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Ayumu Tanaka

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Research Project Center
Graduate School of Economics
Kyoto University
Yoshida-Hommachi, Sakyo-ku
Kyoto City, 606-8501, Japan

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Ayumu Tanaka[†]

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Abstract

This paper provides the first evidence of geographic concentration of foreign visitors in Japan, using a new data on nights spent by foreign visitors in each region. Using locational Gini coefficients, I show that foreign visitors are more geographically concentrated than Japanese visitors and the level of geographical concentration vary across source countries. In addition, I employ gravity equations to examine the determinants of nights spent by foreign visitors in each prefecture. The results suggest that visa policy, transport infrastructure, and natural and cultural factors, as well as 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

[†]Research Fellow, Research Project Center, Graduate School of Economics, Kyoto University; Fellow, Research Institute of Economy, Trade and Industry (RIETI).
E-mail: tanaka-ayumu<at>rieti.go.jp

1 Introduction

Recently, Japanese government has begun to promote travel to Japan from abroad. Since 2003, it has conducted a campaign named, "Visit Japan Campaign (VJC)" to increase foreign visitors. Japan ranks 28th worldwide (6th in Asia) in terms of the numbers of inbound travelers in 2008, while 15th worldwide (2nd in Asia) in 2007 in terms of the numbers of outbound travelers. Table 1 shows that the number of foreign visitors has grown rapidly for the period 2003-2009. The average growth rate is over 30 percent during this period.

Despite the recent growth of the number of inbound travelers in Japan, this study reveals that huge disparity exists in the number of foreign visitors among regions in terms of the number of nights spent by foreigners. I show a small number of prefectures have an overwhelmingly high share of nights spent by foreign visitors in Japan.

Table 1: Foreign visitores in 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: Data are from Japan Tourism Agency.

It is important to reveal what causes this geographic concentration of the number of nights by foreigners among prefectures. The purpose of this paper is to provide the first evidence of the remarkable geographic concentration and analyze the reason for it. Recently, several studies in the trade literature have examined the international flow of travel since international flow of travel can be regard as a services trade. Neiman and Swagel (2009) investigate the impacts of the visa policy on the travel to the US. They find that post-9/11 changes in visa policy were not important contributors to the sharp decline in travel to the US following the attacks. Yasar et al. (2012) also investigate the impacts of the visa policy and find that the impact of the US Visa Waiver Program (VWP) tends to increase the bilateral trade levels between the US and the selected VWP countries, especially for US exports. Cristea (2011), Hovhannisyan and Keller (2011), and Poole

(2010) analyze the role of travel as an input that facilitates trade or innovation by face-to-face communication. Earlier studies such as Kulendran and Wilson (2000) and Shan and Wilson (2001) employ time-series econometric techniques such as cointegration and Granger-causality approaches to explore the relationship between trade and international travel. Kulendran and Wilson (2000) find the two-way Granger-causality between total travel and real total trade, using data for Australia and four importan travel and trading partners. Shan and Wilson (2001) also find two-way Granger-causality between international travel and international trade in the case of China. In addition, Katircioglu (2009) also employs the Granger-causality test and reveals that growth in international trade (both exports and imports) stimulates an increase in international tourist arrivals to Cyprus. Fischer and Gil-Alana (2009) uses a methodology based on long memory regression models and reveals that German tourism to Spain has an effect on German imports of Spanish wine that lasts between 2 and 9 months. Unlike previous studies, this study focuses on the geographic concentration of foreign visitors and analyzes the relationship between the number of nights spent by foreign visitors and the host regions' factor endowments, economic size, and distance from source countries.

The remainder of this paper is divided into four sections. In Section 2, I explain and briefly describe the data used in this paper. In Section 3, using locational Gini coefficient, I reveal the geographic concentration of foreign visitors in terms of nights spent by them. In Section 4, I examine what determines the number of nights spent by foreign visitors, using gravity equations. The summary and conclusion are presented in the final section.

2 Data and overview

In this section, I briefly describe data used in this paper and provide an overview of the data. In this paper, I use recently available data from the Survey of Hotels by the Japan Tourism Agency (JTA). JTA has conducted the survey since 2007. The target of the survey is all hotels with more than 10 employees in Japan. Hotels are required to report the total number of nights by Japanese and foreign visitors. Total number of nights is defined by the sum of nights spent by visitor. From this survey, I construct data which covers the period 2007–2009.

Table 2 shows the number of nights spent by foreign visitors and its ranking and the share in all of 47 prefectures, as well as the fraction of nights spent by foreign visitors. Table 2 reveals that a few prefectures has very large share of total number of nights, while most of prefectures has only tiny share. In 2009, Tokyo has 34.86% of nights, while Mie, the median prefecture, has only 0.47%.

Table 2: Nights spent by foreigners in Japan (2009)

Rank	Prefecture	Nights (thousand)	Share (%)	Fraction of Foreiners (%)	Rank	Prefecture	Nights (thousand)	Share (%)	Fraction of Foreiners (%)
	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

In this section, I employ a Lorenz curve and locational Gini coefficients to assess the degree of geographical concentration of foreign visitors in Japan. The prefectures are adopted as region since prefecture is the most disaggregated level of region in my data, although city or town levels might be desirable for analysis.

The use of Gini coefficients as a measure of geographic concentration is common since Krugman (1991).[*1] Gini coefficients are calculated for the total number of the nights spent by each foreign country's visitors and by all visitors and Japanese and foreign visitors.

Gini coefficients are constructed as follows. First, I calculate each prefecture's share of GDP and share of nights:

$$y_{p,t} = \frac{Y_{p,t}}{Y_t} \tag{1}$$

$$n_{p,t} = \frac{N_{p,t}}{N_t} \tag{2}$$

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

Second, I calculate the Balassa index:

$$B_{p,t} = \frac{n_{p,t}}{y_{p,t}}. \tag{3}$$

This Balassa index represents each region's relative importance of visitors relative to overall economic activity. I also calculate Balassa index using share of population as denominator and obtain qualitatively similar results.

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

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

[*1] See Amiti (1998) for the more detail.

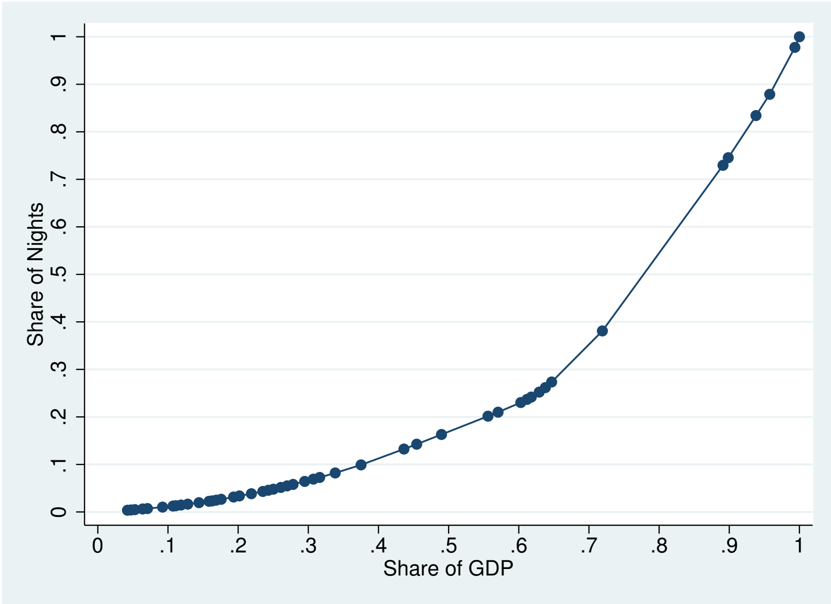

Figure 1: Lorenz curve for the nights spent by foreigners

3.2 Geographic concentration of visitors

Figure 1 displays the Lorenz curve for total number of the nights spent by foreigners. The Figure reveals that geographic concentration of foreign visitors is remarkable, compared with overall economic activities. Top seven prefectures have over 70% of nights, while other prefectures have only tiny shares. The curve are away from 45-degree line.

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

Higher Gini coefficient indicates that total number of nights spent by visitors is more geographically concentrated. One of the major findings is that the Gini coefficients for foreign travelers are much higher than the Gini coefficient for Japanese travelers. This result indicates that destinations of foreign travelers are more geographically concentrated than those of Japanese travelers.

The level of geographic concentration substantially varies across 12 major origin countries. The countries with the highest level of geographic con-

Table 3: Locational Gini coefficients for the 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 World	0.482	0.483	0.499

centration in 2009 are Singapore, Hong Kong, France, and Australia. These countries had the highest level of the Gini coefficients in both 2007 and 2008. The countries with the lowest level of geographic concentration in 2009 are Korea, Taiwan, Thailand, Germany, and China. These countries had the lowest level of the Gini coefficients in both 2007 and 2008.

The Gini coefficient for all visitors including both Japanese and foreign visitors remain almost same for the period 2007–2009. However, the Gini coefficient for foreign visitors has risen, while the coefficient for Japanese visitors has decreased. These results suggest that the destination of Japanese travelers has been more geographically dispersed, while the destination of foreign travelers has been more geographically concentrated on popular prefectures.

4 Gravity equation

4.1 Specification

I investigate the determinants of the sum of the nights spent by foreign visitors, using gravity equations. The number of the Gini coefficients is too small to estimate, although it is important to examine the determinants of the geographic concentration of foreign visitors. I, therefore, estimate the determinants of the sum of the nights spent by foreign visitors.

Several studies have employed the gravity equation to examine the determinants of travel since international travel is a kind of international trade. Neiman and Swagel (2009) derived the gravity equation of 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 the aim of this study is to examine the effects of not only time-variant but also time-invariant variables on the flow of travel.

I estimate the following baseline gravity equations:

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

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 since the number of prefectures is 47 and the number of source countries is 12. $Distance_{f,p}$ is the distance between capital city of country f and capital city of prefecture p. GDP_f and GDP_p are value added of source country and destination prefecture, respectively. The data on GDP_f are the purchasing-power-parity (PPP) adjusted GDP from the Penn World Table. The data on GDP_p are real GDP from the Cabinet Office's Annual Report on Prefectural Accounts. $Visa_f$ is a dummy variable which takes value of one for countries participating in the visa waiver program (VWP) and zero otherwise. Following Neiman and Swagel (2009) and Poole (2010), I use this variable as one of the independent variables. $Airports_p$ is the sum of airports in prefecture p. I use this variable as a measure of physical capital or transport infrastructure. Since Japan is consisted of islands, I consider that the airports play an important role. $Park_p$ and $Treasure_p$ are the sum of the national parks and the sum of the national treasures in prefecture p, respectively. They are measures of natural and cultural capitals as defined in Throsby (1999; 2001), respectively. $Nature_p$ and $Culture_p$ are dummy variables which equal one for prefectures that have the UNESCO world natural heritage and the UNESCO world cultural heritage, respectively and zero otherwise. They are

[*2]The fixed-effect method has been used by many studies such as Redding and Venables (2004) and Helpman et al. (2008) to take account of the unobserved price indexes.

also measures of natural and cultural capitals, respectively. I include their interaction terms with Natural Park and national treasures since the registration as a world heritage may enhance the foreign visitors' knowledge and willingness to experience the national parks and national treasures.

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

4.2 Regression results

I estimate equation (4) by ordinary least square (OLS) method. The regression results for the year 2009 are presented in the left panel of Table 4. The specifications of natural and cultural variables vary across Column (1)–(3). Traditional gravity variables show the expected signs in all specifications. Distance between source country and destination prefecture are negatively and significantly related to the number of the sum of the nights spent in destination prefecture. Both destination prefectures' and source countries' GDP are significantly positively related to the number of nights. The estimated coefficients of destination prefectures' GDP is much larger than those of source countries' GDP.

VWP has positive and significant coefficients. This result is in line with previous studies such as Poole (2010) and suggests that an increase in the number of countries that participating 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 the tourism management literature such as Khadaroo and Seetanah (2008) and Massidda and Etzo (2012).

The positive coefficients on the number of national parks and national treasures are statistically significant across all specifications. The positive coefficients on the dummy variables for the world heritage are statistically significant for cultural heritage only. The world cultural heritage dummy and its interaction terms with the number of national treasures are both statistically significantly associated with increased nights in destination prefectures.

I also estimate equation (4) by Poisson pseudo maximum likelihood (PPML) method, using the dependent variable in levels. Silva and Tenreyro (2006) propose this method because this method will produce consistent estimates as long as the conditional expectation function is not misspecificed. The method has been employed by Head et al. (2009) for the services trade and Neiman and Swagel (2009) for the international travel. In the case of PPML, I do not report the results using interaction terms since interaction effect in nonlinear models is difficult to interpret as discussed by Ai and

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***	-1.213***	-1.216***	-0.699***	-0.711***
	[0.064]	[0.064]	[0.064]	[0.069]	[0.066]
$\ln GDP_f$	0.499***	0.499***	0.499***	0.353***	0.354***
	[0.046]	[0.046]	[0.046]	[0.095]	[0.097]
$Visa_f$	0.807***	0.805***	0.808***	0.496*	0.504*
	[0.152]	[0.152]	[0.152]	[0.222]	[0.221]
$\ln GDP_p$	1.470***	1.651***	1.534***	1.212***	1.310***
	[0.069]	[0.058]	[0.080]	[0.129]	[0.078]
$\ln Airports_p$	0.259**	0.221*	0.249*	0.482***	0.364**
	[0.086]	[0.092]	[0.106]	[0.113]	[0.118]
$\ln Park_p$	0.369**		0.344**	0.113	
	[0.133]		[0.128]	[0.222]	
$\ln Treasure_p$	0.215***		0.130*	0.007	
	[0.041]		[0.057]	[0.102]	
$Nature_p$		0.031			0.59
		[0.195]			[0.365]
$Culture_p$		0.408***			-0.088
		[0.111]			[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. ***, **, * indicate significance at the 1%, 5%, and 10% levels, respectively.

Norton (2003) and Green (2010).

The estimation results using PPLM method are presented in the right panel of Table 4. The results are qualitatively almost same with the OLS results but the sign and statistical significance of coefficients on natural and cultural variables has changed. These variables are positive in column (4) but insignificant in columns (4) and (5).

To summarize, the flow of international travel is associated with the visa policy, transport infrastructure, and natural and cultural factors in many cases as well as traditional gravity variables. As a robustness check, I obtain results using the data for the year 2007 and 2008. They are qualitatively similar with the results of Table 4.

5 Conclusions

This paper investigates the geographic concentration of foreign visitors in Japan, using the data on the nights spent by visitors in 47 prefectures. I find that foreign visitors are more geographically concentrated than Japanese visitors and the level of geographical concentration vary across source countries. Estimation results using gravity equations suggest that not only traditional gravity variables but also 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	2265.4	1.00	2224.8	1.00	1829.8	1.00
(share of foreigners)	(0.07)		(0.07)		(0.06)	
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