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EXPLAINING HIGH ECONOMIC GROWTH IN SMALL TOURISM COUNTRIES WITH A DYNAMIC GENERAL EQUILIBRIUM MODEL

Carmen Álvarez-Albelo[a], Raúl Hernández-Martín[b]

Abstract

This paper shows that tourism specialisation can help to explain the observed high growth rates of small countries. For this purpose, two models of growth and trade are constructed to represent the trade relations between two countries. One of the countries is large, rich, has an own source of sustained growth and produces a tradable capital good. The other is a small poor economy, which does not have an own engine of growth and produces tradable tourism services. The poor country exports tourism services to and imports capital goods from the rich economy. In one model tourism is a luxury good, while in the other the expenditure elasticity of tourism imports is unitary. Two main results are obtained. In the long run, the tourism country overcomes decreasing returns and permanently grows because its terms of trade continuously improve. Since the tourism sector is relatively less productive than the capital good sector, tourism services become relatively scarcer and hence more expensive than the capital good. Moreover, along the transition the growth rate of the tourism economy holds well above the one of the rich country for a long time. The growth rate differential between countries is particularly high when tourism is a luxury good. In this case, there is a faster increase in the tourism demand. As a result, investment of the small economy is boosted and its terms of trade highly improve.

Keywords: High growth, small tourism countries, terms of trade, luxury good, dynamic general equilibrium.

JEL Codes: F43, O33, O41.

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1. Introduction

The specialisation in tourism has deeply contributed to alleviate poverty of countries, and especially of those facing serious obstacles to development. As reported by the World Tourism Organisation, *tourism is one of the major export sectors of developing economies and is the primary source of foreign exchange earnings of the 46 of the 49 least developed countries.* A rigorous empirical analysis by Brau, Lanza and Pigliaru (2007) has far confirmed this extent. More specifically, it has showed that tourism economies have being growing at higher rates than other country groups, including the OECD. This result is even more striking if one takes into account that most of them are islands or archipelagos and, hence, face two important difficulties for development: smallness and remoteness. This evidence poses two questions: Could growth of small tourism countries be sustainable in the long run? How does tourism specialisation operate in fuelling growth of those economies?

In this paper, we offer theoretical answers to these questions that lie in two factors: terms of trade improvements, and the fact that tourism is a luxury good (e.g. Lanza, Temple and Urga, 2003; Smeral, 2004). To do that, we construct a theoretical structure that represents the trade relations between a large rich country (country 1) and a small poor economy (country 2). The theoretical structure nests two different models that only differ in preferences. In the first one (model 1) tourism services are a luxury good, while the expenditure elasticity of tourism imports is unitary in the alternative framework (model 2). The models allow us to evaluate the impact of the specialisation in the production of a luxury good, namely tourism services, on economic growth.

Our analysis is based on the following assumptions. Country 1 has exogenous improvements of productivity, while country 2 does not possesses an own source of sustained growth. Countries 1 and 2 have comparative advantage in the production of capital goods and tourism services, respectively. The capital good production is used within country 1 and also exported. The whole production of tourism services of country 2 is bought abroad. In addition, both economies produce a non-tradable good of consumption. The representative household in country 1 derives utility from consumption and tourism services. Homes in country 2 only obtain utility from consumption.

In both models sustained growth is transmitted from country 1 to country 2. Therefore, we affirmatively answer the first question. Country 2 overcomes decreasing returns and permanently grows in the long run because its terms of trade continuously improve. This finding hinges on sectoral relative productivity. Since the tourism sector is relatively less productive than the capital good sector, tourism services become relatively scarcer and hence more expensive than the capital good. The effects of terms of trade improvements on the growth rate of country 2's income per capita operate through two channels. First, they imply an increase in the purchasing parity power of country 2 and, second, they allow a permanent increase in gross investment per capita and thus in capital per capita. At this point, it is worthwhile to notice that the engine of growth of country 2 cannot be identified using standard techniques based on the computation of the Solow residual. In this sense, a standard analysis of productivity gains would lead to the wrong conclusion that growth of country 2 will be exhausted in the long run.

The answer to the second question is related to the transitional behaviour of the economies. Therefore, we calibrate the models, numerically solve them and compare their results regarding the time evolution of countries' growth rates. In the calibration we impose a unitary price elasticity of tourism demand because it allows us to isolate the effect of an increase in country 1's income on its tourism imports and the economic growth of country 2. Moreover, this choice is in the line of the empirical estimates of this elasticity.[1] Our calibration strategy yields the same long run equilibrium in both models, and then their predictions only differ due to the nature of tourism good.

We have obtained the result that tourism specialisation has a positive impact on country 2's growth as long as tourism is a luxury good. More concretely, in both models country 2 grows faster than country 1, but the growth rate differential is significantly higher in model 1. The reason is twofold: the terms of trade improvements and the accumulation

[1] For instance, Smeral (2004) obtains a price elasticity of tourism imports of 1.24.

of capital of country 2 are larger in model 1 than in model 2. Indeed, along the transition the ratio of tourism imports to income of country 1 grows much faster in model 1 than in model 2. As a consequence, the increase in the relative price of tourism services (country 2's terms of trade) is higher in the first model than in the latter one. Since investment of country 2 is determined by its tourism exports, a higher capital accumulation takes place in model 1 than in model 2.

The rest of the paper is organised as follows. Section 2 exposes the empirical facts regarding country size, tourism specialisation and growth. Section 3 outlines the models. Section 4 solves for the competitive equilibrium of the two-country economy and characterises the long run equilibrium. The calibration of the models is described in Section 5. Section 6 exposes the outcomes from the computation of the models. Section 7 summarises and concludes. Lastly, the three appendices contain some technical details.

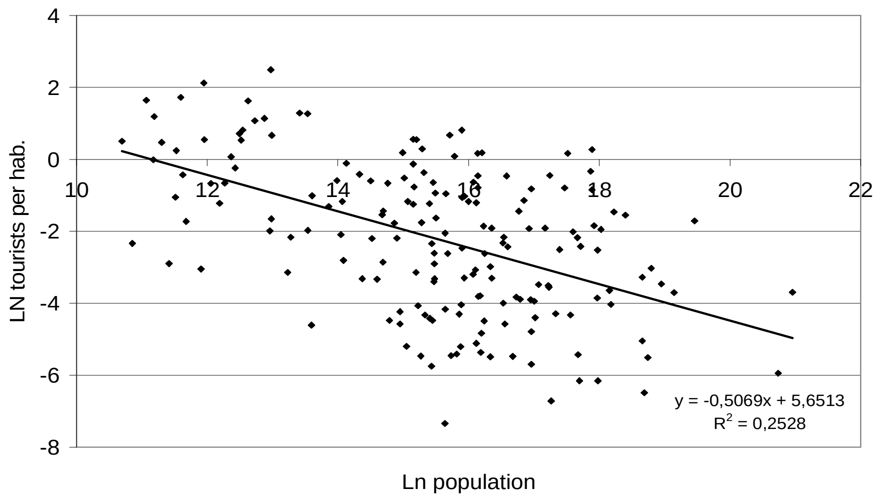
2. Stylised Facts Regarding Country Size, Tourism Specialisation and Economic Growth

The analysis of the relationship between country size, tourism specialisation and economic growth allows two relevant stylised facts to be observed. First, smaller countries tend to be more specialised in tourism than bigger ones. Second, small countries specialised in tourism tend to grow faster than other groups of economies. Given that tourism is considered a low productivity sector, there seems to be a contradiction between specialisation in tourism and obtaining high economic growth rates.

There is no internationally agreed-upon indicator for defining when a country is said to be specialised in tourism. Here, we use as an indicator the number of tourist arrivals in relation to the local population. In this respect, Figure 1 clearly shows that, in the year 2000, smaller countries received more tourists per inhabitant than larger ones[2].

[2] Taken from a sample of 179 countries for which data was available. The year was chosen in order to avoid the instability in international tourism following 2001.

Figure 1: Relationship between Tourist Arrivals per Inhabitant and Population, 2000



Source: World Development Indicators, 2001, World Bank.

Though the explanation of the positive relationship between small size and tourist arrivals per inhabitant is beyond the scope of this paper, it needs to be justified. Hernández-Martín (2006) mentions four possible causes for this. First, small countries are often islands and islands have an attraction bonus; each island or small destination is viewed by tourists as a differentiated product, and tourists show a preference for variety. Second, small countries have often strong comparative advantages in tourism because of the lack of industrial alternatives due to high transport costs, lack of competition, scarcity of natural resources, diseconomies of scale, etc. Third, small countries often enjoy social and political cohesion and thus are viewed as safe places. Forth, small countries have been a preferred choice of tour operators due to their dependence on air travel.

The indicator used in Figure 1 has the disadvantage of using arrivals for identifying when a country is specialised in tourism. It would be more accurate to use an indicator capturing the economic importance of inbound tourism. Given the non-existence of international data series regarding the tourism GDP, in Table 1 we use tourism income in relation to GDP as an indicator[3].

Table 1 shows the characteristics of countries in the world with the highest tourism specialisation. Most of them are very small and most of the small are islands. In the table, there are twenty five countries with a ratio of tourism income to GDP higher than 10 percent. Among those countries, twenty one are small (less than one million inhabitants), twenty two are islands, and the four largest ones have between one and eight million inhabitants[4].

Table 1: Countries with the Highest Tourism Specialisation, 1998

Country	Tourism Receipts/ GDP (%)	Population	Small	Island
Antigua and Barbuda	41,29	69.870	Yes	Yes
Araba	47,20	68.325	Yes	Yes
The Bahamas	32,58	294.000	Yes	Yes
Bahrain	10,11	643.000	Yes	Yes
Barbados	30,49	265.300	Yes	Yes
Belice	14,61	238.500	Yes	No
Cyprus	21,08	749.000	Yes	Yes
Dominica	14,66	71.810	Yes	Yes
Dominican Republic	13,51	8.085.560	No	Yes
Estonia	11,99	1.386.200	No	No
Fiji	16,13	791.170	Yes	Yes
Grenada	17,31	100.100	Yes	Yes
Jamaica	17,82	2.540.010	No	Yes
Jordan	13,69	4.597.350	No	No
Macao, China	40,71	425.000	Yes	Yes
Maldives	56,10	261.480	Yes	Yes
Malta	23,40	385.000	Yes	Yes
Mauritius	16,21	1.159.730	Yes	Yes
Palau	49,44	18,110	Yes	Yes
Samoa	17,18	168.850	Yes	Yes
Seychelles	31,40	78.850	Yes	Yes
St. Kitts and Nevis	26,48	40.130	Yes	Yes
St. Lucia	45,53	151.950	Yes	Yes
St. Vincent and the Grenadines	22,62	111.810	Yes	Yes
Vanuatu	30,72	186.000	Yes	Yes

Source: World Development Indicators 2001 and 2005, World Bank.

[3] The year 1998 has been chosen because it is the period with more available information and, in addition, it is prior to 2001 (see footnote 1). We have followed a standard threshold of one million inhabitants to consider a country as small (e.g. Easterly and Kraay, 2000).

[4] There were available data for 164 countries. Of those, 139 are large, 35 small and 42 islands.

The second stylised, namely the high economic growth of small countries specialised in the tourism industry, has an even greater scope. To this respect, Brau, Lanza and Pigliaru (2007) reached the conclusion that it is necessary to introduce tourism specialisation as an independent variable when analysing small countries, since those specialised in this sector are not disadvantaged. On the contrary, as shown in Table 2, they grew more than other groups of countries during the period 1980-2003. In this sense, we should add that although smallness may constitute a disadvantage for economic development, when accompanied by tourism specialisation it actually becomes an advantage. Furthermore, these authors found that the higher growth experienced by small tourism countries is not due to the traditional determinants of growth (i.e. the convergence effect, a greater propensity to savings-investment or greater openness to trade), what seems to reinforce the hypothesis that the determining factor of their greater rate of growth is the combination of tourism specialisation and their small size [5].

Table 2: Economic Growth of Country Groups, 1980-2003.

Country group	Growth of GDP per capita (%)	Number of countries
OECD	1.91	22
Oil exporter	-0.64	14
Small	1.70	29
Small tourism > 20	2.34	9
Small tourism > 10	2.23	14
Small < 10	1.20	15
Less Developed Countries	0.06	37
All countries	1.00	143

Source: Brau, Lanza and Pigliaru (2007).

The high economic growth of small tourism countries contrasts with a large body of literature which highlights the difficulties facing small economies (e.g. Streeten, 1993; Srinivasan, 1986; Armstrong et al., 1998). Some of these studies stress the difficulties experienced in achieving economies of scale, high transport costs, the lack of competition in domestic markets, etc. However, several empirical works have shown that those difficulties do not necessarily lead to lower growth. In fact, in their extensive empirical review, Easterly and Kraay (2000) failed to find worse economic results in the smaller countries than in the larger ones.

[5] By *tourist countries* these authors mean countries for which tourist income exceeds 10% of the GDP.

The explanations of the high growth rates of small tourism countries focus on four factors. Hernández-Martín (2006) shows that the sectoral change from activities of low productivity (e.g. agriculture) towards tourism can help explaining temporary high growth rates in small tourism countries. However, there is a relevant percentage of economic growth that continues unexplained. Lanza, Temple and Urga (2003) have looked at whether or not economic growth resulting from tourism specialisation is sustainable in the long run. The authors emphasise the apparent contradictory fact of growth being fuelled by a sector with low growth of productivity. They offer two coherent explanations to this fact. The first one is optimistic and states that the reduced productivity growth in the tourism sector may be compensated, on the one hand, by an improvement in the terms of trade[6] in favour of the sector, on the other hand, by the fact that tourism can be considered a luxury good, which may promote rapid growth in both the sector itself and the rest of the economy. The pessimistic explanation says that rapid growth is merely temporary if it is based on the increasing use of natural resources linked to tourism. As the economy approaches full employment of these resources, the evolution of labour productivity becomes a determining factor of growth and, as a result, tourism countries will grow more slowly than others.

The authors empirically tested the two hypotheses and found support for the optimistic one. Nevertheless, they pointed out that the results should be interpreted with caution for two reasons. Firstly, in the short run the existence of unemployment may reduce the improvement of terms of trade for tourism destinations and, secondly, the emergence of new destinations may lead to the same result in the long run.

The consequences of high tourism growth and specialization have been studied by Capó, Riera and Roselló (2005), who consider high growth rates in island regions of Spain as a manifestation of *dutch desease*. This means that explosive tourism growth in small open economies provokes both rent and allocation effects that result in deindustrialization. Nevertheless, the paper is not clear enough about why rapid tourism growth can be problematic, and therefore the long run effects of such a process are not clear. This is because, on the one hand, tourism specialisation means an improvement in

[6] The relevance of terms of trade improvements was also pointed out by Copeland (1991).

welfare following comparative advantages. But, on the other hand, excessive specialization in small tourism countries could lead to an increase in their vulnerability to external shocks.

3. The Models

Time is discrete and endless ($t = 0,1,2,...$). There are two countries denoted by $i = 1,2$, that are involved in trade of capital goods and tourism services. Country 1 is large and rich, has an own source of sustained growth and is specialized in the production of a capital or investment good. Country 2 represents a small and poor economy, which does not possess an own engine of growth and is specialized in the production of tourism services. The capital good production is used within country 1 and also exported. The whole production of tourism services of country 2 is bought abroad. In addition, both countries produce a non-tradable good of consumption. The capital good is taken as numeraire.

The time evolution of population is crucial in our analysis because the growth possibilities of country 2 depend, in a great extent, on how the relative size of the economies evolves through time. Thus, we have to introduce realistic assumptions regarding population. In most growth models the growth rate of population is constant. This is obviously a simplification given that the population grows faster in less developed countries than in developed economies[7]. In our model the time evolution of population is consistent with this observed fact. More specifically, at each period the economies are inhabited by a continuum of measure $L_t^i > 0$, $i = 1,2$ of identical homes. From now on, the super-index in the variables will denote the country. The population of each economy evolves as follows:

[7] This fact is described, for instance, in the report World Population Profile: 1998 (p. 10) delivered by the US Agency for International Development and the American Bureau of the Census.

$$\begin{array}{ll} \textit{Country 1} & \textit{Country 2} \\ L^1_{t+1} = \left(1+n^1\right)L^1_t, & L^2_{t+1} = \left(1+n^2_{t+1}\right)L^2_t, \\ L^1_0 > 0 \quad given, & n^2_{t+1} = n^1 + \left(n^2_1 - n^1\right)\varphi^t, \\ n^1 \geq 0, & L^2_0 > 0, \quad n^2_1 > n^1 \quad given, \quad \varphi \in (0,1), \\ L^1_0 > L^2_0. & \end{array} \tag{1}$$

The equations in (1) imply that the population of country 1 grows at the constant rate n^1 at each period. The population growth rate of country 2, n^2_{t+1}, is initially higher than country 1's, strictly decreases though time and eventually converges to n^1. The parameter φ determines the speed of convergence. Lastly, the value of L^1_0 has to be higher enough than L^2_0 to guarantee that L^1_t / L^2_t never becomes smaller than the unit. In what follows, we will refer to L^1_t / L^2_t as the relative size of country 1.

At each period households supply inelastically one unit of time in the labour market, and hence the population constitutes the labour force of the economy. To this respect, variables in the models will be expressed in per capita (or per worker) terms. Of course, this does not apply for prices. It is also assumed that all markets are perfectly competitive, international factor flows are not allowed and agents have perfect foresight. Next, we describe the environment with detail.

3.1. Firms

The goods are produced with the following Cobb-Douglas technologies:

$$\begin{array}{ll} \textit{Country 1} & \textit{Country 2} \\ z^1_t = (1+\gamma)^t \left(k^1_{z,t}\right)^{\alpha} \left(l^1_t\right)^{1-\alpha}, & x^2_t = \left(k^2_{x,t}\right)^{\alpha} \left(l^2_t\right)^{1-\alpha}, \\ c^1_t = (1+\gamma)^t \left(k^1_{c,t}\right)^{\alpha} \left(1-l^1_t\right)^{1-\alpha}, & c^2_t = \left(k^2_{c,t}\right)^{\alpha} \left(1-l^2_t\right)^{1-\alpha}, \\ \gamma > 0, \quad \alpha \in (0,1) & \end{array} \tag{2}$$

where z^1_t denotes the production of capital good in country 1, x^2_t is the production of tourism services in country 2 and c^i_t denotes the production of consumption good in country i. Technologies use capital and labour as factor inputs. In each economy resources must be allocated between sectors. Thus, $k^1_{z,t}$ and $k^1_{c,t}$ represent the amounts of capital input allocated to the production of capital and consumption goods, respectively, in country 1, while $k^2_{x,t}$ and $k^2_{c,t}$ are those amounts assigned to produce tourism services and consumption good, respectively, in country 2. From now on, the first sub-index will indicate the sector. As the model is expressed in per capita terms, the variables l^1_t and $1-l^1_t$ are the proportions of labour used in capital and consumption good sectors, respectively, in country 1. Similarly, the variables l^2_t and $1-l^2_t$ are those proportions used in tourism and consumption good sectors, respectively, in country 2. Since $\gamma > 0$, the total factor productivity (TFP) grows at the same rate in both sectors of country 1. Country 2, however, does not have an own engine of sustained growth.

The firm problems can be formulated as static ones. The objective functions of firms at t are current profits, π_t:

$$
\begin{array}{ll}
\textit{Country 1} & \textit{Country 2} \\
\pi^1_{z,t} = z^1_t - \left(r^1_t + \delta\right)k^1_{z,t} - w^1_t l^1_t, & \pi^2_{x,t} = p_{x,t}x^2_t - \left(r^2_t + \delta\right)k^2_{x,t} - w^2_t l^2_t, \\
\pi^1_{c,t} = p^1_{c,t}\, c^1_t - \left(r^1_t + \delta\right)k^1_{c,t} - w^1_t\left(1-l^1_t\right), & \pi^2_{c,t} = p^2_{c,t}c^2_t - \left(r^2_t + \delta\right)k^2_{c,t} - w^2_t\left(1-l^2_t\right),
\end{array}
\qquad (3)
$$

where $p^1_{c,t}$ and $p^2_{c,t}$ are the relative prices of consumption in country 1 and 2, respectively, and $p_{x,t}$ is the relative price of tourism services. The omission of the super-index in $p_{x,t}$ indicates international price. Therefore, $p_{x,t}$ and $1/p_{x,t}$ are the terms of trade of country 2 and 1, respectively. The variable r^i_t is the interest rate and w^i_t denotes the wage. The depreciation rate of capital, $\delta > 0$, is assumed to be the same in both countries and across sectors.

3.2. Households

The representative household in country 1 and 2 maximizes its total utility discounted at the rate ρ. Countries differ in preferences as follows:

Country 1 | *Country 2*

$$u_0^1 = \sum_{t=0}^{\infty}(1+\rho)^{-t} L_t^1\, v^1\left(\tilde{c}_t^1, \tilde{x}_t^1\right) \,, \qquad u_0^2 = \sum_{t=0}^{\infty}(1+\rho)^{-t} L_t^2\, v^2\left(\tilde{c}_t^2\right),$$

$$v^1\left(\tilde{c}_t^1,\tilde{x}_t^1\right)=\begin{cases}\dfrac{\left(\left(\tilde{c}_t^1-\overline{c}_t^1\right)^{\eta}\left(\tilde{x}_t^1\right)^{1-\eta}\right)^{1-\sigma}}{1-\sigma} & if\ \sigma\neq 1\\ \eta\, ln\left|\tilde{c}_t^1-\overline{c}_t^1\right|+\left(1-\eta\right)ln\left|\tilde{x}_t^1\right| & if\ \sigma=1\end{cases} \qquad v^2\left(\tilde{c}_t^2\right)=\begin{cases}\dfrac{\left(\tilde{c}_t^2-\overline{c}_t^2\right)^{1-\sigma}}{1-\sigma} & if\ \sigma\neq 1\\ ln\left|\tilde{c}_t^2-\overline{c}_t^2\right| & if\ \sigma=1\end{cases} \quad (4)$$

$$\eta\in(0,1),\quad \rho>0,\quad \sigma>0,\quad \overline{c}_t^i=\left(1+\theta^i\right)^t\overline{c}^i,\quad i=1,2.$$

The shopping basket of homes in country 1 is composed of consumption good, $\tilde{c}_t^1$, and tourism services, $\tilde{x}_t^1$. The shopping basket of country 2 is only composed of consumption, $\tilde{c}_t^2$. In what follows the wiggle symbol (˜) will denote demand. For our purposes we need a non-homothetic utility function for country 1. However, the predictions from a model are informative only if they are compared to those from an alternative framework. This is the reason why we also consider the case of homothetic preferences. Thus, our theoretical structure divides in two different models:

$$\begin{aligned} &Model\ 1:\quad \overline{c}_t^i>0,\quad i=1,2,\\ &Model\ 2:\quad \overline{c}_t^i=0,\quad i=1,2.\end{aligned} \qquad (5)$$

In model 1 there is a Stone-Geary type of relationship between consumption good and tourism services, and hence the utility function country 1 is non-homothetic. We follow Christiano (1989) and assume that the minimum consumption $\overline{c}_t^i$ grows at each period at the rate at which income per capita grows in the long run, θ^i.[8] This type of preferences has two desirable properties. Firstly, the marginal utility of consumption

[8] Alternatively, we could have followed Carroll et al. (2000) and assumed that the minimum consumption is endogenously determined through a habit formation process. Since both approaches virtually have the same implications, we opt by keeping the simplest one.

goes to infinity as $\tilde{c}_t^i$ approaches $\overline{c}_t^i$, which discourages saving. As reported by Christiano (1989), this property is crucial for explaining the time behaviour of countries' saving rate, because it allows explaining the fact that homes save little and consume a lot when they are near the minimum consumption, that is, when they are poor. Since in our model the shopping basket of country 1 is composed of two goods, this approach has a second implication, namely a consumption-dependent elasticity of substitution (ES) between the goods:

$$ES\left(\tilde{c}_t^1\right) = \frac{d\left(\tilde{c}_t^1/\tilde{x}_t^1\right)}{d\ MRS\left(\tilde{c}_t^1,\tilde{x}_t^1\right)} \frac{MRS\left(\tilde{c}_t^1,\tilde{x}_t^1\right)}{\tilde{c}_t^1/\tilde{x}_t^1} = 1-\left(1-\eta\right)\frac{\overline{c}_t^1}{\tilde{c}_t^1}, \quad \overline{c}_t^1 < \tilde{c}_t^1, \tag{6}$$

where $MRS\left(\tilde{c}_t^1,\tilde{x}_t^1\right)$ denotes the marginal relationship of substitution, and consumption is always higher than the minimum level.[9] This elasticity is lower than the unit and rises as consumption does. Therefore, the share of expenditure devoted to consumption in country 1 is high when homes are near $\overline{c}_t^1$. Moreover, in a situation like that the households would be little willing to substitute tourism services for consumption. As consumption moves up its minimum level the household becomes progressively more willing to substitute tourism services for consumption. Consequently, a greater proportion of expenditure is devoted to the former good than to the latter one. Therefore, this utility function implies that consumption is a good of first necessity, while tourism services are a luxury good. In model 2 the elasticity in (6) is unitary and thus consumption and tourism expenditure evolves at the same pace as home's expenditure.

Households in country 1 and 2 receive capital and labour income and face the budget constraints:

$$\begin{aligned} &\textit{Country 1} \\ &\left(1+n^1\right)k_{t+1}^1 = \left(1+r_t^1\right)k_t^1 + w_t^1 - p_{c,t}^1\ \tilde{c}_t^1 - p_{x,t}\ \tilde{x}_t^1, \\ &\textit{Country 2} \\ &\left(1+n_{t+1}^2\right)k_{t+1}^2 = \left(1+r_t^2\right)k_t^2 + w_t^2 - p_{c,t}^2\ \tilde{c}_t^2, \end{aligned} \tag{7}$$

[9] The fulfilment of this condition requires a high enough initial endowment of capital per capita.

where k_t^i, $i=1,2$ is the capital stock of the economy, which is equal to household's wealth at t. At the initial period, homes are endowed with a positive amount of capital that constitutes their initial wealth:

$$k_0^i > 0, \quad i = 1,2. \tag{8}$$

4. The Equilibrium of the Two-Country Economy

In this section we first characterize the competitive equilibrium, and then study the behaviour of the two-country economy in the long run. There is no need for analysing each model separately since model 2 is a particular case of model 1. The results can be obtained using standard techniques, so we opt by confining the details on calculations in three appendices.

4.1 The Competitive Equilibrium

Given the initial endowments $k_0^1 > 0$ and $k_0^2 > 0$, the competitive equilibrium of the two-country economy is characterized by a set of allocations $\left\{l_t^1, l_t^2, k_{t+1}^1, k_{t+1}^2\right\}_{t=0,1,2,...}$ and prices $\left\{p_{c,t}^1, r_t^1, w_t^1, p_{x,t}, p_{c,t}^2, r_t^2, w_t^2\right\}_{t=0,1,2,...}$ that solve firm and household problems, as described in Appendix A, clear all markets and balance the trade balance.

The clearing conditions of labour markets have been already introduced in the models. The rest of conditions are as follows:

$$\begin{aligned}
&\textit{Assets:}\quad k_t^1 = k_{z,t}^1 + k_{c,t}^1, \quad k_t^2 = k_{x,t}^2 + k_{c,t}^2, \\
&\textit{Capital good (in aggregate terms):}\quad \tilde{z}_t^1 L_t^1 + \tilde{z}_t^2 L_t^2 = z_t^1 L_t^1 = (1+\gamma)^t \left(k_{z,t}^1\right)^{\alpha} \left(l_t^1\right)^{1-\alpha} L_t^1, \\
&\textit{Tourism (in aggregate terms):}\quad \tilde{x}_t^1 L_t^1 = x_t^2 L_t^2 = \left(k_{x,t}^2\right)^{\alpha} \left(l_t^2\right)^{1-\alpha} L_t^2, \\
&\textit{Consumption:}\quad \tilde{c}_t^1 = c_t^1 = (1+\gamma)^t \left(k_{c,t}^1\right)^{\alpha} \left(1-l_t^1\right)^{1-\alpha}, \quad \tilde{c}_t^2 = c_t^2 = \left(k_{c,t}^2\right)^{\alpha} \left(1-l_t^2\right)^{1-\alpha}.
\end{aligned} \tag{9}$$

where $\tilde{z}_t^1$ and $\tilde{z}_t^2$ denote investment demands of country 1 and 2, respectively. Note that the clearing conditions of capital good and tourism services markets are expressed in aggregate terms instead of in per capita terms. This adjustment is necessary because countries differ in population size. In each country the aggregate expenditure at period t (ae_t) exhausts gross domestic income at t (gdi_t):

$$\begin{aligned} ae_t^1 &= gdi_t^1 \quad \rightarrow \quad p_{c,t}^1 \tilde{c}_t^1 + \tilde{z}_t^1 + p_{x,t} \tilde{x}_t^1 = z_t^1 + p_{c,t}^1 c_t^1, \\ ae_t^2 &= gdi_t^2 \quad \rightarrow \quad p_{c,t}^2 \tilde{c}_t^2 + \tilde{z}_t^2 = p_{x,t} x_t^2 + p_{c,t}^2 c_t^2. \end{aligned} \tag{10}$$

In addition, the trade balance must be in equilibrium at every t, which requires that:

$$\begin{aligned} &\textit{In aggregate terms} \ \rightarrow \ \tilde{z}_t^2 L_t^2 = p_{x,t} x_t^2 L_t^2 = p_{x,t} \tilde{x}_t^1 L_t^1, \\ &\textit{In per capita terms of country 2} \ \rightarrow \ \tilde{z}_t^2 = p_{x,t} x_t^2 = p_{x,t} \tilde{x}_t^1 \frac{L_t^1}{L_t^2}, \end{aligned} \tag{11}$$

where the first equation in (11) is expressed in aggregate instead of per capita terms to account for countries' differences in population size. The equilibrium in the trade balanced expressed in per capita terms of country 2 reveals that gross investment per capita of this economy is determined by tourism expenditure per capita and the relative size of country 1. This result has two important implications. First, tourism demand per capita is not what really matters for promoting growth of country 2, but tourism expenditure per capita because of the effects of the relative price of tourism. Second, a little tourism expenditure per capita can be compensated by a large relative size of country 1.

From profit-maximising behaviour of firms, we obtain that interest rate and the wage are equal to capital and labour marginal productivities, respectively:

$$\begin{aligned} &\textit{Country 1} \\ &r_t^1 = \alpha \frac{z_t^1}{k_{z,t}^1} - \delta = \alpha \frac{p_{c,t}^1 c_t^1}{k_{c,t}^1} - \delta, \quad w_t^1 = (1-\alpha) \frac{z_t^1}{l_t^1} = (1-\alpha) \frac{p_{c,t}^1 c_t^1}{1 - l_t^1}, \\ &\textit{Country 2} \\ &r_t^2 = \alpha \frac{p_{x,t} x_t^2}{k_{x,t}^2} - \delta = \alpha \frac{p_{c,t}^2 c_t^2}{k_{c,t}^2} - \delta, \quad w_t^2 = (1-\alpha) \frac{p_{x,t} x_t^2}{l_t^2} = (1-\alpha) \frac{p_{c,t}^2 c_t^2}{1 - l_t^2}. \end{aligned} \tag{12}$$

The equalisation of interest rate and the wage between sectors yields the resource allocation in both economies:

$$\begin{array}{ll} \textit{Country 1} & \textit{Country 2} \\ k^1_{z,t} = l^1_t k^1_t, & k^2_{x,t} = l^2_t k^2_t, \\ k^1_{c,t} = \left(1 - l^1_t\right) k^1_t, & k^2_{c,t} = \left(1 - l^2_t\right) k^2_t. \end{array} \tag{13}$$

Since technologies are equally intensive in capital and labour, factor inputs are allocated to each sector in the same proportion. The results in (13) and the expressions for interest rate of countries in (12) yield the relative prices:

$$\begin{array}{ll} \textit{Country 1} & \textit{Country 2} \\ p^1_{c,t} = 1, & p_{x,t} = p^2_{c,t}. \end{array} \tag{14}$$

In country 1, the relative price of consumption equals one given that both goods are produced with the same type of technology. In country 2 the goods are also produce with the same kind of technology, and as a result the relative prices of goods are identical. The results in (13) and (14) allow gross domestic income per capita of countries to be written as:

$$\begin{array}{ll} \textit{Country 1} & \textit{Country 2} \\ gdi^1_t = c^1_t + z^1_t = \left(1+\gamma\right)^t \left(k^1_t\right)^\alpha, & gdi^2_t = p_{x,t}\left(c^2_t + x^2_t\right) = p_{x,t}\left(k^2_t\right)^\alpha. \end{array} \tag{15}$$

Since tourism exports are entirely devoted to import capital good, the results in (13) and (15) imply that the saving rate of country 2 is equal to l^2_t.

The equilibrium conditions in (9) and (11), and the results in (13) allow the capital accumulation of countries to be expressed as:

$$\begin{array}{l} \textit{Country 1} \\ \left(1+n^1\right) k^1_{t+1} = z^1_t - p_{x,t}\tilde{x}^1_t + \left(1-\delta\right) k^1_t, \\ \textit{Country 2} \\ \left(1+n^2_{t+1}\right) k^2_{t+1} = p_{x,t}\tilde{x}^1_t \dfrac{L^1_t}{L^2_t} + \left(1-\delta\right) k^2_t = p_{x,t} \underbrace{l^2_t \left(k^2_t\right)^\alpha}_{x^2_t} + \left(1-\delta\right) k^2_t. \end{array} \tag{16}$$

The expression (16) makes clear that the capital accumulation of country 2 crucially depends on the time evolution of its terms of trade. The accumulation of capital in country 1 is not characterised by decreasing returns, since the TFP in this sector grows at the rate γ. However, country 2 would need continuous improvements in its terms of trade for overcoming decreasing returns and hence stagnation in the long run.

The split of expenditure between consumption and tourism services in country 1 is obtained from the first-order conditions of home's problem:

$$p_{x,t}\tilde{x}_t^1 = \frac{1-\eta}{\eta}\left(\tilde{c}_t^1 - \overline{c}_t^1\right) \;\rightarrow\; \begin{cases} \tilde{c}_t^1 = \eta e_t^1 + (1-\eta)\overline{c}_t^1 \\ p_{x,t}\tilde{x}_t^1 = (1-\eta)\left(e_t^1 - \overline{c}_t^1\right) \end{cases} \quad (17)$$

where e_t^1 denotes household's expenditure, that is, $e_t^1 \equiv \tilde{c}_t^1 + p_{x,t}\tilde{x}_t^1$. The equations in (17) show that, in model 1, the ratios of consumption and tourism expenditure to home's expenditure are not constant. The former ratio increases and the latter one falls as e_t^1 rises. This behaviour is a consequence of the chosen Stone-Geary utility function. Moreover, it is worthwhile to note that the expenditure-saving decision is intertemporal, while the decision on expenditure allocation between the goods in (17) is an intra-period one. This means that the home first decides how much income to spent and save in t, which hinges on the whole time-paths of all prices from the period to infinite. Then, it chooses how to split up expenditure between consumption and tourism services in the current period, which only depends on variables in t. Therefore, the income-elasticity of consumption and tourism expenditure cannot be analytically computed, since it involves intertemporal decisions. The expenditure-elasticity, however, can be easily computed using the equations in (17):

$$\varepsilon_{c,e}^1 \equiv \frac{d\tilde{c}_t^1}{de_t^1}\frac{e_t^1}{\tilde{c}_t^1} = \frac{\eta e_t^1}{\eta e_t^1 + (1-\eta)\overline{c}_t^1} < 1, \quad \varepsilon_{p_x x,e}^1 \equiv \frac{d\left(p_{x,t}\tilde{x}_t^1\right)}{de_t^1}\frac{e_t^1}{p_{x,t}\tilde{x}_t^1} = \frac{e_t^1}{e_t^1 - \overline{c}_t^1} > 1, \quad (18)$$

where $e_t^1 > \overline{c}_t^1$ provided that $\tilde{c}_t^1 > \overline{c}_t^1$. The expenditure-elasticity of consumption ($\varepsilon_{c,e}^1$) and tourism expenditure ($\varepsilon_{p_x x,e}^1$) are lower and higher than the unit, respectively. In this sense, we have defined tourism services as a luxury good and consumption as a good of first necessity, respectively. In model 2, however, the ratios of consumption and tourism expenditure to home's expenditure are constant and the elasticities in (18) are equal to the unit.

The equations governing consumption of country 1 and 2 and the tourism expenditure through time are obtained from the first-order conditions of the household problem in both economies:

Country 1

$$\frac{\tilde{c}_{t+1}^{1}}{\tilde{c}_{t}^{1}}=\left(\frac{p_{x,t+1}}{p_{x,t}}\right)^{\frac{(\sigma-1)(1-\eta)}{\sigma}}\left(\frac{1+r_{t+1}^{1}}{1+\rho}\right)^{\frac{1}{\sigma}}\left(1-\frac{\overline{c}_{t}^{1}}{\tilde{c}_{t}^{1}}\right)+\frac{\overline{c}_{t}^{1}}{\tilde{c}_{t}^{1}},$$

$$\frac{p_{x,t+1}\tilde{x}_{t+1}^{1}}{p_{x,t}\tilde{x}_{t}^{1}}=\left(\frac{p_{x,t+1}}{p_{x,t}}\right)^{\frac{(\sigma-1)(1-\eta)}{\sigma}}\left(\frac{1+r_{t+1}^{1}}{1+\rho}\right)^{\frac{1}{\sigma}}, \tag{19}$$

Country 2

$$\frac{\tilde{c}_{t+1}^{2}}{\tilde{c}_{t}^{2}}=\left(\frac{p_{c,t+1}^{2}}{p_{c,t}^{2}}\right)^{-\frac{1}{\sigma}}\left(\frac{1+r_{t+1}^{2}}{1+\rho}\right)^{\frac{1}{\sigma}}\left(1-\frac{\overline{c}_{t}^{2}}{\tilde{c}_{t}^{2}}\right)+\frac{\overline{c}_{t}^{2}}{\tilde{c}_{t}^{2}}.$$

The first and the third equations in (19) reveal that the minimum consumption level affects the intertemporal elasticity of substitution of consumption (IESC). Indeed, the next and the current period consumption are close to one another if current consumption is near the minimum level. The home becomes more willing to switch consumption through time as this variable moves up its minimum level. This effect is absent in model 2. Moreover, looking at the first two equations in (19), one can see that in both models the intertemporal allocation of expenditure in country 1 is independent from the time evolution of $p_{x,t}$ if σ is equal to the unit. Therefore, holding interest rate constant, the price-elasticity of tourism demand would be unitary. This seems an interesting case for our analysis, since it allows isolating the effect of an increase in country 1's income on its tourism expenditure and the economic growth of country 2. In addition, tourism demand would be elastic and inelastic if σ was lower and higher than one, respectively. In model 1, the first two equations in expression (19) show that if both expenditures grew over time, tourism expenditure would grow at a higher rate than consumption. In model 2, however, both types of expenditures would grow at the same rate.

The construction of the system of equations that characterizes the dynamic behaviour of the two-country economy is described in Appendix B.

4.2. The Long Run Equilibrium

In this sub-section we will show that the long run equilibrium of the two-country economy is characterised by a balanced growth path (BGP), in which countries' population grows at the same rate and the growth rates of variables are constant.

Since the variables l_t^1 and l_t^2 take values in the interval $(0,1)$, their growth rate must be equal to zero. We start analysing the behaviour of the economy of country 1. The interest rate is constant in the long run and hence the variables k_t^1, z_t^1, $\tilde{z}_t^1$, c_t^1, $p_{x,t}\tilde{x}_t^1$ and gdi_t^1 grow at the same constant rate:

$$\theta^1 = (1+\gamma)^{\frac{1}{1-\alpha}} - 1. \tag{20}$$

In country 2 a constant interest rate in the long run requires gross investment, $\tilde{z}_t^2 = p_{x,t}x_t^2$, to grow at the same rate as k_t^2. Therefore, k_t^2, $p_{x,t}x_t^2$, $p_{c,t}^2c_t^2$ and gdi_t^2 grow at the same constant rate:

$$\theta^2 = \theta^1 \equiv \theta. \tag{21}$$

The previous results imply that the production and the relative price of tourism services (and consumption) grow at the rates:

$$\frac{x_{t+1}^2 - x_t^2}{x_t^2} = \frac{c_{t+1}^2 - c_t^2}{c_t^2} = (1+\theta)^{\alpha} - 1, \quad \frac{p_{x,t+1} - p_{x,t}}{p_{x,t}} = (1+\theta)^{1-\alpha} - 1. \tag{22}$$

We then obtain that sustained growth is transmitted from country 1 to country 2 through trade. As we anticipated in the preceding sub-section, the permanent improvements in country 2's terms of trade, $p_{x,t}$, constitute the mechanism of transmission. Indeed, the equilibrium expressions of interest rate:

$$\begin{aligned}&\textit{Country 1}\\ &r_t^1=\alpha\left(k_t^1\left(1+\gamma\right)^{\frac{-t}{1-\alpha}}\right)^{\alpha-1}-\delta\ \rightarrow\quad \frac{k_{t+1}^1}{k_t^1}=\left(1+\gamma\right)^{\frac{1}{1-\alpha}}=1+\theta,\\ &\textit{Country 2}\\ &r_t^2=\alpha\left(k_t^2\left(p_{x,t}\right)^{\frac{-1}{1-\alpha}}\right)^{\alpha-1}-\delta\ \rightarrow\quad \frac{k_{t+1}^2}{k_t^2}=\left(\frac{p_{x,t+1}}{p_{x,t}}\right)^{\frac{1}{1-\alpha}}=1+\theta,\end{aligned}\tag{23}$$

show that the marginal productivity of capital in country 1 holds constant when capital per capita grows unboundedly, given that this economy posses an own source of permanent growth. There are not increases in TFP of country 2, and hence the marginal productivity of capital falls as capital accumulates. However, the permanent improvements in country 2’s terms of trade compensates the fall in the marginal productivity of capital and, as a result, the value of capital marginal productivity approaches to a constant value in the long run. Therefore, country 2 overcomes decreasing returns to capital accumulation and can enduringly grow because the terms of trade becomes more and more favourable to this economy.[10]

A more detailed analysis of the long run equilibrium can be found in Appendix C.

5. Calibration of the Models and the Balanced Growth Path

We have just showed that country 2 can import sustained growth by trading. This result has to do with the long-run behaviour of the two-country economy. In this paper we are also concerned with offering an answer to the question on why small tourism countries have been growing at higher rates than other economies. This question is noticeably related to the transitional behaviour of the two-country economy. We make use of numerical examples to illustrate the predictions from the models. More specifically, we

[10] Hazari, Nowak and Sahli (2003) also obtained that a tourism economy can import sustained growth whenever its terms of trade improve. Moreover, Álvarez-Albelo and Pigem-Vigo (2007) and Álvarez-Albelo and Perera-Tallo (2007) established conditions under which sustained growth is transmitted through terms of trade improvements.

proceed in two stages. We first parameterise the models to characterise the BGP, and then solve them.[11] This section covers the first stage.

Table 3: Empirical Facts of OECD High Income Countries (HIC) and Small Tourism Countries (STC)

OECD High Income Countries (24)	
Population growth rate, 1971-2003[a]	0.66
Ratio of HIC population to STC population, 1970-2003[a]	263
Growth Rate of Real GDP pc 1971-2000[a]	2.13
HIC Tourism Expenditure in STC over GDP	0.043
Small Tourism Countries (13)	
Population growth rate, 1971-2003[a]	1.12
Growth Rate of Real GDP pc, 1971-2003[a]	2.42
STC GDP over HIC GDP 1970-2003[a]	0.165
International tourism receipts over GDP (current US$), 1980-2003[b]	26.1
Real GDP pc of STC over real GDP pc of HIC, 1970-2003[a]	43.2

Notes: The HIC are those included in the World Development Indicators, 2006 constructed by the World Bank. The STC are those included in Brau, Lanza and Pigliaru (2007), except Seychelles because of missing data. The values are means of the period. Variables are in percentage form, except the ratio of HIC population to STC population. The variable GDP pc refers to real Gross Domestic Product per capita in purchasing parity power. The variable HIC Tourism Expenditure in STC over GDP is equal to 0.165×0.261.

Sources: [a]Penn World Table 6.2; [b]Brau, Lanza and Pigliaru (2007).

We choose parameter values for the models to deliver an empirically plausible BGP. We will use data of twenty four OECD high income countries (HIC) and thirteen small tourism countries (STC) in Table 3 to calibrate some parameters of the models. The HIC and the STC as a group will represent country 1 and 2, respectively. Table 4 contains the parameter values and the implied BGP. The calibration targets appear in bold in Table 4.

The data used to construct variables in Table 3 reveal that HIC and STC were not in their long run equilibrium during the considered time period. This fact obligates us to establish some compromise criteria to calibrate the models. In this regard, we will consider the mean of the period of some variables as long run values.

[11] We use the Gauss-Seidel method to solve the models. The code and the results are available upon request via e-mail to the authors.

Table 4: Parameter Values and the Balanced Growth Path

Parameter Values

Population: $n^1 = n^2 = 0.0066$, $L_t^1 / L_t^2 = 263$
Technology: $\gamma = 0.0127$, $\alpha = 0.4$ [a], $\delta = 0.048$ [a]
Preferences: $\sigma = 1$, $\begin{cases} Model\ 1: \ \ \bar{c}^1 = 1, \bar{c}^2 = 0.432, \eta = 0.9986, \rho = 0.462 \\ Model\ 2: \ \ \bar{c}^1 = \bar{c}^2 = 0, \eta = 0.9994, \rho = 0.462 \end{cases}$

Balanced Growth Path

Growth rates (%)
$\boldsymbol{\theta \equiv \theta^1 = \theta^2 = 2.13}$, $\theta_{p_x} = 1.27$, $\theta_{x^2} = \theta_{c^2} = 0.84$
Variables in the dynamic system
$k_t^1 (1+\theta)^{-t} = 7.8177$, $l_t^1 = 0.26143$, $k_t^2 (1+\theta)^{-t} = 3.3772$, $l_t^2 = 0.261$
Interest rates and saving rates (%)
$r^1 = r^2 = 6.85$, $s^1 \equiv \frac{\tilde{z}_t^1}{gdi_t^1} = 26.1$, $\boldsymbol{s^2 \equiv \frac{p_{x,t} x_t^2}{gdi_t^2} = \frac{\tilde{z}_t^2}{gdi_t^2} = 26.1\%}$
Income and expenditure over gross domestic income (%)
$\frac{z_t^1}{gdi_t^1} = 26.143$, $\frac{c_t^1}{gdi_t^1} = 73.857$, $\boldsymbol{\frac{p_{x,t} \tilde{x}_t^1}{gdi_t^1} = 0.043}$, $\frac{p_{x,t} c_t^2}{gdi_t^2} = 73.9$
Differences in per capita income (%)
$\boldsymbol{\frac{gdi_t^2}{gdi_t^1} = 43.2}$
Sources: [a]Cooley and Prescott (1995)

The population growth rate of both economies is set to $n^1 = n^2 = 0.66\%$, where the omission of time denotes stationary value. During the considered time period in Table 3 countries' relative sizes were not constant. As a compromise solution, we opt by setting the long run relative size of country 1 in the models, L_t^1 / L_t^2, equal to the relative size of HIC in Table 3 (263).

The growth rates of income per capita of countries will eventually equalise, that is, $\theta^1 = \theta^2 = \theta$. The measure of income per capita in the model matches with real GDP per capita in purchasing parity power (PPP). The data show that income per capita grew at a higher rate in the STC (2.42) than in the HIC (2.13). Thus, we calibrate α and γ for θ to be equal to the growth rate of the HIC. Cooley and Prescott (1995) calibrated α for the American economy and found a value of 0.4. We consider that value as a good estimate for α. Then, we find that $\gamma = 0.0127$ allows replicating a growth rate of 2.13%. The depreciation rate of capital is equal to that calibrated by Cooley and Prescott (1995) for the US economy ($\delta = 0.048$). We impose a unitary price-elasticity for tourism demand, that is, $\sigma = 1$, and thus tourism expenditure is independent from movements in the relative price of tourism services. We consider this choice as appropriate by two reasons. First, it is not against the empirical evidence regarding the price elasticity of tourism demand (Smeral, 2004) and, second, it allows isolating the effect of income increases on tourism expenditure of country 1 and hence on growth of country 2.

In model 1, we calibrate the parameters $\overline{c}^1$ and $\overline{c}^2$ for them to reflect differences in per capita income of countries in the long run. More concretely, we set $\overline{c}^1 = 1$ and $\overline{c}^2 = 0.432$. This choice makes sense when both $\overline{c}^1$ and $\overline{c}^2$ are positive, since the minimum consumption depends on the relative development level of countries.[12] In the model, country 1 is richer than country 2 and, consequently, what the former economy considers as a level of minimum consumption results to be too high for the latter one. We then seek values for ρ and η to replicate three figures ain Table 3: tourism expenditure over income of HIC (0.043), the ratio of tourism exports to income of STC (26.1), and the ratio of income per capita of STC to income per capita of HIC (43.2). In the model 2 $\overline{c}^1 = \overline{c}^2 = 0$ and thus the expenditure elasticity of tourism expenditure is equal to the unit. We then look for the values of ρ and η for the model to replicate the same three figures in Table 3 as before.

[12] The 1990 World Bank Development Report (pp. 26-27) states that: *A consumption-based poverty line can be though of as comprising two elements: the expenditure necessary to buy a minimum standard of nutrition and other basic necessities and a further amount that varies from country to country, reflecting the cost of participating in the everyday life of society. The first part is relatively straightforward. The cost of minimum adequate caloric intakes and other necessities can be calculated by looking at the prices of foods that makes up the diets of the poor. The second part is far more subjective; in some countries indoor plumbing is a luxury, but in others is a "necessity".*

Our calibration criteria have the advantage of giving rise to the same long run equilibrium in both models. This allows the transitional behaviour of models 1 and 2 to be easily compared. In country 2, the productions of tourism services and consumption good grow at 0.84%, while the terms of trade grow at 1.27%. As we show in Appendix C, capital per capita of country 1 ($7.8177(1+\theta)^t$) is higher than country 2's ($3.3772(1+\theta)^t$) because tourism expenditure of country 1 is quite low, which makes the investment per capita of country 2 relatively smaller than country 1's in spite of the population size differences between countries. In country 1 and 2 the 26.14% and the 26.1% of both capital and labour are allocated to the production of capital goods and tourism services, respectively. Country 1 spends the 0.043% of its income on tourism services and, as a result, the 26.1% of income is devoted to gross investment (saving). Consistently with our analysis in Appendix C, interest rates, and also the saving rates, of countries equalise in the long run if $\sigma = 1$.

The characterisation of the transitional behaviour of the two-country economy requires taking concrete values for n_1^2, φ, L_0^1/L_0^2, k_0^1 and k_0^2. These values appear in Table 5.

Table 5: Population and Initial Endowments of Capital

Population $n_1^2 = 0.0112$, $\varphi = 0.98$, $L_0^1/L_0^2 = 330.43$
Initial endowments of capital per capita $k_0^1 = 2.45$, $k_0^2 = 1$

We set n_1^2 equal to the population growth rate of STC in Table 3. Moreover, we set $\varphi = 0.98$ and hence it takes about two hundred periods for the population growth rates of countries to equalise. This slow convergence is consistent with the observed behaviour of the population growth rate of STC and HIC during the period 1970-2003. These criteria lead to an initial relative size of country 1 of 330.43.

The economy of country 2 does not possess an internal source of sustained growth. Therefore, it is reasonable to assume that when countries started trading the endowment of per capita capital of country 2 was smaller than country 1's. Nonetheless, the lack of statistical information prevents us from exactly computing the differences in capital per capita between HIC and STC. To overcome this difficulty we choose k_0^1 / k_0^2 to be equal to HIC GDP per capita over STC GDP per capita in 1970 (2.45), and then set $k_0^2 = 1$ and $k_0^1 = 2.45$.

6. The Transitional Dynamics of the Two-Country Economy

This section deals with the second stage, which consist of solving the two models and comparing their predictions regarding economic growth of the economies.

6.1. Model 1: Tourism Services as a Luxury Good

Figure 2 displays time paths of significant variables of the model.

INSERT FIGURE 2

The time path of saving rate is driven by the offsetting impacts of an income effect and a substitution effect (Barro and Sala, 1995, pp. 77-79). The first effect relies on homes' willingness to smooth consumption through time. When income is below its long run level homes prefer to devote a high proportion of income to consumption, and thus the saving rate is small at the start of the transition. As income increases, the ratio of consumption to income falls, while the saving rate rises. The substitution effect operates in the opposite direction and depends on interest rate movements. An initial low level of income per capita means that the economy has a small amount of capital per capita. As a result, the interest rate is high and thus current consumption is expensive in relation to the consumption of the next period. Therefore, the saving rate is initially high and decreases as the interest rate falls.

As we commented in Section 3, the introduction of a minimum consumption allows the time behaviour of the saving rate to be consistent with that observed in real economies. The income effect overcomes the substitution effect when income per capita is low.

This occurs because homes are not very willing to switch consumption through time when consumption is near its minimum level. Thus, the saving rate time path is initially upward sloping. As capital accumulates, the substitution effect surpasses the income effect and the saving rate declines. The predictions from our model in panel (a) are then consistent with this observed fact. Nevertheless, it is important to realise that country 2's investment is determined by tourism imports of country 1, instead of by agent decisions in country 2, so the previous explanation only applies for country 1.

The presence of a minimum consumption level in the utility function of country 1 affects the degree of substitutability between the goods. According to our explanation in Section 3, homes are little willing to substitute tourism services for consumption when consumption is close to its minimum level. The degree of substitutability between the goods increases as consumption rises above its minimum level, thereby provoking an increase in expenditure devoted to tourism services, and a decrease in consumption goods during the transition. In this sense, we have defined tourism services as a luxury good. The relationship between tourism expenditure and income is less obvious than that of tourism expenditure and home's expenditure, because income is not just spent, but also saved at each period. In our numerical example there is a positive relationship between tourism expenditure and income of country 1 (panel (b)). The reason for this result can be easily understood by rewriting the equations in (17):

$$\frac{\tilde{c}_t^1}{gdi_t^1} = \eta \frac{e_t^1}{gdi_t^1} + (1-\eta)\frac{\overline{c}_t^1}{gdi_t^1}, \tag{24}$$

$$\frac{\tilde{c}_t^1}{e_t^1} = \eta + (1-\eta)\frac{\overline{c}_t^1}{e_t^1}, \tag{25}$$

$$\frac{p_{x,t}\tilde{x}_t^1}{gdi_t^1} = (1-\eta)\left(\frac{e_t^1}{gdi_t^1} - \frac{\overline{c}_t^1}{gdi_t^1}\right). \tag{26}$$

The saving rate increases at the beginning of the transition, so the ratio of expenditure to income (e_t^1/gdi_t^1) decreases. Along the transition $\overline{c}_t^1$ grows at the rate θ and gdi_t^1 grows at a higher rate than θ (panel (f)). Therefore, from equation (24) it follows that $\tilde{c}_t^1/gdi_t^1$ declines as the saving rate increases. Moreover, the equation (25) indicates that

e_t^1 grows at a higher rate than θ as long as $\tilde{c}_t^1 / e_t^1$ falls along the transition. This result and the equation (26) indicate that $p_{x,t}\tilde{x}_t^1 / gdi_t^1$ rises as the saving rate does. The equation (24) is silent about how $\tilde{c}_t^1 / gdi_t^1$ behaves as the saving rate declines. In our numerical example η is near one, which results in $\tilde{c}_t^1 / gdi_t^1$ increasing as the saving rate declines. Lastly, a look at the equation (26) reveals that $p_{x,t}\tilde{x}_t^1 / gdi_t^1$ rises while the saving rate declines.

The income elasticity of tourism imports, computed as the ratio of tourism imports growth rate to income growth rate, is displayed in panel (c). This elasticity, which is about 3% at the beginning of the transition, declines as income per capita increases and eventually converges to the unit. This range of values is consistent with the estimates for this variable.

The growth performance of country 1 is unaffected by the growth one of country 2. The engines of growth of country 1 during the transition are the accumulation of capital per capita and TFP increases. The accumulation of capital per capita depends positively on the ratio of saving to capital, while the TFP grows at a constant rate. The behaviour of the saving rate in panel (a) implies that capital accumulates slowly, and thus it takes about seventy five periods for the growth rate in panel (f) to reach the BGP. The engines of growth of country 2 during the transition are the accumulation of capital per capita and the terms of trade improvements. The accumulation of capital hinges on tourism expenditure and the relative size of country 1, and the population growth rate of country 2. The terms of trade changes are determined by the scarcity of tourism services in relation to capital goods. It is clear that the growth possibilities of country 2 depend on country 1's economic decisions.

Consequently, the growth of income per capita differ between countries because of differences in the growth of capital per capita, TFP and the terms of trade. The next expression specifies the variables displayed in panels (d) and (e):

$$\frac{gdi_t^2}{gdi_t^1} = \left(\frac{k_t^2}{k_t^1}\right)^{\alpha} \frac{p_{x,t}}{(1+\gamma)^t} \rightarrow \begin{cases} panel\ (d): & \dfrac{\left(k_{t+1}^2/k_{t+1}^1\right)^{\alpha} - \left(k_t^2/k_t^1\right)^{\alpha}}{\left(k_t^2/k_t^1\right)^{\alpha}}, \\ panel\ (e): & \dfrac{p_{x,t+1}/(1+\gamma) - p_{x,t}}{p_{x,t}}. \end{cases} \tag{27}$$

The growth rates of capital per capita are useful for understanding the time path in panel (d):

Country 1 *Country 2*

$$\frac{k_{t+1}^1 - k_t^1}{k_t^1} = \frac{\dfrac{z_t^1 - p_{x,t}\tilde{x}_t^1}{k_t^1} - \left(\delta + n^1\right)}{1+n^1}, \qquad \frac{k_{t+1}^2 - k_t^2}{k_t^2} = \frac{\dfrac{p_{x,t}\tilde{x}_t^1\, L_t^1/L_t^2}{k_t^2} - \left(\delta + n_{t+1}^2\right)}{1+n_{t+1}^2}. \tag{28}$$

Initially, capital per capita grows faster in country 1 than in country 2, but the result reverses after the period twelfth. Note that tourism expenditure and thus investment of country 2 start low, in spite of the fact that L_t^1/L_t^2 takes the highest value at the beginning of the transition. Moreover, n_1^2 doubles n^1. As time passes, tourism expenditure grows much faster than income of country 1 and, in addition, n_{t+1}^2 approaches n^1. As a result, the investment of country 2 rapidly increases regardless the fall in L_t^1/L_t^2, and the capital per capita of country 2 eventually grows faster than country 1's.

The next equation is helpful for understanding the time path displayed in panel (e):

$$p_{x,t} = \frac{p_{x,t}\tilde{x}_t^1\, L_t^1/L_t^2}{x_t^2} = \frac{\dfrac{1-\eta}{\eta}\left((1+\gamma)^t\left(1-l_t^1\right)\left(k_t^1\right)^{\alpha} - \bar{c}^1(1+\gamma)^{\frac{t}{1-\alpha}}\right)L_t^1/L_t^2}{l_t^2\left(k_t^2\right)^{\alpha}}. \tag{29}$$

The relative price of tourism services increases along the transition because of countries differences in productivity. The production of tourism services is unable to increase as does tourism expenditure, which results in a rise of the price of tourism services. This is the reason why country 2's terms of trade grow faster than TFP of country 1 during the transition. Moreover, the fact that in the model tourism increases much faster than income leads to a much higher increase in $p_{x,t}$. The tourism expenditure eventually grows as income of country 1, and thus the differential between the growth rates of $p_{x,t}$ and TFP declines over time and becomes nil in the long run.

The time paths in panel (f) show that the growth rate of income per capita of country 2 is well above that of country 1 along the transitional period. During the first period of the transition the higher growth of country 2 is due to the improvements in the terms of trade, which more than compensate the negative differential displayed in panel (e).

6.2. Model 2: Unitary Expenditure-Elasticity of Tourism Imports

Figure 3 displays the same time paths as Figure 2.

INSERT FIGURE 3

The absence of minimum consumption makes the model unable to deliver hump-shaped saving rates. The substitution effect overcomes the income effect because the preference for smoothing consumption is lower in this model than in model 1. Accordingly, the panel (a) shows that saving rates start high and decrease down to the BGP. However, at the beginning of the transition the saving rate of country 2 barely increases and is lower than country 1's. This behaviour is due to the fact that investment of country 2 is entirely determined by tourism imports of country 1, instead of by agent decisions in the former economy.

The elimination of the minimum consumption in equations (24) through (26) reveals that consumption and tourism expenditure over home's expenditure evolve through time at the same pace. Proceeding as in the previous subsection, it is easy to check that the ratios of consumption and tourism imports to income of country 1 rise at the same rate along the transition. The ratio of tourism imports to income in panel (b) starts being higher than in model 1 simply because the elasticity of substitution of goods in the utility function of country 1 is constant and unitary. Consequently, panel (c) shows that the income elasticity of tourism imports is much lower than that delivered by model 1. More specifically, it ranges from 1.3 to 1.

The description of the engines of growth of countries during the transition in the previous sub-section also applies here. Nevertheless, the behaviour of country 1's saving rate in panel (a) implies that capital accumulates faster than in model 1, which shortens the transition period towards the BGP.

The growth rate differential of capital per capita in panel (d) is positive for a shorter number of periods than in model 1. The relative price of tourism grows faster than TFP of country 2, but the differential in panel (e) is lower than in model 2. The smaller increase in tourism expenditure along the transition is the reason for these two results.

The results in panel (d) and (e) justify the behaviour of income per capita growth rates in panel (f). Though the growth rate of country 2's income per capita is above the one of country 2, the differential between both rates is considerably smaller than in model 1.

7. Conclusion

The empirical evidence provided by Brau, Lanza and Pigliaru (2007) has far confirmed the widely spread view that tourism specialisation is responsible for the remarkable growth performance of small tourism countries. That fact poses the questions on whether growth of those economies will eventually exhaust in the long run, and how does tourism specialisation operate in boosting growth. In this paper we have offered theoretical answers to these questions, which are based on two factors: terms of trade improvements and the fact that tourism is a luxury good. To do that, we have developed two dynamic general equilibrium models that represent the trade relations between a large rich country and a small poor tourism economy. The small economy exports tourism services to and imports capital goods from the rich country. The models only differ in preferences. More concretely, tourism is a luxury good in one of the models, while the expenditure elasticity of tourism imports is unitary in the other framework.

We have obtained results that show that the small tourism economy can import sustained growth by trading whenever its terms of trade continuously improve through time. Regarding the second question, we have found that tourism specialisation does have an important impact on growth when tourism is considered a luxury good. The reason lies in the fact that tourism imports of the rich economy increases much faster than its income. This pushes up the terms of trade of the poor economy. Moreover, since investment of the tourism country is determined by its tourism exports, this also leads to a higher capital accumulation in this economy.

Of course, our analysis leaves aside important factors that can threaten future growth of small tourism countries. In this respect, the role of population gains through immigration, the development of new destinations, the environmental impacts of tourism growth, tourism life cycles, or the use of tourism income to foster imports of consumption goods are some of the factors that can affect the results.

Appendix A: Agents' Decisions

Firms in each country and sector choose capital and labour at t as to maximise the functions in (3). The first order conditions of the firms problem appear in (12).

- *Household's problem in country 1*

The representative household chooses $\tilde{c}_t^1$, $\tilde{x}_t^1$ and k_{t+1}^1 as to maximise (4), subject to (1), (7) and given the initial endowment in (8). The first-order conditions of the problem, for the case of interior solution, are the budget constraint in (7) and:

$$(1+\rho)^{-t} L_t^1 \, \eta \left(\tilde{c}_t^1 - \overline{c}_t^1\right)^{-1+\eta(1-\sigma)} \left(\tilde{x}_t^1\right)^{(1-\eta)(1-\sigma)} - \mu_t^1 p_{c,t}^1 = 0, \tag{30}$$

$$(1+\rho)^{-t} L_t^1 \, (1-\eta)\left(\tilde{c}_t^1 - \overline{c}_t^1\right)^{\eta(1-\sigma)} \left(\tilde{x}_t^1\right)^{-1+(1-\eta)(1-\sigma)} - \mu_t^1 p_{x,t} = 0, \tag{31}$$

$$-\mu_t^1\left(1+n^1\right) + \mu_{t+1}^1\left(1+r_{t+1}^1\right) = 0, \tag{32}$$

where μ_t^1 is the discounted Lagrange multiplier. Moreover, the transversality condition $\lim_{t\to\infty} \mu_t^1 k_t^1 = 0$ must be satisfied.

- *Household's problem in country 2*

The representative household chooses $\tilde{c}_t^2$ and k_{t+1}^2 to maximise (4), subject to (1), (7) and given the initial endowment (8). The first order conditions of the problem are the budget constraint in (7) and:

$$\left(1+\rho\right)^{-t} L_t^2 \left(\tilde{c}_t^2 - \overline{c}_t^2\right)^{-\sigma} - \mu_t^2 p_{c,t}^2 = 0, \tag{33}$$

$$-\mu_t^2\left(1+n_{t+1}^2\right) + \mu_{t+1}^2\left(1+r_{t+1}^2\right) = 0, \tag{34}$$

where μ_t^2 is the discounted Lagrange multiplier. The transversality condition $\lim_{t\to\infty} \mu_t^2 k_t^2 = 0$ must be satisfied.

Appendix B: Construction of the Dynamic System

We start defining the following detrended variables that hold constant in the long run:

$$\begin{aligned} &\hat{k}_t^1 \equiv \frac{k_t^1}{\left(1+\theta\right)^t}, \quad \hat{c}_t^1 \equiv \frac{c_t^1}{\left(1+\theta\right)^t}, \quad \hat{z}_t^1 \equiv \frac{z_t^1}{\left(1+\theta\right)^t}, \\ &\hat{k}_t^2 \equiv \frac{k_t^2}{\left(1+\theta\right)^t}, \quad \hat{c}_t^2 \equiv \frac{c_t^2}{\left(1+\theta\right)^{\alpha t}}, \quad \hat{x}_t^2 \equiv \frac{x_t^2}{\left(1+\theta\right)^{\alpha t}}, \quad \hat{p}_{x,t} \equiv \frac{p_{x,t}}{\left(1+\theta\right)^{(1-\alpha)t}}. \end{aligned} \tag{35}$$

The equilibrium conditions in (9) and the results in (11), (12), (13), (14) and (17) lead to:

$$\begin{aligned} &\hat{c}_t^1 = \left(1-l_t^1\right)\left(\hat{k}_t^1\right)^{\alpha}, \quad \hat{z}_t^1 = l_t^1\left(\hat{k}_t^1\right)^{\alpha}, \quad r_t^1 = \alpha\left(\hat{k}_t^1\right)^{\alpha-1} - \delta, \\ &g\hat{d}i_t^1 = \left(\hat{k}_t^1\right)^{\alpha}, \quad \hat{e}_t^1 = \hat{c}_t^1 + \hat{p}_{x,t}\hat{\tilde{x}}_t^1, \\ &\hat{c}_t^2 = \left(1-l_t^2\right)\left(\hat{k}_t^2\right)^{\alpha}, \quad \hat{x}_t^2 = l_t^2\left(\hat{k}_t^2\right)^{\alpha}, \quad \underbrace{\hat{p}_{x,t}\hat{\tilde{x}}_t^1 = \hat{p}_{x,t}\hat{x}_t^2 \frac{L_t^1}{L_t^2}}_{\text{trade balance}} = \frac{1-\eta}{\eta}\left(\hat{c}_t^1 - \overline{c}^1\right)\frac{L_t^1}{L_t^2}, \\ &\hat{p}_{x,t} = \frac{1-\eta}{\eta}\frac{\hat{c}_t^1 - \overline{c}^1}{\hat{x}_t^2}\frac{L_t^1}{L_t^2}, \quad r_t^2 = \alpha\frac{\hat{p}_{x,t}\hat{x}_t^2}{l_t^2\hat{k}_t^2} - \delta, \quad g\hat{d}i_t^2 = \hat{p}_{x,t}\left(\hat{k}_t^2\right)^{\alpha}. \end{aligned} \tag{36}$$

Note that all equations in (36) depend on detrended capitals per capita, $\hat{k}_t^1$ and $\hat{k}_t^2$, and the variables determining factor allocation, l_t^1 and l_t^2. Thus, we use those equations to write capital accumulation of countries in (16) as:

$$\left(1+n^1\right)\left(1+\theta\right)\hat{k}_{t+1}^1 = \hat{z}_t^1 - \frac{1-\eta}{\eta}\left(\hat{c}_t^1 - \overline{c}^1\right) + \left(1-\delta\right)\hat{k}_t^1, \tag{37}$$

$$\left(1+n_{t+1}^2\right)\left(1+\theta\right)\hat{k}_{t+1}^2 = \frac{1-\eta}{\eta}\left(\hat{c}_t^1 - \overline{c}^1\right)\frac{L_t^1}{L_t^2} + \left(1-\delta\right)\hat{k}_t^2. \tag{38}$$

Moreover, the Euler equations in (19) can be rewritten as:

$$\left(\frac{\hat{c}_{t+1}^1 - \overline{c}^1}{\hat{c}_t^1 - \overline{c}^1}\left(1+\theta\right)\right)^{\sigma} = \left(\frac{\hat{p}_{x,t+1}}{\hat{p}_{x,t}}\left(1+\theta\right)^{1-\alpha}\right)^{(\sigma-1)(1-\eta)}\frac{1+r_{t+1}^1}{1+\rho}, \tag{39}$$

$$\left(\frac{\hat{c}_{t+1}^2 - \overline{c}^2}{\hat{c}_t^2 - \overline{c}^2}\left(1+\theta\right)^{\alpha}\right)^{\sigma} = \left(\frac{\hat{p}_{x,t+1}}{\hat{p}_{x,t}}\left(1+\theta\right)^{1-\alpha}\right)^{-1}\frac{1+r_{t+1}^2}{1+\rho}. \tag{40}$$

Note that it is not necessary to consider both Euler equations of country 1, since the link between consumption and tourism expenditure in (17) has been already taken into account.

Considering (35) and (36), the system of four difference equations (37) through (40), the time evolution of countries population in (1), the initial conditions $\hat{k}_0^1 > 0$ and $\hat{k}_0^2 > 0$, and the two transversality conditions defined in Appendix A fully characterise the dynamic behaviour of the two-country economy.

Appendix C: Balance Growth Path

As time passes the growth rates of l_t^1, l_t^2 tend to zero, n_{t+1}^2 approaches to n^1 and thus L_t^1/L_t^2 tends to a constant value. The results regarding the growth rates of variables in sub-section 4.2 can be easily obtained from expressions (35) through (40). We first characterise the long run behaviour of country 1. The evaluation of (39) in the BGP yields:

$$r^1 = (1+\theta)^{\sigma-(1-\alpha)(1-\eta)(\sigma-1)}(1+\rho)-1, \quad \hat{k}^1 = \left(\frac{\alpha}{r^1+\delta}\right)^{\frac{1}{1-\alpha}}. \tag{41}$$

Evaluating (37) in the BGP and introducing (41) we obtain:

$$l^1 = \eta\alpha\frac{\delta+n^1+\theta+n^1\theta}{r^1+\delta}+1-\eta-(1-\eta)\frac{\bar{c}^1}{g\hat{d}i^1}. \tag{42}$$

The equations in (36) evaluated in the BGP allow production and expenditure over income to be obtained:

$$\begin{aligned} &\frac{z_t^1}{gdi_t^1} = l^1, \quad \frac{c_t^1}{gdi_t^1} = 1-l^1, \quad \frac{p_{x,t}\tilde{x}_t^1}{gdi_t^1} = \frac{1-\eta}{\eta}\left(1-l^1-\frac{\bar{c}^1}{g\hat{d}i^1}\right), \\ &s_t^1 \equiv \underbrace{\frac{\tilde{z}_t^1}{gdi_t^1}}_{saving\ rate} = 1-\frac{1}{\eta}\left(1-l^1\right)+\frac{1-\eta}{\eta}\frac{\bar{c}^1}{g\hat{d}i^1} = \alpha\frac{\delta+n^1+\theta+n^1\theta}{r^1+\delta}. \end{aligned} \tag{43}$$

From the results in (17) and (43) it follows that:

$$\frac{\tilde{c}_t^1}{e_t^1} = \eta+(1-\eta)\frac{\bar{c}^1}{\hat{e}_t^1}, \quad \frac{p_{x,t}\tilde{x}_t^1}{e_t^1} = 1-\eta-(1-\eta)\frac{\bar{c}^1}{\hat{e}_t^1}. \tag{44}$$

Regarding the behaviour of country 2, evaluating (40) and (38) in the BGP we get:

$$r^2 = (1+\theta)^{\sigma-(1-\alpha)(\sigma-1)}(1+\rho)-1, \quad \hat{k}^2 = \frac{1-\eta}{\eta}\frac{L_t^1}{L_t^1}\frac{\hat{c}_t^1-\bar{c}^1}{\delta+n^1+\theta+n^1\theta}. \tag{45}$$

Since the values to which interest rate converge have been already established, we can ensure that the transversality conditions fulfil if:

$$r^i > \delta+n^1+\theta+n^1\theta, \quad i=1,2. \tag{46}$$

The expression for interest rate of country 2 in (36) and the results in (45) allow the value of l^2 to be obtained:

$$l^2 = \alpha\frac{\delta+n^1+\theta+n^1\theta}{r^2+\delta}. \tag{47}$$

From (36) and (47) it follows that:

$$s_t^2 \equiv \underbrace{\frac{p_{x,t} x_t^2}{gdi_t^2}}_{saving\ rate} = l^2, \quad \frac{p_{x,t} c_t^2}{gdi_t^2} = 1 - l^2. \tag{48}$$

The expressions for interest rate of countries in (41) and (45), and the saving rates in (43) and (47) allow the following results to be established:

$$\begin{aligned} r^1 < r^2 \quad and \quad s^1 > s^2 \quad if \quad \sigma < 1, \\ r^1 = r^2 \quad and \quad s^1 = s^2 \quad if \quad \sigma = 1, \\ r^1 > r^2 \quad and \quad s^1 < s^2 \quad if \quad \sigma > 1. \end{aligned} \tag{49}$$

Thus, interest rates, and also the saving rates, of countries equalise in the long run if $\sigma = 1$.

From the second equation in (45) and the results in (43) we obtain:

$$\frac{\hat{k}^2}{\hat{k}^1} = \frac{1-\eta}{\eta} \frac{L_t^1}{L_t^2} \left(\frac{l^1}{s^1} - 1 \right). \tag{50}$$

The previous result indicates that the long run value of k_t^1 / k_t^1 depends on the relative size of country 1, and the ratio of capital production to gross investment of country 1, that is, $z_t^1 / \tilde{z}_t^1 = l^1 / s^1$, which is higher than one. Country 1 devotes a little amount of expenditure to tourism services, and thus exports of capital good are small, which implies that l^1 / s^1 is near the unit. Therefore, a small value for η leads to $\hat{k}^2$ being smaller than $\hat{k}^1$, in spite of the high relative size of country 1. Lastly, the variable gdi_t^2 / gdi_t^2 is obtained from the ratio of tourism expenditure to income of country 1 in (43), the saving rate of country 2 in (48) and the equilibrium in the trade balance in (36):

$$\frac{gdi_t^2}{gdi_t^1} = \frac{L_t^1}{L_t^2} \frac{\frac{1-\eta}{\eta} \left(1 - l^1 - \frac{\bar{c}^1}{g\hat{d}i^1} \right)}{l^2}. \tag{51}$$

Similarly as before, a small proportion of country 1's income spent on tourism services can lead to gdi_t^2 being lower than gdi_t^1 in spite of the high value of the relative size of country 1.

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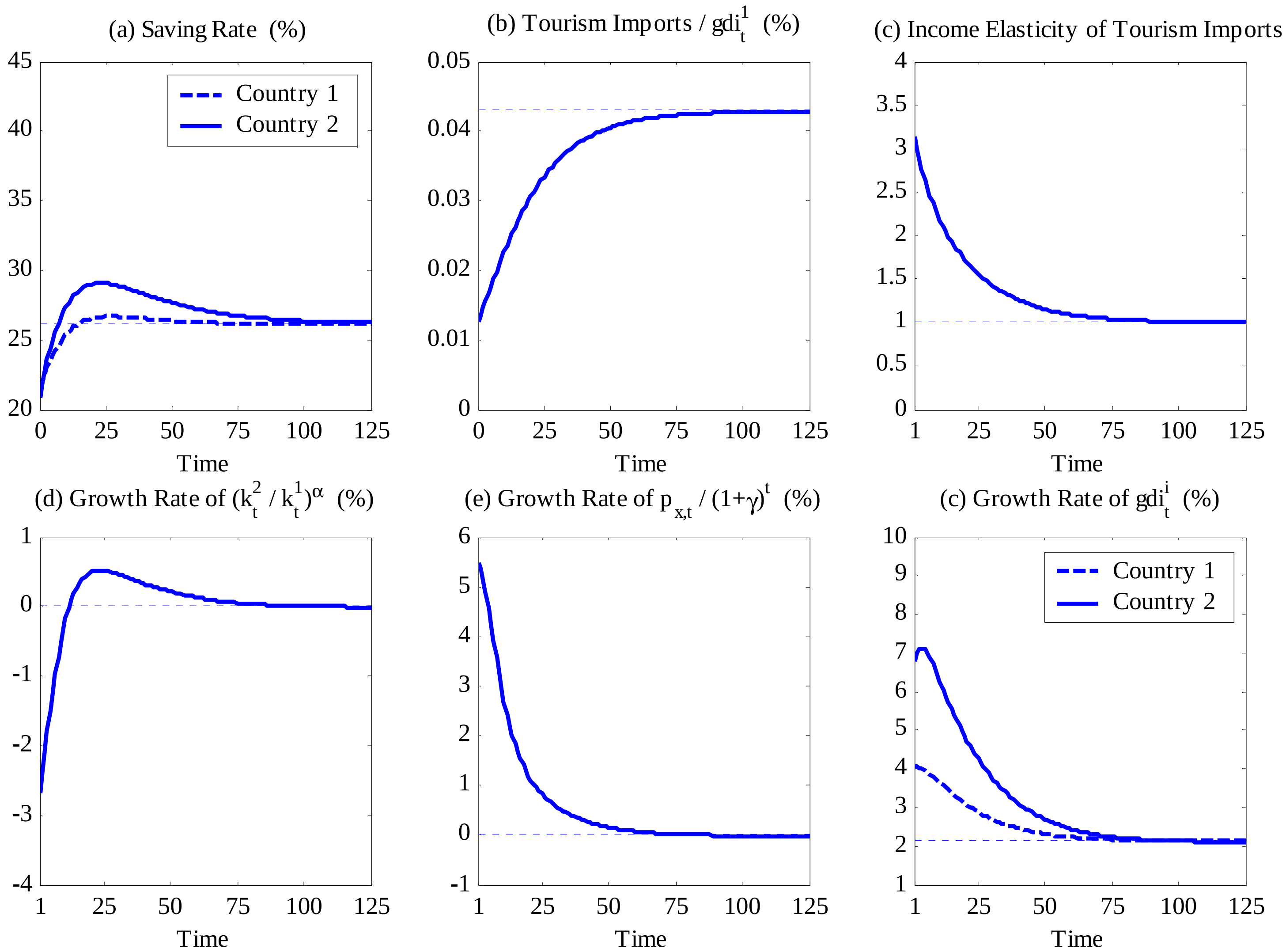

Figure 2: Model 1 ($\bar{c}^1 = 1, \quad \bar{c}^2 = 0.432$)

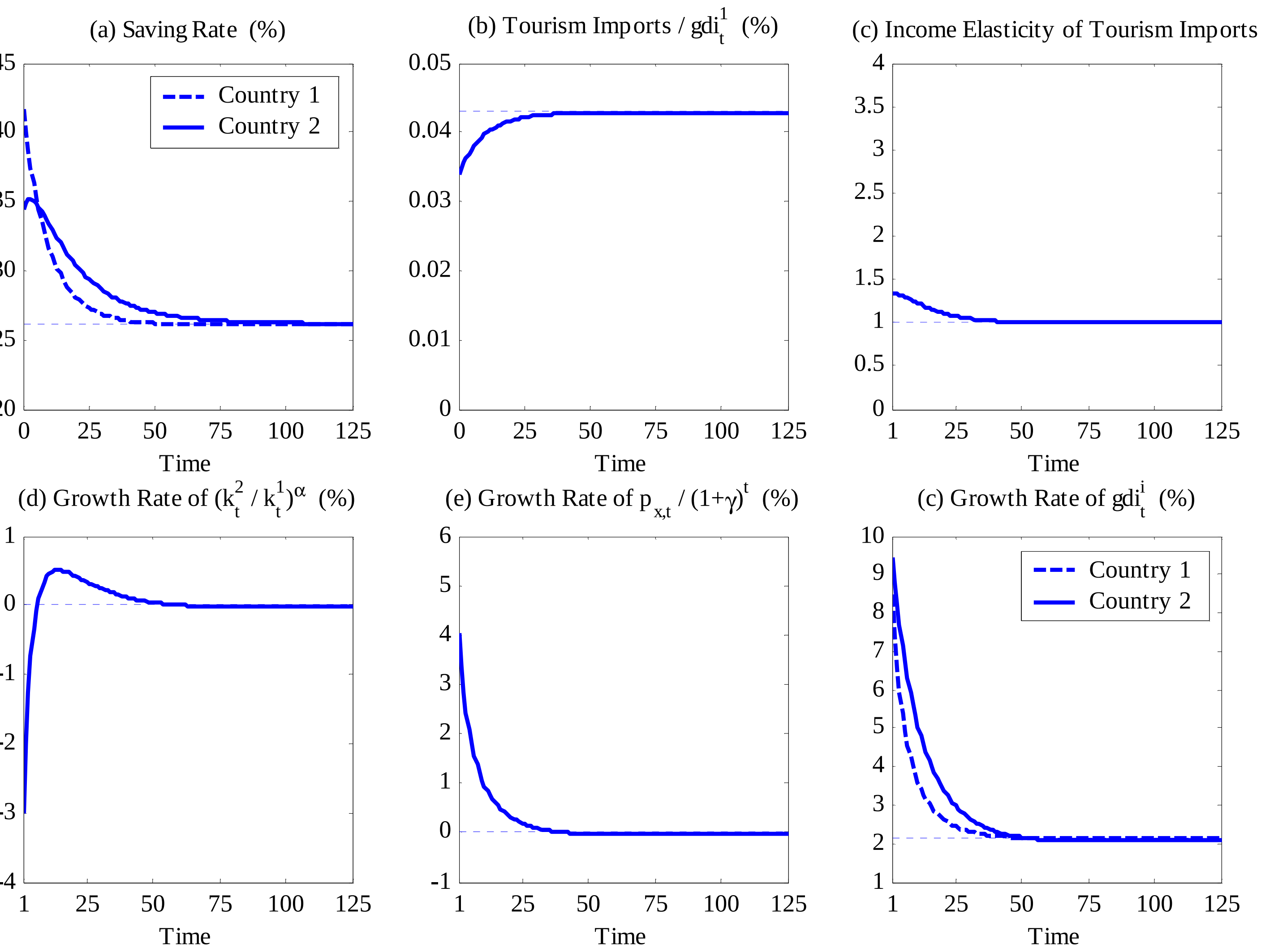

Figure 3: Model 2 ($\bar{c}^1 = \bar{c}^2 = 0$)

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