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WP 50-07

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"SECOND HOMES VS. HOTELS: A SUGGESTION FOR A SELF-ENFORCING POLICY"

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Second Homes *vs.* Hotels: a Suggestion for a Self-enforcing Policy*

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November 7, 2007

Abstract

We set up a theoretical model, in which the policy maker of a tourism destination has to choose how to allocate the limited natural resource "land" between private holiday accommodations (i.e. second homes) or hotels. In a framework of partial equilibrium, the policy maker minimizes a loss function which measures the loss of political consensus and is defined by a linear combination of the policy maker and the local community preferences.

We can obtain both a corner solution, in which we have extreme choices of only holiday houses or only hotels, and an internal solution, in which we have a linear combination of them. To do that the policy maker can use as economic policy instruments either standard policies (indirect control - a Pigou tax - or direct control - regulation) or non-standard policies (a reinvestment commitment of the firm in the tourism destination). The final policy maker decision was made by assessing the welfare consequences of the policy implications.

JEL Classification: R52-D71

Acknowledgement *We would like to thank Corrado Benassi, Gianluigi Pelloni, Antonello E. Scorcu and Laura Vici for helpful comments on a previous version of the paper. The usual disclaimer applies.*

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*A preliminary version of this paper was presented at the "Second International Conference on Tourism Economics" (Palma de Mallorca, May 18^{th}-20^{th}, 2006). A subsequent version has been presented at the "First International Conference Small Open Economies in a Globalized World" (Rimini, August 29^{th}-September 2^{nd}, 2006).

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1 Introduction

Policy makers managing tourism resorts often face an economic policy problem related to tourism investments. This dilemma concerns the allocation of the limited natural resource "land" between either private holiday accommodations (second homes)[1] and hotels. This potential policy dilemma arises particularly in recently established tourism destinations and also in expanding ones.

In the literature a similar issue has been addressed[2] in a framework in which a policy maker has to impose a tax on land to be allocated among new hotels (homogeneous buildings). This "Pigouvian" tax could provide a useful policy instrument if the policy maker were sensitive to the negative externalities associated with using land to build hotels; land which could instead be devoted to more environment friendly activities[3]. Our approach will move beyond these analysis by considering a specific extension of the choice set and the policy alternatives. We develop a static and linear model, in which the building firm has two substitute choice variables - either hotels or second homes (non homogeneous buildings) - while the policy maker should choose between a Pigouvian tax and other alternative policy instruments.

The dilemma inherent in this policy issue is brought about by a clash of interests between the policy maker and the building firm. It emerges when the policy maker has to decide wether to give planning permissions for building private holiday accommodations or hotels. Two main stylized facts would bear out this issue:

- the average market price (market value per square meter) of new private holiday accommodations is often higher than the market price of new hotels[4];
- the "impact effects", measured in terms of costs and employment, of the two alternative choices are analogous. However the "tourism multiplier effect" on local economic development is higher for hotels, because hotel guests tend to have a higher average daily per capita expense (in terms of indirect tourism expenses)[5].

With respect to the first stylized fact, the characteristics of the two kinds of buildings (hotels and second homes) which can bring about different market

[1] "Second homes" are private holiday accommodations which are left unoccupied for most of the year and are mainly used during periods of peak demand for tourism accommodation (Jaakson, 1986).

[2] See, for example, Piga (2003a).

[3] In particular, Piga (2003a) considers a dynamic policy game between the policy maker and a monopolistic firm in a tourism area. The final outcome of his work suggests that the tax alone cannot lead to the socially optimal level of land use.

[4] See Mazzucchelli (2007): in this analysis the difference between the market prices of new second homes and new hotels in Italy is estimated to be on average equal to 40-45%.

[5] See Piga (2003b, p. 900): "Moreover, self-catering accommodations, such as second homes, do not generate such high multiplier effects as hotels". Mazzucchelli (2007) estimates that the average daily per capita expense of international hotel guests in Italy is 46% higher.

prices are:

1. second homes may represent a final durable consumption good while hotels are an instrumental good. Therefore hotels are a higher risk investment;
2. the building firm's production function yields, *ceteris paribus*, to a higher number of marketable square meters (i.e. output) for second homes than for hotels, since hotels are characterized by a large number of accommodation services;
3. second homes last longer than hotels and therefore have a lower depreciation rate;
4. hotels have higher management and maintenance costs as their occupation rate is higher than for private holiday accommodations.

With respect to the second stylized fact, we point out an observable stylized fact: investment in second homes yields immediate employment growth but, at the same time, it leads to a type of tourism with lower development rates. However, the profit margin of the investment in private holiday accommodations can be considerably higher than the profit margin of investment in hotels.

The building firm and the policy maker of the tourism destination can have incompatible goals. Tourism investments, both in second homes and hotels, may generate environmental negative externalities[6], though investment in hotels may bring about positive externalities (tourism multiplier effect) offsetting (at least partially) the negative ones. Investments in second homes would induce a "net" negative externality because the positive effects (tourism multiplier effect) would not be offset by the negative effects (environmental effect).

In this paper we set up a partial, static equilibrium theoretical model, in which the policy maker minimizes a loss function measuring the loss of political consensus. This function is defined in terms of a linear combination of the policy maker and the local community preferences. The model's agents are: (i) the policy maker, who draws up the tourism destination-planning scheme; (ii) the building firm, which builds and sells private holiday accommodations and hotels on the market. The control variables are the square meters of area usable for building, given the disposable land (physical constraint), the prices of private holiday accommodations and hotels and the building costs.

We shall analyze different economic policy scenarios in order to obtain a solution to our economic policy problem. We shall consider standard policies (indirect control, a Pigou tax, or direct control, regulation) or non-standard policies (a reinvestment commitment of the firm in the tourism destination). The final policy maker's decision is made by assessing the welfare consequences of the possible solutions.

[6] See Piga (2003a).

The paper is structured as follows. In section 2 the model is set up. In section 3 the corresponding optimization problems are solve and the enforceable economic policies are analyzed. In section 4 the optimal investment decisions for both the tourism destination and the building firm are discovered. In conclusions a comparative analysis between the different solutions of the problem in terms of "welfare consequences" is made. In Appendix the results of a numerical simulation of the model are shown.

2 The Model

We assume two interacting agents: (i) the policy maker of the tourism destination, which draws up the tourism destination-planning scheme; (ii) one price taker building firm, which builds private holiday accommodations and hotels and then sells them.

The building firm is assumed to be a non-local company (or a multinational company), such that its investments are to be considered as foreign direct investments and its profit does not belong to the residents[7]. Moreover, we assume the firm has a restricted financial budget (liquidity constraint) to invest in buildings within the tourism destination and it is a price taker firm because we analyze its choices in the short-run and we argue it acts in a “small open economy”, in which the market prices are well known to be fixed by the “rest of the world”. The private holiday accommodations and hotels market prices are therefore taken as constant (exogenous variables), as well as the building costs and so the profit margins, while the control variables are the square meters (SM) of area built by the firm as private holiday accommodations or hotels, given the disposable land and capital. The firm, as usual, is profit maximizing.

On the contrary, the policy maker of the tourism destination is interested in minimizing a loss function, which measures the loss of political consensus[8] and is defined by a linear combination of the policy maker and the local community preferences. Precisely, from the mentioned stylized facts we assume that the following parameters affect the policy maker loss function:

- a negative weight for hotels built by the firm (therefore a positive weight in terms of welfare);
- a positive weight for private holiday accommodations built by the firm (therefore a negative weight in terms of welfare);
- a negative weight (therefore a positive one in terms of welfare) for the

[7] For example, in 1997 a multinational company, Ciga Immobiliare, prepared a “master-plan” (development scheme) for a part of Costa Smeralda on the Northeast coast of Sardinia (Italy).

[8] The “loss function” of the policy maker can be interpreted like a measurement of the loss of its political consensus, for example lost votes, such that a zero value means “no lost votes”, while a positive value signals a certain amount of “lost votes”.

building area (in square meters) planned in the tourism destination-planning scheme but at last not utilized.

Notably, this last variable can be regarded as a proxy variable of the full employment in the tourism destination: if the square meters of built area are less than those planned in the tourism destination-planning scheme, we derive that all the local economic district is underemployed, its land, its labour and its capital.

In this model, we specify all the functions as linear combinations in order to obtain a largely intuitive solution. This choice implies both the necessity to apply the linear programming technique and a polarization of the problem solutions into "all or nothing" programs. Nevertheless, this simplification is easily removable, without changing the substance of the argument, by assuming quadratic functions both for profit and loss functions, or by specifying the prices as endogenous variables.

The variables of the model are:

1. the land variables, x (SM built as hotels), y (SM built as private holiday accommodations), $s \equiv x + y$ (SM of total area built by the firm), $S \equiv \bar{x} + \bar{y}$ (SM of building area according to the tourism destination-planning scheme, where $\bar{x}$ and $\bar{y}$ are the SM of building area respectively as hotels and private holiday accommodations), $\bar{S}$ (SM of total area disposable in the tourism destination), where $S \leq \bar{S}$ (physical constraint) and $s \leq S$ (institutional constraint);

2. the building firm variables, p (selling price of one SM built as hotel), v (selling price of one SM built as holiday house), c (building cost of one SM), $m = p - c$ (profit margin on each SM built as hotel), $n = v - c$ (profit margin on each SM built as holiday house), $\Pi(x, y) = mx + ny$ (profit function, with $n > m$)[9], F (liquidity constraint, i.e. financial resources, credit and corporate capital disposable to invest in the tourism destination)[10];

3. the tourism destination variables, $S - s$ (difference between the SM of building area and the SM of total built area), $a \geq 0$ (political consensus to the tourism destination, e.g. in terms of number of lost votes, for the SM of built area, higher or lower than those planned), $b \geq 0$ (political

[9] For simplicity (see equation 3) and without loosing generality of results, we assume that the building costs per SM (c) are the same for hotels and holiday houses. Given this assumption on costs and the previous stylized fact ($v > p$) then $n > m$. Note that this assumption and this stylized fact of the model does not necessarily require nor that the building costs per SM (c) are the same for hotels and holiday houses neither that their average market prices per SM (v and p) are different. On the contrary, it is crucial that the profit margin per SM from the investment in holiday houses is sufficiently higher with respect to the investment in hotels.

[10] The introduction of a liquidity constraint is equivalent to introduce a "credit rationing" hypothesis. As we will see in the Conclusions, one further policy instrument could consist in relaxing this constraint.

consensus to the tourism destination for the SM built as private holiday accommodations), $d \leq 0$ (political consensus to the tourism destination for the SM built as hotels), $L^{'}(x, y) = a(S - s) + by + dx$ (loss function, which measures the loss of political consensus suffered by the policy maker of the tourism destination)[11].

We formulate the hypothesis of polarization of the preferences of the tourism destination policy maker, $a, b > 0$ and $d = 0$[12], such that the loss function becomes: $L^{'}(x, y) = a(S - s) + by$. Dividing then each term by b we obtain: $\frac{L^{'}(x,y)}{b} = \frac{a}{b}(S - s) + y$, that can be expressed as:

$$L(x, y) = \alpha(S - s) + y \tag{1}$$

where $L(x, y) = \frac{L^{'}(x,y)}{b}$ and $\alpha = \frac{a}{b}$ (with $\alpha > 1$ if $a > b$ and $\alpha < 1$ if $a < b$).

In this way, we have all the elements to formulate the optimization problems of the two agents, under the hypothesis that there is not strategic interaction between them[13].

Problem 1 (Tourism Destination Program) *The tourism destination's goal is to minimize its loss function subject to an institutional constraint such that the optimization problem is:*

$$\begin{aligned} \underset{x,y}{Min}\ L(x, y) &= \alpha(S - s) + y \\ s.t.\ \ s &= x + y \leq S \end{aligned} \tag{2}$$

whose solution is: $\bar{x} = S$, $\bar{y} = 0$, that represents the optimal tourism destination-planning scheme for the policy maker, such that the optimal total built area is $\bar{s} = \bar{x} + \bar{y} = S$ and therefore the optimal loss is $L(\bar{x}, \bar{y}) = 0$. Within this solution all the building area should be therefore at last built as hotels.

Proof. By definition $s \equiv x + y$, therefore by substituting s in the target function, we obtain $L(x, y) = \alpha(S - x - y) + y$, whose minimum is achieved in a straightforward way for $\bar{y} = 0$, such that according to the institutional constraint $\bar{x} = S$ and therefore $\bar{s} = \bar{x} = S$. ■

[11] The building firm's profit does not enter into the policy maker loss function because the firm is a non-local company and its profit does not belong to the residents by assumption.

[12] In spite of this hypothesis of polarization of the policy maker preferences, it is possible to obtain a "mixed equilibrium" (internal solution) even with linear functions. As we will see in Problem 5, we can obtain both a corner solution (in which we have extreme choices of only holiday houses or only hotels) and an internal solution (in which we have a linear combination of them).

[13] For simplicity we do not consider physical constraint $S \leq \bar{S}$.in the following optimization problems.

Problem 2 (Building Firm Program) *The building firm's goal is to maximize its profit function subject to a liquidity constraint, such that the optimization problem is:*

$$\underset{x,y}{Max}\ \Pi(x,y) = mx + ny$$
$$s.t.\ \ cx + cy \leq F\ \ (therefore\ x + y \leq \frac{F}{c}) \tag{3}$$

whose solution is: $x^* = 0$, $y^* = \frac{F}{c}$, *such that the optimal total built area is* $s^* = y^* = \frac{F}{c}$ *and therefore the optimal profit is* $\Pi(x^*, y^*) = \frac{nF}{c}$. *Within this solution all the building area should be therefore at last built as private holiday accommodations.*

Proof. The profit function is linear with respect to x and y, therefore the maximum profit is achieved by investing all the financial resources to build the SM of area which give the highest profit margin. Since $n > m$ we obtain a straight solution $y^* = \frac{F}{c}$ and $x^* = 0$ as conditions for the maximum of $\Pi(x,y)$. ■

Since the optimal choices of the building firm do not overlap with tourism destination's goals, this situation generates a policy problem. The standard economic policy instruments provided by the political economics literature to face these kinds of policy problems are: (i) indirect control instruments (Pigou tax/subsidy); (ii) direct control instruments (direct regulation). We shall see the enforcement of both the standard economic policies and furthermore we shall analyze the effects of non-standard economic policies.

3 The Standard and Non-Standard Economic Policies

We assume that the disposable financial resources to invest in buildings at the tourism destination can not be transferred to another different tourism destination or economic sector. In other words, we hypothesize to manage "specific investments" because of the institutional nature of the firm (i.e. its objective function).

3.1 Pigou Tax

One of the most important standard indirect economic policy that the policy maker can enforce, consists of introducing a tax in order to indirectly discourage the private agents from doing something unwanted. In this case it consists of introducing a tax t on the profit margin of each SM of area built by the firm as private holiday accommodations (i.e. a tax on the earnings obtained from the selling of private holiday accommodations), in order to discourage the firm from building them. This tax, called Pigou Tax, must be of a size such that it holds the following equivalence between the profit margins of the two kinds of investments:

$$n\,(1-t) < m \tag{4}$$

and therefore such that:

$$t > \frac{n-m}{n} = 1 - \frac{m}{n} \tag{5}$$

Problem 3 (Pigou Tax) *Given the tourism destination-planning scheme constraint $s \leq S$ (institutional constraint), the building firm optimization problem becomes:*

$$\underset{x,y}{Max}\ \Pi\,(x,y) = mx + n\,(1-t)\,y$$
$$s.t.\ x + y \leq \frac{F}{c}\ \text{and}\ s = x + y \leq S \tag{6}$$

whose possible solutions are:

1. if $\frac{F}{c} < S$ then $x_1 = \frac{F}{c}$, $y_1 = 0$, such that the optimal total built area is $s_1 = x_1 = \frac{F}{c}$ and the optimal profit is therefore $\Pi\,(x_1, y_1) = \frac{mF}{c}$; in this case only a portion of the building area is at last utilized, with an excess of building area at last not utilized equal to $\left(S - \frac{F}{c}\right)$;

2. if $\frac{F}{c} \geq S$ then $x_1 = S$, $y_1 = 0$, such that the optimal total built area is $s_1 = x_1 = S$ and the optimal profit is therefore $\Pi\,(x_1, y_1) = mS$, situation in which all the building area is at last utilized but the firm remains with an excess of financial resources unused equal to $\left(\frac{F}{c} - S\right)$.

In any case, all the disposable resources (building or financing resources) are at last built as hotels: the tourism destination does not collect any tax yield ($nty = 0$) but its goal in terms of typology of buildings is achieved.

Proof. The profit function is linear with respect to x and y, therefore the maximum profit is achieved by investing all the financial resources to build the SM of area which give the highest net profit margin. Since as a result of the Pigou tax $n\,(1-t) < m$, we obtain a straight solution $y_1 = 0$ and therefore $x_1 = \frac{F}{c}$. If $\frac{F}{c} = S$ then all the building area is at last utilized, while if $\frac{F}{c} > S$ then the firm can not build all the SM of area allowed by its financial capital and will be forced to limit itself to the tourism destination-planning scheme constraint S by setting $x_1 = S$. ■

3.2 Direct Regulation

The most usual standard direct economic policy consists of a direct regulation of the economy by the policy maker. In this case it is sufficient to introduce within the tourism destination-planning scheme some quantitative constraints, that is

$y \equiv 0$ (no planning permission to build private holiday accommodations)[14] and $s \leq S$ (tourism destination-planning scheme constraint or institutional constraint).

Problem 4 (Direct regulation) *Given these constraints the building firm optimization problem becomes:*

$$\underset{x,y}{Max}\ \Pi(x,y) = mx + ny$$
$$s.t.\ x + y \leq \frac{F}{c},\ y \equiv 0\ and\ s = x + y \leq S \tag{7}$$

whose possible solutions are exactly the same as in the case of Pigou Tax (see Problem 3):

1. if $\frac{F}{c} < S$ then $y_2 = 0$ and therefore $x_2 = \frac{F}{c}$, such that the optimal total built area is $s_2 = x_2 = \frac{F}{c}$ and the optimal profit is therefore $\Pi(x_2, y_2) = \frac{mF}{c}$; in this case only a portion of the building area is at last utilized, with an excess of building area at last not utilized equal to $\left(S - \frac{F}{c}\right)$;

2. if $\frac{F}{c} \geq S$ then $y_2 = 0$ and therefore $x_2 = S$, such that the optimal total built area is $s_2 = x_2 = S$ and the optimal profit is therefore $\Pi(x_2, y_2) = mS$, case in which all the building area is at last utilized but the firm remains with an excess of financial resources unused equal to $\left(\frac{F}{c} - S\right)$.

Proof. The profit function is linear with respect to x and y, but it is not possible to build private holiday accommodations, therefore $y_2 = 0$ and the only possible profit $\Pi(x_2, y_2) = mx_2$ is achieved by investing all the financial resources to build the disposable area as hotels: $x_2 = \min\left(\frac{F}{c}, S\right)$. ■

The two economic policies described in Problems 3 and 4 yield the same solution for the firm, but in the case of the Pigou Tax the solution $y = 0$ is the outcome of a firm's choice, while in the case of Direct regulation the solution $y \equiv 0$ is the consequence of conformity with the law: in public economics literature, these are standard economic policy instruments. However the tourism destination achieves the absolute minimum value of the loss function $L(x, y) = 0$ only if the financial resources of the firm are high enough (liquidity constraint not binding):

- if $\frac{F}{c} < S$ then $y_i = 0$ and $s_i < S$, therefore the optimal loss is $L(x_i, y_i) = \alpha\left(S - \frac{F}{c}\right) > 0$ for $i = 1, 2$;

- if $\frac{F}{c} \geq S$ then $y_i = 0$ and $s_i = S$, therefore the optimal loss is $L(x_i, y_i) = 0$ for $i = 1, 2$.

[14] The quantitative constraint $y \equiv 0$ is the optimal solution of the tourism destination program (see Problem 1) and it represents therefore a first best solution. An alternative quantitative constraint, like $y < x$ or $y < k$ (where $k \leq x$ is a constant), would represent a second best solution.

In the first case (if $\frac{F}{c} < S$), where the loss for the tourism destination is not zero (it is not at its absolute minimum value), it is necessary to verify whether it is possible to find a more efficient economic policy that can cut down the loss (e.g. the number of lost votes). Let us therefore analyze a typology of non-standard economic policy: an investment commitment of the building firm in the tourism destination[15].

3.3 The Reinvestment Commitment Policy

When the financial resources of the firm are not sufficient to achieve the absolute minimum value of the tourism destination loss, the liquidity constraint is binding (i.e. $\frac{F}{c} < S$) and it is possible to enforce an economic policy that is more efficient than the previous ones (see Problems 3 and 4), without imposing the condition $y \equiv 0$ but at the same time enforcing the tourism destination-planning scheme constraint (or institutional constraint) $s \leq S$. This policy consists of introducing a commitment for the building firm to reinvest all its earnings obtained from the selling of private holiday accommodations, that is introducing a budget constraint in the form of:

$$\Delta F = ny \tag{8}$$

In this case the building firm has at its disposal an amount of financial resources equal to:

$$F + \Delta F = F + ny \tag{9}$$

Problem 5 (Non-Standard Policy: the Reinvestment Commitment) *-Therefore its optimization problem becomes:*

$$\begin{aligned} &\underset{x,y}{Max}\ \Pi(x,y) = mx + ny \\ &s.t.\ x + y \leq \frac{F + ny}{c}\ and\ s = x + y \leq S \end{aligned} \tag{10}$$

whose solution is: $x_3 = \frac{F - S(c-n)}{n}$, $y_3 = \frac{Sc - F}{n}$ *only if* $F - S(c-n) > 0$ *and* $c - n > 0$. *The optimal profit is therefore* $\Pi(x_3, y_3) = \frac{m[F - S(c-n)]}{n} + Sc - F$, *while the optimal loss is* $L(x_3, y_3) = \frac{Sc - F}{n}$ *since the optimal total built area is* $s_3 = x_3 + y_3 = S$. *Even when the starting financial resources are not high enough (*$\frac{F}{c} < S$*) all the building area is eventually utilized in the end thanks to the higher financial resources due to the reinvestment of the earnings coming from private holiday accommodations.*

Proof. The corner solutions must be rejected: (i) $x_3 = 0$, $y_3 > 0$ is not feasible because if some private holiday accommodations are built, the firm obtains

[15] As we have seen in Note [10], one possible extension of this model could consist in relaxing the liquidity constraint, which would represent a further non-standard policy instrument. We are grateful to Claudio Piga for this useful observation.

earnings that must be reinvested into the building of hotels; (ii) $x_3 > 0$, $y_3 = 0$ is not an optimal solution insofar as been proved in the previous cases (since $n > m$). The only solution, if it exists, is therefore in some "interior solution" ($x_3 > 0$, $y_3 > 0$) that can be computed by solving the system of equations made by the two constraints (10) solved for y:

$$\begin{cases} y = \frac{F}{c-n} - \frac{c}{c-n}x \text{ (with } c-n>0\text{, that is } 2c>v) \\ y = S - x \end{cases} \tag{11}$$

whose solution is: $x_3 = \frac{F-S(c-n)}{n}$, $y_3 = \frac{Sc-F}{n}$ only if $F - S(c-n) > 0$ and $c - n > 0$. It is straightforward then to verify that the optimal profit is $\Pi(x_3, y_3) = \frac{m[F-S(c-n)]}{n} + Sc - F$ and that all the building area is at last utilized, $s_3 = x_3 + y_3 = \frac{F-S(c-n)+Sc-F}{n} = S$, such that the optimal loss becomes equal to $L(x_3, y_3) = y_3 = \frac{Sc-F}{n}$. ■

The three Problems 3, 4 and 5, which describe the different possible economic policies, represent typical problems of linear programming in the space (x, y). The Figure 1 represents the solution of Problem 5 in the hypothesis $\frac{F}{c} < S$.

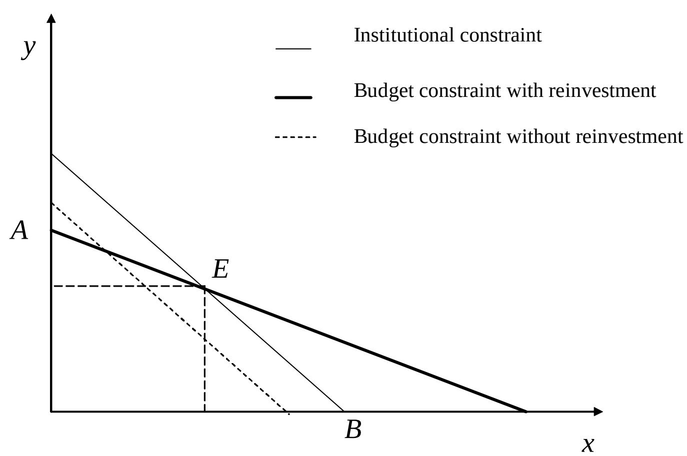

Figure 1 - The solutions A and B are not feasible or dominated solutions. The solution $E(x > 0 \,;\, y > 0)$ is an optimal solution. In point E there is full equilibrium, given both the reinvestment commitment and the full utilization of the building area.

The two lines depicting the budget constraint (or reinvestment commitment) and the institutional constraint (or building area constraint) are no longer parallel but the reinvestment commitment, that depends on the value of y, yields the possibility of an intersection between the two constraints. In this way, the constraints cause a "vertex" and therefore the chance of an interior solution (or mixed equilibrium) $x, y > 0$, only if the parametric conditions $c-n > 0$ and $F-S(c-n) > 0$ hold. Furthermore, if $\alpha > 1$ and $\frac{F}{c} < S$ this last solution, as we shall show in the next Section, dominates all the other possible economic policies and we can not rule out the possibility that the outcome will be higher also in terms of firm profit.

4 Welfare Comparison of the Economic Policies

To conclude the model we have to define the values of the parameters for which the non-standard economic policy that we called "reinvestment commitment policy" (see Problem 5) dominates, or at least is indifferent to, the standard direct or indirect policies (see Problems 3 and 4). In fact, as we have shown, these standard policies yield the same results which are suboptimal if the financial resources of the firm are not sufficient to build all the disposable area (i.e. if $\frac{F}{c} < S$).

In other words, since the final policy maker's decision is made by assessing the welfare consequences of the possible solutions, we need to verify if and when the results of the non-standard policy are more efficient:

- if the loss function achieves a lower value (for the tourism destination), i.e. if the "reinvestment commitment policy" is welfare improving (see Proposition 6);
- if the profit function achieves a higher value (for the building firm), i.e. if the "reinvestment commitment policy" is self-enforcing and therefore the commitment is credible (see Proposition 7)[16].

Proposition 6 (Tourism Destination Optimal Choice) *With reference to the direct regulation policy (see Problem 4), but the same conclusions can be easily extended to the Pigou tax policy (see Problem 3), it is possible to show that:*

$$L(x_3, y_3) \le L(x_2, y_2) \;\; \textit{iff} \; \alpha \ge 1 \; \textit{or} \; a \ge b \tag{12}$$

If the policy maker of the tourism destination attaches more importance to the goal of the full utilization of the building area as planned in the tourism destination-planning scheme (i.e. to the parameter a, which is also a proxy variable of the local full employment) than to the negative externality on the tourism economy brought about by the construction of private holiday accommodations instead of hotels (i.e. to the parameter b), then the "reinvestment commitment policy" dominates the standard economic policies.

Proof. Since $\frac{F}{c} < S$ (the financial resources of the firm are not sufficient), we take into consideration the optimal loss functions computed in the cases of

[16] Obviously, in this case there is no longer the necessity of monitoring the commitment at all.

direct regulation (see Problem 4) and reinvestment commitment (see Problem 5):

$$\begin{array}{c} L(x_3, y_3) = \frac{Sc-F}{n} \leq \alpha\left(S - \frac{F}{c}\right) = L(x_2, y_2) \\ \frac{Sc-F}{n} \leq \alpha\left(\frac{Sc-F}{c}\right) \end{array} \quad (13)$$

and multiplying the two terms by $(Sc - F)^{-1}$ we obtain:

$$\frac{1}{n} \leq \frac{\alpha}{c} \text{ and therefore } \alpha \geq \frac{c}{n} \quad (14)$$

But since $n = v - c$ by assumption and $v < 2c$ from (11), inequality that can be reinforced by setting $v = 2c$, we can rewrite the previous condition as:

$$\alpha \geq \frac{c}{2c - c} \text{ and therefore } \alpha \geq 1 \quad (15)$$

Recalling the definition of the parameter $\alpha = \frac{a}{b}$, this condition implies that $a \geq b$, parameters of the loss function that measure tourism destination preferences in terms of political consensus, depending from the different land allocations. ■

Proposition 7 (Building Firm Optimal Choice) *With reference once again only to the direct regulation policy (see Problem 4), it is possible to show that:*

$$\Pi(x_3, y_3) \geq \Pi(x_2, y_2) \ \textit{ iff } pv \geq c(2p - c) \quad (16)$$

In conclusion, the building firm might also prefer the "reinvestment commitment policy" instead of being subjected to an exogenous direct regulation policy, but this is true only under specific conditions in terms of prices (p and v) and costs (c). If these conditions hold, the solution of the budget constrained (reinvestment commitment policy) can be therefore chosen by the firm itself.

Proof. Since $\frac{F}{c} < S$, we take into consideration the optimal profit functions computed in the cases of direct regulation (see Problem 4) and reinvestment commitment (see Problem 5):

$$\begin{array}{c} \Pi(x_3, y_3) = \frac{m[F - S(c-n)]}{n} + Sc - F \geq \frac{mF}{c} = \Pi(x_2, y_2) \\ mc(F - Sc + Sn) + nc^2 S - ncF \geq mnF \\ Sc(mn + nc - mc) \geq F(mn + nc - mc) \end{array} \quad (17)$$

On condition that $mn + nc - mc \geq 0$, we therefore obtain:

$$Sc \geq F \quad (18)$$

that is verified by assumption ($\frac{F}{c} < S$). We have then to develop the parametric condition $mn + nc - mc > 0$:

$$nc + m(n - c) \geq 0 \quad (19)$$

Recalling the definitions of the parameters $m = p - c$ and $n = v - c$, this condition implies that:

$$\begin{aligned} vc - c^2 + (p - c)(v - 2c) \geq 0 \\ pv \geq c(2p - c) \end{aligned} \tag{20}$$

This condition represents a constraint on the exogenous variables prices (p and v) and costs (c) and only when this condition is present then the building firm might also gain advantage (in terms of total profits) from budget constraint (reinvestment commitment policy) rather than undergoing the building constraint (direct regulation policy). ■

5 Conclusions

It is important to assess the welfare consequences of the different possible economic policies. The previous Proposition 6 shows that if the tourism destination attaches much value to the full utilization of the building area (and thus to local full employment), i.e. if $a > b$[17], then a non-standard economic policy is the more efficient option. Such a policy consists of:

1. a planning permission to build private holiday accommodations;
2. a binding budget constraint of the earnings obtained from selling the second homes (reinvestment commitment policy).

Other standard economic policies[18] can be therefore less efficient if the financial resources of the firm are not sufficient to build all the area originally planned in the tourism destination scheme. This inefficiency emerges when the positive net externalities associated with building only hotels are dominated by the negative externalities brought about by an excess and non-utilized building area.

For the reinvestment commitment policy to be effective, both the built area and the actual reinvestment of the earnings (obtained from selling private holiday accommodations) must be monitored by the local policy maker. In other words, monitoring the commitment is a tricky problem.

Moreover, the previous Proposition 7 shows that only if the prices and costs of the building firm support the condition for the preference of a reinvestment commitment solution - rather than undergoing an exogenous constraint, i.e. if $pv \geq c(2p - c)$ - then the problem of monitoring the commitment does not exist any more. In this case the policy would in fact be self-enforcing. It can

[17] Under a political point of view this condition means that the tourism destination policy maker looses more consensus (votes) in case of partial utilization of the building area than for the SM of area built by the firm as private holiday accommodations.

[18] The other standard economic policies consist in (i) no permitting to build holiday houses (direct control) or (ii) introducing a tax only (or more) on the earnings obtained from selling holiday houses (indirect control).

be favorable for the firm itself to suggest an agreement with local authorities enforcing self-monitoring so as to avoid external interventions. In this way, the agreed solution could also take the form of a self-regulation, e.g. the building firm which works in the sector of private holiday accommodations could mimic a sort of non-profit organization (NPO).

Corollary 8 *In the case of the reinvestment commitment policy (see Problem 5), if $F < Sc$ then the absolute value of the SM built as hotels is lower than those imposed by the standard economic policies (see Problems 3 and 4).*

Proof. We can show that $x_2 > x_3$:

$$\begin{array}{c} x_2 = \frac{F}{c} > \frac{F-S(c-n)}{n} = x_3 \\ nF > cF - c^2 S + ncS \\ F(n-c) > Sc(n-c) \end{array} \tag{21}$$

Dividing by $n - c < 0$ both the terms we obtain:

$$F < Sc \tag{22}$$

that is verified by assumption. ■

In other words, the tourism destination "pays" for the advantage of the full utilization of the building area ($s_3 > s_2$) in terms of fewer SM of hotels built ($x_2 > x_3$). From the point of view of the building firm, moreover, under the previous condition $pv \geq c(2p - c)$, the ranking of its profits will be: $\Pi(x^*, y^*) \geq \Pi(x_3, y_3) \geq \Pi(x_2, y_2)$. The building firm would therefore prefer not to have any restriction at all (see Problem 2), but if some constraints are introduced by the policy maker, then even the firm would prefer to endorse the reinvestment commitment policy rather than be constrained by a severe regulation.

Another non-standard economic policy that could be implemented instead of the "reinvestment commitment policy" consists in relaxing the liquidity constraint of the building firm, i.e. the credit rationing hypothesis. All the public interventions that facilitate the possibility to borrow for the building firm (i.e. credit facilities) represent possible examples of such a non-standard policy (public-private partnerships in developing the land, project financing, subsidized credit, no-interest bearing credit, public credit, etc.)[19].

Finally, we conclude the paper with a possible extension to our model. A dynamic model could be implemented by specifying how the total built area $s(t) = x(t) + y(t)$ evolves over time, according to a law of motion of this type: $\dot{s}(t) = f(\dot{x}, \dot{y}; t)$; $s(0) = 0$; $s(t) \leq \bar{S}$.

[19] Nevertheless, since we do not consider the implementation costs of the economic policies, we can not say which is the more efficient one (second best analysis). We are grateful to Claudio Piga for suggesting this implementation.

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6 Appendix: a Numerical Exercise

We present a numerical example of the model, whose results in terms of the endogenous variables are showed in the following Table 1. To compute these results, we fix the following numerical values for the exogenous parameters of the model:

$$\bar{S} = 1000 \text{ SM}; S = 800 \text{ SM}; F = 2500; p = 6; v = 7; c = 4; \alpha = 2$$

so that the profit margins are:

$$m = 6 - 4 = 2 \text{ and } n = 7 - 4 = 3$$

and the profit and loss functions:

$$\Pi (x, y) = 6x + 16y \text{ and } L (x, y) = 2 (800 - s) + y$$

For these values all the most important parametric conditions of the model hold: $F < Sc$ $(2500 < 3200)$; $n > m$ $(3 > 2)$; $c - n > 0$ $(4 - 3 > 0)$;

$F - S(c-n) > 0$ $(2500 - 800 * 4 + 800 * 3 > 0)$; $pv > c(2p-c)$ $(42 > 32)$; $\alpha > 1$ $(2 > 1)$.

In Table 1 we observe how the optimal choices of the tourism destination and the building firm represent a clash of interests that justifies an economic policy intervention both in fixing the building area and in preventing the permission to build private holiday accommodations. In particular, since the financial resources that the firm has at its disposal are lower than those necessary to utilize all the building area, the only binding constraint is those preventing to build private holiday accommodations.

Table 1: Numerical simulation of the model.

Policy	Hotels(x)	S.Homes(y)	Built area(s)	Loss(L)	Profit(Π)
Tourism Destin.	800	0	800	0	1600
Building Firm	0	625	625	975	1875
Direct Regulat.	625	0	625	350	1250
Reinv.Commit.	567	233	800	233	1833

Through the numerical simulation we can compare the outcomes of the direct regulation policy (see Problem 4) and the reinvestment commitment policy (see Problem 5). In this example, with the shown values of parameters, in the case of direct regulation policy (see Problem 4) 175 SM of area remain not built $(800-625)$, with a "political" loss for the tourism destination equal to 350 votes, lower than in the case of absence of any regulation (975 votes). For this reason, a direct regulation policy in the form a planning scheme introducing some institutional constraints is better than an absence of any regulation.

Nevertheless, if thanks to a reinvestment commitment policy (see Problem 5) the policy maker can give some planning permission to build private holiday accommodations, then the SM of area built by the firm as hotels are higher than those built as private holiday accommodations (the typology of tourism prevailing in the destination is still hotel based), but even more interesting is that now the "political" loss for the tourism destination decreases (233 vs. 350). For this reason, a reinvestment commitment policy is better than a direct regulation policy fixing a severe planning scheme.

Finally, since $1875 > 1833 > 1250$, which confirms the conclusion above stated (see Corollary 8), also in this example the firm itself prefers to offer to the policy maker the solution of a credible self-regulation, so that a contractual agreement with the tourism destination can be realized.