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Panel data analysis of the factors
for determining inbound tourism in Japan

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Panel data analysis of the factors for determining inbound tourism in Japan *

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Abstract

The demand for inbound tourism in Japan has been increasing since 2013. In 2015, the number of inbound tourists reached approximately 20 million. The Japanese government is making various efforts to increase the number of foreign visitors and has set a target of approximately 40 million inbound tourists to be reached by 2020. The aim of this paper is to demonstrate empirically the demand for inbound tourism in Japan by using the gravity model with panel data. According to demand theory, the income factor, as well as the relative prices in origin countries, influence the demand for inbound tourism. Focusing on a visa-permission tourism policy, the paper clarifies that not only income and relative price effects but also travel policy will have a significant effect on increasing inbound tourism in Japan.

Keywords: inbound tourism, demand theory, visa-permission policy, panel data, gravity model.

JEL Classification Code: z32, z38

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1. Introduction

1-1. Research Background

The number of inbound tourists in Japan has been increasing since 2013, despite the “Great East Japan Earthquake” of 2011, while the domestic tourism market in Japan has not noticeably expanded. According to the Japan National Tourism Organization (JNTO), the number of inbound tourists reached approximately 20 million in 2015 and exceeded the number of outbound tourists for the first time in 45 years. In this regard, the Japanese government has introduced several policies to promote inbound tourism. For example, the Japanese government’s Cabinet indicated that the demand for inbound tourism was one of the challenges in the “Basic Policy about Economic and Fiscal Management and Structural Reform 2002” and established the headquarters of the “Visit Japan Campaign” in 2003. The Japanese government has set a target of 40 million inbound tourists to be reached by 2020.

The aim of this paper is to understand the demand trends for inbound tourism and demonstrate empirically the factors that influence demand. It is expected that the number of inbound tourists will continuously increase as part of the tourism strategy set by the government in the “Tourism-based Country Promotion Basic Act” enforced in 2007. In this context, it is important to clarify the factors that influence inbound tourism in Japan in order to consider the future of Japan as a tourism-based country.

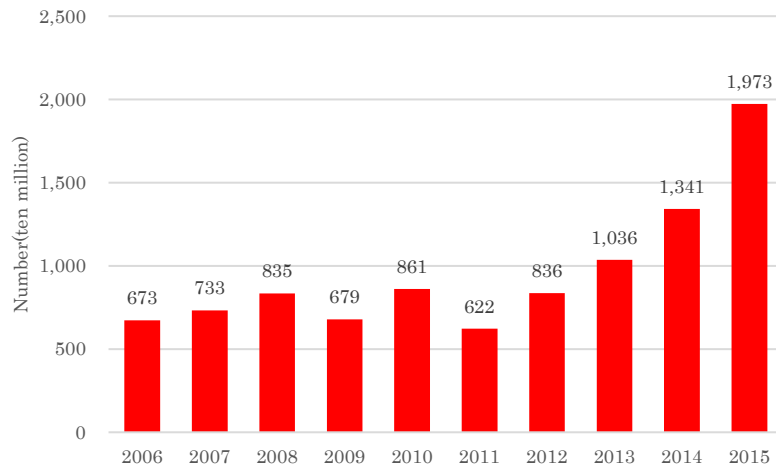
According to the Japan Tourism Agency (2016), “an inbound international visitor refers to foreign travelers entering Japan. This group consists of foreign nationals legally entering Japan minus foreign nationals who are residents of Japan (both [of which are] according to the nationality-based statistics [issued] by the Ministry of Justice), plus those in transit.”¹ The visitors based on this definition include those who visit for purposes other than simply travel, such as business, cultural and artistic activities, and visits to relatives. In order to focus only on the trend of traveling to Japan, this paper considers just international visitors in accordance with the nationality-based statistics of the Ministry of Justice in terms of the definition of an “inbound” tourist.

Figure 1 shows that the number of inbound tourists decreased in 2011, the year of the Great East Japanese Earthquake; however, the number has been increasing since 2013. Prior studies indicate that this growth is related to the quantitative and qualitative monetary easing by Japan’s central bank. As can be seen in Figure 2, the exchange rate of the Japanese currency, the yen, against the U.S. dollar has continued to be weak since

¹ Refers to HP in the Japan Travel Agency
http://www.mlit.go.jp/kankocho/en/siryoutoukei/in_out.html (accessed June 16, 2016).

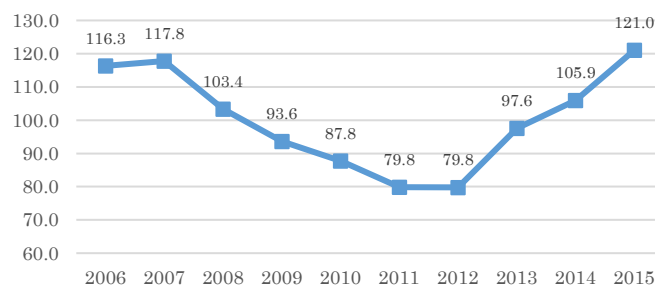
2013. Such currency depreciation makes the cost of travel cheaper in the destination country and thus encourages an increase in inbound tourism.

Figure 1 : The numbers of inbound tourists



Source: Author's own construction based on the statistical data of the Ministry of Justice

Figure 2: The exchange rate of the yen against the U.S. dollar



Source: Author's own construction based on the statistical data of the World Bank

Based on demand theory, tourism economics focus on the elements of price and income as factors that promote demand. Additionally, economic growth in source and destination countries is considered an income factor that promotes demand.

Further, tourism policy can encourage inbound tourism to increase. Such policy includes various strategies. This study adopts visa permission as the variable of tourism policy. Visa permission has various kinds of deregulation (the easing of a primary visa, a multiple-entry visa, and a visa waiver). This study considers a visa waiver as visa permission. However, from 2015 we also include the part-easing of a visa restriction regarding China as visa permission because China has a market share of Japanese

inbound tourism.²

1-2. Literature Review

The Mizuho Research Institute Ltd. (2016) empirically analyzes the demand for inbound tourism based on an econometric methodology. This work attempts to analyze 15 countries (South Korea, China, Taiwan, Hong Kong, Thailand, Singapore, Malaysia, Indonesia, the Philippines, the United Kingdom, France, Germany, the United States, Canada, and Australia) using time-series data from the first quarter of 1995 to the fourth quarter of 2015. The result of this study has shown that the trend of a low yen against the U.S. dollar increases inbound tourism in newly industrialized countries (NICs). Moreover, with regard to Southeast Asia, economic growth is a factor of inbound tourism in Japan. Additionally, inbound tourism from China is not a strong response to the exchange rate; instead, the income factor significantly influences demand. Further, this study has concluded that visa permission has a positive effect on inbound tourism.

However, the Mizuho Research Institute Ltd. (2016) cannot consider the total of inbound tourism in Japan because of the nature of the time-series data analysis. In order to achieve a comprehensive analysis, we need to analyze panel data in which cross-sectional data is added to time-series data.

One typical methodology that is used to analyze international tourism with panel data is the gravity model. According to Morley, Rossello, and Santana-Gallego (2014), the gravity model assumes that “bilateral flows between two countries are directly proportional to the countries’ economic masses and inversely proportional to the distance between them.” Empirical studies using the gravity model adopt real gross domestic product (GDP) or real GDP per capita as the countries’ economic masses. The distance between two countries is regarded as a kind of travel cost. In addition, expenditure at the destination is an important factor for determining the demand for inbound tourism. Normally, in the gravity model, *expenditure* is calculated with the exchange rate and the relative ratio of prices between a destination country and an origin country. The other variables are *population* and *specific events* such as festivals, disasters, and political disturbances.

Based on the foregoing, this study attempts to estimate demand for inbound tourism

² The Japanese government has eased the range of multiple-entry visas since 2015 as follows: (1) multiple-entry visas for short-term business purposes and for cultural and intellectual figures; (2) multiple-entry visas for individual tourists visiting Okinawa or one of three prefectures in Tohoku; and (3) multiple-entry visas for individuals with substantially high incomes (refers to HP in the Japanese Ministry of Foreign Affairs: http://www.mofa.go.jp/press/release/press4e_000576.html (accessed March 30, 2017)).

in Japan using the gravity model with panel data. We use *visa permission* as the policy variable together with *price* and *income*.

2. Methods and Data

This research estimates an expression of a linear logarithmic model (1) based on the prior section.

$$(1) \quad Tour_{it} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln Y_{jt} + \beta_3 \ln RP_{it} + \beta_4 \ln Pop_{it} + \beta_5 \ln Pop_{jt} \\ + \beta_6 (Visa\text{-}permission\ country_i \times AFTER_t) + \beta_7 Visa_i + \beta_8 AFTER_t \\ + \beta_7 yr_t + \mu_i + \varepsilon_{it}$$

In the above model, the subscript i is the origin country and j is the destination (Japan). $Tour_{it}$ is the number of tourists and refers to the variable of *tourism demand*. Y_{it} and Y_{jt} respectively are the income factors in the origin country and in the destination country. This paper adopts *real GDP per capita* as the proxy variable. Income factors in both countries have positive effects on tourism demand. RP_{it} is the relative price, which means expenditure in the destination country relative to expenditure in the origin country. Relative price is represented as follows (2).

$$(2) \quad RP_{it} = \frac{(CPI_i/EX_i)}{(CPI_j/EX_j)} = \left(\frac{CPI_i}{CPI_j} \right) / \left(\frac{EX_i}{EX_j} \right)$$

CPI_i and CPI_j respectively are the consumer price indexes in the origin country, i , and the destination country (Japan). EX_i and EX_j respectively are the exchange rates of the domestic currencies in i and j in terms of the U.S. dollar. The relative price has a negative influence on inbound tourism demand. Pop_{it} and Pop_{jt} each represent the populations in i and j . Culiuc (2014) concludes that the populations in the origin and the destination countries have a negative effect on inbound tourism demand. However, some research finds that population encourages an increase in the number of international tourists (e.g., Hanafiash and Harun 2010; Massidda and Etzo 2012; and so on).

$Visa\text{-}permission\ country_i$ is the dummy variable, which is 1 if visa restrictions are eased and 0 otherwise. $AFTER_t$ is the time dummy variable, which is 1 after visa restrictions are eased and 0 before they are eased. The cross term $Visa\text{-}permission\ country_i \times AFTER_t$ is the difference between a country that eases

visa restrictions and countries that do not ease visa restrictions after a year of visa permission. Thus, the coefficient β_4 refers to the effect of visa permission. μ_i refers to a specific fixed country and the time-invariant effect, such as the distance between two countries. This investigation attempts to remove μ_i using a fixed-effect model. γ_t is the time dummy that indicates political disturbance or disaster. This estimation uses the time dummy to represent the Great East Japan Earthquake. ε_{it} is the error term.

This paper sets a target for 190 countries as the cross-sectional data (see Table 1) and the 10 years from 2006 to 2015 as the time-series data. Table 2 shows the source of the data, and Table 3 presents the basic statistics. We try to estimate the inbound demand model using unbalance panel data because parts of the data are missing. Table 4 shows the visa-permission schedule in Japan since 2006. The Japanese government has eased visa restrictions for Indonesia since December 2014; thus, this paper assumes that visa restrictions for Indonesia eased in 2015.

Table 1: A list of countries' cross-sectional data

| |
|--|
| Asia (39 countries) |
| Afghanistan, Bahrain, Bangladesh, Bhutan, Brunei Darussalam, Cambodia, China, Cyprus, Hong Kong, India, Indonesia, Iran, Iraq, Islamic Rep., Israel, Jordan, Korea, Rep. Kuwait, Lao PDR, Lebanon, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Oman, Pakistan, Philippines, Qatar, Saudi Arabia, Singapore, Sri Lanka, Syrian Arab Republic, Taiwan, Thailand, Timor-Leste, Turkey, United Arab Emirates, Vietnam, Yemen Rep. |
| Europe (50 countries) |
| Albania, Andorra, Armenia, Austria, Azerbaijan, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Kazakhstan, Kosovo, Kyrgyz Republic, Latvia, Liechtenstein, Lithuania, Luxembourg, Macedonia FYR, Malta, Moldova, Monaco, Netherlands, Norway, Poland, Portugal, Romania, Russian Federation, San Marino, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Tajikistan, Turkmenistan, United Kingdom, Ukraine, Uzbekistan |
| Africa (53 countries) |
| Algeria, Angola, Arab Rep., Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo Dem. Rep., Congo Rep., Côte d'Ivoire, Djibouti, Egypt, Ethiopia, Equatorial Guinea, Eritrea, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Morocco, Mozambique, Namibia, Niger, Nigeria, Rwanda, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Togo, Tunisia, Uganda, Zambia, Zimbabwe |
| North America (22 countries) |
| Antigua and Barbuda, Bahamas, Barbados, Belize, Canada, Costa Rica, Dominica, Dominican Republic, El |

Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Mexico, Nicaragua, Panama, St. Kitts and Nevis, St. Lucia, St. Vincent and the Grenadines, Trinidad and Tobago, United States

South America (12 countries)

Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Suriname, Uruguay, Venezuela

Oceania (14 countries)

Australia, Fiji, Kiribati, Marshall Islands, Micronesia Fed. Sts., Nauru, New Zealand, Palau, Papua New Guinea, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu

Table 2: Information about each variable

| | Variable | | Source |
|--------------------------|--|--------------------------------|---|
| The dependence variable | <i>Inbound demand</i> ($Tour_{it}$) | The number of inbound tourists | The nationality-based statistics of the Ministry of Justice |
| The explanatory variable | <i>Income</i> (Y_{it}) | Real GDP per capita | Database of the World Bank ⁱⁱⁱ |
| | <i>Price</i> (RP_{it}) | Relative price | |
| | <i>Others</i> (X_{it}) | The population (P_{it}) | |
| | | Time dummy 2011 ($Y2011$) | |

Table 3: Basic statistics

| | Frequency | Min. | Max. | Average | S.E. |
|----------------|-----------|------------|---------------|-----------------|-----------------|
| $Tour_{it}$ | 1,862 | 1 | 3,367,616 | 34,724.637 | 214,608.8272 |
| Y_{it} | 1,807 | 208.650 | 145,221.192 | 12746.806 | 433.608 |
| Y_{jt} | 1,899 | 41,010.788 | 44,656.832 | 43,407 | 1,006.847 |
| Pop_{it} | 1,886 | 9,732 | 1,371,220,000 | 35810453.661 | 136,601,189.534 |
| Pop_{jt} | 1,900 | 219,956 | 128,070,000 | 127,617,090.087 | 2,950,407.149 |
| RP_{ijt} | 1,709 | 0.479 | 7.452 | 1.033 | 0.271 |
| $After_{2013}$ | 1,900 | 0 | 1 | 0.300 | 0.458 |
| $After_{2015}$ | 1,900 | 0 | 1 | 0.100 | 0,300 |
| yr_{2011} | 1,900 | 0 | 1 | 0.100 | 0.300 |

Table 4: The list of visa permissions

| Year | Content |
|------|---------|
|------|---------|

| | |
|-----------|--|
| Sep. 2013 | Visa permission for Thailand and Malaysia |
| Dec. 2014 | Visa permission for Indonesia under a preregistration system |
| Jan. 2015 | Part easing of the visa restriction in China |

3. Results and Analysis

Table 5 shows the results of the estimation. The results of the Wu–Hausman test statistically support the use of the fixed-effect model and not a random-effect model. Thus, we can remove the effect from the fixed-effect term. According to the estimation results, it is statistically significant in all models that the income in the origin countries has a positive effect on inbound tourism demand. However, the income in Japan does not significantly influence such demand. Although real GDP per capita in Japan has not increased significantly in recent times, the demand for inbound tourism has tended to increase. Thus, income in Japan is not statistically correlated with inbound tourism demand.

Table 5: The panel analysis results

| | Model 1 | Model 2 | Model 3 | Model 4 |
|--------------------------------------|--------------------|-------------------|--------------------|--------------------|
| C | -28.294*** (9.372) | -22.933** (9.485) | -28.147*** (9.368) | -22.956** (9.478) |
| Y_{it} | 0.747*** (0.268) | 0.656*** (0.234) | 0.749*** (0.268) | 0.655*** (0.234) |
| Y_{jt} | 0.792 (0.743) | 0.528 (0.753) | 0.796 (0.743) | 0.527 (0.756) |
| Pop_{it} | 1.371*** (0.391) | 1.241*** (0.381) | 1.359*** (0.396) | 1.243*** (0.385) |
| Pop_{jt} | -0.153*** (0.006) | -0.149*** (0.006) | -0.061*** (0.006) | -0.149*** (0.006) |
| RP_{ijt} | -0.053*** (0.020) | -0.040** (0.016) | -0.061*** (0.023) | -0.038*** (0.016)s |
| $RP_{ijt} \times ASIA$ | | -1.119*** (0.248) | | -1.121*** (0.249) |
| $RP_{ijt} \times Europe$ | | | 0.037 (0.047) | -0.008 (0.047) |
| $Thailand$ $\times After_{2013}$ | 0.916*** (0.045) | 0.708*** (0.067) | 0.913*** (0.046) | 0.708*** (0.067) |
| $Malaysia$ $\times After_{2013}$ | 0.491*** (0.046) | 0.354*** (0.055) | 0.490*** (0.046) | 0.354*** (0.055) |
| $Indonesia$ $\times After_{2015}$ | 0.424*** (0.057) | 0.328*** (0.058) | 0.423*** (0.057) | 0.328*** (0.058) |
| $China$ $\times After_{2015}$ | 0.744*** (0.058) | 0.417*** (0.098) | 0.741*** (0.059) | 0.417*** (0.098) |
| $After_{2013}$ | 0.270*** (0.037) | 0.246*** (0.038) | 0.271*** (0.038) | 0.246*** (0.038) |

| | | | | |
|--------------------------------|-------------------|-------------------|------------------|------------------|
| <i>After</i> ₂₀₁₅ | 0.344*** (0.039) | 0.318*** (0.039) | 0.343*** (0.039) | 0.318*** (0.039) |
| <i>yr</i> ₂₀₁₁ | -0.480*** (0.039) | -0.463*** (0.038) | -0.480***(0.039) | -0.463***(0.038) |
| Obs. | 1,594 | 1,594 | 1,594 | 1,594 |
| Modified <i>R</i> ² | 0.985 | 0.985 | 0.985 | 0.985 |

Notes: ** denotes significance at 5%. *** denotes significance at 1%.

The numbers in parentheses are robust standard errors.

The population in an origin country positively influences inbound tourism demand. The interpretation of this result is that there is a positive coefficient because population growth increases the potential number of tourists coming to Japan. However, the population in a destination country has a negative effect on inbound tourism. In the case of Japan, this is because the Japanese government and travel companies have placed resources in the inbound tourism market at the expense of international tourism demand because demand in the domestic tourism market has been sluggish.

The results show that the coefficient of relative price is negative but low. Thus, relative price does not greatly affect inbound tourism demand. However, the cross term with the Asian countries' dummy and relative price demonstrates that the influence of this cross term is greater compared with other countries. However, the cross term with the European countries' dummy and relative price is not statistically significant. This means that no difference exists between European countries and other countries regarding relative price.

The coefficients of *Thailand* × *After*₂₀₁₃, *Malaysia* × *After*₂₀₁₃, *Indonesia* × *After*₂₀₁₄ and *China* × *After*₂₀₁₅ are statistically significant and positive. This finding suggests that the number of inbound tourists is increasing to a greater extent in those countries for which visa permission has been eased compared with those countries for which visa permission has not been eased. Further, the result of the Great East Japan Earthquake demonstrates that inbound tourism demand decreased by 46.3%–48.0% compared with other years.

4. Conclusion

This study analyzes inbound tourism demand in Japan using the gravity model with panel data (annual data from 2006 to 2015 for 190 countries). This study's estimation clarifies that inbound tourism demand is statistically related to the factors of income, price, and tourism policy.

The results indicate that income growth in origin countries increases inbound tourism demand in Japan. Moreover, the effect of the *relative price* variable on such demand is

statistically significant, although the coefficient is low. However, a difference exists between Asian countries and others.

The trend of a low yen and high U.S. dollar following the quantitative and qualitative monetary policy in Japan positively influences the value of the relative price. Further, the relative price may experience unstable changes because of trends in the global economy. If the exchange rate of the yen against the U.S. dollar is high, inbound demand may decrease. In order to achieve the goal of 40 million inbound tourists by 2020, the Japanese government must keep the exchange rate stable.

Further, this research demonstrates that tourists from Thailand, Malaysia, Indonesia, and China are increasing to a greater extent than those from other countries after the easing of visa restrictions. It is difficult to ease visa restrictions from the national security perspective; however, in order to increase the number of inbound tourists, it is desirable that the Japanese government should relax the visa restrictions for countries where such restrictions have not currently been eased.

In the future, we should address a further three points. First, we should use the *number of international tourists* as the proxy variable of inbound tourism demand. We should also pay attention to the amount of expenditure by foreign tourists as well as their numbers. Consequently, we need to make an estimation by employing the *amount of expenditure* as a proxy variable. Because the pattern of expenditure differs between each country, such an analysis may introduce another perspective to the study of inbound tourism demand in Japan.

Second, this research analyzes all inbound tourists in Japan regardless of the airport entrance point. In reality, foreign tourists visit Japan by using many different routes and travel to various locations within Japan. An estimation of inbound tourism demand that considers each international airport entry point would enable us to understand the concrete structure of inbound tourism more comprehensively. Further, we could employ *tourism policy* or *strategy* as the variable.

Finally, this study uses a static model with panel data. In a further step, we could develop a dynamic model such as the generalized method of moments (GMM) model of Arellano and Bond (1991). Because a dynamic panel model employs lag variables of the dependent variable, an estimation of a dynamic model can enable us to capture the “repeater” effect and the “word-of-mouth” effect.

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