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TANAKA Ayumu
RIETI



Research Institute of Economy, Trade & Industry, IAA

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TANAKA Ayumu[†]

Research Institute of Economy, Trade and Industry

Abstract

Using new data that tabulate the number of nights spent by visitors in each prefecture and locational Gini coefficients, this study provides the first empirical evidence that foreign travelers concentrate their visits to Japan in extremely few locations. Moreover, the concentration in travel destinations is far greater for foreign travelers than for Japanese ones, and the degree of geographic concentration varies according to their nationality. In addition, this study employs gravity equations to examine the factors that determine the number of nights that foreign visitors spend in each prefecture. Empirical results suggest that visa policy, transportation infrastructure, and natural and cultural factors along with traditional gravity variables such as distance and economic size play a role in international travel to Japanese prefectures.

Keywords: Foreign visitors; Geographic concentration; Locational Gini coefficient; Gravity equation

JEL classification: F14, L83, R12

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[†] Research Institute of Economy, Trade and Industry (RIETI).

E-mail: tanaka-ayumu<at>rieti.go.jp

1 Introduction

Since the launch of its Visit Japan Campaign in 2003, the Japanese government has sought to attract foreign visitors to Japan. Japan ranked 28th worldwide (sixth in Asia) in the number of inbound travelers in 2008 and 15th (second in Asia) in the number of outbound travelers in 2007. Table 1 shows that the number of foreign visitors grew by an average of 30% yearly from 2003 to 2009. Despite the general growth in the number of inbound travelers, this study reveals a significant disparity among Japanese prefectures in the number of foreign visitors as measured by the number of nights spent by foreigners. Foreign visitors spend an overwhelmingly high number of nights in a few prefectures.

Table 1: Foreign visitors to Japan since 2003

	level (10 thousand)	growth rate (%)
2003	521.2	
2004	613.8	17.8
2005	672.8	9.6
2006	733.4	9.0
2007	834.7	13.8
2008	835.1	0.0
2009	679.0	-18.7
2003-2009	698.6	30.3

Source: Japan Tourism Agency.

It is important to reveal what causes this geographic concentration in the number of nights that foreigners spend in Japan's 47 prefectures. This paper provides the first empirical evidence of this remarkable geographic concentration in travel destinations and analyzes its causes. Previous studies have examined international travel flows from the perspective of trade in services. Neiman and Swagel (2009) found that post-9/11 changes in visa policy were unimportant in explaining the sharp decline in travel to the US following the attacks. Yasar et al. (2012) also investigated visa policy and revealed that the US Visa Waiver Program (VWP) contributed to increased bilateral trade, especially for US exports, between the US and selected VWP countries. Cristea (2011), Hovhannisyan and Keller (2011), and Poole (2010) analyzed travel as an input that facilitates trade or innovation by face-to-face communication. Earlier studies (Kulendran and Wilson, 2000; Shan and Wilson, 2001) employed time-series econometric techniques such as cointegration and Granger-causality approaches to explore the relationship between trade and international travel. Kulendran and Wilson

(2000) found two-way Granger-causality between total travel and real total trade using data for Australia and four important travel and trading partners. Shan and Wilson (2001) also found two-way Granger-causality between international travel and international trade for China. Katircioglu (2009) also employed the Granger-causality test and revealed that growth in international trade (exports and imports) stimulated an increase in international tourist arrivals to Cyprus. Fischer and Gil-Alana (2009) used a methodology based on long memory regression models and revealed that German tourism to Spain has an effect on German imports of Spanish wine that lasts two to nine months. Unlike previous studies, this study focuses on the geographic concentration of foreign visitors and analyzes the relationship between the number of nights foreign visitors spend in a prefecture and that prefecture's factor endowments, GDP, and distance from visitors' countries of origin.

The remainder of this paper is divided into four sections. Section 2 explains and briefly describes the data used in this study. Using locational Gini coefficients, Section 3 reveals the geographic concentration of foreigners' travel destinations as measured by the number nights they spend. Using gravity equations, Section 4 examines what determines the number of nights spent by foreign visitors. Section 5 summarizes and concludes the paper.

2 Data and overview

This section describes and reviews the data used in this study. This study employed recently available data from the survey of hotels conducted by the Japan Tourism Agency (JTA) yearly since 2007. Japanese hotels must report the number of nights spent by Japanese and foreign visitors, and since 2007, JTA has surveyed all Japanese hotels with more than 10 employees. From this survey, I constructed data covering 2007-2009. The total number of nights is defined by the sum of nights spent per visitor.

Table 2 shows the number of nights spent by foreign visitors in each prefecture, the prefecture's ranking, its share among all 47 prefectures, and the proportion of nights spent by foreign visitors. Table 2 reveals that a few prefectures dominate the number of nights and that most prefectures account for only a small percentage. In 2009, Tokyo had 34.86% of nights, whereas Mie, the median prefecture, had 0.47%.

Table 2: Number of nights spent by foreigners in Japan (2009)

Rank	Prefecture	Nights (thousand)	Share (%)	Fraction of Foreigners (%)	Rank	Prefecture	Nights (thousand)	Share (%)	Fraction of Foreigners (%)
	Total	18297.8	100.00	6.07					
1	Tokyo	6377.7	34.86	18.47	25	Tochigi	85.6	0.47	1.30
2	Osaka	1966.5	10.75	12.52	26	Kagoshima	67.5	0.37	1.46
3	Hokkaido	1806.7	9.87	7.36	27	Saitama	66.5	0.36	2.33
4	Chiba	1622.7	8.87	10.45	28	Iwate	64.6	0.35	1.55
5	Kyoto	818.0	4.47	9.58	29	Aomori	59.2	0.32	1.71
6	Aichi	704.2	3.85	7.49	30	Toyama	57.3	0.31	2.22
7	Kanagawa	609.2	3.33	5.35	31	Fukushima	56.9	0.31	0.80
8	Yamanashi	408.8	2.23	10.18	32	Ibaraki	56.2	0.31	1.97
9	Fukuoka	374.8	2.05	4.23	33	Okayama	51.6	0.28	1.42
10	Shizuoka	372.2	2.03	2.78	34	Akita	45.1	0.25	1.56
11	Hyogo	311.8	1.70	3.76	35	Miyazaki	42.9	0.23	1.77
12	Okinawa	293.0	1.60	2.55	36	Yamagata	41.7	0.23	1.04
13	Nagasaki	216.7	1.18	5.18	37	Gunma	40.9	0.22	0.69
14	Kumamoto	190.8	1.04	3.83	38	Nara	34.7	0.19	3.13
15	Nagano	186.8	1.02	1.89	39	Ehime	34.0	0.19	1.42
16	Oita	172.5	0.94	4.19	40	Saga	27.1	0.15	1.40
17	Hiroshima	171.9	0.94	3.49	41	Kagawa	25.5	0.14	1.18
18	Gifu	153.3	0.84	4.26	42	Yamaguchi	25.2	0.14	0.90
19	Ishikawa	122.0	0.67	2.18	43	Kochi	16.3	0.09	0.89
20	Miyagi	115.1	0.63	1.74	44	Fukui	16.0	0.09	0.73
21	Wakayama	88.8	0.49	2.63	45	Tottori	14.0	0.08	0.59
22	Shiga	88.3	0.48	3.53	46	Tokushima	12.6	0.07	1.05
23	Niigata	87.4	0.48	1.20	47	Shimane	10.3	0.06	0.47
24	Mie	86.6	0.47	1.63					

3 Geographic concentration

3.1 Locational Gini coefficients

This section discusses the employment of the Lorenz curve and locational Gini coefficients to assess the degree of geographic concentration of foreign visitors' destinations. Prefectures are identified as destinations because a prefecture is a regional unit that offers most disaggregated available data, although city or town levels might be desirable for analysis.

Gini coefficients have been commonly used to measure geographic concentration since Krugman (1991).^{*1} Gini coefficients are calculated for the total number of nights spent by each foreign country's visitors, all visitors, Japanese visitors, and foreign visitors. Gini coefficients are constructed as follows. First, I calculate each prefecture's share in total Japanese GDP and share in total nights spent by visitors:

$$y_{p,t} = \frac{Y_{p,t}}{Y_t} \quad (1)$$

$$n_{p,t} = \frac{N_{p,t}}{N_t} \quad (2)$$

where Y and N indicate real GDP (value added) and the number of nights spent by visitors, respectively. The subscripts p and t indicate the destination prefecture and year, respectively. Data for real GDP are from the Japanese Cabinet Office's Annual Report on Prefectural Accounts.

Second, I calculate the Balassa index:

$$B_{p,t} = \frac{n_{p,t}}{y_{p,t}}. \quad (3)$$

The Balassa index represents the importance of visitors relative to the overall economic activity for each region. I also calculate the Balassa index using each prefecture's share of population in total Japanese population as the denominator and obtain qualitatively similar results.

Third, I draw the Lorenz curve by ranking the Balassa indexes in descending order and plotting the cumulative share of nights on the vertical axis against the cumulative share of GDP on the horizontal axis.

Fourth, I obtain Gini coefficients as twice the area between a 45-degree line and the Lorenz curve. The coefficients can vary from 0 to 1. The closer the distribution of nights to that of the overall economic activity in Japan, the smaller the Gini coefficient.

^{*1}See Amiti (1998) for more details.

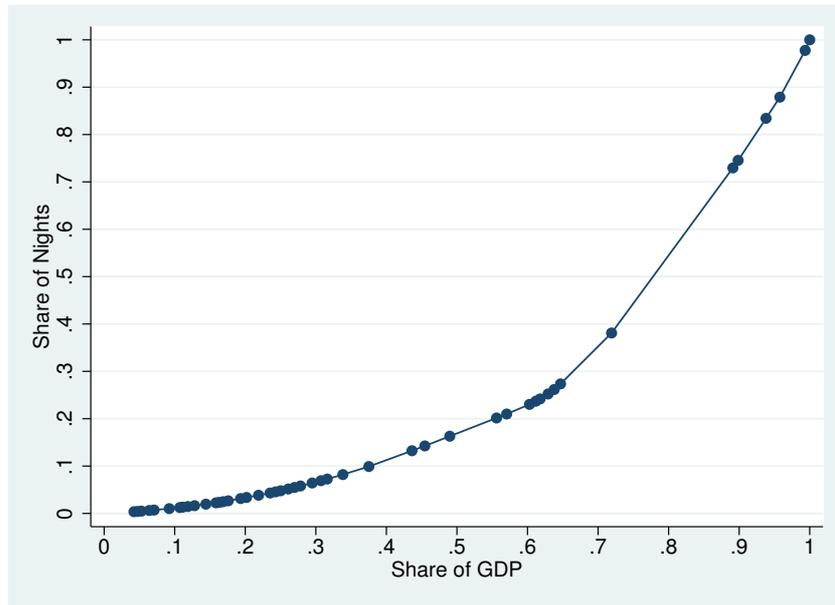


Figure 1: Lorenz curve for the nights spent by foreigners

3.2 Geographic concentration of visitors

Figure 1 displays the Lorenz curve for the total number of nights spent by foreigners. It reveals a remarkable geographic concentration of foreign visitors' travel destinations compared with the overall economic activity. The top seven prefectures have over 70% of nights, whereas other prefectures have small shares. The curves are away from the 45-degree line.

Table 3 presents the Gini coefficients for the total number of nights spent by visitors. Gini coefficients are calculated for visitors from 12 major countries, visitors from the rest of world, all visitors, foreign visitors, and Japanese visitors.

A higher Gini coefficient indicates that the number of nights visitors spend in a locale is geographically more concentrated. One major finding is that Gini coefficients for foreign travelers are far higher than those for Japanese travelers. This result indicates that destinations of foreign travelers are geographically more concentrated than destinations of Japanese travelers.

The geographic concentration varies substantially among the 12 major origin countries. Countries with the greatest geographic concentration in

Table 3: Locational Gini coefficients for nights spent by foreigners in Japan

	2007	2008	2009
Total	0.287	0.286	0.286
Japan	0.307	0.305	0.303
Foreign	0.419	0.425	0.452
Korea	0.489	0.503	0.474
China	0.457	0.457	0.501
Hong Kong	0.560	0.577	0.606
Taiwan	0.477	0.492	0.487
USA	0.530	0.518	0.527
Canada	0.560	0.574	0.576
UK	0.602	0.600	0.590
Germany	0.505	0.502	0.499
France	0.605	0.609	0.602
Singapore	0.621	0.638	0.635
Thailand	0.486	0.452	0.488
Australia	0.602	0.598	0.600
Rest of the World	0.482	0.483	0.499

2009 were Singapore, Hong Kong, France, and Australia. These countries had the highest Gini coefficients in 2007 and 2008. Countries with the lowest geographic concentration in 2009 were Korea, Taiwan, Thailand, Germany, and China. These countries had the lowest Gini coefficients in 2007 and 2008.

The Gini coefficients for all visitors, including Japanese and foreign visitors, remained almost constant throughout 2007-2009. However, the Gini coefficient for foreign visitors increased, while the coefficient for Japanese visitors decreased. These results suggest that destinations chosen by Japanese travelers have been more geographically dispersed, whereas foreigners concentrate their travels in popular prefectures.

4 Gravity equation

4.1 Specifications

I use gravity equations to investigate the determinants of the sum of the nights spent by foreign visitors. It is important to examine the determinants of the geographic concentration of foreign visitors, but the number of Gini coefficients is too small to estimate. Therefore, I estimate the determinants

of the sum of the nights spent by foreign visitors. Previous studies employed gravity equations to examine determinants of international travel. Neiman and Swagel (2009) derived a gravity equation for international travel from the theoretical framework of Anderson and van Wincoop (2003). Following Neiman and Swagel (2009) and other studies, I employ a gravity model but I use more traditional gravity variables rather than fixed effects of source countries and destination prefectures^{*2} since this study examines the effects of both time-variant and time-invariant variables on travel flows.

I estimate the following baseline gravity equations:

$$\begin{aligned} \ln N_{f,p} = & \ln \alpha + \ln Distance_{f,p} + \ln GDP_f + Visa_f + \ln GDP_p \quad (4) \\ & + \ln Airports_p + \ln Park_p + \ln Treasure_p + \\ & + Nature_p \cdot \ln Park_p + Culture_p \cdot \ln Treasure_p + \ln \epsilon_{f,p} \end{aligned}$$

where $N_{f,p}$ is the sum of the nights spent by foreign visitors from country f in prefecture p . The sample size is 564 (47 prefectures \times 12 source countries). $Distance_{f,p}$ is the distance between the capital city of country f and the capital of prefecture p . GDP_f and GDP_p are value added of source country and destination prefecture, respectively. Data for GDP_f are adjusted for purchasing power parity from the Penn World Table. Data for GDP_p are real GDP from the Cabinet Office's Annual Report on Prefectural Accounts. $Visa_f$ is a dummy variable that takes the value of 1 for countries participating in the VWP and 0 otherwise. Following Neiman and Swagel (2009) and Poole (2010), I use this dummy as one independent variable. $Airports_p$ is the number of airports in prefecture p . This variable measures physical capital or transportation infrastructure. Since Japan is a multi-island nation, airports are significant in that regard. $Park_p$ and $Treasure_p$ are the number of national parks and the number of national treasures, respectively, in prefecture p . They are measures of natural and cultural capitals, respectively, as defined in Throsby (1999, 2001). $Nature_p$ and $Culture_p$ are dummy variables that equal 1 for prefectures that contain UNESCO world natural heritage sites and the UNESCO world cultural heritage sites, respectively, and 0 otherwise. They also measure natural and cultural capitals, respectively. I include their interaction terms for Natural Park and National Treasures since designation as a world heritage site may enhance foreign visitors' awareness and willingness to experience them.

Descriptive statistics for all variables are in Table 6 of the Appendix.

^{*2}Many studies have employed the fixed-effects method (Redding and Venables, 2004; Helpman et al., 2008) to account for unobserved price indexes.

4.2 Regression results

I estimate equation (4) by ordinary least squares (OLS). Regression results for 2009 appear in the left panel of Table 4. Specifications of natural and cultural variables vary across Columns (1)-(3). Traditional gravity variables show the expected signs in all specifications. Distances between the source country and destination prefectures are negatively and significantly related to the sum of the nights spent in destination prefectures. Destination prefectures' and source countries' GDPs are significantly and positively related to the number of nights. The estimated coefficients of destination prefecture GDPs significantly exceed those of source country GDPs.

Coefficients of VWP are positive and significant. This result is in agreement with the results of previous studies such as Poole (2010) and suggests that an increase in the number of countries that participate in VWP results in an increase in the number of foreign visitors. The number of airports is positively associated with the number of nights, in line with tourism management literature such as Khadaroo and Seetanah (2008) and Massidda and Etzo (2012).

Positive coefficients of the number of national parks and national treasures are statistically significant across all specifications. Positive coefficients of the dummy variables for world heritage designation are statistically significant for cultural heritage only. The world cultural heritage dummy and its interaction terms with the number of national treasures are significantly associated with a larger number of nights spent in destination prefectures.

I also estimate equation (4) by the Poisson pseudo maximum likelihood (PPML) method using the dependent variables in levels. Silva and Tenreyro (2006) propose this method because it produces consistent estimates if the conditional expectation function is correctly specified. The method was employed by Head et al. (2009) for the service trade and by Neiman and Swagel (2009) for international travel. In the case of PPML, I do not report the results using interaction terms because interaction effects in nonlinear models are difficult to interpret (Ai and Norton, 2003; Green, 2010).

Estimation results using PPML appear in the right-hand-side panel of Table 4. The results are qualitatively almost identical with the OLS results, but the signs and statistical significance of coefficients of natural and cultural variables have changed: they are positive in column (4) but insignificant in columns (4) and (5).

To summarize, the flow of international travel is in many cases associated with visa policy, transportation infrastructure, and natural and cultural factors in addition to traditional gravity variables. As a robustness check, I

Table 4: Gravity equation (2009)

Dep. var.	$\ln N_{f,p}$			$N_{f,p}$	
	OLS			PPML	
	(1)	(2)	(3)	(4)	(5)
$\ln Distance_{f,p}$	-1.215*** [0.064]	-1.213*** [0.064]	-1.216*** [0.064]	-0.699*** [0.069]	-0.711*** [0.066]
$\ln GDP_f$	0.499*** [0.046]	0.499*** [0.046]	0.499*** [0.046]	0.353*** [0.095]	0.354*** [0.097]
$Visa_f$	0.807*** [0.152]	0.805*** [0.152]	0.808*** [0.152]	0.496* [0.222]	0.504* [0.221]
$\ln GDP_p$	1.470*** [0.069]	1.651*** [0.058]	1.534*** [0.080]	1.212*** [0.129]	1.310*** [0.078]
$\ln Airports_p$	0.259** [0.086]	0.221* [0.092]	0.249* [0.106]	0.482*** [0.113]	0.364** [0.118]
$\ln Park_p$	0.369** [0.133]		0.344** [0.128]	0.113 [0.222]	
$\ln Treasure_p$	0.215*** [0.041]		0.130* [0.057]	0.007 [0.102]	
$Nature_p$		0.031 [0.195]			0.59 [0.365]
$Culture_p$		0.408*** [0.111]			-0.088 [0.189]
$Nature_p * \ln Park_p$			0.186 [0.199]		
$Culture_p * \ln Treasure_p$			0.114* [0.052]		
Observations	564	564	564	564	564
R-squared	0.682	0.670	0.687	0.724	0.730

Notes: Robust standard errors are shown in brackets. Constants are suppressed. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

obtained results using data for 2007 and 2008 and found them to be qualitatively similar to the results in Table 4.

5 Conclusion

Using official data on nights spent by visitors in 47 prefectures, this study has investigated the geographic concentration of destinations chosen by foreign visitors to Japan. It found that foreign visitors visit fewer Japanese prefectures than Japanese visitors and that the extent of geographical concentration varies among countries where foreign visitors originate. Alongside traditional gravity variables, estimation results using gravity equations suggest that visa policy, transport infrastructure, and natural and cultural factors play a role in international travel to Japanese prefectures.

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Appendix

Table 5: Number and share of nights spent by Japanese and foreigners (2007-2009)

	2007 (10 thousand)	2007 (share)	2008 (10 thousand)	2008 (share)	2009 (10 thousand)	2009 (share)
Japanese and foreigners	30938.2		30969.9		30130.4	
Japanese	28672.7		28745.0		28300.6	
foreigners (share of foreigners)	2265.4 (0.07)	1.00	2224.8 (0.07)	1.00	1829.8 (0.06)	1.00
Korea	435.2	0.19	380.3	0.17	218.8	0.12
China	221.0	0.10	247.8	0.11	258.1	0.14
Hong Kong	175.5	0.08	184.9	0.08	157.1	0.09
Taiwan	388.4	0.17	372.7	0.17	263.7	0.14
USA	299.5	0.13	273.7	0.12	231.3	0.13
Canada	25.4	0.01	25.5	0.01	23.2	0.01
UK	55.2	0.02	53.7	0.02	44.6	0.02
Germany	45.4	0.02	43.7	0.02	37.4	0.02
France	43.5	0.02	47.9	0.02	43.9	0.02
Singapore	53.2	0.02	58.9	0.03	54.1	0.03
Thailand	44.1	0.02	46.1	0.02	44.4	0.02
Australia	52.5	0.02	62.8	0.03	53.9	0.03
Rest of World	343.6	0.15	354.7	0.16	323.4	0.18

Table 6: Descriptive statistics for the gravity equations (2009)

	N	Min	Mean	Max	SD
$N_{f,p}$	564	10.000	25364.540	989160.000	82670.570
$\ln Distance_{f,p}$	564	6.275	8.455	9.413	0.836
$\ln GDP_f$	12	12.383	14.204	16.455	1.265
$Visa_f$	12	0.000	0.833	1.000	0.389
$\ln GDP_p$	47	14.620	15.837	18.340	0.824
$Airports_p$	47	0.000	2.106	14.000	2.994
$Park_p$	47	0.000	1.617	6.000	1.153
$Treasure_p$	47	0.000	23.000	267.000	56.628
$Nature_p$	47	0.000	0.085	1.000	0.282
$Culture_p$	47	0.000	0.277	1.000	0.452