Welfare effects of tourism consumption: A CGE model for the Galician economy

Abstract

When the poor are not involved in tourism (actively or passively), tourism activities will help to make social inequalities deeper and will enlarge the gap between those with access to capital (physical and human) and those who are on the threshold of subsistence. Additionally, the better way of determining the degree of participation of low-income population is not through disposable income measures, but from a welfare point of view. This takes into account not only revenues gained from tourism but also the access to tourism products and the subsequent utility generated. Therefore, the main aim of this paper is to calculate how an increase in tourism consumption affects to households welfare disaggregated by level of income, using a static regional CGE model calibrated with a 2008 Galician SAM.

1. Introduction

Tourism activities can make social and economic inequalities deeper. Additionally, the better way of determining the degree of participation of low-income population is not through disposable income measures, but from a welfare point of view. This takes into account not only revenues gained from tourism but also the access to tourism products and the subsequent utility generated.

Furthermore, during the current economic crisis, different tourism policies have been applied in Spain, such as the "tourism tax" in Catalonia, in order to increase revenues for the regional governments. This can imply a change in the level of prices, the number of overnights stays, overall consumption of visitors and, consequently, on disposable income and welfare of domestic households, among others.

Therefore, the main aim of this paper is to evaluate, in terms of welfare, the economic consequences of an expansion in tourism consumption and different tourism policies in a regional economy like Galicia, through a CGE model. As a first attempt, we developed a basic static regional CGE model for Galicia calibrated with the 2008 SAM. Results of impact simulations and increases in Value-Added Tax (VAT) for tourism characteristic activities are presented as different simulation scenarios.

CGE models can be defined as a system of non-linear equations obtained from the optimized behaviour of the main economic and institutional agents. In this kind of models, the equilibrium (supply equals demand in all markets) is achieved with adjustments in prices and quantities at the same time, describing the circular flow of income and the possible substitutions between consumption and factors derived from elasticities. In this sense, CGE models are designed to serve for empirical analysis and the evaluation of economic policies.

In the next section of this paper we present a literature review regarding CGE models and their application to tourism issues. Sections 3 and 4 describe the characteristics of the CGE model proposed and explain the functional forms used, as well as the closure rule chosen. After this, we explain the steps for the calibration in Section 5. Then, we present three scenarios with a ten per cent increase in inbound tourism consumption and four tourism taxation scenarios, increasing the value-added tax on tourism products and the results obtained in Section 6. Finally, the last section shows the main conclusions drawn from this paper.

2. CGE models applied to tourism

In this section we will briefly review the main applications of CGE models in tourism economics. Despite the fact that tourism lends itself to CGE analysis as it is, by nature, a multi-sector activity (Blake, 2000), there is not extensive literature analyzing issues related to tourism using this methodology (Dwyer, Forsyth and Spurr (2004), Blake, Gillham and Sinclair (2006) and Laffargue (2009). We can divide this literature into four sub-topics: taxing foreign tourism, tourism and poverty, interregional effects of tourism and impact studies. At the end of the section, we also add some regional examples of CGE models applied to Spanish regions.

Taxing foreign tourism

The monopoly that the government has on the market of products consumed by visitors can be used to extract income from them through taxes, which can either be levied on tourism businesses or directly on visitors. The degree of inelasticity of demand depends mostly on the degree of differentiation of the destination and affects this ability to tax. The greater the degree of differentiation of the destination, the more inelastic demand will be and, therefore, the greater the possibility of taxation as Gooroochurn and Sinclair (2003) explain.

A model for analysing the effects of an increase in the levels of taxation on foreign tourism in Spain is elaborated in Blake (2000). In this paper, results show that this increase in tax rates will cause a welfare gain for the residents, since visitors are the ones that receive most of the negative effects of the tax and the consequent decrease in welfare.

Gooroochurn and Sinclair (2005) presented a similar study for the economy of Mauritius finding also that taxing foreign visitors increases domestic welfare. Another outcome in this paper is that increasing taxes on tourism-related sectors also reduces income inequality, since richer households have a higher proportion of consumption of tourism products than low-income ones.

Tourism and poverty

CGE models also allow us to show how the circular flow of income works and, hence, the response of different types of households to exogenous shocks. Based on this income distribution mechanism, tourism consumption and its possible effects on income inequality and poverty levels of an economy can easily be associated.

Wattanakuljarus and Coxhead (2008) presented some simulations for Thailand with a CGE model revealing that, although tourism growth benefits all household classes, high-income and non-agricultural households receive the greatest gains.

Another study that implements a CGE model in order to calculate the effects of tourism on poverty relief and income redistribution in Brazil is Blake, Arabache, Sinclair and Teles (2008). The results show that low-income households benefit, but less than some

higher income groups. Therefore, both papers conclude that tourism demand expansion is not pro-poor as is often assumed.

Interregional effects

Adams and Parmenter (1995) analyze the effects of an additional ten per cent expansion in tourist arrivals using the ORANI model for Australia. This interregional model shows that regions within the country can be affected differently during a tourism boom. In particular, the state of Queensland experienced a negative effect in its domestic product due to the decline of traditional exports, and Victoria (having one of the major airports in the country) had better results overall.

Impact studies

The most typical analysis in tourism and CGE models is evaluating the impact of a change (rise or fall) in tourism demand (generally inbound) on an economy. Along these lines, Zhou, Yanagida, Chakravorty and Leung (1997) among other examples, study the economic impact of a ten per cent decline of visitor expenditures in Hawaii. They conclude that this decrease will largely affect the industries closely related to tourism (accommodation and transport services, and eating and drinking industries), as expected. Other similar papers that provide quantitative estimations of tourism impact are Sugiyarto, Blake and Sinclair (2003) for Indonesia or Madden and Thapa (2000) for Australia.

Regional cases in Spain

Although tourism plays a very important role in the Spanish economy and there are several studies applying CGE models to analyze different topics at a regional level such as tax reforms (Cardenete and Sancho (2003) and Cardenete (2004) for Andalusia and Llop and Manresa (2004) for Catalonia) or environmental policies (Manresa and Sancho (2004) for Catalonia, Cardenete, Fuentes and Polo (2008) for Andalusia and De Miguel, Cardenete and Pérez (2009) for Extremadura), to our knowledge, there is only one paper studying the regional effects of tourism: Polo and Valle (2008) for the Balearic Islands.

In this paper, Polo and Valle present a comparison of the effects of a ten per cent decline in visitors' expenditures in the Balearic Island economy using an IO, a SAM,

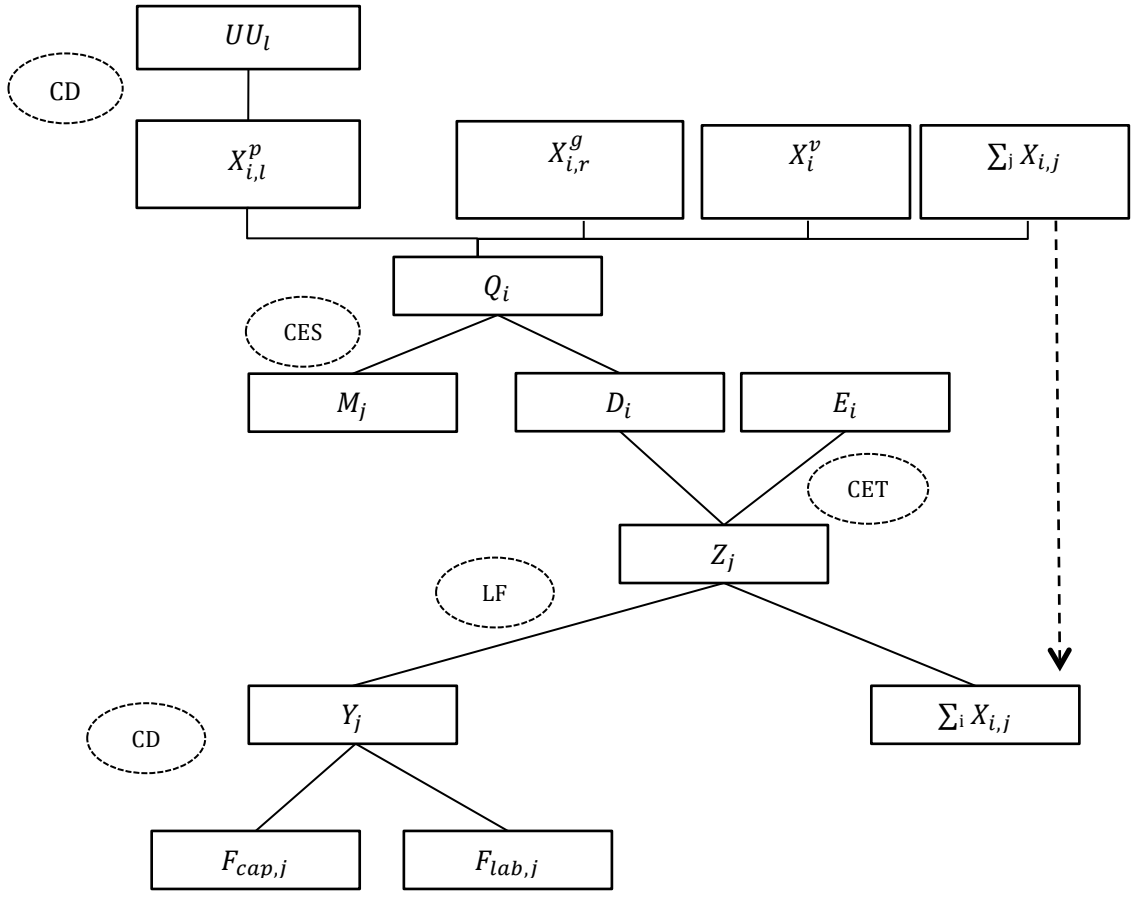
and a CGE model. These models were implemented with the 1997 IO table and a SAM constructed by the authors for the same year. The CGE model used is a static regional model with 24 sectors, one representative household, two governments (regional and central) and one foreign sector. Depending on the closure rule selected, results can vary from a 0.31% positive change of the real GDP with the savings driven closure to a -4.44% change with the Keynesian closure.

3. Model specification for Galicia

The model is a static regional model based on the standard CGE model presented in Hosoe *et al*. (2010), similar to the models of Condon *et al*. (1987) and Dervis *et al*. (1981), and it is calibrated with the 2008 Galician SAM. Figure 1 offers a general idea of the standard CGE model and its functional forms.

Capital and labor ($F_{cap,j}$ and $F_{lab,j}$) are aggregated into the composite factor (Y_j) using a Cobb-Douglas function. This composite factor is combined with the intermediate inputs ($\sum i\ X_{i,j}$) to produce the total output (Z_j) using a Leontief function. The total output is transformed into exports (E_i) and domestic goods and services (D_i) using a Constant Elasticity of Transformation function. The domestic good is combined with imports (M_j) to produce the composite Armington's good (Q_i) with a Constant Elasticity of Substitution function. At this point supply meets demand. The Armington composite good is distributed among households consumption, governments consumption, investment and intermediate uses ($X_{i,l}^{p}$, $X_{i,r}^{g}$, X_i^v and $\sum_j X_{i,j}$). Finally, households utility (UU_l) is generated by the consumption of tourism characteristic products and non-tourism products using a Cobb-Douglas.

Figure 1 - Overview of the CGE model specification and its functional forms*



*CD stands for a Cobb-Douglas function, CES for a constant elasticity of substitution type of function, CET for a constant elasticity of transformation function and LF for a Leontief type of function

UU_l – *Utility*

$X_{i,l}^{p}$ – *Household consumption*

$X_{i,r}^{g}$ – *Government consumption*

X_i^v – *Investment*

$\sum j\ X_{i,j}$ – *Intermediate uses*

Q_i – *Composite good (Armington good)*

$F_{cap,j}$ *and* $F_{lab,j}$ – *Productive Factors*

M_j – *Imports*

D_i – *Domestic good*

E_i – *Exports*

Z_j – *Total Output*

Y_j – *Composite factor (value-added)*

$\sum i\ X_{i,j}$ – *Intermediate inputs*

4. Closure rules

There is extensive literature regarding macro closures of CGE models, starting with the first paper of Sen (1963) on this topic. Taylor and Lysy (1979) found that the choice of closure affected the policy simulation results obtained, and therefore selecting the most realistic closure rules for the economy we want to describe is an important matter. Based on the papers of Rattso (1982), Dewatripont and Michel (1987), Thissen (1998), Valle (2004) and Álvarez (2010), we can define different options for choosing a macro closure.

Equilibrium for Factor markets:

- Productive factors are plenty used.
- Productive factors are underused.

Equilibrium for Government behaviour:

- Public consumption is exogenous with fixed tax rates and public savings being flexible.
- Public consumption is exogenous with a fixed propensity for public saving and endogenous tax rates.
- Public consumption is endogenous with a fixed propensity for public saving and fixed tax rates.

Equilibrium for Foreign deficit:

- Foreign savings are fixed and the exchange rate is endogenous.
- Foreign savings are endogenous and the exchange rate is fixed.

Equilibrium for Investment-savings:

- Private investment is endogenous and the propensity for private saving is fixed. (Savings driven).
- Private investment is exogenous and the propensity for private saving is flexible and endogenous. (Investment driven).

In this first attempt of our model, we choose a macroeconomic closure rule that follows the neoclassical equilibrium for factor markets (productive factors are plenty used). We also consider that public consumption is endogenous with a fixed propensity for public savings and fixed tax rates. For the foreign deficit, foreign savings are fixed and the exchange rate is considered as endogenous. And finally, this model is savings driven, so private investment is endogenous and the propensity for private saving is fixed.

5. Calibration of the model

The purpose of the calibration step is to solve the unknown parameters of the system. As usual, we consider that all prices in the model are equal to one in the base year and, then, values in the SAM are equal to quantities (Harberger, 1962). As we already stated, the SAMGAL-08 is the central database used to specify the scale parameters and the fixed variables of the model.

Table 1 – Value of the Armington elasticities of substitution and transformation

Sector Code	Activities	Value of the Armington and transformation elasticities
1	Primary sector	2.31
2	Mining and quarrying products	2.80
3	Food products and beverages	2.80
4	Textiles, furs and leather	3.29
5	Wood and products of wood and cork	2.21
6	Pulp, paper and paper products	2.21
7	Coke, refined petroleum products and nuclear fuels	2.56
8	Chemicals, rubber and plastic products	1.90
9	Other non-metallic mineral products	2.80
10	Metallurgy and other basic metals	2.80
11	Machinery and equipment	2.99
12	Motor vehicles, and other transport equipment	5.20
13	Electrical energy, gas, steam and hot water	2.80
14	Other manufactured goods	2.80
15	Construction work	1.90
16	Public administration and defence services	1.92
17	Transport and communicating services	1.90
18	Accommodation services	1.90
19	Restaurant services	1.90
20	Cultural and sport services	1.92
21	Rental services	1.92
22	Other services	1.92

The elasticities of substitution between domestic production and imports are obtained exogenously from the well-known Global Trade Analysis Project (GTAP) (Hertel, 1997) and the SALTER model (Jomini *et al*., 1991), Table 1. We assume the same elasticities for substitution and transformation for tax simulations.

This model is homogeneous of degree zero in prices. Because of Walras' law, we can only solve the model for relative prices. As usual, we have to choose one good or factor as a numeraire and fix its price at one. In our case we choose the price of labor (wage) as a numeraire of the model.

6. Simulation results

6.1. Scenarios proposed

We are going to divide the scenarios on two: impact simulations of changes in tourism consumption and simulations of taxation on tourism characteristic activities.

Impact scenarios (presented in table 2) based on a similar expansion than the one experienced in Galicia in the celebration of the Xacobeo years:

Scenario 1: A ten per cent increase in total Inbound Tourism as is assumed for the years of Xacobeo celebrations, following the BBVA research analysis on the effects of the Xacobeo 2010 (BBVA research, 2011). They established a 10.9% growth in arrivals of visitors from the rest of Spain and an increase of 15.2% in arrivals of foreign visitors.

Scenario 2: A ten per cent increase in total Inbound Tourism but only in tourism characteristic activities.

Scenario 3: A ten per cent increase in total Inbound Tourism but only in hospitality services (S18 and S19). This scenario allows us to compare the results obtained with the ones of those which identify tourism as the hospitality sector, basically.

Table 2 – Impact scenarios

	SC1	SC2	SC3
	Δ 10% increase in Total Inbound Tourism	Δ 10% increase in Tourism characteristic products	Δ 10% increase in Hospitality
S1	8324	0	0
S2	0	0	0
S3	11492	0	0
S4	528	0	0
S5	194	0	0
S6	1652	0	0
S7	5932	0	0
S8	115	0	0
S9	229	0	0
S10	826	0	0
S11	0	0	0
S12	548	0	0
S13	3966	0	0
S14	690	0	0
S15	0	0	0
S16	0	0	0
S17	34353	34353	0
S18	31109	31109	31109
S19	62679	62679	62679
S20	6570	6570	0
S21	1593	1593	0
S22	63358	63358	0
	234158	199662	93788

Taxation scenarios:

Scenario 4: VAT rate change from eight to ten per cent in accommodation services, as was altered in the fiscal reform of 2009.

Scenario 5: VAT rate change from eight to ten per cent in restaurant services and similar establishments, as was altered in the fiscal reform of 2009.

Scenario 6: Scenarios 1 and 2 at the same time, as were changed in the fiscal reform of 2009.

Scenario 7: A hypothetical VAT rate change from eight to 21 per cent for these two products, moving them to a higher taxation bracket from a reduced type to a normal type.

6.2. Results obtained from impact simulations

Production and other macroeconomic results

As expected, an increase in inbound tourism consumption has a positive impact on sectors related to tourism characteristic products (transport and communication services, accommodation services, restaurant services and cultural and sport services), as well as on those activities indirectly associated (food and beverage products, the primary sector and other services). For example, in the first scenario, a ten per cent increase in inbound tourism consumption mainly affects the production of accommodation services (+6.24%, +2.84% on domestic production), restaurant services (+1.53%) and transport services (+1.37%).

Nevertheless, the reallocation of resources between productive sectors, due to the savings driven closure rule used, causes other sectors (essentially associated with private investment goods and services such as construction (-2.65%) or machinery and equipment (-2.85%)) to fall when there is a decrease in the current account with the rest of the world (-7.38%). A similar result was also found in Valle (2004) and Álvarez (2010) when they simulated a decline in tourism consumption in the Balearic Islands and Spain, respectively.

Most of the remaining results are close to cero including prices, private and public consumption and total production.

Welfare effects

A direct measure of economic welfare is, by definition, utility. However, as Hosoe *et al*. (2010) note, utility has its weaknesses as a welfare estimator because it is ordinal by nature. Moreover, we cannot compare the amount of utility for different households either. Only when no household is worse off and at least one is better off, can we conclude that social welfare has improved, from the viewpoint of Pareto efficiency.

To overcome these limitations, we use Hicksian equivalent variations of the utility of each household and percentage changes in individual utility. We can define the Hicksian equivalent variations (EV) as follows:

$$\boldsymbol{EV = ep\left(p_i^{q0}, UU_l^{*}\right) - ep(p_i^{q0}, UU_l^{0})} \qquad (1)$$

Where ep is an expenditure function that indicates the minimum expenditure level that satisfies the given utility UU under a price vector p_i^q. For comparing situations in terms of utility levels (UU_l^* and UU_l^0), we have to control for different changes in prices using the base run price vector $p_i^{q\,0}$ (which gives us the same utility level) in both expenditure functions.

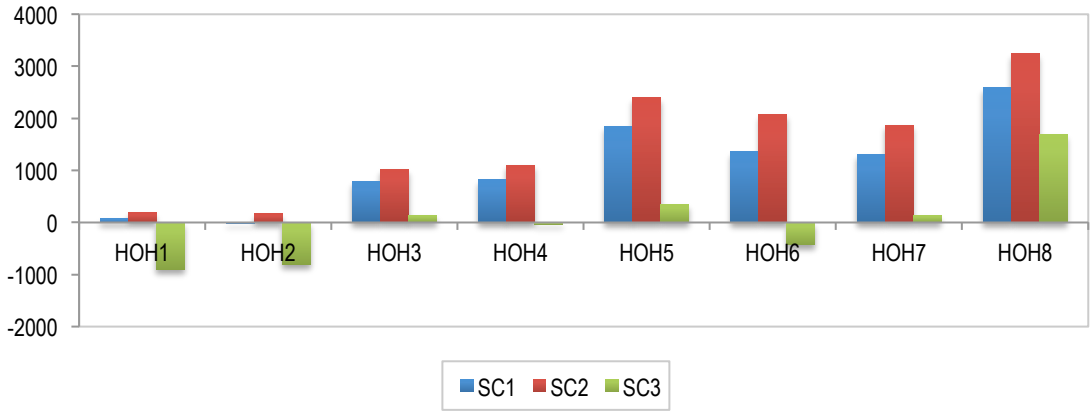
Once we explain how to measure welfare with our CGE model, results show that an increase in inbound tourism causes a positive impact on the welfare of the households. In terms of the Hicksian equivalent variation, inbound tourism (SC1) increases the social welfare of Galicia and also all individuals´ welfare, except for the second household. Nevertheless, considering the results in variation of the utility as well, in general all scenarios benefit high-income households more than low-income ones (Figure 2).

Table 3 – Results of the impact scenarios

		SC1	SC2	SC3
		Δ 10% increase in Total Inbound Tourism	**Δ 10% increase in Tourism characteristic products**	**Δ 10% increase in Hospitality**
Total production		-0.0540	-0.0499	-0.0326
Hicksian equivalent variation	HOH1	72.4317	190.2948	-896.3453
	HOH2	-22.6540	166.7460	-799.0866
	HOH3	785.1921	1020.8990	143.5406
	HOH4	818.7836	1103.2358	-31.7727
	HOH5	1849.2840	2393.5715	349.0259
	HOH6	1360.6039	2066.1521	-422.7075
	HOH7	1303.6623	1867.2710	141.3749
	HOH8	2588.3325	3244.2978	1698.4228
Change in utility	HOH1	0.0033	0.0087	-0.0410
	HOH2	-0.0007	0.0052	-0.0248
	HOH3	0.0296	0.0385	0.0054
	HOH4	0.0268	0.0361	-0.0010
	HOH5	0.0361	0.0467	0.0068
	HOH6	0.0244	0.0370	-0.0076
	HOH7	0.0241	0.0345	0.0026
	HOH8	0.0368	0.0461	0.0241

When we try to isolate the effect of tourism characteristic products, SC2 offers the best results of all the impact simulations. However, SC3, which only reflects an expansion in accommodation and restaurant services, presents a negative impact on the welfare of four households and it is only considerably positive for the richest families.

Figure 2 - Welfare effects of impact scenarios. Hicksian equivalent variations



6.3. *Results obtained from tax simulations*

Production and other macroeconomic results

In this section, the economy-wide effects of increasing the value-added tax on tourism products are presented through four more scenarios. Regarding SC6, we can see the effects of the fiscal reform of 2009 (where tourism products were included in the reduced products bracket) and in SC7 we simulate the inclusion of tourism products among the normal VAT rate.

These two scenarios have strong negative effects on domestic production in accommodation (-3.32% in SC6 and -17.00% in SC7) and restaurants services (-0.99% in SC6 and -6.32% in SC7) as expected, but also some influence on those activities with important linkages with them such as food and beverages industries (-0.17% in SC6 and -0.98% in SC7) and primary sectors (-0.05% in SC6 and -0.29% in SC7).

With regards to prices results, it can be seen that these policies increase the prices of these sectors in +0.83% and +0.93%, respectively, in SC6 and +4.46% and +6.19% in SC7, but they have different effects depending on the sector (SC4 and SC5). Taxing accommodation services will charge the effect mainly onto the inbound consumption

while in the case of restaurant services tax will be levied on domestic consumers, both final and intermediate ones.

Private consumption on these two sectors would fall progressively by level of income from -0.59% and 2.92% in accommodation and -0.69% and -4.51% in restaurants (for the lowest-income household) to -0.82% and -4.26% and -0.92% and -5.82% (for the highest-income household) in SC6 and SC7, respectively. This result is related to the increase in disposable income in Table 55. It can be seen also that public consumption and savings increase with the rise of VAT on these activities, as expected.

Finally, regarding trade impact, exports of accommodation will fall drastically a -7.57% in SC6 and -35.16% in SC7. Restaurants will also fall considerably, -2.94% in SC6 and -17.69% in SC7. On the other hand, imports of these activities will increase +1.13% and +0.99% in SC6 and +6.24% and +6.62% in SC7, which means a rise of the outbound tourism of Galicia.

Welfare effects

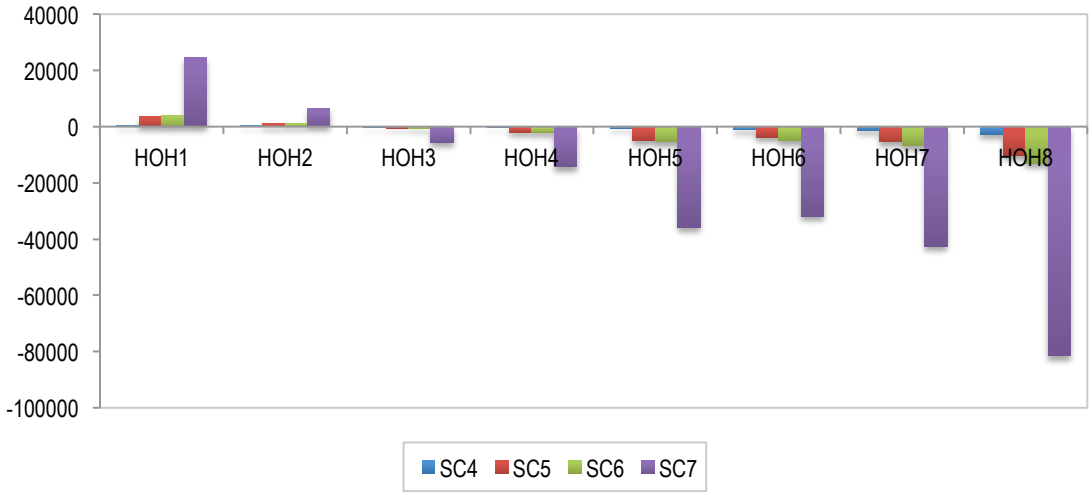
Table 58 shows results regarding welfare. As can be observed, these policies would make the poorest households better off, but the middle- and high-income households would be worse off (Figure 3). Therefore, increasing the VAT of tourism products would decrease inequality in terms of disposable income, but also social welfare in general. Distinguishing between policies, the increase in restaurants has more noticeable results than the same increase in accommodation since its relation with the domestic economy is higher.

Table 4 – Results of the taxation scenarios

		SC4	SC5	SC6	SC7
		VAT from 8% to 10% in accommodation	**VAT from 8% to 10% in restaurant services**	**VAT from 8% to 10% in accommodation and restaurant services**	**VAT from 8% to 21% in accommodation and restaurant services**
Total production		0.0322	-0.0025	0.0297	0.1323
Hicksian equivalent variation	HOH1	412.2014	3689.9063	4101.9897	24610.3785
	HOH2	249.8134	1016.6276	1266.2727	6495.1326
	HOH3	-207.6152	-542.1599	-749.7594	-5717.5139
	HOH4	-101.8178	-1992.4306	-2094.1187	-14323.7615
	HOH5	-576.9342	-4872.7243	-5448.8325	-35773.6941
	HOH6	-1165.2184	-3771.8789	-4935.7847	-31802.0161
	HOH7	-1337.1098	-5341.0463	-6676.3483	-42516.1070
	HOH8	-2721.3525	-10261.8481	-12978.4242	-81441.2595

Change in utility	HOH1	0.0189	0.1689	0.1878	1.1267
	HOH2	0.0077	0.0315	0.0393	0.2015
	HOH3	-0.0078	-0.0205	-0.0283	-0.2157
	HOH4	-0.0033	-0.0652	-0.0685	-0.4686
	HOH5	-0.0113	-0.0951	-0.1063	-0.6981
	HOH6	-0.0209	-0.0676	-0.0885	-0.5702
	HOH7	-0.0247	-0.0987	-0.1233	-0.7854
	HOH8	-0.0387	-0.1458	-0.1843	-1.1568

Figure 3 - Welfare effects of taxation scenarios. Hicksian equivalent variations



7. Summary and conclusions

This paper presented a first attempt of a CGE analysis of the macroeconomic and welfare effects of an expansion in tourism consumption and an increase on VAT rates in tourism products for Galicia. This framework allows us to estimate possible changes in utility, and we continue taking into account the full circular flow of income of the economy.

The design, formulation and calibration of the Galician CGE model proposed, was shown in the first part of this paper. This model is a static regional model with the particularity of presenting two governments (central and regional) and eight households, and is calibrated with the 2008 Galician SAM.

After we selected the closure rule followed and the external information used for the calibration, in the second part of the paper, results of three impact scenario and four tourism taxation simulations were presented.

As can be expected, an expansion in inbound tourism consumption would have a positive impact on tourism characteristic activities (transport and communication services, accommodation services, restaurant services and cultural and sport services), and also on those sectors indirectly associated (food products and beverages, the primary sector and other services). These results are similar to the ones obtained in other impact studies such as Zhou *et al*. (1997) or Blake (2000). However, as we have seen, the savings driven closure rule used causes other sectors associated with private investment to fall when there is a decrease in the current account with the rest of the world, as was also found in Valle (2004) and Álvarez (2010), when they simulate a fall in tourism consumption in the Balearic Islands and Spain, respectively.

Focusing on welfare effects, in terms of Hicksian equivalent variation, inbound tourism (SC1) increases the social welfare of Galicia. Nevertheless, considering the results in variation of utility as well, in general all the scenarios benefit high-income households more so than low-income ones.

By implementing the tourism tax simulations proposed, this closure rule selected seems to work better than for the demand impact studies. In this case, the impact on these two sectors would be negative. Another interesting result is that, as prices of these activities grow, visiting other regions or countries is relatively cheaper also for the Galician population, so there is a significant increase in imports.

In terms of welfare, these policies would increase the utility of low-income households, but the middle and high-income households would be worse off. Therefore, increasing the VAT of tourism products would decrease inequality in terms of disposable income, but also social welfare in general.

As can be observed through these results, different policies have different effects on international tourists, domestic residents and productive sectors within the economy. We can conclude from the results obtained that taxing accommodation services will charge the effect principally on the inbound consumers (relocating income from non-resident visitors to resident households through the governments) while, in the case of restaurant services, the tax would be levied on the domestic consumers, both final and intermediate ones.

References

Adams, P. D.; 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, pp. 985-994.

Álvarez, M. (2010): *An evaluation of public policies in Spain*, PhD Thesis, Universitat Autónoma de Barcelona.

Armington, P. S. (1969): "A Theory of Demand for Products Distinguished by Place of Production", *Staff Papers-International Monetary Fund*, pp. 159-178.

BBVA research (2011): *Situación Galicia*, Servicio de Estudios del Grupo BBVA. Madrid.

Blake, A. (2000): *The economic effects of tourism in Spain*. Christel DeHaan Tourism and Travel Research Institute.

Blake, A.; Arbache, J. S.; Sinclair, M. T.; Teles, V. (2008): "Tourism and poverty relief", *Annals of Tourism Research*, 35, pp. 107-126.

Blake, A.; Gillham, J.; Sinclair, M. T. (2006): "CGE tourism analysis and policy modelling", *International handbook on the economics of tourism*, pp. 301.

Cardenete, M. A.; Sancho, F. (2003): "An applied general equilibrium model to assess the impact of national tax changes on a regional economy", *Review of Urban & Regional Development Studies*, 15, pp. 55-65.

Cardenete, M. A.; Fuentes, P.; Polo, C. (2011): "Análisis de intensidades energéticas y emisiones de CO2 a partir de la matriz de contabilidad social de Andalucía del año 2000", *Agricultural and Resource Economics*, 8, pp. 31-48.

Condon, T.; Dahl, H.; Devarajan, S. (1986): *Implementing a computable general equilibrium model on gams: The Cameroon model*. World Bank.

De Miguel, F. J.; Cardenete, M. A.; Pérez, J. (2009): "Effects of the tax on retail sales of some fuels on a regional economy: a computable general equilibrium approach", *The Annals of Regional Science*, 43, pp. 781-806.

Dervis, K.; De Melo, J.; Robinson, S.; Mundial, B. (1981): *A general equilibrium analysis of foreign exchange shortages in a developing economy*. World Bank.

Dewatripont, M.; Michel, G. (1987): "On closure rules, homogeneity and dynamics in applied general equilibrium models", *Journal of Development Economics*, 26, pp. 65-76.

Dwyer, L.; Forsyth, P.; Spurr, R. (2004): "Evaluating tourism's economic effects: new and old approaches", *Tourism management*, 25, pp. 307-317.

Flores, C. (2004): "Evaluación de una reducción de las cuotas empresariales a la Seguridad Social a nivel regional a través de un Modelo de Equilibrio General Aplicado: el caso de Andalucía", *Estudios de Economía Aplicada*, 22, pp. 99-113.

Gooroochurn, N.; Sinclair, M. T. (2003): *The welfare effects of tourism taxation*. Christel DeHaan Tourism and Travel Research Institute.

Gooroochurn, N.; Thea Sinclair, M. (2005): "Economics of tourism taxation: Evidence from Mauritius", *Annals of Tourism Research*, 32, pp. 478-498.

Harberger, A. C. (1962): "The incidence of the corporation income tax", *The Journal of Political Economy*, 70, pp. 215.

Hertel, T. W.; Tsigas, M. E. (1997): "Structure of GTAP". *Global Trade Analysis: modeling and applications*, pp. 13-73.

Hosoe, N. (2010): *Textbook of Computable General Equilibrium Modeling: Programming and Simulations*.

Jomini, P.; Zeitsch, J. F.; McDougall, R.; Welsh, A.; Brown, S.; Hambley, J.; Kelly, J. (1991): *SALTER: a general equilibrium model of the world economy*.

Laffargue, J. P. (2009): *The economic and social effects of tourism activities and tourism policies. A survey of the computable general equilibrium (CGE) models approach*, 0905, CEPREMAP.

Llop, M.; Manresa, A. (2004): "The general equilibrium effects of social security contributions under alternative incidence assumptions", *Applied Economics Letters*, 11, pp. 847-850.

Madden, J. R.; Thapa, P. J. (2000): *The contribution of tourism to the New South Wales economy*.

Manresa, A.; Sancho, F. (2004): "Energy intensities and CO 2 emissions in Catalonia: a SAM analysis", *International Journal of Environment, Workplace and Employment*, 1, pp. 91-106.

Polo, C.; Valle, E. (2008): "A general equilibrium assessment of the impact of a fall in tourism under alternative closure rules: the case of the Balearic Islands", *International regional science review*, 31, pp. 3-34.

Rattsø, J. (1982): "Different macroclosures of the original Johansen model and their impact on policy evaluation", *Journal of Policy Modeling*, 4, pp. 85-97.

Sen, A. K. (1963): "Neo-Classical and Neo-Keynesian Theories of Distribution", *Economic Record*, 39, pp. 53-66.

Sugiyarto, G.; Blake, A.; Sinclair, M. T. (2003): "Tourism and globalization: economic impact in Indonesia", *Annals of Tourism Research*, 30, pp. 683-701.

Taylor, L.; Lysy, F. J. (1979): "Vanishing income redistributions: Keynesian clues about model surprises in the short run", *Journal of Development Economics*, 6, pp. 11-29.

Thissen, M. (1998): *A classification of empirical CGE modelling*. University of Groningen.

Valle, E. (2004): *Modelos mutlisectoriales aplicados a la economía balear*. PhD Thesis, Universitat de les Illes Balears.

Wattanakuljarus, A.; Coxhead, I. (2008): "Is tourism-based development good for the poor?: A general equilibrium analysis for Thailand", *Journal of Policy Modeling*, 30, pp. 929-955.

Willenbockel, D. (1994): *Applied General Equilibrium Modelling: Imperfect Competition and European Integration*. Wiley: Chichester.

Zhou, D.; Yanagida, J. F.; Chakravorty, U.; Leung, P. (1997): "Estimating economic impacts from tourism", *Annals of Tourism Research*, 24, pp. 76-89.