COMPARING THE ECONOMIC IMPACT OF TOURISM USING DIFFERENT INPUT OUTPUT MODELS. AN APPLICATION FOR GALICIA.

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Abstract:

The main particularity of Tourism is to be defined from the demand side, instead from the supply side like the other economic activities. For this reason, Tourism impact studies are usually performed with demand models based on input output (IO) methodology.

In spite of this fact, the Leontief model presents some limitations such as: no assumption of supply constraints (even workers), constant return to scale, fixed commodity input structure or homogeneous sector output. In addition of the traditional ones, we also could consider that it only defines the behavior of the productive agents and it does not recognize all the interdependencies between regions.

Therefore, the aim of this paper is to compare the results obtained with the classic demand model (Leontief model) with other models that attempt to solve some of those limitations. For instance, we implement an expanded model considering the households (induced impacts model), a two-region model that allows us to estimate the spillover and the feedback effects (interregional model) and our own model based on the supply and use tables, in order to correct the possible obsolescence of the data offered by the Symmetric Table (rectangular model). For practical purposes, we will perform the analysis for a regional economy like Galicia.

Keywords: Input-Output Models, Tourism Demand, Income Effects.

INTRODUCTION

What is the impact of tourism on the Galician[1] economy? What does tourism mean and what does not? What kind of models can we use to measure the economic impact of tourism?

All these questions are quite common in our society but they are not easy to answer yet. The aim of this paper is to provide an adequate response to these and other similar issues. Thus, for example, it is very common to read that tourism is one of the engines of the Spanish economy; nevertheless its contribution to the GDP or the number of jobs it generates is not clear. Moreover, it is normal to think that when a person makes a visit to a doctor who lives in another city it is not for sightseeing, and, although he does not sleep there, he would be classified as an excursionist, and the expenses he has made are therefore included as touristic.

When visitors consume goods and services in Galicia, they are not only stimulating those industries that produce them, but indirectly also those that are supplying to them the inputs that they need to carry out their production. In other words, touristic expenditures are not only important because of the production or employment they directly generate, but also for the effect they have on the rest of the economy. Thus, the suppliers of primary and intermediate inputs (production factors) necessary for the development of tourism (such as those that supply inputs to the hotels, transport companies or travel agencies) are also an essential part of the consequences of tourism on an economy. To account for all the importance of tourism in Galicia we should not only measure the direct effects of tourism, but also its indirect effects.

Undoubtedly, tourism is currently representing a strategic subject for the economy, in Galicia and in a large number of countries and regions, not only for its quantitative dimension, but also for being a heterogeneous activity that is composed by a diverse set of productive sectors with the purpose of satisfying touristic demand. This heterogeneity is not a result of the nature and characteristics of the commodity to

[1]Galicia is one of the 17 regions of Spain.

determine when some good or service is tourism, but to the circumstances of the consumer, i.e. is subject to the subjectivity of who demands those goods and services and how. Therefore, the definition of tourism must not be considered from its content (as the other economic activities) but from the recipients of it, the visitors.

In fact, the economic analysis of tourism can be divided into two groups, from the supply or demand perspective. The first group, which can be considered as the more traditional core, treats tourism as another economic sector or industry (like agriculture or construction) restricted to those activities directly related with the stay and movement of visitors, i.e., hospitality and travel arrangements. The second group is inclined to strictly use as a demarcation principle of tourism activities, the behavior of tourists and excursionists, which also includes other activities that are consumed by visitors during their stay. Thus, this viewpoint dominates the debate since the World Conference on "Measuring the Economic Impact of Tourism" that took place in Nice in 1999 and the subsequent publication of the methodological document of Tourism Satellite Accounts (United Nations, 2001).

Moreover, these types of analysis may be directed to countries (Bull, 1991; Blake, 2000; Kweka et al., 2003), regions (Polo and Valle, 2002; Castañón et al., 2007), cities (Fuller, 1995; Fretchling and Horváth, 1999) or a particular cultural event (Blake, 2005; Kasimati, 2003) and they are used to provide information to public and private policy makers (Fretchling, 1994). More specifically, depending on the ultimate goal of the study, the available variables can be more or less adequate. Therefore, in order to measure the weight of tourism in an economy such indicators are used: the share of the GDP or the number of generated jobs, both in absolute or relative values, as was proposed by the Spanish Tourism Satellite Account (CSTE) methodology. The "Touristic GDP" or the share of the GDP is obtained as the total impact of demand on the Aggregated Gross Value plus taxes on products.

In general, these studies are usually conducted with demand models based on input-output (IO) (Fletcher, 1989; Fletcher, 1994; Archer, 1982; Balaguer et al., 2002; Capó et al., 2007) or computable general equilibrium models (CGE) (Blake, 2008; Dwyer et al., 2006). In this paper we use IO analysis to examine the significance of tourism on a regional economy like Galicia. Despite the fact that some limitations appear with this

Leontief model, in cases that there is few available data, implementing a CGE model is quite complicated. Anyway, we try to solve some of the problems through more advanced input-output based models as can be: the induced impact model, the inter-regional model and the rectangular model. Furthermore, it should be noted that estimations appear to be lower using CGE models than IO (Zhou et al., 1997), due to the reallocation and substitution of resources and because input-output does not allow prices to fall.

This paper is divided into six sections. In the first two fragments, we analyze the fundamentals of some different input-output models and their limitations. In the third section, the objective is to identify the concept of tourism, focusing on explaining terms like tourism, tourist or types of tourism, among others. The next section explains the steps to do the simulations and the variables to measure the economic impact of tourism. The fifth section presents the results obtained for Galicia in 2005 with the four different models. Finally, the last section mentions the main conclusions reached through this paper.

1. THE TRADITIONAL MODEL AND ITS LIMITATIONS

Input-output was the name given to the analytical framework developed by W. Leontief and presented in 1936 in *"Quantitative Input-Output Economics Relations in the Economic System of the United States"*. It is defined as an accounting framework that presents the interdependence in the production structure and allows us to implement simulation and prediction models, such as the demand model, the most traditional one. The essential premise is to consider that an economy can be divided into homogeneous industries with mutual and stable relations over time, expressed through *"technical coefficients"*.

Thus, the main advantage of this type of model (over partial equilibrium models) is that it takes into account economic interdependence, i.e. the mutual dependence of two or more industries in the production process. This interdependence of the flows of the industries means that, changes in final demand in some specific products of one industry will affect other associated sectors of the economy and, sequentially, also those industries associated with them.

The classic demand model

As shown in *"The Structure of American Economy 1919-1939",* the initial goal of Leontief was conducting a study on the interrelationships between different parts of an economy. Thus, more specifically, the process is to simplify the walrasian scheme of general equilibrium, first, aggregating the products, so each sector offers one output and then, adopting the linear form for the production equations. Therefore, designing an economy separated into *n* sectors, where the level of output in each sector will depend on the level of others (Dorfman, 1954).

As a result, knowing the final demand for a particular moment in time we obtain the value of required output for each industry to satisfy it. In other words, it can be used to examine how the production changes in response to a change in final demand.

$$X = (I - A)^{-1}D$$

Beyond the traditional limitations of the Leontief model: no assumption of supply constraints (even workers), constant return to scale, fixed commodity input structure or homogeneous sector output (Hara, 2008); there are others that can be solved through more advanced input-output based models, for example, introducing the households or another regions.

2. SOME OTHER DIFFERENT INPUT-OUTPUT MODELS

The induced impact model

Although, input-output is considered as an economy-wide model, it only defines the behavior of the productive agents of the economy through complementary or Leontief functions. Therefore, it is needed to make the households an endogenous variable of the model to estimate the income effects. The wages that resident workers earn cause a new round of positive impacts on the economy, the induced effects.

The first step is to expand the intermediate demand matrix in order to include the household sector (or sectors) as a common productive sector. The elements in the last row represent the income directly generated because of the production of one unit of

sector *i*. The new last column represents the direct needs of products of the sector *i* to obtain a final unit of private consumption. It can be expressed as:

$$A^{\square} = \begin{pmatrix} a_{11} & a_{12} & c_1 \\ a_{21} & a_{22} & c_2 \\ w_1 & w_2 & \end{pmatrix} \quad , \quad D^{\square} = \begin{pmatrix} d_1 \\ d_2 \\ C \end{pmatrix}$$

Where:

$$a_{ij} = \frac{x_{ij}}{X_j} \ , \quad w_i = \frac{W_i}{X_i} \ , \quad c_i = \frac{C_i}{C}$$

The a_{ij} are the technical coefficients that symbolize the intermediate purchases (x_{ij}) divided between the total production value (X_j). Moreover, the c_i are the ratios between the consumption of products of each sector (C_i) and the total consumption in goods and services of the residents (C). Finally, the w_i are the ratios between the incomes generated in each sector (W_i) and the total production value(X_i).

A two region model

Originally, the applications of input-output model were undertaken at national level, but the growing interest in trying to identify the economic impacts that are more geographically disaggregated resulted in input-output tables being developed at regional level, too. In this way, we can consider the peculiarities of a sub-national productive structure. The national intermediate coefficients are somehow an "average" of flows of individual producers who are located in specific regions, and the structures of these regions can be identical or differ considerably.

The main problem is that the one-region models do not recognize all the interdependencies between regions. In other words, each region appears as if were disconnected from the others. The first model that considers the possible inter-regional linkages was shown by Isard in 1951 with the "*Interregional and Regional Input-Output analysis: A Model for a Space Economy*." During later years, this extension of the Leontief model was called the "Isard model".

So, using *L* and *M* as two sub-regions of *R* (Miller and Blair, 1985), the new intermediate consumption matrix can be identified as:

$$Z = \begin{bmatrix} Z^{LL} & Z^{LM} \\ Z^{ML} & Z^{MM} \end{bmatrix}$$

Where Z^{LL} and Z^{MM} represent the intra-regional flows, and Z^{ML} and Z^{LM} the inter-regional flows. Thus, while the elements of the Z^{ML} correspond to intermediate exports from *M* to *L*, at the same time they also represent intermediate imports that come from *L* to *M*, and vice versa with the elements of Z^{LM}. Consequently, the bi-regional model can be described in a matrix structure, considering also that the sum of X^L and X^M equal to the total output of the region R (X^R):

$$\begin{bmatrix} Z^{LL} & Z^{LM} \\ Z^{ML} & Z^{MM} \end{bmatrix} \begin{bmatrix} D^L \\ D^M \end{bmatrix} \begin{bmatrix} X^L \\ X^M \end{bmatrix}$$
$$\begin{bmatrix} IP^L & IP^M \end{bmatrix}$$
$$\begin{bmatrix} X^L & X^M \end{bmatrix}$$

The main advantage of this extension is that if we consider an increase in final demand for the product produced by sector *i* in region *L,* some of the inputs to make it will come from industries outside the region, for example, in our case from region *M.* Therefore, this causes a stimulus of production in *M,* which will cause, through an inter-regional chain effect, a greater demand for new products in the region *L* and so on, until the marginal effect is practically zero. Thus, there is a feedback effect in these types of models, since there is a connection between *L* and the region itself through *M.*

There appear only a few applications based on the model described by Isard due to the amount of information necessary to conduct it. Probably the most ambitious attempt to implement this model was done by Japan in 1960 using surveys to producers for nine different regions. Moreover, the data for the matrix should be updated every five years, becoming even more expensive and difficult. Another example is the model of three regions compiled by the Netherlands (Oosterhaven, 1981).

In order to compare the results that offer this type of analysis with the traditional of Leontief, we developed a model of two regions, Galicia (*G*) and Rest of Spain (*RE*), for the year 2005. Therefore, we are able to calculate the impact of tourism on *G* and its

effects in the second region *RE,* and for the total (Spain), taking into account the previously mentioned feedback effects[2].

The main assumptions for developing this model were: considering that the sum of intermediate flows, final demands, primary inputs and the total output of the economy of *G* and *RE* must be equal to the symmetric input-output table for the interior of Spain (without foreign imports) for 2005, published by the National Statistical Institute (INE). Likewise, therefore, the productive structure of Galicia is given by the symmetric interior table, published in 2005 by the Galician Statistics Institute (IGE) and the structure of the Rest of Spain is given by a subtraction of the previous intermediate flows.

A rectangular model

The construction of symmetric tables (ST) is a very expensive task because of the amount of information that is needed. Consequently, they are published every five years upon recommendation of the European System of Accounts. Thus, we just could estimate the models in separate points in time; nevertheless, the tables of supply and use (SUT) are prepared annually, so models based on them, such as the "simplified" model by Pereira (2006), could be the suitable approach for measuring impacts while the symmetric matrices are not available. That is, the rectangular models as we explain below are born with the idea of solving another problem: the possible obsolescence of the data offered by the ST through the development of alternative models. Specifically, this section will show the fundamentals of the rectangular model of Pereira, in order to compare with the results obtained in the traditional Leontief model of the year 2005.

[2] Briefly, to simplify the model of Isard we will apply the formulation of Riefer and Tiebout (1969) consisting, like Batten and Martellato (1985) explain, in combining the classical approach of Isard in the intra-regional flows and the formulation of Chenery-Moses (1953, 1955) for the inter-regional ones. As it was explained before, Isard's model considers that there is information available to the entire matrix of intermediate flows, including those who go from any sector of the region *L* to another of the region M, which complicates and increases the cost of this methodology. Simplification of the Chenery-Moses approach means to consider that each of the four sub-matrices of *Z* is diagonal. Combining both as was proposed by Riefer and Tiebout only $Z^{ML}$and Z^{LM} are diagonal which in our case is more appropriate, taking into account that we have information of the input-output symmetric matrices for Galicia and Spain for the same year, 2005.

Briefly, based on the product identity by leaning on the relationship between demand and supply interior flows:

$$q = X + y - m$$

Where q represents the production by products, y symbolizes the final demand vector, m the imports vector and X the intermediate inputs matrix. On the basis of the stability of technical coefficients, we replace the intermediate demand X for Bg, knowing that B is the total non-homogeneous technical coefficients matrix and g the vector of production by sector[3], thereby obtaining:

$$q = B^d g + y^d$$

If we work with the hypothesis of product technology[4], the next step would be to replace q by Cg:

$$Cg = B^d g + y^d$$

or, alternatively, in order to explain the production vector for industries:

$$(C - B^d)g = y^d$$

Considering that the number of products is higher than the number of sectors, as is usually the case, the problem arises because the obtained matrix is a rectangular one and, obviously, we need to invert it. Without making an aggregation of products in order to obtain a square matrix, apt to be used in a standard inversion, Pereira proposes to take g using the generalized inverse of Moore-Penrose.

[3] The super index *d* refers to domestic or internal flows.

[4] We can distinguish two different hypotheses regarding the relationships between products and production by industry:

a) Relying on structures by columns, there are models based on the assumption of the product technology, where each product is produced with a certain technology, without taking into account the economic sector where is produced. Thus, we are considering the stability of the coefficient matrix of specialization, C.

b) Relying on structures by rows, the models are based on the assumption of the industry technology, where each product is produced according to the technology sector, in which the secondary products are produced as the main products. In this case, what is being considered is the stability of the market coefficient matrix, D.

Multiplying both sides by $(C - B^d)_x$ and simplifying, we obtain the rectangular demand model for non-homogeneous industries[5]:

$$g = (C - B^d)_x y^d$$

By building this model with a rectangular matrix (sectors per product), we can infer how each element(β_{ij}^d) reflects the additional amount generated by the industry *i* if we increase the final demand of product *j* in one unit.

Likewise, the relative production of each sector can be expressed as:

$$g_i = \sum_{j=1}^{m} \beta_{ij}^d \, y_j^d$$

$$\forall i \in \{1,2,3,\dots,n\}; \forall j \in \{1,2,3,\dots,m\}$$

3. TOURISM AS AN ECONOMIC ISSUE

The fact that the term tourism comprises a whole set of heterogeneous activities that involve several sub-complex relationships between each, causes that appears some very different definitions. Among them all, in order to clearly delimit this field, we will select one established at 1991 by the World Tourism Organization in the Ottawa Conference on Travel and Tourism Statistics where the concept of tourism was defined as:

> "*The activities of persons traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes*".

This definition[6] allows us to highlight some important conditions in order to identify when and how the visitors acquire the status of travelers for touristic purposes. It is

[5] The sub-index *x* refers to the generalized inverse of Moore-Penrose.

[6] We can draw some interest conclusions about this as: tourism is not only equivalent to leisure or vacations; people who travel and take vacations within their usual environment are not visitors; those who are continuously traveling on vacation for more than one year are not visitors or among others, also excluded are those travelers who are paid at the destination place as immigrants, guest speakers or artists.

relevant if we take into consideration that they transform in tourism their travels and their expenditures. Following the WTO, we can define different concepts, taking into account the viewpoint of the destination place:

Traveler: any person, resident or not, who moves in or out his usual environment for any reason and by any kind of transport. Travelers include the categories of visitors and other travelers.

Visitor: anyone who moves to a different place from their usual environment, either inside or outside their country of residence, for a duration of less than twelve months, whose primary purpose is not having a paid job in the visited place (the concept of pay does not include benefits to the costs of transport and subsistence). The notion of tourist is divided into two distinct categories: tourists and excursionists. This division depends on the criterion of staying in or not for at least one night.

Tourist: temporary visitor in a country that remains at least 24 hours for personal or business purposes[7], i.e., the tourist must stay at least one night in ahotel or a similar site for accommodation at the visited place.

Excursionist: temporary visitor who remains in a site less than 24 hours also for personal or business reasons, without having any overnight stay in the visited place. Within it are also included cruise passengers who sleep on the ship, and, consequently, owners and passengers of yachts and other private ships.

[7] In general, the vulgarization of the term tourist results that it is understood as visitors traveling for pleasure or on holidays. Of course, tourists are not only visitors with recreational purposes, but also people who travel for other reasons, mainly business and other visits when they sleep at the destination. In this sense, following the reason of the travel perspective we can divide the visitors in: visitors for personal reasons, which would include leisure travel, kinship or friendship, education and training, health, religion, shopping and others, and visitors for business purposes, which includes people who move as a result of their occupation, and to attend conventions and conferences or make some purchases, sales or other activities related to their business.
The distinction between business tourists and leisure tourists is relevant for two main reasons. First, they form two distinct market segments. Second, because their levels of expenditure at the destination are different. While visitors for holidays are more in volume than the visitors for business, the last ones are those with a higher per capita spending at the destination. Moreover, while holiday travel can be considered as final demand, business travel is a derived demand, i.e. an input in the production of other goods and services. Finally it is obvious that holiday tourism has a seasonal component much more relevant than the business tourism.

From another point of view, following the perspective of residence and destination of the travel, we obtain the classification of tourist flows (Table 1). This will helps us to define the concepts of internal tourism, outbound tourism, inbound tourism, interior tourism, national tourism and international tourism. Thus, it identifies the tourism trade with different trade flows.

Internal tourism is that made by the residents of the country as visitors who travel only within the same country. The *inbound tourism* is the tourism made by non-residents traveling within the country they chose, and the *outbound tourism* is made by the residents of the country since they travel to another country.

Table 1 - Tourism flows.

		Destination territory		
		Inside the same economic territory	Outside the economic territory	TOTAL
Residential territory	Resident	**INTERNAL TOURISM**	**OUTBOUND TOURISM**	*NATIONAL TOURISM*
	Non residents	**INBOUND TOURISM**		
	TOTAL	*INTERIOR TOURISM*		

Source: Methodological rules of the Spanish Tourism Satellite Account (2002).

The previous tourism flows can be combined in different ways in order to show three new categories of tourism: *Interior tourism*, which includes internal tourism and inbound tourism, *national tourism*, includes internal tourism and outbound tourism, and finally, *international tourism* which is the sum of the *inbound tourism* and the *outbound tourism*.

4. COMPOSING THE FINAL DEMAND VECTOR

As was shown above when we explained the fundamentals of the models, the next step is to prepare the final demand vector for Galicia. We need to obtain the *interior tourism consumption*, i.e. the multiplication of 1) the number of internal and inbound visitors, 2) their daily expenditure and 3) the number of days that they stay in the territory.

Thus, for the calculation of *inbound touristic consumption*, we chose to use official data from the Galician Statistics Institute (IGE), and more specifically, from the Input-Output framework of 2005 (MIOGA 05) where we got the data about the non-residents' consumption, 1.838.809.000 €. Based on our own estimations derived from different sources like the Hotel Occupation Survey (EOH) published by the National Statistical Institute (INE) and surveys such as Frontur, Familitur and Egatur from the Institute of Tourism Studies (IET), we can get the *internal tourism consumption*, which is 1.319.937.595 €. As a result, adding this two concepts we obtain the total *domestic or interior tourism consumption*, i.e.3.158.746.595 €.[8]

After that, following the analysis, we need to know the composition of the expenditure, that is, the products in which the visitor or types of visitors spent their budget. Here, we can choose between two scenarios to calculate the *internal tourism*: in the one hand, to assume that residents consume in the same way when they are in their country of residence than when they are demanding activities related to tourism, and in the other hand, to assume that their consumption behavior is similar to non-residents (*inbound tourism*). Both options are unsatisfactory and we should work in a more disaggregated scheme that allows us to divide the consumers into the maximum possible number of groups (tourists and excursionist, pilgrims, different visitors by residential territory, etc.) because the consumer profile is certainly different. For the structure of non-residents' consumption, the best information we are able to use is the one published in the Input-Output framework of Galicia for 1998 (MIOGA 98), a pioneer analysis in Spain. Instead, for the residents consumption expenditure structure, that is offered by Input-Output framework of Galicia for 2005 (MIOGA 05), to be precise the structure of final consumption expenditure in domestic households. To avoid compromising the results due to the used assumption, we present both possibilities in the following tables:

[8]There is a problem in this region, with the tourism sources and the information that can be found. It is very difficult to obtain reliable statistics related to these issues (number of visitors, daily expenditure or number of days of the stay) mainly, because we are taking into account a territorial point of view (destination) and not an industrial perspective.

Table 2 - Composition of the expenditure (Thousands of €). Hypothesis 1.

	Inbound touristic consumption	**Internal touristic consumption**	**Composition of the expenditure**	**Total tourist expenditure**
Restaurants	663.636	476.365	36.09%	1.139.991
Accommodation	519.288	372.750	28.24%	892.030
Real estate activities	196.939	141.365	10.71%	338.301
Recreational, cultural and sporting activities	155.014	111.271	8.43%	266.282
Post and telecommunications	40.271	28.907	2.19%	69.176
Manufacture of coke, refined petroleum products and nuclear fuels	24.824	17.819	1.35%	42.643
Renting of machinery and equipment without operator and of personal and household goods	22.434	16.103	1.22%	38.536
Land transport; transport via pipelines	20.779	14.915	1.13%	35.693
Other service activities	19.492	13.991	1.06%	33.482
Manufacture of food products and beverages	18.388	13.199	1.00%	31.587
Other activities	157.588	113.119	8.57%	270.704
Total	**1.838.837**	**1.319.938**	**100.00%**	**3.158.747**

Source: Own elaboration from data of MIOGA 98 and MIOGA 05.

As can be clearly seen the composition of the total tourist expenditure varies considerably depending on the chosen hypothesis. When residents and non-residents consume in the same way, the main expenditures are the restaurants, accommodation, real estate activities and recreational and cultural activities. Among them these add up to 83.47% of total spending. Instead, in the second case, the incidence of these activities descends to 66.52%, mainly due to the structure of final consumption expenditure of the resident households. In fact, in this structure they are entering many other sectors that previously did not form part on the vector, as they can be the wholesale and the retail trade, health activities or the sale and repair of motor vehicles.

Table 3 - Composition of the expenditure (Thousands of €). Hypothesis 2.

	Inbound touristic consumption	Internal touristic consumption	Composition of the inbound expenditure	Composition of the internal expenditure	Total tourist expenditure
Restaurants	663.628	275.471	36.09%	20.87%	939.099
Accommodation	519.346	34.186	28.24%	2.59%	553.532
Real estate activities	196.952	196.671	10.71%	14.90%	393.623
Recreational, cultural and sporting activities	155.032	59.925	8.43%	4.54%	214.957
Retail trade, except of motor vehicles and motorcycles; repair of personal and household goods	0	157.997	0.00%	11.97%	157.997
Wholesale trade and commission trade, except of motor vehicles and motorcycles	0	72.729	0.00%	5.51%	72.729
Post and telecommunications	40.286	36.562	2.19%	2.77%	76.848
Health and social work	0	51.346	0.00%	3.89%	51.346
Sale, maintenance and repair of motor vehicles and motorcycles; retail sale services of automotive fuel	11.722	41.578	0.64%	3.15%	53.300
Land transport; transport via pipelines	20.693	22.175	1.13%	1.68%	42.868
Other activities	231.177	371.166	12.57%	28.12%	602.343
Total	**1.838.809**	**1.319.938**	**100.00%**	**100.00%**	**3.158.747**

Source: Own elaboration from data of MIOGA 98 and MIOGA 05.

5. RESULTS FOR GALICIA

Taking into account all these data we can make some simulations about the economic impact of tourism in the Galician region, using the methodology described in the second section. We begin by presenting the results of the different models with the following indicators: Total Output multiplier, Gross Value Added (GVA) multiplier and employment multiplier.

Total Output and GVA multipliers symbolize how many euros are directly and indirectly required to be produced in order to satisfy each initial euro of the touristic demand. Thus, 1,45€ of domestic production is needed to satisfy 1€ of the interior tourism demand and, 0,75€ of that amount is GVA production (the rest is intermediate consumption). In the case of employment multipliers, they are measured in number of jobs per million euros spent by the final demand.

Table 4 - Results for Galicia.

		Leontief model	Induced model	Bi-regional model	Rectangular model
Interior tourism H.1	Output multiplier	1,4465	2,1893	1,4289	1,2643
	GVA multiplier	0,7512	0,9663	0,6357	0,6168
	Employment multiplier	15,7813	21,3878	16,0179	13,3993
Interior tourism H.2	Output multiplier	1,449	2,2192	1,4295	1,2693
	GVA multiplier	0,7561	0,9792	0,6359	0,6182
	Employment multiplier	17,3174	23,1309	16,0247	14,7096
Outflows to ROS (Spillover) H.1	Output multiplier	…	…	0,1540	…
	GVA multiplier	…	…	0,1159	…
	Employment multiplier	…	…	2,5489	…
Outflows to ROS (Spillover) H.2	Output multiplier	…	…	0,1413	…
	GVA multiplier	…	…	0,1142	…
	Employment multiplier	…	…	2,6190	…
Inflows (Feedback) H.1	Output multiplier	…	…	0,0336	…
	GVA multiplier	…	…	0,0824	…
	Employment multiplier	…	…	0,3008	…
Inflows (Feedback) H.2	Output multiplier	…	…	0,0335	…
	GVA multiplier	…	…	0,0670	…
	Employment multiplier	…	…	0,7513	…

As we can see in table 4, the highest difference between scenarios with the classic demand model appears in the employment multiplier (close to 16 jobs per million euros

with the first one against 19 jobs with the second one). In percentage, it is between 4,59% and 5,04% depending on the hypothesis, i.e. between 49.849 and 54.701 equivalent jobs. As a result, it can be highlighted that the more diversified the touristic vector is, the more employment will be required to satisfy each euro of touristic consumption. However, the difference for the Total Output and GVA multipliers appears to be much lower. The significance of tourism in Galicia is between 4,73% and 4,74% of the Output and between 5,51% and 5,54% of the GVA in 2005, depending on the hypothesis.

Relaxing the assumption of no household's consumption, or in other words, if we implement the induced impact model, we obtain the results divided into different effects (direct, indirect and induced impacts). We calculate this model to get the income effects that appear due to resident workers' wages (between 49,849 and 54.701 jobs as it was estimated before) and the expenditure that they make with this budget.

Thus, taking into account the households[9], the total effect of Tourism in Galicia is between 7,16% and 7,25% of the Output depending on the hypothesis. Disaggregating, we can observe that the direct impact is 3,27%, the indirect between 1,46% and 1,47% and finally, the induced effects between 2,43% and 2,56%.

In terms of multipliers, the induced effect increases the results of the Leontief model between 0,7493€ and 0,7702€ of Output and between 0,2151€ and 0,2231€ of GVA per every euro of final demand. Additionally, the employment multiplier grows between 5,60 and 5,82 jobs. These results confirm that with the second scenario, the higher the number of jobs generated, the more consumption is made and consequently, the higher the induced impact on the economy.

Relaxing the assumption of no more regions, we present the results obtained with the Bi-regional model of Galicia-Rest of Spain. With this model we can draw conclusions about what impact tourism has in Galicia over other Spanish regions and over the total for Spain. Once implemented, the results are quite similar to those obtained with the traditional demand model. With this model (open for the income of households), interior tourism has a total impact between 1,4625€ and 1,4630€ of Output (interior +

[9] Here we are assuming that all the earnings they receive will be spent, so there is no savings.

feedback effects), between 0,7181€ and 0,7029€ of GVA and between 16,32 and 16,78 jobs, depending on the scenario.

The spillover effects, i.e. the outflows of tourism for the Galician economy that goes to the Rest of Spain (ROS) are remarkable. From every euro that a visitor spend in Galicia, between 0,15€ and 0,14€ of Output and between 0,116€ and 0,114€ of GVA goes away. In employment terms, if Galicia doesn´t need to import any products from the Rest of Spain to satisfy the visitors demand, it would be generated between 8.049 and 8.270 jobs.

The feedback effects can be calculated as the difference between the total effects for Galicia and those which were obtained without taking into consideration the second region (interior). For example, the gains of tourism from the ROS are 0,03€ of Output and between 0,08€ and 0,06€ of GVA per every euro. The employment per million euros grows between 0,30 and 0,75 jobs (in 2005 case between 947 and 2.368 jobs). This large difference in the employment results appears due to the higher imports of agricultural products from Galicia to ROS, which comes out with the second hypothesis. As the last point, for the whole Spanish economy tourism in Galicia represents between 0,34% and 0,33% of the GVA and between 0,19% and 0,20% of the employment (between 59.587 and 61.261 jobs).

Finally, we relax the homogeneity assumption, allowing industries to be able to produce more than one product. With the rectangular model we simulate the same impact of tourism in Galicia, with the idea of testing if the result obtained can be used as a more or less reliable approximation of the traditional model, while the symmetric table is not available. As is shown in Table 4, when this model is implemented, it give us lower results: underestimates the GVA by a little more than 1%, and the employment is also lower, by between 0,69% and 0,76% (between 7.564 and 8.279 jobs), depending on the hypothesis.

Also the multipliers are lower than in the Leontief model: the Total Output multiplier decrease in 12,5%, the GVA multiplier between 17,8% and 18,3% and the employment multipliers descend 15,1%. Despite this difference, the results are quite satisfactory taking into account the possible existence of some negative values that appear in the process, although, usually very small ones.

6. CONCLUSIONS

With simple observation we can notice that tourism has reached such importance nowadays that it is hardly comparable with any other economic activity. It could be said that it is a phenomenon that became universal in the late twentieth century with improvements in quality of life but it is still under expansion. Nevertheless, the comparisons between different studies on this subject reflect an important problem of definition. In fact, when we talk about tourism in the strict sense we are considering it almost as a residual concept (what is not considered migration, or who does not receive wages, etc.). This causes differences between some outcomes and indicators, and sometimes comes to serious contradictions.

Despite this, as we have explained in the paper, the analysis of the economic impact of tourism should be based on expenditures made by visitors. But not only that, the fact of limiting the benefits of tourism to touristic consumption without accounting for the existence of indirect and induced impacts would be wrong. In other words, if we were trying to calculate what would happen to the Galician economy if the visitor arrivals disappear, we need to take into account all these effects. For this reason, these types of impact studies (and especially about the tourism phenomenon) are usually implemented through demand-based models of input-output (IO) or computable general equilibrium.

With this IO methodology, the results for the Leontief model indicate that the significance of tourism in Galicia is between 5,51% and 5,54% of the GVA in 2005, and between 4.60% and 5.04% of the jobs, i.e. between 49,849 and 54,701 equivalent jobs. These results appear when not considering the spending on public tourism expenditure (for instance tourism promotion) or investment. This interval is marked by the difficulty to compose the final demand due to the deficiency of the information provided for the statistical data sources. In fact, we must choose between two structural hypotheses about the tourism expenditure of the residents in order to be able to estimate the model. On the one hand, we assume that its structure is equal to non-residents and on the other hand, that is equal to residents in general, without taking into account that they are visitors. This difference does not make many changes in the results for the GVA, but it appears to be significant in the case of dependent jobs or, in the employment multiplier.

The effect on the different multipliers depends on the assumption we relax. As we expected, relaxing the assumption of no household's consumption or the assumption of no more regions we obtain higher multipliers due to the induced effects in the first case and the feedback effects in the second one. However, if we relax the homogeneity assumption, allowing industries to be able to produce more than one product, we get lower multipliers. To conclude, it is important to be aware with the assumptions and limitations our model has when we estimate the economic impact of tourism.

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