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A Spatial Economic Approach to International Trade in High-Quality National Brand Goods and Regional Branding from Developing Countries

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1. Introduction

This study develops a spatial economic model of international trade in national brand goods and services—including branded agricultural products, globally renowned films and anime, and international cultural tourism services. The analysis focuses on mechanisms through which national brand industries agglomerate within the global economy, especially in developing countries. It also highlights the importance of intercultural exchange and mutual understanding between nations. Given the wide range of goods recognized as national brands in contemporary society, any analysis of international trade must account for the characteristics of cultural goods. International trade and cultural relationships between nations exert significant economic, cultural, and social impacts. Economically, trade expands markets and creates employment, thereby further promoting growth in both countries. Many modern goods and services are imbued with cultural attributes shaped by national preferences or corporate branding strategies. The export and import of such goods not only generate economic benefits but also deepen intercultural understanding between nations. Culturally, while trade facilitates mutual appreciation through cultural inflows, it may also affect traditional lifestyles, create friction, or, in extreme cases, trigger diplomatic breakdowns. For instance, the trade of French wine and cheese into Japan and Japanese anime and manga into France has strengthened bilateral cultural exchange. Nonetheless, globalization raises concerns such as cultural homogenization and economic disparities. Sustainable trade must thus respect the cultural values of all nations.

First, in relation to international trade and industrial location, conventional theory suggests that in large–small country settings, the larger country experiences a "home market effect," wherein industry tends to agglomerate beyond its population share due to economies of scale. A series of studies by **Takita (2021)**, and **Takita, Wang, and Zhang (2021)**, have explored the mechanisms by which developing countries and remote mountain regions can achieve sustainable development through the production of nationally branded goods. Through international trade and cultural mutual understanding, even countries with small populations—particularly mountainous regions—may generate sustainable systems. In these cases, stronger cultural and diplomatic relations lead to heightened demand from

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larger countries for the brands of smaller ones. This generates a "reverse home market effect," wherein small countries experience industrial agglomeration driven by external demand—without the need for foreign aid—demonstrating the potential for sustainable mechanisms even under competitive market conditions.

Second, traditional nationally branded goods and services—including food products, crafts, language education, and tourism—are rooted in the ethnic and cultural traditions of each country. For consumers, such goods often represent the national identity and, as cultural goods, they may exhibit extremely low production efficiency. Existing international trade models generally assume a productivity threshold required for firms to begin production and export. However, even inefficient producers may generate demand if they offer high value-added goods capable of covering labor costs. Goods and services based on traditional production methods offer significant untapped potential.

Previous spatial economic models—such as **Krugman (1980)** and **Helpman et al. (2008)**—explain intra-industry trade under monopolistic competition and show that industrial agglomeration tends to occur in larger countries due to spatial trade costs. However, these models do not adequately account for the effects of cultural relationships on trade volume, the disappearance of trade, or the emergence of small countries as global centers of cultural production.

Studies that incorporate the characteristics of cultural goods are limited and often rely on empirical extensions of standard trade models. Representative contributions in this field include **Tanaka (2016)**, **Schulze (1999)**, **Ferreira and Waldfogel (2013)**, and **Takara (2018)**. **Tanaka (2016)** reviews empirical and policy discussions on cultural goods trade, noting contemporary challenges. Tangible cultural goods that are unique and difficult to reproduce (e.g., artworks) are often subject to trade restrictions, while intangible cultural goods that are replicable and benefit from economies of scale (e.g., films, music, literature) are protected through intellectual property rights. These policies have been shown to positively influence social welfare.

Schulze (1999), using the Helpman–Melitz–Rubinstein model and trade data from the Standard International Trade Classification, empirically analyzes the trade in artworks and finds that cultural goods behave as luxury goods and are negatively impacted by "cultural discounting." **Ferreira and Waldfogel (2013)** also utilize a gravity model based on the Helpman et al. framework to analyze the effects of reduced transaction costs—driven by information technology—on music consumption and national bias, using CD sales data. Their findings suggest that while lower spatial costs may increase the global influence of dominant cultures, cultural distance (e.g., language, geography) remains a persistent factor, and national bias in music consumption may even intensify. This may be due not only to the dominance of major cultural exporters but also to the global diffusion of works by artists from smaller countries. However, their scope is limited to music and does not address film or literature. **Takara (2018)** similarly examines music trade using CD charts and shows that cultural distinctions positively affect the likelihood of trade, though digital platforms like streaming services are not included.

Our own theoretical work builds upon **Takita and Zeng (2017)**, who introduced a spatial economic model in which government investment in the conservation of natural and cultural heritage enhances regional brand value. The model highlights how government tax revenues can be used to maintain cultural resources and maximize social welfare. As an open small-country model, it also considers how national branding of agricultural products can stimulate domestic consumption.

Takita (2021) extends this framework by incorporating cultural diversity and the "Patriot Effect"—a combination of national bias and brand loyalty—as well as the "Anti-Patriot Effect," which includes affection for foreign brands. This model suggests that a reverse home market effect may arise in large countries in response to strong demand for small-country brands. In a further development, **Takita, Wang, and Zhang (2021)** explore how global efforts to preserve natural and historical cultures can differentiate regional brand goods and enhance global welfare. This work emphasizes the importance of terroir in shaping industrial agglomeration in small countries when cultural preferences are symmetrically distributed between nations.

This study analyzes international trade in nationally branded goods rooted in historical and ethnic traditions. It highlights how cultural understanding between countries—and the role of quality and branding—can offset low labor productivity inherent in traditional production methods. If consumer demand is strong, even high-priced, high-quality goods can successfully enter international markets. This theoretical finding demonstrates how intercultural exchange can activate the global economy, mitigate North–South disparities and poverty, and promote global peace. The same perspective applies not only to international society but also to the domestic context—particularly to the co-prosperous relationship between major urban centers and mountainous regions, which serve as supply bases for regional brand goods. Intercultural understanding drives sustainable international trade and contributes to the construction of a sustainable global society. **Takita (2022)** further proposes a multilateral, multi-product exchange system for national brand goods based on international trade theory.

2. Model

This study constructs a spatial economic model to analyze international trade in national brand goods and services. The model outlines the assumptions and theoretical structure regarding consumer behavior, firm behavior, factor markets, and market equilibrium for national brand goods in a world consisting of a large and a small country.

2.1 Assumptions

In developing the spatial economic model, the following assumptions are made:

1. The world consists of two countries: Country 1 (a large country) and Country 2 (a small country), and the global population is normalized to 1.
2. Consumers maximize utility subject to income constraints by consuming national brand goods produced domestically and abroad.

3. Consumers in both countries have preferences for domestic or foreign brands, reflecting patriotism or foreign affinity. These preferences are determined by the degree of intercultural understanding and diplomatic relations between the two countries and are assumed to be symmetric.
4. Households in each country supply labor services to either domestic or foreign firms and earn labor income accordingly.
5. All labor is homogeneous in quality, and labor is the sole factor of production.
6. Firms operate under monopolistic competition and choose prices to maximize profits. Each firm produces one variety of a national brand good.
7. In order to maintain quality based on their respective traditions and cultures, each country uses a distinct increasing-returns-to-scale production technology.

2.2 Overall Structure of the Two-Country Economy

This model describes international trade between a large and a small country, incorporating not only physical distance but also cultural distance or psychological dimensions that reflect cultural, historical, and religious ties. Each country uses production technologies based on its own traditions and culture to maintain the quality of its nationally branded goods.

(1) Bilateral Relationship

The trade of national brand goods is influenced by multiple factors, including not only spatial considerations but also psychological aspects such as the degree of affection for the other country's culture.

(a) Spatial Distance

Transportation and communication costs between the two countries have declined significantly due to technological advancement. For information-based goods such as films or anime, exports via the internet incur negligible costs. Assuming domestic transportation costs are negligible, we define the iceberg-type spatial trade cost as $\tau(\geq 1)$, and the **spatial trade freeness index** in **Table 1** is given by $\phi_\tau(\equiv \tau^{1-\sigma})$.

Table 1. Spatial Trade Freeness Index ϕ_τ

Import Export	Country 1	Country 2
Country 1	1 1	$\tau(\geq 1)$ $\phi_\tau(\equiv \tau^{1-\sigma} \leq 1)$
Country 2	$\tau(\geq 1)$ $\phi_\tau(\equiv \tau^{1-\sigma} \leq 1)$	1 1

(b) Cultural Distance

The cultural relationship between countries greatly affects trade. Influencing factors include colonial histories (e.g., the British Empire), religion, national ideologies, historical linkages, and international conflicts. We define the strength of cultural ties as $\beta(\geq 0)$, and the cultural freeness index as $\phi_\beta \equiv \beta^{1-\sigma}(\geq 0)$.

- $0 \leq \beta < 1,\ \phi_\beta > 1$: Patriot Effect or preference for domestic brands
- $\beta = 1,\ \phi_\beta = 1$: Symmetric cultural preferences
- $\beta > 1,\ 0 \leq \phi_\beta < 1$: Anti-Patriot Effect or preference for foreign brands

These preferences are internal, non-monetary factors but still exert significant influence on trade behavior. Here the new cultural trade freeness index is presented in Table 2.

Table 2. Cultural Trade Freeness Index ϕ_β

Import Export	Country 1	Country 2
Country 1	1 1	$\beta(\geq 0)$ $\phi_\beta(\equiv \beta^{1-\sigma} \geq 0)$
Country 2	$\beta(\geq 0)$ $\phi_\beta(\equiv \beta^{1-\sigma} \geq 0)$	1 1

(c) Combined Spatial and Cultural Distance

The combined spatial-cultural distance is defined to reflect how psychological closeness can offset physical distance. In some cases, strong affection for foreign cultures may even reverse perceived distance, akin to emotional closeness in a romantic relationship.

- Spatial distance: $\tau(\geq 1)$ and spatial freeness index: $\phi_\tau(\equiv \tau^{1-\sigma})$
- Cultural distance: $\beta(\geq 0)$ and cultural freeness index: $\phi_\beta \equiv \beta^{1-\sigma}(\geq 0)$
- Combined distance: $\tau/\beta(\geq 0)$ and combined freeness index: $\phi \equiv \left(\frac{\tau}{\beta}\right)^{1-\sigma}(\geq 0)$

Three cases:

- $0 \leq \frac{\tau}{\beta} < 1$, or $\phi \equiv \left(\frac{\tau}{\beta}\right)^{1-\sigma} > 1$: Cultural closeness outweighs spatial barriers.
- $\frac{\tau}{\beta} = 1$, or $\phi = 1$: Neutral balance.
- $\frac{\tau}{\beta} > 1$, or $0 \leq \phi < 1$: Spatial distance dominates despite cultural affinity.

The total trade freeness index is defined as $\phi \equiv \left(\frac{\tau}{\beta}\right)^{1-\sigma} (\geq 0)$, and is presented in **Table 3**.

Table 3. Total Trade Freeness Index ϕ

Import / Export	Country 1	Country 2
Country 1	1 1	$\tau/\beta(\geq 0)$ $\phi = \frac{\phi_\tau}{\phi_\beta}(\equiv \frac{\tau^{1-\sigma}}{\beta^{1-\sigma}} \geq 0)$
Country 2	$\tau/\beta(\geq 0)$ $\phi = \frac{\phi_\tau}{\phi_\beta}(\equiv \frac{\tau^{1-\sigma}}{\beta^{1-\sigma}} \geq 0)$	1 1

(2) Quality of National Brand Goods

Quality plays a critical role in international trade of national brand goods. When production is based on traditional and cultural methods, it typically requires:

- Fixed labor input per firm: $f(Q_i) = fQ_i{}^{\mu_f}$
- Labor input per unit output: $m(Q_i) = mQ_i{}^{\mu_m}$

Let the quality of national brand goods in the large country (Country 1) be normalized to $Q_1 = 1$, and in the small country (Country 2) be $Q_2 = Q(\geq 0)$.

To assess the importance of high-quality production rooted in traditional culture, we define the **cultural impact index** as:

$$h(Q_i; \mu_f, \mu_m) = Q_i{}^{\mu_f + (\sigma-1)(\mu_m - 1)} (\mu_f > 0, \mu_m > 0)$$

This index captures the degree to which demand generated by cultural significance can offset low productivity due to labor-intensive production methods.

(3) Analytical Indicators

In constructing the general equilibrium model, we define key indicators relevant to population, industry, and economy. These indicators are necessary for the theoretical assessment of market structure and trade effects.

(a) Population Indicators

Population-related variables include the residential population, labor force, and migrant labor (cross-border workers).

Table 4. Residential and Labor Population

	Country 1	Country 2
Residential Population q_i	q	$1-q$
Labor Population L_i	L	$1-L$
Migrant Labor $L_i - q_i$	$L-q$	$q-L$

(b) Industrial Indicators

These include the price and quantity of national goods produced by firms in each country, total firm output, labor demand, wages, and the number of firms.

Table 5. Industrial Structure

		Country 1	Country 2
Seles Price	$p_i(n_i)$	$p_1(n_1)$	$p_2(n_2)$
Firm Output	$x_i(n_i)$	$x_1(n_1)$	$x_2(n_2)$
Total Output Value		$p_1(n_1)x_1(n_1)$	$p_2(n_2)x_2(n_2)$
Workers per Firm	l_i	l_1	l_2
Wage Rate	w_i	w	w
Number of Firms	N_i	N_1	N_2

(c) Economic Indicators

These include GDP, GNI, and measures of trade volumes and trade values for both countries.

Table 6. GDP and GNI

	Country 1	Country 2
Gross Domestic Product GDP_i	wL	$w(1-L)$
Gross National Income GNI_i	wq	$w(1-q)$

Table 7. International Trade

(1) Trade Volumes

Demand Supply	Country 1 Population q	Country 2 Population $1-q$
National brand good by Firm n_1 in country 1	$c_{11}(n_1)q$	$c_{12}(n_1)(1-q)$
Total composite national brand goods	$C_{11}q$	$C_{12}(1-q)$
National brand good by Firm n_2 in country 2	$c_{21}(n_2)q$	$c_{22}(n_2)(1-q)$
Total composite national brand goods	$C_{21}q$	$C_{22}(1-q)$

(2) Trade Values

Demand Supply	Country 1	Country 2
Country 1	T_{11}	T_{12}
Country 2	T_{21}	T_{22}

2.3 Consumer Behavior

This section describes consumer behavior in both the large and small countries. Consumers in both countries are assumed to be equally affected by spatial and cultural distance. The only differences between the countries lie in population size and the quality of goods rooted in traditional culture.

(1) Formalization of Consumer Behavior

The representative consumer in country j maximizes utility by consuming two types of nationally branded goods $c_{ij}(n_i)(i,j=1,2)$ produced in both countries, subject to an income constraint.

To capture cultural relationships between countries, we introduce a parameter $\beta \geq 0$, representing preferences for national brands, and a quality parameter $Q > 0$, denoting the quality of nationally branded goods produced in the small country (normalized to $Q = 1$ for the large country). Let C_{ij} denote the composite consumption of national brand goods from country i by consumers in country j. We introduce a diversity parameter ρ for regional brand goods, such that the elasticity of substitution among varieties is $\sigma \equiv 1/(1-\rho)$. The domestic price of the nationally branded good produced by firm $n_i \in [0, N_i]$ in country i is denoted $p_i(n_i)$.

Consumer preferences and behavior are defined as follows. Cultural preferences are assumed to be symmetric across countries, while product quality varies by country:

Country 1: $\underset{c_{i1}(n_i)}{max}\ u_1 = log({C_{11}}^{\rho} + (\beta Q C_{21})^{\rho})^{\frac{1}{\rho}}$

Country 2: $\underset{c_{i2}(n_i)}{max}\ u_2 = log((\beta C_{12})^{\rho} + (Q C_{22})^{\rho})^{\frac{1}{\rho}}$ where $C_{ij} = \left(\int_0^{N_i} c_{ij}(n_i)^{\rho}\, dn_i\right)^{\frac{1}{\rho}} (i,j=1,2)$

Subject to the income constraint:

$$\int_0^{N_j} p_j(n_j) c_{jj}(n_j)\, dn_j + \int_0^{N_i} \tau p_i(n_i) c_{ij}(n_i)\, dn_i = w \ \ (i,j=1,2\ i \neq j)$$

Here, $P_i = \left(\int_0^{N_i} p_i(n_i)^{\rho}\, dn_i\right)^{\frac{1}{\rho}}$ is the price index for nationally branded goods from country i, $\tau \geq 1$ represents iceberg-type trade and communication costs, and N_i is the number of firms in country i.

(2) Optimization of National Brand Composite Goods (Stage 1)

The representative consumer in country $j = 1, 2$ solves a two-stage utility maximization problem. In this section, we formulate the first stage: the utility maximization over composite consumption of national brand goods from both countries.

Each representative consumer in country j consumes two types of national brand composite goods: C_{1j} and C_{2j}, derived from domestic and foreign firms respectively. Consumers consider spatial trade costs $\tau \geq 1$, cultural affinity $\beta \geq 0$, and product quality $Q > 0$, and derive utility u_j.

Country 1: $\underset{C_{11},C_{21}}{max}\ u_1 = log({C_{11}}^{\rho} + (\beta Q C_{21})^{\rho})^{\frac{1}{\rho}} \qquad s.t. P_1 C_{11} + \tau P_2 C_{21} = w$ (2)

Country 2: $\underset{C_{12},C_{22}}{max}\ u_2 = log((\beta C_{12})^{\rho} + (Q C_{22})^{\rho})^{\frac{1}{\rho}} \qquad s.t. \tau P_1 C_{12} + P_2 C_{22} = w$ (3)

Solving these optimization problems yields the following demand functions:

Country 1's demand: $$C_{11} = \frac{(\beta Q)^{1-\sigma} {P_1}^{-\sigma}}{(\beta Q P_1)^{1-\sigma} + (\tau P_2)^{1-\sigma}} w = \frac{{P_1}^{-\sigma}}{{P_1}^{1-\sigma} + \phi (P_2/Q)^{1-\sigma}} w \quad (4)$$

$$C_{21} = \frac{(\tau P_2)^{-\sigma}}{(\beta Q P_1)^{1-\sigma} + (\tau P_2)^{1-\sigma}} w = \frac{1}{\tau Q} \frac{\phi (P_2/Q)^{-\sigma}}{{P_1}^{1-\sigma} + \phi (P_2/Q)^{1-\sigma}} w \quad (5)$$

Country 2's demand: $$C_{12} = \frac{Q^{1-\sigma} (\tau P_1)^{-\sigma}}{(\tau Q P_1)^{1-\sigma} + (\beta P_2)^{1-\sigma}} w = \frac{1}{\tau} \frac{\phi {P_1}^{-\sigma}}{\phi {P_1}^{1-\sigma} + (P_2/Q)^{1-\sigma}} w \quad (6)$$

$$C_{22} = \frac{\beta^{1-\sigma} {P_2}^{-\sigma}}{(\tau Q P_1)^{1-\sigma} + (\beta P_2)^{1-\sigma}} w = \frac{1}{Q} \frac{(P_2/Q)^{-\sigma}}{\phi {P_1}^{1-\sigma} + (P_2/Q)^{1-\sigma}} w \quad (7)$$

Here, $\phi \equiv \left(\frac{\tau}{\beta}\right)^{1-\sigma}$ denotes the generalized freeness index incorporating both spatial and cultural distances.

(3) Cost Minimization of Goods and Trade (Stage 2)

This section formalizes the cost minimization problem associated with cross-border trade. The representative consumer in country $j = 1, 2$ consumes nationally branded goods $c_{ij}(n_i)$, produced by firms $n_i \in [0, N_i]$ in country i. The total cost includes product prices and transport/communication expenses, with domestic costs considered negligible, while international costs are captured using iceberg-type trade costs $\tau \geq 1$.

The consumer minimizes the following cost function:

$$\min_{c_{ij}(n_i)} I_{ij} = \int_0^{N_i} p_{ij}(n_i) c_{ij}(n_i)\, dn_i \ (i, j = 1,2) \quad \text{Subject to: } \left(\int_0^{N_i} c_{ij}(n_j)^{\rho}\, dn_j\right)^{\frac{1}{\rho}} = C_{ij} \quad (8)$$

where the effective price $p_{ij}(n_i)$ is defined as: $p_{ij}(n_i) = \begin{cases} p_i(n_i) & i = j\ (domestic) \\ \tau p_i(n_i) & i \neq j\ (foreign) \end{cases} (i, j = 1,2)$

From this optimization, the individual demand functions for nationally branded goods are derived as follows:

Country 1's consumption: $$c_{11}(n_1) = \left(\frac{p_1(n_1)}{P_1}\right)^{-\sigma} C_{11} = \frac{p_1(n_1)^{-\sigma}}{{P_1}^{1-\sigma} + \phi (P_2/Q)^{1-\sigma}} w \quad (9)$$

$$c_{21}(n_2) = \left(\frac{p_2(n_2)}{P_2}\right)^{-\sigma} C_{21} = \frac{1}{\tau Q} \frac{\phi p_2(n_2)^{-\sigma}}{{P_1}^{1-\sigma} + \phi (P_2/Q)^{1-\sigma}} w \quad (10)$$

Country 2's consumption: $$c_{12}(n_1) = \left(\frac{p_1(n_1)}{P_1}\right)^{-\sigma} C_{12} = \frac{1}{\tau} \frac{\phi p_1(n_1)^{-\sigma}}{\phi {P_1}^{1-\sigma} + (P_2/Q)^{1-\sigma}} w \quad (11)$$

$$c_{22}(n_2) = \left(\frac{p_2(n_2)}{P_2}\right)^{-\sigma} C_{22} = \frac{1}{Q} \frac{(p_2(n_2)/Q)^{-\sigma}}{\phi {P_1}^{1-\sigma} + (P_2/Q)^{1-\sigma}} w \quad (12)$$

The price index for country i is defined as: $P_i = \left(\int_0^{N_i} p_i(n_i)^{\rho}\, dn_i\right)^{\frac{1}{\rho}}$

2.4 Firm Behavior

Firms in both countries produce national brand goods based on traditional cultural practices. Although the production technologies rooted in tradition tend to be less productive, they are recognized

for generating high-quality products, often identified as national brands. Firms in country 1 ($n_1 \in [0, N_1]$) and country 2 ($n_2 \in [0, N_2]$) operate under monopolistic competition and increasing returns to scale, setting prices $p_1(n_1)$ and $p_2(n_2)$ to maximize profits.

While all firms produce only one type of national brand good, the technologies used differ according to each country's cultural tradition. Let the quality of goods in country 1 be the benchmark ($Q_1 \equiv 1$), requiring fixed labor input f and marginal labor m. Country 2 produces goods with quality $Q_2 \equiv Q > 0$), with required labor inputs:

Each firm maximizes profits: $\max_{p_i(n_i)} \pi_i = p_i(n_1)x_i(n_i) - wl_i(n_i)$ (13)

Where $l_i(n_i) = f(Q_i) + m(Q_i)x_i(n_i)$,

fixed labor: $f(Q_i) = fQ_i^{\mu_f}$ (14) and marginal labor: $m(Q_i) = mQ_i^{\mu_m}$ (15)

Profit maximization implies:

$\frac{d\pi_i}{dp_i(n_i)} = x_i(n_i) + (p_i(n_i) - m(Q_i)w)\frac{dx_i(n_i)}{dp_i(n_i)} = 0$ (16)

Under free entry, firms earn zero profit ($\pi_i = 0$), which implies:

$x_i(n_i) = \frac{wf}{p_i(n_i) - m(Q_i)w}$ (17)

2.5 Market Equilibrium

Let $q^1 = q$, $q^2 = 1 - q$ be the residential population shares, and $L_1 = L$, $L_2 = 1 - L$ be the labor shares in countries 1 and 2.

Goods Market Equilibrium

$c_{11}(n_1)q + \tau c_{12}(n_1)(1 - q) = x_1(n_1)$ (17) $\tau c_{21}(n_2)q + c_{22}(n_2)(1 - q) = x_2(n_2)$ (18)

Labor Market Equilibrium

Assuming homogeneous labor and labor mobility between firms:

$L_1 + L_2 = 1$ where $L_1 = \int_0^{N_1} l_1(n_1)dn_1 \ (\equiv L)$, $L_2 = \int_0^{N_2} l_2(n_2)dn_1 \ (= 1 - L)$ (19)

3. Equilibrium Calculations

In Section 2, we described the structure of the economic model. This section solves for the model's endogenous variables, which form the basis for the policy implications discussed in the following section.

3.1 Prices and Output Scale of Firms

Under monopolistic competition and increasing returns to scale, firms incorporate traditional cultural production methods to produce national brand goods. We derive the equilibrium values for

prices and production.

(1) Prices

Under monopolistic competition, the price of nationally branded goods is given by:

$p_1(n_1) = \frac{\sigma}{\sigma-1} mw (\equiv p_1 = p)$ (20) $p_2(n_2) = \frac{\sigma}{\sigma-1} mQ^{\mu_m} w (\equiv p_2 = pQ^{\mu_m})$ (21)

Individual firms in both countries converge to the same price level within each country. When quality in country 2 is higher than in country 1, the price of national brand goods in country 2 is higher by a factor of $Q^{\mu_m} (> 1)$, reflecting greater labor costs associated with maintaining traditional cultural quality.

The price indices are:

$$P_1 = \left(\int_0^{N_1} p_1(n_1)^{\rho} \, dn_1 \right)^{\frac{1}{\rho}} = p_1 N_1^{\frac{1}{\rho}} = \frac{\sigma}{\sigma-1} mw N_1^{\frac{1}{1-\sigma}} \quad (22)$$

$$P_2 = \left(\int_0^{N_2} p_2(n_1)^{\rho} \, dn_1 \right)^{\frac{1}{\rho}} = p_2 N_2^{\frac{1}{\rho}} = \frac{\sigma}{\sigma-1} mQ^{\mu_m} w N_2^{\frac{1}{1-\sigma}} \quad (23)$$

(2) Output and Production Value

While product prices rise with improvements in quality, it is noteworthy that the output per firm may either decrease or increase. Specifically, output per firm in each country is given by:

$x_1(n_1) = \frac{wf}{p_1(n_1) - mw} = \frac{f(\sigma-1)}{m} (\equiv x_1 = x)$ (24) $x_2(n_2) = \frac{f(\sigma-1)}{m} Q^{\mu_f - \mu_m} (\equiv x_2 = xQ^{\mu_f - \mu_m})$ (25)

From equation (25), the output of firms in Country 2 depends on the quality index $x_2 = \frac{f(\sigma-1)}{m} Q^{\mu_f - \mu_m}$, the output in Country 2 is smaller than in Country 1. When $0 < \mu_f < \mu_m$, Country 2's output exceeds that of Country 1. If $\mu_f > \mu_m > 0$, then production is carried out with considerable time and effort in small quantities based on traditional culture, resulting in much higher prices ($p_2 \gg p_1$). However, the production value of firms in both countries remains: $p_1(n_1)x_1(n_1) = f\sigma w, p_2(n_2)x_2(n_2) = f\sigma w Q^{\mu_f}$ Thus, the production value is always larger for Country 2. The number of firms, which will be discussed later, is also an important factor depending on firm scale.

(3) Number of Workers

The number of workers per firm in each country is:

$l_1(n_1) = f + mx_1(n_1) = f\sigma (\equiv l)$ (26) $l_2(n_2) = fQ^{\mu_f} + mQ^{\mu_m} x_2(n_2) = f\sigma Q^{\mu_f}$ (27)

Hence, if firms in the small country adopt quality-enhancing technologies based on traditional culture, their firm scale becomes larger than that of large-country firms.

(4) Number of Firms

Higher quality in traditional industries leads to a larger firm scale, but the number of firms in each country is determined as:

$$N_1 = \frac{L_1}{f\sigma} = \frac{1}{f\sigma}\left(\frac{(1+\phi)(1-\phi)}{(1-\phi h(Q))(1-\phi h(Q)^{-1})}q - \frac{\phi h(Q)^{-1}}{1-\phi h(Q)^{-1}}\right) \quad (28)$$

$$N_2 = \frac{L_2}{f\sigma Q^{\mu_f}} = \frac{1}{f\sigma Q^{\mu_f}}\left(\frac{1}{1-\phi h(Q)^{-1}} - \frac{(1+\phi)(1-\phi)}{(1-\phi h(Q))(1-\phi h(Q)^{-1})}q\right) \quad (29)$$

where $\phi = \frac{\phi_\tau}{\phi_\beta}(\equiv \frac{\tau^{1-\sigma}}{\beta^{1-\sigma}} \geq 0)$, and the **quality impact coefficient** is defined as: $h(Q) \equiv Q^{\mu_f+(\sigma-1)(\mu_m-1)}$

(5) Quantity Demanded

Given the price and price index of nationally branded goods:

$p_1 = \frac{\sigma}{\sigma-1}mw(\equiv p), p_2 = \frac{\sigma}{\sigma-1}mQ^{\mu_m}w(= pQ^{\mu_m})$ and $P_i = p_i N_i^{\frac{1}{1-\sigma}}$, the representative demand for each firm's product is:

$$c_{11}(n_1) = \frac{p_1(n_1)^{-\sigma}}{{P_1}^{1-\sigma}+\phi\left(\frac{P_2}{Q}\right)^{1-\sigma}}w = \frac{p^{-1}}{N_1+\phi Q^{(\mu_m-1)(1-\sigma)}N_2} = \frac{\sigma-1}{\sigma m}\left(\frac{1}{N_1+\phi Q^{(\mu_m-1)(1-\sigma)}N_2}\right) \quad (30)$$

$$c_{21}(n_2) = \frac{1}{\tau Q}\frac{\phi p_2(n_2)^{-\sigma}}{{P_1}^{1-\sigma}+\phi\left(\frac{P_2}{Q}\right)^{1-\sigma}}w = \frac{1}{\tau Q}\frac{\phi Q^{(\mu_m-1)(-\sigma)}p^{-1}}{N_1+\phi Q^{(\mu_m-1)(1-\sigma)}N_2} = \frac{\sigma-1}{\sigma m}\left(\frac{1}{\tau Q}\frac{\phi Q^{(\mu_m-1)(-\sigma)}}{N_1+\phi Q^{(\mu_m-1)(1-\sigma)}N_2}\right) \quad (31)$$

$$c_{12}(n_1) = \frac{1}{\tau}\frac{\phi p_1(n_1)^{-\sigma}}{\phi {P_1}^{1-\sigma}+\left(\frac{P_2}{Q}\right)^{1-\sigma}}w = \frac{1}{\tau}\frac{\phi p_1(n_1)^{-\sigma}}{\phi {P_1}^{1-\sigma}+\left(\frac{P_2}{Q}\right)^{1-\sigma}}w = \frac{1}{\tau}\frac{\phi p^{-1}}{\phi N_1 + Q^{(\mu_m-1)(1-\sigma)}N_2}$$
$$= \frac{\sigma-1}{\sigma m}\left(\frac{1}{\tau}\frac{\phi}{\phi N_1+Q^{(\mu_m-1)(1-\sigma)}N_2}\right) \quad (32)$$

$$c_{22}(n_2) = \frac{1}{Q}\frac{(p_2(n_2)/Q)^{-\sigma}}{\phi {P_1}^{1-\sigma}+(P_2/Q)^{1-\sigma}}w = \frac{1}{Q}\frac{Q^{(\mu_m-1)(-\sigma)}p^{-1}}{\phi N_1+Q^{(\mu_m-1)(1-\sigma)}N_2} = \frac{\sigma-1}{\sigma m}\left(\frac{1}{Q}\frac{Q^{(\mu_m-1)(-\sigma)}}{\phi N_1+Q^{(\mu_m-1)(1-\sigma)}N_2}\right) \quad (33)$$

Using equations (28) and (29), we derive: $N_1 + \phi Q^{(\mu_m-1)(1-\sigma)}N_2 = \frac{(1+\phi)(1-\phi)}{f\sigma(1-\phi h(Q))}q$ and $\phi N_1 + Q^{(\mu_m-1)(1-\sigma)}N_2 = \frac{(1+\phi)(1-\phi)}{f\sigma(h(Q)-\phi)}(1-q)$

Substituting into equations (30)-(33), the final representative consumer demand for nationally branded goods is:

$$c_{11}(n_1) = \frac{f(\sigma-1)(1-\phi h(Q))}{m(1+\phi)(1-\phi)}q^{-1} \quad (34) \qquad c_{21}(n_2) = \frac{\phi}{\tau Q^{\sigma(\mu_m-1)+1}}\frac{f(\sigma-1)(1-\phi h(Q))}{m(1+\phi)(1-\phi)}q^{-1} \quad (35)$$

$$c_{12}(n_1) = \frac{\phi}{\tau}\frac{f(\sigma-1)(h(Q)-\phi)}{m(1+\phi)(1-\phi)}(1-q)^{-1} \quad (36) \qquad c_{22}(n_2) = \frac{1}{Q^{\sigma(\mu_m-1)+1}}\frac{f(\sigma-1)(h(Q)-\phi)}{m(1+\phi)(1-\phi)}(1-q)^{-1} \quad (37)$$

where $h(Q) \equiv Q^{\mu_f+(\sigma-1)(\mu_m-1)}$.

3.2 National Economies: Population, GDP, GNI, Trade Volume, and Trade Value

We explain industrial agglomeration and international trade between large and small countries. It is well known that in large countries, due to their larger consumer base and higher transportation costs, industries tend to agglomerate more than proportionally to population size—this phenomenon is referred to as the home market effect. In the present analysis, incorporating cultural ties between large and small countries, as well as production technologies designed to preserve traditional cultural goods, yields a variety of noteworthy outcomes.

(1) Labor Population Comparison

Labor population in each country is given by:

$$L_1 = \int_0^{N_1} l_1(n_1)dn_1 = f\sigma N_1 = \frac{(1+\phi)(1-\phi)}{(1-\phi h(Q))(1-\phi h(Q)^{-1})}q - \frac{\phi h(Q)^{-1}}{1-\phi h(Q)^{-1}} \quad (38)$$

$$L_2 = \int_0^{N_2} l_2(n_2)dn_2 = f\sigma Q^{\mu_f} N_2 = -\frac{(1+\phi)(1-\phi)}{(1-\phi h(Q))(1-\phi h(Q)^{-1})}q + \frac{1}{1-\phi h(Q)^{-1}} \quad (39)$$

where $h(Q) \equiv Q^{\mu_f-(1-\sigma)(\mu_m-1)}$.

(2) Gross Domestic Product (GDP)

Given the zero-profit condition: $\Pi\Pi_i = \int_0^{N_i} p_i(n_i)x_i(n_i)dn_i - w\int_0^{N_i} l_i(n_i)dn_i = 0$,
GDP of each country is:

$$\int_0^{N_1} p_1(n_1)x_1(n_1)dn_1 = w\int_0^{N_i} l_i(n_1)dn_1 = f\sigma w N_1 = \left(\frac{(1+\phi)(1-\phi)}{(1-\phi h(Q))(1-\phi h(Q)^{-1})}q - \frac{\phi h(Q)^{-1}}{1-\phi h(Q)^{-1}}\right)w \quad (40)$$

$$\int_0^{N_2} p_2(n_2)x_2(n_2)dn_2 = f\sigma Q^{\mu_f} w N_2 = \left(\frac{1}{1-\phi h(Q)^{-1}} - \frac{(1+\phi)(1-\phi)}{(1-\phi h(Q))(1-\phi h(Q)^{-1})}q\right)w \quad (41)$$

(3) Gross National Income (GNI)

Given equal wage levels due to homogeneous labor skills, **GNI** is:
$GNI_1 \equiv wq$ in country 1 and $GNI_2 \equiv w(1-q)$ in country 2.

(4) Volume of International and Domestic Trade

The import and export volumes between Country 1 and Country 2 can be expressed as follows:

$$C_{11}q = \left(\int_0^{N_1} c_{11}(n_1)^{\frac{\sigma-1}{\sigma}}dn_1\right)^{\frac{\sigma}{\sigma-1}} q = \frac{f(\sigma-1)(1-\phi h(Q))}{m(1+\phi)(1-\phi)} N_1^{\frac{\sigma}{\sigma-1}} \quad (42)$$

$$C_{21}q = \left(\int_0^{N_2} c_{21}(n_2)^{\frac{\sigma-1}{\sigma}}dn_2\right)^{\frac{\sigma}{\sigma-1}} q = \frac{\phi}{\tau Q^{\sigma(\mu_m-1)+1}} \frac{f(\sigma-1)(1-\phi h(Q))}{m(1+\phi)(1-\phi)} N_2^{\frac{\sigma}{\sigma-1}} \quad (43)$$

$$C_{12}(1-q)=\left(\int_0^{N_1} c_{12}(n_1)^{\frac{\sigma-1}{\sigma}}dn_1\right)^{\frac{\sigma}{\sigma-1}}(1-q)=\frac{\phi}{\tau}\frac{f(\sigma-1)(h(Q)-\phi)}{m(1+\phi)(1-\phi)}N_1^{\frac{\sigma}{\sigma-1}} \tag{44}$$

$$C_{22}(1-q)=\left(\int_0^{N_2} c_{22}(n_2)^{\frac{\sigma-1}{\sigma}}dn_2\right)^{\frac{\sigma}{\sigma-1}}(1-q)=\frac{1}{Q^{\sigma(\mu_m-1)+1}}\frac{f(\sigma-1)(h(Q)-\phi)}{m(1+\phi)(1-\phi)}N_2^{\frac{\sigma}{\sigma-1}} \tag{45}$$

The values of international and domestic trade, T_{ij}, for each country are summarized as:

$$T_{11}\equiv P_{11}C_{11}q=\int_0^{N_1} p_{11}(n_1)c_{11}(n_1)dn_1\,q=p_1c_{11}N_1q=\frac{(1+\phi)(1-\phi)h(Q)q-\phi(1-\phi h(Q))}{(1+\phi)(1-\phi)(h(Q)-\phi)}w \tag{46}$$

$$T_{21}\equiv P_{21}C_{21}q=\int_0^{N_2} p_{21}(n_2)c_{21}(n_2)dn_2\,q=\tau p_2c_{21}N_2(1-q)=\frac{\phi(1-\phi h(Q))[1-(1+\phi)(1-\phi)q]}{(1+\phi)(1-\phi)(h(Q)-\phi)}w \tag{47}$$

$$T_{12}\equiv P_{12}C_{12}(1-q)=\int_0^{N_1} p_{12}(n_1)c_{12}(n_1)dn_1\,(1-q)=\tau p_1c_{12}N_1$$
$$=\frac{\phi[(1+\phi)(1-\phi)h(Q)q-\phi(1-\phi h(Q))]}{(1+\phi)(1-\phi)(1-\phi h(Q))}w \tag{48}$$

$$T_{22}\equiv P_{22}C_{22}(1-q)=\int_0^{N_2} p_{22}(n_2)c_{22}(n_2)dn_2\,(1-q)=p_2c_{22}N_2$$
$$=\frac{(1-\phi h(Q))-(1+\phi)(1-\phi)q}{(1+\phi)(1-\phi)(1-\phi h(Q))}w \tag{49}$$

4. Policy Implications: Industrial Agglomeration Driven by National Brands and Quality

This section aims to theoretically demonstrate that national brand goods based on traditional, low-productivity cultural techniques can still create industrial agglomeration in mountainous and remote regions if they achieve high quality and strong brand power, even with high prices. We incorporate spatial distance, cultural factors, and the relationship between traditional techniques and quality to examine the determinants of industrial agglomeration.

4.1 Spatial and Cultural Distance

We utilize the previously defined comprehensive trade freeness index:

$$\phi=\frac{\phi_\tau}{\phi_\beta}\left(\equiv\frac{\tau^{1-\sigma}}{\beta^{1-\sigma}}\geq 0\right) \tag{50}$$

As a benchmark, we first consider the case where only spatial distance matters $\phi_\tau=\phi_{\tau_0}(\leq 1)$. When consumer preferences emphasize foreign brands ($\phi_\beta>1$), trade freeness is reduced. Conversely, when $\phi_\beta<1$, comprehensive trade freeness is strengthened.

4.2 Relationship Between Quality and Production Technology

Using a production technology rooted in the traditional culture of country i, labor input required to achieve quality Q_i $(Q_2 \geq Q_1 \; or \; Q_2 < Q_1 \equiv 1)$ is modeled as follows: fixed labor per firm is $f(Q) = fQ^{\mu_f}$ and labor required per unit output is $m(Q) = mQ^{\mu_m}$ (cf. Equation 14). This results in reduced labor productivity. However, the price of the small country's national good is $p_2/p_1 = Q^{\mu_m}$ times that of the large country (from Equations 20 and 21), and output per firm becomes $x_2/x_1 = Q^{\mu_f - \mu_m}$ times (from Equations 24 and 25). Depending on the traditional technology, high quality may lead to either more or less output.

4.3 Standard Case of Comprehensive Trade Freeness: $0 < \phi(\equiv (\tau/\beta)^{1-\sigma}) < 1$

The linear equations for the number of workers in the large and small countries, L_1 and L_2 (see Equations 38 and 39), are used to analyze Figures 1 and 2:

$$L_1 = \frac{(1+\phi)(1-\phi)}{(1-\phi h(Q))(1-\phi h(Q)^{-1})} q - \frac{\phi h(Q)^{-1}}{1-\phi h(Q)^{-1}} = A(\phi, h(Q))(q - k(\phi, h(Q))) + \frac{1}{2} \tag{51}$$

$$L_2 = -\frac{(1+\phi)(1-\phi)}{(1-\phi h(Q))(1-\phi h(Q)^{-1})} q + \frac{1}{1-\phi h(Q)^{-1}} = -A(\phi, h(Q))(q - k(\phi, h(Q))) + \frac{1}{2} \tag{52}$$

where: $A(\phi, h(Q)) \equiv \frac{(1+\phi)(1-\phi)}{(1-\phi h(Q))(1-\phi h(Q)^{-1})}$, $k(\phi, h(Q)) \equiv \frac{1}{2}\frac{(1+\phi h(Q)^{-1})(1-\phi h(Q))}{(1+\phi)(1-\phi)}$

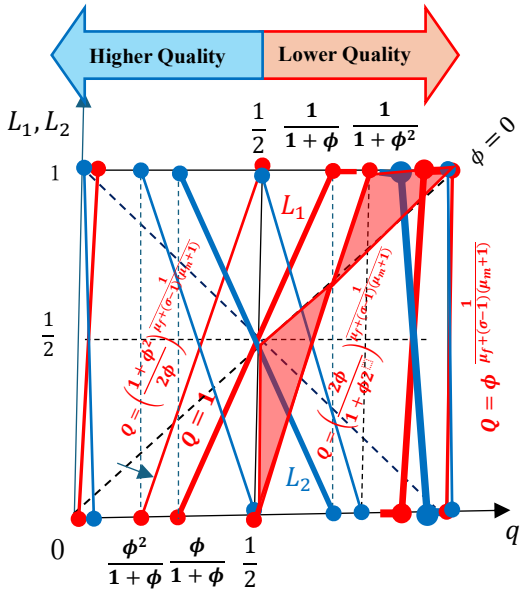

Figure 1. Industrial and Residential Population of Two Countries by Differences in Quality and Spatial-Cultural Distance ($0 \leq \phi < 1$)

(1) Equal Quality Across Countries: $Q_2 = Q_1(\equiv 1)$

As a benchmark case, we begin by considering the scenario in which the quality of national brand goods is identical in both countries, i.e., $Q_2 = Q_1(\equiv 1)$. Under this condition, the large country

exhibits both the home-market effect in the range $\frac{1}{2} < q < \frac{1}{1+\phi}$ and complete agglomeration when $\frac{1}{1+\phi} \leq q \leq 1$.

1. If $\frac{1}{2} < q < \frac{\phi}{1+\phi}$, the home market effect emerges in the large country.

$$L_1 = \frac{1+\phi}{1-\phi}\left(q - \frac{1}{2}\right) + \frac{1}{2} \qquad L_2 = \frac{1+\phi}{1-\phi}\left(q - \frac{1}{2}\right) + \frac{1}{2}$$

2. If $\frac{\phi}{1+\phi} \leq q \leq 1$, complete agglomeration occurs in the large country.

$$L_1 = 1,\ L_2 = 0$$

(2) Higher Quality in the Small Country: $Q_2 = Q > 1$

When the quality level of the small country (Country 2) exceeds that of the large country (Country 1), we examine the implications using Figure 1.

(a) $\mathbf{1 < Q_2 < \left(\frac{1+\phi^2}{2\phi}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}}$

As the small country's quality $\boldsymbol{Q_2 = Q > 1}$ increases, from the baseline case of equal quality $\boldsymbol{Q_2 = Q_1 (\equiv 1)}$, line L_2 in **Figure 1** shifts leftward while rotating counterclockwise (Equation 51). Meanwhile, line L_1 rotates clockwise, and also shifts leftward (Equation 52). Depending on the population size of the large country, we observe in sequence: the home-market effect and complete agglomeration in the large country.

(b) $\mathbf{Q_2 \geq \left(\frac{1+\phi^2}{2\phi}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m+1)}}}$

Once Q_2 reaches this upper threshold, the model predicts complete agglomeration in the large country. Even with a high-quality brand, production reaches a limit in the small country, leading to a shift of industrial concentration to the large country.

(3) Case of Low Quality in the Small Country ($Q_2 = Q < 1$)

In the case where the quality of the small country (Country 2) is lower than that of the large country (Country 1), we analyze the situation using **Figure1**.

(a) $\left(\frac{2\phi}{1+\phi^2}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}} \leq Q_2 < 1$

Compared to the case where both countries have equal national brand quality ($Q_1 = Q_2 = 1$), the line L_1 (from Equation (51)) rotates counterclockwise and shifts to the right. Similarly, the line L_2 (from Equation (52)) rotates clockwise and also shifts to the right. In this case, depending on the population size of the large country, a reverse home-market effect is observed in the large country, followed by a home-market effect and complete agglomeration.

(b) $\phi^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}} < Q_2 < \left(\frac{2\phi}{1+\phi^2}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}$

Here, the line L_1 rotates clockwise and shifts rightward, while line L_2 rotates counterclockwise and also shifts rightward. Within this range of quality, depending on the population size of the large country, complete agglomeration in the small country newly emerges, while the range in which the large country experiences the reverse home-market effect, home-market effect, and complete agglomeration gradually narrows.

(c) $Q_2 \leq \phi^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}$

Eventually, when $Q_2 = \phi^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}$, complete agglomeration occurs in the small country, and the industry in the large country disappears.

Table 8. Industrial Agglomeration of Two Countries Based on Differences in Quality and Spatial-Cultural Distance ($0 \leq \phi < 1$)

Quality of Small Country Q_2 (Large Country = 1)	Agglomeration economies of National brand industry	Population of Large country
$Q = \phi^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}$	**Complete agglomeration in the small country** (Disappearance of large country's industry)	All
↑ (Quality of small country is low)	**1. Complete agglomeration in the small country** **2. Reverse home-market effect in the large country** **3.** Home-market effect in the large country **4.** Complete agglomeration in the large country	Smaller larger
$Q = \left(\frac{2\phi}{1+\phi^2}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}$	**1. Reverse home-market effect in the large country** **2.** Home-market effect in the large country **3.** Complete agglomeration in the large country	Smaller larger
↑ (Quality of small country is slightly low)	**1. Reverse home-market effect in the large country** **2.** Home-market effect in the large country **3.** Complete agglomeration in the large country	Smaller larger
Q =1 (Same quality)	1.Home-market effect in the large country 2.Complete agglomeration in the large country	Smaller larger
↓ (Quality of small country is slightly high)	1. Home-market effect in the large country 2. Complete agglomeration in the large country	Smaller larger
$Q = \left(\frac{1+\phi^2}{2\phi}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}$	Complete agglomeration in the large country (Disappearance of small country's industry)	All

4.4 Special Case of Comprehensive Trade Freeness: $\phi(\equiv (\tau/\beta)^{1-\sigma}) > 1$

When the generalized freeness of trade, defined as $\phi(\equiv (\tau/\beta)^{1-\sigma})$, exceeds 1, the behavior of the labor allocation lines L_2 (for the small country) and L_1 (for the large country) can be summarized as follows. These are illustrated in **Figure 2** and **Table 9**.

$$L_2 = \frac{(\phi+1)(\phi-1)}{(\phi h(Q)-1)(\phi h(Q)^{-1}-1)} q - \frac{1}{\phi h(Q)^{-1}-1} = B(\phi, h(Q))(q - r(\phi, h(Q))) + \frac{1}{2} \quad (53)$$

$$L_1 = -\frac{(\phi+1)(\phi-1)}{(\phi h(Q)-1)(\phi h(Q)^{-1}-1)} q + \frac{\phi h(Q)^{-1}}{\phi h(Q)^{-1}-1} = -B(\phi, h(Q))(q - r(\phi, h(Q))) + \frac{1}{2} \quad (54)$$

Where $h(Q) \equiv Q^{\mu_f+(\sigma-1)(\mu_m-1)}$ is the quality impact index, $B(\phi, h(Q)) \equiv \frac{(\phi+1)(\phi-1)}{(\phi h(Q)-1)(\phi h(Q)^{-1}-1)}$ represents the slope coefficient. $r(\phi, h(Q)) \equiv \frac{1}{2}\frac{(\phi h(Q)^{-1}+1)(\phi h(Q)-1)}{(\phi+1)(\phi-1)}$ is the critical population ratio point where both countries employ an equal share of labor.

These expressions describe how the population ratio q of the large country affects labor distribution across countries, and how quality Q and total freeness of trade ϕ shape the industrial agglomeration and relative labor absorption.

(1) Equal Quality Across Countries: $Q_2 = Q_1 (\equiv 1)$

We first consider the benchmark case where the quality of national brand goods is identical in both the large country and the small country ($Q_1 = Q_2 = 1$). Under these conditions, the large country exhibits a reverse home-market effect, and full agglomeration occurs in the small country.

1. $\frac{1}{2} < q < \frac{\phi}{1+\phi}$

   $L_2 = \frac{\phi+1}{\phi-1}\left(q - \frac{1}{2}\right) + \frac{1}{2}$ $\qquad$ $L_1 = -\frac{\phi+1}{\phi-1}\left(q - \frac{1}{2}\right) + \frac{1}{2}$

2. $\frac{\phi}{1+\phi} \leq q \leq 1$

   The labor allocation becomes extreme, resulting in $L_1 = 0$ and $L_2 = 1$.

(2) Higher Quality of the Small Country ($Q_2 = Q > 1$)

We now analyze the case where the quality of national brand goods in the small country (Country 2) exceeds that of the large country (Country 1), using **Figure 2** and **Table 9**.

(a) $\mathbf{1 < Q_2 \leq \left(\frac{1+\phi^2}{2\phi}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}}$

As the quality level increases, the line L_2 rotates counterclockwise and shifts to the right (from Equation 53), while L_1 rotates clockwise and also shifts to the right (from Equation 54). Depending on the population size of the large country, we sequentially observe a home-market effect in the large country and a reverse home-market effect in the large country, and finally complete agglomeration in the small country.

(b) $\mathbf{Q_2 = \left(\frac{1+\phi^2}{2\phi}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}}$

At this threshold, depending on the size of the large country, we also observe: a home-market effect and a reverse home-market effect in the large country, and eventually full agglomeration in the small country.

(c) $\mathbf{\left(\frac{1+\phi^2}{2\phi}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}} < Q_2 < \phi^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}}$

Beyond this point, full agglomeration in the large country becomes possible, and all patterns—complete agglomeration , home-market effect and reverse home-market effect in the large country,

and completed agglomeration in the small country—can coexist depending on the population ratio. When the small country's population is relatively large, the reverse home-market effect and agglomeration into the small country are notable.

(d) $\boldsymbol{Q_2 \geq \phi^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}}$

Complete agglomeration occurs in the large country. Even if the small country has high-quality brands, they reach their limit in terms of production capacity.

(3) Lower Quality in the Small Country ($Q_2 = Q < 1$)

When the small country's product quality Q_2 falls below that of the large country ($Q_2 < Q_1 \equiv 1$), the implications can likewise be illustrated using **Figure 7**.

(a) $\boldsymbol{\left(\frac{2\phi}{1+\phi^2}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}} < Q_2 < 1}$

Starting from the baseline of equal quality ($Q_1 = Q_2 = 1$), line L_2 in **Figure 7** shifts leftward while rotating counter-clockwise, and line L_1 shifts leftward while rotating clockwise. In this regime, one observes a reverse home-market effect in the large country and complete agglomeration in the small country.

(b) $\boldsymbol{Q_2 \leq \left(\frac{2\phi}{1+\phi^2}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}}$

The model predicts complete agglomeration in the small country, and the large country's industry disappears altogether.

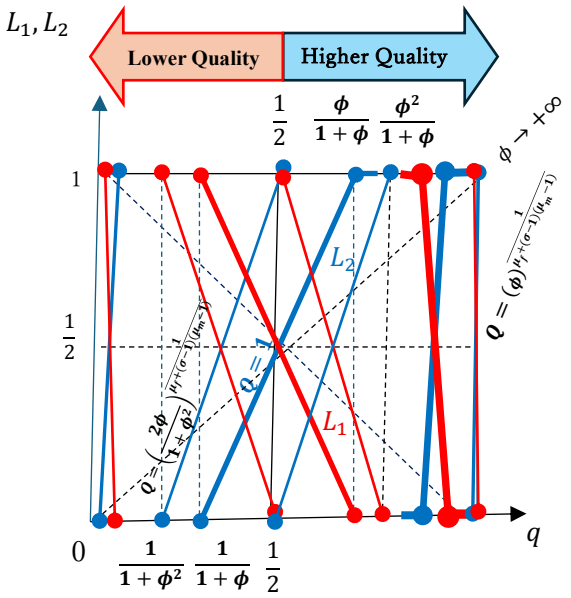

Figure 2. Industrial Agglomeration between Two Countries with Extreme Preferences for Foreign Culture Beyond Spatial Distance ($\phi(\equiv (\tau/\beta)^{1-\sigma}) > 1$)

Table 9. Industrial Agglomeration between Two Countries Depending on Quality Differentials and Spatial-Cultural Distance ($\phi(\equiv (\tau/\beta)^{1-\sigma}) > 1$)

Quality of the Small Country (Relative to the Large Country = 1)	Industrial Agglomeration between Large and Small Countries	Population of Large country
$Q = \left(\frac{2\phi}{1+\phi^2}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}$	Complete agglomeration in the small country (Large country's industry disappears)	All
↑ (Slightly lower quality in the small country)	1. Reverse home-market effect in the large country 2. Complete agglomeration in the small country	Smaller larger
$Q = 1$ (Equal quality)	1. Reverse home-market effect in the large country 2. Complete agglomeration in the small country	Smaller larger
↓(Slightly higher quality in the small country)	1. Home-market effect in the large country 2. Reverse home-market effect 3. Complete agglomeration in the small country	Smaller larger
$Q = \left(\frac{1+\phi^2}{2\phi}\right)^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}$	1.Home-market effect in the large country 2.Reverse home-market effect 3.Complete agglomeration in the small country	Smaller larger
↓(High quality in the small country)	1.Complete agglomeration in the large country 2.Home-market effect 3.Reverse home-market effect 4.Complete agglomeration in the small country	Smaller larger
$Q = \phi^{\frac{1}{\mu_f+(\sigma-1)(\mu_m-1)}}$	Complete agglomeration in the large country (Small country's industry disappears)	All

4.5 Summary

In actual international trade, not only "geographical distance" but also “cultural distance"—which includes cultural ties and historical or political conflicts—plays a crucial role. This study has demonstrated that even if productivity is low due to traditional cultural production methods, consumer willingness to pay, derived from national brand recognition, can sufficiently compensate for the low productivity when the product quality is high.

5. Conclusion

This study developed a spatial economic model of international trade in national brand goods and services (ranging from branded agricultural products to globally recognized films and animations).

1. We analyzed how reductions in transaction costs (including transport, communication, and market transaction costs) and the formation of quality and brand value affect the industrial location of regional branded goods and services in both large and small countries.
2. The mechanisms through which home-market effects and reverse home-market effects emerge via the creation of global brands in mountainous regions of advanced countries or in developing nations were clarified.
3. It was found that as interest in traditional cultural brand goods increases, the home-market effect in large countries weakens. If this interest grows stronger, the reverse home-market effect is triggered, leading to greater industrial agglomeration in smaller countries.
4. The model explicitly incorporates not only the cultural and psychological effects that create brands but also the relationship between these effects and traditional production methods necessary to ensure quality.
5. While it has been commonly assumed that products with extremely low labor productivity, due to traditional cultural processes, cannot survive in production or be exported, the findings show that if brand power increases sufficiently, even low productivity can be overcome.

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