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Economics of tourism & growth for small island countries

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HIGHLIGHTS

- A model of tourism and economic growth model is developed.
- Impact of income change in source countries on destination is examined.
- Price elasticity of demand, income elasticity of tourist, and degree of competition in service sector are analysed.
- Modelling presented provides a good framework for applied economic research.

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ABSTRACT

We theoretically analyze the impact of changes in foreign income from tourism source countries on the growth of tourism dependent small island economies. Using a general theoretical construct, we attempt to answer the question of how price elasticity of demand, income elasticity of tourist and the degree of competition in the service sector influence the economic development of small economies. One of the main results is that politicians may consider applying policies which lead to a competitive environment in the service sector to maximize growth and the consequent labor income share.

1. Introduction

Noting the huge impact of tourism at a global level, we develop an economic growth model for small island countries whose economy depends largely on international tourism. Taking into account the contribution of tourism on GDP from the World Travel & Tourism Council (http://www.wttc.org/datagateway/) in 2013, countries which show high dependency of tourism include Seychelles (58%), Anguilla (59%), Antigua and Barbuda (60%), Aruba (85%), Barbados (36%), Cook Islands (49%) former Dutch Antilles (48%), St. Lucia (37%), British Virgin Islands (85%), Fiji (38%), Macau (95%), Maldives (78%), and Vanuatu (51%).

The existing literature (Brida, London, & Rojas, 2013; Chao, Hazari, Laffargue, Sgrò, & Yu, 2006, 2008, Chao, Hazari, and Yu, 2010; Schubert & Brida, 2008) pays little attention to small islands' specific factors such as the limited amount of land or a non-perfectly competitive market structure of the tourism industry, which our model attempts to overcome.

The intuition is that a composite tourism good is produced by hotels which operate in a monopolistic competition and make use of land and different services. Except the model of Hazari and Sgrò (1995), which assume a monopoly, all other papers assume perfect competition.

2. The model

Similar to Schubert, Brida, and Risso (2011), the demand function $X^{T,D}$ for the composite tourism good X^T, consisting of all goods and services consumed by tourists, is given by:

$$X^{T,D} = \left(p^T\right)^{-\eta}\left(Y^F\right)^{\phi}, \tag{1}$$

where Y^F represents the tourists' aggregate real income, p^T the

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tourism good's price, and we assume a fixed exchange rate. The exponents η and ϕ represent the absolute value of the price elasticity and the income elasticity, respectively. From the literature (see Song, Dwyer, Li, & Cao, 2012; Brida & Pulina, 2010) we can derive, that mostly $\phi > 1 > -\eta > 0$ hold. Omitting the consumption side of the island economy, we make the simplifying assumptions that: all land is residentially owned and that the number of workers N is given; each worker lives for one period, gets one off-spring, and supplies her labor inelastically. The tour operators sell the tourism good in a perfectly competitive market where the composite tourism good is produced by fixed amount land L^T and tourist services provided by m hotels. Typically, hotel services are not homogenous. Hence, the market structure of the hotel sector can be described as monopolistically competitive. Using the Dixit-Stiglitz approach (Dixit & Stiglitz, 1977; Ethier, 1982; Romer, 1989, 1990), we define s_i as the quantity of hotel services offered by hotel i and consider the aggregate production of the tourism good $X^{T,S}$ as:

$$X^{T,S} = A\left(L^T\right)^{\beta} \sum_{i=1}^{m} s_i^{1-\beta}, \tag{2}$$

where $A > 0$, and $1 > \beta > 0$. Tour operators operate under perfect competition and thus the factor prices p_i of the service goods and p_{L^T} the rental price for a piece of land is treated as given. A representative tour operator maximizes profits:

$$\max_{L^T, s_1, \ldots, s_m} p^T A\left(L^T\right)^{\beta} \sum_{i=1}^{m} s_i^{1-\beta} - p_{L^T} L^T - \sum_{i=1}^{m} p_i s_i \tag{3}$$

The resulting $m + 1$ first order conditions are:

$$\beta p^T A\left(L^T\right)^{\beta-1} \sum_{i=1}^{m} s_i^{1-\beta} - p_{L^T} = 0 \tag{4}$$

$$(1-\beta) p^T A\left(L^T\right)^{\beta} s_i^{-\beta} - p_i = 0, \quad \forall i = 1, , m \tag{5}$$

From (5) we derive the price functions for all m services:

$$p_i(s_i) = (1-\beta) p^T A\left(L^T\right)^{\beta} s_i^{-\beta}, \ \forall i = 1, , m \tag{6}$$

The hotels are confronted with labor costs, fixed costs M and an internationally given interest factor R. The fixed cost reflects all costs to set up the hotel i and its quantity of services depends on the labor input n_i. Assuming $s_i = n_i$, the unit labor requirement is one and the competitive wage rate equals w. The more similar the hotel services the lower is the elasticity of substitution regarding the different hotels.

Each hotel solves the maximization problem:

$$\max_{s_i} p_i(s_i) s_i - w n_i - RM \tag{7}$$

Assuming that all hotels are symmetric and a perfectly competitive labor market, we derive $n_i = \frac{N}{m}$. Solving the FOC for the wage rate, we get:

$$w = (1-\beta)^2 p^T A m^{\beta} N^{-\beta} \left(L^T\right)^{\beta} \tag{8}$$

Using equations (2)–(6) and (8) we get the short-run and the long-run equilibrium values. In the short-run m is constant and we get:

$$p^T = \left(Y^F\right)^{\frac{\phi}{\eta}} \left(A\left(L^T\right)^{\beta} N^{1-\beta} m^{\beta}\right)^{-\frac{1}{\eta}}. \tag{9}$$

$$w = (1-\beta)^2 \left(Y^F\right)^{\frac{\phi}{\eta}} (A)^{\frac{\eta-1}{\eta}} N^{-\frac{(1-\beta(1-\eta))}{\eta}} \left(L^T m\right)^{\frac{\beta(\eta-1)}{\eta}}. \tag{10}$$

$$\Pi_s = (1-\beta)\beta \left(Y^F\right)^{\frac{\phi}{\eta}} N^{-\frac{(\eta-1)(1-\beta)}{\eta}} m^{\frac{\beta(\eta-1)-\eta}{\eta}} (A)^{\frac{\eta-1}{\eta}} \left(L^T\right)^{\frac{\beta(\eta-1)}{\eta}}. \tag{11}$$

The international capital market requires that the gross margin of the representative hotel divided by its fixed costs is equal to the international capital market interest factor:

$$\frac{(1-\beta)\beta \left(Y^F\right)^{\frac{\phi}{\eta}} N^{\frac{(\eta-1)(1-\beta)}{\eta}} m^{\frac{\beta(\eta-1)-\eta}{\eta}} (A)^{\frac{\eta-1}{\eta}} \left(L^T\right)^{\frac{\beta(\eta-1)}{\eta}}}{M} = R. \tag{12}$$

Equation (12) delivers the optimal m^*:

$$m^* = \left[\left(\frac{(1-\beta)\beta}{RM}\right)^{\eta} N^{(\eta-1)(1-\beta)} (A)^{\eta-1} \left(L^T\right)^{\beta(\eta-1)} \left(Y^F\right)^{\phi}\right]^{\frac{1}{\beta(1-\eta)+\eta}}. \tag{13}$$

where the exponent $\frac{1}{\beta(1-\eta)+\eta} > 0$. Using (13) and (9)–(12) we get the following long-run equilibrium values:

$$w^* = \left[\frac{(1-\beta)^{(2\eta+\beta(1-\eta))} (A)^{n-1} \left(\frac{\beta L^T}{RM}\right)^{\beta(\eta-1)} \left(Y^F\right)^{\phi}}{N}\right]^{\frac{1}{\beta(1-\eta)+\eta}}. \tag{14}$$

$$p^* = \left[\frac{(1-\beta)^{\eta} (A)^{n-1} \left(\frac{\beta L^T}{RM}\right)^{\beta(\eta-1)} \left(Y^F\right)^{\phi}}{N}\right]^{\frac{1}{\beta(1-\eta)+\eta}} \tag{15}$$

$$s^* = n^* = \left[\frac{N(A)^{1-n} \left(L^T\right)^{\beta(1-\eta)} \left(\frac{RM}{\beta(1-\beta)}\right)^{\eta}}{(1-\beta)^{\eta} \left(Y^F\right)^{\phi}}\right]^{\frac{1}{\beta(1-\eta)+\eta}}. \tag{16}$$

$$p^{T*} = \left[\frac{(RM)^{\beta} \left(Y^F\right)^{\phi(1-\beta)}}{N^{1-\beta} A\left((1-\beta)\beta L^T\right)^{\beta}}\right]^{\frac{1}{\beta(1-\eta)+\eta}} \tag{17}$$

$$p^*_{L^T} = \left[\beta^{\eta} L^{T^{(2\beta(\eta-1)-\eta)}} (A)^{n-1} \left(\frac{(1-\beta)}{RM}\right)^{\beta(\eta-1)} N^{(1-\beta)(\eta-1)} \left(Y^F\right)^{\phi}\right]^{\frac{1}{\beta(1-\eta)+\eta}} \tag{18}$$

$$X^{T*} = \left[(A)^{n} \left(\frac{(1-\beta)\beta L^T}{RM}\right)^{\beta\eta} N^{(1-\beta)\eta} \left(Y^F\right)^{\phi\beta}\right]^{\frac{1}{\beta(1-\eta)+\eta}}. \tag{19}$$

Multiplying the RHS of (18) with the RHS of (19), the GDP in foreign currency becomes:

$$\begin{aligned} Y^* &= p^{T*} X^{T*} \\ &= \left[(A)^{n-1} \left(\frac{(1-\beta)\beta L^T}{RM}\right)^{\beta(\eta-1)} N^{(1-\beta)(\eta-1)} \left(Y^F\right)^{\phi}\right]^{\frac{1}{\beta(1-\eta)+\eta}} \end{aligned} \tag{20}$$

The GDP is split into three constant shares of incomes: the labor income share $(1-\beta)^2$, the land rent share β, and the capital income

share $\beta(1-\beta)$. The coefficient β determines also the price mark-up over the marginal costs, which equals to $1/(1-\beta)$ in the hotel industry.

The intuition is that a higher β means is more difficult for tour operators to substitute one hotel service by another, or alternatively the more β is close to one the more market power has the supplier of a hotel service. Thus, β reflects how easy or difficult it is to substitute different hotel services. A small β and thus strong competition leads to relative high wages, and low land rents, while the effect on the capital income is ambiguous.

Obviously, the GDP is driven by demand of tourism and as long as the economy has free access to the world capital market all necessary investments Mm^*_{t+1} can be realized. To derive the growth rate of the nominal GDP, we assume that the foreign real incomes grow at a rate of g_f. It is sufficient to consider the nominal GDP measured in foreign currency units because the island citizens are assumed to consume only imported goods and the corresponding inflation rate of import goods is exogenous. The resulting growth factor of the nominal GDP is:

$$1+g=\left(1+g_f\right)^{\frac{\phi}{\beta(1-\eta)+\eta}} \tag{21}$$

The growth factors of the price and the quantity of the tourism good differ from the aggregate growth factor:

$$1+\widehat{p^{T*}}=\left(1+g_f\right)^{\frac{(1-\beta)\phi}{\beta(1-\eta)+\eta}} \tag{22}$$

$$1+\widehat{X^{T*}}=\left(1+g_f\right)^{\frac{\beta\phi}{\beta(1-\eta)+\eta}} \tag{23}$$

Proposition 1: *The growth rate of the small islands country exceeds the growth rate of the source country of the tourists, if $\phi>\beta(1-\eta)+\eta$. If the price and income elasticity is one, the growth rate of both countries is equal.*

Proposition 2: *The growth rate of the small islands country increases, if the elasticity of income rises, the price elasticity declines and the competition in the service is relatively strong.*

Based on the propositions, we note that while the islands country can hardly influence the income and price elasticity, it has the opportunity to influence the degree of competition in the service sector by market regulation. Thus policy-makers should enhance competition and guarantee market transparency.

Thus, if the competition in the service sector is relatively strong, the prices will grow faster than the corresponding quantities.

3. Growth effects of a foreign income change

A one-time demand effect causes in the short run only price adjustments while in the medium run, we expect the capital endowments to adjust. However, these adjustments do not influence the long-run developments, but the demand and income level.

We analyze the effects on the endogenous variables caused by a one percent increase of foreign income Y^F. If the number of hotels m is fixed, according to (9) the respective price elasticity of the tourist good regarding the foreign income is:

$$\frac{\partial p^T}{\partial Y^F}\frac{Y^F}{p^T}\bigg|_{dm=0}=\frac{\phi}{\eta}>0. \tag{24}$$

The price of the tourism good and hence the domestic GDP rise as a consequence. The higher the income elasticity and the lower the price elasticity, the stronger is the price increase. The other prices increase accordingly, and as a result the hotels earn in the short run a profit rate which exceeds the world-market interest rate.

In the medium run, the number of hotels will be adjusted:

$$\frac{\partial m^*}{\partial Y^F}\frac{Y^F}{m^*}=\frac{\phi}{\beta(1-\eta)+\eta}>0. \tag{25}$$

The elasticity regarding the number of hotels (25) decreases if the degree of competition declines and β converges to one. Using (25), we derive the medium-run effects:

$$\frac{\partial p^{T*}}{\partial Y^F}\frac{Y^F}{p^{T*}}=\frac{\phi(1-\beta)}{\beta(1-\eta)+\eta}>0, \tag{26}$$

$$\frac{\partial X^{T*}}{\partial Y^F}\frac{Y^F}{X^{T*}}=\frac{\phi\beta}{\beta(1-\eta)+\eta}>0. \tag{27}$$

$$\frac{\partial Y^*}{\partial Y^F}\frac{Y^F}{Y^*}=\frac{\phi(1-\beta)}{(\beta(1-\eta)+\eta)\eta}>0. \tag{28}$$

$$\frac{\partial s^*}{\partial Y^F}\frac{Y^F}{s^*}=-\frac{\partial p^*}{\partial Y^F}\frac{Y^F}{p^*}=-\frac{\phi}{\beta(1-\eta)+\eta}<0. \tag{29}$$

If the foreign income increases by one percent in the medium-run the number of hotels, the GDP, the price of the tourism good, the quantity of the tourism good, and the price of hotel services increase, while the quantity of services and number of employees per hotel decline. The extent of the effects depends on the magnitude of the income elasticity, the price elasticity and degree of competition. As long as part of the hotels is foreign-owned, it is desirable for the island country to have a competitive market structure in the service sector.

In the short-run, the price increase is relatively strong and will be weakened later by increasing number of hotels. The long-run effects are characterized by an increase of the growth rate of the foreign incomes. The respective elasticities of the growth factors is:

$$\frac{\partial G}{\partial G_f}\frac{G_f}{G}=\frac{\phi}{\beta(1-\eta)+\eta}>0. \tag{30}$$

$$\frac{\partial \widehat{p^*_T}}{\partial G_f}\frac{G_f}{\widehat{p^*_T}}=\frac{(1-\beta)\phi}{\beta(1-\eta)+\eta}>0. \tag{31}$$

$$\frac{\partial \widehat{X^{T*}}}{\partial G_f}\frac{G_f}{\widehat{X^{T*}}}=\frac{\beta\phi}{\beta(1-\eta)+\eta}>0. \tag{32}$$

Once again, for islands economy it is desirable that the competition between hotels is strong.

4. Conclusions

The model presented answers the question of how the price elasticity of demand, the income elasticity of tourists and the competition in the hotel services sector influence the economic development of small island economies. One of the key results is that policies which lead to strong competition in the services sector will maximize the growth rate and national income. In our view, the model presented can be extended to capture other important aspects such as the role of land property laws, spatial land planning, capital controls, tax policies and public infrastructure.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.tourman.2016.02.020.

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