Competition in cross-border tourism

Kaifan Chen (Graduate School of Environmental Studies, Nagoya University, madaozero@gmail.com)
Tatsuaki Kuroda (Graduate School of Environmental Studies, Nagoya University, tatsukuroda@nagoya-u.jp)

観光に関する国際的競争の研究

陳 凱帆（名古屋大学 大学院環境学研究科）
黒田 達朗（名古屋大学 大学院環境学研究科）

要約

本研究では、往復に支障のない範囲にある二つの国を想定し、それぞれの市民が自国内あるいは国境を越えて他国を自由に観光目的の旅行が可能な状況を分析する。両国政府は、それぞれの国内で適切な税を課し、その税収を用いて、治安、公共施設、自然地帯、人工景観建設などの観光インフラ整備を行うことにより、自国の社会厚生を最大化するよう行動する。各国には観光産業があり、両国政府の提供する観光インフラを前提に、それぞれの観光サービスの料金を選択することにより、顧客の獲得に基づく利潤最大化を目的に競争する。上記のように、両国の市民はそれらを前提条件として、自らの効用を最大化するように国内および他国への観光回数を選択する。本研究では、この状況を 3 段階の連続ゲームとして分析することにより、政策的な示唆を得ることを目的とする。ただし、一般的な理論解の比較が困難なことから、最終的には消費者の選好を表す特定のパラメータを複数仮定してシミュレーション分析を行うことにより、代表的なケースの比較静学的な特徴を明らかにする。

Key words
tourism, infrastructure, competition, sequential game, cross-border

1. Introduction

Tourism has long been part of any economy. It serves as a type of resource that performs an important role in national economies. With the rise of globalization, cross-border tourism has grown and induced intense competition among counties. See Figure 1 about the growth of Chinese cross-border tourists, for example.

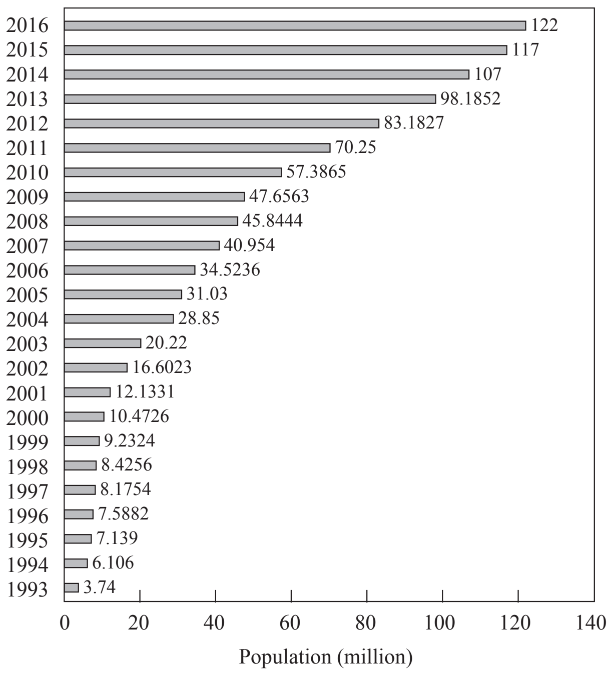


Figure 1: Chinese cross-border tourism from 1992 to 2016

Here, we follow the definition of tourism as follows:

> "Tourism is deemed to include any activity concerned with the temporary short-term movement of people to destinations outside the places where they normally live and work, and their activities during the stay at these destinations." (Burkart and Medlik, 1974, p.X)

In our discussion of tourism, we also consider the term "tourism product." We define it as a series of interrelated services, namely, services produced from various industries (economics), community services (social aspect), and natural services.

Mason (2000) formulated the following components of tourism products:

- Attractions: Natural, cultural, or man-made attractions, such as festivals or performing arts;
- Accessibility: The ease of obtaining or achieving organizational goals, such as those for tourism (travel agents);
- Amenities: Facilities in place to deliver pleasure, such as accommodation, cleanliness, and hospitality; and
- Networking: The network of cooperation related to the products offered locally, nationally, and internationally.

Let us now consider the supply and demand from the perspective of tourism products. The following are the effects of tourism on the economy:

- Income (value added) generation
- Employment generation
- Tax revenue generation
- Balance of payment effects
- Improvement of the economic structure of a region
- Encouragement of entrepreneurial activity
- Economic disadvantages

As for the economic impact of cross-border tourism, it can increase the foreign exchange reserves of the national economy and further improve regional industrial development. This type of tourism also contributes to the increase in employment and taxes. The *Annual Report of China Outbound Tourism Development*, the report from the China Tourism Research Institute Annual, provides crucial data on the research on the economic effects of tourism.

As evident from the report and in Figure 2, cross-border tourism has become another form of international trade. The local consumption of tourists can be regarded as another type of merchandise export. Obviously, within the limit range that can be supported , cross-border tourism has a productive role in the national economy. To a certain extent, tourism is a shortcut to rapid economic development, but only if public construction is completed. Bird (1991) explained the same notion in his book on tax policy and economic development. However, cross-border tourism significantly differs from domestic tourism, especially because the former comprises several other factors.

1.1 Factors of the host country

Tourism resources are desired assets regardless of type. The consumer price index, inflation rate, and exchange rate of the host country are major impact factors that influence tourism. Among the related studies, Archer (1987) explored demand forecasting and estimation in travel, tourism, and hospitality. Artus (1970) focused on the effect of revaluation on the foreign travel balance of Germany. Moreover, Chadee and Mieczkowski (1987) performed an empirical analysis of the effects of exchange rates on Canadian tourism.

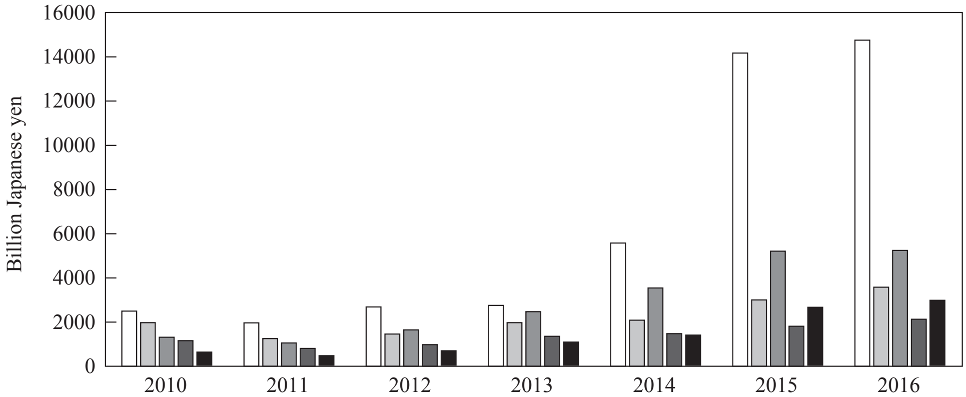
Clearly, tourism resources are widely available all over the world. Given that they are alternatively distributed, they are indicative of the importance of tourists' destination choices as they seek cheap tourism products. Regardless of the development of tourism resources and the industry, high tourism prices that continue to increase yearly can cause tourism demand to flow to other countries. Martin and Witt (1988) investigated substitute prices in models of tourism demand. Rosenweing (1988) highlighted the ideas related to the elasticities of substitution in Caribbean tourism demand.

Impact factors, such as security, hygiene, and climate, are equally important to tourism. Walsh (1996) performed a demand analysis of Irish tourism. In some instances, such as the Revolution of Thailand or the Hong Kong Umbrella revolution, these determinants generate greater impact than economic factors.

1.2 Factors of the sending country

Departure tourism depends on the economic development of the country and is specifically determined by its foreign exchange reserves, leisure opportunities, and income level. Martin and Witt (1987) developed tourism demand forecasting models and emphasized the importance of choosing an appropriate variable to represent the tourists' cost of living. In addition, Geyikdagi (1995) investigated the related effects of investments on tourism development and the demand for travel.

Occupational structure is considered another tourism factor



	2010	2011	2012	2013	2014	2015	2016
China.PR	2498	1964	2688	2759	5583	14174	14754
KOR	1973	1254	1466	1978	2090	3008	3577
TW	1318	1059	1648	2475	3544	5207	5245
USA	1159	813	979	1362	1475	1814	2130
HK	593	430	655	1054	1370	2627	2947

Figure 2: Consumption of foreigners visiting Japan

based on the notion that tourism opportunities are often maximized by company management, scholars, and researchers and not by family units. For instance, Gunadhi and Boey (1986) concentrated on the demand elasticities of tourism in Singapore.

Demographic composition, such as urbanization or classification of cultural level, is now regarded as another important tourism factor. Tie-Sheng and Li-Cheng (1985) noted the same issues in their paper entitled "Domestic tourist development in China: A regression analysis." In fact, urban dwellers in developed countries are interested in rural tourism in other countries. By contrast, urban dwellers in developing countries enjoy urban tourism in developed countries.

1.3 Impact factors of the host and sending countries

The political relationship between the host and the sending countries sometimes depend on their economic relations, which can be considered a decisive influence on tourism demand. The balance of payments, interest rates, monetary policies, and exchange rates also exert a significant influence in general. When the national currency devaluates, tourism prices tend to attract foreign tourists, thereby stimulating the growth of the tourism industry. However, such principle is not simple to generalize. Take for example Japan's recent monetary easing policy referred to as "The Abe Mix." Although this policy improved the export-oriented enterprises and the status of the tourism industry, it ultimately failed to play a significant role in enhancing the overall economy of the country.

If a country can sustain their tourism numbers while continuously attracting more tourists, the national economy is likely to be given a boost. Hence, the pivotal issue is the limited number of tourists, which makes a competitive tourism market particularly important for governments.

Suppose all the impact factors of the tourism industry, such as security and public facilities, can be regulated to improve the maintenance of natural areas, artificial scenic construction, and others. We represent the areas for improvement as T. The government uses taxes to improve its preparedness for T and increase its tourism competitiveness. In this way, we can study how a government uses tax leverage to achieve the most favorable outcome as it competes with another country.

Unfortunately, references related to this subject are limited. Most studies emphasize such areas as one commodity trafficking, the local economic structure, and household income. Scarce materials are available on competition between countries. An example is the work of García-Ferrer (1997), which explored forecasting international tourism demand in Spain. The few studies that explore competition between countries include the works of Papatheodorou (1999) and Patsouratis (2005), which investigated the sightseeing competition game between Mediterranean countries from an empirical perspective and the demand for international tourism in the Mediterranean region, respectively. Eadigton and Redman (1991) explored economics and tourism. Gonzalez and Moral (1995) analyzed international tourism in Spain, and White (1985) released an international travel demand model for US travel to Western Europe. Hence, competition between countries, especially in terms of tourism, is an interesting area of research that is explored in the present work.

The rest of the paper is organized as follows. Section 2 discusses the utility and surplus functions of consumers, industries, and governments in the two countries participating in the game. Section 3 presents the sequential game in the asymmetric case, in which citizens have a particular preference. Section 4 explains the sequential game in the case of population asymmetry, and the last section provides the concluding remarks.

2. A model

We now discuss the case, in which the sequential actions are reversed. As we described in the previous section, sequential games with perfect information are often solved by backward induction . We can now identify the pricing strategy set by enterprises after the establishment of the industry tax rate and the corporate profit function. Subsequently, we can ascertain how the government sets the industry tax rate to achieve the largest social welfare.

2.1 Consumer behavior

Let us consider two countries: Country 1 and Country 2. The citizens of the two countries refuse to relocate to the other country because of employment considerations and only prefer to travel for leisure purposes. Harmonious political relations are assumed to exist between the two governments, and no artificial obstacles to movement are established. We also suppose that all the impact factors of the tourism industry, such as security and public facilities (transportation, free WiFi, etc.), can be controlled to improve the maintenance of natural areas, artificial scenic construction, and others. The public investments for these improvements are denoted as T. For Country 1, all the factors are represented by T_1. The same is presumed for Country 2. The governments use taxes to improve their preparedness for T and to compete for tourists. In this model, the governments only impose industry tax to residents and use this tax revenue to improve T.

Domestic tourism and foreign tourism are regarded as substitute goods. For a simple analysis, we suppose that the market demand structure, including the cost of enterprises, is a straight line. We then analyze the consumers in Country 1 and Country 2.

For the consumers of Country 1, we use n_1 to denote domestic travel frequency and p_1 to indicate tourism ticket price (assuming that the toll is already included in the ticket cost). We use n_2 to represent the cross-border tourism frequency of the country and p_2 to designate the tourism ticket price (assuming that the toll is also already included in the ticket cost). Following Sakai (1990), the consumer utility U_1 is then given as

$$U_1 = \alpha_1 T_1 n_1 + \alpha_2 T_2 n_2 - \frac{1}{2}(\beta_1 n_1^2 + 2\gamma_1 n_1 n_2 + \beta_2 n_2^2). \quad (1)$$

In the expression, α_1, α_2, β_1, β_2, γ_1 are constants with the following relations:

$\alpha_1, \alpha_1 > 0,$
$\beta_1, \beta_2 > 0,$
$\beta_1\beta_2 > \gamma_1^2,$
$\alpha_1\beta_2 - \alpha_2\gamma_1 > 0,$
$\alpha_2\beta_1 - \alpha_1\gamma_1 > 0.$

We also observe a competitive relationship between T_1 and T_2. Consumer surplus of Country 1, L_1, is calculated as the utility minus the total cost of domestic and cross-border tourism. We consider the cross-border transportation cost as the percentage of cross-border tourism prices which equals $S - 1$ ($S \geq 1$), hence

$$L_1 = U_1 - p_1 n_1 - p_2 n_2 S. \quad (2)$$

Consumer action depends on the way consumer surplus is maximized. We can use a partial differential equation for the function L_1 to derive an optimum n_1 and n_2

$$\begin{cases} \dfrac{\partial L_1}{\partial n_1} = \alpha_1 T_1 - \beta_1 n_1 - \gamma_1 n_2 - p_1 = 0 & (3) \\ \dfrac{\partial L_1}{\partial n_2} = \alpha_2 T_2 - \beta_2 n_2 - \gamma_1 n_1 - p_2 S = 0 & (4) \end{cases}$$

$$n_1^* = a_1 - b_1 p_1 + S c_1 p_2, \quad (5)$$
$$n_2^* = a_2 - S b_2 p_2 + c_1 p_1, \quad (6)$$

where

$$a_1 = \frac{\alpha_1\beta_2 T_1 - \alpha_2\gamma_1 T_2}{\beta_1\beta_2 - \gamma_1^2},$$
$$b_1 = \frac{\beta_2}{\beta_1\beta_2 - \gamma_1^2},$$
$$c_1 = \frac{\gamma_1}{\beta_1\beta_2 - \gamma_1^2},$$
$$a_2 = \frac{\alpha_2\beta_1 T_2 - \alpha_1\gamma_1 T_1}{\beta_1\beta_2 - \gamma_1^2},$$
$$b_2 = \frac{\beta_1}{\beta_1\beta_2 - \gamma_1^2}.$$

We essentially use the same variables for the consumers of Country 1 and Country 2. We use n_4 to denote the domestic travel frequency of Country 2 and p_2 to refer to the tourism ticket price (assuming that the toll is already included in the ticket cost). We use n_3 to represent the cross-border tourism frequency of Country 2 and p_1 to signify the tourism ticket (assuming the toll is also already included in the ticket cost).

$$U_2 = \alpha_3 T_1 n_3 + \alpha_4 T_2 n_4 - \frac{1}{2}(\beta_3 n_3^2 + 2\gamma_2 n_3 n_4 + \beta_4 n_4^2). \quad (7)$$

In the expression, α_3, α_4, β_3, β_4, γ_2 are constants with the following relationships:

$\alpha_3, \alpha_4 > 0,$
$\beta_3, \beta_4 > 0,$
$\beta_3\beta_4 > \gamma_2^2,$
$\alpha_3\beta_4 - \alpha_4\gamma_2 > 0,$
$\alpha_4\beta_3 - \alpha_3\gamma_2 > 0.$

Similarly, consumer surplus of Country 2 is,

$$L_2 = U_2 - p_1 n_3 S - p_2 n_4. \quad (8)$$

Consumer action also depends on how consumer surplus is maximized. We can employ a partial differential equation for function L_2 to derive an optimum n_3 and n_4

$$\begin{cases} \dfrac{\partial L_2}{\partial n_3} = \alpha_3 T_1 - \beta_3 n_3 - \gamma_2 n_4 - p_1 S = 0 & (9) \\ \dfrac{\partial L_2}{\partial n_4} = \alpha_4 T_2 - \beta_4 n_4 - \gamma_2 n_3 - p_2 = 0 & (10) \end{cases}$$

$$n_3^* = a_3 - S b_3 p_1 + c_2 p_2, \quad (11)$$

$$n_4^* = a_4 - b_4 p_2 + S c_2 p_1, \quad (12)$$

where

$$a_3 = \frac{\alpha_3\beta_4 T_1 - \alpha_4\gamma_2 T_2}{\beta_3\beta_4 - \gamma_2^2},$$
$$b_3 = \frac{\beta_4}{\beta_3\beta_4 - \gamma_2^2},$$
$$c_2 = \frac{\gamma_2}{\beta_3\beta_4 - \gamma_2^2},$$
$$a_4 = \frac{\alpha_4\beta_3 T_2 - \alpha_3\gamma_2 T_1}{\beta_3\beta_4 - \gamma_2^2},$$
$$b_4 = \frac{\beta_3}{\beta_3\beta_4 - \gamma_2^2}.$$

2.2 Industry behavior

2.2.1 Tourism industry of Country 1

As previously stated, the corporate profit function can be written as

$$\pi_1 = p_1 (n_1^* + n_3^*) - T_1, \quad (13)$$

where

$$n_1^* = a_1 - b_1 p_1 + S c_1 p_2,$$
$$n_3^* = a_3 - S b_3 p_1 + c_2 p_2.$$

By profit maximization of the tourism industry, we can derive an optimum price p_1^* as

$$p_1^* = \frac{a_1 + a_3 + (c_1 S + c_2)\, p_2}{2\,(b_1 + b_3 S)}. \tag{14}$$

As in the previous case, the relationship between p_1 and p_2 is one of *strategic complements*.

2.2.2 Tourism industry of Country 2

As for Country 1, the corporate profit function can be written as

$$\pi_2 = p_2\,(n_2^* + n_4^*) - T_2, \tag{15}$$

where

$$n_2^* = a_2 - S b_2 p_2 + c_1 p_1,$$
$$n_4^* = a_4 - b_4 p_2 + S c_2 p_1.$$

Similarly, the profit-maximizing price p_2^* is given as

$$p_2^* = \frac{a_2 + a_4 + (c_1 + c_2 S)\, p_1}{2\,(b_2 S + b_4)}. \tag{16}$$

Again, prices here are *strategic complements*.

Based on these profit-maximizing prices, we can derive the equilibrium prices chosen by the tourist corporations as

$$\begin{cases} p_1^e = \dfrac{2K_1\,(a_1 + a_3) + K_2\,(a_2 + a_4)}{Q} & (17) \\ p_2^e = \dfrac{2K_3\,(a_2 + a_4) + K_4\,(a_1 + a_3)}{Q} & (18) \end{cases}$$

where

$Q = 4K_1K_3 - K_2K_4 = 4\,(b_1 + b_3S)\,(b_2S + b_4) - (c_1S + c_2)\,(c_1 + c_2S)$,
$K_1 = b_2S + b_4$,
$K_2 = c_1S + c_2$,
$K_3 = b_1 + b_3S$,
$K_4 = c_1 + c_2S$.

2.3 Government behavior

2.3.1 Government of Country 1

Similarly, the social welfare V_1 is equal to the sum of the consumer surplus and the corporate profit, which is expressed as

$$V_1 = L_1 + \pi_1, \tag{19}$$

where

$$L_1 = U_1 - p_1 n_1 - S p_2 n_2,$$
$$U_1 = \alpha_1 T_1 n_1 + \alpha_2 T_2 n_2 - \frac{1}{2}(\beta_1 n_1^2 + 2\gamma_1 n_1 n_2 + \beta_2 n_2^2).$$

2.3.2 Government of Country 2

Similarly, the government of Country 2 attempts to maximize the social welfare function V_2 described as

$$V_2 = L_2 + \pi_2, \tag{20}$$

where

$$L_2 = U_2 - S p_1 n_3 - p_2 n_4,$$
$$U_2 = \alpha_3 T_1 n_3 + \alpha_4 T_2 n_4 - \frac{1}{2}(\beta_3 n_3^2 + 2\gamma_2 n_3 n_4 + \beta_4 n_4^2).$$

Thus, the equilibrium infrastructure for tourism provided by both governments are respectively given below.

$$\begin{cases} T_1^e = \dfrac{f_2 - g_1}{f_1 f_2 - g_1 g_2} & (21) \\ T_2^e = \dfrac{f_1 - g_2}{f_1 f_2 - g_1 g_2} & (22) \end{cases}$$

As the general forms of f_i, g_i (i = 1, 2) are very complicated and so it is difficult to compare the two cases described above in general, we focus on several specific cases to demonstrate the possible differences between the two cases . Moreover, when we compare the cases, we examine the strategic behavior of the two players: the government and the industry.

3. Comparative analysis of Case 1

For the simplest yet most extreme case, we assume that the impact of tourists is centered entirely on α and β, and that $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 1$; $\gamma = 0$. In this case, the citizens of the two countries have specific preferences for domestic and cross-border tourism. We suppose the presence of two different types of citizens: those of Country 1 are particularly keen on domestic tourism (which we tentatively attribute to psychological factors, such as patriotism) whereas the other group of citizens (Country 2 citizens) are particularly keen on cross-border tourism (which we tentatively attribute to foreign travels). For simplicity, we combine these preferences and find that the degree of national enthusiasm for cross-border tourism is equal to that of the national enthusiasm for domestic tourism. Furthermore, the keen preference for traveling abroad is twice that for domestic travel expressed as $\alpha_1 = \alpha_3 = 2\alpha_2 = 2\alpha_4$.

In this case, we can show (21) and (22) are simplified as

$$T_1^e = \frac{1}{f_1} \text{ and } T_2^e = \frac{1}{g_2}$$

where,

$$f_1 = \frac{\alpha_1^2\,(S^2 + 2S + 2)}{(1 + S)^2}$$
$$g_2 = \frac{\alpha_2^2\,(S^2 + 2S + 2)}{(1 + S)^2}$$

Hence, the equilibrium taxes are given below.

$$\begin{cases} T_1^e = \dfrac{(1 + S)^2}{\alpha_1^2\,(S^2 + 2S + 2)} & (23) \\ T_2^e = \dfrac{(1 + S)^2}{\alpha_2^2\,(S^2 + 2S + 2)} & (24) \end{cases}$$

As the preferences $\alpha_1 = 2\alpha_2$, then $4T_1^e = T_2^e$.

Apparently, when the Nash equilibrium is reached, the government of Country 2 spends more taxes than Country 1. The citizens of the former are particularly keen on cross-border tourism, a characteristic which we tentatively attribute to foreign travels, whereas the citizens of the latter prefer domestic tourism to attract domestic and foreign tourists.

Furthermore, the respective tourism prices in equilibrium are given below.

$$\begin{cases} p_1^e = \dfrac{(1+S)}{\alpha_1(S^2+2S+2)} & (25) \\ p_2^e = \dfrac{(1+S)}{\alpha_2(S^2+2S+2)} & (26) \end{cases}$$

The preference $\alpha_1 = 2\alpha_2$ means that $2p_1^e = p_2^e$, and there exists $\gamma_1 = \gamma_2 = 0$, through the equilibrium price p_1^e *and* p_2^e. We can find that the price of tourism entails an independent pricing. On the surface, the price is unaffected by the tourism industry of the other country.

Evidently, when the Nash equilibrium is reached, the industry of Country 2, whose residents favor cross-border tourism, applies the higher price p_2^e than the price of Country 1 (p_1^e), whose inhabitants prefer domestic tourism.

At the same time, we are concerned about the industry profits $\pi_1 = p_1(n_1^* + n_3^*) - T_1$ *and* $\pi_2 = p_2(n_2^* + n_4^*) - T_2$ of both countries in equilibrium, which are respectively calculated below.

$$\begin{cases} \pi_1^e = \dfrac{(1+S)^2(-S^2-S-1)}{\alpha_1^2(S^2+2S+2)} & (27) \\ \pi_2^e = \dfrac{(1+S)^2(-S^2-S-1)}{\alpha_2^2(S^2+2S+2)} & (28) \end{cases}$$

Given that $S \geq 1$, $\alpha_1 = 2\alpha_2$, then $2\pi_1^e = \pi_2^e \leq 0$. In other words, in this model, the best option for both governments, which is based on social welfare, is to levy the high industry tax. Such levying would enhance tourism factors to attract the tourists even if such a move generates a deficit for the tourism industries, which is still a positive effect. Although this notion does not seem realistic, the government may then reallocate the resources later by taxing the consumers to subsidize the tourism industries. However, resource redistribution is not the focus of this study.

With the calculated tourism factors investment T and tourism prices p of both countries, let us examine the consumer behavior of the two countries. In equilibrium, the average travel frequencies of each citizen in terms of domestic travel and cross-border travel are respectively given below.

$$\begin{cases} n_1 = \dfrac{S(1+S)}{\alpha_1(S^2+2S+2)} & (29) \\ n_2 = \dfrac{(1+S)}{\alpha_2(S^2+2S+2)} & (30) \end{cases}$$

We use n_1 and n_2 to denote the frequencies of domestic travel and cross-border travel of each citizen in Country 1, respectively.

$$\begin{cases} n_3 = \dfrac{S(1+S)}{\alpha_1(S^2+2S+2)} & (31) \\ n_4 = \dfrac{(1+S)}{\alpha_2(S^2+2S+2)} & (32) \end{cases}$$

In the equations above, we use n_4 to denote domestic travel frequency and n_3 to indicate the cross-border travel frequency of each citizen in Country 2.

By comparison, we can find

$$\frac{n_1}{n_2} = \frac{S}{2}, \quad (33)$$

For the citizens of Country 1, in the case of acceptable transportation cost ($S \leq 2$), the frequency of cross-border travel is higher than that of domestic, even if the citizens are particularly keen on domestic travel ($\alpha_1 = 2\alpha_2$). Thus,

$$\frac{n_3}{n_4} = \frac{1}{2S}. \quad (34)$$

For the citizens of Country 2, the frequency of domestic travel is higher than that of its cross-border counterpart, despite the preference of citizens for cross-border tourism ($\alpha_3 = 2\alpha_4$).

Then, we compare the frequency of domestic travel and cross-border travel for both countries.

$$\begin{cases} \dfrac{n_1}{n_4} = \dfrac{1}{2} & (35) \\ \dfrac{n_2}{n_3} = \dfrac{2}{1} & (36) \end{cases}$$

From the travel frequencies of the citizens of the two countries, we can observe that a particular preference exists, and that the citizens of both countries still prefer to travel to Country 2. Such an outcome indicates that the policy of Country 2 to increase tourism investment to attract tourists is effective. By contrast, everyone favored Country 1 (whose citizens were keen on domestic tourism, whereas those of Country 2 favor cross-border tourism), which did not spend much on tourism investment (only Country 2 has an investment amounting to 25 %.) In terms of strategy, the government of Country 1 maintains that the use of consumer preferences is a better choice for social welfare. In fact, this decision caused a considerable loss in the number of tourists.

$$\begin{cases} \dfrac{n_1}{n_3} = S & (37) \\ \dfrac{n_2}{n_4} = \dfrac{1}{S} & (38) \end{cases}$$

For the tourism industries of the two countries, more reception tourists come from the domestic market because of transportation costs . As with other industries, how to protect the domestic market and maintain the national consumption of domestic tourists is an extremely important topic.

$$\frac{n_1 + n_3}{n_2 + n_4} = \frac{\alpha_2 (S^2 + 2S + 1)}{\alpha_2 (S^2 + 2S + 1)} = \frac{1}{2} \tag{39}$$

We can also see that, thanks to the policy of Country 2, which aims to increase investment in tourism factors to attract tourists, the tourism demand for Country 2 is greater than that for Country 1 . That development emboldens the industry of Country 2 to set higher tourist prices than the other country that has a large enough basis for tourist demand.

$$\frac{n_1 + n_2}{n_3 + n_4} = \frac{S^2 + 3S + 2}{2S^2 + 3S + 1} \tag{40}$$

Given that transportation cost exists ($S \geq 1$), $n_3 + n_4 \geq n_1 + n_2$. As S increases, the total travel frequency of citizens from Country 2 is higher than that from Country 1. To some extent, we can confirm that the eagerness of Country 2's government to initiate tourism investments affects the citizen's enthusiasm for tourism. Such enthusiasm persists despite their preference for cross-border tourism, even in the case of transportation cost limit. They are also more willing (relative to Country 1 citizens) to engage in tourism spending for domestic tourism rather than into other means of public consumption .

4. Comparative analysis of Case 2

For the second case, we assume that the population is asymmetric between the two countries, and the population ratio between Country 1 and Country 2 is N ($\frac{\textit{Population of Country 2}}{\textit{Population of Country 1}} = N$, $N \geq 1$). For the sake of simplicity, we presume that the possibility of N <1 has been verified. The citizens of the both countries have no particular preferences for domestic and cross-border tourism: $\alpha_1 = \alpha_3 = \alpha_2 = \alpha_4$. We also adopt the same assumption for the other parameters, namely, $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 1$; $\gamma = 0$.

- Observation 1

  To some extent, we can infer that the government of a smaller country pays more attention to the development of its own tourism resources and has more enthusiasm and motivation for the development of its tourism industry.

In this case, we can show (21) and (22) are simplified as

$$T_1^e = \frac{1}{f_1} \quad \text{and} \quad T_2^e = \frac{1}{g_2}$$

where,

$$\begin{cases} f_1 = \dfrac{\alpha_2^1 (2N^3S + 3N^2 + 4N^2S^2 + 2N + 6NS + 3)}{4 (1 + NS)^2}, \\ g_2 = \dfrac{\alpha_2^2 (2N^3 + 5N^2 + 2N^2S + 4S^2 + 8NS + 1 - 2S)}{4 (N + S)^2} \end{cases}$$

Hence, the equilibrium taxes are given below.

$$\begin{cases} T_1^e = \dfrac{4 (1 + NS)^2}{\alpha_1^2 (2N^3S + 3N^2 + 4N^2S^2 + 2N + 6NS + 3)} & (41) \\ T_2^e = \dfrac{4 (N + S)^2}{\alpha_2^2 (2N^3 + 5N^2 + 2N^2S + 4S^2 + 8NS + 1 - 2S)} & (42) \end{cases}$$

$$\frac{T_1^e}{T_2^e} = \frac{(1 + NS)^2 (2N^3 + 5N^2 + 2N^2S + 4S^2 + 8NS + 1 - 2S)}{(N + S)^2 (2N^3S + 3N^2 + 4N^2S^2 + 2N + 6NS + 3)} \tag{43}$$

As two parameters, S (transportation cost) and N (population ratio), are found in the formula, we try to simulate the effects of the change of N on both sides in the case of different S. We set up three different transportation costs: no transportation cost (S = 1), half of the tourism price (S = 1.5), and the transportation cost equal to the tourism price (S = 2). See Figure 3.

Apparently, when the Nash equilibrium is reached, the government of Country 1, which has the smaller population, spent more taxes than Country 2 to attract domestic and foreign tourists. With the increase in distance (more transportation costs), the smaller country (Country 1) is expected to increase more investment in the development of tourism resources.

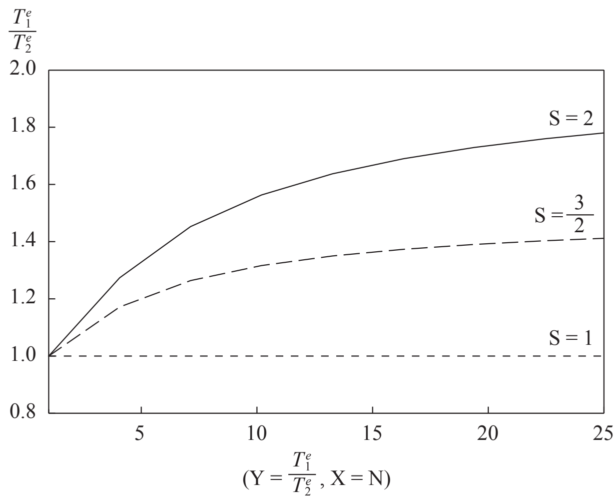


Figure 3: Comparison of governmental investments

Of course, this investment growth is not endless. In fact, as the population gap increases, we can find that the smaller country's investment of tourism factors tends to be stable. On the one hand, the tourism budget for the national finance is not infinite. On the other hand, the combination of the subsequent changes in tourism prices and the profits of the tourism industry can also be found in relation to the tourism industry eventually reaching "maximum capacity" or the "the saturated state." In the other words, with the increase in the population gap, the total demand also increases. Furthermore, even if the industry of a smaller country does not use intense price cuts, the huge demand can easily maximize the benefits.

- Observation 2

  To some extent, given the high tax from the government of the *smaller country, the tourist industry is more willing to launch a price war to compete for the market with low price and attract tourists.*

After making a comparison at the government level, we turn our attention to the tourism industries of both countries. Similar to Case 1, because $\gamma_1 = \gamma_2 = 0$, the tourist prices of the two countries are determined independently and do not affect each other. The tourism prices in equilibrium are given by

$$\begin{cases} p_1^e = \dfrac{2\,(1+N)\,(1+NS)}{\alpha_1\,(2N^3S+3N^2+4N^2S^2+2N+6NS+3)} & (44) \\ p_2^e = \dfrac{2\,(1+N)\,(N+S)}{\alpha_2\,(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)} & (45) \end{cases}$$

$$\frac{p_1^e}{p_2^e} = \frac{(1+NS)\,(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)}{(N+S)\,(2N^3S+3N^2+4N^2S^2+2N+6NS+3)} \quad (46)$$

As two parameters, S (transportation cost) and N (population ratio), are involved in the formula, we attempt to simulate the effects of the change of N on both sides in the case of different S. We set up three different transportation costs: no transportation cost ($S = 1$), half of the tourism price ($S = 1.5$), and the transportation cost equal to the tourism price ($S = 2$). See Figure 4.

Evidently, when the Nash equilibrium is reached, the industry of Country 1, which has the smaller population, sets a lower price than Country 2 to attract domestic and foreign tourists. With the increase in distance (more transportation costs), the price reduction of the smaller country (Country 1) is expected to become more obvious. In fact, the cost of transport between the two countries is based on the proportion of tourism prices. Hence, when the prices differ, the transportation costs represent another pair of asymmetric relations.

Of course, this price reduction is not endless. As the population gap increases, we find that a smaller country's tourism industry with intense price reduction can slowly rebound and gradually become stable. As described above, the tourism industry eventually reaches the acceptable "maximum capacity" or "the saturated state." I other words, with the increase in the population gap, the total demand also increases. Furthermore, even if the industry of the smaller country does not use intense price cuts, the huge demand can easily maximize the benefits.

At the same time, we are concerned with the industry profits $\pi_1 = p_1\,(n_1^* + Nn_3^*) - T_1$ *and* $\pi_2 = p_2\,(n_2^* + Nn_4^*) - T_2$ of both countries in equilibrium, which are calculated as

$$\pi_1^e = \frac{4\,(1+NS)^2\,(1+N)\,(1+2NS-N)}{\alpha_1^2\,(2N^3S+3N^2+4N^2S^2+2N+6NS+3)^2} + \frac{4\,(1+NS)^2\,(1+N)\,(2+NS-S)\,N}{\alpha_1^2\,(2N^3S+3N^2+4N^2S^2+2N+6NS+3)^2} - \frac{4\,(1+NS)^2}{\alpha_1^2\,(2N^3S+3N^2+4N^2S^2+2N+6NS+3)} \quad (47)$$

$$\pi_2^e = \frac{4\,(N+S)^2\,(1+N)\,(2N+S-NS)}{\alpha_2^2\,(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)^2} + \frac{4\,(N+S)^2\,(1+N)\,(2S+N-1)\,N}{\alpha_2^2\,(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)^2} - \frac{4\,(N+S)^2}{\alpha_2^2\,(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)} \quad (48)$$

Given the two parameters, S (transportation cost) and N (population ratio), in the formula, π_1^e/π_2^e, we attempt to simulate the effects of the change of N on both sides in the case of different S. We set up three different transportation costs: no transportation cost ($S = 1$), half of the tourism price ($S = 1.5$), and the transportation cost equal to the tourism price ($S = 2$). See Figure 5.

In this model, the best option for both governments that is based on social welfare is to levy the high industry tax to enhance tourism factors, thereby attracting tourists. Although this seems unrealistic, the government can then reallocate the resources later to make them stay in the market by taxing the consumers to subsidize the tourism industries. However, as

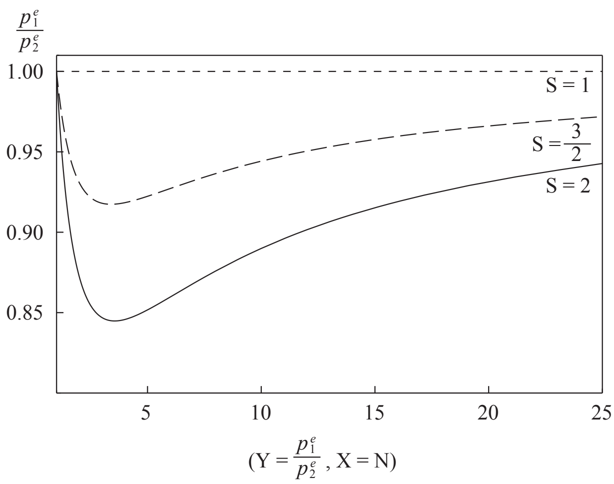


Figure 4: Comparison of tourism prices

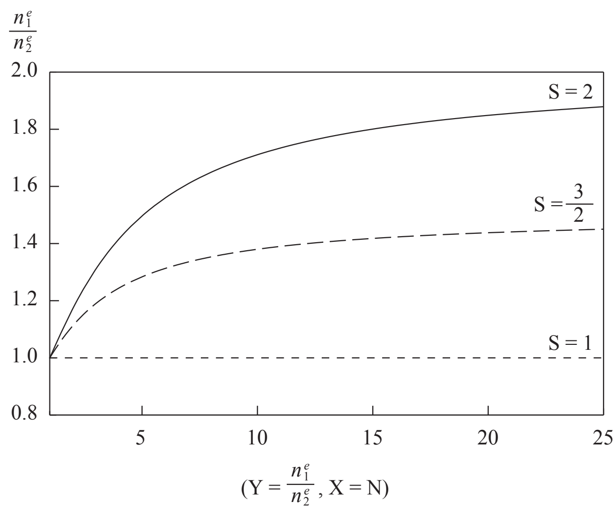


Figure 5: Comparison of industry profits

previously stated, resource redistribution is not the focus of this study.

We observe that the best option for social welfare in the smaller country's tourism entails a tax policy. If purely stand on the side of the tourism industry, it is difficult to evaluate whether such strategy is a "welcomed policy." With the high tax from the government of the smaller country, the tourism industry has no choice but to launch a price war and try to compete for the market with low price to attract tourists and stop losses.

In fact, with the tax increase, the tourism industry deficit grows, although the deficit growth is eventually stabilized when the population gap increases. However, through the curve, we can clearly notice that, under the tourism policy of the smaller country and with the distance increase, the loss of the industry becomes larger.

- Observation 3

  For the citizens of Country 2 (the country with a larger population), when the population gap is not extensive, the frequency of domestic travel is higher than that of cross-border travel. When the population gap increases, the citizens of Country 2 prefer cross-border tourism over domestic tourism.

  In summary, from the travel frequencies of the citizens of the two countries, we can observe that particular preferences do not exist. Citizens of both countries still prefer to travel to Country 1, which means the policy of Country 1 (i.e., increasing tourism investment to attract tourists) is effective. On the other hand, the government of Country 2, which does not spend much on tourism investment as its strategy, claim that maintaining the status quo is the better choice for social welfare. In reality, this strategy caused a considerable loss in the number of tourists.

  Through the total travel frequency curve, we find that the smaller country's tourism policy is successful. Additionally, more tourists are received by the smaller country from the larger country. With the rise of transportation costs, the difficulty of tourists travelling abroad from the smaller country increases, and more tourists received by the larger country consist of domestic travelers.

With the calculated tourism factors investment T and tourism prices p of both countries, let us focus on the consumer behavior of the two countries.

The average travel frequencies of each citizen in equilibrium are respectively given by

$$\begin{cases} n_1 = \dfrac{2\,(1+NS)\,(1+2NS-N)}{\alpha_1\,(2N^3S+3N^2+4N^2S^2+2N+6NS+3)} & (49) \\[2ex] n_2 = \dfrac{2\,(N+S)\,(2N+S-NS)}{\alpha_2\,(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)} & (50) \end{cases}$$

where n_1 denotes the domestic travel frequency and n_2 refers to the cross-border travel frequency of each citizen in Country 1.

$$\begin{cases} n_3 = \dfrac{2\,(1+NS)\,(2+NS-S)}{\alpha_1\,(2N^3S+3N^2+4N^2S^2+2N+6NS+3)} & (51) \\[2ex] n_4 = \dfrac{2\,(N+S)\,(2S+N-1)}{\alpha_2\,(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)} & (52) \end{cases}$$

In the equations above, n_4 signifies domestic travel frequency and n_3 represents the cross-border travel frequency of each citizen in Country 2.

By comparison, we can find

$$\frac{n_1}{n_2} = \frac{(1+NS)(1+2NS-N)(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)}{(N+S)(2N+S-NS)(2N^3S+3N^2+4N^2S^2+2N+6NS+3)} \quad (53)$$

As two parameters, S (transportation cost) and N (population ratio), are found in the formula, we attempt to simulate the effects of the change of N on both sides in the case of different S. We set up three different transportation costs: no transportation cost ($S = 1$), half of the tourism price ($S = 1.5$), and the transportation cost equal to the tourism price ($S = 2$). See Figure 6.

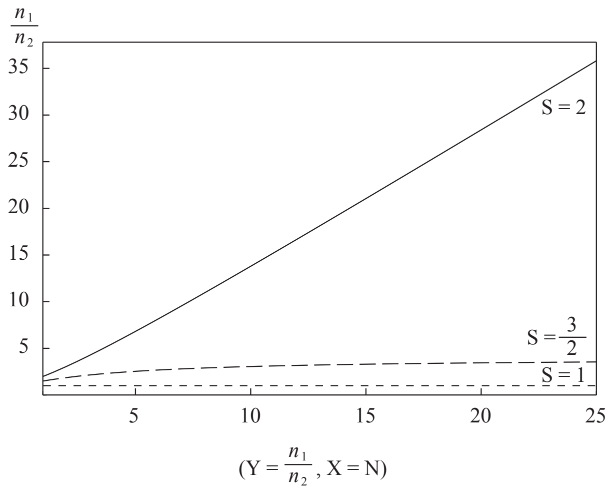


Figure 6: Comparison of destinations (country 1)

For the citizens of Country 1, the frequency of domestic travel is higher than that of cross-border tourism. The graph shows that the tourism policy of the government from the smaller country ensures that its citizens tend to stay in domestic travel. In addition, the increase of the transportation costs decreases the cross-border tourism and intensifies the focus on domestic tourism from the citizens of the smaller country.

$$\frac{n_3}{n_4} = \frac{(1+NS)(2+NS-S)(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)}{(N+S)(2S+N-1)(2N^3S+3N^2+4N^2S^2+2N+6NS+3)} \quad (54)$$

As two parameters, S (transportation cost) and N (population ratio), are found in the formula, we attempt to simulate the effects of the change of N on both sides in the case of different S. We set up three different transportation costs: no transportation

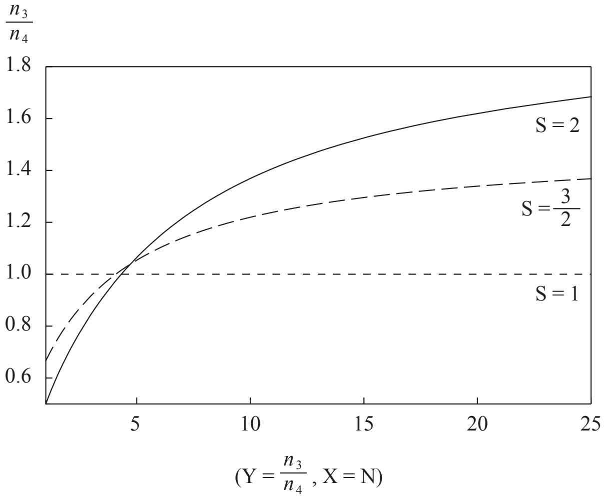


Figure 7: Comparison of destinations (country 2)

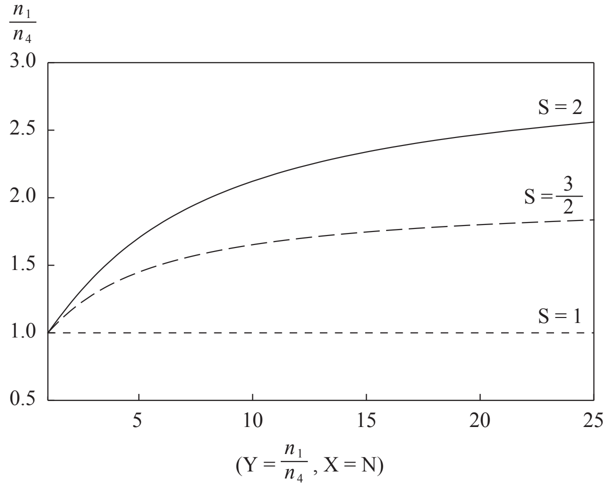


Figure 8: Comparison of domestic trips

cost ($S = 1$), half of the tourism price ($S = 1.5$), and the transportation cost equal to the tourism price ($S = 2$). See Figure 7.

For the citizens of Country 2, when the population gap is not sizeable, the frequency of domestic tourism is higher than that of cross-border travel. When the population gap increases, the citizens of Country 2 prefer cross-border tourism over domestic travel. On the one hand, as described, the government of the smaller country promotes the enthusiasm for tourism development, inducing its own industry to participate in a price war to attract tourists for competing in the market. On the other hand, the "saturated state" of Country 2 reduces the utility of domestic tourists, and relatively cheaper tourism prices and transportation costs makes cross-border travel easier. Tourists prefer to travel to the country that is more enthusiastic to tourism development, even if this leads to higher transportation costs.

We then compare the frequency of the domestic travel and cross-border travel of both countries.

$$\frac{n_1}{n_4} = \frac{(1+NS)(1+2NS-N)(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)}{(N+S)(2S+N-1)(2N^3S+3N^2+4N^2S^2+2N+6NS+3)} \quad (55)$$

$$\frac{n_2}{n_3} = \frac{(N+S)(2N+S-NS)(2N^3S+3N^2+4N^2S^2+2N+6NS+3)}{(1+NS)(2+NS-S)(2N^3+5N^2+2N^2S+4S^2+8NS+1-2S)} \quad (56)$$

Given that two parameters, S (transportation cost) and N (population ratio), are found in the formula, we attempt to simulate the effects of the change of N on both sides in the case of different S. We set up three different transportation costs: no transportation cost ($S = 1$), half of the tourism price ($S = 1.5$), and the transportation cost equal to the tourism price ($S = 2$). See Figure 8.

From the travel frequencies of the citizens of the two countries, we can see that a particular preference does not exist and that the citizens of Country 1 prefer domestic travel. Furthermore, the higher the transportation cost, the more obvious the frequency difference between the two countries.

From the result, note that because Country 1 is more enthusiastic as regards the development of tourism, the tourism price of the country is also lower, which reduces the difficulty of traveling domestic for the citizens. These findings suggest that the frequency of domestic tourism in Country 1 is higher than that in Country 2. Accordingly, the policy of Country 1, which increases tourism investment to attract tourists, is effective.

As two parameters, S (transportation cost) and N (population ratio), are present in the formula, we try to simulate the effects of the change of N on both sides in the case of different S. We set up three different transportation costs: no transportation cost ($S = 1$), half of the tourism price ($S = 1.5$), and the transportation cost equal to the tourism price ($S = 2$). See Figure 9.

From the travel frequencies of the citizens of the two countries, we can see that a particular preference does not exist, and that the Country 2 citizens prefer cross-border travel. The higher the transportation cost, the more obvious the frequency difference between the two countries. Thus, even at a considerable transportation cost, Country 1 is more attractive than its counterpart.

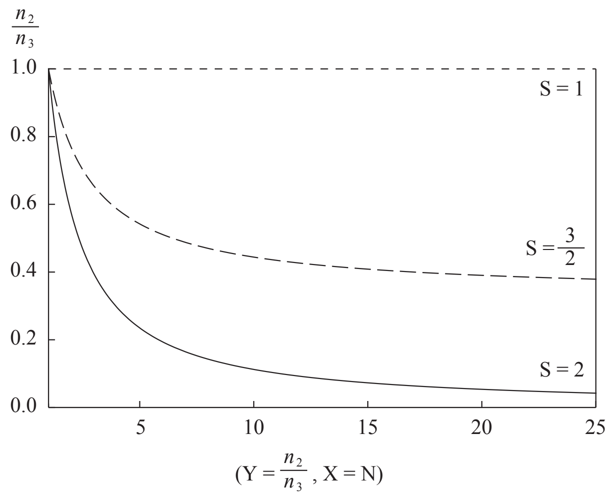


Figure 9: Comparison of foreign trips

In summary, from the travel frequencies of the citizens of the two countries, we note that a particular preference does not exist, and the citizens of both countries still prefer to travel to Country 1. Such outcome means that the policy of Country 1 (i.e., increasing tourism investment to attract tourists) is helpful. Country 2 did not spend much on tourism investment as a strategy, and its government claims that maintaining the status quo is the better choice for social welfare. In fact, this decision caused a considerable loss in the number of tourists.

$$\frac{n_1}{n_3} = \frac{1 + 2NS - N}{2 + NS - S} \tag{57}$$

$$\frac{n_2}{n_4} = \frac{2N + S - NS}{2S + N - 1} \tag{58}$$

As two parameters, S (transportation cost) and N (population ratio), are found in the formula, we attempt to simulate the effects of the change of N on both sides in the case of different S. We set up three different transportation costs: no transportation cost ($S = 1$), half of the tourism price ($S = 1.5$), and the transportation cost equal to the tourism price ($S = 2$). See Figure 10-13.

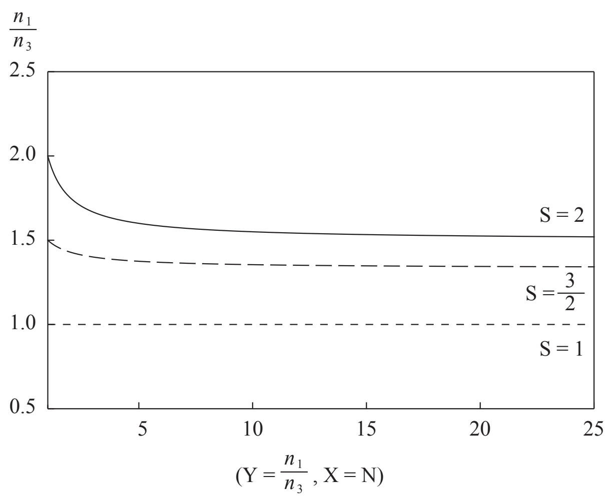


Figure 10: Comparison of trips to country 1 (per capita)

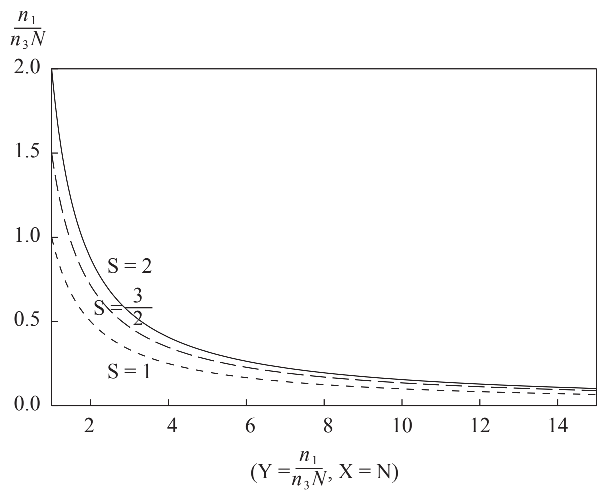


Figure 11: Comparison of tourists to country 1

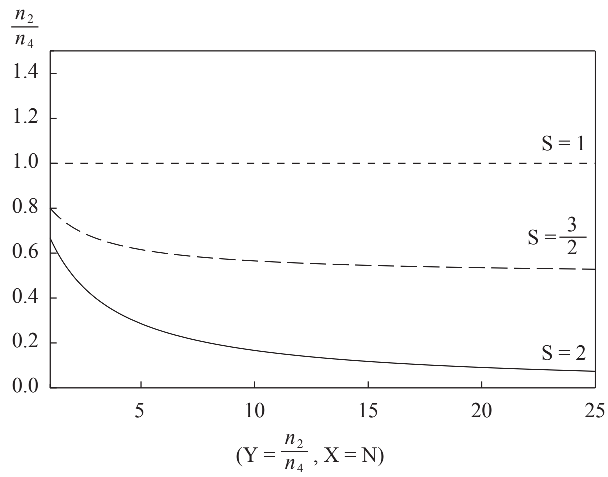


Figure 12: Comparison of trips to country 2 (per capita)

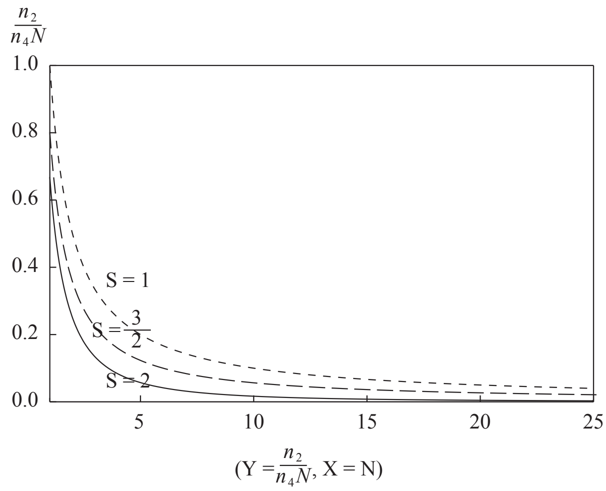


Figure 13: Comparison of tourists to country 2

Note that, thanks to the policy of Country 1 (i.e., increasing investment in tourism factors to attract tourists), the tourism demand for Country 1 is greater than that for Country 2. Of course, the initiative of the industry of Country 1 to launch the price war to seize the market also is an indispensable strategy.

$$\frac{n_1 + n_2}{n_3 + n_4} \tag{59}$$

where,

$$n_1 + n_2 = \frac{2\,(1 + NS)\,(1 + 2NS - N)}{\alpha_1\,(2N^3S + 3N^2 + 4N^2S^2 + 2N + 6NS + 3)} + \frac{2\,(N + S)\,(2N + S - NS)}{\alpha_2\,(2N^3 + 5N^2 + 2N^2S + 4S^2 + 8NS + 1 - 2S)}$$

and

$$n_3 + n_4 = \frac{2\,(1 + NS)\,(2 + NS - S)}{\alpha_1\,(2N^3S + 3N^2 + 4N^2S^2 + 2N + 6NS + 3)} + \frac{2\,(N + S)\,(2S + N - 1)}{\alpha_2\,(2N^3 + 5N^2 + 2N^2S + 4S^2 + 8NS + 1 - 2S)}$$

As two parameters, S (transportation cost) and N (population ratio), are found in the formula, we attempt to simulate the effects of the change of N on both sides in the case of different S. We set up three different transportation costs: no transportation cost ($S = 1$), half of the tourism price ($S = 1.5$), and the transportation cost equal to the tourism price ($S = 2$). See Figure 14.

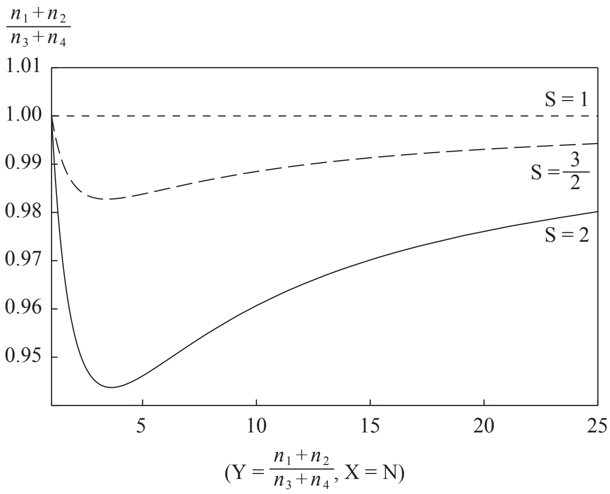


Figure 14: Comparison of trips of both country (per capita)

Given that transportation cost exists ($S \geq 1$), as S increases, the total travel frequency of Country 2 citizens is higher than that in Country 1. To some extent, we can confirm that the enthusiasm of the government of Country 1 to initiate tourism investment affects the citizens of both countries. Even in the case of transportation cost limit, Country 2 citizens are more willing (relative to Country 1 citizens) to engage in tourism spending into domestic tourism rather than into other means of public consumption.

In fact, if the population gap is not large enough, when the tourism price of Country 1 reduces quickly, the gap of total tourism frequency of Country 2 is obviously higher than that in Country 1, especially when the distance increases.

5. Concluding remarks

This study focuses on how neighboring governments compete for tourists by using industry taxes to improve their infrastructures, which in turn, serve domestic and foreign travelers. In particular, we introduce the tourism industries of two countries, whose governments compete with each other to attract visitors for maximum profit .

We consider two cases in the sequential games: two nations whose citizens have particular preferences for domestic and cross-border tourism. We also assume that the population is inconsistent between the two countries, and that the population ratio between Country 1 and Country 2 is N. The citizens of both countries have no particular preferences for domestic and cross-border tourism. In either case, consumers of both countries attempt to maximize their utility or surplus, given the infrastructures for tourism and the price of tourism at both countries , at the third or last stage.

Although we derive the outcome of each sequential game, comparing them in general cases is difficult. Hence, we assume several specific sets of parameters representing consumer preference, and then analyze the possible outcomes based on the strategic . According to the results of the simulation, many possible patterns are present. Specifically, the leadership of each government does not always guarantee better outcomes for industry. One of the reasons may be that the social welfare function as a governmental target includes the profits of the tourism industry in each country.

As described above, in the case where both countries in the game has the same population, we could assume that a particular preference exists based on the travel frequencies of the citizens of the two countries. That is, the citizens of both countries still prefer to travel to Country 2. Such a preference means that the policy of Country 2 (increasing tourism investment to attract tourists) is effective. Conversely, everyone favored Country 1 (the citizens of Country 1 are particularly keen on domestic tourism, and their counterparts in Country 2 prefer cross-border tourism), which did not spend much on tourism investment (only Country 2 has an investment amounting to 25 %) . In terms of strategy, the government of Country 1 claims that the use of consumer preferences is a better choice for social welfare. In fact, this decision caused a considerable loss in the number of tourists. As transportation cost exists ($S \geq 1$), the total travel frequency of Country 2 citizens is higher than that in Country 1 as S increases. To some extent, we can confirm that the enthusiasm of the government of Country 2 toward tourism investment also affects the citizen's enthusiasm for tourism. Although they are particularly keen on cross-border tourism, even in the case of transportation cost limit, Country 2 citizens are more willing (relative to Country 1 citizens) to engage in tourism spending into domestic tourism rather than into other means of public consumption.

In the other case, the population is asymmetric between the two countries, and the citizens of both countries have no particular preferences for domestic and cross-border tourism. For the tourism industries of both countries, more reception tourists come from domestic travel because of the existence of transportation cost. As with other industries, how to protect the domestic market and maintain the national consumption of domestic tourists is an extremely important issue. As S increases, the total travel frequency of Country 2 citizens is higher than that in Country 1. To some extent, we can confirm that the enthusiasm of the government of Country 1 to initiate tourism investment affects the enthusiasm for tourism of the citizens of both countries. However, in the case of transportation cost limit, Country 2 citizens are more willing (relative to their Country 1 counterparts) to engage in tourism spending into domestic tourism rather than into other means of public consumption. In fact, when the population gap is not large enough, when the tourism price of Country 1 reduces quickly, the gap of total tourism frequency of Country 2 is obviously higher than that in Country 1, especially when the distance increases.

As described, we can assume that whereas governments could gain leadership by some public commitment or binding contract and make the optimal decision based on social welfare, private industries could not. In this model, the tourism industries of both countries are always at a loss state. Furthermore, the starting point of the enterprise has become absolute: "How to reduce losses under the current policy." Although this notion does not seem realistic, the governments could reallocate the resources later to make the tourists stay in the market by taxing the consumers to subsidize the tourism industries. However, as we have previously mentioned, resource redistribution is not the focus of this study.

Finally, in this research, we regard the tourist prices of the two countries as determined independently and do not affect each other with the very specific parameters. At the same time, transportation is also limited to the same round-trip costs. These variables must be altered in future studies. Furthermore, in reality, profits of tourism should have some ripple effects on other domestic industries through input-output relationships. Although we just focus on tourism industry in this research, it is better to extend this study to analyze the indirect effects.

Acknowledgement

The authors thank the referee for valuable comments.

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(Received October 27, 2017; accepted November 22, 2017)