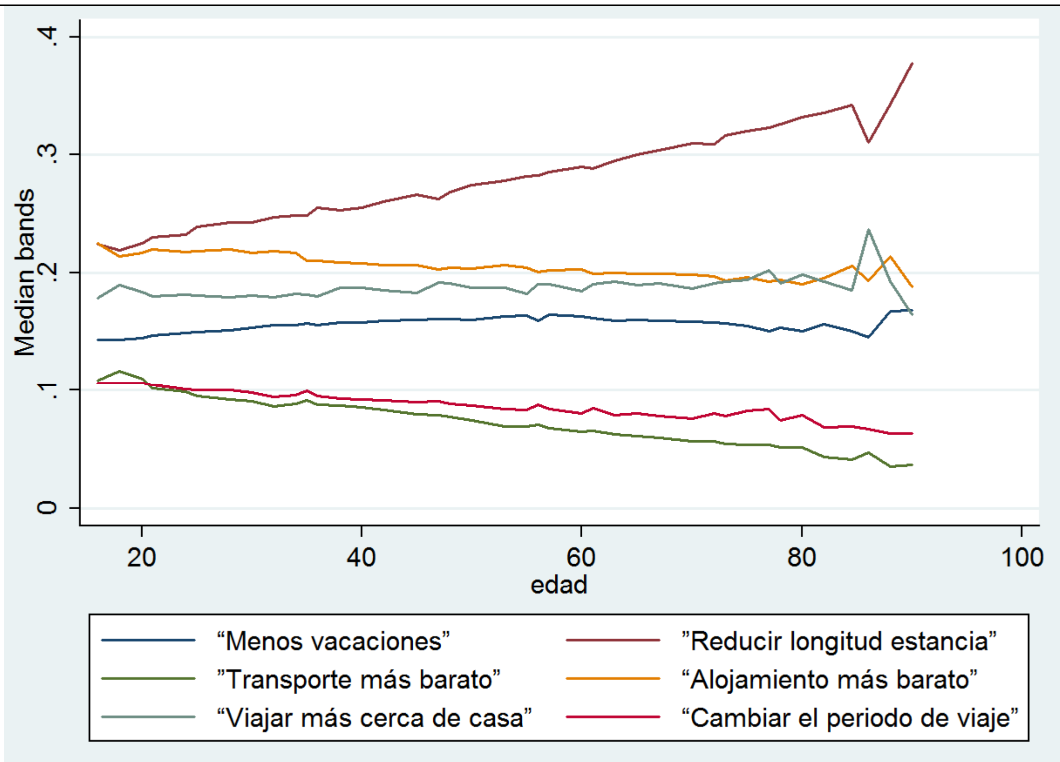


Figura 2.3: Medias móviles de la probabilidad por edad



La figura 2.3 muestra el cambio de la media móvil de la probabilidad de cada estrategia de recorte en función de la edad. Por ejemplo, para personas de 65 años, la probabilidad de optar por "reducir la estancia" es 34,78% superior que para los de 20. En lo que respecta a la alternativa "alojamiento barato", la probabilidad disminuye un 33,33% para personas de 65 años, en comparación con las de 20.

Las principales conclusiones de este capítulo pueden resumirse como sigue. En primer lugar, la edad importa. En particular, los turistas de mayor edad tienen más probabilidades de reducir la duración de su estancia bajo un cambio del PIB. En segundo lugar, el clima de origen también influye en el tipo de recorte a realizar. Los turistas que viven en regiones con buen clima son más propensos a reducir el tiempo de estancia (32%) que los turistas que viven en regiones con peor clima. En tercer lugar, para la mayoría de las regiones, las estrategias de recorte preferidas son claras: la forma favorita es a través de la reducción de la duración de la estancia seguida por la reserva de un alojamiento más barato. El promedio de las probabilidades de tales estrategias son 27% y 20%, respectivamente. Sin embargo, coviene recordar que existe una gran heterogeneidad entre las regiones en lo que al tipo de estrategia de recorte se refiere. Todo este conocimiento se puede emplear para construir paquetes más flexibles que pueden adaptarse a las necesidades de los diferentes perfiles de turistas durante los períodos de crisis económicas. Esta flexibilidad debe basarse en una combinación de variables micro y macroeconómicas, como pueden ser la edad, el género, el clima en las regiones de origen, la severidad de la crisis (reducción del PIB) y las expectativas sobre el crecimiento del PIB.

Desde el punto de vista de la gestión del destino, es importante entender que las estrategias de recorte implican efectos totales, efectos parciales o ningún efecto sobre el destino. Por un lado, las estrategias de recorte que tienen efectos completos en el destino son "reducción de la longitud de la estancia" y "alojamiento barato". Por otra parte, "menos vacaciones" y "viajar cerca de casa" pueden o no afectar directamente el destino (efectos parciales). Por último. "el transporte más barato" y "cambiar el período de viaje" son estrategias con efectos más difusos en cuanto a su impacto en el destino (otros efectos). Según los resultados, la probabilidad de recortar a través de estrategias que afectan directamente a los destinos (efectos totales) es del 47,4%, mientras que el resto de las probabilidades, los efectos parciales y otros efectos, representan el 35,4 % y 17,2 %, respectivamente.

Capítulo 3: Turismo: crecimiento económico, empleo y la “enfermedad holandesa”

Introducción y objetivos

Desde 2008. España se encuentra bajo una fuerte recesión económica (reducción de 0,92 % en el PIB real desde 2008 hasta 2012 y la tasa de desempleo del 24,3 % en 2012). Las principales consecuencias de la situación actual de crisis son: la elevada deuda privada (hogares y empresas) alimentado después de años de bajas tasas de interés, alta tasa de desempleo, menores salarios, bajada del consumo privado, contracción del crédito (crisis bancaria), mayor tasa de interés para las emisiones de renta fija pública y decrecimiento económico.

Más allá de este breve diagnóstico, la crisis española tiene dos factores adicionales: la pertenencia a la moneda europea (euro) y, debido a ello, un control del déficit público para cumplir con el compromiso de déficit de la UE. El primer factor actúa como si España tuviera un tipo de cambio fijo forzando a una devaluación interior a través de salarios más bajos para ganar competitividad exterior. El segundo factor no permite caer en un déficit público persistente y reduce la posibilidad de llevar a cabo políticas de demanda para impulsar la economía. La devaluación interior ya está reduciendo el déficit y los salarios, lo que está contrayendo aún más la demanda interior, y España, como la mayoría de las economías desarrolladas, se basa en gran medida de la demanda interior para impulsar la economía.

En paralelo con la situación económica descrita anteriormente. España ha estado recibiendo una gran llegada de turistas desde 2010 como consecuencia de la primavera árabe que comenzó en diciembre de 2010 en Túnez y se extendió rápidamente a otros países árabes de la región. Este flujo positivo e inesperado de turistas se produjo después de años de disminución. Esta nueva situación, junto con las previsiones económicas más optimistas (World Economic Outlook. Fondo Monetario Internacional, 2013), ha alimentado la idea de que las llegadas de turistas podrían sustituir la débil demanda interior, impulsar la economía y reducir la tasa de desempleo. Bajo este contexto, la existencia de bienes transables y no transables es clave para entender el efecto anteriormente aducido del turismo en la economía. Esta hipótesis y la transición de un auge económico hacia una crisis (o hacia un contexto de menor crecimiento) pueden ser teóricamente respaldadas por una versión adaptada del modelo TNT (Larraín y Sachs, 1994).

El éxito de algunos países asiáticos en los años ochenta promoviendo el crecimiento económico a través de las industrias orientadas a la exportación (Banco Mundial, 1993) y la orientación exportadora del turismo ha guiado los estudios sobre el turismo y el crecimiento económico en torno a la hipótesis de las exportaciones (Balassa, 1978) . Autores como Neves y Maças (2008) o Dritsakis (2004) apoyan la capacidad del turismo. un sector no intensivo en tecnología, para promover el crecimiento económico y aumentar la acumulación de capital. Estas conclusiones contradicen los resultados de Solow (1956) y otros autores como Aghion y Howitt (1998) o Grossman y Helpman (1991) sobre la relación entre sectores más intensivos en capital y el crecimiento a largo plazo. Lanza, Temple y Urga (2003) afirman que el menor crecimiento de la productividad en la economía basada en el turismo podría ser superado por una progresiva especialización en el turismo que podría mejorar los términos de intercambio y compensar la pérdida de productividad. Por otra parte, también destacan la importancia de la alta elasticidad precio e ingreso de la demanda de turismo que puede compensar la pérdida de productividad en el largo plazo.

Además, existen consecuencias más profundas en la relación entre el turismo y la economía que no deben ser descuidadas. Las diferencias en el uso de capital y trabajo tienen también implicaciones importantes a nivel sectorial. Copeland (1991) y Chao, Hazari, Laffargue, Sgro y Yu (2006) ponen de manifiesto la importancia de los bienes no transables en la economía basada en el turismo. Según ellos, el turismo aumenta el consumo de bienes no transables y mejora los términos de intercambio, aunque podría producir *desacumulación* de capital de los sectores manufactureros (intensivos en capital) a los no transables (intensivos en mano de obra). Por otra parte, la apreciación del tipo de cambio real debido a las llegadas de turistas también puede socavar la competitividad exterior de las exportaciones tradicionales. El desplazamiento de capital y mano de obra de los sectores tradicionales hacia los no transables y la apreciación del tipo de cambio real puede generar una "enfermedad" económica conocida como "enfermedad holandesa " por el cual el efecto positivo del turismo en la economía en el corto plazo podría terminar en una contracción económica en el largo (Corden y Neary, 1982).

El uso de modelos de equilibrio general recursivo-dinámico permite trabajar en estos dos niveles. Por un lado, permite cuantificar el impacto de la llegada de turistas en el PIB y el desempleo. Por otro lado, también permite analizar el efecto de tal choque sobre la reasignación de recursos (capital y trabajo) entre los sectores, la pérdida de competitividad y. en definitiva, comprobar la existencia de la "enfermedad holandesa" en la economía a nivel más sectorial. Dos escenarios y cinco períodos son proyectados para tal fin. El primero (escenario post-crisis) se basa en la proyección del Fondo Monetario Internacional (Fondo Monetario Internacional, 2013) y en el Boletín Económico del Banco de España (Banco de España, 2013). El segundo es un escenario previo a la crisis basada en el desempeño de la economía española en los cinco años anteriores a la crisis económica. Los dos escenarios tratan de proporcionar una perspectiva más amplia del verdadero potencial del turismo para dar respuesta a los objetivos perseguidos en este trabajo bajo diferentes trayectorias económicas.

Marco teórico del impacto del turismo en una economía: modelo TNT -T

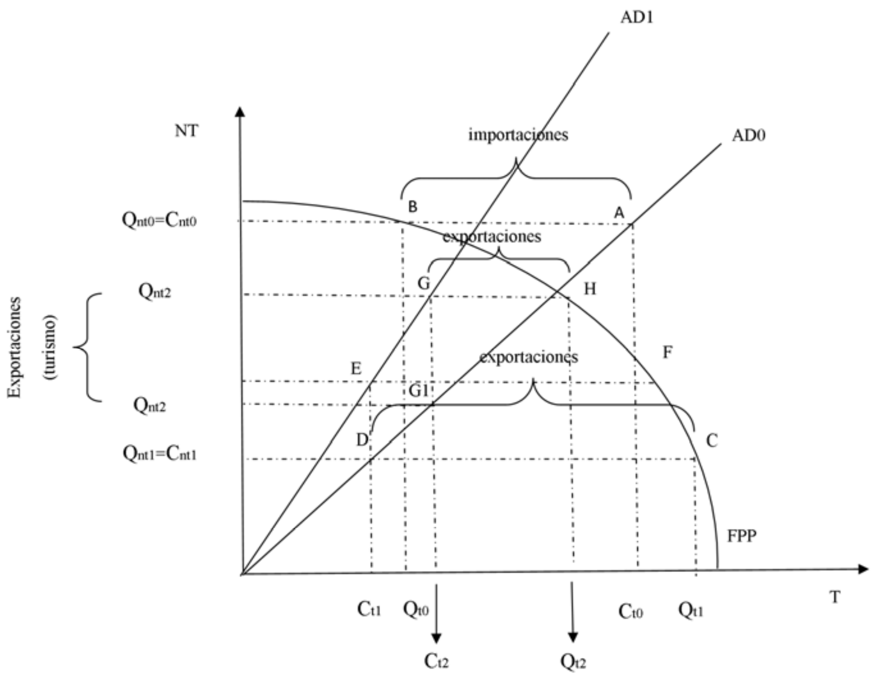
En esta sección se desarrolla una nueva versión del modelo TNT (Sachs y Larrain, 1994) para incluir la influencia del turismo en la producción y consumo de bienes transables y no transables, así como la existencia de un nuevo equilibrio debido a la infrautilización del trabajo y el capital (llamado modelo TNT-T).

Hay bienes que son transables (bienes que se pueden exportar) y bienes no transables (bienes que no se pueden exportar como alojamiento. servicios de restauración o un corte de pelo). Esta simple diferencia en el tipo de productos tiene importantes consecuencias sobre la economía. Por ejemplo, en una situación de auge económico, las economías tienden a consumir más bienes transables que los que pueden llegar a producir, por lo que las importaciones crecen. En términos gráficos (ver Figura 3.1), la economía consume bienes transables en A (Ct0) y los produce en B (Qt0); la diferencia entre A y B son las importaciones. El consumo de bienes no transables es Cnt0 y. dadas las características de este tipo de bienes coincide con su producción (Pnt0). DA hace referencia a la demanda agregada. FPP significa frontera de posibilidades de producción. NT son bienes no transables y T bienes transables. Cuando la economía se desplaza de una situación de crisis (o a una de decrecimiento económico) la economía se mueve hacia abajo a lo largo de DA0 hasta D. Durante este proceso, tanto el consumo de bienes transables como de no transables decae. El menor consumo de bienes transables puede ser compensado por un aumento de las exportaciones (diferencia entre D y C). Pero la caída en la producción de bienes no transables sólo puede ser soportada por la demanda interior.

El turismo es una exportación intensiva en el consumo de bienes no transables tales como alojamiento o servicios de restauración. La inclusión del consumo turístico en el modelo desplaza la demanda agregada de DA0 a DA1. En esta nueva situación, en un principio. el consumo de bienes no transables se incrementa desde D a E. Tan pronto el turismo comienza a demandar bienes no transables y la crisis económica queda atrás, la producción y la demanda agregada aumentan. Por lo tanto, el consumo total pasa de E a G. La diferencia entre G (demanda agregada con el efecto turístico) y G1 (demanda agregada sin turismo) representa las exportaciones de bienes no transables. Esto significa que la equivalencia entre la producción y el consumo de los bienes no transables ya no se cumple debido a la inclusión del turismo en el modelo. Por otro lado, el movimiento de E a G sólo se puede lograr mediante la reducción de la producción (y exportaciones) de mercancías transables (de C a H). a pesar del aumento de la demanda de D a G.

Para concluir, el modelo demuestra que la inclusión del turismo alivia la caída de los bienes no transables en un escenario de decrecimiento económico y que a su vez puede actuar como un sustituto de la demanda interna. En segundo lugar, el modelo también muestra que para aumentar la producción de bienes no transables la producción de bienes transables tiene que disminuir (situación donde unos ganan y otros pierden). En consecuencia, las exportaciones de bienes transables disminuyen. El modelo TNT-T aquí desarrollado asume la plena utilización de la mano de obra y el capital. Ahora el modelo será relajado para incluir hipótesis más realista, como el desempleo y la acumulación de capital que mejor describe la situación actual en España.

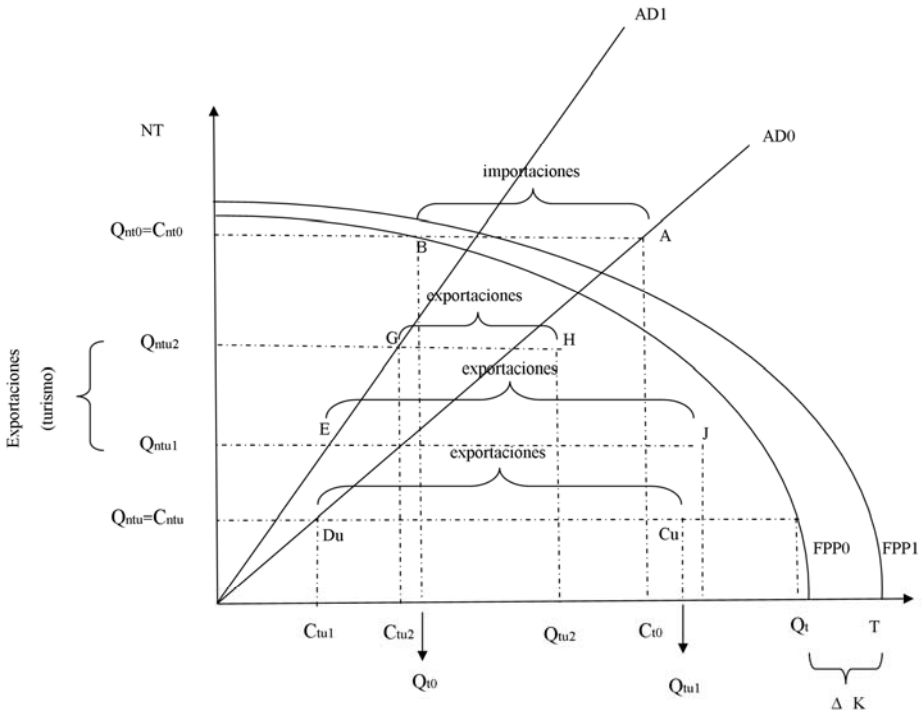
Figura 3.1: modelo TNT-T



La figura 3.2 muestra el modelo TNT-T pero permitiendo acumulación de capital y desempleo. Estos supuestos más suaves permiten la consideración de otro equilibrio que no era asequible bajo los supuestos más restrictivos del modelo anterior. El razonamiento es similar a la figura 3.1, pero ahora, cuando la economía se dirige hacia una situación de crisis la menor demanda genera desempleo. Así que el equilibrio se alcanza en un punto inferior (Cu) (punto interior de FPP) en lugar de D como en la figura 3.1 (Cu < D). Al igual que en la figura 3.1, el consumo turístico desplaza la demanda agregada hacia arriba desde AD0 a AD1. El crecimiento de la demanda debido al turismo aumenta en mayor proporción el consumo de bienes no transables y por tanto, la producción (aumentando la demanda de empleo) para satisfacer el aumento de la demanda. El aumento del empleo y el capital generado en la economía empuja la FPP hacia arriba desde FPP1 a FPP2. En estas nuevas circunstancias, ambos sectores (transables y no transables) pueden aumentar su dotación de mano de obra y capital y por ende, aumentar su producción (situación en la que todos ganan). Este nuevo equilibrio no se alcanzaba en el modelo mostrado en la figura 3.1. Esta nueva situación viene representada por E y J. donde E> Du y J > Cu. Por otra parte, el sector transable puede subir sus exportaciones (diferencia entre E y J) en lugar de reducirlas como en la figura 3.1. Este equilibrio sólo será accesible en condiciones de bajo consumo turístico y reducida apreciación del tipo de cambio real. Por otra parte, el crecimiento de la producción de bienes transables también dependerá de la tecnología utilizada y, por tanto, del equilibrio entre el trabajo y el capital que se puede lograr.

El equilibrio en el que unos ganan y otros pierden también es alcanzable bajo estas nuevas premisas. En la figura 3.2, este equilibrio está representado por G y H. donde las exportaciones tradicionales se reducen y crece la producción de bienes no transables a pesar de la variación al alza de la FPP de FPP1 a FPP2.

Figura 3.2: Modelo TNT-T con desempleo y acumulación de capital



Base de datos

Este estudio se basa en tres bases de datos: la tabla input-output (IOT). la cuenta satélite del Turismo (TSA) y la Contabilidad Nacional de España 2006. Las dos primeras bases de datos se combinan para construir un nuevo IOT cuya finalidad principal es separa entre categorías turísticas y no turísticas. Como resultado, la nueva IOT tiene todos los bienes y servicios divididos entre turísticos y no turísticos. Por último, la nueva IOT se combina con los datos de las cuentas nacionales para construir la matriz de contabilidad social española (SP-SAM-06) siguiendo los criterios de Fernández y Manrique de Lara (2006). El SP-SAM-06 está formado por diecisiete productos y actividades.

Modelo Blovifis

El modelo ha sido programado en MPSGE (problema de complementariedad mixta) como un modelo de equilibrio general computable. Un model de equilibrio general computable se base a su vez en tres condiciones generales: cero beneficio, vaciado de mercado y restricción presupuestaria. La principal hipótesis detrás de un modelo dinámico-recursivo asume que el comportamiento de los agentes depende del pasado y del estado actual.

La estructura económica-productiva reflejada por dicho modelo es como sigue. El capital y el trabajo son combinados para formar el bien compuesto (también conocido como valor añadido). Este bien compuesto es usado junto con los bienes intermedios por los sectores económicos para producir bienes finales. Los cuales, a su vez, se dividen en bienes domésticos y de exportación. Los bienes domésticos son combinados con los bienes importados para producir los bienes Armington. Estos bienes tratan de reflejar la sustitución imperfecta entre bienes domésticos y de importación. Los bienes armington son usados para satisfacer el consumo final (hogares, gobierno y turistas extranjeros), la inversión y los consumos intermedios que son demandados por los sectores económicos para producir.

Calibración, escenarios proyectados y efectos asumidos

Los choques simulados son:

- aumento del 2 % en la llegada de turistas.
- aumento del 10 % en la llegada de turistas.

El aumento del 2 % en la llegada del turismo ha sido tomado de la Organización mundial del turismo (Orgainización Mundial del Turismo, 2013). Por otro lado, el poco probable aumento del 10% en la llegada de turistas pretende comprobar la fortaleza del turismo para generar crecimiento económico y reducir la tasa de desempleo.

Los escenarios proyectados son:

• post-crisis: tasa de interés del 5 %, 0,7% de crecimiento y 5 % de depreciación del capital.

• pre-crisis: tasa de interés del 4%, 3 % de crecimiento y 5 % de depreciación del capital.

La tasa de interés y la tasa de crecimiento de la situación de pre-crisis son el promedio del diferencial de la deuda pública y el crecimiento económico promedio desde 2008 a 2012. En lo que respecta a la situación de post-crisis, las proyecciones se basan en el boletín económico del Banco de España publicado en 2013 y en los estudios económicos y financieros mundiales de las proyecciones del Fondo Monetario Internacional para 2013 y 2014, ya anteriormente citados.

Resultados

Desempleo

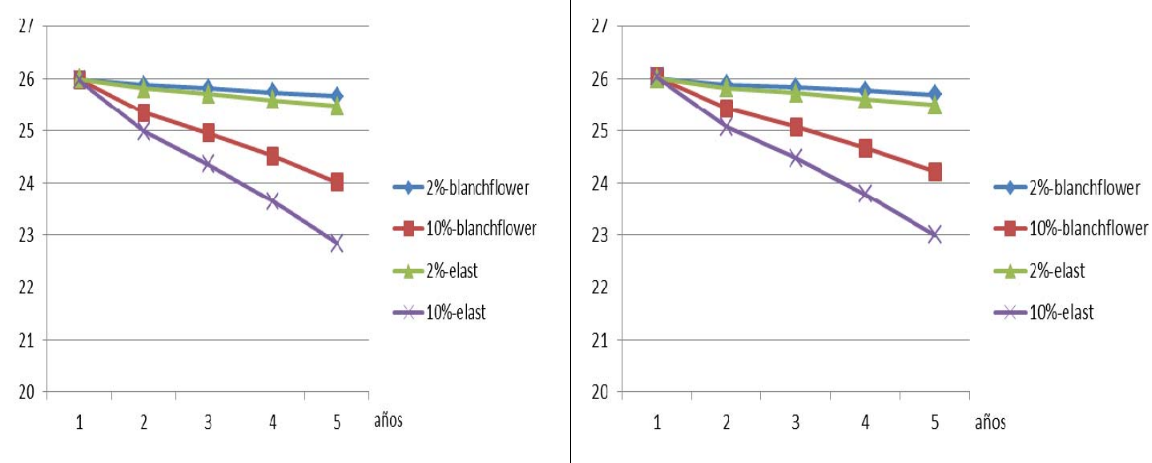
Dos tipos de elasticidades son usadas para analizar mejor la variación que se produce en los niveles de desempleo. Blanchflower y Oswald (1995) estiman una elasticidad de empleo en torno al 0.1%, por otro lado, también se asume una segunda elasticidad mucho más elástica (*elast*) de 0.001% que pueda reflejar mejor la actual situación de premura laboral.

Como se puede ver en la figura 3.4, el aumento del 2% en la llegada de turistas, tienen un impacto muy similar en la tasa de desempleo en los dos escenarios y con ambas elasticidades. En una situación de post-crisis, el efecto sobre el desempleo es muy pequeño. En el último año. la tasa de desempleo se reduce un 1,30% (25,74%) y un 2,03 % (25,.47%) para las elasticidades Blanchflower y *elast*. respectivamente. Esto significa la creación de alrededor de 76.651 y 119.948 nuevos empleos, respectivamente. En una situación de pre-crisis, la tasa de desempleo se reduce un 1,15% (25,70%) y 1,92 % (25,61%) en el quinto año. respectivamente. Esto significa la creación de alrededor de 67.807 y 113.208 nuevos empleos, respectivamente.

Con el efecto del 10% en la llegada de turistas, las diferencias en el desempleo son más acusadas. En una situación de post-crisis, en el último año, la tasa de desempleo se reduce 7,53% (24,04%) y 12,03% (22,87%) para las elasticidades *elast* y Blanchflower. respectivamente. Esto significa alrededor de 443.991 y 709.324 nuevos puestos de trabajo, respectivamente. Por otro lado, en una situación de pre-crisis, la tasa de desempleo se reduce un 6,84% (24,22%) y 11,50 % (23,01%) para el quinto año. respectivamente. Esto significa alrededor de 403.306 y 678.074 nuevos puestos de trabajo, respectivamente. En resumen, la llegada de turistas aquí asumidas no significa una fuerte reducción en la tasa de desempleo en ninguno de los escenarios, pero es un importante alivio sobre todo en el caso del 10%. El resto de los resultados del trabajo se basa en la elasticidad *elast*.

Figura 3.4: Ratio de desempleo para diferentes elasticidades (%)

Post-crisis	Pre-crisis



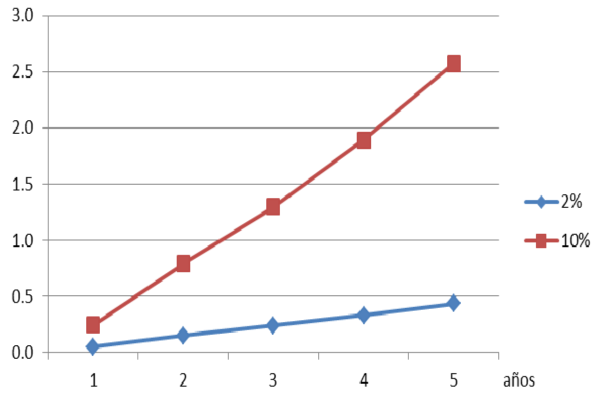
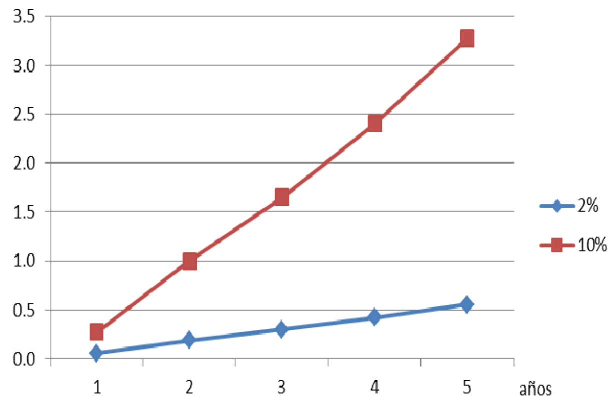
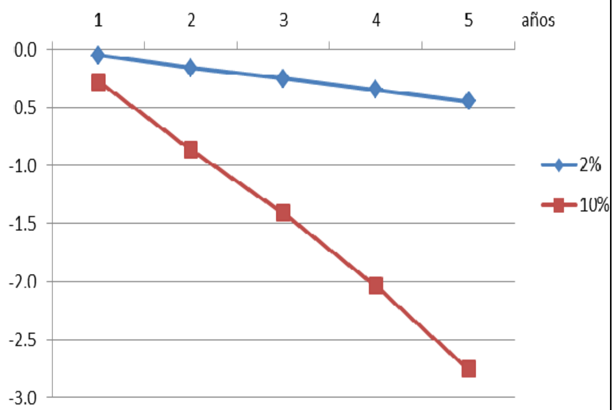
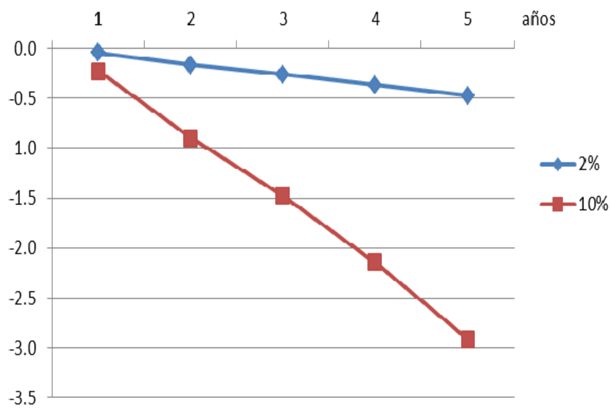
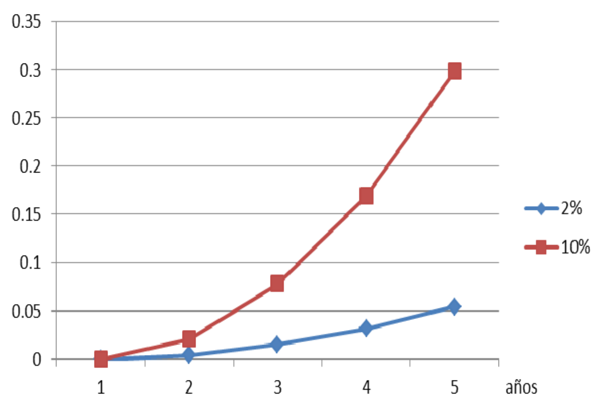
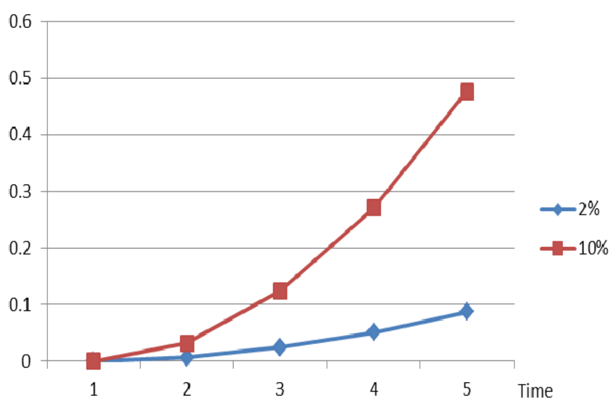
Valor añadido bruto real (VABR), déficit exterior y acumulación de capital

Según la figura 3.5 y centrados en la situación posterior a la crisis, el aumento del 2% en la llegada de turistas aumenta la VABR de 0,05 % en el primer año a 0,44 % en el quinto año. El impacto probable del 10 % en la llegada de turistas significa un fuerte fomento a la economía de un 0,25 % en el primer año a un 2,58 % en el quinto año. Durante los cinco años, el crecimiento acumulativo de la VABR es un 1,21 % y un 6,81 % para el impacto del 2 % y 10 %, respectivamente. En el caso del 2 % el déficit se reduce hasta el 0,06% en el primer año y hasta el 0,45 % en el último año. En el caso del 10 %, la reducción del déficit pasa de un 0,28% a un 2,75 % en el último año. Al final del quinto año, el déficit se acumula una reducción de alrededor de 1,27 % y 7,35 % para el choque de 2 % y 10 %, respectivamente.

Con respecto a la situación anterior a la crisis, el aumento de las llegadas de turistas en un 2% aumenta el VABR desde un 0,06 % en el primer año hasta un 0,55 % en el último año. Al igual que en el escenario posterior a la crisis, el impacto del 10% significa un fuerte fomento a la economía, que va desde 0,28 % en el primer año a un 3,28 % en el quinto año. Durante los cinco años, el crecimiento acumulativo de la VABR es del 1,53 % y del 8,63 % para los choques del 2 % y 10 %, respectivamente. Por otra parte, la mejora en el déficit por cuenta corriente es similar al cambio en VABR. En el caso del choque de 2 %, el déficit se reduce un 0,04% el primer año y un 0,48 % el último. Estos cambios en la cuenta corriente son un poco más bajos que en el escenario de post-crisis. En el caso del 10 %, la reducción del déficit pasa de 0,23 % a un 2,91 % en el último año. Al final del quinto año, el déficit acumula una reducción del 1,32 % y del 7,66 % para el choque de 2 % y 10 %, respectivamente.

El cambio en VABR debido al aumento de la llegada de turistas es significativo pero modesto para el choque del 2 % en ambos escenarios. Sin embargo, el choque poco probable de 10% produce un fuerte impulso a la economía. El aumento en las llegadas de turistas aumenta el tipo de cambio real que hace disminuir las exportaciones tradicionales y eleva las importaciones. El efecto general es una reducción del déficit. Este resultado está de acuerdo con Adams y Parmenter (1995), Copeland (1991) or Narayan (2004) . Esta mejora general en los términos de intercambio es especialmente útil en la situación económica actual en España en el que el país tiene un alto endeudamiento exterior generado durante el boom económico. En resumen, el aumento de VABR prueba que el turismo es capaz de promover el crecimiento económico a pesar de la menor utilización tecnológica. Por otra parte, el turismo también aumenta la acumulación de capital (gráfico 3.5), pero en tasas moderadas que refuerza la conclusión de Capó et al. (2007) acerca de las bajas ganancias de productividad generados por el turismo en el largo plazo.

Figura 3.5: Cambio en el valor añadido bruto real, deficit exterior y acumulación de capital (%)

Post-crisis	Pre-crisis
Valor añadido bruto real	Valor añadido bruto real
	
Déficit por cuenta corriente	Déficit por cuenta corriente
	
Acumulación de Capital	Acumulación de Capital
	

Ganadores y perdedores: “la enfermedad holandesa"

Desde una perspectiva macroeconómica, el efecto positivo de las llegadas de turistas en la economía ya se ha puesto de manifiesto en los apartados anteriores. Sin embargo, a nivel sectorial, el impacto del turismo tiene efectos diversos en función de los bienes producidos o los servicios prestados, lo que en último término produce una reasignación de recursos entre los sectores económicos. Más concretamente, el turismo tiene dos impactos notables sobre la economía: aumenta la demanda de bienes no transables y. al mismo tiempo, aumenta la tasa de cambio que socava la competitividad exterior de las exportaciones tradicionales. Estos resultados pueden ser vistos como una consecuencia general de la "enfermedad holandesa". El término "enfermedad holandesa" fue utilizado por primera vez por la revista "The Economist" en 1977 para explicar el efecto del petróleo descubierto en los años sesenta en el Mar del Norte en la economía holandesa. Corden y Neary (1982) y Corden (1984) son los primeros que modelan dicho enfermedad en términos académicos. Estos trabajos diferencian tres tipos de sectores: sector en auge, sector rezagado y sector no transable. El sector en auge comienza a producir y exportar con fuerza con lo cual comienza a demandar trabajadores de otros sectores (sectores rezagados y los sectores no transables) para mantener la producción (efecto de recursos). Al mismo tiempo, la renta generada por el sector en auge aumenta el tipo de cambio real que erosiona la competitividad exterior de las exportaciones tradicionales, y, junto con el aumento en la demanda de bienes no transables producidos por los ingresos generados, produce el efecto gasto. Este aumento de los bienes no transables también aumenta la demanda de trabajadores y capital a costa del sector rezagado (otro efecto recurso). Como resultado, se produce una desindustrialización del sector rezagado, un fuerte aumento de los precios internos y en el intercambio real que, en último término, hace tambalear la competitividad y se contrae la economía.

La enfermedad holandesa ha sido tradicionalmente asociada a las exportaciones de petróleo de países como Arabia Saudita. Qatar. Venezuela o Noruega. Gran parte de ellos evitan cambiar la mayor parte de los ingresos obtenidos por sus exportaciones de petróleo a la moneda local para prevenirse de la enfermedad holandesa. Sin embargo, esta enfermedad económica puede generalizarse a cualquier situación en la que un país comienza a recibir una cantidad importante de dinero extranjero que desencadenan las consecuencias explicadas en el párrafo anterior. Por ejemplo. Laplagne et al. (2001), Usui (1996), VanWijnbergen (1986) y White (1992) muestran cómo los países en desarrollo pueden sufrir de esta enfermedad gracias a la ayuda externa recibida.

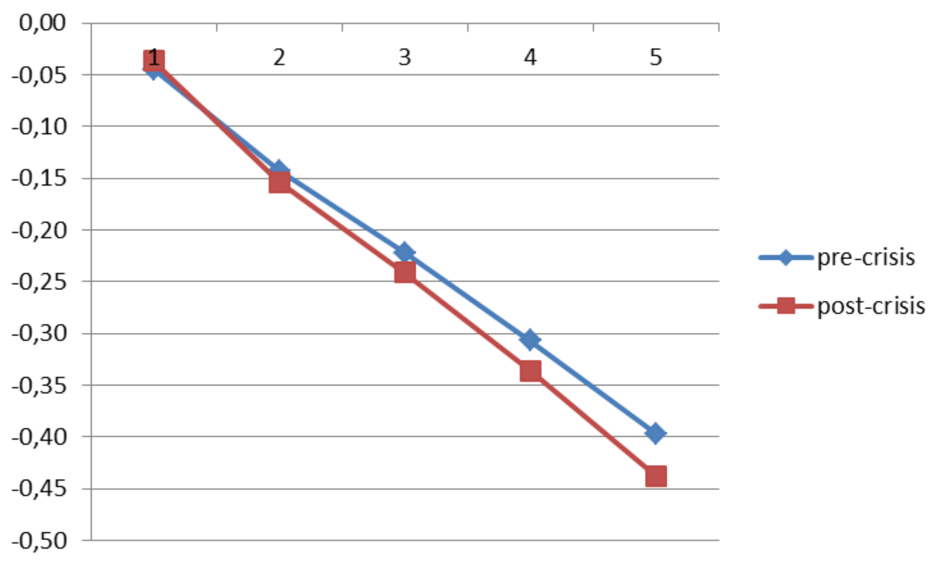
Wijnbergen (1984) argumenta que la connotación negativa del término "enfermedad holandesa” no debe ocultar una teoría del comercio importante detrás de dicho efecto por el cual una economía tiende a producir aquellos bienes que requieren un uso intensivo del factor más abundante en el país (teoría del comercio de Heckscher-Ohlin). Según Roca (1998), el diagnóstico de la enfermedad holandesa se puede comprobar atendiendo a cuatro hipótesis: la apreciación del tipo de cambio real, el descenso de las exportaciones del sector rezagado, la disminución de la producción del sector rezagado y un probable aumento de la producción de los sectores no transables. Las dos primeras hipótesis forman el efecto gasto y las dos últimas, el efecto recurso. Además, una quinta hipótesis debe ser añadido en lo que respecta a los objetivos de este artículo: el probable aumento del empleo en los sectores en auge y no transables y los probables respectivos descensos en los sectores rezagados (situación en la que unos ganan y otros pierden).

Efecto gasto

- Apreciación del tipo de cambio real

Como se muestra en la figura 3.6, el incremento del 2% en la llegada de turistas aprecia el tipo de cambio real casi 0,4% y un 0,45% en el quinto año en ambos escenarios, respectivamente.

Figura 3.6: cambio en el tipo de cambio real (%)



- Disminución de las exportaciones de los sectores rezagados

Los sectores rezagados están asociados con la agricultura, la energía y la minería y la industria. Como se muestra en la tabla 3.1, las exportaciones en los sectores rezagados disminuyen en ambos escenarios, a pesar de la alta tasa de desempleo. La apreciación del tipo de cambio real y la menor intensidad en el uso de mano de obra de estas actividades, supera el efecto positivo de los salarios más bajos debido a la alta tasa de desempleo. La disminución de las exportaciones tradicionales es especialmente considerable en el lado turístico de estos sectores y, más precisamente, en los productos básicos agrícolas con una caída de 7,52% y 7,93% en el último año en los escenarios de post-crisis y pre-crisis, respectivamente. Las exportaciones de los sectores rezagados representan el 70% aproximadamente de las exportaciones totales en España. Por lo tanto, cualquier impacto negativo en ellos afectará gravemente a la cuenta corriente.

Tabla 3.1: cambio en las exportaciones en los sectores rezagados (%)

		Post-crisis				
bien\año		**1**	**2**	**3**	**4**	**5**
Agricultura	**t**	-1,68	-3,08	-4,58	-6,06	-7,52
	nt	-0,50	-0,80	-1,19	-1,58	-1,95
Energía and minería	**t**	-	-	-	-	-
	nt	-0,45	-0,70	-1,04	-1,37	-1,70
Industria	**t**	-0,65	-1,11	-1,65	-2,19	-2,71
	nt	-0,24	-0,31	-0,44	-0,57	-0,70
		Pre-crisis				
		1	**2**	**3**	**4**	**5**
Agricultura	**t**	-1,87	-3,27	-4,86	-6,41	-7,93
	nt	-0,65	-0,95	-1,41	-1,86	-2,29
Energía and minería	**t**	-	-	-	-	-
	nt	-0,56	-0,77	-1,14	-1,49	-1,83
Industria	**t**	-0,70	-1,10	-1,62	-2,13	-2,63
	nt	-0,29	-0,29	-0,42	-0,53	-0,62

Efecto recurso

- Disminución de la producción en el sector rezagado

La producción en el sector rezagado (la agricultura. la energía y la minería y la industria) caen ligeramente durante los cinco años en ambos escenarios como se muestra en la tabla 3.2. El mayor descenso se produce en "energía y minería" en ambos escenarios. Por lo tanto, no se logra alcanzar el equilibrio en el que todos ganan (sectores transables y no transables) como se mostraba en el modelo TNT-T.

Tabla 3.2: Cambio en la producción del sector rezagado (%)

	Post-crisis				
Sector\año	**1**	**2**	**3**	**4**	**5**
Agricultura	-0,24	-0,35	-0,53	-0,69	-0.85
Energía and minería	-0,31	-0,48	-0,72	-0,95	-1,18
Industria	-0,16	-0,20	-0,29	-0,38	-0,46
	Pre-crisis				
	1	**2**	**3**	**4**	**5**
Agricultura	-0,31	-0,40	-0,58	-0,76	-0,93
Energía and minería	-0,37	-0,52	-0,77	-1,01	-1,25
Industria	-0,19	-0,18	-0,26	-0,33	-0,39

- Un aumento de la producción en los sectores no transables

Como puede apreciarse en la tabla 3.3, las salidas por actividades aumentan en el sector en auge (B) y en los sectores no transables (N) en ambos escenarios. El sector del alojamiento, el sector del transporte aéreo y el sector de agencias de viajes son los más beneficiados de las llegadas de turistas, con un aumento de 5,29%, 3,01% y 14,67% en el escenario posterior a la crisis y del 5,26%, 3,14% y 13,04% en el previo a la crisis para el quinto año, respectivamente. Este resultado está en línea con el modelo TNT-T por el cual la demanda turística aumenta la demanda agregada hacia los bienes no transables.

Tabla 3.3: Cambio en la producción en los sectores en auge ay no-transables (%)

	Post-crisis				
Sector\año	**1**	**2**	**3**	**4**	**5**
Construcción(N)	0,07	0,19	0,30	0,42	0,55
Comercio(B)	0,01	0,13	0,20	0,28	0,36
Alojamiento(ByN)	0,99	2,06	3,12	4,20	5,29
Restauración(ByN)	0,22	0,56	0,86	1,17	1,49
Transporte por ferrocarril(B)	0,49	1,08	1,63	2,20	2,78
Transporte por carretera(B)	0,04	0,19	0,29	0,41	0,53
Transporte marítimo(B)	0,07	0,27	0,41	0,56	0,72
Transporte aéreo(B)	0,54	1,18	1,78	2,39	3,01
Otros servicios de	-0,01	0,09	0,14	0,20	0,27
Agencias de viaje(ByN)	2,67	5,35	8,08	10,85	13,65
Inmobiliaria(ByN)	0,03	0,17	0,26	0,36	0,47
Alquiler de coche(ByN)	0,13	0,36	0,55	0,75	0,96
Entretenimiento(ByN)	0,08	0,25	0,38	0,52	0,67
	Pre-crisis				
	1	**2**	**3**	**4**	**5**
Construcción(N)	0,07	0,23	0,37	0,51	0,67
Comercio(B)	-0,01	0,16	0,26	0,36	0,48
Alojamiento(ByN)	0,96	2,04	3,09	4,17	5,26
Restauración(ByN)	0,20	0,59	0,91	1,24	1,59
Transporte por ferrocarril(B)	0,47	1,09	1,65	2,23	2,83
Transporte por carretera(B)	0,01	0,20	0,32	0,44	0,59
Transporte marítimo(B)	0,02	0,24	0,38	0,52	0,68
Transporte aéreo(B)	0,53	1,22	1,85	2,49	3,14
Otros servicios de	-0,05	0,09	0,16	0,23	0,32
Agencias de viaje(ByN)	2,56	5,12	7,72	10,36	13,04
Inmobiliaria(ByN)	0,01	0,21	0,32	0,45	0,59
Alquiler de coche(ByN)	0,11	0,37	0,57	0,78	1,00
Entretenimiento(ByN)	0,07	0,29	0,45	0,62	0,81

- Un probable incremento / disminución del empleo en el sector en auge y no-transable / sector rezagado.

Los sectores rezagados (L) reducen la tasa de empleo a pesar de la alta tasa de desempleo y el aumento de las llegadas de turistas, con la excepción de la industria que aumenta el empleo del segundo al quinto año en ambos escenarios. Por otro parte, los sectores en auge y no transables aumentan su demanda de mano de obra. Los sectores más beneficiados de la alta tasa de desempleo son el alojamiento, los servicios de restauración, el transporte ferroviario, el transporte aéreo y las agencias de viajes que aumentan su demanda de trabajadores un 6,12%, 2,33%, 3,45%, 3,8% y el 14,67% en la situación posterior a la crisis y un 6,28%, 2,64%, 3,65%, 4,12% y 14.31% en la situación anterior a la crisis, respectivamente.

Tal vez, y dando por sentada la apreciación del tipo de cambio real, un aumento mayor en el proceso de acumulación de capital podría permitir a los sectores rezagados absorber dicho capital y. en consecuencia, también aumentar su demanda de empleo. Desafortunadamente, el sector turístico no parece proporcionar tal aumento en la acumulación de capital.

Para concluir, en este mundo en constante cambio, la relación entre el turismo y el crecimiento económico es tan difusa y compleja que cualquier conclusión en este respecto debe tomarse con cautela. Por ejemplo, la llegada de Internet y las nuevas tecnologías ha convertido algunos bienes no transables en transables; tales como servicios de contabilidad. Países como la India ya están tomando ventaja de esta nueva situación. Estos cambios constantes e imprevistos harán reconsiderar muchas teorías y conclusiones asentadas previamente en la disciplina. Teniendo esto en cuenta y con base en los supuestos y proyecciones establecidos en este documento, se puede afirma que el turismo proporciona crecimiento económico, reduce la tasa de desempleo, mejora de los términos de intercambio y aumenta la demanda interna en el medio plazo en España. El efecto sobre las variables macroeconómicas varía en intensidad. Para los países altamente endeudados como España, la mejora en el déficit por cuenta corriente es muy beneficiosa en el corto y medio plazo. El efecto sobre el valor añadido bruto real y el empleo también es positivo. No obstante, el efecto sobre el desempleo es un pequeño alivio en lugar de una solución. Las llegadas de turistas tienen un doble efecto sobre la demanda interna. Por un lado, la demanda interna crece en su lado no-turístico debido al aumento en la demanda de empleo. Por otro lado, el lado turístico de la demanda interna se reduce debido a la subida de los precios internos producidos por las llegadas de turistas.

No obstante, a nivel microeconómico, los efectos positivos del sector turístico no son tan claros y positivos como a nivel macroeconómico. La llegada de turismo promueve fuertemente la apreciación del tipo de cambio real que erosiona las ventajas potenciales de la existencia de una alta tasa de desempleo y la acumulación de capital generados por el turismo. Por lo tanto, el crecimiento basado en el turismo socava sectores tradicionales como la agricultura, la energía y la minería; y la industria en una clara consecuencia de la enfermedad holandesa a pesar de que la economía está lejos de su frontera de posibilidades de producción.

Capítulo 4: el rol del clima en la decisión del destino turístico

Introdución y objetivos

La elección de destino es el último paso en un proceso de toma de decisiones complejas en las que dos tipos de variables explicativas tiene que ser combinadas: los relacionados con las características individuales (también conocido como variables invariantes con la elección) y las características de destino (variables variantes con la elección). En lo que respecta a esta última, el éxito de un destino turístico depende de muchas características. Entre ellos, el clima es uno de los factores más importantes (De Freitas, 2003). Para algunos destinos, como los basados en el sol y playa, la fiabilidad en el clima es tan importante que las condiciones climáticas son vitales (Capó, Riera y Rosselló, 2007), especialmente cuando dichos destinos se basan en actividades al aire libre (ciclismo. pesca o caminar), mientras que para otros destinos que esto se considera como un activo complementario (Gómez-Martín, 2005). En este sentido, el cambio climático puede jugar un papel importante a la hora de cambiar los flujos turísticos actuales haciendo más cálido y por tanto más apetecibles destinos que ahora no lo son. Sin embargo, un destino turístico se basa también en otros atributos más allá de la dotación de clima que no puede dejarse de lado. Uno de ellos es el nivel de desarrollo social y económico del país, que también es percibido positivamente por los turistas (tabla 4.1). Para los políticos, la comprensión y la gestión tanto del clima y los factores socioeconómicos son fundamentales para convertirse en un destino turístico exitoso.

Tabla 4.1: Los diez países más visitados del mundo

	Millones de llegadas	Ranking PIB(PPA) per cápita	Ïndice de desarrollo humano
Francia	83	24º	Muy alto
Estados Unidos de América	67	6º	Muy alto
China	57.7	93º	Medio
Spain	57.7	29º	Muy alto
Italy	46.4	30º	Muy alto
Turkey	35.7	68º	Alto
Germany	30.4	17º	Muy alto
United	29.3	21º	Muy alto
Russian	25.7	58º	Alto
Malaisia	25	59º	Alto

Fuente: Organización Mundial del Turismo. Fondo Monetario Internacional y Naciones Unidas.

Por otra parte, la forma en que un turista percibe los atributos de destino también está condicionada por las características individuales de la región de residencia. La distancia es una de estas variables que no es igualmente percibido por los individuos. Curiosamente, no hay consenso en la literatura a si afecta positivamente o no a la elección de destino. Para algunos autores, la distancia es vista como una restricción para el individuo (Taylor y Knudson, 1976). Por el contrario, para algunos otros se percibe como una fuente de utilidad en sí mismo (Baxter, 1979). Pero tal vez, las variables de la región de residencia más condicionadas es el clima. Para los turistas en las regiones frías, el clima en el destino es visto como un factor de empuje (turistas de regiones más frías tienden a viajar a regiones más cálidas). Por el contrario, el clima también puede actuar como un factor de atracción para los turistas en regiones más cálidas que tienden a viajar a nivel doméstico (Eugenio-Martín y Campos-Soria, 2010). Al mismo tiempo, los turistas de regiones más frías pueden estar dispuestos a aceptar condiciones de clima en destino más bajas en contraste con las regiones más cálidas. Este tipo de asimetrías en las percepciones del clima tienen que ser abordados de manera adecuada con el fin de explicar la elección de destino de los individuos. Hasta ahora, la literatura no ha sido muy prolífica en temas de clima y la elección de destino. La elección de destino se ha basado principalmente en datos agregados (Bigano, Lize y Tol, 2006a; o Madison, 2001) sin analizar las diferencias en las percepciones del clima que ocurre a nivel individual. Por el contrario, los que lo hacen se centran en unos pocos destinos o regiones (Bujosa y Rosselló, 2013; Nicolau y Más, 2006). Así, el proceso de elección de destino no se ha abordado aún teniendo en cuenta una serie más amplia de destinos y combinando variables individuales y del destino.

En este trabajo se estima un modelo logit con parámetro aleatorios (logit mixto), donde la asunción de parámetros aleatorios individuales permite una visión mejor y más precisa en la percepción individual de las condiciones climáticas. Al mismo tiempo, los atributos individuales y de destino se combinan en el mismo marco con el fin de elegir un destino de sol y playa.

Logit mixto

De acuerdo a Fiebig, Keane, Louviere and Wasi (2009), un modelo logit mixto es un caso especial de un modelo nultinomial generalizado (ecuación (1.a)).

$$U_{ij} = \beta_i x_{ij} + \varepsilon_{ij}\,; \quad \varepsilon_{ij} \sim iid \qquad (1.a)$$

Donde U_{ij} representa la utilidad del individuo i por elegir la alternativa j. Asimismo ahora cada individuo tiene su propio parámetro aleatorio β_i que varía de acuerdo a la ecuación (1.b), donde β es un vector de pesos de cada atributo en la utilidad. η_i representa la heterogeneidad individual, σ_i es conocido como un factor de escala y γ es un parámetro que toma valores entre 0 y 1.

$$\beta_i = \beta\sigma_i + \gamma\eta_i + (1-\gamma)\sigma_i\eta_i\,; \quad \eta_i \sim N(0,1) \qquad (1.b)$$

Si γ=0 y $\sigma_i = \sigma$, el modelo colapsa a un logit mixto (ecuación (2.a)) y el parámetro aleatorio se distribuye de acuerdo a la ecuación (2.b).

$$U_{ij} = \beta_i x_{ij} + \varepsilon_{ij}\,; \quad \varepsilon_{ij} \sim iid \qquad (2.a)$$

$$\beta_i = \beta + \eta_i \qquad (2.b)$$

El modelo logit mixto puede igualmente incluir correlación entre los parámetros aleatorios (Hensher. Rose & Greene. 2005) (ecuación 2.c). La correlación entre los parámetros aleatorios se captura asumiendo valores distintos de cero fuera de la diagonal principal de la variable Γ. Por tanto, la desviación típica ya no es independiente.

$$\beta_i = \beta + \Gamma\eta_i\,; \quad \text{var}\left[\beta_i \mid x_i\right] = \Sigma = \Gamma\Gamma'\,; \quad \eta_i \sim N(0,1) \qquad (2.c)$$

η_i se distribuye de acuerdo a una distribución normal si bien otro tipo de distribuciones pueden ser igualmente asumidas.

En lo que respecta a los modelos de elección de destino, los modelos logit mixtos cumplen los requisitos necesarios para capturar mejor las características asimétricas de los individuos. La ecuación (2.c) permite capturar la heterogeneidad individual de los atributos climáticos (β_i), la correlación entre dichos atributos (Γ) y la parte más estocástica, y difícilmente anticipable, de los mismos (η_i).

En el ámbito de la elección de destino, los modelos logit mixtos han sido aplicados por Bujosa y Rosselló (2013) y Nicolau y Más (2006).

Resultados y conclusiones

Dos modelos son estimados en este artículo. Las principales diferencias entre ambos se muestran en la siguiente tabla.

Tabla 4.2. Variables explicativas

Parámetros aleatorios:	
Precipitationes (mm)	$\beta_{prec} = \beta_{prec}^{media} + \Gamma \eta_i$
Temperatura (ºC)	$\beta_{temp} = \beta_{temp}^{media} + \beta_{temp}^{origen} temperatura_{origen} + \Gamma \eta_i$
Temperatura al cuadrado	$\beta_{temp2} = \beta_{temp2}^{media} + \beta_{temp2}^{origen} temperatura \wedge 2_{origen} + \Gamma \eta_i$
Distancia(miles del kilómetros)	$\beta_{dist} = \beta_{dist}^{media} + \beta_{ingreso} \log(ingreso_{origen}) + \Gamma \eta_i$
Parámetros no aleatorios:	
Carreteras pavimantadas	% del total de carreteras en el destino
Esperanza de vida	Esperanza de vida en el destino
Educación secundaria	Años de educación secundaria alcanzada en el destino
Ratio_ppp	Ratio de la paridad del poder adquisitivo entre destino y origen

De acuerdo con la tabla 4.2, el modelo permite que los parámetros que acompañan a las variables de clima (temperatura y precipitaciones) varíen para cada individuo, a su vez, la temperatura y la temperatura al cuadrado en destino varía en media respecto a sus respectivas contrapartes en origen. La distancia varía en media respecto al logaritmo del ingreso. Las precipitaciones y la distancia asumen una relación lineal con la utilidad en vez de una no lineal como es el caso de la temperatura. El resto de variables explicativas se asumen como no aleatorias en sus parámetros.

Tabla 4.3. Variables determinants en la elección del destino

	Modelo	
	Parámetro	Dev. típica
Parámetros aleatorios:		
Precipitaciones	-0.02484***	0.00110
Temperatura	2.43831***	0.09074
Temperatura^2	-0.09977***	0.00308
Distancia	-7.12421***	0.20619
Parámetros no aleatorios:		
Carreteras pavimentadas	0.01732***	0.00095
Educación secundaria	0.01832***	0.00229
Esperanza de vida	0.11228***	0.00847
Ratio ppp	-0.06550***	0.00202
Heterogeneidad en media:		
Temperatura: temperatura en origen	0.14276***	0.00403
Temperatura^2: (temperatura en origen)^2	-0.45548D-4***	0.2911D-05
Distancia: Log(ingreso)	0.76293***	0.02648

Tabla 4.3(continuación). Variables determinants en la elección del destino

	Modelo	
	Parámetros	Dev. Típica
Valores diagonal principal matriz de cholesky:		
Dev. Típica precipitaciones	0.01632***	0.00073
Dev. Típica temperature	0.62423***	0.06736
Dev. Típica temperatura^2	0.01162***	0.00093
Dev. Típica distancia	0.92091***	0.02336
Valores fuera de la diagonal matriz de cholesky :		
Cov(temperatura, precipitaciones)	-0.01920***	0.00122
Cov(temperatura^2,precipitaciones)	-0.74488D-4***	0.1896D-04
Cov(temperatura^2, temperatura)	0.00459***	0.00152
Cov(distancia, precipitaciones)	-0.00231***	0.00030
Cov(distancia, temperatura)	0.20065***	0.2440
Cov(distancia, temperatura^2)	0.98583***	0.00059
Dev. Típica de los parámetros aleatorios		
Precipitaciones	0.01632***	0.00073
Temperatura	1.33174***	0.05757
Temperatura^2	0.02025***	0.00147
Distancia	0.98583***	0.2200
Mc fadden pseudo R-cuadrado:	0.2966	
AIC	32,312	
Log function de verosimilitud	-16,135.267	

La tabla 4.3 muestra el resultado del modelo. Todas las variables explicativas tienen el signo esperado y son altamente significativas. Por otra parte, las desviaciones estándar de los parámetros aleatorios son también altamente significativas lo que refuerza la suposición de parámetro aleatorio para estas variables. Las precipitaciones en destino afectan negativamente a la utilidad individual (-0.02484). Por otro lado, la temperatura en destino afecta positivamente la utilidad individual (2.43831) y este efecto se incrementa por la temperatura en origen (0.14276). En otras palabras, los turistas de regiones cálidas prefieren temperatura cálida en destino. No obstante, la temperatura al cuadrado supone un punto de cambio en el efecto creciente de la utilidad antes aumentos de la temperature en el destino. Bajo estas circunstancias, los turistas tenderán a viajar domésticamente cuando la temperatura en el destino esté por encima de la temperatura optima, a partir de dicho punto la utilidad en el destino decrecerá. Si las regiones frías actuales se calientan debido al cambio climático, los habitantes de estas regiones serán más sensibles a la temperatura como lo son los de las regiones cálidas actuales. Esta relación coincide con otros hallazgos de autores tales como Bigano et al. (2006a), aunque ellos reducen el efecto asimétrico a la temperatura al cuadrado.

Como ya se explicó en la sección anterior, la desviación estándar ya no es independiente debido a las correlaciones asumidas entre los parámetros aleatorios. Por lo tanto, cuanto mayor sea la covarianza, mayor será la relación entre los parámetros. En el caso de las precipitaciones, la parte de la desviación estándar total explicada por sí misma es 0,01632, el resto de la desviación estándar total se explica por la interacción con la temperatura (-0,01920), la temperatura al cuadrado (-0,074488D-4) y la distancia (-0,00231). En el caso de la precipitación y la temperatura, esta desviación estándar significa que los individuos con sensibilidades más grandes a las precipitaciones son menos sensibles a la temperatura. En el caso de la temperatura y la distancia, los turistas con sensibilidades más grandes a la temperatura no están tan preocupados por la distancia en su función de utilidad, hasta un punto de inflexión (temperatura óptima) en el que a mayor distancia la utilidad decrece a pesar de temperaturas más altas. Precipitaciones y distancia muestran una relación negativa. Los individuos que le dan mucha importancia a las precipitaciones no suelen estar tan preocupados por la distancia. La relación negativa entre la distancia y temperatura refuerza la hipótesis de Von Thünen (1826) por la cual la gente está dispuesta a asumir mayores distancias con el fin de disfrutar de mayores rentas de situación (mejores condiciones climáticas en destino). La relación entre la distancia, temperatura y las precipitaciones también está en conformidad con Nicolau y Más (2006).

Como puede verse también en ambos modelos, variables como las carreteras pavimentadas, la educación secundaria, la esperanza de vida y ppp_rate reflejan que los turistas prefieren los países más desarrollados, pero, al mismo tiempo, más barato que sus regiones de residencia. Estos resultados son importantes para los políticos porque, a diferencia de las variables climáticas, el destino puede actuar sobre estas variables con el fin de atraer turismo (Eugenio-Martín. Martín Morales y Sinclair, 2008).

La tabla 4.4, muestra los cambios que se producirían en la elección del destino ante cambios en la temperatura porjectados por el panel intergubernamental sobre cambio climático (2007). De acuerdo al escenario A, ante un aumento de 1.8ºC en los dos principales países emisores de turistas (Reino Unido y Gran Bretaña), todos los principales destinos turísticos actuales verían decrecer su entrada de turistas. Por ejemplo, Francia y España verían decrecer su flujo de turistas en un 5.76% y un 6.70% respectivamente. Analizando el escenario B, esto es, suponiendo una aumento general de 1.8ºC, todos los principales destinos turísticos verían aumentar su flujo de turistas, si bien el Reino Unido y Alemania serían los más beneficiados.

Tabla 4.4. Cambios en la elección de los principales destinos ante cambios en la temperatura

		Escenario A: +1.8 ºC en Reino Unido y Alemania	Escenario B: +1.8 ºC en todos los destinos
	Flujos iniciales (%)	Cambio en los flujos (%)	Cambio en los flujos (%)
Croacia	1.88	-1.77	0.76
Chipre	2.67	-1.01	0.93
Francia	7.56	-5.76	4.96
Grecia	10.09	-4.94	0.40
Italia	8.04	-7.78	2.96
Malta	4.39	-3.17	1.15
Oriente medio	2.59	-1.47	2.52
Portugal	4.31	-2.82	1.84
España	9.46	-6.70	1.05
Reino Unido	6.89	24.99	7.07
Alemania	6.52	36.81	6.55

El modelado de la elección de destino es un reto. Todas las metodologías tienen sus pros y sus contras, pero, por lo que sabemos, los modelos logit mixtos son probablemente los que mejor se ajusten al modelado de la elección de destino ya que combina atributos tanto de origen como de destino. Las percepciones asimétricas del clima por parte de los turistas han sido probadas y confirmadas. Los individuos de regiones frías están más dispuestos a viajar a regiones más cálidas. El cambio climático puede suponer un cambio en este patrón turístico ya que las regiones actualmente más frías verán aumentar su flujo turístico al aumentar su temperatura media por el impacto del calentamiento global.

Atributos relacionados con el nivel de desarrollo (carreteras pavimentadas, año de la educación o la esperanza de vida) son percibidos positivamente por el turista. Estas variables son más manejables por los políticos a pesar de los "ingresos" vienen en el largo plazo. Este resultado demuestra que los destinos de sol y playa son más que las dotaciones ambientales. Por lo tanto, el crecimiento impulsado por el turismo puede requerir un cierto nivel de desarrollo económico para aprovecharse realmente de ella.

Como se mencionó en el documento, la forma en que el clima está incluido en los modelos de demanda turísticos carece a menudo de una representación adecuada. Ni los datos agregados, ni los índices climáticos actuales captan adecuadamente el efecto climático. Tan pronto como la sociedad tome más conciencia por el impacto del clima y el medio ambiente, más micro datos estarán disponibles. A pesar de ello, se espera que los datos agregados sigan manteniendo una posición destacada en la investigación turística. Bajo estas circunstancias, el desarrollo de un índice de clima turístico basado en ponderaciones objetivas y de preferencias declaradas ayudará a tener una visión más precisa de la respuesta de los turistas al clima. En consecuencia, el uso de este índice climático como variable en los datos macro también ayudará a capturar mejor el impacto del cambio climático.

Annex. Codes

Stata code (chapter 1)

```
*endogeneity:

*haussman

reg exporigin incomemonth $trime $ano $pais $pa $pal $destino $people $party veces_total $why2  if nights<31, noconstant

predict prexorigin

predict resorigin, residual


reg expisland prexorigin resorigin incomemonth $trime $pais $pa $pal $destino $people $party $why2 veces_total if nights<31, noconstant

reg expisland incomemonth $trime $ano $pais $pa $pal $destino $people $party veces_total $why2  if nights<31, noconstant

predict prexpisland

predict resisland, residual

reg exporigin prexpisland resisland incomemonth $trime $ano  $pais $pa $pal $destino $people $party veces_total if nights<31, noconstant

*residuals correlations:

corr  resisland resorigin

corr  resorigin resisland
```

```
reg exporigin incomemonth $trime $ano $pais $pa $pal $destino $people $party veces_total  if nights<31, noconstant

predict resorigin1, residual

reg expisland incomemonth $trime $pais $pa $pal $destino $people $party veces_total $why2  if nights<31, noconstant

predict resisland1, residual

corr  resorigin1 resisland1

sureg (exporigin expisland incomemonth $trime $ano $pais $pa $pal $destino $people $party veces_total, noconstant) (expisland exporigin incomemonth $trime $pais $pa $pal $destino $people $party $why2 veces_total, noconstant) if nights<=31, corr


*heterokedasticity:

* separated models:

reg exporigin expisland incomemonth $trime $ano  $pais $pa $pal $destino $people $party veces_total if nights<31

estat hett

reg expisland exporigin incomemonth $trime $pais $pa $pal $destino $people $party $why2 veces_total if nights<31

estat hett

* reg3 : "the model"

reg3 (exporigin expisland incomemonth $trime $ano $pais $pa $pal $destino $people $party veces_total, noconstant) (expisland exporigin incomemonth $trime $pais $pa $pal $destino $people $party $why2 veces_total, noconstant) if nights<=31

* Residuals: heterokedasticity test
```

```
lmhreg3

*the model

* reg3 : "El modelo con todas las variables"

set more off

reg3 (exporigin expisland incomemonth $trime $ano $pais $pa $pal $destino $people $party veces_total, noconstant) (expisland exporigin incomemonth $trime $pais $pa $pal $destino $people $party $why2 veces_total, noconstant) if nights<=31

* Estimation controling by heteroskedasticity (GMM)

gmm(eq1: exporigin -{xb: expisland incomemonth $pa $pal  $trime $pais $ano $destino $people $party veces_total}) (eq2:expisland -{xc:exporigin incomemonth $trime $pais $pa $pal $people $party $why2 $destino veces_total}) if nights<=31, instruments(eq1: incomemonth $pa $pal  $trime $pais $ano $destino $people $party veces_total) instruments(eq2:incomemonth $trime $pais $pa $pal $people $party $why2 $destino veces_total) winitial(unadjusted,independent) wmatrix(robust) twostep
```

Stata code (chapter 2)

```
gsem  ///
($employmenth education gender age age2  gdppcpps2009 growth climate L@1    -> cutback,probit)          ///
(2.howcutback1 <-  age   climate  coast airport   L@X  ,  mlogit)             ///  Reduced length
(3.howcutback1 <-  age   climate  coast airport   L@X  ,  mlogit)             ///  Cheaper transport
(4.howcutback1 <-  age   climate  coast airport   L@X   ,  mlogit)             ///  Cheaper accommodation
(5.howcutback1 <-  age   climate  coast airport   L@X  ,  mlogit)             ///  Closer to home
(6.howcutback1 <-  age   climate  coast airport   L@X  ,  mlogit),            ///  Period of travel
 startvalues(iv) startgrid(.1 1 10) var(L@1) noconstant
```

Recursive-dynamic CGE code (chapter 3)

```
$ontext

$model:blovifis

$sectors:
     tourism(time)          ! tourist consumption (non-resident)
     actv(a,time)           ! sectoral production
     y(c,tnt,time)          ! sypply of goods (domestic and export)
     resident(time)         ! resident demand
     gov(time)              ! government demand
     invest(time)           ! investment demand
     arm(c,tnt,time)        ! armington supply

$commodities:
    pactv(c,tnt,time)       ! activity price
     pd(c,tnt,time)         ! domestic price
     pfx(time)              ! foreign exchange
     pa(c,tnt,time)         ! armington price
     pfactor(jt,time)       ! factor price
     ph(time)               ! resident prices
     pg(time)               ! government price
     pinv(time)             ! investment price
     pt(time)               ! tourist price (non-resident)
$consumers:
     household(time)        ! resident
      government(time)      ! government
      enterprises(time)     ! enterprises
      tourist (time)        ! non-resident

$auxiliary:
      unemployment(time)    ! unemployment rate
```

```
    dtax(time)                  ! direct taxes
    capital(jh,time)            ! capital accumulation
    fsav(jh,time)               ! foreign saving
    capflow(jh,time)            ! capital flow


$PROD:y(c,tnt,time)    T:elastprod(c,tnt)

  o:pfx(time)            q:export_bp(c,tnt)  p:pexport0(c,tnt) a:government  t:taxexport(c,tnt)
  o:pd(c,tnt,time)       q:((sum(a,prod_bp(c,tnt,a))-sum(wld,export_bp(c,tnt)))
  i:pactv(c,tnt,time)    q:(sum(a,prod_bp(c,tnt,a)))


$PROD:actv(a,time)   s:0  id:elasid(a)  va:elasva(a)

o:pactv(c,tnt,time)   q:prod_bp(c,tnt,a)   p:pproduction0(c,tnt,a)   a:government  t:taxproduction0(c,tnt,a)
i:pa(c,tnt,time)             q:ci_cst_utbp_tot(c,tnt,a)      p:pprodts0(c,tnt,a)  a:government(time)   t:taxic0(c,tnt,a)
 i:pfactor("jt1",time)     q: L(a)        va:
 i:pfactor("jt3",time)     q: K(a)        va:
$PROD:tourism(time)  s:0.32
 o:pt(time)          q:(sum((c,tnt),nonresident_tourism_consumption(c,tnt)))
 i:pa(c,tnt,time)   q:nonresident_tourism_consumption(c,tnt)


$PROD:resident(time)  s:0.30
o:ph(time)                   q:(sum((c,tnt),final_demand_pp(c,tnt,"jh1")))
 i:pa(c,tnt,time)            q:fdemand_bp(c,tnt,”jh1”)   p:phh0(c,tnt,”jh1”)   a:government    t:taxhh(c,tnt,”jh1”)

$PROD:gov(time)  s:0
o:pg(time)                   q:(sum((c,tnt),final_demand_pp(c,tnt,"jh2")))
 i:pa(c,tnt,time)             q:fdemand_bp(c,tnt,”jh2”)   p:phh0(c,tnt,”jh2”)   a:government    t:taxhh(c,tnt,”jh2”)


$PROD:invest(time) s:0
 o:pinv(time)         q:gfcf
```

```
 i:pa(c,tnt,time)      q: chginv(c,tnt)
 i:pa(c,tnt,time)      q: fcf(c,tnt)   p:pfbk0(c,tnt)   a:government(time)    t:taxfbk(c,tnt)

$PROD:arm(c,tnt,time)   sa:elasdm(c,tnt)
o:pa(c,tnt,time)       q:armington(c,tnt)
i:pd(c,tnt,time)        q:domestic(c,tnt)    sa:
i:pfx(time)               q:import(c,tnt)        sa:

$DEMAND:household(time)

d:ph(time)        q: (sum((c,tnt),final_demand_pp(c,tnt,"jh1"))*qref(time))   p:pref(time)
d:pinv(time)     q:(saving("jh1")*qref(time))     p:pref(time)

e:pfactor("jt3",time)    q:1      r:capital("jh1",time)
e:pfactor("jt1",time)    q:((explot ("jh1","jt1")*qref(time))/(1-u0))
e:pfactor("jt1",time)    q:(-(explot ("jh1","jt1")*qref(time))/(1-u0))   r:unemployment(time)
e:pinv(time)                q:(other_inv("jh1")*qref(time))
e:pfx(time)                  q:(income_abroad("jh1")*qref(time))
e:pg(time)                   q:(taxes_and_transfers("jh1","jh1")*qref(time))   r:dtax(time)
e:pfx(time)                  q:(sum(wld,fsav("jh1",wld))*qref(time))         r:capflow("jh1",time)
e:pinv(time)                q:(-sum(wld,fsav("jh1",wld))*qref(time))        r:fsav("jh1",time)

$DEMAND: enterprises(time)

d:pinv(time)               q:(saving("jh3")*qref(time))     p:pref(time)

e:pfactor("jt3",time)   q:1      r:Kapital("jh3",time)
e:pinv(time)       q:(other_inv("jh3")*qref(time))
e:pg(time)          q:(taxes_and_transfers("jh3","jh3")*qref(time))   r:dtax(time)
 e:pfx(time)       q:(sum(wld,fsav("jh3",wld))*qref(time))               r:capflow("jh3",time)
e:pinv(time)       q: (-sum(wld,fsav("jh3",wld))*qref(time))            r:fsav("jh3",time)
```

```
$DEMAND:government(time)

d:pg(time)                    q: (sum((c,tnt),final_demand_pp(c,tnt,"jh2"))*qref(time))  p:pref(time) d:pinv(time)
q: (saving("jh2")*qref(time))      p:pref(time)


e:pfactor("jt3",time)      q:1        r:Kapital("jh2",time)

 e:pinv(time)                q:(other_inv("jh2")*qref(time))

 e:pg(time)                  q:(taxes_and_transfers("jh2","jh2")*qref(time))   r:dtax(time)

e:pfx(time)                  q:(sum(wld,fsav("jh2",wld))*qref(time))              r:capflow("jh2",time)

e:pinv(time)                 q:(-sum(wld,fsav("jh2",wld))*qref(time))             r:fsav("jh2",time)


$DEMAND:tourist(time)

 d:pt(time)  q:(sum((c,tnt),nonresident_tourism_consumption(c,tnt)))* qref(time))  p:pref(time)

 e:pfx(time)    q(tourist_income*qref(time))


*unemployment rate 26%

$constraint:unemployment(time)

pfactor("jt1",time)/ph(time)=E=((1/(u0**(elas_u)))*(unemployment(time)**(elas_u)));


*public budget balance: direct taxes equal government demand

$constraint: dtax(time)

dtax(time) =E=1;

$constraint:Kapital(jh,time)

            Kapital(jh,time)=E=(1-delta(jh))*Kapital(jh,time-1)+ capital_balisteri(jh)$tfirst(time)+ invest(time-
1)*(I0(jh))*(R+delta(jh));
```

*foreign savings

$constraint: fsav(jh,time)

fsav(jh,time)*sum(wld,fsav(jh,wld))*pinv(time)-(borrowing(jh)*pfx(time)+lending(jh)*pinv(time)) =E=0;

*Capital flow(foreign capital)

$constraint: capflow(jh,time)

capflow(jh,time)*pfx(time)=E=fsav(jh,time)*pinv(time);

Nlogit code (chapter 4)

```
RPLOGIT; LHS=eleccion;
    choices=
d1,d2,d3,d4,d5,d6,d7,d8,d9,d10,d11,d12,d13,d14,d15,d16,d17,d18,d19,d20,d21,
d22,d23,d24,d25,d26,d27,d28,d29,d30,d31,d32,d33,d34,d35,d36,d37,
d38,d39,d40,d41,d42,d43,d44,d45,d46,d37,d47,d48,d49,d50,d51
    rpl=lincome;
    fcn=mean_pre(n|#0),mtemp(n|#0),mtemp2(n|#0),dist(n|#1);
    halton;
    correlated;
    maxit=500;
    RHS=mean_pre,mtemp,mtemp2,dist,lgdp,secondar,lifeexpe,ppp_rate;


RPLOGIT; LHS=eleccion;
    choices=
d1,d2,d3,d4,d5,d6,d7,d8,d9,d10,d11,d12,d13,d14,d15,d16,d17,d18,d19,d20,d21,
d22,d23,d24,d25,d26,d27,d28,d29,d30,d31,d32,d33,d34,d35,d36,d37,
d38,d39,d40,d41,d42,d43,d44,d45,d46,d37,d47,d48,d49,d50,d51
    rpl=x187,mtempori,lincome,mtorigi2;
    fcn=mean_pre(n|#1000),mtemp(n|#0100),mtemp2(n|#0001),dist(n|#0010);
    halton;
    correlated;
    maxit=500;
    RHS=mean_pre,mtemp,mtemp2,dist,lgdp,secondar,lifeexpe,ppp_rate$
```

References

Adams, P.D. and Parmenter, B.R. (1995). An applied general equilibrium analysis of the economic effects of tourism in a quite small, quite open economy. Applied Economics, 27(10), 985-994.

Aghion, P. and Howitt, P. (1998). Market structure and the growth process. Review of Economic Dynamics, 1(1), 276-305.

Agnew, M.D. and Palutikof, J.P. (2006). Impacts of short-term climate variability in the UK on demand for domestic and international tourism. Climate Research, 21: 109–120.

Aguiló, E. and Juaneda, C. (2000). Tourist expenditure for mass tourism markets. Annals of Tourism Research, 27(3), 624-637.

Alavalapati, J.R. and Adamowicz, W.L. (2000). Tourism impact modeling for resource extraction regions. Annals of Tourism Research, 27(1), 188-202.

Albaladejo Pina, I.P. and Martínez-García, M. P. (2013). An endogenous growth model of international tourism. Tourism Economics, 19(3), 509-529.

Alderighi, M., Cento, A. and Piga, C.A. (2011). A case study of pricing strategies in European airline markets: The London-Amsterdam route. Journal of Air Transport Management, 17, 369-373.

Alderighi, M., Cento, A., Nijkamp, P. and Rietveld, P. (2012). Competition in the European aviation market: the entry of low-cost airlines. Journal of Transport Geography, 27, 223-233.

Alegre, J. and Cladera, M. (2010). Tourist expenditure and quality: why repeat tourists can spend less than first-timers. Tourism Economics, 16(3), 517-533.

Alegre, J. and Pou, Ll. (2006). The length of stay in the demand for tourism. Tourism Management, 27(6), 1343-1355.

Alegre, J. and Pou, Ll. (2008). *Research note:* Tourism expenditure and all-inclusive packages- the case of a mature Mediterranean destination. Tourism Economics, 14(3), 645-655.

Alegre, J. and Pou. L. (2004). Micro-economic determinants of the probability of tourism consumption. Tourism Economics, 10(2): 125–144.

Alegre, J., Cladera, M. and Sard, M. (2011). Analysing the influence of tourist motivations on tourist expenditure at a sun-and-sand destination. Tourism Economics, 17(4), 813-832.

Alegre. J., Mateo, S. and Pou. Ll. (2013). Tourism participation and expenditure by Spanish households: the effect of the economic crisis and unemployment. Tourism Management, 39: 37–49.

Amelung, B. and Viner, D. (2006). Mediterranean tourism: exploring the future with the tourism climatic index. Journal of Sustainable Tourism, 14(4), 349-366.

Amelung, B., Nicholls, S. and Viner, D. (2007). Implications of global climate change for tourism flows and seasonality. Journal of Travel research, 45(3), 285-296.

Armington, P.S. (1969). A theory of demand for products distinguished by place of production. IMF Staff Papers, 16(1), 170-201.

Balaguer, J. and Cantavella-Jordá, M. (2002). Tourism as a long-run economic growth factor: the Spanish case. Applied Economics, 34(7), 877-884.

Balassa, B. (1978). Exports and economic growth: further evidence. Journal of Development Economics, 5(2), 181-189.

Balistreri, E.J. and Hillberry, R.H. (2003). The gravity model: an illustration of structural estimation as calibration. Economic Inquiry, 46 (2008), pp. 511–527.

Bank of Spain. (2013). Economic bulletin: Spanish economic projections report. Madrid, Spain: Bank of Spain.

Baxter, M.J. (1979). The interpretation of the distance and attractiveness components in models of recreational trips. Geographical Analysis, 11(3), 311–315.

Ben Abda, M., Belobaba, P.P. and Swelbar, S.W. (2012). Impacts of LCC growth on domestic traffic and fares at largest US airports. Journal of Air Transport Management, 18, 21-25.

Berrittella, M., Bigano, A., Roson, R. and Tol, R.S.J. (2006). A general equilibrium analysis of climate change impacts on tourism. Tourism Management, 27, 913-924.

Bigano, A., Bosello, F., Roson, R., and Tol, R.S.J. (2008). Economy-wide impacts of climate change: a joint analysis for sea level rise and tourism. Mitigation and Adaptation Strategies for Global Change, 13(8), 765-791.

Bigano, A., Hamilton, J.M. and Tol, R.S.J. (2006a). The impact of climate on holiday destination choice. Climatic Change, 76(3-4), 389-406.

Bigano, A., Hamilton, J.M., Maddison, D.J. and Tol, R.S.J. (2006b). Predicting tourism flows under climate change. Climatic Change, *79*(3), 175-180.

Blake, A. (2000). The economic effects of tourism in Spain. Christel DeHaan Tourism and Travel Research Institute Discussion Paper 2000/2. Retrieved February 1, 2011, from http://www.nottingham.ac.uk/ttri/series.html

Blake, A. and Sinclair, M.T. (2003). Tourism crisis management: US response to September 11. Annals of Tourism Research, 30(4), 813-832.

Blake, A., Arbache, J.S., Sinclair, M.T. and Teles, V. (2008). Tourism and poverty relief. Annals of Tourism Research, 35(1), 107-126.

Blake, A., Durbarry, R., Eugenio-Martin, J.L., Gooroochurn, N., Hay, B., Lennon, J., Sinclair, M.T. and Yeoman, I. (2006). Integrating forecasting and CGE models: The case of tourism in Scotland. Tourism Management, 27(2), 292-305.

Blake, A., Durbarry, R., M. Sinclair, T. and Sugiyarto G. (2001). Modelling tourism and travel using tourism satellite accounts and tourism policy and forecasting models. Christel DeHaan Tourism and Travel Research Institute Discussion Paper 2001/4. Retrieved February 1, 2011, from http://www.nottingham.ac.uk/ttri/series.html.

Blake, A., Sinclair, M.T. and Sugiyarto, G. (2003). Tourism and EU accession in Malta and Cyprus. Tourism and Travel Research Institute Discussion Paper, 2003/7. Retrieved February 1, 2011, from http://www.nottingham.ac.uk/ttri/pdf/2003_7.pdf

Blanchflower, D. and Oswald, A.J. (1995). An introduction to the wage curve. Journal of Economic Perspectives, 9(3), 153-167.

Boehringer, C., Rutherford, T.F. and Wiegard, W. (2003). Computable General Equilibrium Analysis: Opening a Black Box, ZEW Discussion Paper No. 03-56, Mannheim, Germany.

Brau, R., Lanza, A. and Pigliaru, F. (2007). How fast are small tourism countries growing? Evidence from the data for 1980-2003. Tourism Economics, 13(4), 603-614.

Brent-Ritchie. J.R., Amaya-Molinar. C.M. and Frechtling. D.C. (2010). Impacts of the world recessions and economic crisis on tourism: North America. Journal of Travel Research, 49: 15–45.

Bronner, F., and Hoog. R. (2012). Economizing strategies during an economic crisis. Annals of Tourism Research. 39(2). 1048–1069.

Brooke, A., Kendrick, D. and Meeraus, A. (1988). GAMS: a user's guide. San Francisco: The Scientific Press.

Bujosa, A. and Rosselló, J. (2013). Climate change and summer mass tourism: the case of Spanish domestic tourism. Climatic change, 117(1-2), 363-375.

Burfisher, M.E. (2011). Introduction to computable general equilibrium models. Cambridge: Cambridge University Press.

Cameron, A.C. and Trivedi, P.K. (2005). Microeconometrics: methods and applications. Cambridge: Cambridge University Press.

Capó, J., Riera, A. and Rosselló, J. (2007). Accommodation determinants of seasonal patterns. Annals of Tourism Research, 34(2), 422-436.

Capó, J., Riera, A. and Rosselló, J. (2007). Tourism and long-term growth. A Spanish perspective. Annals of Tourism Research. 34(3), 709-726.

Carlsen, J.C. and Hughes. M. (2008). Tourism market recovery in the Maldives after the 2004 indian ocean tsunami. Journal of Travel & Tourism Marketing, 23(2–4), 139-149.

Castillo-Manzano, J.L., López-Valpuesta, L. and González-Laxe, F. (2011). The effects of LCC boom on urban tourism fabric: the viewpoint of tourism managers. Tourism Management, 32, 1085-1095.

Caves, W.D., Christensen, L.R. and Tretheway, M.W. (1984). Economies of density versus economies of scale: why trunk and local service airline costs differ. The RAND Journal of Economics, 15, 471-489.

Chao, C.C., Hazari, B.R., Laffargue, J.P., Sgro, P.M. and Yu, E.S. (2006). Tourism, Dutch Disease and welfare in a n open dynamic economy. Japanese economic review, 57(4), 501-515.

Chen, C.M. and Chang, K.L. (2012). The influence of travel agents on travel expenditures. Annals of Tourism Research, 39(2), 1258-1263.

Civil Aviation Authority, (2006). CAP 770, no-frills carriers: Revolution or Evolution? A study by the Civil Aviation Authority. London, UK. Retrieved 3 October, 2011, from http://www.caa.co.uk/application.aspx?catid=33&pagetype=65&appid=11&mode=detail&id=2528

Coenen, M. and Van Eekeren, L. (2003). A study of the demand for domestic tourism by Swedish households using a two-staged budgeting model. Scandinavian Journal of Hospitality and Tourism, 3(2), 114-133.

Copeland, B.R. (1991). Tourism, welfare and de-industrialization in a small open economy. Economica, 58(232), 515-529.

Corden, W. M., and Neary, J. P. (1982). Booming sector and de-industrialisation in a small open economy. The Economic Journal, 92(368), 825-848.

Corden, W.M. (1984). Booming sector and Dutch disease economics: survey and consolidation. Oxford Economic Papers, 36(3), 359-380.

Davison, L. and Ryley, T. (2010). Tourism destinations preferences of low-cost airline users in the East Midlands. Journal of Transport Geography, 18, 458-465.

De Freitas, C.R. (2003). Tourism climatology: evaluating environmental information for decisión making and business planning in the recreation and tourism sector. International Journal of Biometeorology, 48, 45-54.

De Mello, M., Pack, A. and Sinclair, T. (2002). A system of equations model of UK tourism demand in neighbouring countries. Applied Economics, 34(4), 509-521.

Devarajan, S., Ghanem, H. and Thierfelder, K. (1997). Economic reform and labor unions: a general-equilibrium analysis applied to Bangladesh and Indonesia. The World Bank Economic Review, 11(1), 145-170.

Di Liberto, A. (2013). High skills, high growth: Is tourism an exception? The Journal of International Trade and Economic Development, 22(5), 749-785.

Díaz-Pérez, F.M., Bethencourt-Cejas, M. and Álvarez-González, J.A. (2005). *Research note:* The segmentation of canary island tourism markets by expenditure: implications for tourism policy. Tourism Management, 26(6), 961-964.

Divisekera, S. (2003). A model of demand for international tourism. Annals of Tourism Research 30(1), 31-49.

Divisekera, S. (2010). Economics of tourist´s consumption behaviour: some evidence from Australia. Tourism Management, 31(5), 629-639.

Doganis, R. (2006). The airline business. London: Routledge.

Dolnicar, S, Crouch, G.I, Devinney, T., Huybers, T., Louviere, J.J. and Oppewal, H. (2008). Tourism and discretionary income allocation. Heterogeneity among households. Tourism Management, 29, 44-52.

Domar, E. D. (1946). Capital expansion, rate of growth, and employment. Econometrica, 14(2), 137-147.

Donzelli, M. (2010). The effect of low-cost air transportation on the local economy: Evidence from Southern Italy. Journal of Air Transport Management, 16(3), 121-126.

Dritsakis, N. (2004). Tourism as a long-run economic growth factor: an empirical investigation for Greece using causality analysis. Tourism Economics, 10(3), 305-316.

Durbarry, R. (2004). Tourism and economic growth: the case of Mauritius.Tourism Economics, 10(4), 389-401.

Dwyer, L., Forsyth, P. and Dwyer, W. (2010). Tourism Economic Policy. Clevedon: Channel View Publications.

Dwyer, L., Forsyth, P., Spurr, R. and VanHo, T. (2006). Economic effects of the world tourism crisis on Australia. Tourism Economics, 12(2), 171-186.

Dwyer, L., Forsyth, P., Spurr, R., and Hoque, S. (2010). Estimating the carbon footprint of Australian tourism. Journal of Sustainable Tourism, 18(3), 355-376.

Easterly, W. and Kraay, A. (2000). Small states, small problems? Income, growth, and volatility in small states. World Development, 28(11), 2013-2027.

Eugenio-Martin, J L., Martin-Morales, N. and Sinclair, M. T. (2008). The role of economic development in tourism demand. Tourism Economics, 14(4), 673-690.

Eugenio-Martin, J.,L., Martín-Morales, M.N. and Scarpa, R. (2004). Tourism and economic growth in Latin American countries: a panel data approach. Fondazione Eni Enrico Mattei Discussion Papers 26/2004. Retrieved 12 January 2012, from http://www.feem.it/userfiles/attach/Publication/NDL2004/NDL2004-026.pdf

Eugenio-Martin, J.L. (2003). Modelling determinants of tourism demand as a 5-stage process: a discrete choice methodological approach. Tourism and Hospitality Research, 4(4), 341-354.

Eugenio-Martin, J.L. (2008). Economic and econometric analysis of the determinants of participation and destination choice in tourism demand.Unpublished doctoral dissertation, University of Las Palmas of Gran Canaria.

Eugenio-Martin, J.L. and Campos-Soria, J.A. (2010). Climate in the region of origin and destination choice in outbound tourism demand. Tourism Management, 31(6), 744-753.

Eugenio-Martin, J.L. and Campos-Soria, J.A. (2011). The role of income and the substitution pattern between domestic and international tourism demand. Applied Economics, 43(20): 2519–2531.

Eugenio-Martin, J.L. and Campos-Soria, J.A. (2014). Economic crisis and tourism expenditure cutback decision. Annals of Tourism Research, 44: 53–73.

Eugenio-Martin, J.L., Sinclair. M.T. and Yeoman. I. (2005). Quantifying the effects of tourism crises: An application to Scotland. Journal of Travel and Tourism Marketing, 19(2/3): 23–36.

European Commission (EC). (2013). VAT rates applied in the Member States of the European Union. Brussels, Belgium: European Commission. Retrieved 12 February, 2013, from http://ec.europa.eu/taxation_customs/resources/documents/taxation/vat/how_vat_works/rates/vat_rates_en.pdf

Eymann, A. (1995). Consumers' Spatial Choice Behavior. Heidelberg: Physica-Verlag.

Eymann, A. and Ronning, G. (1992). Discrete choice analysis of foreign travel demand. H. J. Vosgerau (Ed.), European integration in the world economy. Studies in international economics and institutions. Springer, Berlin.

Fernández, F.M. and Manrique de Lara, C. (2006). La matriz de contabilidad nacional. Un método alternativo de presentación de las cuentas nacionales. Revista Asturiana de Economía, 37, 85-106.

Fernández-Kranz, D. and Hon, M.T. (2006). A cross-section analysis of the income elasticity of housing demand in Spain: Is there a real estate bubble? The Journal of Real Estate Finance and Economics, 32(4), 449-470.

Fiebig, D.G., Keane, M.P., Louviere, J. and Wasi, N. (2010). The generalized multinomial logit model: accounting for scale and coefficient heterogeneity. Marketing Science, 29(3), 393-421.

Fisher, I. (1933). The debt-deflation theory of great depressions. Econometrica, 1(4), 337-357.

Fleischer, A. Peleg, G. and Rivlin, J. (2011). The impact of changes in household vacation expenditures on the travel and hospitality industries. Tourism Management, 32(4), 815–821.

Forsyth, P. (2003). Low-cost carriers in Australia: experiences and impacts. Journal of Air Transport Management, 9(5), 277-284.

Frechtling, D.C. (1982). Tourism trends and the business cycle. Tourism Management, 3(4): 285-290.

Fu, X., Dresner, M. and Oum, T.H. (2011). Effects of transport service differentiation in the US domestic airline market. Transportation Research Part E, 47(3), 297-305

Fujii, E.T., Khaled, M. and Mak, J. (1987). An empirical comparison of systems of demand equations for tourist expenditures in resort destinations. Philippine Review of Economics, 24, 79-102.

Gago, A., Labandeira, X., Picos, F., and Rodríguez, M. (2009). Specific and general taxation of tourism activities. Evidence from Spain. Tourism Management, 30(3), 381-392.

Ghali, M.A. (1976). Tourism and economic growth: an empirical study. Economic Development and Cultural Change, 24(3), 527-538.

Gokovali, U., Bahar, O. and Kozak, M. (2007). Determinants of length of stay: a practical use of survival analysis. Tourism Management, 28(3), 736–746.

Gómez Martín, M.B. (2005). Weather, climate, and tourism. A geographical perspective. Annals of Tourism Research, 32(3), 571-591.

Gooroochurn, N. and Thea-Sinclair, M. (2005). Economics of tourism taxation: Evidence from Mauritius. Annals of Tourism Research, 32(2), 478-498.

Gössling, S., and Hall, C. M. (2006). Uncertainties in predicting tourist flows under scenarios of climate change. Climatic change, 79(3-4), 163-173.

Graham, A. and Dennis, N. (2010). The impact of low-cost airline operations to Malta. Journal of Air Transport Management, 16, 127-136.

Greene, W.H. (1997). Econometric Analysis (3rd editions). New Yersey: Prentice-Hall International.

Greer, T. and Wall, G. (1979). Recreational hinterlands: a theoretical and empirical analysis. Publication Series, Department of Geography, University of Waterloo, 14, 227-246.

Grossman, G.M. and Helpman, E. (1991). Trade, knowledge spillovers, and growth. European Economic Review, 35(2), 517-526.

Gujarati, D. (2003). Econometrics (4th ed). Mexico: Mc Graw-Hill Interamericana.

Gunduz, L. and Hatemi-J, A. (2005). Is the tourism-led growth hypothesis valid for Turkey? Applied Economics Letters, 12(8), 499-504.

Hageman, R. (1981). The determinant of household vacation travel: some empirical evidence. Applied Economics, 13(2), 225-234.

Haider, W. and Ewing, G.O. (1990). A model of tourist choices of hypothetical Caribbean destinations. Leisure Sciences, 12(1), 33-47.

Hall, C.M. (2010). Crisis events in tourism: subjects of crisis in tourism. Current Issues in Tourism, 13(5), 401–417.

Hamilton, J.M. and Tol, R.S.J. (2007). The impact of climate change on tourism in Germany, the UK and Ireland: a simulation study. Regional Environmental Change, 7(3), 161-172.

Hamilton, J.M., Maddison, D.J., and Tol, R.S.J. (2005a). Effects of climate change on international tourism. Climate Research, 29(3), 245-254.

Hamilton, J.M., Maddison, D.J., and Tol, R.S.J. (2005b). Climate change and international tourism: a simulation study. Global Environmental Change, 15(3), 253-266.

Harris Interactive. (2009). Adults in five largest European countries and the US will take fewer vacation days this summer bun won´t let economic crisis spoil their vacations. Press release, Harris Interactive, Rochester, NY. Retrieved 26 June, 2012, from www.harrisinteractive.com.

Harris, J.R and Todaro, M.P. (1970).Migration, unemployment and development: a two-sector analysis American Economic Review, 60 (1) (1970), pp. 120–142.

Hayashi, F. (2000). Econometrics. New Yersey: Princeton University Press.

Hazari, B.R. and Sgro, P.M. (1995). Tourism and growth in a dynamic model of trade. Journal of International Trade and Economic Development, 4(2), 143-252.

Heckman, J. (1976). The common structure of statistical models of truncation. sample selection and limited dependent variables models and a simple estimator for such models. Annals of Economics and Social Measurement, 5(4), 475–492.

Heckman, J. (1979). Sample selection bias as a specification error. Econometrica, 47(1), 153–161.

Henderson, J.C. (1999). Managing the Asian financial crisis: tourist attractions in Singapore. Journal of Travel Research, 38(2), 177–181.

Hensher, D.A., Rose, J.M. and Greene, W.H. (2005). Applied choice analysis: a primer. Cambridge: Cambridge University Press.

Hertel, T. W. (1998). Global trade analysis: modeling and applications. T. W. Hertel (Ed.). Cambridge: Cambridge University Press.

Hong-Bumm, K., Jung-Ho, P., Seul. K.L. and SooCheong, S.J. (2012). Do expectations of future wealth increase outbound tourism? Evidence from Korea. Tourism Management, 33(5): 1141–1147.

Hung, W.T., Shang, J.K. amd Wang, F.C. (2013). A multilevel analysis on the determinants of household tourism expenditure. Current Issues in Tourism, 16(6): 612–617.

International Monetary Fund. (2013).World economic outlook, April 2013. Washington: International Monetary Fund.

Interngovernmental Panel on Climate Change. (2007). Climate Change 2007: Synthesis Report. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, Geneva, Switzerland.

Jafari, J., Pizam, A. and Przeclawski, K. (1990). A sociocultural study of tourism as a factor of change. Annals of Tourism Research, 17(3), 462-472.

Katz, L.F. and Summers, L.H. (1989). Industry rents: Evidence and implications. Brookings Papers on Economic Activity: Microeconomics, Special Issue, 209-275.

Kehoe, T.J., Polo, C. and Sancho, F. (1995). An evaluation of the performance of an applied general equilibrium model of the Spanish economy. Economic Theory, 6, 115-141.

Keynes, J.M. (1936). The General Theory of Employment, Interest and Money. London: Macmillan and Co.

Kim, H.J., Chen, M.H. and Jang, S. (2006). Tourism expansion and economic development: the case of Taiwan. Tourism Management, 27(5), 925-933.

Krugman, P.R. and Obstfeld, M. (2006). Economía Internacional. Madrid: Pearson educación.

Küster, R., Ellersdorfer, I. and Fahl, U. (2007). A CGE-Analysis of Energy Policies Considering Labor Market Imperfections and Technology Specifications. Fondazione Eni Enrico Mattei Discussion Papers, 2007/7. Retrieved May 15, 2012, from http://services.bepress.com/feem/paper73/

Lanza, A., Temple, P. and Urga, G. (2003). The implications of tourism specialisation in the long run: an econometric analysis for 13 OECD economies. Tourism Management, 24(3), 315-321.

Laplagne, P., Treadgold, M. and Baldry, J. (2001). A model of aid impact in some South Pacific Microstates. World Development, 29, 365–383.

Law, R. (2001). The impact of the Asian financial crisis on Japanese demand for travel to Hong Kong: a study of various forecasting techniques. Journal of Travel & Tourism Marketing, 10 (2-3): 47–65.

Lawton, T. (2002). Cleared for take-off: Structure and strategy in low fare airline business. Ashgate: Aldershot.

Lee, C.C. and Chang, C.P. (2008). Tourism development and economic growth: a closer look at panels. Tourism Management, 29(1), 180-192.

Lewis, W.A. (1954). Economic development with unlimited supplies of labour. The Manchester School, 22(2), 139-191.

Lize, W. and Tol, R.S.J. (2002). Impact of climate on tourism demand. Climatic Change. 55, 429-449.

Lofgren, H. (2001): A CGE model for Malawi: Technical documentation, TMD Discussion Paper 70/2001. Retrieved, 12 April, 2012, from http://ideas.repec.org/p/fpr/tmddps/70.html

Mabugu, R. (2002). Short-term effects of policy reform on tourism and the macroeconomy in Zimbabwe: applied CGE analysis. Development Southern Africa, 19(3), 419-430.

Madison, D. (2001). In search of warmer climate? The impact of climate change on flows of British tourists. Climatic Change. 49,193-208.

Mak, J., Moncur, J. and Yonamine, D. (1997). Determinants of visitors expenditures and visitor lengths of stay: a cross-sectional analysis of U.S. Visitors to Hawaii. Journal of Travel Research, 15(3), 5-8.

Malighetti, P., Paleari, S. and Redondi, R. (2009). Pricing strategies of low-cost airlines: the Ryanair case study. Journal of Air Transport Management, 15, 195-203.

Mao. C-K., Ding. C.G. and Lee. H-Y. (2010). Post-SARS tourist arrival recovery patterns: an analysis based on a catastrophe theory. Tourism Management, 31: 855–861.

Martínez-Garcia, E., Ferrer-Rosell, B., & Coenders, G. (2012). Profile of business and leisure travelers on low cost carriers in Europe. Journal of Air Transport Management, 20, 12-14.

Marx, K. (1867). Capital, Volume I. Trans. Ben Fowkes. New York and London: Penguin Books.

Mason, K. J. (2005). Observations of fundamental changes in the demand for aviation services. Journal of Air Transport Management, 11(1), 19-25.

Mathieson, A. and Wall, G. (1982). Tourism, economic, physical and social impacts. London: Longman.

Mckercher, B. and Lew, A.A. (2003). Distance decay and the impact of effective tourism exclusion zones on international travel flows. Journal of Travel Research, 42(2), 159-165.

Melenberg, B. and Van Soest, A. (1996). Parametrics and semiparametric modeling of vacation expenditures. Journal of Applied Econometrics, 11, 59-76.

Melenberg, B. and Van Soest. A. (1996). Parametric and semi-parametric modeling of vacation expenditures. Journal of Applied Econometrics, 11(1), 59–76.

Meng, X., Siriwardana, M. and Pham, T. (2013). A CGE assessment of Singapore's tourism policies. Tourism Management, 34, 25-36.

Mergoupis, T. and Steuer, M. (2003). Holidays taking and income. Applied Economics, 35(3), 269-284.

Mieczkowski, Z. (1985). The tourism climatic index: a method of evaluating world climates for tourism. The Canadian Geographer/Le Géographe canadien, 29(3), 220-233.

Mok, C. and Iverson, T.J. (2000). Expenditure-based segmentation: Taiwanese tourist to Guam. Tourism Management, 21, 299-305.

Moreno, A. and Amelung, B. (2009). Climate change and tourist comfort on Europe's beaches in summer: a reassessment. Coastal Management, 37(6), 550-568.

Morley, C.L. (1994a). Experimental destination choice anaylsis. Annals of Tourism Research, 21(4), 780–791.

Morley, C.L. (1994b). Discrete choice analysis of the impact of tourism prices. Journal of Travel Research, Fall, 8–14.

Muñoz, C., Iráizoz, B. and Rapún, M. (2008). Las Cuentas de la nación I. Introducción a la economía aplicada (3rd edition). Madrid: Thomson Civitas.

Narayan, P.K. (2004). Economic impact of tourism on Fiji's economy: empirical evidence from the computable general equilibrium model. Tourism Economics,10(4), 419-433.

Nicholls, S. and Amelung, B. (2008). Climate change and tourism in Northwestern Europe: Impacts and adaptation. Tourism analysis, 13(1), 21-31.

Nicolau, J.L. and Más, F.J. (2005a). Heckit modeling of tourist expenditure: evidence from Spain. International Journal of Service Industry Management, 16(3), 271-293.

Nicolau, J.L. and Más, F.J. (2005b). Stochastic modeling: a three-stage tourist choice process. Annals of Tourism Research, 32(1), 49-69.

Nicolau, J.L. and Más, F.J. (2006). The influence of distance and prices on the choice of tourist destinations: The moderating role of motivations. Tourism Management, 27(5), 982 996.

Nowak, J.J., Sahli, M. and Cortes-Jimenez, I. (2007). Tourism, capital good imports and economic growth: theory and evidence for Spain. Tourism Economics, 13(4), 515-536.

O´Brien, A. (2012). Wasting a good crisis. Developmental failure and irish tourism since 2008 Annals of Tourism Research, 39(2): 1138–1155.

O´Hagan, J.W. and Harrison, M.J. (1984). Market shares of US tourist expenditure in Europe: an econometric analysis. Applied Economics, 16, 919-931.

O'Connell, J. F., & Williams, G. (2005). Passengers' perceptions of low cost airlines and full service carriers: A case study involving Ryanair, Aer Lingus, Air Asia and Malaysia Airlines. Journal of Air Transport Management, 11(4), 259-272.

Oh, C.O. (2005). The contribution of tourism development to economic growth in the Korean economy. Tourism Management, 26(1), 39-44.

Okumus, F. and Karamustafa. K. (2005). Impact of an economic crisis. Evidence from turkey. Annals of Tourism Research, 32(4): 942–961.

Okumus, F., Altinay, M. and Arasli, H. (2005). The impact of Turkeys´s economic crisis of February 2001 on the tourism industry in Northern Cyprus. Tourism Management, 26: 95–104.

Olive Research. (2009). Impact of economic downturn on attitudes and behaviour of international tourists to Britain. London: VisitBritain. Retrieved 12 April 2012, from http://www.visitengland.org/Images/International%20research-%20full%20report_tcm30-19717.pdf

Page, S., Song, H. and Wu, D.C. (2012). Assessing the impact of the global economic crisis and swine flu on inbound economic crisis in the United Kingdom. Journal of Travel Research, 51(2): 142–153.

Palmer, A., Beltrán, M. and Cortiñas, P. (2006). Robust estimators and bootstrap confidence intervals applied to tourism spending. Tourism Management, 27, 42-50.

Papatheodorou, A. (1999). The demand for international tourism in the Mediterranean region. Applied Economics, 31(5), 619-630.

Papatheodorou, A., Rosselló, J. and Xiao, H. (2010). Global economic crisis and tourism: Consequences and perspectives. Journal of Travel Research, 49(1), 39-45.

Parrilla, J.C., Font, A.R. and Nadal, J.R. (2007). Tourism and long-term growth a Spanish perspective. Annals of Tourism Research, 34(3), 709-726.

Poirier, R.A. (1995). Tourism and development in Tunisia. Annals of Tourism Research, 22(1), 157-171.

Polo, C. and Sancho, F. (1993). Insights or forecasts? An evaluation of a computable general equilibrium model of Spain. Journal of forecasting, 12(5), 437-448.

Prideaux, B. (1999). Tourism perspectives of the Asian financial crisis: lessons for the future. Current Issues in Tourism, 2(4): 279–293.

Pulina, M. and Cortés-Jiménez, I. (2010). Have low-cost carriers influenced tourism demand and supply? The case of Alghero, Italy. Tourism Analysis, 15, 617-635.

Pyatt, G. and Round, J.I. (1985). Social accounting matrices: A basis for planning. Washington D.C: The World Bank,.

Requeijo, G.J., Iranzo, M.J., Martínez de Dios, J., Pedrosa, R. M. and Salido, H.J.(2007). Técnicas Básicas de Estructura Económica (1st edición). Madrid: Delta publicaciones.

Rey, B., Myro, R.L. and Galera, A. (2011). Effect of low-cost airlines on tourism in Spain. A dynamic panel data model. Journal of Air Transport Management, 17, 163-167.

Riley, M., Ladkin, A. and Szivas, E. (2001). Tourism employment. Analysis and planning. Clevedon, Channel view. Aspect of Tourism.

Roca, A.M. (1998). Dutch Disease and banana exports in the Colombian Caribbean, 1910-1950. " paper presented at the meeting of the Latin American Cliometric Society (LACLIO) in Cartagena, Colombia, August 27-28. Retrieved 20 October, 2013, from http://www.stanford.edu/group/sshi/lacsc_papers.html.

Rosselló, J. and Riera, A. (2012). Pricing European package tours: the impact of new distribution channels and low-cost airlines. Tourism Economics, 18(2), 265-279.

Rosselló, J. and Santana-Gallego, M. (2014). Recent trends in international tourist climate preferences: a revised picture for climatic change scenarios. Climatic Change, 124, 119-132.

Rosselló-Nadal, J. (2014). How to evaluate the effects of climate change on tourism. Tourism Management, 42, 334-340.

Rostow, W.W. (1960). The process of economic growth: A Non-Communist Manifesto. Cambridge: Cambridge University Press.

Rutherford, T.F. (1994). The GAMS/MPSGE and GAMS/MILES user notes. Washington D.C: GAMS Development Corporation.

Rutherford, T.F. (1999). Applied general equilibrium modeling with MPSGE as a GAMS subsystem: An overview of the modeling framework and syntax. Computational Economics, 14(1-2), 1-46.

Rutherford, T.F. and Light, M.K. (2002). A general equilibrium model for tax policy analysis in Colombia. Department of National Planning Discussion Paper 22,.

Sachs, J.D. and Larraín, B.F. (1994): Macroeconomía en la economía global. Mexico D.F, México: Prentice Hall Hispanoamérica (3rd edition).

Schmidt, S.J. (2005). Econometría. Mexico: Mc Graw-Hill Interamericana.

Seddighi, H. R. and Theocharous, A.L. (2002). A model of tourism destination choice: a theoretical and empirical analysis. Tourism management, 23(5), 475-487.

Sequeira, T.N. and Maças, N,P. (2008). Does tourism influence economic growth? A dynamic panel data approach. Applied Economics, 40(18), 2431-2441.

Sheldon, P. and Dwyer, L. (2010). The global financial crisis and tourism: Perspectives of the academy. Journal of Travel Research, 49(1), 3–4.

Sinclair, M.T. and Stabler, M. (1997). The economics of tourism. Routledge

Skrondal, A. and Rabe-Hesketh, S. (2004). Generalized latent variable modeling. Chapman & Hall/CRC.

Smeral, E. (2003). A structural view of tourism growth. Tourism Economics, 9(1), 77–93.

Smeral, E. (2009). The impact of the financial and economic crisis on European tourism. Journal of Travel Research, 48(1), 3-13.

Smeral, E. (2010). Impacts of the world recession and economic crisis on tourism: Forecasts and potential risks. Journal of Travel Research, 49(1), 31-38.

Smith, A. (1776). La Riqueza de las naciones. Economía, Madrid: Alianza editorial.

Solow, R.M. (1956). A contribution to the theory of economic growth. The Quarterly Journal of Economics, 70(1), 65-94.

Song, H. and Li, G. (2008). Tourism Demand Modeling and Forecasting—A Review of Recent Research. Tourism Management, 29(2), 203-220.

Song, H. and Lin, S. (2010). Impacts of financial and economic crisis on tourism in Asia. Journal of Travel Research, 49(1), 16–30.

Sorenson, N. (1991). The impact of geographic scale and traffic density on airline production costs: the decline of the no-frills airlines. Economic Geography, 67(4), 335–345.

Spanish Statistical Office (INE). (2004). Cuenta Satélite del turismo de España: nota metodológica. Instituto Nacional de Estadística, Madrid. Retrieved 10 January, 2009, from http://www.ine.es/metodologia/t35/metosateln.pdf

Sugiyarto, G., Blake, A. and Sinclair, M.T. (2003). Tourism and globalization: economic impact in Indonesia. Annals of Tourism Research, 30(3), 683-701.

Tang, C.F. and Abosedra, S. (2012). Small sample evidence on the tourism-led growth hypothesis in Lebanon. Current Issues in Tourism, 17(3), 1-13.

Taylor, Ch.E. and Knudson, D.M. (1976). Area preferences of Midwestern campers. Journal of Leisure Research, 12(Spring), 39–48.

Train, K. (1998). Recreation demand models with taste differences over people. Land economics, 74(2), 230-239.

Train, K. (2009). Discrete choice methods with simulation. Cambridge: Cambridge University Press.

United Nations World Tourism Organisation. (2008). Tourism satellite account: Recommended methodological framework, 2008. Washington D.C: United Nations World Tourism Organisation . Retrieved, 10 September, 2011, from http://unstats.un.org/unsd/statcom/doc08/BG-TSA.pdf

United Nations World Tourism Organisation. (2013). Tourism highlights, 2013 edition. Madrid, Spain: United Nations World Tourism Organisation. Retrieved 10 September, 2011, from http://mkt.unwto.org/publication/unwto-tourism-highlights-2013-edition

Usui, N. (1996). Aid induced structural change in developing countries: An extension of the two-gap model. Singapore Economic Review, 41, 53–66.

Van Soest, A. and Kooreman, P. (1987). A micro-econometric analysis of vacation behaviour. Journal of Applied Econometrics, 2, 215-226.

VanWijnbergen, S. (1986). Exchange rate management and stabilization policies in developing countries. Journal of Development Economics, 23, 227–247.

Vera, J.F. and Ivars, J.A. (2009). Spread of low-cost carriers: tourism and regional policy effect in Spain. Regional Studies, 43(4), 559-570.

Von Thünen, J.H. (1826). Der Isolierte Staat in Beziehung auf landwrirtschaft und Nationalekonomie (Hamburg).

Wang, Y.S. (2009). The impact of crisis events and macroeconomic activity on Taiwan´s international inbound tourism demand. Tourism Management, 30, 75–82.

Wattanakuljarus, A. and Coxhead, I. (2008). Is tourism-based development good for the poor? A general equilibrium analysis for Thailand. Journal of Policy Modeling, 30(6), 929-955.

White, H. (1992). The macroeconomic impact of development aid: A critical survey. Journal of Development Studies, 28, 163–240.

Windle, R. and Dresner, M. (1999). Competitive responses to low cost carrier entry. Transportation Research Part E, 35, 59-75.

Wolfe, R.I. (1970). Communication. Journal of Leisure Research, 2(1), 85–87.

Wolfe, R.I. (1972). The inertia model. Journal of Leisure Research, 4, 73–76.

World Bank. (1993). The east Asian miracle. Oxford: Oxford University Press.

Wu, D.C., Li, G. and Song, H. (2012). Economic analysis of tourism consumption dynamics: A time-varying parameter demand system approach. Annals of tourism research, 39, 2, 667-685.

Young, J. and Whang, T. (2011). The impact of low cost carriers on korean island tourism. Journal of Transport Geography, 19(6), 1335-1340.

Zellner, A. and Theil, H. (1962). Three-least squares: simultaneous estimation of simultaneous equations. Econometrica, 30(1), 54-78.

Zhou, D., Yanagida, J.F., Chakravorty, U. and Leung, P. (1997). Estimating economic impacts from tourism. Annals of Tourism Research, 24(1), 76.