

# Market-segment specialization and long-term growth in a tourism-based economy

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## RESUMEN

Este trabajo aborda el problema del crecimiento a largo plazo en una economía turística. En particular, analiza el papel de la especialización en un segmento de mercado turístico en la fase de declive de la industria. Para ello se construyó un modelo de crecimiento endógeno donde los diferentes tipos de capital se representan por medio de los posibles valores de la elasticidad-precio de la demanda. Se resolvió el problema de optimización social a través de la aplicación de la teoría de control óptimo. Los resultados muestran que tasas de consumo no decrecientes en la economía son posibles si la oferta turística se orienta a segmentos de mercado más selectos que el puro turismo de masas.

**Palabras clave:** control óptimo, economía turística, tipo de turismo, crecimiento sostenido

**Área temática:** A1-Optimización

## ABSTRACT

This paper addresses the problem of long term growth in a tourism-based economy. Specifically, it analyses the role of the market-segment specialization in the decline phase of the industry. To do this, an endogenous growth model is built where the different types of tourism are represented by the different values of the price-elasticity of demand. The social optimization problem is solved analytically by using optimal control theory. The results show that non-decreasing consumption rates in the economy are possible by reorienting the supply to more selected market segments than pure mass tourism.

## 1 INTRODUCTION

The economic importance of tourism has grown dramatically from the early 1950's . According to the figures of the World Tourism Organization, the number of tourists at the world level is 2600% higher than in 1950. In the meantime, tourism spending rose steadily reaching a nominal level 200 times higher than in 1950. As a consequence of this prominent role of tourism some countries are using tourism as their main development levy. This is especially true for small and insular countries, the so-called Small Islands Developing States (SIDS).

Since the seminal work of Lanza and Pigliaru (1994), it is a common belief that tourism countries could grow faster than other countries due to a huge positive improvement in the terms of trade for the tourism countries. This theoretical proposition received some empirical support (Lanza et al. 2003, Brau et al, 2007). Aside from this endogenous theory of tourism led growth, some authors put light on the fact that tourism countries could experience sustained long term growth relying only on the existence of an increasing demand for tourism, and its associated increase in

price, due to the fact that world income is raising over-time (Nowak et al. 2007, Schubert et al. 2011).

Other authors question this issue. For example, the recent work by Figini and Vici (2010) shows that if tourism countries grew faster during the period 1980-2005 as a whole, there is no positive effect of tourism specialization on growth for the period 1995-2005. Capó et al. (2007) studied the relationship between tourism development and long term growth in Spain and shown that regions such as the Canary or the Balearics Islands with production structures focusing on tourism could experience lower long term growth than others. This result echoes the famous decline phase emphasized in the destination life cycle theory (Butler,1980). To sum up, according to the literature, tourism could be an engine of growth but there exist evidences showing that, in the long term, growth would be slower and could even collapse.

This paper focuses on a point that has received little attention, that is the role of the type of tourism developed by a given destination in its long term growth. We consider that each destination operates on a particular market segment. There exists a broad range of market segments and a given destination has to choose its own. We develop a growth model that shows how by switching from a type of tourism to another one, a destination can avoid or at least postpone the decline phase predicted by the life cycle theory. The switch enables the destination to rejuvenate its product and experience a new phase of sustained growth, what it means that product redefinition and optimal marketing positioning could be key factors to long term growth of tourism-based economies.

Our finding is supported by previous literature. For example, from a theoretical

point of view, Saarinen (2006) explained that "by changing the tourism product through development and marketing and by introducing new types of facilities and infrastructure the destination and its limits of growth can be modified and moved forward to a new higher level". Several authors have shown that some typical mass tourism destinations, said to be declining in general, such as the Balearics Islands (Aguiló, Alegre, Sard, 2005) or Benidorm (Claver-Cortés, Molina-Azorin, Pereira-Moliner, 2007) circumvented the decline because of a proper redefinition of the tourism product.

## 2 THE MODEL

The model presented in this paper is based on the endogenous growth model with increasing returns developed by Romer (1986). This model asserts that a potential engine of long term growth lies in the existence of a "learning by doing" effect (Arrow, 1962) that enhances for free the productivity of capital. The point is that during the process of capital accumulation by individual firms costless knowledge is produced as a by-product. This unexpected accumulation of knowledge improves the productivity of capital and generates growth. We use a similar argument in the context of a tourism destination.

The industry includes a big enough number of local competing firms  $N$  which offer the same product (e.g. Hotels, B&B). The global supply in the economy is  $S = f(K, k; \bar{L}, \bar{R})$ , where  $k$  represents the amount of capital of each indential firm,  $K = N \cdot k$  is the aggregate level of capital (knowledge) in the economy,  $\bar{L}$  is the unskilled labour assigned to the firm and  $\bar{R}$  represents the specific attractions of the destination. The two last factors are assumed constant on time. For notational simplicity, we also consider the same number of consumers than firms. Each firm

produce with constant return-to-scale in inputs  $k$  and  $\bar{L}$ . However, it presents non-decreasing return-to-scale if the aggregated knowledge is included as an input. That is,

$$f(\lambda K, \lambda k; \lambda \bar{L}, \bar{R}) \geq f(K, k; \lambda \bar{L}, \bar{R}) = \lambda f(K, k; \bar{L}, \bar{R}), \quad \forall \lambda > 1.$$

We assume that the destination exerts a monopoly over some part of the global demand of tourism, due to the uniqueness of the supply included in their specific attractions  $\bar{R}$ . Let  $\eta \in (-\infty, -1)$  be the price-elasticity of demand, which is assumed constant. Therefore, the demand follows the equation  $D = Bp^\eta$ , where  $p$  is the relative price of the tourist product with respect to the productive capital. Parameter  $B$  denotes the rest of factors influencing on the demand, such as the income in the origin country, tastes, etc. We consider them constant in this model.

Market clearance is produced, that is,  $N \cdot S = D$ , and the equilibrium price is

$$p_e(K, k) = \left( B^{-1} f(K, k) \right)^{1/\eta},$$

where the dependence on parameters has been omitted for the sake of notational simplicity. Therefore, the revenue obtained by each firm,  $Y = p_e(\cdot) f(\cdot)$ , follows the expression

$$Y(K, k) = B^{-1/\eta} (f(K, k))^{\eta+1/\eta},$$

and the total income in the economy is  $N \cdot Y$ . The neoclassical capital accumulation in every firm process is assumed, so,

$$\dot{k} = Y - c, \tag{1}$$

where  $c(t)$  is the consumption of every firm at time  $t$ . A depreciation rate of capital is assumed null.

The existence of a social planner is assumed, whose objective is to know the amount of yearly consumption of every firm to optimise their aggregate discounted utility in the long term. The aggregate level of knowledge is endogenous, that is, the social planner includes the aggregate level of knowledge  $K = Nk$  in the optimization problem<sup>1</sup>. We define  $F(k) \equiv f(Nk, k)$  the production function in the economy when knowledge is internalized. Since all firms are identical, the social optimization problem (*SP*) can be stated for a representative firm, that is,

$$\begin{aligned} (SP) : \quad & \max_{c \geq 0} \int_0^{\infty} u(c) e^{-\rho t} dt \\ & \text{s.t.} \quad \dot{k} = B^{-1/\eta} (F(k))^{\eta+1/\eta} - c \\ & \quad \quad k(0) = k_0 \geq 0. \end{aligned} \quad (2)$$

Function  $u(c)$  is a twice differentiable increasing and concave function and represents the utility of consumption. A constant and greater than one intertemporal elasticity of substitution  $\sigma = -u_{cc}c/u_c > 1$  is assumed. The optimization problem includes only one state and one control variable, so the solution is directly obtained applying the Pontryagin's maximum principle. The current value hamiltonian of problem (SP) is

$$H = u(c) + \lambda \left( B^{-1/\eta} (F(k))^{\eta+1/\eta} - c \right),$$

where  $\lambda$  represents the current value Lagrange multiplier. As usual, the necessary conditions for  $c$  is that the marginal utility of consumption is identical to the valuation of one unit of additional capital, that is,  $u_c = \lambda$ . The trajectory of  $\lambda$  follows the equation  $\dot{\lambda} = \rho\lambda - \lambda \frac{d}{dk} B^{-1/\eta} (F(k))^{\eta+1/\eta}$ . Therefore, the Euler equation for this

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<sup>1</sup>Romer (1986) also solves the competitive equilibrium case, which considers no intervention in the economy, so every firm optimise its discounted utility taking the accumulated knowledge exogenous. The optimal welfare solution of this problem lies below the social optimum case. The competitive equilibrium case is not analysed here since does not add nothing new to the previous analysis of Romer (1986).

economy adopts the form<sup>2</sup>:

$$\frac{\dot{c}}{c} = \frac{1}{\sigma} (Y_k - \rho) = \frac{1}{\sigma} \left( B^{-1/\eta} \frac{\eta + 1}{\eta} (F(k))^{1/\eta} F_k - \rho \right). \quad (3)$$

The optimal trajectory of consumption and capital are the solutions of the Euler equation and the capital accumulation process that satisfy the boundary ( $k(0) = k_0 \geq 0$ ) and transversality condition  $\lim_{t \rightarrow \infty} \lambda(t) k(t) e^{-\rho t} = 0$ . The following proposition gives conditions for the existence of solution of problem (SP)

**Proposition 1** *Given problem (SP), let us assume the following conditions over the production function:*

- i)  $F$  is increasing in  $k$  and satisfies  $F_{kk} + (F_k)^2 \frac{1}{\eta} F^{-1} \leq 0$ .*
- ii)  $\lim_{k \rightarrow 0^+} F(k) = 0$ ,  $\lim_{k \rightarrow \infty} F(k) = \infty$ .*
- iii)  $\lim_{k \rightarrow \infty} \frac{F(k)}{k^{\frac{\eta}{\eta+1}}} = M \geq 0$ ,  $L \in \Re$*
- iv)  $\lim_{k \rightarrow 0^+} \frac{F_k(k)}{F^{-1/\eta}(k)} \geq B^{1/\eta} \frac{\eta}{\eta+1} \rho$*

*Then, there exists an optimal solution  $(k^*(t), c^*(t))$  for problem (SP). If  $M \leq B^{\frac{1}{\eta+1}} \rho^{\frac{\eta}{\eta+1}}$ , the optimal solution converges to an stationary state  $(k_e, c_e)$ . In other case, the solution  $(k^*(t), c^*(t))$  grows indefinitely.*

**Proof.** The proof is still a draft, so pending points are indicated. Initially, let us assume that condition i) is satisfied with equality for all  $k \geq 0$ . Therefore  $Y_{kk} = B^{-1/\eta} \frac{\eta+1}{\eta} \left( F_{kk} F^{\frac{1}{\eta}} + (F_k)^2 \frac{1}{\eta} F^{\frac{1}{\eta}-1} \right) = 0$ . Hence  $Y = B^{-1/\eta} (F(k))^{\eta+1/\eta}$  is linear, so taking into account condition ii),  $F(k) = A^{\frac{\eta}{\eta+1}} B^{\frac{1}{\eta+1}} k^{\frac{\eta}{\eta+1}}$ , with  $A \in \Re$ . Condition iii) implies that  $A = B^{-\frac{1}{\eta}} M^{\frac{\eta+1}{\eta}}$  and condition iv) is satisfied since  $\lim_{k \rightarrow 0^+} \frac{F_k(k)}{F^{-1/\eta}(k)} =$

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<sup>2</sup>Notation  $F_k = \frac{d}{dk} F(k)$ , as usual.

$\lim_{k \rightarrow 0^+} AB^{\frac{1}{\eta}} \frac{\eta}{\eta+1} k^{-1} = \infty$ . Therefore, the optimal solution of problem (SP) follows the trajectory defined by the following differential equations:

$$\begin{aligned} \dot{c} &= \frac{1}{\sigma} (A - \rho), \\ \dot{k} &= Ak - c. \end{aligned} \tag{4}$$

The system replies the one obtained from the AK model with constant returns of capital (Barro and Sala-i-Martin, 2004). The optimal paths of capital and consumption are:

$$k(t) = k_0 e^{\frac{A-\rho}{\sigma} t}, \quad c(t) = c_0 e^{\frac{A-\rho}{\sigma} t},$$

with  $c_0 = \frac{\sigma k_0}{(\sigma-1)A+\rho}$ . The stationary state is  $(k_e, c_e) = (0, 0)$ . The proposition follows directly since  $M \leq B^{\frac{1}{\eta+1}} \rho^{\frac{\eta}{\eta+1}} \Leftrightarrow A \leq \rho$ .

Now, let us assume that condition i) is not satisfied with equality for all  $k \geq 0$ . Therefore,  $Y$  is strictly increasing, concave and nonlinear. We divide the proof in two parts:

a) Assume that  $M \leq B^{\frac{1}{\eta+1}} \rho^{\frac{\eta}{\eta+1}}$ . Given the definition of revenue function, we have  $\lim_{k \rightarrow \infty} Y_k = B^{-\frac{1}{\eta}} M^{\frac{\eta+1}{\eta}} \leq \rho$ . Condition iv) implies that  $\lim_{k \rightarrow 0^+} Y_k \geq \rho$ . So given that the function  $Y$  is differentiable, there exists a unique point  $k_e \in (0, +\infty)$ :  $Y_k(k_e) = \rho$ . Therefore,  $(k_e, c_e)$  is one equilibrium point of the system (1) and (3). There exists other equilibrium point in  $(0, 0)$ . The local characterization of the equilibrium point is given by the Jacobian matrix of the system, which is,

$$J(k, c) = \begin{pmatrix} Y_k & -1 \\ cY_{kk}/\sigma & (Y_k - \rho)/\sigma \end{pmatrix}.$$

Substituting  $(k_e, c_e)$  in the Jacobian matrix, we have  $\det J(k_e, c_e) = \frac{c_e}{\sigma} Y_{kk}(k_e) \leq 0$ . We assume that  $\det J(k_e, c_e) = \frac{c_e}{\sigma} Y_{kk}(k_e) < 0$  (the proof for the null case is pending). In this case,  $(k_e, c_e)$  is a saddle point. Thus, there exists a one-dimensional stable manifold of  $(k_e, c_e)$  defined by two trajectories converging to this steady state. These are the optimal trajectories for the problem (2). Figure 1 shows the phase diagram



of the system. From the Poincaré-Bendixon theorem and the disposition of flows in Figure 1, the trayectory converging to the saddle point with  $k < k_e$  converges to  $(0, 0)$  when  $t \rightarrow -\infty$ . Therefore, assuming an initial capital  $k_0 < k_e$ , the optimal consumption and capital path is increasing until reaching the steady state, where growth stops.

[FIGURE 1 HERE]

b) Assume that  $M > B^{\frac{1}{\eta+1}} \rho^{\frac{\eta}{\eta+1}}$ . First, we define the following variables:  $z = Y/k$ ,  $w = c/k$  and the parameter  $A = B^{-\frac{1}{\eta}} M^{\frac{\eta+1}{\eta}}$ , which is larger than  $\rho$  given the previous assumption. After some calculations, the system (1) and (3) is transformed into:

$$\begin{aligned} \frac{\dot{z}}{z} &= \left( \frac{Y_k}{z} - 1 \right) (z - w), \\ \frac{\dot{w}}{w} &= \frac{1}{\sigma} (Y_k - \rho) - (z - w). \end{aligned} \quad (5)$$

This system is not autonomous from  $k$ , since  $Y_k$  depends specifically on  $k$ . Nevertheless, a local analysis can be done. In particular, there are three potential equilibrium points of system (5), those are  $(0, 0)$ ,  $(Y_k(k^1), 0)$ ,  $\left( Y_k(k^1), \frac{(\sigma-1)Y_k(k^1)+\rho}{\sigma} \right)$ , with  $k^1 \geq 0$  such that  $Y_k(k^1) = \frac{Y(k^1)}{k^1}$ . However, since  $Y_k$  is strictly decreasing,  $\lim_{k \rightarrow \infty} \frac{Y(k)}{k} = \lim_{k \rightarrow \infty} Y_k = A > \rho$  and given condition iv),  $\lim_{k \rightarrow 0^+} \frac{Y(k)}{k} = \lim_{k \rightarrow 0^+} Y_k \geq A$ , necessarily  $\frac{Y(k)}{k} > A, \forall k \geq 0$ . Hence, the only possible equilibrium point of system (5) is given by assuming  $k \rightarrow \infty$ , so the system is transformed into

$$\begin{aligned} \frac{\dot{z}}{z} &= \left( \frac{A}{z} - 1 \right) (z - w), \\ \frac{\dot{w}}{w} &= \frac{1}{\sigma} (A - \rho) - (z - w). \end{aligned} \quad (6)$$

There are two possible equilibrium points of this system compatible with the def-

inition of  $z$  and  $w$ , those are  $(z_e^1, w_e^1) = \left(A, \frac{(\sigma-1)A+\rho}{\sigma}\right)$  and  $(z_e^2, w_e^2) = (A, 0)$ . The characterization of these equilibrium points in the system (5) is given by the jacobian matrix, which is

$$J(z_e^1, c_e^1) = \begin{pmatrix} -\frac{A-\rho}{\sigma} & 0 \\ -w_e \left(\frac{1}{A\sigma} + 1\right) & w_e \end{pmatrix},$$

$$J(z_e^2, c_e^2) = \begin{pmatrix} -\frac{1}{A} & 0 \\ 0 & -\frac{A(\sigma-1)+\rho}{\sigma} \end{pmatrix}.$$

To calculate the elements in the matrix, we assume that  $\lim_{z \rightarrow z_e} \partial Y_k / \partial z = \lim_{k \rightarrow \infty} \partial Y_k / \partial k = 0$  (the proof of this assertion is pending). Note that  $A > \rho$  and  $w_e^1 > 0$ , since  $\sigma > 1$ . Then,  $(z_e^1, c_e^1)$  is a saddle point since  $\det(J(z_e^1, c_e^1)) = -\frac{A-\rho}{\sigma} w_e < 0$  and  $(z_e^2, c_e^2)$  is a sink since both eigenvalues of the Jacobian matrix are negative. The isocline  $\dot{z} = 0$  is the bisector of the first quadrante and the vertical line  $z = z_e$ . The isocline  $\dot{w} = 0$  is represented by the horizontal axis  $w = 0$  and the curve  $w = (\sigma z - Y_k + \rho) / \sigma$ . Taking into account that  $\lim_{z \rightarrow z_e} \partial Y_k / \partial z = 0$ , we have that the slope of the isocline in  $(z_e, w_e)$  is  $\partial w / \partial z|_{z=z_e} = 1$ . Assuming that mean revenues  $Y/k$  are decreasing and concave, we have that the isocline is increasing everywhere. So, there exists only one path converging to the equilibrium point  $(z_e, w_e)$  from  $z > z_e$ . Thus, given an initial capital  $k_0 \geq 0$ , there exists only one  $c_0$  such that  $(z_0, w_0) = (Y(k_0)/k_0, c_0/k_0)$  is located in this path.

The proof ends by showing that this trajectory verifies the transversality condition for system (3) and (1). In the steady state  $(z_e, w_e)$ , the system can be rewritten as

$$\begin{aligned} \dot{c} &= \frac{1}{\sigma} (A - \rho), \\ \dot{k} &= Ak - c. \end{aligned} \tag{7}$$

The solution of this system is  $(c(t), k(t)) = \left(\bar{c} e^{\frac{1}{\sigma}(A-\rho)t}, e^{At} \left(\bar{k} - \bar{c} \int_0^t e^{\frac{(1-\sigma)A-\rho}{\sigma}s} ds\right)\right)$ , for certain values  $\bar{c}$ ,  $\bar{k}$ . Since  $c(t)/k(t) = w(t) \rightarrow w_e$ , necessarily  $\bar{c} = \frac{(\sigma-1)A-\rho}{\sigma} \bar{k}$ .

Given that  $\lambda(t) = c^{-\sigma}(t)$ , we have,

$$\lim_{t \rightarrow \infty} e^{-\rho t} \lambda(t) k(t) = \lim_{t \rightarrow \infty} \bar{c}^{-\sigma} \bar{k} e^{\frac{(1-\sigma)A-\rho}{\sigma} t} = 0.$$

Therefore, the path converging to the saddle point  $(z_e, w_e)$  is the optimal solution of the problem. This path approximates in the long term to a permanent positive growth rates of consumption and capital. ■

*Remark 1.* Condition iii) indicates that the production function  $F(k)$  behaves like function  $Mk^{\frac{\eta}{\eta+1}}$  when  $k \rightarrow \infty$ . In this case, the result above implies that growth in the long term is only possible if  $M > B^{\frac{1}{\eta+1}} \rho^{\frac{\eta}{\eta+1}}$ . Therefore, production functions presenting returns to scale larger than one but lower than  $\frac{\eta}{\eta+1} > 1$  are not sufficient to assure increasing growth rates of consumption in the local economy. The more inelastic with respect price the demand is, the more productive the tourism economy should be in order to maintain consumption positive growths.

*Remark 2.* In case of  $M \leq B^{\frac{1}{\eta+1}} \rho^{\frac{\eta}{\eta+1}}$ , the change in some of the conditions of the industry can affect the steady state  $(k_e, c_e)$ . In particular, given the equilibrium condition,

$$Y_k(k_e) = B^{-1/\eta} \frac{\eta + 1}{\eta} F_k(k_e) F^{1/\eta}(k_e) = \rho,$$

Let us define  $\psi(B, \eta) = B^{-1/\eta} \frac{\eta + 1}{\eta} F_k(k_e) F^{1/\eta}(k_e)$ . Hence, the influence of changes in the demand factors  $B$  on the steady state can be deduced applying the Implicit Function theorem. After some simplifications, it follows that<sup>3</sup>

$$\frac{\partial k_e}{\partial B} = \frac{-\psi_B}{\psi_{k_e}} = \frac{1/\eta B^{-1}}{\frac{F_{kk}(k_e)}{F_k(k_e)} + \frac{1}{\eta} F^{-1}(k_e) F_k(k_e)} > 0,$$

The effect on the steady state of consumption follows the same direction. Given the equilibrium condition,  $c_e = Y(k_e)$ ,

$$\frac{\partial c_e}{\partial B} = Y_k(k_e) \frac{\partial k_e}{\partial B} > 0,$$

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<sup>3</sup>Condition i) in  $k = k_e$  is assumed to be satisfied with strictly negative sign.

since  $Y_k > 0$ . Therefore, an increase of a demand factor, such as the income in the origin country, originates an increase in steady state of consumption in the host country, as expected. Parameter  $B$  may also include other factors attracting the demand, such as natural resources. Figure 2 illustrates the hypothetical case of local consumption evolution in a tourism based economy. Given a specific development, the tourist destination achieves a phase where tourist income increase at a low rate and consequently local welfare stagnates. According to the sign of the derivative above, the tourism destination can be rejuvenated and present a phase of positive consumption rates by utilizing new attractions of the destination, as it has been argued in many theoretical and empirical applications (Butler 1980, Aguiló et al. 2005, Saarinen 2006, Claver Cortés et al. 2007).

[FIGURE 2 HERE]

Accordingly, the influence of the price elasticity of the demand on the steady state is given by

$$\frac{\partial k_e}{\partial \eta} = \frac{-\psi_\eta}{\psi_{k_e}} = \frac{1/\eta^2 \left( \ln \frac{B}{F(k_e)} \right) - \frac{1}{\eta(\eta+1)}}{\frac{F_{kk}(k_e)}{F_k(k_e)} + \frac{1}{\eta} F^{-1}(k_e) F_k(k_e)}.$$

Since the denominator is strictly negative, we have after some simplifications that

$$\partial k_e / \partial \eta > 0 (\partial c_e / \partial \eta > 0) \iff B > F(k_e) e^{\frac{\eta}{\eta+1}}.$$

Therefore, a certain destination can extend positive growth rates of consumption for the local society by reorienting the tourist product to more selected market segments ( $\eta$  increasing) if the other factors incentivizing the demand are larger than the actual production times a correction factor  $e^{\frac{\eta}{\eta+1}}$ . Let us observe this condition in the

two extreme cases. If the destination starts from a situation of pure mass tourism ( $\eta \rightarrow -\infty$ ), the condition is that  $B > eF(k_e^\infty)$ , with  $k_e^\infty \leq +\infty$  the steady state for the case  $\eta \rightarrow -\infty$ . If the price elasticity of the tourist demand in the destination is proximate to  $\eta \rightarrow -1$ , that is, the highest price insensitive tourism demand, the growth rates of consumption can be enhanced by reorienting the tourist product to lower price elasticity if  $B < F(k_e)e^{\frac{\eta}{\eta+1}}$ , where  $\lim_{\eta \rightarrow -1} e^{\frac{\eta}{\eta+1}} = \infty$  and  $k_e \rightarrow 0$  given the conditions ii) and iv). The optimum market segment, that is, that one between pure mass tourism and highest selected tourism where the destination obtains the larger steady state of consumption in the long run, depends on the specification of the production function in the economy.

*Remark 2.* Conditions of Proposition 1 are verified by a group of functions usually considered in Macroeconomics. In particular, the Cobb-Douglas technology,

$$f(K, k) = AK^\epsilon k^{\alpha(\eta)}, \quad (8)$$

where  $A$  is the technological coefficient,  $0 < \epsilon < 1$  is the productivity of the aggregated knowledge and  $\alpha(\eta)$  is the share of capital in the production function of the economy. The latter depends on the price elasticity of the demand, that is, the supply of the tourist product depends on the specific market segment visiting the destination. In general, it is assumed that  $0 \leq \alpha(\eta) \leq 1$  and is differentiable and increasing for all  $\eta \in (-\infty, -1)$ , so the closer the market segment to the case of pure mass tourism ( $\eta \rightarrow -\infty$ ) is, the lower is the share of capital (knowledge) in the composition of the product.

Following the hypothesis of the social optimum case, aggregated knowledge is assumed to be internalized in the production function ( $K = Nk$ ), the revenue for each firm is given by the equation

$$Y = B^{-\frac{1}{\eta}} A^{\frac{\eta+1}{\eta}} N^{\epsilon \frac{\eta+1}{\eta}} k^{h(\eta)},$$

with  $h(\eta) = (\epsilon + \alpha(\eta))\frac{\eta+1}{\eta}$ . Condition i) in the Proposition 1 is verified if and only

if  $h(\eta) \leq 1$ . In case of  $h(\eta) = 1$ , the revenue function is the type  $AK$ , already analysed in the proof of the Proposition.

Let us consider  $h(\eta) < 1$ . In this case, the rest of conditions in Proposition 1 are satisfied directly with  $M = 0$ . Therefore, there exists an optimal path  $(k^*(t), c^*(t))$  for problem (SP), which converges to an stationary state  $(k_e, c_e)$ . This steady state for the capital is defined by the following equation,

$$k_e^{h(\eta)-1} = B^{\frac{1}{\eta}} A^{-\frac{\eta+1}{\eta}} N^{-\epsilon \frac{\eta+1}{\eta}} \frac{\rho}{h(\eta)}. \quad (9)$$

The influence of some factors can be analysed. For example, the effect of increasing the number of firms in the economy over the steady state enhance the steady state of capital and consumption, due to

$$\frac{\partial k_e}{\partial N} = -\frac{\epsilon}{N} \frac{\eta+1}{\eta} \frac{k_e}{h(\eta)-1} > 0.$$

Similar effect is obtained by augmenting the technological coefficient  $A$ , as expected.

### 3 CONCLUSIONS

We have developed an endogenous growth model to explain how the specialization in a market segment can influence on the long-term growth in a tourism-based economy. The model is based on the "learning by doing" effect in the economy, as stated in the Romer (1986)'s endogenous growth model.

The main result of the paper shows that long-term growth in a tourism economy is possible if the production function presents high enough increasing returns to scale. The more specialized in price-inelastic market segment (selected market segment) is, the most productive the economy needs to be in order to present permanent increasing consumption growth rates. In the case of stationary solution is achieved,

an optimum market segment exists (highest stationary consumption) in between the pure mass tourism and highest price inelastic market segment.

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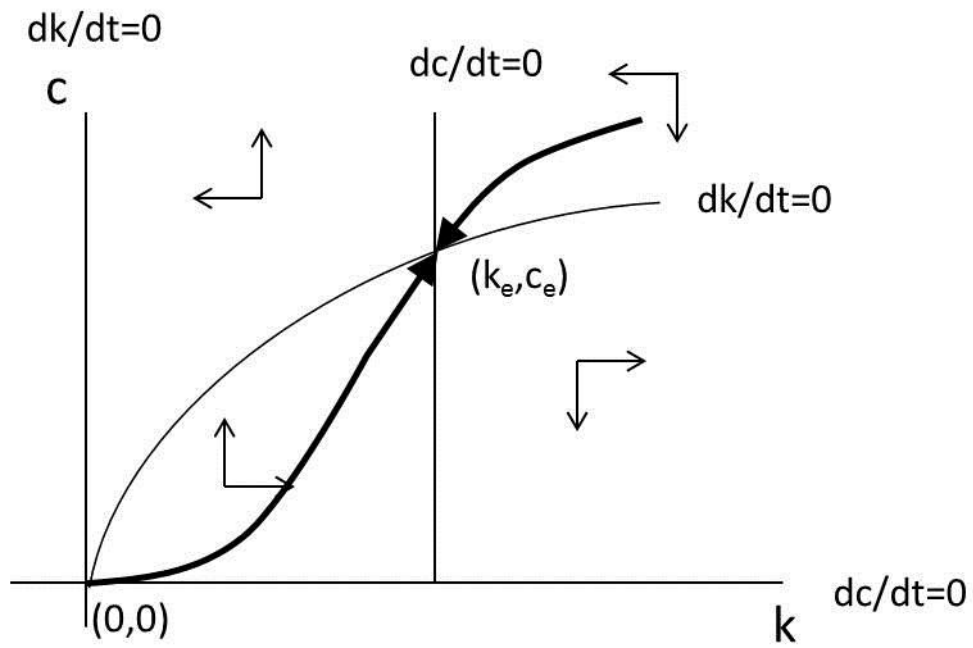


Figure 1. Phase diagram for system (1) and (3) in case  $M \geq B^{\frac{1}{\eta+1}} \rho^{\frac{\eta}{\eta+1}}$ . There exists only one saddle point  $(k_e, c_e)$ .

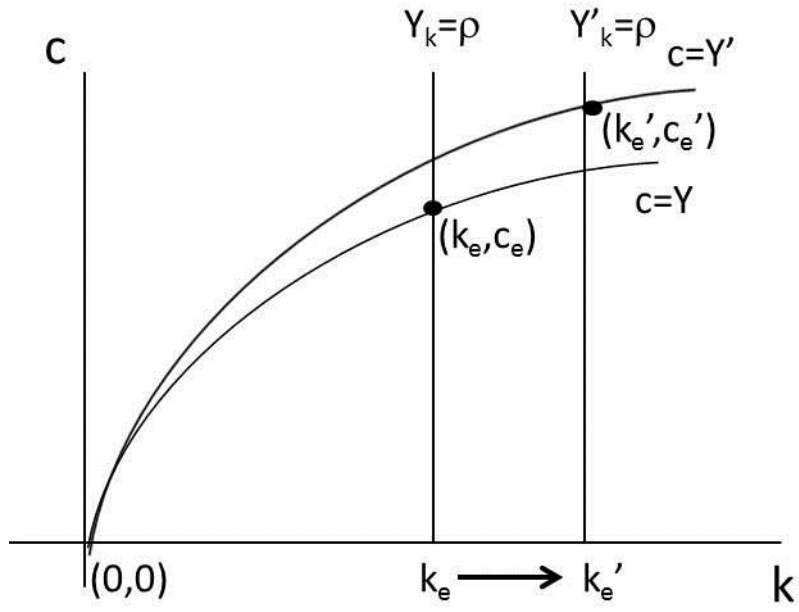


Figure 2. Effect of utilizing new attractions in the destination. The initial stationary solution  $(k_e, c_e)$  moves to  $(k_e', c_e')$