XXVIII REUNION DE ESTUDIOS REGIONALES:
Optimal qualities in the tourism sector

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Abstract
In this paper we obtain the quality and the quantity production of tourism services that an economy specialized in tourism would have if completely unregulated. We use a vertical differentiation model with variable costs. The market outcome has been compared to the social planner solution, when this accounts for the external costs that the tourism activity provokes on resident households and for the possibility that an important share of the consumer surplus goes to non-residents. From this perspective, it is found that an optimal solution allows for the coexistence of the high and low qualities, and that when the external costs are directly affected by quality, the social planner strongly penalizes the high quality segment.

Keywords: quality, spillovers, tourism sector markets

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1 Introduction

The pattern of specialization is not irrelevant for the capacity of an economy to generate income and welfare. This is indeed true for an economy specialized in tourism, where the kind of market segments in which the economy ends up specialized determines its basic competitiveness factors. On the one hand, a mass-tourism development strategy, usually means low quality services and therefore, the need of maintaining low prices and costs, with the consequent dependence on a large number of visitors that in aggregate generate congestion problems and externalities as large environmental, cultural and social costs. On the other hand, a high quality tourism development strategy implies competition based on differentiation and innovation, a higher price and a lower number of visitors and therefore, a larger potential for sustainable growth. High quality demand is more inelastic and related to high income consumers. Higher income consumers, however, also might generate a larger per capita external cost.

Given this, in several mature tourism destinations, highly dependent on mass-tourism, has grown concern about the need to change the pattern of specialization, shifting resources from low quality to high quality tourism services. In this context a social debate has arisen about the possible strategies to reduce the environmental and social costs of tourism development and guarantee its sustainability. In this debate, a structural change in favor of high quality tourism has drawn special attention given that more quality in the tourism services would presumably allow the same or higher income with a smaller number of tourists.

In order to clarify this question, we want to compare the quality and the quantity production of tourism's services (measured through hotel's services) that an economy specialized in tourism should have in different contexts of decision. We use a vertical differentiation model in which two firms compete in both the quality and the level of production. We solve the market oligopoly equilibrium solution as well as the social planner problem. In order to capture the negative effect that the tourism activity has on total welfare, we include an externality effect as well as the proportion of consumer's surplus that corresponds to the resident population. Comparing in terms of welfare, we derive the way in which tourism markets should perform
in order to gain in efficiency.

After having motivated the importance of modelling how the quality and the output should be chosen in a tourism-based economy, in section 2 we develop an industrial organization model that we will use in order to provide answers to the pointed questions. In section 3 we solve the market equilibrium, in which two firms (hotels) have to decide upon their level of production after having decided the quality to serve. In section 4, we solve the social planner problem, that takes into account not only the producers’ surplus but also the consumer surplus of residents, as well as the externality effects that such an activity has on welfare. We use section 5 in order to do some comparative statics of the different decision possibilities. Finally, we highlight the main conclusions of the paper in section 6.

2 The Model

In this section we present the basic model we use. We consider the simple case of two firms producing a tourism product after having decided the quality of the good they are to produce. We use a vertical product differentiation model under Cournot competition in which high quality is indexed as $u_1$, and low quality as $u_2$, with $u_1 > u_2$.

There is a continuum of consumers in the market. They differ in their tastes, described by the parameter $\theta \in [0, \bar{\theta}]$, $\theta$ being uniformly distributed with unit density. We define $\bar{\theta}$ as the consumer endowed with the higher taste for quality in the economy. Consumers have the same (indirect) utility function $U = \theta u - p$, if they buy one unit of the good of quality $u$ at a price $p$, and zero utility if they do not buy the differentiated good. The higher the quality $u$ of the good, the higher the utility $U$ reached by the consumers for any given price $p$. However, consumers with a higher $\theta$ will be willing to pay more for a higher quality good. In accordance with the literature on product differentiation, we assume that consumers can buy at most one unit of the good.

Note that $\theta$ can be interpreted as the marginal rate of substitution between income and quality, so that a higher $\theta$ corresponds to a lower marginal utility of income and therefore a higher income (Tirole (1988)). Under this interpretation, the model proposed here is the analog of the models where
consumers differ by their incomes rather than by their tastes (Gabszewicz and Thisse (1979, 1980), Shaked and Sutton (1982, 1983), Bonanno (1986), Ireland (1987)).

We assume that there are only two firms in the industry, and that they compete with two strategic variables, their level of production and also the quality of the services they provide. It is likewise considered that there exists a lower bound to the quality level, so that \( u > 0 \). This can be interpreted as a minimum standard legal requirement or as being inherent to the production process. We further assume that current endowments and resources of the economy allow for the use of a maximum quality level, denoted by \( \bar{u} \).

Each firm incurs a cost of the form \( C_i(u_i, q_i) = \frac{u_i^2}{2} q_i \), that is, variable costs of quality improvement. This happens when the main burden of quality improvement falls, for instance, on more skilled labor or more expensive raw materials and inputs. We think that it is the case in the tourism sector. This type of costs function have been firstly analyzed by Mussa and Rosen (1978), Gal-Or (1983), and Champsaur and Rochet (1989).

In order to derive the demand expressions for the high and low quality good, we define the taste parameter of the consumer indifferent between buying the high and the low quality good, that is good 1 or good 2. His taste parameter \( \theta_{1,2} \) is such that,

\[
\theta_{1,2} = \frac{p_1 - p_2}{u_1 - u_2}.
\]  (1)

The consumer indifferent between buying the low quality good, that is good 2, or not buying at all has has the taste parameter \( \theta_{0,2} = p_2 / u_2 \). For such consumer, the purchase of the good of quality \( u_2 \) will imply a zero utility level.

The demand functions can be easily built, noting that all the consumers for whom \( \bar{\theta} > \theta \geq \theta_{1,2} \) will buy quality \( u_1 \), all those described by \( \theta_{1,2} > \theta \geq \theta_{0,1} \) will buy quality \( u_2 \), and those described by \( \theta_{0,1} > \theta \) will not buy at all. Notice that we allow for the possibility that the market is not covered, that is, that some consumers may not buy any of the goods, that is \( 0 < \theta_{0,1} \).

Then, the demand functions for the high and low quality firms are respectively given by:
\[
D_1(p_1, p_2) = \bar{\theta} - \theta_{1,2} = \bar{\theta} - \frac{p_1 - p_2}{u_1 - u_2}, \\
D_2(p_1, p_2) = \theta_{1,2} - \theta_{0,2} = \frac{p_1 - p_2}{u_1 - u_2} - \frac{p_2}{u_2}.
\]

3 The market equilibrium

In this section we consider the case in which the two firms (hotels) compete in the market as described in the following two-stage game. At the first stage, firms choose the quality of the good they want to produce. At the second stage, a competitive process occurs where firms choose quantities\(^1\). In equilibrium, it will be the case that firms always choose to offer distinct qualities. To solve the problem of firms, we look for the sub-game perfect Nash equilibrium of the game. As usual, this will be obtained by backward induction.

In order to choose quantities at the last stage of the game we have to invert the system of demand functions shown in the previous section. This gives:

\[
p_1 = \bar{\theta}u_1 - q_2u_2 - q_1u_1, \\
p_2 = (\bar{\theta} - q_1 - q_2)u_2.
\]

Then, the profit function for each firm can be written as:

\[
\Pi_1 = p_1q_1 - C_1 = (\bar{\theta}u_1 - q_2u_2 - q_1u_1)q_1 - \frac{u_1^2q_1}{2}, \\
\Pi_2 = p_2q_2 - C_2 = (\bar{\theta} - q_1 - q_2)u_2q_2 - \frac{u_2^2q_2}{2}.
\]

Firms choose quantities to maximize their profits, for any given quality pair \((u_1, u_2)\). First-order conditions are:

\[
\frac{\partial\Pi_1}{\partial q_1} = \bar{\theta}u_1 - q_2u_2 - 2q_1u_1 - \frac{u_1^2}{2}, \\
\frac{\partial\Pi_2}{\partial q_2} = (\bar{\theta} - q_1 - q_2)u_2 - \frac{u_2^2}{2}.
\]

Hence, the optimal quantities produced by the high and the low quality firm result in

\(^1\)For further details see Motta (1993).
\[ q_1 = \frac{-2u_1^2 + u_2^2 + 4u_1 \bar{\theta} - 2u_2 \bar{\theta}}{8u_1 - 2u_2} \]
\[ q_2 = \frac{u_1^2 - 2u_1 u_2 + 2u_1 \bar{\theta}}{8u_1 - 2u_2}. \quad (6) \]

At the first stage, firms choose qualities in order to maximise their profits (recall that unit production costs are a quadratic function of quality), given by:

\[ \Pi_1 = \frac{u_1(2u_1^2 - u_2^2 - 4u_1 \bar{\theta} + 2u_2 \bar{\theta})}{4(4u_1 - u_2)^2} \]
\[ \Pi_2 = \frac{u_1^2 u_2(1 - 2u_2 + 2\bar{\theta})}{4(4u_1 - u_2)^2}. \quad (7) \]

The first-order conditions are given by the following expressions:

\[ \frac{\partial \Pi_1}{\partial u_1} = \frac{1}{4(4u_1 - u_2)^2} \left[ (2u_1^2 - u_2^2 - 4u_1 \bar{\theta} + 2u_2 \bar{\theta}) \right. \]
\[ \left. (24u_1^3 - 10u_1^2 u_2 + 4u_1 u_2^2 + u_2^3 - 16u_1^2 \bar{\theta} + 4u_1 u_2 \bar{\theta} - 2u_2^2 \bar{\theta}) \right] \]
\[ \frac{\partial \Pi_2}{\partial u_2} = \frac{u_1^2 (u_1 - 2u_2 + 2\bar{\theta})(4u_1^2 - 2u_1 u_2 + u_2^2 + 8u_1 \bar{\theta} + 2u_2 \bar{\theta})}{4(4u_1 - u_2)^2}. \quad (8) \]

The symmetric solution to this system is given by \( u_1 = u_2 = 2\bar{\theta} \). However, we can derive the second derivatives and check that \( \frac{\partial^2 \Pi_1}{\partial u_1^2} = \frac{\partial^2 \Pi_2}{\partial u_2^2} = 4\bar{\theta}/9 \), when computed in correspondence of the candidate maximum. In other words, choosing this same quality would give the firms a minimum profit.

We now turn to the question of whether a Nash equilibrium for this game exists at all. It is possible to show that the analytical expressions of \( u_1 \) and \( u_2 \) which simultaneously satisfy the two conditions mentioned above is not simple. As an example, consider \( \bar{\theta} = 1 \). In this case we can check than the following pair solves the system of equations: \( u_1 = 1,73611 \text{ and } u_2 = 0,710648 \). But again, the second derivatives computed to this candidate are positive, leading us to a minimum.

Finally, the following pair also solves the system of equations written above:\footnote{Numerical computations have been performed using the Mathematica program. The exact solutions have more than 10 decimals.}

\[ u_1^* = 0,778638 \quad u_2^* = 0,587366 \quad (9) \]
Further, the second derivatives computed at this candidate maximum are negative, being $\frac{\partial^2 \Pi_1}{\partial u_1^2} = -0.1850$ and $\frac{\partial^2 \Pi_2}{\partial u_2^2} = -0.2042$. So, this pair is a local maximum.

However, this is not enough to ensure we have found a Nash equilibrium. We also have to check that firm 2 has no incentive to leapfrog the rival firm and itself produce the highest quality. Likewise, we have to prove, that firm 1 has no incentive to deviate and produce a quality lower than the produced by firm 2. Formally, the following conditions need to be satisfied:

$$\Pi_2(u_2^*, u_1^*) \geq \Pi_2(u_2, u_1^*) \text{for } u_2 \leq u_1^* \text{ and }$$

$$\Pi_2(u_2^*, u_1^*) \geq \Pi_2(u_2, u_1^*) \text{for } u_2 \geq u_1^* \tag{10}$$

$$\Pi_1(u_1^*, u_2^*) \geq \Pi_1(u_1, u_2^*) \text{for } u_1 \geq u_2^* \text{ and }$$

$$\Pi_1(u_1^*, u_2^*) \geq \Pi_1(u_1, u_2^*) \text{for } u_1 \leq u_2^* \tag{11}$$

Appendix 1 contains the proof that the candidate solution above is indeed a Nash equilibrium, that is, satisfies the conditions mentioned above. We can therefore summarize this result through the following proposition:

**Proposition 1** Under the assumption of variable costs of quality improvement, the equilibrium of the game in which the duopolist firms first choose qualities and then quantities, is such that a firm will select a quality $u_1^* = 0.778638$, and the other the quality $u_2^* = 0.587366$ (for $\bar{\theta} = 1$).

In Table 1 we show the equilibrium values under Cournot competition between this two firms:

<table>
<thead>
<tr>
<th>High quality firm</th>
<th>Equilibrium value</th>
<th>Low quality firm</th>
<th>Equilibrium value</th>
</tr>
</thead>
<tbody>
<tr>
<td>$u_1^*$</td>
<td>0.778638</td>
<td>$u_2^*$</td>
<td>0.587366</td>
</tr>
<tr>
<td>$p_1^*$</td>
<td>0.468323</td>
<td>$p_2^*$</td>
<td>0.317629</td>
</tr>
<tr>
<td>$q_1^*$</td>
<td>0.212146</td>
<td>$q_2^*$</td>
<td>0.247086</td>
</tr>
<tr>
<td>$\Pi_1^*$</td>
<td>0.0350433</td>
<td>$\Pi_2^*$</td>
<td>0.0358594</td>
</tr>
</tbody>
</table>

Table 1: Equilibrium values (for $\bar{\theta} = 1$).
These figures point out that the high quality level firm produces less quantity at a higher price than the low quality firm. However, profits are somewhat larger for the firm that produces the low quality good.

4 The Social Planner Outcome

Throughout this section we derive the optimal values of qualities and quantities that a social planner would choose in order to maximize a certain objective function. Then we compare this optimal solution to the market outcome, and comment on some policy making implications.

4.1 The objective function of the social planner

As it is common in the industrial organization literature, it has been assumed that the social planner cares about the overall welfare of the relevant population. This total surplus or welfare function typically consists of the sum of the producer and the consumer surplus. Although following this general framework, our welfare specification incorporates some specific features.

Since our analysis focuses on the tourist sector, we believe that several particularities apply. Basically, we focus on the consequences on local agents. The particularities are the following. First, we consider that only a proportion of the consumers are local, while the remaining ones are foreigner tourists. It has been assumed that the local social planner does not care about the surplus of non-resident consumers, and thus this will be ignored. Second, we assume that the production—or either, the consumption—of the tourism services generates external costs that affect local residents, independently of whether they participate or not in the market. With these two particularities in mind, the total surplus function can be written down as:

\[ W = PS + \alpha CS - EXT, \]  

where \( PS \) denotes the aggregate producer surplus; \( CS \) the consumer surplus, with \( \alpha \) representing the share of consumer surplus that goes to resident consumers, \( 0 \leq \alpha \leq 1 \); and \( EXT \) are the externalities the tourism activity generates. In our model, the aggregate producer surplus simply corresponds to the sum of profits of firms 1 and 2, that is
\[ PS = \Pi_1 + \Pi_2, \]  

which have already been used in the previous section. Regarding the consumer surplus, it corresponds to the sum of the differences between the willingness to pay of each consumer and the market price, for each market. The willingness to pay is affected by the quality level of the good as well by the taste parameter \( \theta \). Then, the consumer surplus can be expressed as

\[ CS = CS_1 + CS_2 = \int_{\theta_{1,2}}^\theta (\theta u_1 - p_1) d\theta + \int_{\theta_{0,2}}^{\theta_{1,2}} (\theta u_2 - p_2) d\theta, \]

which can more conveniently be expressed as

\[ CS = \frac{1}{2}[q_1^2 u_1 + 2q_1 q_2 u_2 + q_2^2 u_2]. \]

As what regards the externality component of the total surplus function, different possibilities may be considered. For instance, it can be assumed that each produced unit generates a certain external cost, and that such cost may or not be related to quality. In general terms,

\[ EXT = EXT_1 + EXT_2, EXT_i = C_{i}^{EXT}(u_i, q_i), \]

where \( C^{EXT} \) stands for the externality value, and \( i \) denotes the market segment. It is considered that

\[ \frac{\partial C_{i}^{EXT}}{\partial q_i} > 0, \]

that is that the external costs increase with the output level. As for the relationship of the externality with quality it has been assumed that they relate directly, that is

\[ \frac{\partial C_{i}^{EXT}}{\partial u_i} > 0. \]

This positive relationship between externalities and quality goes as follows. It implies that providing a unit output of relatively high quality causes higher external costs. We believe that this is a reasonable assumption. For instance, it can be justified if it is considered that a high quality unit of
output requires a higher consumption of natural resources, and this can be translated into external costs. Further below, other possibilities regarding the characteristics of the external cost functions are considered. For the moment, the following specification of the functions have been adopted:

\[ C_1^{EXT} = c_1^{EXT} \frac{u_1^2}{2} q_1, \]

\[ C_2^{EXT} = c_2^{EXT} \frac{u_2^2}{2} q_2. \]

Notice that it has been assumed that \( c_1^{EXT} = c_2^{EXT} = c^{EXT} \). The definite welfare function our social planner considers results from summing up the above expressions for aggregate producer surplus, for the residents' consumer surplus, and that of externalities.

### 4.2 Optimal quantities and qualities

This welfare function ultimately depends upon the quality and quantity variables, that is

\[ W = W(\phi; q_1, q_2, u_1, u_2), \]

where \( \phi \) represents the set of parameters used. The problem of the social planner consists then in choosing the output levels as well as the qualities that should be implemented so that the welfare is maximized. Then,

\[ \max_{q_1, q_2; u_1, u_2} W(\phi; q_1, q_2; u_1, u_2). \]

(17)

To solve this maximization problem, we proceed as follows. We derive the first order conditions of the problem, and find the optimal values of the variables involved. The same sequence of decisions used in the resolution of the market problem is followed; that is, it is considered that the social planner first chooses the quality levels, and the determines output levels. Analytically, we find first optimal quantities, and then solve for optimal qualities using backward induction.

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3Other possibilities might be considered, for instance, that all variables are simultaneously chosen.
Let us first find the optimal values of quantities. The problem of the social planner in the last stage is

$$\max_{q_1, q_2} W(\phi; q_1, q_2, u_1, u_2)$$

(18)

By rearranging the first order conditions, and denoting with the superscript $SP$ the choices of the social planner, it is found that:

$$q_1^{SP} = \frac{2\bar{\theta} - (1 + c)u_1 - (1 + c)u_2}{2(2 - \alpha)}$$

(19)

$$q_2^{SP} = \frac{(1 + c)u_1}{c(2 - \alpha)}.$$

Substituting these values into the social welfare function, this can be exclusively expressed in terms of the qualities $u_1$ and $u_2$. It results

$$W(\phi; u_1, u_2) = \frac{u_1(4\bar{\theta} - 4(1 + c)\bar{\theta}u_1 + (1 + c)^2(u_1^2 + u_1u_2 - u_2^2))}{8(2 - \alpha)}.$$  

(20)

The problem in the first stage consists then in choosing the appropriated levels of quality. From the maximization of the function above with respect to qualities $u_1$ and $u_2$ it is found that

$$u_2(u_1) = \frac{u_1}{2}.$$  

That is, the optimal low quality level is half the value of the high quality one. As for $u_1$, it is found that a local maximum exists if

$$u_1(u_2) = \frac{2\bar{\theta} + (1 + c)u_2}{3(1 + c)}.$$  

By combining the two expressions above, the optimal values of qualities are found, and they can be expressed solely in terms of the parameters. It results

$$u_1 = \frac{4\bar{\theta}}{5(1 + c)}$$

(21)

and

$$u_2 = \frac{2\bar{\theta}}{5(1 + c)}.$$  

(22)

However, these equilibrium values of $u$ apply only in certain instances. They provide a local maximum of the welfare function – see figure 1. In fact,
it results that a global maximum of the function is found the higher the quality \( u_1 \), or that total surplus is maximized only when \( u_1 \) converges to infinity.

However, it is unreasonable to think of an infinitely high quality. If that was the case, \( p_1 \) would also tend to infinity, as would private costs for firms. It can be argued that firms face budget restrictions, as consumers do, so that an infinitely large quality would not financially be at reach of economic agents. In terms of our model, this implies that there is an upper bound to quality, \( \bar{u} \), and that this upper quality would be the one chosen by the social planner.

In general terms, we obtain then the following values of the choice variables:

\[
\begin{align*}
&u_1^{SP} = \bar{u} \\
&u_2^{SP} = \frac{\bar{u}}{2} \\
&q_1^{SP} = \frac{4\theta - 3(1 + c)\bar{u}}{4(2 - \alpha)}
\end{align*}
\]  

\( ^4\)For example, they apply for the particular case in which \( c = 0 \).
\[ q_{2}^{SP} = \frac{(1 + c) \bar{u}}{2(2 - \alpha)}. \]  

(26)

As for the welfare attained, it is

\[ W = \frac{\pi[16\bar{\theta}^2 - 16(1 + c)\Theta \pi + 5(1 + c)^2 \pi^2]}{32(2 - \alpha)}. \]  

(27)

4.3 Comparison of results

For the sake of comparison, we compare the market and the social planner scenarios for particular values of the parameters. In all instances, the taste parameter has been normalized to 1, \( \bar{\theta} = 1 \). As well, when needed for the social planner scenarios, maximum quality level has been chosen as 1, \( \bar{u} = 1 \).

- **Comparison of the market and social planner solutions in absence of externalities (c = 0)**

We comment on some of the differences affecting some of the main variable values arising from different scenarios. Table 2 summarizes the computation results. The first column includes information that corresponds to the market equilibrium scenario developed in section 3, where the total surplus value has been computed both for the extreme cases in which either there are no resident consumers, or all of the consumers are local. In the former case, total surplus coincides with total profits of firms, while in the second the consumer surplus is summed up.

<table>
<thead>
<tr>
<th>Market Equilibrium</th>
<th>SP equilibrium (for ( \alpha = 0 ))</th>
<th>SP equilibrium (for ( \alpha = 1 ))</th>
</tr>
</thead>
<tbody>
<tr>
<td>( u_1^* = 0.78 )</td>
<td>( u_1^{SP} = 0.8 )</td>
<td>( u_1^{SP} = 0.8 )</td>
</tr>
<tr>
<td>( u_2^* = 0.59 )</td>
<td>( u_2^{SP} = 0.4 )</td>
<td>( u_2^{SP} = 0.4 )</td>
</tr>
<tr>
<td>( q_1^* = 0.21 )</td>
<td>( q_1^{SP} = 0.2 )</td>
<td>( q_1^{SP} = 0.4 )</td>
</tr>
<tr>
<td>( q_2^* = 0.25 )</td>
<td>( q_2^{SP} = 0.2 )</td>
<td>( q_2^{SP} = 0.4 )</td>
</tr>
<tr>
<td>( W^*(\alpha = 0) = 0.0709 )</td>
<td>( W^{SP} = 0.08 )</td>
<td>-</td>
</tr>
<tr>
<td>( W^*(\alpha = 1) = 0.1371 )</td>
<td>-</td>
<td>( W^{SP} = 0.16 )</td>
</tr>
</tbody>
</table>
Optimal qualities differ from their market equilibrium ones. Thus, in both extreme optimal cases, the high quality chosen by the social planner is higher compared to the market scenario, while the low quality is lower. Thus, the quality gap increases.

While optimal quality values do not depend on the $\alpha$ share of consumer surplus that go to resident consumers, quantities do. When there are no resident consumers quantities result slightly smaller compared to the market outcome. However, when all consumers are resident, quantities double compared to the case in which they are are all non-resident.

It can be shown that for this instance in which all the consumer surplus enters the welfare function used by the social planner, prices set up by firms 1 and 2 coincide with their respective marginal costs, and profits equal zero. When the consumer surplus is unimportant for local decision-makers, though, prices differ from marginal costs, and firms obtain the aggregate attainable maximum profits. For other positive values of $\alpha$ inferior to 1, intermediate results should be expected.

With respect to the aggregate surplus, and as expected, the social planner solutions yield higher welfare values that those derived from the market scenario.

- Comparison of different social planner outcomes with externalities ($c > 0$)

Again, we compare some of the results, now focusing on the social planner problems. We analyze how the optimal choices of the social planner change in varying some chosen parameters. Table 3 shows the computed values of some of the variables for some specific values of the parameters. Surprisingly, qualities chosen are higher when externalities are present, even when accounting for the positive effect of quality on the marginal external cost. As before, qualities do not vary when changing the $\alpha$ proportion. However, although quality choices by the social planner result higher, the chosen quantities do diminish for the high quality segment. Thus, while the low quality market segment expands, the high quality one shrinks. Both effects are less important.
Table 3: Different social planner outcomes (Computed for $\theta = 1$, $\bar{u} = 1$)

<table>
<thead>
<tr>
<th>No externalities</th>
<th>With externalities</th>
<th>With externalities</th>
</tr>
</thead>
<tbody>
<tr>
<td>For $c = 0, \alpha = 1$</td>
<td>For $c = 0.25, \alpha = 0$</td>
<td>For $c = 0.25, \alpha = 1$</td>
</tr>
<tr>
<td>$u_1^* = 0.8$</td>
<td>$u_1^{SP} = 1$</td>
<td>$u_1^{SP} = 1$</td>
</tr>
<tr>
<td>$u_2^* = 0.4$</td>
<td>$u_2^{SP} = 0.5$</td>
<td>$u_2^{SP} = 0.5$</td>
</tr>
<tr>
<td>$q_1^* = 0.4$</td>
<td>$q_1^{SP} = 0.03125$</td>
<td>$q_1^{SP} = 0.0625$</td>
</tr>
<tr>
<td>$q_2^* = 0.4$</td>
<td>$q_2^{SP} = 0.8125$</td>
<td>$q_2^{SP} = 0.625$</td>
</tr>
<tr>
<td>$W^{SP} = 0.16$</td>
<td>$W^{SP} = 0.059$</td>
<td>$W^{SP} = 0.119$</td>
</tr>
</tbody>
</table>

when consumers are resident, but they still apply. That is, less units of the high quality good are produced and more of the low quality one, compared to the framework in which there are no externalities.

Finally, the worst possible scenario in terms of total surplus corresponds to the case in which there are no resident consumers, and externalities are present. According to the figures in the table above, the negative costs associated to the externality exceed the positive effects on welfare derived of including the consumers.

5 Comparative statics and economic policy issues

While in the previous section we provided and commented on some computation results arising for particular values of the parameters of the model, here we provide some comparative statics that may permit more general claims on how the optimal policy of the social planner responds to changes in the environment. From these relationships, we attempt to obtain interesting guidelines for the regulation and policymaking in the tourism market.

$$\frac{\partial q_1}{\partial \theta} > 0 \quad \frac{\partial q_1}{\partial c} < 0 \quad \frac{\partial q_1}{\partial \bar{u}} < 0 \quad \frac{\partial q_1}{\partial \alpha} \text{ ambiguous sign}$$

$$\frac{\partial q_2}{\partial \theta} = 0 \quad \frac{\partial q_2}{\partial c} > 0 \quad \frac{\partial q_2}{\partial \bar{u}} > 0 \quad \frac{\partial q_2}{\partial \alpha} > 0$$

The previous partial derivatives show how the sizes of the markets of goods with quality 1 and 2 change with the parameters. As it was suggested above, the parameters sometimes affect in differing ways $q_1$ and $q_2$. It can
be seen that a higher importance of the externalities negatively affects $q_1$, while it encourages $q_2$. This result directly emerges from the assumption we made about how qualities increase the external cost burden.

While an increase in the $\tilde{\theta}$ value increases $q_1$, it does not affect $q_2$. Regarding the impact of what we defined as maximum attainable quality, $\bar{\theta}$, it positively affects $q_2$, but it negatively impacts on $q_1$. Finally, the highest the proportion of resident consumers, higher the market size $q_2$; meanwhile, its effect on $q_1$ is ambiguous.

General conclusions about how the parameters affect welfare cannot be made. For some computed results, it generally results that welfare increases with the participation of local residents in the market. On the contrary, it decreases with a rise in the externality cost $c$ and the maximum quality $\bar{\theta}$.

From the results pointed out before some policy recommendations seem to emerge. It would turn out that in a differentiated market where externalities are present, and where the proportion of non-resident consumers may be outstanding $^5$, the market equilibrium leads to suboptimal situations.

With respect to optimal quantities $q_1$ and $q_2$, and according to our results, the social planner should especially constrain the high quality segment of the market, instead of the low quality one. This contradicts the "common" belief that suggests that regions should specialize in high-quality tourists. Our results likewise show that the social welfare is maximized when two different quality levels exist.

6 Summary and Conclusions

In this paper we have tried to investigate the effects that the consideration of the residents' consumer surplus and of negative externalities caused by the tourism activity have on the optimal provision of tourism services. It has been considered a theoretical framework with a vertical differentiation model in which two firms compete with output level and the quality of the service. From the market equilibrium resolution, it turns out that two different qualities exist in equilibrium. As expected, the market outcome is

$^5$The Spanish case might be an example, although the segregation of consumers and residents happens to be even more clear for more smaller geographical areas that have specialized in exporting tourism services. Such would be the case of the Balearic Islands, for instance.
suboptimal.

We solve for the social planner problem as well. We first consider that there are no externalities affecting the welfare of residents. In general terms, it turns out that the result in this case is that the high quality chosen by the social planner is larger compared to the market scenario, while the low quality is lower. That is, the quality gap rises. Adding consumers to the welfare function logically provokes an increase in the optimal output levels. While in the market solution the low quality firm provides more tourism services than the high quality firm, in the social planner solution quantities to be provided by each firm are now equal. Of course, total welfare is suboptimal in the market scenario.

When introducing the spillover effect on the welfare function, results change. Total welfare falls down. Although the quality choices made by social planner result higher, the chosen quantities do diminish for the high quality segment. That is, less units of the high quality good are produced and most of the production of tourism services is then of low quality. Although this a non-intuitive result, it derives from our assumption about how different qualities impact the size of the externality and thus welfare. It is nevertheless arguable whether this is the most reasonable of the assumptions.

We plan to dedicate our further research precisely to this latter issue. Alternative functional forms and assumptions can be considered to describe the external costs derived from the tourism production and consumption, and they should be easily be fitted in the framework of our model. Additionally, an externality that captures the how the low quality tourism activity worsens the performance of the high quality segment should be undertaken.

Appendix

Proof of Proposition 1

We first prove (a) that the low firm has no incentive to leapfrog the high quality, and then (b) that the high quality firm has no incentive to select a quality lower than its rival.

- (a) If the low quality firm decided to provide a quality higher than \( q^* \) and leapfrog its rival, it would obtain the following profits:
$$
\Pi_1 = \frac{u_1(2u_1^2 - u_2^2D - 4u_1q + 2u_2q)^2}{4(u_1^2 - u_2^2)^2}
$$

Then, it is possible to see that:

$$
\Pi_1(u_1 = 0.77, u_2^D = u_1^*) = 0.0323347 < \Pi_2(u_1 = u_1^*, u_2 = u_2^*) = 0.0358594
$$

- (b) If the top quality firm decided to deviate from the proposed equilibrium to produce a quality lower than its rival, it would earn:

$$
\Pi_2 = \frac{u_1^2D u_2(u_1^D - 2u_2 + 2q)^2}{4(u_1^D - u_2^2)^2}
$$

In this case,

$$
\Pi_2(u_1^D = u_2^*, u_2 = 0.59) = 0.0325831 < \Pi_1(u_1 = u_1^*, u_2 = u_2^*) = 0.0350433
$$

There is then no incentive for the top quality to deviate.

Proposition 1 is then proved.

References


