Tourism and Industrial Agglomeration

Dao-Zhi Zeng* and Xiwei Zhu†

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Abstract

Tourism generates considerable income and employment in host countries and regions which substantially improves local economies. Meanwhile, the manufacturing sector remains the most important part in regional and national economies. This paper investigates their interdependence through a general-equilibrium analysis. On the one hand, a tourism boom is pro-industrialization because the income generated by tourism attracts more manufacturing firms and, on the other hand, de-industrialization for attracting labor from the manufacturing sector. We clarify conditions of trade balances in three sectors. The welfare analysis clarifies conditions for the smaller country to be better off, and conditions for the equilibrium to be optimal.

Keywords: Tourism, Industrial agglomeration, Dutch disease, Balance of trade

JEL Classifications: L83, R13, R58

1 Introduction

Over the past six decades, tourism has been one of the largest and fastest growing economic sectors. According to the World Tourism Organization (2008), over 903 million people traveled to a foreign country in 2007. International tourism receipts, combined with passenger transport, are currently more than US$ 856 billion. The export income generated by international tourism ranks fourth after fuels, chemicals, and automotive

*Graduate School of Information Sciences, Tohoku University, Sendai 980-8579, Japan. E-mail: zeng@se.is.tohoku.ac.jp.
†Center for Research of Private Economy, Zhejiang University, Zhejiang 310027, China. E-mail: xwzhu@zju.edu.cn.
products. Tourism generates considerable income and employment in host countries and regions, which substantially improves the local economies. Typical examples include Singapore, Thailand, Hong Kong, Cyprus, Maldives, Fiji, the Caribbean Islands, Tunisia, and Egypt. The governments of these countries have pursued aggressive policies to promote tourism. The success of these policies is supported by considerable economic studies on tourism (Sinclair and Stabler, 1997; Luzzi and Flückiger, 2003; Hazari and Sgro, 2004).

On the other hand, the manufacturing sector remains the most important actor in regional and national economies. In reality, a shift away from manufacturing can be detrimental. If the natural resources in the tourism sector begin to run out, people might worry that competitive manufacturing industries do not return as quickly or as easily as they left. Therefore, it is important for a regional policymaker to understand the effects of tourism on industrial development: does tourism result in pro-industrialization or de-industrialization?

Despite the importance of this topic, there are only a limited number of studies focusing on it, such as those by Corden and Neary (1982), Copeland (1991) and Hazari and Sgro (2004). The literature is not sufficient for two reasons. First, although the authors explore tourism economy by use of general-equilibrium models, their results are limited to small open economies, not applicable to larger countries such as China, India, and the United States, which have an impact on the international market. Secondly, those models cannot analyze the influence of the transport costs/tariffs of traded goods because the prices of imported goods are fixed. Therefore, their results do not show how regional integration is related to regional development, which is a particularly important issue in developing countries. The purpose of this paper is to shed light on the interaction between tourism and industrialization using a systematic analysis of a general equilibrium model in which both the tourism sector and the manufacturing sector are explicitly included.

Typical tourism goods are local amenities such as hot springs, beaches, mountains, nightlife, restaurant meals, and shopping opportunities. Strictly speaking, those services are non-tradable because their transport costs are infinite and their consumption must be at the same location of their production. In other words, those goods and services are not exportable in the traditional sense that their prices are determined in the local market rather than the international market. Therefore, following the literature (e.g., Copeland, 1991; Nowak et al., 2003; Hazari and Sgro, 2004), we call the tourism services non-traded goods. However, foreign consumption of tourism goods is possible as a result of tourists’ movement. Through tourism, these non-traded goods appear to be tradable. As a result, the import/export amount of travel and tourism is an important index of a
national economy in many countries.

Since the seminal paper of Komiya (1967), the importance of the non-traded good sector has been known to international economists. However, as in the literature of tourism economics, those models are also based on a small open economy. Furthermore, these authors assume homogeneous products and perfect competition in the manufacturing sector (the importing sector), which do not reflect the real world of numerous types of manufactured goods and a large share of intra-industry trade.

The dearth of general-equilibrium research on the interaction between tourism and industrialization in a relatively large country is mainly due to its complexity. Fortunately, recent techniques devised in the framework of New Economic Geography (NEG) have made it possible to establish a general equilibrium setting to disclose the interdependence between tourism and the rest of the economy, in particular the manufacturing sector. Started by a series of papers in the 1980s and 1990s (Krugman, 1980, 1991), NEG is concerned with how industrial agglomeration results from monopolistic competition, technology of increasing returns, and transport costs. Extensive reviews on this subject can be found in the books of Fujita et al. (1999), Fujita and Thisse (2002), and Baldwin et al. (2003). In the framework of NEG, countries are not limited to be small. Prices are not fixed but endogenously determined. The rapid development of NEG in recent years has made spatial economics a mainstream in trade theory and regional science.

By explicitly embedding a tourism sector into the so-called “footloose capital” (FC) model (Martin and Rogers, 1995; Baldwin et al., 2003), we are able to examine the tourism services and the manufacturing location together. The space consists of two countries: South, which is smaller, and North, which is larger. There are three sectors in our model. Two of them (the agricultural sector and the manufacturing sector) are standard in an NEG framework. The agricultural sector employs labor for its production, while the manufacturing sector uses labor and capital. In the additional tourism sector, we assume that the goods are produced by labor and a new factor: natural resources.\(^1\) For example, hot springs services are provided by prospecting and development of underground resource. The common factor of labor links the three sectors. As a result, more labor in one sector means less labor in the other two. The agricultural goods of the two countries

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\(^1\)We have two reasons to introduce the new factor. First, many tourism services are located on high mountains and long beaches, which are not suitable for agricultural production. Second, Tokarick (2006) suggests that a three-factors-three-goods model is more reasonable than the two-factors-three-goods model employed by Yano and Nugent (1999), who found that aid from one country to another may reduce the recipient’s welfare (known as the transfer paradox) by a general equilibrium model incorporating a non-traded good sector.
are homogeneous and freely transported between the countries; they are chosen as the numéraire. Manufactured goods are costly to be transported. In contrast, tourism goods are consumed by both domestic residents and foreign tourists (after paying certain travel costs).

To the best of our knowledge, this NEG model is the first general equilibrium model of tourism economics that does not have the small-open-economy limitation. The equilibrium analysis in this paper is a new way to examine whether a tourism boom results in de-industrialization. On the other hand, this paper also contributes to the literature on spatial economics in the following two respects. First, instead of adding a separate sector, Behrens (2004, 2005), Tabuchi and Thisse (2006), and Peng et al. (2006) treat non-traded goods as products in the manufacturing sector. While their results demonstrate the agglomeration patterns of non-traded goods, they do not disclose the interaction between tourism and industrialization. Secondly, although our model contains a new factor and a new sector, it remains highly tractable, which allows us to rigorously analyze equilibrium, welfare and trade balance.

Previewing our main results, the equilibrium analysis finds that the tourism sector may compete with the manufacturing sector for labor inputs, resulting in de-industrialization; however, tourism may also stimulate manufacturing since it induces more demand for manufactured goods. The net effect of a tourism boom is a tradeoff between the two opposite impacts. This theoretical result explains why empirical studies in the literature (Balaguer and Cantavella-Jorda, 2002; Dritsakis, 2004; Durbary, 2004; Kim et al., 2006; Oh, 2005) reveal an opposite relationship between a tourism boom and economic development. The result is also contrastive to the literature on resource curse and Dutch disease, indicating that the exploitation of natural resources results in a decline in the manufacturing sector.

In a rigorous analysis on the trade balance in each of the three sectors, we find that for the smaller country to be a net exporter of manufacturing goods, it must also be a net exporter of tourism goods. Its tourism sector needs to be relatively better developed than that of the larger country.

In welfare analysis, we find that if tourism is sufficiently attractive, residents in smaller countries may be better off than those in large countries. As opposed to Ottaviano et al. (2002) and Baldwin et al. (2003), we find that over-agglomeration and under-agglomeration are both possible in presence of the tourism sector.

A resident consumes foreign tourism goods by paying additional travel costs. Different from the transport costs of manufacturing goods, travel costs depend on the number of
trips rather than the consumption amount of tourism goods. We find that smaller travel costs attract more manufacturing firms in the resource abundant country, and increases trade imbalance in the manufacturing sector and the tourism sector.

The rest of this paper is organized as follows. The model is presented in Section 2. Section 3 provides the equilibrium analysis while Section 4 gives the trade balance analysis. Section 5 studies welfare. Then, we formalize the travel costs and examine their impacts on the equilibrium and welfare in Section 6. Finally, Section 7 summarizes the conclusions.

2 The model

We employ a model of NEG to characterize the manufacturing industry with imperfect competition, increasing returns, and transport costs. Specifically, we extend the FC model of Martin and Rogers (1995) by incorporating a tourism sector.

The global economy consists of two countries: South and North. There are three factors: labor, capital, and natural resources. The world population is denoted by $L^w$; $\Theta$ of them are in South, and $(1-\Theta)$ are in North. We assume that $\Theta < 1/2$; thus, South is smaller than North\(^2\). The world capital stock is denoted by $K^w$, equally shared by all the workers. Therefore, there are $\Theta K^w$ units of capital in South and $(1-\Theta)K^w$ units of capital in North. The world amount\(^3\) of natural resources are denoted by $S^w$: $\varepsilon$ of them are located in South and $1-\varepsilon$ of them, in North.

<table>
<thead>
<tr>
<th>Factor</th>
<th>South’s share</th>
<th>North’s share</th>
<th>World</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resource</td>
<td>$\varepsilon$</td>
<td>$1-\varepsilon$</td>
<td>$S^w$</td>
</tr>
<tr>
<td>Capital</td>
<td>$\Theta$</td>
<td>$1-\Theta$</td>
<td>$K^w$</td>
</tr>
<tr>
<td>Labor</td>
<td>$\Theta$</td>
<td>$1-\Theta$</td>
<td>$L^w$</td>
</tr>
</tbody>
</table>

The distribution of endowments are summarized in Table 2.1. We assume that labor and natural resources are immobile between countries but physical capital is mobile.

\(^2\)Note that many authors in the literature of New Economic Geography focus on the larger country North to analyze the agglomeration force in the manufacturing sector. In contrast, we concentrate on South for two reasons. First, if we embody South as Home and North as the rest of the world, then our framework is consistent with the fact that any country is smaller than the rest of the world. Second, we are interested in knowing whether the development of tourism in a smaller country can compensate its disadvantage in the manufacturing sector due to its smaller size.

\(^3\)The units of natural resources and tourism goods will be introduced later.
Denote the share of capital employed in South by $\theta$. The share in North is, therefore, $1 - \theta$. As in the literature of spatial economics (see Baldwin et al. 2003, p. 74), we straightforward assume that, in each country, $\Theta$ of its employed capital belongs to South and $1 - \Theta$ of the employed capital comes from North regardless of $\theta$. In other words, the employed capital in each country comes from two countries with the same ratio $\Theta/(1 - \Theta)$ for any $\theta$. Therefore, the average capital returns in two countries are always the same.

There are three kinds of products: the numéraire good $A$ produced in the agricultural sector, the composite manufactured good $M$ or $M^*$ produced in the manufacturing sector, the tourism goods $T$ and $T^*$ produced in the tourism sector. The preference of representative consumers in South and North is captured by the following Cobb-Douglas utility functions:

$$U = [T^\gamma(T^*)^{1-\gamma}]^\xi M^{(1-\xi)} A^{(1-\mu)(1-\xi)},$$
$$U^* = [T^\gamma(T^*)^{1-\gamma}]^\xi (M^*)^{(1-\xi)} A^{(1-\mu)(1-\xi)},$$

where parameters $\mu \in (0, 1)$, $\xi \in [0, 1)$, $\gamma \in [0, 1]$, and superscript variables pertaining to North are denoted by an asterisk. Note that $T$ and $T^*$ take a Cobb-Douglas form inside the tourism sector, and, therefore, they are differentiated. Meanwhile, the model degenerates to the traditional NEG model of two sectors when $\xi = 0$. If $\gamma = 1$ (resp. 0), tourism services are consumed in South (resp. North) only. Consuming the foreign tourism good requires traveling to the other country. To ease the burden of notations, we postpone the inclusion of travel costs until Section 6 by temporarily assuming costless travel.

The composite goods $M$ and $M^*$ are made up of a number of differentiated goods $i$

$$M = \left[ \int_0^n m(i)^{\frac{\sigma - 1}{\sigma}} di + \int_0^{n^*} m^*(i^*)^{\frac{\sigma - 1}{\sigma}} di^* \right]^{\frac{\sigma}{\sigma - 1}},$$
$$M^* = \left[ \int_0^n \overline{m}(i)^{\frac{\sigma - 1}{\sigma}} di + \int_0^{n^*} \overline{m}^*(i^*)^{\frac{\sigma - 1}{\sigma}} di^* \right]^{\frac{\sigma}{\sigma - 1}},$$

where an upper bar refers to variables related to imported varieties and $\sigma > 1$ is both the elasticity of demand for any variety and the elasticity of substitution between any two varieties. Notation $n$ represents the number of varieties in South, and $n^*$ represents the number of varieties in North.

Now, we turn to production. The agricultural sector supplies the homogeneous good under perfect competition using labor as the only input of a constant returns to scale tech-
nology. Without loss of generality, we normalize the productivity to one. The population in each country is assumed to be large enough for the country to produce the agricultural good. The transport of the agricultural good is free; therefore, the wages in two countries are the same, \( w = w^* = 1 \). The tourism sector supplies the tourism good under perfect competition using labor and natural resources under a constant returns to scale technology. We assume Leontief technology in its production. For simplicity, the unit of natural resources and the unit of tourism goods are chosen so that one unit of natural resources and one unit of labor\(^4\) produce one unit of tourism goods in both countries. Therefore, the costs of one unit of tourism services in two countries, South and North, are

\[
w + s \quad \text{and} \quad w^* + s^*,
\]

respectively, where \( s \) and \( s^* \) are the prices of natural resources in two countries. We will see in the equilibrium analysis that this Leontief technology helps us to capture the resource movement effect. The natural resources such as underground hot springs, beaches and mountains are owned by the national governments, and the rents \( s \) and \( s^* \) are uniformly distributed among local residents.

In the manufacturing sector, monopolistically competitive firms offer a continuum of varieties of differentiated goods using labor and capital under increasing returns to scale. We assume that firms can differentiate their products at no cost, and there is thus a one-to-one correspondence between firms and varieties. Then, it holds that \( n = \theta K^w \) and \( n^* = (1 - \theta)K^w \). We choose the units of manufactured goods and capital so that in order to produce \( m(i) \) units of variety \( i \), firm \( i \) incurs a fixed input requirement of one unit of capital and a marginal input requirement of \( (\sigma - 1)/\sigma \) units of workers; then, the total costs in South and North are

\[
r + \frac{\sigma - 1}{\sigma}wm(i) \quad \text{and} \quad r^* + \frac{\sigma - 1}{\sigma}w^*m(i),
\]

respectively, where \( r \) and \( r^* \) are the capital returns in South and North, respectively. With expenditure \( E \) in South and \( E^* \) in North, Southern consumption \( d \) and Northern

\(^4\)We assume that \( S^w \) is small enough so that the value of tourism services in two countries are completely consumed. Particularly, \( S^w = 0 \) if \( \xi = 0 \), which corresponds to the case of no tourism sector. This implies no production of tourism services if there is no demand so that our model is consistent with the traditional NEG model of two sectors.
consumption $\bar{d}^*$ of a typical product manufactured in South are

$$d = \frac{p^{-\sigma}}{P^{1-\sigma}} \mu(1 - \xi)E \quad \text{and} \quad \bar{d}^* = \frac{(\bar{p}^*)^{-\sigma}}{(P^*)^{1-\sigma}} \mu(1 - \xi)E^*, \quad (1)$$

respectively, where $P$ and $P^*$ are the price indices

$$P = \left[ \int_0^n p^{1-\sigma} ds + \int_0^{n^*} (\bar{p}^*)^{1-\sigma} ds^* \right]^{\frac{1}{1-\sigma}},$$

$$P^* = \left[ \int_0^n (\bar{p})^{1-\sigma} ds + \int_0^{n^*} (p^*)^{1-\sigma} ds^* \right]^{\frac{1}{1-\sigma}}.$$  

Assume Samuelson’s iceberg form of international transportation costs: $\tau > 1$ units of the manufactured good must be shipped for one unit to reach the other country. A typical manufacturing firm located in South sets prices to maximize its profit

$$\Pi = pd + \bar{p}^* \bar{d}^* - \frac{\sigma - 1}{\sigma} (d + \tau \bar{d}^*) - r. \quad (2)$$

According to (1), the first-order condition gives $p = 1$ and $\bar{p}^* = \tau$. Similar results, $p^* = 1$ and $\bar{p} = \tau$, hold for a typical firm in North. Therefore, the manufacturing price indices are simplified as

$$P = \left[ \theta + \phi(1 - \theta) \right] K^w \quad \text{and} \quad P^* = \left[ \phi \theta + 1 - \theta \right] K^w, \quad (3)$$

where $\phi = \tau^{1-\sigma} \in (0, 1)$ represents the trade freeness. A small $\tau$ corresponds to a large $\phi$. The prices of all goods are summarized in Table 2.2.

<table>
<thead>
<tr>
<th>Table 2.2: Various prices</th>
</tr>
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<tbody>
<tr>
<td></td>
</tr>
<tr>
<td>Labor</td>
</tr>
<tr>
<td>Natural Resources</td>
</tr>
<tr>
<td>Capital</td>
</tr>
<tr>
<td>Agricultural goods</td>
</tr>
<tr>
<td>Tourism goods</td>
</tr>
<tr>
<td>Manufactured goods</td>
</tr>
</tbody>
</table>

Due to the free entry of firms, the profit of any firm is zero. We then obtain the capital
returns from (2) as follows:

\[ r = \frac{\mu(1 - \xi)}{\sigma K^w} \left[ \frac{E}{\theta + \phi(1 - \theta)} + \frac{E^*}{\phi \theta + (1 - \theta)} \right], \]  
\[ r^* = \frac{\mu(1 - \xi)}{\sigma K^w} \left[ \frac{E}{\phi \theta + (1 - \theta)} + \frac{E^*}{\phi \theta + (1 - \theta)} \right]. \]  

(4)  

(5)

The expenditure consists of workers’ wages, the rents of capital and natural resources. Note that the natural resources of a country are owned by the government and their rent is shared among the national inhabitants.

\[ E = \Theta K^w[\theta r + (1 - \theta)r^*] + \Theta L^w + \varepsilon S^w s, \]  
\[ E^* = (1 - \Theta)K^w[\theta r + (1 - \theta)r^*] + (1 - \Theta)L^w + (1 - \varepsilon)S^w s^*. \]  

(6)  

(7)

Since all the tourism goods in two countries are consumed, rents \( s \) and \( s^* \) are nonnegative, and the above expenditures are positive:

\[ E > 0, \quad E^* > 0. \]  

(8)

Finally, for future reference, we introduce three more notations. Because labor is large enough for the agricultural good to be produced in two countries, the labor input in the traded sectors (including the agricultural sector and the manufacturing sector) is

\[ L^{\text{trade}} \equiv L^w - S^w > 0. \]  

(9)

When the resource share is different from the labor share (say, \( \varepsilon > \Theta \)), then extra labor

\[ L^{\text{move}} = (\varepsilon - \Theta)S^w \]

is employed in the tourism sector of South, which causes some loss in the traded sectors. This is called resource movement effect in the literature of non-traded goods (Corden and Neary, 1982).

Since the wages of workers are \( w = w^* = 1 \), the value of the extra labor is \( L^{\text{move}} \) again. Note that the total expenditure in the world is \( E^w \), the value share of the labor moving from the traded sector to the tourism sector is, therefore,

\[ Q^{\text{move}} \equiv \frac{L^{\text{move}}}{E^w}. \]  

(10)
The total worldwide spending on traded goods is \((1 - \xi)E^w\), and share \(\mu\) of it is the expenditure on manufactured goods. Mill pricing with a constant mark-up implies that the operating profit is simply the value of sales times \(1/\sigma\). A straightforward calculation reveals that the total payment to capital worldwide is \((\mu/\sigma)(1 - \xi)E^w\). Thus the labor value in the traded sector is \(L^{\text{trade}} = (1 - \xi)E^w - (\mu/\sigma)(1 - \xi)E^w\). We then obtain another expression for (10):
\[
Q^{\text{move}} = (1 - \xi)\frac{\sigma - \mu}{\sigma} \frac{L^{\text{move}}}{L^{\text{trade}}}. 
\]

3 Equilibrium

Physical capital moves in search of the highest nominal reward. To study the spatial equilibrium and its stability, following established tradition in spatial economics, we assume that markets for goods adjust instantaneously, while the international mobility of capital is relatively slow, which implies that wages adjust much faster than the capital share. In addition, following the literature, we apply the ad hoc dynamic system to describe the international factor flows:
\[
\dot{\theta} = (r - r^*)(1 - \theta)\theta. 
\]
(11)

This is adopted from replicator dynamics routinely used in evolutionary game theory and also used in standard textbooks, such as those by Fujita et al. (1999, p. 62) and Baldwin et al. (2003, p. 72). Intuitively, capital moves to South if \(r > r^*\), in proportion to the present shares \(\theta\) in South and \(1 - \theta\) in North. On the other hand, although our stability discussion is based on this dynamic system, Tabuchi and Zeng (2004) tell us that the stability does not depend on this specific dynamic system because it is a two-country model.

3.1 Interior equilibrium

To explore the essential relationship between the tourism and the manufacturing sectors, we first focus on interior equilibrium, in which \(r = r^*, \theta \in (0, 1)\). The market-clearing conditions in three sectors are examined as follows.

The agricultural sector is simple. Recall that the population in each country is large enough for the agricultural goods to be produced there. Let \(L_A\) and \(L^*_A\) be the agricultural labor in two countries. Then, the market-clearing condition of the agricultural good is
\[
L_A + L^*_A = (1 - \mu)(1 - \xi)(E + E^*). 
\]
The demands of tourism goods $T$ and $T^*$ are
\[
T = \frac{\gamma \xi E + \gamma \xi E^*}{p_T} = \frac{\xi \gamma}{1 + s}(E + E^*),
\]
\[
T^* = \frac{(1 - \gamma)\xi E + (1 - \gamma)\xi E^*}{p^*_T} = \frac{\xi(1 - \gamma)}{1 + s^*}(E + E^*).
\]
Let $L_T$ and $L^*_T$ be the labor demands in the tourism sectors. Note that producing one unit of the tourism goods requires one unit of labor. Then, it holds that
\[
L_T = \frac{\xi \gamma}{1 + s}(E + E^*),
\]
\[
L^*_T = \frac{\xi(1 - \gamma)}{1 + s^*}(E + E^*).
\]
On the other hand, since producing one unit of the tourism goods requires one unit of natural resources, we have
\[
\xi \gamma (E + E^*) = \varepsilon (1 + s) S^u, \tag{12}
\]
\[
\xi (1 - \gamma) (E + E^*) = (1 - \varepsilon) (1 + s^*) S^u. \tag{13}
\]
The previous section already explored the market-clearing conditions for the manufacturing sector and derived profit expressions (4) and (5).

In summary, we have six equations, (4), (5), (6), (7), (12), and (13), for six unknowns $E, E^*, r, r^*, s,$ and $s^*$. Solving them, we obtain
\[
E = \frac{\sigma L^{\text{trade}}}{\sigma - \mu} \frac{\Theta + \xi (\gamma - \Theta)}{1 - \xi} - Q^{\text{move}}, \tag{14}
\]
\[
E^* = \frac{\sigma L^{\text{trade}}}{\sigma - \mu} \frac{1 - \Theta + \xi (\Theta - \gamma)}{1 - \xi} + Q^{\text{move}}, \tag{15}
\]
\[
s = \frac{\sigma L^{\text{trade}}}{S^w} \frac{\xi \gamma - Q^{\text{move}}}{\varepsilon (1 - \xi) (\sigma - \mu) - \frac{\Theta}{\varepsilon}},
\]
\[
s^* = \frac{\sigma L^{\text{trade}}}{S^w} \frac{\xi(1 - \gamma) + Q^{\text{move}}}{(1 - \varepsilon)(1 - \xi)(\sigma - \mu)} - \frac{(1 - \Theta)}{1 - \varepsilon},
\]
\[
r = \frac{\mu L^{\text{trade}}}{K^w(\sigma - \mu)} \left\{ \frac{\Theta + \xi (\gamma - \Theta)}{\theta + \phi(1 - \theta)} + \phi \frac{1 - \Theta + \xi (\Theta - \gamma)}{1 - \theta + \phi \theta} \right\} - \frac{(1 - \theta)(1 - \phi^2)Q^{\text{move}}}{(1 - \theta + \phi \theta)\theta + \phi(1 - \theta)} \tag{16}
\]
\[
r^* = \frac{\mu L^{\text{trade}}}{K^w(\sigma - \mu)} \left\{ \frac{1 - \Theta + \xi (\Theta - \gamma)}{1 - \theta + \phi \theta} + \phi \frac{\Theta + \xi (\gamma - \Theta)}{\theta + \phi(1 - \theta)} \right\}
\]
\[
\theta(1 - \phi^2)Q_{\text{move}} \left\{ \frac{\theta(1 - \phi^2)Q_{\text{move}}}{(1 - \theta + \phi\theta)(\theta + \phi(1 - \theta))} \right\}, \tag{17}
\]

From (14), we know that the expenditure \(E\) increases in the share \(\gamma\) of tourism services in South and \(E^*\) decrease in \(\gamma\):

\[
\frac{\partial E}{\partial \gamma} = \frac{\sigma L^{\text{trade}}}{\sigma - \mu} \frac{\xi}{1 - \xi} > 0, \quad \frac{\partial E^*}{\partial \gamma} = -\frac{\sigma L^{\text{trade}}}{\sigma - \mu} \frac{\xi}{1 - \xi} < 0. \tag{18}
\]

The equilibrium share of the manufacturing firms is determined as follows.

**Proposition 1** At an interior equilibrium, the industrial share in South is

\[
\theta^e = \theta^0 + \theta^1 + \theta^\text{move}, \tag{19}
\]

where

\[
\theta^0 = \Theta - \left( \frac{1}{2} - \Theta \right) \frac{2\phi}{1 - \phi}, \tag{20}
\]

\[
\theta^1 = \frac{\xi(1 + \phi)(\gamma - \Theta)}{1 - \phi}, \tag{21}
\]

\[
\theta^\text{move} = -\frac{1 + \phi}{1 - \phi} Q^\text{move}. \tag{22}
\]

Furthermore, this equilibrium is always stable.

**Proof:** At an interior equilibrium, it holds that \(r = r^*\). Solving it we obtain the equilibrium distribution \(\theta^e\) of (19). Note that (16), (17) and (19) imply

\[
\left. \frac{d(r - r^*)}{d\theta} \right|_{\theta = \theta^e} = -\frac{\mu(1 - \phi)^2 L^{\text{trade}}}{K^w(\sigma - \mu)(1 - \theta + \phi\theta)(\theta + \phi(1 - \theta))}\bigg|_{\theta = \theta^e} < 0.
\]

Therefore, the interior equilibrium is always stable with respect to the dynamic system (11). \(\square\)

Meanwhile, at equilibrium \(\theta^e\), the common capital rent in two countries is

\[
r = r^* = \frac{\mu L^{\text{trade}}}{(\sigma - \mu)K^w}.
\]

This expression is independent of the natural resource share \(\varepsilon\). The reason is that capital is not used in the tourism sector.
The expression $\theta^0$ of (19) is the firm share in South when there is no tourism sector as in a standard NEG model. The larger country North attracts a more-than-proportionate share of firms in a monopolistically competitive industry. This is called the home market effect (HME) in the literature (Krugman, 1980; Helpman and Krugman, 1985; Fujita et al., 1999).

The impact of tourism sector on the manufacturing sector can be seen from $\theta^I$ of (21) and $\theta^{move}$ of (22). Specifically, $\theta^I$ represents the income effect of Southern tourism services. This term is positive iff $\gamma > \Theta$, i.e., the tourism services in South is more-than-proportionate preferred to that of North. Note that the positiveness of $\theta^I$ does not require $\gamma > 1/2$. This is because Northern consuming population $(1 - \Theta)L$ of $T$ is more than Southern consuming population $\Theta L$ of $T^*$. Meanwhile, this income effect is larger when trade is freer and/or the tourism sector is more important, because

$$\frac{\partial}{\partial \phi} \frac{\xi(1 + \phi)}{1 - \phi} > 0, \quad \frac{\partial}{\partial \xi} \frac{\xi(1 + \phi)}{1 - \phi} > 0.$$

In contrast, $\theta^{move}$ captures the (labor) resource movement effect. This term is positive iff $\varepsilon < \Theta$, i.e., South has less-than-proportionate natural resource. In other words, a disadvantage in natural resources results in a more agglomerated manufacturing share there. This is consistent with the resource curse in the literature (see Auty, 1993), saying that countries with an abundance of natural resources tend to have less economic growth than countries without these natural resources. This result is derived from our assumptions of the Cobb-Douglas utility function and the Leontief technology in the production of tourism services. Intuitively, since the consumption share on the tourism services is fixed, the less the tourism goods, the higher are their prices. Due to the Leontief technology, the natural resources income in a country with less natural resources is higher, which attracts more manufacturing firms according to the income effect. This is enlarged by the resource movement effect: less natural resource requires less labor in the tourism sector and more labor can be employed in the manufacturing sector. Moreover, the resource movement effect is larger when trade is freer and/or the tourism sector is less important, because

$$\frac{\partial}{\partial \phi} \frac{1 + \phi}{1 - \phi} > 0, \quad \frac{\partial |Q^{move}|}{\partial \xi} < 0.$$

To attract more firms in the manufacturing sector, the income effect and the resource movement effect tell us that we need a higher quality rather than a larger quantity of tourism service. This is because two effects increases $\theta^e$ when $\gamma > \Theta$ and $\varepsilon < \Theta$. We will
come back to this point in Section 3.2.

Researchers in spatial economics find that it is often hard to detect the HME in empirical studies (e.g., Davis and Weinstein, 1999, 2003). Basically, this is because the real world is much more complicated than the two-sector models of HME in the literature. Incorporating the tourism sector, $1 - \theta^e > 1 - \Theta$ holds (i.e., the HME in the larger country can be observed) if and only if

$$\frac{\phi}{1 + \phi}(1 - 2\Theta) + \xi(\Theta - \gamma) + Q^{move} > 0.$$  \hspace{1cm} (23)

The LHS of (23) is increasing in $\phi$. Therefore, (23) is easier to be satisfied for a larger $\phi$ (freer trade). The LHS is decreasing in $\gamma$, which means that the Northern manufacturing share is larger if the Southern tourism services are less preferred. On the other hand, the LHS is increasing in $\epsilon - \Theta$ (through $Q^{move}$). Therefore, the HME is less explicit if the share of natural resources in South is smaller.

This equilibrium result allows us to revisit the well-known Dutch disease in the literature. In the 1960s, the discoveries of natural gas in the Netherlands inflicted some adverse effects on the manufacturing sector. The Dutch disease was first studied by Corden and Neary (1982), who developed a small open economy model and clarified how the exploitation of natural resources is related to a decline in the manufacturing sector. Corden and Neary (1982) use two effects, namely the resource movement effect and the spending effect, to identify the impact of a resource boom on the economy. In the resource movement effect, the resource boom will increase the demand for labor, which will cause production to shift toward the booming sector, away from the manufacturing sector. In their small open economy model, the de-industrialization is strengthened by the spending effect, which results from the extra revenue generated by the resource boom. It increases the demand for labor in the non-tradable sector, further shifting labor away from the manufacturing sector.

### 3.2 Tourism boom

Some authors, such as Copeland (1991), Nowak et al. (2003), Hazari et al. (2003), Chao et al. (2006), and Nowak and Sahli (2007), have applied the non-traded-good model to tourism study and examined the interdependence between tourism and the rest of the economy. The assumption of a small open country is kept in all papers and their results show that a tourism boom may bring losses in various economies. On the other
hand, empirical studies show that the relation between a tourism boom and economic development is uncertain, even in small countries. For example, Balaguer and Cantavella-Jorda (2002), Dritsakis (2004), Durbary (2004), and Kim et al. (2006) find that tourism is a major factor of overall long-run economic growth in Spain, Greece, Mauritius and Taiwan, while Oh (2005) argues that tourism expansion does not cause economic growth in South Korea.

In contrast, our framework illustrates that the spending effect works opposite to the resource moving effect and the net effect is thus a tradeoff between them. Specifically, a tourism boom in South can be described by the following three aspects.

(i) a larger $\varepsilon$, which results in a larger supply of Southern tourism services;

(ii) a larger $\gamma$, which represents a larger demand of Southern tourism services;

(iii) a larger $\xi$, which represents a larger demand for tourism.

Noting that $\theta^{\text{move}}$ of (22) is decreasing in $\varepsilon$ (through $Q^{\text{move}}$), the resource movement effect is observed in (i). This confirms that a simple increase in the quantity of Southern natural resources causes de-industrialization in the country. On the other hand, the expenditure in South increases through (ii) because $E$ of (15) increases in $\gamma$ (see (18)). Different from the small-open-economy model, this spending effect, represented by the income effect in $\theta^I$, increases the manufacturing share in South. In fact, we have

$$\frac{\partial \theta^I}{\partial \gamma} = \frac{\xi(1 + \phi)}{1 - \phi} > 0.$$  

In other words, a quality improvement of Southern tourism services increases $\gamma$, which results in pro-industrialization rather than de-industrialization in South. Intuitively, the price of imported goods is endogenously determined in our setup, which is different from the small-open-economy model of Corden and Neary (1982). For this reason, a larger $\gamma$ results in larger revenue in South, which causes more Southern expenditure on manufactured goods and attracts more firms coming to South. In total, the net effect of a tourism boom on the manufacturing share is a tradeoff between the de-industrialization effect of (i) and the pro-industrialization of (ii).

We can see the tradeoff relationship again in (iii). For simplicity, we analyze a special case that South is the only country having tourism, i.e., $\varepsilon = 1$, $\gamma = 1$. This is very close to the European situation that most tourism resources are concentrated in the Southern
part like Italy. In this case, (19) is simplified as

$$\theta^e = \Theta - \left(\frac{1}{2} - \Theta\right) \frac{2\phi}{1 - \phi} + \frac{(1 + \phi)(1 - \Theta)}{(1 - \phi)\sigma L^{\text{trade}} + (\sigma - \mu)S_w} \left[ \xi - \frac{(\sigma - \mu)S_w}{\sigma L^{\text{trade}} + (\sigma - \mu)S_w} \right].$$

The first two items represent the industry share in South without tourism. The last term is positive iff

$$\xi > \xi^\sharp = \frac{(\sigma - \mu)S_w}{\sigma L^{\text{trade}} + (\sigma - \mu)S_w}.$$

Therefore, if the tourism boom is big enough such that $\xi > \xi^\sharp$, then the spending effect is stronger than the resource moving effect, and the tourism is pro-industrialization. Otherwise, the resource moving effect dominates and the industry share decreases.

### 3.3 Equilibrium path

The previous analysis tells us how the interior equilibrium depends on various parameters. As in other footloose capital model, the unique interior equilibrium $\theta^e$ evolves to a stable corner equilibrium if the value $\theta^e$ of (19) is outside (0,1). To obtain a whole evolving path with respect to increasing trade freeness, below we remove the comparative advantage in natural resources and assume that South has a better tourism sector:

$$\varepsilon = \Theta, \quad \gamma > \Theta.$$  \hspace{1cm} (24)

The first condition removes the resource movement effect and the second condition means that the tourism services in South is more-than-proportionate preferred to that of North.

Under (24), (19) is simplified as

$$\theta^e = \Theta - \left(\frac{1}{2} - \Theta\right) \frac{2\phi}{1 - \phi} + \frac{\xi(1 + \phi)(\gamma - \Theta)}{1 - \phi}.$$  

Let

$$\tilde{\phi} \equiv \frac{\Theta + \xi(\gamma - \Theta)}{1 - \Theta - \xi(\gamma - \Theta)}, \quad \xi = \frac{1 - 2\Theta}{2(\gamma - \Theta)}, \hspace{1cm} (25)$$

We focus on the following two cases.\(^5\)

- Case I: The tourism in South is not important enough in the sense that $\gamma < 1/2$, or

\(^5\)We exclude a critical case of $\gamma \geq 1/2$, $\xi = \tilde{\xi}$, in which $\theta^e = 1/2$ always hold.
\( \gamma \geq 1/2 \) and \( \xi < \tilde{\xi} \);

- Case II: The tourism in South is important in the sense that \( \gamma \geq 1/2 \) and \( \xi > \tilde{\xi} \).

In Case I, \( \theta^e \) decreases in \( \phi \) and reaches 0 at \( \tilde{\phi} \). Therefore, the tourism in South is not effective enough to defeat the HME in the larger country, and the manufacturing sector leaves South completely when trade is free enough.

To the contrary, in case II, \( \theta^e \) increases in \( \phi \) and reaches 1 at \( 1/\tilde{\phi} \). The Southern tourism is strong enough to generate higher income so that manufacturing firms locate there completely when trade is free enough.

Figure 1: Equilibrium

Figure 1 illustrates the evolving paths with respect to increasing \( \phi \) in these two cases.

4 Balance of Trade

Traditionally, a good or service is called tradable if it can be sold in another location distant from where it was produced. Therefore, the tourism goods are non-tradable in the absence of tourism. However, because of the tourism, those local services look tradable. As a result, we are able to examine the trade balance at equilibrium \( \theta^e \) in the tourism sector, together with the tradable manufacturing and agricultural sectors.
4.1 The manufacturing sector

The manufacturing output in South is \( \theta^e K^w \sigma r \), and the total demand in South is \( \mu(1-\xi)E \). Therefore, the net export in the manufacturing sector of South is

\[
\text{Net}^M = \theta^e K^w \sigma r - \mu(1-\xi)E = -\frac{2\mu\sigma \phi[\frac{1}{2}(1-2\Theta) + \xi(\Theta - \gamma) + Q^\text{move}]}{\sigma - \mu)(1-\phi)}L^{\text{trade}}. \tag{26}
\]

We then know that South imports manufacturing goods in net (or the bigger country North exports manufactured goods in net) if and only if

\[
\frac{1}{2}(1-2\Theta) + \xi(\Theta - \gamma) + Q^\text{move} > 0. \tag{27}
\]

Therefore, if the Southern tourism services are more preferable and/or the Southern natural resources are fewer, then the manufacturing sector in North exports less. Condition (27) is quite close to condition (23) of HME but they are different. First, (27) is independent of \( \phi \), while (23) is increasing in \( \phi \). Secondly, (27) is weaker than (23). In other words, (27) is automatically satisfied if (23) holds.

Two more remarks follow. On the one hand, (27) is satisfied in Case I of Section 3.3. Therefore, for the smaller country South to be able to export manufactured goods in net, it is necessary to let the Southern tourism be more attractive than the larger country North as in Case II when \( \varepsilon = \Theta \). On the other hand, the absolute value of (26) is an increasing function of \( \phi \). Therefore, the imbalance in the manufacturing sector increases in trade freeness.

4.2 The tourism sector

The consumption of tourism services in South by consumers from North is measured by \( \gamma \xi E^* \), while Southern consumption of Northern tourism services is \( (1-\gamma)\xi E \). The net export in the tourism sector of South is

\[
\text{Net}^T = \gamma \xi E^* - (1-\gamma)\xi E = \frac{\sigma \xi L^{\text{trade}}}{\sigma - \mu}(Q^\text{move} + \gamma - \Theta). \tag{28}
\]

Therefore, South exports tourism services in net iff

\[
(1-\xi)(\gamma - \Theta) + Q^\text{move} > 0. \tag{28}
\]
(28) holds if $\varepsilon \geq \Theta$ and $\gamma > \Theta$. Therefore, the North imports in net the tourism service in both cases I and II of Section 3.3.

### 4.3 The agricultural sector

The labor demands in the manufacturing sector and the tourism sector in South are

$$L_M = \frac{\sigma - 1}{\sigma} \mu (1 - \xi) (1 + \phi) \frac{\theta^e E}{\theta^e + \phi (1 - \theta^e)} = \theta^e K^w r (\sigma - 1),$$

$$L_T = \frac{\xi \gamma}{1 + s} (E + E^*) = \varepsilon S^w,$$

respectively. The labor input in the agricultural sector is then $L_A = \Theta L^w - L_M - L_T$, and the agricultural production in South is

$$Q^A = \Theta L^w - \theta^e K^w r (\sigma - 1) - \varepsilon S^w.$$

Since the consumption in South is $(1 - \mu)(1 - \xi)E$, the net export of South is

$$Net^A = Q^A - (1 - \mu)(1 - \xi)E$$

$$= \frac{\sigma L^{\text{trade}}}{(\sigma - \mu)(1 - \phi)} \left\{ \frac{2(1 - \xi) \mu \phi - \xi (1 - \phi)}{(1 - \xi)} Q^{\text{move}} \right.$$ 

$$+ (2\Theta - 1)[\xi (1 - \phi) - \mu \phi (1 - \xi)] + \xi (1 - \gamma - \Theta) (1 - \phi)$$

$$+ \xi \mu \phi (1 - 2\gamma) \right\} + (\theta^e - \Theta) \frac{\mu}{\sigma - \mu} L^{\text{trade}}.$$

Recall that the agricultural good is the numéraire in our model and is used to balance all trades between two countries. Therefore, the following trade balance in all sectors holds:

$$Net^A = (\theta^e - \Theta) K^w r - Net^M - Net^T.$$

### 4.4 No resource advantage

Having more natural resources in South corresponds to a larger $Q^{\text{move}}$. From (27) and (28), we know that resource abundance in South helps South to become a net importer of manufacturing goods and a net exporter of tourism goods.

To derive more clear results, we now consider the case of $\varepsilon = \Theta$ so that $Q^{\text{move}} = 0$. In this case, there is no resource advantage between two countries. Then, we have:
Proposition 2 (i) South exports tourism services in net iff the income effect $\theta^I$ is positive. (ii) If South exports manufacturing goods in net, then South also exports tourism services and imports agricultural goods in net.

Proof: (i) From (28), we know that South exports tourism services in net iff $\gamma > \Theta$, which is equivalent to $\theta^I > 0$ from (21). (ii) If South exports manufacturing goods in net, then it holds that
\[
\frac{1 - 2\Theta}{2} + \xi(\Theta - \gamma) < 0
\]
from (26), which implies $\gamma - \Theta > (1 - 2\Theta)/(2\xi) > 0$. Therefore, South also exports tourism services in net. Finally, from (29), we have $\gamma > 1/2$ and $\xi > \tilde{\xi}$, where $\tilde{\xi}$ is defined in (25). Then $\text{Net}^A$ decreases in $\xi$ and it takes negative value at $\tilde{\xi}$. Therefore, $\text{Net}^A < 0$ holds in this case. $\square$

The reverse of (ii) may not be true. For example, South exports tourism services in net but imports manufacturing goods in net in Case I of Section 3.3.

5 Welfare

Our analytically solvable model allows us to do more analysis on welfare, which is important for policy making. Let $y$ and $y^*$ be the individual income in South and North, respectively. The indirect utility functions in two countries are as follows.

\[
V = \frac{y}{\text{CPI}}, \quad V^* = \frac{y^*}{\text{CPI}^*},
\]

where CPI and CPI* are the consumer price indices in two countries:

\[
\text{CPI} = \left(\frac{p_T}{\gamma \xi}\right)^{\gamma} \left[\frac{p_T^*}{(1 - \gamma) \xi}\right]^{(1 - \gamma) \xi} \left[\frac{P}{\mu (1 - \xi)}\right]^{\mu (1 - \xi)} \left[\frac{1}{(1 - \mu)(1 - \xi)}\right]^{(1 - \mu)(1 - \xi)},
\]

\[
\text{CPI}^* = \left(\frac{p_T}{\gamma \xi}\right)^{\gamma} \left[\frac{p_T^*}{(1 - \gamma) \xi}\right]^{(1 - \gamma) \xi} \left[\frac{P^*}{\mu (1 - \xi)}\right]^{\mu (1 - \xi)} \left[\frac{1}{(1 - \mu)(1 - \xi)}\right]^{(1 - \mu)(1 - \xi)},
\]

and where $P$ and $P^*$ are the price indices of the manufactured goods shown in (3).

For convenience, this section assumes (24).

5.1 Is the larger country better off?

Since the workers are immobile, consumer welfare may not be equalized at equilibrium. We first address the following questions: Is the tourism sector related to the relative
equity of two countries? If so, who is better off?

For this purpose, let us examine the revenue from the tourism sector. According to (24), the resource price differential is simplified as

\[ s - s^* = \frac{\sigma(\gamma - \Theta)\xi L^\text{trade}}{(\sigma - \mu)(1 - \Theta)(1 - \xi)S^w} > 0. \]

Therefore, the resource price in the smaller country, South, is higher than that of the larger country, North. This is because of a larger demand in the smaller country under (24).

Meanwhile, the larger country may benefit from the manufacturing agglomeration. The per capita income can be calculated from (14), (15) and (24) as

\[\begin{align*}
y &= \frac{E}{\Theta L^w} = \frac{\sigma[\gamma \xi + \Theta(1 - \xi)]}{(\sigma - \mu)(1 - \xi)} \frac{L^\text{trade}}{L^w}, \\
y^* &= \frac{E^*}{(1 - \Theta)L^w} = \frac{\sigma[1 - \gamma \xi - \Theta(1 - \xi)]}{(\sigma - \mu)(1 - \xi)(1 - \Theta)} \frac{L^\text{trade}}{L^w}.
\end{align*}\]

Therefore, the welfare ratio of two countries can be written as

\[\frac{V}{V^*} = \frac{y}{y^*} \frac{\text{CPI}}{\text{CPI}^*} = \frac{1 - \Theta}{\Theta} \left[ \frac{\gamma \xi + (1 - \xi)\Theta}{1 - \gamma \xi - \Theta(1 - \xi)} \right]^{1 + \frac{\mu(1 - \xi)}{\sigma - 1}}.\]

**Proposition 3** There exists \( \xi^* \in (0,1) \) such that residents in South is better off than those in North if \( \xi > \xi^* \).

**Proof:** We have

\[ \lim_{\xi \to 1} \frac{V}{V^*} = \frac{1 - \Theta}{\Theta} \left( \frac{\gamma}{1 - \gamma} \right) > 1 \]

for both interior and corner equilibria, where the inequality is from (24). The conclusion holds since \( V/V^* \) is continuous in \( \xi \). \( \blacksquare \)

The result tells us that, if tourism is sufficiently attractive and people consume international tourism services, a smaller country provides a higher utility than a larger one. This explains why many countries promote international tourism to improve their domestic economies. Hong Kong, Singapore and Luxembourg are typical examples of small countries (districts) with a high degree of economic prosperity. All of them are successful in developing their tourism sectors.
5.2 Second-best criterion

Now we turn to the efficiency problem. We try to answer whether a global planner with a utilitarian social welfare function can improve the decentralized equilibrium. For this purpose, we compare the previous equilibrium industrial distribution with the optimal distribution. We first consider the second best criterion, in which the planner is able to control the location of firms, but she is not able to control the labor and product prices.

The planner maximizes the welfare of the whole world, which is simply the sum of indirect utility across all individuals:

\[ W = \left[ \Theta \frac{y}{\text{CPI}} + (1 - \Theta) \frac{y^*}{\text{CPI}^*} \right] L^w = \frac{E}{\text{CPI}} + \frac{E^*}{\text{CPI}^*}, \]

where \( E \) and \( E^* \) are given in (6) and (7), respectively.

Note that \( s \) and \( s^* \) are independent of \( \theta \). We then have

\[
\begin{align*}
\frac{1}{\text{CPI}} \frac{d\text{CPI}}{d\theta} &= \frac{\mu(1 - \xi)}{1 - \sigma} \frac{1 - \phi}{\theta + \phi(1 - \theta)}, \\
\frac{1}{\text{CPI}^*} \frac{d\text{CPI}^*}{d\theta} &= -\frac{\mu(1 - \xi)}{1 - \sigma} \frac{1 - \phi}{\phi \theta + 1 - \theta}, \\
d\frac{E}{d\theta} &= \Theta K^w (r - r^*), \quad d\frac{E^*}{d\theta} = (1 - \Theta) K^w (r - r^*).
\end{align*}
\]

Then we have

\[
\frac{dW}{d\theta} = K^w (r - r^*) \left( \frac{\Theta}{\text{CPI}} + \frac{1 - \Theta}{\text{CPI}^*} \right) + \frac{\mu(1 - \phi)(1 - \xi)}{(1 - \sigma)} \left[ \frac{1}{\text{CPI}^*} \frac{E^*}{\phi \theta + 1 - \theta} - \frac{1}{\text{CPI}} \frac{E}{\theta + \phi(1 - \theta)} \right]. \tag{30}
\]

The optimal distribution \( \theta^* \) can be obtained by solving equation \( dW/d\theta = 0 \). Unfortunately, our general framework does not allow an analytical solution for this equation.

Nevertheless, we are able to examine whether the optimum is reached at the equilibrium. To do so, note that it holds at interior equilibrium \( \theta^e \) that

\[
\begin{align*}
\frac{r}{\theta^e} &= \frac{r^*}{\theta^e}, \\
\frac{E^*}{\theta + \phi(1 - \theta)} |_{\theta = \theta^e} &= \frac{E}{\theta + \phi(1 - \theta)} |_{\theta = \theta^e},
\end{align*}
\]

so that

\[
\frac{dW}{d\theta} |_{\theta = \theta^e} = \frac{\mu(1 - \phi)(1 - \xi)}{1 - \sigma} \frac{E}{\theta + \phi(1 - \theta)} \frac{1}{\text{CPI}^* - 1} |_{\theta = \theta^e}.
\]
Therefore, the equilibrium satisfies the FOC of the optimality iff
\[
\left. \frac{\text{CPI}}{\text{CPI}^*} \right|_{\theta = \theta^e} = 1.
\]

The following proposition shows that this condition is unlikely to be satisfied. Since North is larger, most NEG models in the literature investigate the agglomeration in North. For the convenience of comparison, we are interested to know whether the agglomeration in North is too much or not enough. As in Section 3.3, we focus on Cases I and II.

**Proposition 4** (1) In Case I, the manufacturing industry is under-agglomerated in North when \( \phi < \tilde{\phi} \), and the optimum coincides with the equilibrium when \( \phi \geq \tilde{\phi} \).

(2) In Case II, the manufacturing industry is over-agglomerated in North when \( \phi < 1/\tilde{\phi} \), and the optimum coincides with the equilibrium when \( \phi \geq 1/\tilde{\phi} \).

**Proof:** Case I. According to our analysis in previous section, the equilibrium \( \theta^e \) is interior when \( \phi < \tilde{\phi} \). For such an equilibrium we have
\[
\left. \frac{\phi \theta + 1 - \theta}{\theta + \phi(1 - \theta)} \right|_{\theta = \theta^e} = \left. \frac{E^*}{E} \right|_{\theta = \theta^e} = \frac{1 - \gamma \xi - \Theta(1 - \xi)}{\gamma \xi + \Theta(1 - \xi)} > 1.
\]

Then it holds that
\[
\left. \frac{\text{CPI}}{\text{CPI}^*} \right|_{\theta = \theta^e} = \left( \frac{E^*}{E} \right)^{\frac{\nu(1 - \xi)}{\sigma - 1}} > 1.
\]

Therefore, \( d(W/L_w)/d\theta|_{\theta = \theta^e} < 0 \) holds, which implies that the total welfare will be improved if more manufacturing firms move to North. In other words, the manufacturing industry in North is under-agglomerated at any interior equilibrium. As a result, the optimal share \( \theta^* \) of manufacturing firms in South does not exceed the equilibrium share \( \theta^e \), as shown in Figure 2. For this reason, we know that \( \theta^* = \theta^e = 0 \) when \( \phi \geq \tilde{\phi} \).

Case II can be shown similarly. \( \square \)

The above proposition says that if tourism goods in South is more preferred (i.e. \( \gamma \geq 1/2 \)) and tourism services are important (i.e., \( \xi \) is large), then less agglomeration in North is better. Otherwise, more agglomeration in North is better.

In Baldwin et al. (2003) (Chapter 11, P.258), the authors assume an exogenously determined level of capital returns. For this reason, they obtain a result (Result 11.9 on P. 261) that the equilibrium coincides with the optimum when there is no comparative advantage in the capital ratio of two countries. In our model, however, capital returns are endogenously determined. Furthermore, because of the tourism sector, per capita incomes
$y$ and $y^*$ are different. Both of them depend on the industrial distribution $\theta$. Proposition 4 shows that the equilibrium usually do not coincide with the optimum. Particularly, we find that the agglomeration in North is not enough even when there is no tourism sector (i.e., $\xi = 0$).

Based on a quasi-linear framework, Ottaviano et al. (2002) provide a comparison between the equilibrium and the optimum in a core-periphery model. They find possible over-agglomeration for some parameters. In their setup, mobile workers move according to their real wage. In contrast, the capital moves according to the nominative profit in our footloose-capital model. Therefore, at equilibrium, the larger country is more attractive in Ottaviano et al. (2002) than in our framework. In fact, Proposition 4 claims under-agglomeration in North rather than over-agglomeration when there is no tourism sector (i.e., $\xi = 0$).

5.3 First-best criterion

In the first-best criterion, a planner is able to control the product prices as well as the location of firms. The first-best prices of manufactured goods are set as the marginal cost $(\sigma - 1)/\sigma$. 

Figure 2: Equilibrium and optimum
The welfare of the whole world is
\[
\hat{W} = \left[ \Theta \tilde{y}_{\text{CPI}} + (1 - \Theta) \tilde{y}^*_{\text{CPI}} \right] L^w = \frac{\tilde{E}}{\text{CPI}} + \frac{\tilde{E}^*}{\text{CPI}},
\]
where
\[
\tilde{E} = \Theta(L^w + S^w \tilde{s}), \tag{31}
\]
\[
\tilde{E}^* = (1 - \Theta)(L^w + S^w \tilde{s}^*), \tag{32}
\]
\[
\tilde{CPI} = \left( \frac{\tilde{p}_{\text{T}}}{\gamma \xi} \right)^{(1-\gamma)\xi} \left( \frac{\tilde{p}_{\text{T}}}{(1 - \gamma)\xi} \right)^{(1-\gamma)\xi} \left[ \frac{\tilde{P}}{\mu(1 - \xi)} \right]^{\mu(1-\xi)} \left[ \frac{1}{(1 - \mu)(1 - \xi)} \right]^{(1-\mu)(1-\xi)},
\]
\[
\tilde{CPI}^* = \left( \frac{\tilde{p}_{\text{T}}}{\gamma \xi} \right)^{(1-\gamma)\xi} \left( \frac{\tilde{p}_{\text{T}}}{(1 - \gamma)\xi} \right)^{(1-\gamma)\xi} \left[ \frac{\tilde{P}^*}{\mu(1 - \xi)} \right]^{\mu(1-\xi)} \left[ \frac{1}{(1 - \mu)(1 - \xi)} \right]^{(1-\mu)(1-\xi)},
\]
\[
\tilde{p}_T = 1 + \tilde{s}^*,
\]
\[
\tilde{p}_{\text{T}} = 1 + \tilde{s},
\]
\[
\tilde{P} = \frac{\sigma - 1}{\sigma} \left\{ [\theta + \phi(1 - \theta)] K^w \right\}^{\frac{1}{1-\sigma}},
\]
\[
\tilde{P}^* = \frac{\sigma - 1}{\sigma} \left\{ [\phi \theta + (1 - \theta)] K^w \right\}^{\frac{1}{1-\sigma}}.
\]
Together with (31) and (32), the following two equations
\[
\xi \gamma (\tilde{E} + \tilde{E}^*) = \Theta(1 + \tilde{s})S^w,
\]
\[
\xi (1 - \gamma)(\tilde{E} + \tilde{E}^*) = (1 - \Theta)(1 + \tilde{s}^*)S^w.
\]
determine four variables, \( \tilde{s}, \tilde{s}^*, \tilde{E} \) and \( \tilde{E}^* \), as follows.
\[
\tilde{E} = \frac{\Theta + \xi(\gamma - \Theta)}{1 - \xi} L^{\text{trade}}, \tag{33}
\]
\[
\tilde{E}^* = \frac{1 - \Theta + \xi(\Theta - \gamma)}{1 - \xi} L^{\text{trade}},
\]
\[
\tilde{s} = \frac{\xi \gamma}{\Theta(1 - \xi)S^w L^{\text{trade}}} - 1,
\]
\[
\tilde{s}^* = \frac{\xi (1 - \gamma)}{(1 - \Theta)(1 - \xi)S^w L^{\text{trade}}} - 1. \tag{34}
\]
None of them depends on \( \theta \) directly. Therefore, the derivatives
\[
\left. \frac{d\hat{W}}{d\theta} \right|_{\theta = \theta^*} = \left. \frac{dW}{d\theta} \right|_{\theta = \theta^*}
\]
25
are exactly the same. The previous analysis about the second-best criterion remains true for the first-best criterion, although we do not precisely know the first- and the second-best outcomes.

Note that we do not conclude that the first-best and the second-best outcomes are the same. In fact, they are different, because the first term of (30) for the second-best outcome does not appear in the first-best analysis at all.

6 Travel costs

Since tourism is a movement of tourists to consume the non-traded good, travel costs are evidently a significant factor for the growth of tourism.

Different from the transport costs of manufacturing goods, travel costs depend on the number of trips rather than the consumption amount of tourism goods. However, we can employ a similar technology to those of von Thünen (1826) and Samuelson (1952) to model the travel costs. Specifically, we assume that a tourist travels by a wagon pulled by a horse. To feed the horse, \( C \) units of the agricultural good are consumed. An alternative explanation is that a tourist travels on foot. A resident’s working time is the remains of the fixed total time subtracted by the travel time. The two stories agree well with the fact that travel costs may appear in either money or time.

We assume that the number of trips is the same for all residents to consume domestic and foreign tourism goods. All residents, therefore, pay the same total travel cost \( C \). Including the travel cost, (9), (6), (7), (31) and (32) are rewritten as

\[
L^{\text{trade}} = (1 - C)L^w - S^w (> 0),
\]
\[
E = \Theta K^w[\theta r + (1 - \theta)r^*] + \Theta L^w(1 - C) + \varepsilon S^w s,
\]
\[
E^* = (1 - \Theta)K^w[(\theta r + (1 - \theta)r^*) + (1 - \Theta)L^w(1 - C) + (1 - \varepsilon)S^w s^*],
\]
\[
\tilde{E} = \Theta L^w(1 - C) + \varepsilon S^w \tilde{s},
\]
\[
\tilde{E}^* = (1 - \Theta) L^w(1 - C) + (1 - \varepsilon)S^w \tilde{s}^*.
\]

The following three results tells how the results in the previous sections are related to the travel costs.

(i) After solving the new equations, we obtain the same expressions of (14)\sim(19). Therefore, the absolute value of \( \theta^{\text{move}} \) of (22) increases in \( C \), which implies that smaller travel costs attract more manufacturing firms in the resource abundant country.
(ii) Expressions (33)∼(34) still hold. Therefore, our previous conclusions on the relationship between welfare and equilibrium, as well as the relationship between the first-best and the second-best criteria are not changed by the inclusion of travel cost.

(iii) Since $L^{\text{trade}}$ decreases in $C$, smaller travel costs result in larger trade imbalance in the manufacturing sector and the tourism sector.

7 Conclusions

The contribution of this paper is fourfold. First, this paper establishes a rich model to examine the relationship between tourism and industrial location. This NEG framework includes three sectors: manufacturing, agricultural, and tourism. Different from those presented in the literature on tourism economics, our model does not impose the small-open-economy assumption for a general equilibrium analysis.

The model is highly tractable. In the equilibrium analysis, we find that a tourism boom has two opposite effects on the rest of the economy. The resource movement effect results in de-industrialization but the income effect contributes to pro-industrialization. The framework clearly reveals the mechanism of the resource curse and the Dutch disease.

Secondly, we have examined the trade balances in all sectors. Because of the tourism sector, the larger country is not definitely the exporter of manufacturing goods in net. Because of the size disadvantage, a necessary condition for the smaller country to be the exporter in the manufacturing sector is that it must also be the exporter in the tourism sector.

The third contribution is the welfare analysis. Because of the existence of tourism sector, the smaller country may be better off than the larger one. In addition, while previous literature only finds the possibilities of over-agglomeration in the larger country and consistency of equilibrium and optimum, we find that under-agglomeration in the larger country is also possible.

The fourth contribution is to provide a way to incorporate travel costs in the framework. We find that smaller travel costs attract more industrial firms in the country of more natural resources, and result in larger trade imbalance in the manufacturing and the tourism sectors.

In summary, our framework captures a new and tractable way of describing how tourism affects the industrial location. We hope that it provides a useful foundation for future empirical studies.
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References


