COMMONS AND ANTI-COMMONS PROBLEMS IN A TOURISM ECONOMY

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ABSTRACT
Tourism countries tend to face the commons and anti-commons problems simultaneously. The former problem is related to congestion, and over-production. The latter problem relies on the complementariness between tourism services, leading to under-production. Direct selling and bundling through the presence of tour operators emerge as possible market arrangements. This paper develops a two-period model to analyse the welfare effects on the destination economy of both problems, and the public policy to fix them under the sound assumption that tour operators are foreign firms. Four main results are obtained. First, in the direct selling situation the optimal policy depends on the relative importance of the problems. Second, tour operators always lead to over-production. Third, the presence of a single tour operator is not the solution to congestion. Lastly, the switch from several tour operators to a single one is welfare reducing.

*Keywords:* commons; anti-commons; tourism; direct selling; tour operators; optimal policy

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*Running head:* Commons and anti-commons problems

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I. INTRODUCTION

Countries highly specialised in tourism are small, remote ones (e.g. Brau et al., 2007) and, as a consequence, tend to share three features. First, the local tourism industry is greatly dependent on foreign air transport. Second, they are perceived by tourists as differentiated products, which confer on them market power. Lastly, the tourism expansion generally has negative economic impacts because of the intensive use of common resources.¹ These features are the breeding ground of two market failures: the commons and anti-commons problems, which provoke over- and under-production of tourism services, respectively. These problems and the standard market solution to the second one –foreign tour operators– certainly affect welfare levels of these countries, and might make necessary the implementation of public policies. In this paper we study at a theoretical level these issues.

It is pertinent to establish what is understood by commons and anti-commons problems. The well-known problem of the commons arises from the fact that private costs underestimate social costs, which results in over-production. In our analysis the commons problem will consist of a congestion problem, and not of the tragedy of the commons.² In addition, tourism services provided by firms in origin countries – generally the case of transport– and tourism services supplied at the destination– typically accommodation, leisure activities etc– exhibit a high degree of complementariness, so the tourism basket can be combined as a package. Accordingly, a tourist would care about the package price instead of each service price. Candela et al.

¹ The two first implications were pointed out by Hernández-Martín (2008). Regarding the second implication, the empirical evidence by Prieto-Rodriguez and González-Díaz (2008) showed that there is an economic rent for hotels on tourism islands. The third implication has been extensively analysed in the literature (e.g. Giannoni and Maupertuis (2007); León, Hernández and González; 2007). Brau et al. (2007) use the threshold of 10 and 20% of tourism income in GDP to consider that a country is specialised in tourism. According to World Bank Development Indicators, there are 28 countries in the world whose tourist income represents more than 10% of GDP in 2007. Of them, 18 are islands and 19 have a population of less than one million inhabitants.

²
(2008) were the first in using the concept of anti-commons to analyse tourism markets. In their analysis of local tourism systems, they showed that when these complementary goods are produced under imperfect competition the anti-commons problem may emerge. This problem appears when there is no coordination among the firms in making their decisions. As a consequence, each industry charges its own mark-up, which leads to a higher package price and a smaller tourism production than if a unique mark-up were charged on the package price.

The tourism markets themselves have generated a reply to the anti-commons problems, namely the tour operators. As shown by the literature on industrial organisation, the joint maximisation of profits is a solution to the anti-commons, provided that a unique mark-up is charged (e.g. Andreiychenko et al., 2006). In the tourism markets this task is carried out by the tour operators, often based in the origin country of tourists. They choose the package prices and productions that maximise the total surplus, and then the surplus is shared between foreign tour operators and local firms in the destination through negotiation processes. Nonetheless, this private solution will not probably coincide with the social solution required by the destination. Furthermore, the tendency to concentration in the tour operator industry (e.g. Soler Domingo, 2004; Bastakis et al., 2004) may have additional implications for welfare in the tourism countries.

Our aim in this paper is to analyse the joint effects of these problems on welfare of the tourism destination, together with the public policy to fix them. We emphasise the distributive problem generated by the presence of complementariness, namely how the total surplus generated by both industries is divided between foreign and local firms.

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2 The well-known _tragedy of the commons_ refers to the exhaustion of a common resource due to overuse.
3 However, the concept itself was first introduced in the field of Law and Economics by Michelman (1982).
The division is critical for the tourism economy as it impinges on resource allocation and hence on welfare. Since the answer depends on whether the tourism services are sold to tourists independently –direct selling– or jointly –tour operators– we consider three scenarios. First, the analysis of direct selling is relevant for many destinations not dependent on travel intermediaries or those where tour operators’ market share has been eroded by new trends like independent travelling or the expansion of low-cost airline services. Nevertheless, small tourism economies keep depending greatly on international tour operators. In the second scenario, we analyze whether or not this market solution to the anti-commons coincides with that required by the tourism destination. We also consider a third scenario including a single tour operator to account for the effects of concentration in this industry on destination’s welfare.

To accomplish our aim, we develop a two-period model that represents the aggregate behaviour of a tourism economy that faces exogenous tourism demands and enjoys market power in its export markets. The framework is based on the following assumptions. The economy produces non-traded consumption goods and traded tourism services. There are two factor inputs: physical capital, which depreciates fully, and a common resource that is only used by the tourism sector. The revenues from the tourism exports in the first period pay for the imports of capital goods for the next period. In the tourism sector there is an external effect related to the industry’s production, which stands for the congestion problem provoked by the use intensity of the common

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4 The lack of coordination between the industries brings about the well-known problem of double marginalisation.
5 As an example, in 2008 packages holidays represented 39% of trips and 43% of expenditure of UK residents’ holiday visits abroad, while these figures turned out to be 55% and 52%, respectively, when the destination countries were not European or North-American (Travel Trends 2008, pp. 48-49, Statistics UK).
6 A two-period model is enough to illustrate the ideas that we develop in this paper. Furthermore, this structure is quite convenient for the analysis of optimal policies, since it allows the changes in welfare to be easily computed (e.g. Huizinga, 1995).
7 The positive role for economic growth of using the tourism revenues to import capital goods was showed, both theoretically and empirically, by Nowak et al. (2007).
resource. In addition, tourists need to buy transport services to reach the destination. These services are produced at zero cost by foreign firms that also enjoy market power. Foreign transport and the local tourism services are perfect complementary, so the tourism basket can be combined as a package. Lastly, there is a government in the economy whose objective is to maximise social welfare.

The prevailing market arrangement operates as a restriction in the design of optimal policies. In this respect we show that, in the three scenarios, the government’s strategy for maximising welfare is to behave similarly to a price-leader, in the sense of computing local residual tourism demand and then maximising social profits. The reason is quite simple: the economic rent is resource saving.

Our findings regarding the direct selling situation reveal that it would become optimal to tax the local tourism price whenever the commons problem overcame the anti-commons problem. When the opposite applies, subsidising will become optimal. It might be also the case that the effects of both problems exactly offset, and hence no public policy is needed.

In the second scenario foreign transport firms act also as tour operators, buying tourist services produced in the destination and selling all-inclusive packages in origin countries. We obtain that, from the perspective of the tourism economy, the joint maximisation of profits cannot be considered as a solution to the anti-commons. This is because the maximisation of the total surplus –which charges a unique mark-up– does not imply the maximisation of profits earned by the tourism country –which requires adding a second mark-up according to a price-leader strategy. Therefore, the presence of tour operators and the unsolved commons problem lead to tourism over-production. A
public intervention consisting of taxing the local tourism price allows the optimal resource allocation to be reached.\textsuperscript{8}

The tendency to concentration in the tour operator industry poses two relevant questions concerning congestion and welfare changes in tourism destinations. The third scenario, including a single tour operator, allows us to address those aspects. Regarding the first question, it could be argued that the presence of a unique tour operator could be the solution to the congestion problem, given that this firm could control the aggregate tourism production. Nevertheless, we show that from the perspective of the tourism economy this argument is not correct. Indeed, in accordance with the literature on industrial organisation, the joint maximisation of profits may imply that the local tourism goods are priced below its social marginal cost. Therefore, once again a public intervention is needed to reduce the tourism production. The second question refers to changes in welfare provoked by the switch from several tour operators to a single one. To this respect, one might think that the presence of a unique tour operator would improve welfare as long as, in making its decisions, it considers the social costs. However, we find quite the opposite, the reason lying in the effects on the local residual tourism demand. In the negotiations processes, the tourism price earned by local firms is formed as the average costs plus a proportion of the total surplus per production unit. Such a proportion represents the negotiation power of local firms. The switch increases the total surplus per production unit, thus provoking a rise in the local tourism price. But it also lowers average costs, which leads to a reduction in the local tourism price. Even keeping the negotiation power unaltered, the latter effect overcomes the former one, and

\textsuperscript{8} It is beyond our aim to make a complete evaluation of the role played by tour operators in tourism economies. We have just concentrated on their capacity to sell jointly different tourist services and not on other contributions to the destination economy (Bastakis et al., 2004) as their ability to solve asymmetric information problems, to stabilize tourism flows or to reach scale economies.
a contraction of the local residual tourism demand, and hence in the tourism revenues, takes place. The overall result is a reduction in welfare.

Our findings indicate that the presence of foreign tour operators can never yield an optimal resource allocation in the destination. These firms and the tourism destinations do not have the same objectives, so their views about the solution of the commons and anti-commons problems differ substantially. Therefore, the government at the destination should not leave the solution of these problems in the tour operators’ hands.

The rest of the paper is organised as follows. The second section describes the environment. The direct selling situation is studied in the third section. The emergence of tour operators is discussed in the fourth section. The two subsequent sections analyse the situations with several tour operators and a single tour operator, respectively. Finally, the last section summarises and concludes.

II. THE ENVIRONMENT

Our theoretical framework represents the aggregate equilibrium of a two-period tourism economy that enjoys market power in tourism markets. The time period is denoted as $t = 0, 1$. The tourism destination produces a large number $m$ of traded tourism good varieties, $x_i^t$, $i = 1, 2, \ldots, m$, and a non-traded good of consumption, $Y_t$. There are two factor inputs: physical capital, $K_t$, that is used in both sectors and depreciates fully; and a common resource, $R_t$, that is only used by the tourism sector. In period 0 the revenues from tourism exports pay for the imports of capital goods for the next period. Hence, in period 1 the tourism production is nil and capital is entirely allocated to the consumption goods sector. In every period, the country is inhabited by a continuum of measure one of identical households. From now on, it should be kept in mind that the
capital goods will be taken as numeraire, and that the variables will be expressed in per capita terms of the tourism economy.

The tourists come from a large number $n$ of origins, denoted by $j = 1, 2, \ldots, n$. Moreover, they must buy transport services to reach the destination. We assume that transport and tourism services at the destination are perfectly complementary, so the tourism basket can be combined as a package. The transport services are supplied by foreign firms because the tourism economy does not have comparative advantage in the production of those services.

Next, we describe the environment in detail.

The consumption goods sector in the tourism economy

There is a continuum of measure one of competitive firms that produce consumption goods with the AK technology:

$$ Y_t = K_{Y,t}, \quad (1) $$

where $K_{Y,t}$ denotes physical capital allocated to the sector. The representative firm chooses capital so as to maximize profits,

$$ \Pi_{Y,t} = (p_t - (r_t + I))K_{Y,t}, $$

where $p_t$ is the consumption goods price, $r_t$ is the interest rate and the depreciation rate of capital is equal to unity. The maximisation of profits yields:

$$ p_t = r_t + I. \quad (2) $$

The demands of transport and local tourism services

For simplicity, we assume that the tourism market is organised in independent segments according to tourist features. More specifically, each type of tourist is denoted by the pair $(i, j)$, which means that he/she demands local tourism good $i$ and comes from
origin \( j \). Therefore, there are \( m \times n \) types of tourists. The tourism basket purchased by the tourist of type \((i, j)\) costs \( q_{0i}^{i,j} \) units of capital good:

\[
q_{0i}^{i,j} = q_{L,0}^{i,j} + q_{F,0}^{i,j},
\]

where \( q_{L,0}^{i,j} \) denotes the price of local tourism goods and \( q_{F,0}^{i,j} \) is the price of foreign transport services. The equation (3) implies that transport and local tourism goods are combined in a one-to-one relationship. We formulate the demands as:

\[
x_{0i}^{i,j} = \left( q_{L,0}^{i,j} + q_{F,0}^{i,j} \right)^{-\sigma}, \quad i = 1, 2, \ldots, m, \quad j = 1, 2, \ldots, n, \quad \sigma > 1,
\]

where \( x_{0i}^{i,j} \) is the demanded amount of foreign transport and local tourism services, and hence of tourism baskets, of type \((i, j)\).

\(\text{The government in the tourism economy}\)

There is a public planner or government in the tourism economy with the objective of correcting the undesirable effects of commons and anti-commons problems on social welfare. In doing so, it uses ad-valorem taxes/subsidies and lump-sum transfers/taxes as policy instruments. More specifically, for reducing tourism production it collects ad-valorem taxes on the local tourism price, with tax rate \( \tau > 0 \), and distributes the tax revenues among the families in the form of lump-sum transfers, \( T_0 > 0 \), in order not to introduce further distortions. Conversely, to increase tourism production it grants local tourism firms ad-valorem subsidies on the local tourism price, \( \tau < 0 \), which are financed with lump-sum taxes paid by households, \( T_0 < 0 \). The public budget is always balanced:

\[
\tau \sum_{i=1}^{m} \sum_{j=1}^{n} q_{L,0}^{i,j} x_{0i}^{i,j} = T_0.
\]
The local tourism sector

Each firm retains monopoly power over its market segments. Firm $i$ sells its services to tourists from all origins, so it faces $n$ demands. The production function of firm $i$ is:

$$x^i_0 = \frac{R}{X^\epsilon} k^i_{x,0}, \quad X_0 \equiv \sum_{i=1}^m x^i_0 = \sum_{i=1}^m \sum_{j=1}^n x^{i,j}_0, \quad \epsilon > 0,$$

where $x^i_0$ is the production of tourism good $i$, and $k^i_{x,0}$ denotes the capital devoted to producing it. Thus, the total capital used by the sector is equal to $K_{X,0} = \sum_{i=1}^m k^i_{x,0}$. The variable $X_0$ is the industry’s production, and the term $X^\epsilon_0$ is an external effect that represents the use intensity of the fixed factor $R$. This simple formulation stands for the congestion problem generated by a tourism expansion, which decreases productivity and raises the production costs. Therefore, there are constant returns to capital at the firm (private) level, while returns are decreasing at the industry (social) level. Taking into account the equation (6) and public intervention, the cost function of firm $i$ becomes:

$$e_0 = (r_0 + 1) \frac{X^\epsilon_0}{R} x^i_0 + \tau \sum_{j=1}^n q^{i,j} x^{i,j}_0.$$

The foreign transport sector

The transport services are produced at zero cost. We will work under two different assumptions. First, in each origin there is a unique provider of transport services that retains monopoly power in its market. Second, there is a unique monopoly that provides services to all origins.

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9 In order to simplify notation, the equilibrium result of interest rate equalisation has already been introduced.
The households in the tourism economy

The representative household derives utility from consumption and seeks to maximise the total discounted utility:

\[ U_o = \ln(C_o) + \beta \ln(C_1), \beta > 0. \]  

(8)

In the initial period, the representative household is endowed with \( K_0 > 0 \) units of capital, earns capital income and profits, and either receives transfers or pays taxes. The income is then divided into consumption expenditure and savings or capital for the next period. In period 1, the capital income is used to purchase consumption goods. The budget constraints can be then written as:

\[ p_o C_o + K_i \leq (1 + r_0) K_o + \Pi_{L,0} + T_o, \quad p_i C_i \leq (1 + r_i) K_i, \]  

(9)

where \( \Pi_{L,0} = \sum_{i=1}^{m} \pi^i_{L,0} \) represents the profits from the local tourism sector. The solution to this problem implies that:

\[ p_i C_i = \beta (1 + r_i) p_o C_o. \]  

(10)

III. DIRECT SELLING

In our first scenario, we analyse the direct selling situation, in which local and foreign firms make their decisions independently and sell their productions directly to tourists.

The problems of local and foreign firms

Considering the demands in (4), the local firm \( i \) chooses the tourism prices in order to maximise the sum of profits from \( n \) different origins:

\[ \max_{\{\bar{q}^i,\bar{r}\}} \pi^i_{L,0} = \sum_{j=1}^{n} \pi^i_{L,0} = \sum_{j=1}^{n} \left( (1-\tau) q^i_{L,0} - (r_0 + 1) \frac{X^i_{L,0}}{R} \right) x^i_{L,0}, \]  

(11)
while the foreign firm \( j \) decides on the transport prices to maximise the sum of profits from the \( m \) types of tourists:

\[
\max_{\{\pi^{i,j}_{F,0}\}_{i=1}^{m}} \pi^{i,j}_{F,0} = \sum_{i=1}^{m} q^{i,j}_{F,0} x^{i,j}_{0}.
\]

(12)

The resolution of problems in (11) and (12) yields two reaction functions that show how local and foreign firms charge their own mark-up \( q^{i,j}_{0} / \sigma \):

\[
q^{i,j}_{L,0} - \frac{r_{0} + 1}{1-\tau} X^{\sigma}_{0} = \frac{q^{i,j}_{0}}{\sigma}, \quad q^{i,j}_{F,0} - \frac{q^{i,j}_{0}}{\sigma} \rightarrow q^{i,j}_{0} - \frac{r_{0} + 1}{1-\tau} X^{\sigma}_{0} = \frac{2}{\sigma} q^{i,j}_{0}.
\]

(13)

The tourism basket and the prices of local tourism and transport are obtained from the equations in (13):

\[
q^{i,j}_{0} = \frac{\sigma}{\sigma - 2} \frac{r_{0} + 1}{r_{0} + l} X^{\sigma}_{0}, \quad q^{i,j}_{L,0} = \frac{1}{\sigma - 2} \frac{r_{0} + 1}{r_{0} + l} X^{\sigma}_{0}, \quad q^{i,j}_{F,0} = \frac{1}{\sigma - 2} \frac{r_{0} + 1}{r_{0} + l} X^{\sigma}_{0}.
\]

(14)

Looking at the demands in (4) and the results in (14), it follows that the equilibrium is symmetrical and hence the superscripts \( i \) and \( j \) can be removed. This feature will remain unchanged throughout the paper. The aggregate tourism production can be obtained by adding up all demands defined in (4) and introducing the tourism basket price in (14):

\[
X^{\sigma}_{0} = (mn)^{\frac{1}{1+\sigma}} \left( \frac{\sigma - 2}{\sigma} \frac{l - \tau}{r_{0} + l} R \right)^{\frac{\sigma}{1+\sigma}}.
\]

(15)

Lastly, the aggregate profits earned by local and foreign firms can be calculated by adding up the profits in (11) and (12) over local tourism goods and origins, respectively, and substituting (14) and (15):

\[
\Pi^{i,j}_{L,0} = \frac{r_{0} + 1}{\sigma - 2} \left( mn \right)^{\frac{1}{1+\sigma}} \left( \frac{\sigma - 2}{\sigma} \frac{l - \tau}{r_{0} + l} R \right)^{\frac{\sigma}{1+\sigma}} \left( \frac{\sigma(1+\sigma)}{1+\sigma} \frac{l - \tau}{r_{0} + l} R \right)^{\frac{\sigma}{1+\sigma}}, \quad \Pi^{i,j}_{F,0} = \frac{\Pi^{i,j}_{L,0}}{1-\tau}.
\]

(16)
The analysis hitherto shows that the necessary condition for direct selling to be feasible is $\sigma > 2$. The reason lies in the double mark-up charged on the tourism basket price: there would be no room for a double mark-up if the price elasticity of the demand for tourism baskets were smaller than two. Throughout this section, we will assume that direct selling is workable.

The aggregate equilibrium of the tourism economy

Some straightforward manipulations of the equations (2), (9) and (10), (14) and (15) yield the aggregate equilibrium conditions $p_0 = \frac{\sigma - 2}{\sigma} (1 - \tau) R \left( mn \right)^{\frac{1}{\sigma}} X_0^{\frac{1}{\sigma}}$, $p_i = 1$, $C_0 = K_0 - K_{X,0}$ and $C_i = q_{L,0} X_0 = \beta p_i C_0$ from which the factor allocation and hence tourism production are obtained:

$$K_{X,0}^{DS} = \frac{\left( X_0^{DS} \right)^{\frac{1}{\beta \epsilon}}}{R} = \frac{\beta K_0}{\sigma - 1} \frac{1}{\sigma - 2} \frac{1}{1 - \tau} + \beta,$$

where the superscript $DS$ indicates direct selling. Considering the equilibrium conditions and the tourism production implied by (17), we get the consumption levels in periods 0 and 1, the aggregate profits earned by local firms and foreign firms, and the local tourism price:

$$q_{L,0}^{DS} = \frac{\sigma - 1}{\sigma} \left( mn \right)^{\frac{1}{\sigma}} \left( X_0^{DS} \right)^{-\frac{1}{\sigma}}.$$

Equation (18) is the local residual tourism demand arising after the transport firms have maximised their profits, which coincides with the marginal income of tourism baskets.
The social optimum

The presence of the commons and anti-commons problems might justify a public intervention with the aim of achieving an optimal resource allocation. In defining the optimal policy, the local government has incentives to use the market power of the economy in tourism markets. These incentives come from the fact that, owing to its small size, the resource allocation in the tourism economy has a negligible impact on the international markets of capital goods. Moreover, the local planner is restricted by the tourism market structure. In this regard, direct selling implies the existence of duopoly relationships with simultaneous price determination in each market segment.

The objective function of the government is welfare, which comes from introducing the equilibrium expressions of consumption in periods 0 and 1 into the utility function in (8). The solution of the planner’s problem yields the optimal tax/subsidy rate:

\[ \tau^{DS} = 1 - \frac{\sigma - 1}{\sigma(1+\epsilon)} \sigma - 2 > 0. \]  

Substituting \( \tau^{DS} \) in (17), we obtain the optimal factor allocation and tourism production:

\[ \tilde{K}_{X,0}^{DS} = \left( \tilde{X}_{0}^{DS} \right)^{1+\epsilon} = \frac{\beta K_{0}}{R} \frac{\sigma}{\sigma - l + \beta}. \]  

Here and throughout the paper the tilde will indicate optimal values. From equation (19) three cases can be distinguished, which rely on the relative importance of the commons and anti-commons problems. The conditions under which each of these cases emerge can be better understood by looking at the rules for maximising profits at an aggregate level displayed in the Figure 1. Notice that in the figure the price of consumption goods is taken as given.
The aggregate tourism production when no policy is implemented, $X^\text{DS}_0$, comes from equalising the sum of local and foreign marginal incomes (MIFL) and the private marginal cost, which coincides with the average cost (AC). The price of tourism baskets, $q^\text{DS}_0$, is obtained by substituting this production into the demand of tourism baskets (DTB). As we discussed before, the local tourism price, $q^\text{DS}_{L,0}$, becomes equal to the marginal income of tourism baskets (MITB). The latter result has a significant implication, namely the optimum needs the maximisation of profits earned by the tourism economy or social profits, defined as the difference between the aggregate tourism revenues and the social costs, $q_{L,0}X^0 - p_0X^{1+\varepsilon}/R$, where $q_{L,0}$ is given by the demand defined in (18). Consistently, the optimal tourism production, $\tilde{X}^\text{DS}_0$, requires the equalisation of marginal income of local tourism services (MILTS) and the social marginal cost (SMC). The local tourism price, $\tilde{q}^\text{DS}_{L,0}$, is then obtained from the local residual tourism demand (MITB).

The government follows a price-leader strategy, since it lets foreign firms maximise their profits, computes the local residual tourism demand and then maximises social profits. This sequential strategy implies the existence of two mark-ups on the price of tourism baskets:

$$\tilde{q}^\text{DS}_0 - p_0\left(1 + \varepsilon\right)\left(\tilde{X}^\text{DS}_0\right)^\varepsilon = \frac{2}{\sigma^{\text{DTB-MIFL}}_\text{MILTS-MILF}}\tilde{q}^\text{DS}_0 - \frac{1}{\sigma^{\text{DTB-MIFL}}_\text{MILTS-MILF}}q^\text{DS}_0. \quad (21)$$

The comparison of the equations in (13) (after setting $\tau = 0$ and $r_0 + l = p_0$) and (21) shows two changes introduced by the policy regarding the mark-up charged on the price of tourism baskets, or total mark-up. First, it reduces the total mark-up by the amount
The policy depends on the relationship between the social marginal cost (SMC) and the marginal income of local tourism services (MILTS). Indeed, the local government will find it optimal to reduce tourism production whenever the direct selling equilibrium implies that the marginal income is smaller than the social marginal costs. It could be also the case that both coincide, and hence no welfare gains will be achieved from changing the tourism production. Lastly, as illustrated in the Figure 1, the maximisation of welfare will entail an increase in production whenever the marginal income overcomes the social marginal cost. In the first case, the implementation of the local optimum as a decentralised equilibrium requires the introduction of an ad-valorem tax, $\tau^{DS} > 0$, which acts to increase the private marginal cost. In the second case no public policy is needed, $\tau^{DS} = 0$. Lastly, an ad-valorem subsidy, $\tau^{DS} < 0$, which reduces the private marginal cost (MCP in the figure), allows the optimal tourism production to be reached.

IV. THE EMERGENCE OF TOUR OPERATORS

The anti-commons problem is understood as the under-production provoked by the absence of coordination between firms that have market power and produce complementary goods. From the point of view of the literature on industrial organisation, that is, from the firms’ perspective, the joint maximisation of profits allows this problem to be solved. In tourism markets this maximisation is carried out by tour operators that are often big companies based in the origin countries of tourists.
Here, we will assume that only foreign transport firms can act as tour operators. Tour operators purchase the tourism production from firms in the destination, construct tourism packages by adding transport services and sell them to tourists. We will follow the literature on transfer prices (e.g. Raper et al., 2000) and assume a two-step process in the determination of package productions and prices and the dividing up of the ensuing surpluses. In the first step, the tour operators choose the package prices and productions so as to maximise joint profits. Then, the total surplus is divided between the parties through bilateral negotiations on transfer prices or local tourism prices. The sharing out of profits relies on the negotiation power of the parties, which will be exogenously given.

The presence of tour operators requires the contracts to be mutually beneficial for the parties, in the sense that the profits earned by the tour operators and local firms should be equal to or greater than those obtained in a direct selling situation. Noticeably, there will be tour operators in the economy if the direct selling is unfeasible. But, because of the external effect, their presence is not guaranteed when the direct selling is feasible. Therefore, before going on with the analysis, we must establish the necessary –but not sufficient– condition for the equilibrium with tour operators to exist in the latter case.

Such a condition is nothing but the possibility of increasing the total surplus by means of the joint maximisation of profits. The total profits might rise whenever the marginal income of tourism packages was smaller than the social marginal cost:

\[ \frac{\sigma - I}{\sigma} (mn)^{\frac{\sigma}{\sigma + \gamma}} \left( X^{DS}_b \right)^{\frac{\sigma - I}{\sigma}} > (1 + \varepsilon) \frac{p^{DS}_b}{1 - \tau} \frac{X^{DS}_b}{R} \rightarrow \varepsilon < \frac{I}{\sigma - 2}. \]  

\(10\) Note that \( d^{DS}_{l,b} = \frac{\sigma - I}{\sigma} (mn)^{\frac{\sigma}{\sigma + \gamma}} \left( X^{DS}_b \right)^{\frac{\sigma - I}{\sigma}} = \frac{\sigma - I}{\sigma - 2} \frac{p^{DS}_b}{1 - \tau} \frac{X^{DS}_b}{R}. \)
This arrangement implies that foreign firms have monopsony power in buying local tourism services and monopoly power in selling tourism packages. Additionally, every local firm acts as a monopoly in the markets of its tourism good. Therefore, the market structure entails bilateral monopoly relationships (e.g. Blair and Kaserman, 1987). In the subsequent sections, we will study the case with several tour operators and one with a unique tour operator, respectively. The study of the latter case is pertinent as long as it implies that the tour operator can make decisions on the whole tourism production, and hence deal with the congestion problem.

V. SEVERAL TOUR OPERATORS

Since the agents’ decisions are based on rational expectations, local and foreign firms make an accurate prediction of profits associated with any general equilibrium, and hence their decisions on whether or not to sign a contract turn out to be correct.

The tour operators’ problem and the negotiation processes

In the first step, the foreign firm in origin $j$ faces $m$ demands of tourism packages and chooses $m$ package prices in order to maximise total profits:

$$
\max_{\{\phi^j_i\}_{i=1}^m} \sum_{i=1}^m \left( \frac{\pi_{L,0}^{i,j}}{1-\tau} + \pi_{F,0}^{i,j} \right) = \sum_{i=1}^m \left( q_o^{i,j} - \frac{r_o + I X_0^\varepsilon}{L-\tau R} \right) (g_o^{i,j})^{-\sigma}, \tag{23}
$$

where local profits have been adjusted to account for public policy. Notice that the foreign firm pays a price $q_o^{i,j}$, and consequently the local firm receives a part $\pi_{L,0}^{i,j}/(1-\tau)$ of the total surplus that corresponds to the market segment $(i,j)$. Moreover, the number of tour operators is large enough so that none of them knows how its decisions affect the aggregate production. Consequently, the external effect $X_0^\varepsilon$
is taken as given. The solution of the $n$ problems defined by (23) yields the package price:

$$q_{0}^{i,j} = \frac{r_{0} + l X_{0}^{r}}{l - \tau R} \frac{q_{0}^{i,j}}{\sigma} \rightarrow q_{0}^{i,j} = q_{0} = \frac{\sigma r_{0} + l X_{0}^{r}}{\sigma - l \tau R}.$$  \hspace{1cm} (24)

The equation (24) shows that a unique mark-up is charged. Using the package price in (24), the aggregate tourism production can be computed by proceeding as in the previous section:

$$X_{0} = (mn)^{\frac{i}{1+\sigma}} \left( \frac{\sigma - l \tau R}{\sigma r_{0} + l} \right)^{\frac{i}{1+\sigma}}.$$  \hspace{1cm} (25)

Once package prices and productions have been determined, a number $m \times n$ of bilateral negotiations take place in the second step to divide up the total surplus generated. More specifically, the tour operator and the local firm negotiate on the local tourism price –transfer price– $q_{L,0}^{i,j}$ so as to maximise the utility from the agreement, $V_{0}^{i,j}$:

$$\max_{q_{L,0}^{i,j}} V_{0}^{i,j} = \left( q_{L,0}^{i,j} - \frac{r_{0} + l X_{0}^{r}}{l - \tau X_{0}^{r}} \right)^{\phi} \left( q_{0}^{i,j} - q_{L,0}^{i,j} \right)^{1-\phi} \left( q_{0}^{i,j} - q_{L,0}^{i,j} \right)^{i \sigma}, \quad \phi \in (0,1),$$  \hspace{1cm} (26)

where the parameters $\phi$ and $1 - \phi$ represent the negotiation power of local and foreign firms, respectively. This maximisation problem is subject to the restriction that the parties obtain at least the same profits as in the direct selling equilibrium. In this respect, when direct selling is feasible the firms realise the government incentives for implementing an optimal policy, so they consider as alternative profits those linked to the optimum.

Under the assumption that the conditions for a general equilibrium with tour operators are satisfied, the local tourism prices would become:
\[ q_{L,0}^{i,j} = \left( 1 + \frac{\varphi}{\sigma - 1} \right) \frac{1}{1 - \tau} \frac{r_0 + I X_o^e}{R} \tag{27} \]

and, consequently, the total surplus expressed in aggregate terms, \( \Pi_{0}^{TS} \):

\[ \Pi_{0}^{TS} = \frac{\Pi_{L,0}^{TS} + \Pi_{F,0}^{TS}}{1 - \tau} = \frac{1}{\sigma - 1} \frac{r_0 + I X_0^{1+e}}{1 - \tau} \tag{28} \]

would be shared out between local and foreign firms according to their negotiation power, that is, \( \Pi_{L,0} = \varphi (1 - \tau) \Pi_{0}^{TS} \) and \( \Pi_{F,0} = (1 - \varphi) \Pi_{0}^{TS} \). This division will remain unchanged in the case that we will analyse in the next section.

The aggregate equilibrium of the tourism economy

Using (2), (9) and (10), (25) and (27), we obtain the same equilibrium conditions as in the previous section, except for the relative price of consumption in period 0,

\[ p_0 = \frac{\varphi - 1}{\sigma - 1} R (mn)^{\frac{1}{\sigma}} X_0^{\frac{1+e}{1-\tau}} \] 

These conditions allow the factor allocation and hence the tourism production to be obtained:

\[ K_{X,0}^{STO} = \left( \frac{X_0^{STO}}{R} \right)^{1+e} \frac{\beta K_0}{\left( 1 + \frac{\varphi}{\sigma - 1} \right) \frac{1}{1 - \tau} + \beta} \tag{29} \]

where the superscript \( STO \) denotes the presence of several tour operators. Considering the tourism production in (29), the local tourism price becomes equal to:

\[ q_{L,0}^{STO} = \left( 1 + \frac{\varphi}{\sigma - 1} \right) \frac{\varphi - 1}{\sigma} (mn)^{\frac{1}{\sigma}} \left( X_0^{STO} \right)^{\frac{1}{1-\tau}} \tag{30} \]

Similar to the case of direct selling, the equation (30) is the local residual tourism demand. This demand is above the marginal income of tourism packages whenever \( \varphi \neq \theta \), while in the direct selling situation it coincided with that marginal income. The
reason for this result is quite obvious: the production of tourism packages is obtained by
equalising the marginal income of tourism packages and the private marginal costs
(average costs). Therefore, in order for local firms to earn positive profits the local
tourism price must by necessity be above the marginal income of tourism packages.

The local optimum

The solution of the planner’s problem yields the optimal tax rate:

$$\tau^{STO} = 1 - \frac{\sigma - 1}{\sigma(1+\varepsilon)} \left( 1 + \frac{\phi}{\sigma - 1} \right) \in (0,1). \quad (31)$$

The introduction of (31) into (29) shows that the optimal tourism production, \(\tilde{X}_{STO}^0\),
coincides with that in (20). As a consequence, if a direct selling situation was feasible
and the firms took as alternative profits those associated with the optimum, then no
contract would be signed and the direct selling situation would prevail. Indeed, the
comparison between the total surplus generated by tour operators and that in the
alternative situation reveals that the former is smaller than the latter. Throughout the
remainder of this section we will assume that direct selling is unfeasible, so there are
tour operators in the economy.

Figure 2, which displays the strategy for maximising profits at the aggregate level,
illustrates the findings. With no policy the aggregate tourism production, \(X_{STO}^0\), is
obtained by equalising the marginal income of tourism packages (MITP) and the private
marginal cost or average cost (AC). The package price and the local tourism price, \(q_{STO}^0\)
and \(q_{L,0}^{STO}\), come from substituting this production into the demand for tourism packages
(DTP) and the local residual tourism demand (LRTD), respectively. The fact that the
tour operators maximise the total private surplus together with the unsolved commons
problem justify a public intervention with the aim of maximising social welfare. To
achieve this objective, the local government considers the local residual tourism demand in (30) and maximises the social profits. Therefore, the optimal tourism production, $\tilde{X}_{0}^{STO}$, requires the equalisation of the marginal income of local tourism services (MILTS) and the social marginal cost (SMC).

FIGURE 2 ABOUT HERE

The existence of several tour operators always leads to over-production of tourism services. The expression of the total mark-up implied by the local optimum sheds light on this result:

$$
\bar{q}_{0}^{STO} - p_{0}(1+\epsilon)\left(\tilde{X}_{0}^{STO}\right)^{\epsilon} = \frac{\tilde{q}_{0}^{STO}}{\sigma_{OTP-MITP}} + (1-\varphi)\frac{\sigma_{MITP-MILTS}}{\sigma} - \tilde{q}_{0}^{STO}.
$$

(32)

The comparison between the mark-up in (24) (after setting $\tau = 0$ and $r_{0} + l = p_{0}$) and that in (32) reveals that the sequential strategy of the government adds a second mark-up, which is equal to the difference between the marginal income of tourism packages and that of local tourism services. This double margin has the effect of raising the package price and reducing the tourism production. Moreover, considering the social marginal cost instead of the private marginal cost operates in the same direction. Accordingly, the implementation of the local optimum as a decentralised equilibrium requires taxing the local tourism price, which leads to an increase in the private marginal costs (ACP).

VI. A SINGLE TOUR OPERATOR

Our third scenario considers the situation where only one foreign tour operator negotiates with tourism firms based in the destination country. Before carrying out the
analysis, it should be noted that the aggregate results from the direct selling situation with a unique foreign firm coincide with those in the third section.

The tour operator’ problem and the negotiation processes

In the first step of the process the tour operator chooses a number \( m \times n \) of package prices to maximise total profits:

\[
\max_{\{q_{i,j}^l\}} \sum_{i=1}^{m} \sum_{j=1}^{n} \left( \pi_{i,j} + \frac{\pi_{i,j}^0}{1 - \tau} \right) = \sum_{i=1}^{m} \sum_{j=1}^{n} \left( q_{0,j}^{i,j} \right)^{1-\sigma} - \frac{r_0 + 1}{1 - \tau} \frac{1}{R} \left( \sum_{i=1}^{m} \sum_{j=1}^{n} (q_{0,j}^{i,j})^{-\sigma} \right)^{1+\varepsilon},
\]

(33)

where the external effect \( X_{0}^{\varepsilon} \) has been internalised. The solution of the problem yields the package price:

\[
q_{0,j}^{i,j} = \frac{r_0 + 1}{1 - \tau} \frac{(1 + \varepsilon) X_{0}^{\varepsilon}}{R} \rightarrow q_{0,j}^{i,j} = q_0 = \frac{\sigma (1 + \varepsilon) r_0 + 1 X_{0}^{\varepsilon}}{\sigma - 1} \frac{1}{l - \tau} \frac{1}{R},
\]

(34)

which incorporates a unique mark-up besides the social marginal cost. The aggregate tourism production can be then computed using the package price in (34):

\[
X_0 = (mn)^{\frac{1}{\varepsilon+\sigma}} \left( \frac{\sigma - 1}{\sigma (1 + \varepsilon) r_0 + 1} \frac{l - \tau}{R} \right)^{\frac{\sigma}{\varepsilon+\sigma}}.
\]

(35)

In the second step, a number \( m \times n \) of bilateral negotiations take place to divide up the total surplus generated. More specifically, the tour operator and each local firm negotiate on the local tourism price, \( q_{L,0}^{i,j} \), to maximise the utility from the agreement:

\[
\max_{q_{L,0}^{i,j}} V_0^{i,j} = \left( q_{L,0}^{i,j} - \frac{r_0 + 1 X_{0}^{\varepsilon}}{1 - \tau} \frac{1}{R} \right)^{\varphi} \left( q_{0,j}^{i,j} - q_{L,0}^{i,j} \right)^{1-\varphi} x_{0,j}^{i,j},
\]

subject to the restriction that they obtain at least the same profits as in the direct selling optimum. Assuming that the conditions for a general equilibrium with a single tour operator are satisfied, the local tourism prices can be written as:
\[ q_{L,0}^{i,j} = \left( l + \varphi \frac{l + \sigma \varepsilon}{\sigma - 1} \right) \frac{r_0 + l X_0^e}{1 - \tau} R, \]  \hspace{1cm} (37)

and, consequently, the total surplus expressed in aggregate terms becomes:

\[ \frac{\Pi_{L,0} + \Pi_{F,0}}{1 - \tau} = \frac{l + \sigma \varepsilon}{\sigma - 1} \frac{r_0 + l X_0^{i,e}}{1 - \tau} R. \]  \hspace{1cm} (38)

The aggregate equilibrium of the tourism economy

Some manipulations of (2), (9) and (10), (35) and (37) yield the same equilibrium conditions as in the previous section, except for

\[ p_0 = \frac{\sigma - l}{\sigma(1 + \varepsilon)} (1 - \tau) R \left( mn \right)^{\frac{l}{\sigma}} X_0^{\frac{i + \sigma \varepsilon}{\sigma}}. \]

From these conditions, we obtain the capital allocation and the aggregate tourism production:

\[ K_{X,0}^{TO} = \left( X_0^{TO} \right)^{i+\varepsilon} \frac{\beta K_0}{R} = \frac{\beta K_0}{\left( l + \varphi \frac{l + \sigma \varepsilon}{\sigma - 1} \right) \frac{1}{1 - \tau} + \beta}, \]  \hspace{1cm} (39)

where the superscript \( TO \) indicates the presence of a unique tour operator. Considering the tourism production in (39), the local tourism price can be written as:

\[ q_{L,0}^{TO} = \frac{l + \varphi \frac{l + \sigma \varepsilon}{\sigma - 1} \sigma - l}{l + \varepsilon} \left( mn \right)^{\frac{l}{\sigma}} \left( X_0^{TO} \right)^{\frac{l}{\sigma}}. \]  \hspace{1cm} (40)

Provided that \( \varphi \leq \varepsilon (\sigma - l)/(1 + \sigma \varepsilon) \), the local residual tourism demand in (40) can be located below or above the marginal income of tourism packages, or coincide with it. In this respect, it is worth noting that the aggregate tourism production is obtained by equalising the marginal income of tourism packages and the social marginal cost. Therefore, local firms could earn positive profits even if the local tourism price were equal to or lower than the marginal income of tourism packages.
The local optimum

The solution of the planner’s problem yields the optimal tax rate:

\[
\tau^{TO} = 1 - \frac{\sigma - 1}{\sigma(1 + \varepsilon)} \left( 1 + \varphi \frac{1 + \sigma \varepsilon}{\sigma - 1} \right) \in (0, 1).
\] 

(41)

Considering (41) and (39), it follows that the optimal tourism production, \( \bar{X}^{TO}_\theta \), is equal to that in (20). Accordingly, if a direct selling situation were feasible, then no contract would be signed. Indeed, for the total surplus to be greater than in the alternative situation it should hold that \( \varepsilon > 1/(\sigma - 2) \), which is in contradiction to condition (22).

Thus, in the remainder of this section we will assume that direct selling is unfeasible, so there is a single tour operator in the economy.

Figure 3 illustrates the strategy for maximising profits at the aggregate level. With no policy the aggregate tourism production, \( X^{TO}_\theta \), comes from equalising the marginal income of tourism packages (MITP) and the social marginal costs (SMC). Therefore, this arrangement leads to the maximum total surplus. The package price, \( q^{TO}_\theta \), and the local tourism price, \( q^{TO}_L \), are then obtained by substituting that production into the demand for tourism packages (DTP) and the local residual tourism demand (LRTD), respectively.

FIGURE 3 ABOUT HERE

Since there is a unique tour operator that charges a unique mark-up and makes its decisions taking into account the social marginal costs, one might think that the problems of commons and anti-commons have been fixed. This argument would be correct from the tour operator’s point of view, since it yields the maximum total surplus. However, this is far from being true from the tourism economy’s perspective. Regarding the problem of commons, under this arrangement the local tourism goods
may be priced below their social marginal cost. But, even though the local tourism price was higher than the social marginal cost, as in the Figure 3, the tourism economy would not be earning the maximum profits. Therefore, a public intervention would be justified in order to maximise the social welfare. To achieve this objective, the local government considers the local residual tourism demand and maximises the social profits. The optimal tourism production, $\bar{X}^{TO}_0$, requires the equalisation of the marginal income of local tourism services (MILTS) and the social marginal costs (SMC). This result tells us that the existence of a single tour operator always leads to tourism over-production. The comparison between the expressions for the total mark-up implied by the local optimum:

$$\tilde{q}^{TO}_0 - p_0 (1 + \varepsilon) \left( \frac{\bar{X}^{TO}_0}{R} \right) = \tilde{q}^{TO}_0 \frac{l + \sigma \varepsilon - 1}{\sigma} + (1 - \varphi) \frac{l + \sigma \varepsilon - 1}{\sigma} \tilde{q}^{TO}_0,$$

and that in (34) (after setting $\tau = 0$ and $r_0 + l = p_0$) indicates that the government adds a second mark-up, which raises the package price and reduces the tourism production. Accordingly, the implementation of the local optimum as a decentralised equilibrium requires taxing the local tourism price, which increases both the average and the social marginal costs (ACP and SMCP, respectively). Under the policy, the tour operator equalises the social marginal costs associated with the policy (SMCP) and the marginal income of tourism packages (TPMI) to obtain the package production, $\bar{X}^{TO}_0$.

Figure 4 shows our last result, which refers to welfare changes provoked by the switch from several tour operators to a single one. This figure depicts the frontiers of consumption possibilities, which are constructed using the equilibrium conditions $C_0 = K_0 - X^{1+\varepsilon}_0 / R$ and $C_i = q_{L,0} X_0$, and the social indifference curves associated to the optimum, $C_0 = e^{\beta} C^\beta_i$. 
One could think that the existence of a single tour operator would be positive for the welfare of the tourism economy, as long as it can internalise the external effect linked to congestion. The Figure 4 shows that this is not the case. On the contrary, the welfare level turns out to be lower with a single tour operator than with several. The explanation can be found looking at the rewritten expressions of the local residual tourism demands in (30) and (40):

$$ \begin{align*}
\text{Several tour-operators} & \rightarrow \ q_{L,0} = \frac{\sigma - 1}{\sigma} \left( mn \right)^{\frac{1}{\sigma}} X_0^{\frac{1}{\sigma}} + \frac{\phi}{\sigma} \left( mn \right)^{\frac{1}{\sigma}} X_0^{\frac{1}{\sigma}}, \\
\text{One tour-operator} & \rightarrow \ q_{L,0} = \frac{\sigma - 1}{\sigma (1 + \epsilon)} \left( mn \right)^{\frac{1}{\sigma}} X_0^{\frac{1}{\sigma}} + \phi \frac{1 + \sigma \epsilon}{\sigma (1 + \epsilon)} \left( mn \right)^{\frac{1}{\sigma}} X_0^{\frac{1}{\sigma}}.
\end{align*} \tag{43} $$

As long as $\phi \in (0, 1)$, the demand with a unique tour operator lays below the one arising with several tour operators. The transfer price is calculated as the sum of the average costs and the proportion $\phi$ of the total surplus per production unit. The switch from several tour operators to a single one reduces the tourism production, which decreases the average cost and increases the total surplus per production unity. The former effect turns out to be stronger than the latter one, so a reduction in the tourism price occurs.\(^{11}\)

As shown in the Figure 6, the reduction of the local residual tourism demand provokes a contraction of the consumption possibilities frontier:

\(^{11}\) It could be argued that there is no reason for thinking of the negotiation power of the parties as being the same in both cases. Though this seems a reasonable objection, it is also sensible to think of $\phi$ value as being smaller when a unique tour operator exists, which would reinforce our results.
Several tour-operators \( \rightarrow \) 
\[ C_0 = K_0 - \frac{l}{R} \left( \frac{\sigma}{\sigma - I + \phi} \right)^{\frac{1}{\sigma}} C_i \]

One tour-operator \( \rightarrow \) 
\[ C_0 = K_0 - \frac{l}{R} \left( \frac{\sigma}{\sigma - I + (1 + \phi)} \right)^{\frac{1}{\sigma}} C_i \]

which inevitably leads to a reduction in welfare.

VII. CONCLUSION

Countries specialised in tourism tend to face the so-called commons and anti-commons problems, which lead to tourism over- and under-production, respectively. The tourism markets have created their own solution to the anti-commons problem, namely the international tour operators. However, this reply is entirely private and hence might not be all the adequate for the tourism destinations. In this paper, we have analysed the joint effects of these problems and the private solution to the second one on destination’s welfare, together with the public intervention required to achieve an optimal resource allocation. We have highlighted the distributive problem generated by the share up of the total surplus between foreign and local firms, which crucially depends on the type of market arrangement –direct selling, several tour operators and a unique tour operator. In our framework, regardless the type of market structure, the local government must follow a price-leader strategy to achieve the maximum welfare level. Our findings can be summarised as follows. First, the direct selling scenario is compatible with either over- or under-production, depending on the dimension of commons and anti-commons problems. This is a case for public intervention except in the exceptional situation where both problems offset exactly. Second, from the destination point of view the presence of tour operators results in an increase in production that is above the optimum. Third, the existence of a unique tour operator is not the solution to the
congestion problem, providing that the local tourism goods might be priced below their social marginal costs. Lastly, even keeping the negotiation power unchanged, the switch from several tour operators to a single one turns out to be welfare reducing.

We then conclude that the private reply to the anti-commons does not coincide with the social solution required by the destination, what is a case for public intervention. The reason lies in the fact that tour operators are foreign firms, what gives rise to a distributive problem that limits social welfare gains of the destination. Noticeably, the distributive would not exist if the only tour operator was local. In this latter case the tour operator’s strategy would lead to an optimal outcome. Of course, our analysis refers to the tour operators’ capacity to address the anti-commons problem, and leaves aside their contribution to destinations in terms of stabilization of flows, providing information and reputation in origin countries, marketing capacities, etc. Therefore, our results must be interpreted accordingly.

Notwithstanding, we recognise that further research is needed for a deeper understanding of this subject. In this respect, aspects such as the competition among different tourism destinations, the co-existence of tour operators and direct selling, the contributions of tour operators to the marketing of destinations, endogenous negotiation power, or the tragedy of the commons would certainly affect tour operators’ strategy and/or policy decisions.

REFERENCES


The World Bank Group (2009), *World Economic Indicators*. 


Figure 1: Profit-maximising strategy with direct selling: subsidy

Note: Aggregate social costs considered by the local planner is \( E_o = p_o X_o^{1+\epsilon} \). Curves in the figure are defined as follows:

Social marginal cost (SMC): \( \frac{\partial E_o}{\partial X_o} = p_o (1 + \epsilon) X_o^{\epsilon} \)

Average cost and private marginal cost (AC): \( \frac{E_o}{X_o} = p_o X_o^{\epsilon} \)

Average cost and private marginal cost under the policy (ACP): \( \frac{E_o}{X_o} = \frac{p_o X_o^{\epsilon}}{1 - \tau^{\text{Misc}}} \)

Demand of tourism baskets (DTB): \( q_o = (nn)^{\frac{1}{\sigma}} X_o^{\frac{1}{\sigma}} \)

Marginal income of tourism baskets (MITB): \( \frac{\partial (q_o X_o)}{\partial X_o} = q_{L,0} = \frac{\sigma - 1}{\sigma} (nn)^{\frac{1}{\sigma}} X_o^{\frac{1}{\sigma}} \)

Marginal income of local tourism services (MILTS): \( \frac{\partial (q_{L,0})}{\partial X_o} = \left( \frac{\sigma - 1}{\sigma} \right)^2 (nn)^{\frac{1}{\sigma}} X_o^{\frac{1}{\sigma}} \)

Sum of local and foreign marginal incomes (MIFL): \( \frac{\partial (q_{L,0})}{\partial X_o} + \frac{\partial (q_{F,0} X_o)}{\partial X_o} = \frac{\sigma - 2}{\sigma} (nn)^{\frac{1}{\sigma}} X_o^{\frac{1}{\sigma}} \)
Figure 2: Profit-maximising strategy with several tour-operators

Note: Curves are defined as in the Figure 1, except for:

Average cost and private marginal cost under the policy (ACP): \[ \frac{E_o}{X_0} = \frac{p_0 X_0^\prime}{1 - \tau^{STO}} \]

Residual local tourism demand (LRTD): \[ q_{L,0} = \left( 1 + \frac{\phi}{\sigma - 1} \right) \left( \frac{\sigma - 1}{\sigma} \right)^{\frac{1}{\sigma}} \left( mn \right)^{\frac{1}{\sigma}} X_0^{\frac{1}{\sigma}} \]

Marginal income of local tourism services (MILTS): \[ \frac{\partial (q_{L,0} X_0)}{\partial X_0} = \left( 1 + \frac{\phi}{\sigma - 1} \right) \left( \frac{\sigma - 1}{\sigma} \right)^{\frac{1}{\sigma}} \left( mn \right)^{\frac{1}{\sigma}} X_0^{\frac{1}{\sigma}} \]
Figure 3: Profit-maximising strategy with a single tour-operator

Note: Curves are the same as in the Figure 2, except for:

Marginal cost under the policy (SMCP): \[ \frac{\partial E_0}{\partial X_0} = \frac{p_0 (1 + \varepsilon) X_0'}{1 - \tau'} \]

Average cost under the policy (ACP): \[ \frac{E_0}{X_0} = \frac{p_0 X_0'}{1 - \tau'} \]

Local residual tourism demand (LRTD): \[ q_{L,0} = \left(1 + \phi \frac{1 + \sigma \varepsilon}{\sigma - 1} \right) \left(\frac{\sigma - 1}{\sigma (1 + \varepsilon)}\right)^\frac{j}{\sigma} X_0^\frac{j}{\sigma} \]

Marginal income of local tourism services (MILTS): \[ \frac{\partial (q_{L,0} X_0)}{\partial X_0} = \left(1 + \phi \frac{1 + \sigma \varepsilon}{\sigma - 1} \right) \left(\frac{\sigma - 1}{\sigma (1 + \varepsilon)}\right)^\frac{j}{\sigma} X_0^\frac{j}{\sigma} \]

\[ \quad \]
Figure 4: One tour-operator, several tour-operators and welfare