Economics Bulletin

Volume 33, Issue 2

A Dynamic Model of Tourism and Economic Growth: the Role of Physical and Human Capital

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Abstract

This paper study the relationships between tourism and economic growth by introducing a dynamic model whose ingredients are an economy producing a non-traded consumption good consumed by domestic residents and foreign tourists and a capital good. The model analyses the relationships between tourism growth, physical and human capital accumulation and changes in the terms of trade. From this analysis, several interesting results are obtained that depend on initial conditions of the main variables and on variations in terms of trade.. First, it is shown that tourism allows local population to enjoy a given welfare level with a lower saving rate than they would have in a closed economic system. Second, it is revealed that along the balanced growth path, the rate of human capital accumulation in the tourism industry acts negatively on the rate of change in the terms of trade. A more productive industry becomes more cheaper and cheaper for the rest of the world and for the residents themselves. Third, it is shown that when prices steadily increase, the model implies an unbalanced relationship between domestic and tourism demands. In that case, the economy could assign all production to internal consumption, vanishing the tourism industry; or, by the contrary, it could specialize completely in tourism, exporting all production of domestic consumption goods and importing all consumption goods for domestic demand.

Our research was supported by the Free University of Bolzano, project "“Le attrazioni culturali e naturali come motore dello sviluppo turistico. Un'analisi del loro impatto economico, sociale e culturale”.
Citation: Juan Gabriel Brida and Silvia London and Mara Rojas, (2013) "A Dynamic Model of Tourism and Economic Growth: the Role of Physical and Human Capital", *Economics Bulletin*, Vol. 33 No. 2 pp. 1361-1373.
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Submitted: January 14, 2013. **Published:** June 06, 2013.

1. Introduction

International tourism is recognized to have a positive effect on the increase of long-run economic growth through different channels. First, tourism is a significant foreign exchange earner, allowing to pay for imported capital goods or basic inputs used in the production process. Second, tourism plays an important role in spurring investments in new infrastructure and competition between local firms and firms in other tourist countries. Third, tourism stimulates other economic industries by direct, indirect and induced effects. Fourth, tourism contributes to generate employment and to increase income. Fifth, tourism can cause positive exploitation of economies of scale in national firms (see Andriotis, 2002; Brida et al, 2008; Brida and Risso, 2010; Croes, 2006; Fagance, 1999; and Lin and Liu, 2000). Finally, tourism is an important factor of diffusion of technical knowledge, stimulation of research and development, and accumulation of human capital. These beliefs that tourism can promote or cause long-run economic growth are known in the literature as the Tourism Led Growth Hypothesis (see Balaguer and Cantavella-Jordá, 2002; Brida et al, 2010; Shan and Wilson, 2001; and the recent review paper Brida et al, 2013). Tourism is the leading source of foreign exchange in at least one of three developing countries that have made it a priority sector, and this holds specially for small islands (Durbarry, 2004). This is true particularly for small economies where most of the tourism industry is not owned by residents. As pointed out by Croes (2006), tourism provides advantages in overcoming the smallness of a country in three ways. First, it provides the volume to overcome insufficient market demand enabling greater efficiency and providing economies of scale for more goods and services which decreases the unit costs of production. Second, it increases competition by encouraging new entrants in the market place, which provides a positive impact on the price level of goods and services. Third, tourism, by providing scale and competition together with greater consumer choice and trade openness, can raise the standard of living and thus improve the quality of life in a small country. (see Brida and Schubert, 2008)

Despite the arguments and beliefs presented in favor of the important impacts of tourism on economic growth, there are very few growth models including tourism as a sector and analyzing the impacts of changes in tourism growth on long-run economic growth. Lu et al (2011) develops a dynamic optimizing macro model that sheds light on two tourism stylized facts, namely, (i) the congestion externalities caused by tourism expansion and (ii) the wealth effect generated by the revenues from overseas tourism taxation. Nowak et al (2007) provide a theoretical explanation of the tourism-led growth hypothesis. The key link are capital imports, financed with tourism earnings. However, they restrict their analysis solely on the balanced growth steady-state equilibrium. Brida et al (2011) studies the impacts on economic growth of a small tourism driven economy caused by an increase in the growth rate of international tourism demand. The study presents a dynamic model whose ingredients are a large population of intertemporally optimizing agents and an AK technology representing tourism production and shows that an increase in the growth of tourism demand leads to transitional dynamics with gradually increasing economic growth and increasing terms of trade. Chao et al. (2005; 2006) examines the effects of an expansion in tourism on capital accumulation, sectoral output and resident welfare in an open economy with an externality in the traded good sector. By using numerical simulations, both studies show that an expansion of tourism may reduce the capital stock, thereby lowering welfare in a two-sector model with a capital-generating externality. Lanza and Pigliaru (2000) point out that what matters is a country's relative endowment of the natural resource, rather than its absolute size, in the explanation of faster growth in countries specialized in tourism. But they recognize the human capital accumulation as "the engine of growth".

Hazari and Kaur (1995) examine the impact of tourism on the welfare of the domestic residents and the relative price of the non-traded good when this commodity is produced by a monopoly and consumed by tourists and local residents. By using a Komiya (1967) type first-best model, the paper shows that in the presence of monopoly production of non-traded goods and services an expansion of tourism may result in a decline in the welfare of domestic residents. Hazari and Sgrò (1995) consider tourism and growth in a dynamic model of trade, where tourism is incorporated by allowing non-traded goods and services to be consumed by tourists and residents. They show that while an increase in tourism lowers domestic capital accumulation, it raises domestic consumption and welfare. In a static framework, Hazari and Ng (1993) examine the relationship between tourism and welfare where tourists consume non-traded goods and services showing that in a monopoly power framework, tourism may be welfare reducing.

In this paper, we generalize the model introduced in Hazari and Sgrò (1995) by the incorporation of human capital accumulation and the individual decision in consumption and time allocation. Following Lucas (1988) and Lanza and Pigliaru (2000), human capital accumulation in tourism sector takes the form of learning-by-doing unlike capital sector[1]. People who want to get a job in capital good industry must have a level of formal education to enter to labor market, assigning part of their life-time to schooling and acquiring knowledge through a deliberate effort in human capital accumulation. Nevertheless, who are working in tourism sector are making experiences and getting better at promoting cultural goods, at looking after natural and historical resources and at doing everything referent to the own tourist activity. In other words, in tourism firms (consumption firms), human capital is interpreted as a result of learning-by-doing. Likewise, as in Hazari and Sgrò (1995) and Lanza and Pigliaru (2000), the determination in the terms of trade play an important role in the explanation of the growth performance.

The rest of the paper is organized as follows. Section 2 provides the dynamic model representing an economy where tourism is the main economic sector and describes the economic framework. Section 3 describes the main properties of the model. Some concluding remarks are made in Section 4.

2. The model

Firms

We consider a small open economy that receives tourists and produces two kinds of commodities X_1 and X_2. Let X_1 be the quantity of the non-traded consumption good and X_2 the quantity of the capital good. Both goods are produced with labour, human and physical capital. The production function is assumed to be neoclassical and strictly concave and is written, for the *i*-th commodity or *i*-th industry, as:

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[1]Although the first and most famous part of Lucas's work (1988) shows human capital accumulation as a function in terms of nonworking time and previous human capital, the second part of that seminal paper (Lucas 1988, see page 28) introduced a form of human capital accumulation based on learning-by-doing, in which the same fraction of time is invested in production as well as used in knowledge creation.

(1) $$X_i = F_i(K_i, L_i, h_i) = u_i L_i f_i(k_i, h_i), \quad i = 1,2$$

where K_i, h_i and L_i are the amounts of physical capital, human capital and labor employed in the i-th industry, u_i is the fraction of labor time allocated to sector i and $k_i = K_i/(u_i L)$ is the capital-labor ratio. In per capita terms and using Cobb-Douglas functional forms, (1) can be written as

(2) $$x_i = u_i f(k_i, h_i) = u_i k_i^{\beta_i} h_i^{1-\beta_i}, \quad i = 1,2$$

with $0 < \beta_i < 1$ the physical capital's share in product i.

As can be seen from (2), the returns to variable proportions of capital are strictly decreasing, or the second order derivative of f_i with respect to k_i is negative for any i. Denote the price of the i-th commodity, the wage rate and the return to capital by p_i, w and r respectively. Since the marginal productivity of a factor must be equal in all industries when all of the two industries are assumed to be operating, for $i = 1,2$ we have from (2):

(3) $$p_i f_{k_i}' = p_i \beta_i k_i^{\beta_i - 1} h_i^{1-\beta_i} = r$$

(4) $$p_i \left[f_i(k_i, h_i) - k_i f_{k_i}' \right] = p_i (1-\beta_i) k_i^{\beta_i} h_i^{-\beta_i} = w$$

where f_i' is the derivative of f_i with respect to k_i. From (3) and (4):

$$\omega = \frac{w}{r} = \frac{f_i(k_i, h_i)}{f_{k_i}'} - k_1 = \frac{(1-\beta_i)}{\beta_i} k_i$$

$$\frac{p_1}{p_2} = \frac{f_{2k_i}'}{f_{1k_i}'} = \frac{\beta_2 k_2^{\beta_2 - 1} h_2^{1-\beta_2}}{\beta_1 k_1^{\beta_1 - 1} h_1^{1-\beta_1}}$$

In addition, the touristic country imports capital from the rest of the world. As long as physical capital keeps moving from one country to another, the rate of return to capital equals the international rate: $r = r^*$. Nonetheless, no labor migration is supposed and the wage rate is stated internally. If K^d and K^f are respectively the domestic and foreign capital and K^T is total capital in the economy we have:

(5) $$u_1 k_1 + u_2 k_2 = \frac{K^d}{L} + \frac{K^f}{L} = \frac{K^T}{L}$$

The equilibrium condition in the capital markets implies that savings (the income minus the consumption) must equal the newly produced capital (X_2) plus the capital received from abroad ($\dot{K}^f$) plus the share of earnings of foreign investors; i.e., in per capita terms:

(6) $$\frac{\dot{K}^T}{L} = y - c = x_2 + \frac{\dot{K}^f}{L}$$

As we pointed out above, the nature of the human capital used in one sector differs from the other one. Increases in h_2 depends on the time u_3 invested in human capital accumulation, the previous level h_2 and a parameter $\delta_2 \geq 1$, whereas the growth of h_1 is linked with the fraction of production time u_1, the current stock h_1 and a parameter of efficiency $\delta_1 \geq 1$. Summarizing:

(7) $$\dot{h}_1 = \delta_1 u_1 h_1$$

(8) $$\dot{h}_2 = \delta_2 (1 - u_1 - u_2) h_2$$

Note that both functional forms are those postulated by Lucas (1988). As long as full employment means that who is not in labor market is in school, the total amount of time fulfills the following condition:

(9) $$u_1 + u_2 + u_3 = 1$$

For the sake of discussion, it is assumed no depreciation for both physical and human capital.

Consumers

The domestic economy consists of two types of consumers: residents and foreign tourists. The value of the tourism demand for x_1 is given by:

(10) $$d_1^T = \tau (p_1)^{-\eta}$$

where $d_1^T = D_1^T / L$ is the tourism demand in per capita terms, $0 < \eta < 1$ is the constant price elasticity and $\tau = T / L$ the proportion between tourists arriving at each time and local population. T grows at an exogenous exponential rate:

(11) $$T(t) = T(0) e^{\nu t}$$

Let $\gamma \geq 0$ be the index of relative risk aversion (or $1/\gamma$ the intertemporal elasticity of substitution), the period utility function of the representative household is an increasing function of consumption and adopts the traditional form:

(12) $$U = \frac{c^{1-\gamma} - 1}{1-\gamma}$$

Residents generate per capita consumption c by adopting a consumer technology that combines two goods, the non-traded goods and an imported good M, such that:

(13) $$x = \left[\alpha_1 \left(d_1^R\right)\right]^{\sigma} \left[\alpha_m (m)\right]^{1-\sigma}$$

where x is the per capita consumption of residents, being $D_1^R / L = d_1^R$ and $M / L = m$ the per capita demands of residents for X_1 and M, respectively; $\alpha_1, \alpha_m \geq 0$ are the demand weights of each good in the utility function with $\alpha_1 + \alpha_m = 1$; and σ is the share of consumption of non-traded in total consumption, with $\sigma \in \{0;1)$.

In order to maximize residents' utility at each moment t, the relative equilibrium price must be equal to the marginal rate of substitution in consumption. Let assume without loose of generality that international prices are $p_2 = p_m = 1$. From (13), the residents' relative demand will be:

(14) $$\frac{m}{d_1^R} = \left(\frac{\sigma}{1-\sigma}\right) p_1$$

Substituting (14) and (13) into the utility function (12), the intertemporal utility function is therefore:

$$W = e^{-\rho\, t}\,\frac{\left\{\left[\frac{(1-\sigma)p_1}{\sigma}\right]^{1-\sigma}\alpha_1{}^{\sigma}\alpha_m{}^{1-\sigma}d_1^R\right\}^{1-\gamma}}{1-\gamma} \qquad (15)$$

where $0 < \rho < 1$ is the discount rate.

Residents take as given the prices of factors and goods. Each person works u_1 and u_2 units of time in each sector, getting a market wage w proportional to his human capital level. Moreover, the household obtains the interest income from the domestic capital. The total income recived by residents is the sum of total labor income and financial income: $Y = [w(u_1h_1 + u_2h_2) + rk^d]L$. The saving is invested in domestic as well as foreign capital. Hence, households will see to increase their assets according to:

$$\dot{K}^d = Y - C - \dot{K}^f = [w(u_1h_1 + u_2h_2) + rk^d]L - C - \dot{K}^f \qquad (16)$$

with $C = c\,L = \left(p_1 d_1^R + m\right)L$.

In order to obtain the macroeconomic equilibrium, the net balance of payments implies that the demand value of tourists for the non-traded goods should be equal to the demand value for imports by domestic residents plus the variations in capital received from abroad:

$$p_1 D_1^T = M + \dot{K}^f \qquad (17)$$

We assume that labor force L grows exponentially at a constant rate: $L(t) = L(0)e^{nt}$. By using and (5), (10), (14) and (17), in per capita terms, (16) becomes:

$$\dot{k}^d = w(u_1h_1 + u_2h_2) + rk^d - p_1 d_1^R - \tau\, p_1^{1-\eta} - n k^d \qquad (18)$$

The constrained optimization problem of households consist of maximize (15) subjet to (16), (7) and (8). In that case, the current-value Hamiltonian is defined by:

$$H = \frac{\left\{\left[\frac{(1-\sigma)p_1}{\sigma}\right]^{1-\sigma}\alpha_1{}^{\sigma}\alpha_2{}^{1-\sigma}d_1^R\right\}^{1-\gamma}}{1-\gamma} + \lambda_1\left[w(u_1h_1 + u_2h_2) + rk^d - p_1 d_1^R - \tau\left(p_1\right)^{1-\eta} - n k^d\right] + \qquad (19)$$
$$+ \lambda_2\delta_1 u_1 h_1 + \lambda_3\delta_2(1 - u_1 - u_2)h_2$$

being λ_1, λ_2 and λ_3 the shadow price of restrictions. Maximizing with respect to $\{d_1^R, u_1, u_2, k^d, h_1, h_2\}$, it is obtained the conditions that must be satisfied for residents' optimality from (21):

$$\left\{\left[\frac{(1-\sigma)p_1}{\sigma}\right]^{1-\sigma}\alpha_1{}^{\sigma}\alpha_m{}^{1-\sigma}\right\}^{1-\gamma}\left(d_1^R\right)^{-\gamma} - \lambda_1\, p_1 = 0 \qquad (20)$$

$$\lambda_1 wh_1 + \lambda_2\delta_1 h_1 - \lambda_3\delta_2 h_2 = 0$$

(21) $$\lambda_1 wh_2 - \lambda_3\delta_2 h_2 = 0$$

(22) $$\dot{\lambda}_1 = \rho\lambda_1 - \lambda_1(r-n)$$

$$\dot{\lambda}_2 = \rho\lambda_2 - \lambda_1 wu_1 - \lambda_2\delta_1 u_1$$

(23) $$\dot{\lambda}_3 = \rho\lambda_3 - \lambda_1 wu_2 - \lambda_3\delta_2(1-u_1-u_2)$$

The general transversality condition are verified.

3. Analysis of the model

The short-run

Proposition 3.1: *Given the first order conditions, there exists a balanced path of domestic consumption of residents given by:*

(24) $$\frac{\dot{d}_1^R}{d_1^R} = \gamma^{-1}\left\{r-(\rho+n)+[(1-\sigma)(1-\gamma)-1]\frac{\dot{p}_1}{p_1}\right\}$$

Proof: This result follows directly from equations (20) and (22). ♦

The sign of the impact will depend not only on $\dot{p}_1/p_1$ sign, but also on the magnitudes of the parameters involved in equation (24). For example, if $r \geq (\rho+n)$ [2] and the terms of trade are declining over time, $\dot{d}_1^R/d_1^R$ will be always positive. If $\dot{p}_1/p_1$ is positive, a positive growth rate of domestic consumption will be compatible with lesser values of γ and a lower share of consumption of non-traded. That is, constant increases in relative prices are consistent with a great willingness of households to accept deviations from a uniform pattern of consumption over time. With increasing relative prices, agents will choose consume more in present than in future.

Proposition 3.2: *The proportional rate of accumulation of domestic capital is given by:*

(25) $$\frac{\dot{k}^d}{k^d} = \frac{sr[\omega(u_1h_1+u_2h_2)+k^d]}{k^d} - \frac{\tau p_1^{1-\eta} - \left(\frac{\sigma}{1-\sigma}\right)p_1 d_1^R}{k^d} - n$$

Proof: From (18), it follows $\frac{\dot{k}^d}{k^d} = \frac{w(u_1h_1+u_2h_2)+rk^d}{k^d} - \frac{p_1 d_1^R}{k^d} - \frac{\tau p_1^{1-\eta}}{k^d} - n$, and considering $(1-s)y = c = p_1 d_1^R + m$, we obtain (25). ♦

[2] See Barro and Sala-i-Martin (2004) for a justification.

As in Hazari and Sgrò (1995), tourism has an impact on the accumulation of domestic capital. Comparing also with traditional growth theory[3], there is an impact of tourism on the domestic capital accumulation due to foreign capital is paid for by exports of consumption goods. But, unlike Hazari and Sgrò's results, the substitution between domestic capital (and saving) and foreing capital becomes less deep due to the demand for imports of consumption goods. Then, the reduction in $\dot{k}^d$ is offset against $m = \left(\dfrac{\sigma}{1-\sigma}\right) p_1 d_1^R$. Moreover, in this case economy is driven by human capital accumulation to balanced growth path rather than to a steady-state with null growth rates.

Proposition 3.3: *The optimal time allocation and the optimal growth rate of human capital* h_1 *are*[4]*:*

$$(u_1)^* = 1 - \left(\frac{r-n}{\delta_2}\right), \qquad (u_2)^* = \left(\frac{r^* - n}{\delta_2}\right) - (u_3)^*$$

$$\left(\frac{\dot{h}_1}{h_1}\right)^* = \delta_1 - (r-n)\frac{\delta_1}{\delta_2}, \qquad \left(\frac{\dot{h}_2}{h_2}\right)^* = \delta_2 u_3{}^*$$

Proof: This result follows directly by differentiating (21) and replacing in (23) and (9). ♦

A greater productivity parameter in human capital of type 2 improves its accumulation and increases the time allocated to work in other activities (tourism and human capital accumulation of type 1, in this case). Further, the productivity of schooling must be big enough for people to decide to assign time to work in tourism industry. That is, 0< $(u_1)^*$ < 1 if and only if $0 < r - n < \delta_2$.

Long-run equilibrium

Proposition 3.4: *In the long-run, there exists a balanced path of the relative precies, which varies according to:*

$$\left(\frac{\dot{p}_1}{p_1}\right)^* = \frac{(\nu - n)\tilde{d}^T + [r - (\rho + n)]\gamma^{-1}\tilde{d}^R - \delta_1[1 - (r-n)/\delta_2]}{[\beta_1/(1-\beta_1)] - (1-\eta)\tilde{d}^T - [1 - (1-\gamma)(1-\sigma)]\gamma^{-1}\tilde{d}^R} \qquad (26)$$

Proof: The equilibrium in consumption market entails the equalization between demand and supply: $d_1^T + d_1^R = x_1$. Differencing with respect to time and making some transformations:

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[3] As Hazari and Sgrò (op. cit.) show, the growth rate in traditional growth theory is usually noted as $\dfrac{s\,r\left(\omega + k^d\right)}{k^d} = n$.

[4] As in Chou (2002) and Chou (2006), among others, closed-form solutions cannot be obtained in this case.

$\frac{\dot{d}_1^T}{d_1^T}\frac{d_1^T}{x_1}+\frac{\dot{d}_1^R}{d_1^R}\frac{d_1^R}{x_1}=\frac{\dot{x}_1}{x_1}$. Rewritten $\tilde{d}^R = d_1^R/x_1$ and $\tilde{d}^T = d_1^T/x_1$, deriving $\dot{d}_1^T/d_1^T$ and $\dot{x}_1/x_1$ from (11) and (13) respectively and using (24), we obtain (26). ♦

The equilibrium depends on the participations of residents' demand and tourism's demand in the total demand for consumption good. Like most of the works in tourism topic, an increase in the rate of tourist arrivals and a reduction in elasticity price have a positive impact on the local economy through an improvement in terms of trade. But, it is clear that $\dot{p}_1/p_1$ may be positive or negative.

Balanced growth path imply that all variables are growing at constant rates. Looking at (26), if through the transitional dynamics $\dot{d}_1^T/d_1^T > \dot{d}_1^R/d_1^R$, with constant growth rates, $\tilde{d}^T$ increases whereas $\tilde{d}^R$ is reduced until that $\tilde{d}^R$ becomes null and $\tilde{d}^T = 1$. In that case:

$$\left(\frac{\dot{p}_1}{p_1}\right)^* = \frac{(\nu-n)-\delta_1[1-(r-n)/\delta_2]}{[\beta_1/(1-\beta_1)]-(1-\eta)} = \frac{\nu-n-(\dot{h}_1/h_1)^*}{[\beta_1/(1-\beta_1)]-(1-\eta)}$$

This scenario is only posible with *increasing terms of trade* ($\dot{d}_1^R/d_1^R$ is positive otherwise, and $\tilde{d}^R$ never becomes zero). With a constant price elasticity of tourists' demand, a tourism specialized country (and total consumer-importing country) will exhibit a greater (a lower) intensity in the use of capital in tourism sector if the rate of tourism arrival is greater (is lower) than the rate of growth of "human resources" (that is, $n+(\dot{h}_1/h_1)^*$).

On the contrary, if $\dot{d}_1^R/d_1^R > \dot{d}_1^T/d_1^T$ the dynamics leads to a complete specialization in consumption goods for domestic demand, import stops and the economy works as a closed; $\left(\frac{\dot{p}_1}{p_1}\right)^*$ is now:

$$\left(\frac{\dot{p}_1}{p_1}\right)^* = \frac{[r-(\rho+n)]\gamma^{-1}-\delta_1[1-(r-n)/\delta_2]}{[\beta_1/(1-\beta_1)]-\gamma^{-1}} = \frac{r-(\rho+n)-\gamma(\dot{h}_1/h_1)^*}{(\gamma\beta_1-1)/(1-\beta_1)}$$

Remember that γ should not be large enough to have both $\dot{d}_1^R/d_1^R$ and $\dot{p}_1/p_1$ as positives. Note that occurs when $\gamma(h_1/h_1)^* > r-(\rho+n)$. Households only support increasing prices if the retribution to labour weighted by the risk coefficient increases more than the net cost of capital. In the middle of those situations, it can be shown that if dynamics make $\dot{d}_1^R/d_1^R$ or $\dot{d}_1^T/d_1^T$ equal $\dot{x}_1/x_1$, also $\dot{d}_1^R/d_1^R$ and $\dot{d}_1^T/d_1^T$ will be equal. The relevant issue will be initial conditions. Suppose, for example, that in any time each variable raises at exponential rate *g*, such that $x_1(t) = x_1(0)e^{gt}$, $d_1^T(t) = d_1^T(0)e^{gt}$ and $d_1^R(t) = d_1^R(0)e^{gt}$. So, $\tilde{d}^T$ and $\tilde{d}^R$ can be express as the relation between initial conditions: $\tilde{d}^J = d_1^J(0)e^{gt} / x_1(0)e^{gt} = d_1^J(0)/x_1(0)$, with $J = T, R$.

Proposition 3.5*: Total consumption of residents varies according to:*

$$\left(\frac{\dot{c}}{c}\right)^* = \left(\frac{\dot{p}_1}{p_1}\right)^* + \left(\frac{\dot{d}_1^R}{d_1^R}\right)^*$$

Proof: Since $c = \left(p_1 d_1^R + m\right)$, it is straightforward obtain the above equation by deriving with respect to time. ♦

Hence, when demand for domestic consumption is zero total consumption still grows at increasing price rate.

Proposition 3.6: *The dynamics of physical capital demanded by firms 1 and 2 are:*

$$\left(\frac{\dot{k}_1}{k_1}\right)^* = \left(\frac{\dot{h}_1}{h_1}\right)^* + \frac{\dot{p}_1}{p_1} = \delta_1 - (r-n)\frac{\delta_1}{\delta_2} + \frac{\dot{p}_1}{p_1}$$

$$\left(\frac{\dot{k}_2}{k_2}\right)^* = \left(\frac{\dot{k}^d}{k^d}\right)^* = \left(\frac{\dot{h}_2}{h_2}\right)^* = \delta_2 u_3 *$$

Proof: With r and w constant along the balance path, and deriving with respect to time from (3) or (4), and (6), there are obtain the above results. ♦

Once again, the rate of change in terms of trade has influence on capital accumulation in consumption industry and in total capital accumulation. From (5), along the balanced growth path[5]:

$$\frac{\dot{k}^T}{k^T} = (u_1)^* \tilde{k}_1 \left(\frac{\dot{k}_1}{k_1}\right)^* + (u_2)^* \tilde{k}_2 \left(\frac{\dot{k}_2}{k_2}\right)^*$$

$$\left(\frac{\dot{k}^T}{k^T}\right)^* = \tilde{k}_1\left(1 - \frac{r-n}{\delta_2}\right)\left[\delta_1\left(1 - \frac{r-n}{\delta_2}\right) + \left(\frac{\dot{p}_1}{p_1}\right)^*\right] + \tilde{k}_2\left[(r-n) - \delta_2 (u_3)^*\right](u_3)^*$$

being $\tilde{k}_i = k_i / k^T$, for $i = 1, 2$. Increasing terms of trade stimulate total capital accumulation and initial conditions are revelants one more time.

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[5] $(u_3)^*$ is determined by setting initial conditions

4. Conclusions

Using a dynamic framework, this paper has examined the short- and long-run effects of tourism on resident income, capital accumulation and economic growth for a small open economy. Some of the benefits of tourism have been shown in this paper. First of all, as in Hazari and Sgrò(1995), tourism allows local population to enjoy a given welfare level with a lower saving rate than they would need in a closed economic system. Nevertheless, in our case, we have shown a reduction in substitution process between domestic and foreing capital considering individual election. Second, human capital has been taken into account as one of the engine of growth like in Lanza and Pigliaru (2000). As we said in Introduction, tourism is an important factor of human capital accumulation, and learning-by-doing seems to be the more suitable form to considerate the human capital in tourism industry. Along the balanced growth path, the rate of human capital accumulation in tourism industry acts negatively on the rate of change in the terms of trade. A more productive industry becomes cheaper and cheaper for the rest of the world and for the residents themselves. Third, it is posible a result with unbalanced between domestic and touristic demands. In that case, economy could assign all production to internal consumption, vanishing the tourism industry; or it could specialize completely in tourism, exporting all production of domestic consumption goods and importing all consumption goods for domestic demand. The latest only is possible with prices steadily rising. With complete specialization, the firms will be more capital intensive if the exogenous increases in demand of tourist is large enough to be cover with successives improvements in human resourses. In any case (including an intermediate case with the existence of domestic and tourism demand for internal consumption goods) results will depend on initial conditions.

Future research can include the use of data from an economy with the characteristics of the model to test for the validity of the theoretical findings and calibrate the short- and long run impacts of an increase in tourism on the economy. The tourism market is plenty of imperfections and distortions generated by externalities and public goods, thereby rendering simple representations as problematic. Future research could also concentrate in introducing some of these points in our model, augmenting thus the general equilibrium framework we applied.

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