

# Empirical analysis of the factors affecting Japan's inbound air travel demand

学位名	修士(工学)
学位授与機関	東京海洋大学
学位授与年度	2021
URL	<a href="http://id.nii.ac.jp/1342/00002205/">http://id.nii.ac.jp/1342/00002205/</a>

**Master's Thesis**

**EMPIRICAL ANALYSIS OF THE FACTORS  
AFFECTING JAPAN'S INBOUND AIR  
TRAVEL DEMAND**

**September 2021**

**Graduate School of Marine Science and Technology  
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## **Abstract**

Since the middle of the 20th century, tourism has experienced continued growth and deepening diversification. It has become one of the important ways to drive the country's economic development. Japan is no exception. The number of inbound visitors to Japan has expanded rapidly in recent years.

This study examines the factors affecting inbound air travel demand to Japan. It focuses on policy implementation of visa-waiver, international air transport deregulation, and Visit Japan Campaign as such factors.

In 2007, Japan began to relax restrictions on international aviation policies. In 2010, Japan announced six major measures for aviation and airports. The open skies policy was one of them. In October 2010, Japan signed the first open skies bilateral agreement with the US. As of 2021, Japan has signed open skies agreements with 35 countries. Under such agreements, foreign airlines are allowed to enter Japanese airports (except Haneda Airport) without capacity restriction and airfare restriction. As a result, airlines from neighboring countries have gradually increased the number of routes and frequencies to Japan, which has promoted inbound tourism.

The Japanese government has extended the visa-waiver policy to some Asian countries since 2003. As of 2020, Japan has implemented a visa-waiver policy for 68 countries/regions. Visa relaxation has experienced four stages: single visa relaxation, multiple visas relaxation, visa exemption, and extension of stay according to the visa.

The Visit Japan Campaign (VJC) is a variety of tourism promotion activities for foreign tourists visiting Japan. The Campaign includes overseas advertising, publishing information through websites, participating in international tourism fairs, and developing tourist products for visiting Japan in key tourist countries and regions, etc. As of 2021, the target countries for VJC include 21 priority markets and 1 region.

Regression analysis based upon the gravity model is used to estimate the determinants of Japan's inbound air travel demand for the period of 2002 to 2019. The dependent variable is the number of foreign travelers visiting Japan by air.

According to different purposes, the inbound tourism market is divided into leisure inbound tourism market and business inbound tourism market which are separately analyzed by ordinary least squares regression. The independent variables are divided into economic factors, geographical factors, and policy factors related to promoting inbound. Year dummies are also included.

All independent variables show the expected signs in both the leisure inbound tourism market and business inbound tourism market. Regarding economic factors, the GDP of the source country has a positive impact on inbound tourism in both markets. The exchange rate of the source country's currency relative to the Japanese yen has a negative impact on inbound tourism in the leisure market. The rise in the exchange rate means the appreciation of the yen and the increase in travel expenses to Japan, which makes the number of tourists to Japan decrease. CPI of Japan relative to the source country has a negative impact on inbound tourism in both markets. Geographical factor, the distance between the main airport of the source country and Narita Airport, inhibits residents of the source country from traveling to Japan in both markets.

Policy factors including open skies policy, visa-waiver policy, and VJC, play an important role in promoting inbound tourism in both markets. The reduction in airfare and the increase in routes brought about by the open skies policy are conducive to the increase in Japan's inbound air travel demand. The visa-waiver policy reduces the cost and time of visa application, making it easier for tourists to come to Japan. VJC attracts foreign tourists by vigorously promoting the charm of tourism in Japan abroad, thereby increasing the demand for inbound air travel in Japan. At the same time, it also increases business inbound air travelers by attracting and supporting international conferences.

# 1. Introduction

## 1.1 Background

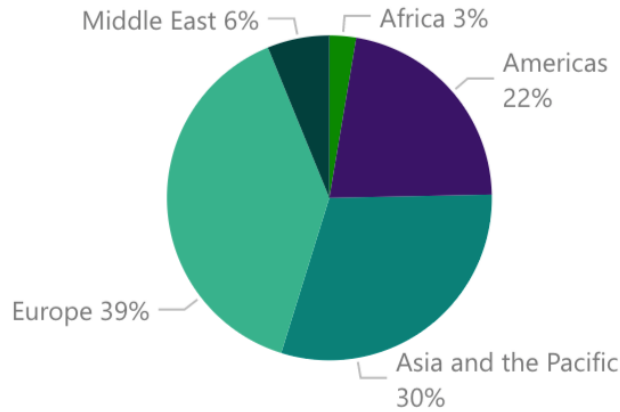
Since the middle of the 20th century, tourism has experienced continued growth and deepening diversification. It has become one of the important ways to drive the country's economic development, benefiting all tourist destinations and communities around the world. Some countries or regions list tourism as a pillar industry, making the tourism economy one of the fastest-growing economic sectors in the world. In some developed countries, inbound tourism has received financial support from the state to increase tax revenue and provide a large number of employment opportunities for laborers. Japan is no exception.

According to the World Tourism Organization (UNWTO), the number of international tourists has increased from 25 million in 1950 to 1.466 billion in 2019 at an average annual growth rate of about 5%. Correspondingly, international tourism revenue has increased from 2 billion dollars in 1995 to 1.466 billion dollars in 2019 at an average annual growth rate of about 4%. According to the United Nations World Tourism Organization, the number of international tourists will continue to increase at an annual rate of 3.3% from 2020 to 2030. It is estimated that the number of international tourists will increase to 1.8 billion by 2030. These data clearly show the rising trend of the number of international tourists and international tourism revenue, as well as the huge growth potential of the international tourism market.

From the perspective of the regional distribution of total global tourism revenue, Europe, Asia and the Pacific, and Americas present a tripartite situation. In 2019, the market shares of the three major regions, as shown in Figure 1, were 39%, 30%, and 22%, respectively. The tourism revenue generated was 5.72 trillion dollars, 4.41 trillion dollars, and 3.23 trillion dollars, respectively. The total tourism revenue of the three major regions accounted for more than 90%, and the total share of Africa and the Middle East did not exceed 10%. Since the 1990s, the tourism industry in Asia and the Pacific has developed rapidly.



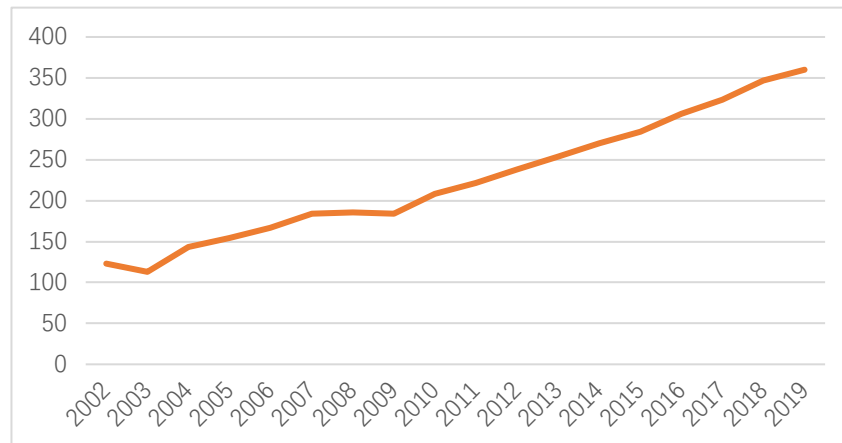
**Figure 1. Share distribution of international tourism revenue in 2019**



*Source: the United Nations Conference on Trade and Development*

As shown in Figure 2, the number of international tourists in Asia and the Pacific in 2019 reached 360 million, with an average growth rate of about 6.5% in the past ten years. According to the World Travel and Tourism Council (WTTC), tourism took a leading role in promoting the economic development of Asia and the Pacific in 2019. The contributing factors include the growing number of middle-income households, relaxation of visa formalities, enhanced connectivity, and the government's emphasis on tourism. The GDP created by tourism in Asia and the Pacific in 2019 was 2.971 trillion dollars, accounting for 9.8% of the regional economy. This was a 5.5% increase compared to the previous year, and it exceeded the entire economic growth of the region for the fifth consecutive year. Among them, the total consumption of international tourists reached 548 billion dollars, accounting for 6.6% of the total exports of Asia and the Pacific.

**Figure 2. International tourist arrivals in Asia and the Pacific (millions)**



*Source: the United Nations Conference on Trade and Development, 2002-2019*

The World Tourism Cities Federation (WTCF) listed the top 20 countries in the world by total tourism revenue as T20 countries. Overall, 80% of the global tourism economy is concentrated in the Top 20 countries. T20 countries in global tourism revenue in 2019 include the United States, China, Germany, the United Kingdom, India, and other countries. Since 2012, the United States, China, and Germany have consistently accounted for the top three in total tourism revenue. Japan ranked fourth and sixth in 2018 and 2019 respectively.

In Japan, since the 2000s, various policies to encourage inbound tourism have been implemented. In particular, the announcement of "a tourism-oriented country" and the start of VJC in 2003 had a great impact on Japan's international tourism. Subsequently, the Basic Law for the Promotion of the Establishment of the Country was enacted in 2007. Japan Tourism Agency was established as an external agency of the Ministry of Land, Infrastructure, Transport and Tourism (MLIT) to strengthen inbound tourism from a policy perspective in 2008. The inbound tourist arrivals in 2003 were 5.21 million, and in 2018 it increased from over 30 million to 31.19 million. Japan ranks 11th in the world and 3rd in Asia, second only to China and Thailand. According to data from the Japan Tourism Agency, the amount of tourism consumption including Japanese tourism consumption in 2018 was 27.4 trillion yen. This has had a very good impact on Japan's economy. The expansion effect of

production is 55.4 trillion yen, accounting for 5.3% of GDP. The value-added effect is 28.2 trillion yen, accounting for 5.2% of GDP. The employment-inducing effect affected 4.41 million people, accounting for 6.4% of the total employment.

In 2016, the government held the Tourism Vision Concept Conference to Support Tomorrow's Japan and plans to reach 60 million passengers by 2030. The number of inbound visitors to Japan has expanded rapidly in recent years. However, due to the impact of the novel coronavirus pneumonia epidemic, it has dropped sharply in 2020. As the novel coronavirus infection is gradually brought under control, it is necessary to prepare for the restoration of the number of inbound visitors to Japan in the future.

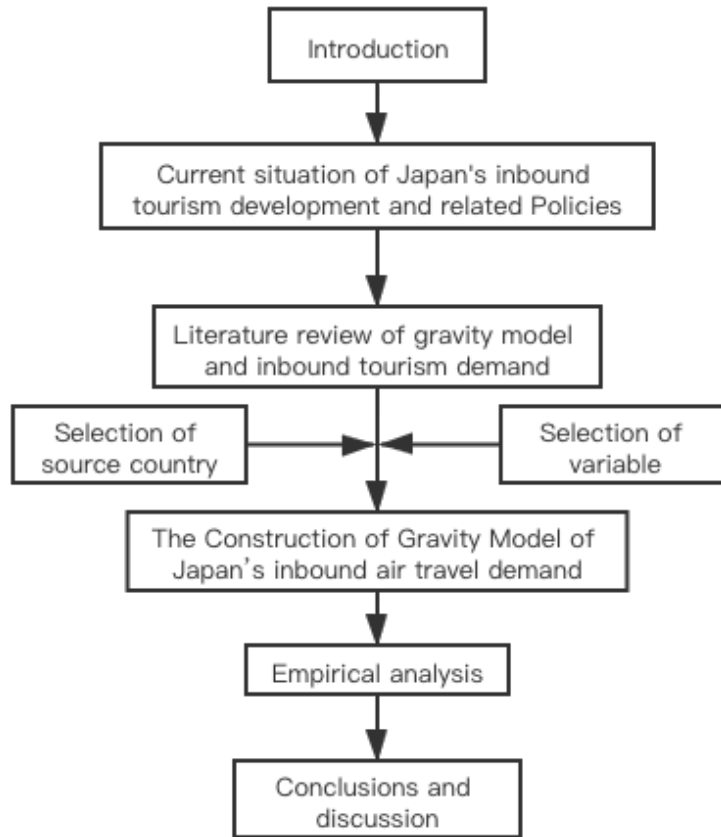
## **1.2 Objective**

The objective of this paper is to examine the factors affecting inbound air travel demand to Japan for different purposes and provide some policy suggestions for the development of Japan's inbound tourism on this basis. It focuses on policy implementation of visa-waiver, international air transport deregulation, and Visit Japan Campaign as such factors.

## **1.3 Methodology and strategy**

This paper's research on the factors affecting Japan's inbound air travel demand is on the basis of the gravity model. According to the research results of domestic and foreign scholars and the development status of Japan's inbound tourism and related policies, explanatory variables are appropriately added to construct a gravity model of the influencing factors of Japan's inbound air travel demand. Then the ordinary least squares method was used to regress the pooled data from 2002 to 2019. Figure 3 is the research strategy of this paper.

**Figure 3. Research strategy**



#### **1.4 Structure of paper**

The structure of this paper is mainly divided into six parts.

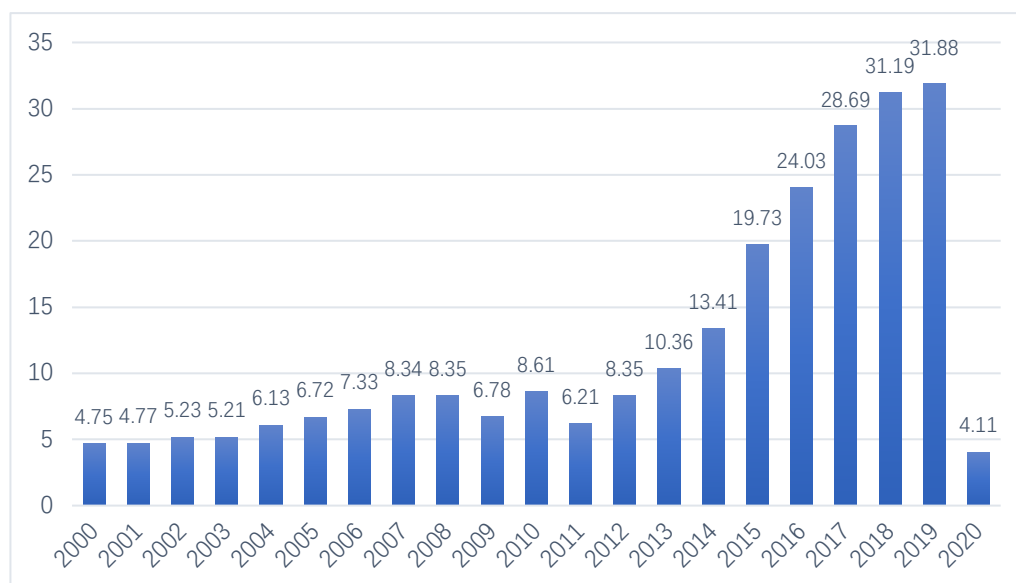
Section 1 is the introduction. It mainly elaborates the background, objective, methodology and strategy, and structure of this paper. Section 2 sorts out the current situation of Japan's inbound air travel demand and related policies. Related policies include open skies policy, visa waiver, and Visit Japan Campaign. Section 3 reviews the relevant literature, summarizing the literature on gravity models and inbound air travel demand. And then it explains the hypothesis of the paper. Section 4 constructs the gravity model of Japan's inbound air travel demand, including the description of data and variables. Section 5 presents the results of regression analysis. Section 6 is the main conclusions, relevant policy suggestions, research limitations, and prospects.

## 2. Overview of inbound tourism and related policies in Japan

### 2.1 Overview of inbound tourism in Japan

Figure 4 shows the number of foreign visitors to Japan from 2000 to 2020. The overall trend is increasing. After the implementation of the Visit Japan Campaign in 2003, the number of foreign visitors to Japan has been on the rise. Although the number was temporarily reduced in 2009 by the Lehman shock and 2011 by the Great East Japan Earthquake, it still reached 31.88 million in 2019. Due to the novel coronavirus pneumonia epidemic, the number of foreign visitors to Japan in 2020 has dropped to 4.11 million in a cliff-like manner.

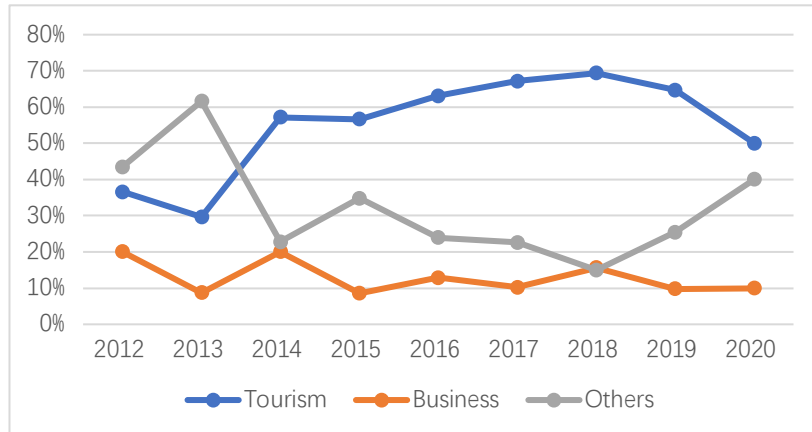
**Figure 4. Number of foreign visitors to Japan (million)**



*Sources: Japan National Tourism Organization, 2000-2020*

The main purpose of foreign visitors to Japan is leisure, business, and others. The share of leisure visitors has shown an upward trend. As shown in Figure 5, the trend of the share of business visitors is relatively stable and fluctuates within a small range. The gap in the share of leisure visitors and business visitors has gradually widened.

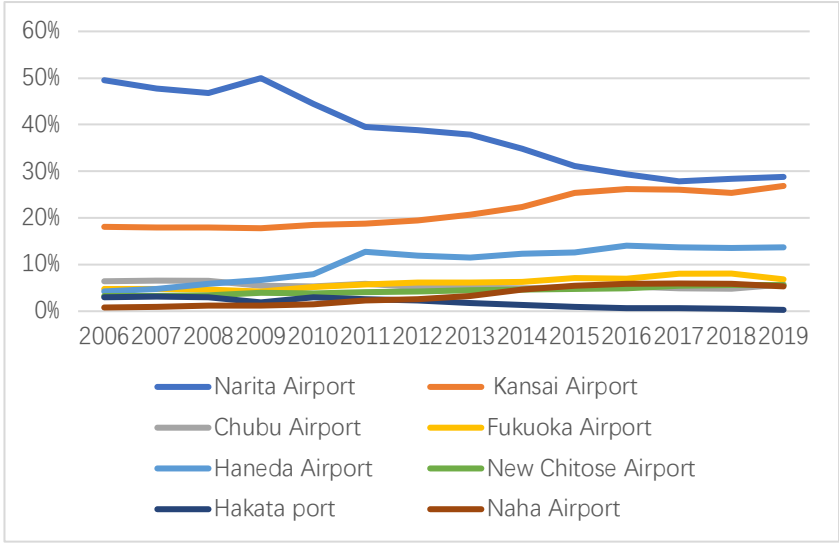
**Figure 5. Trends in annual visitor arrivals to Japan by purpose**



*Sources: Japan National Tourism Organization, 2012-2020*

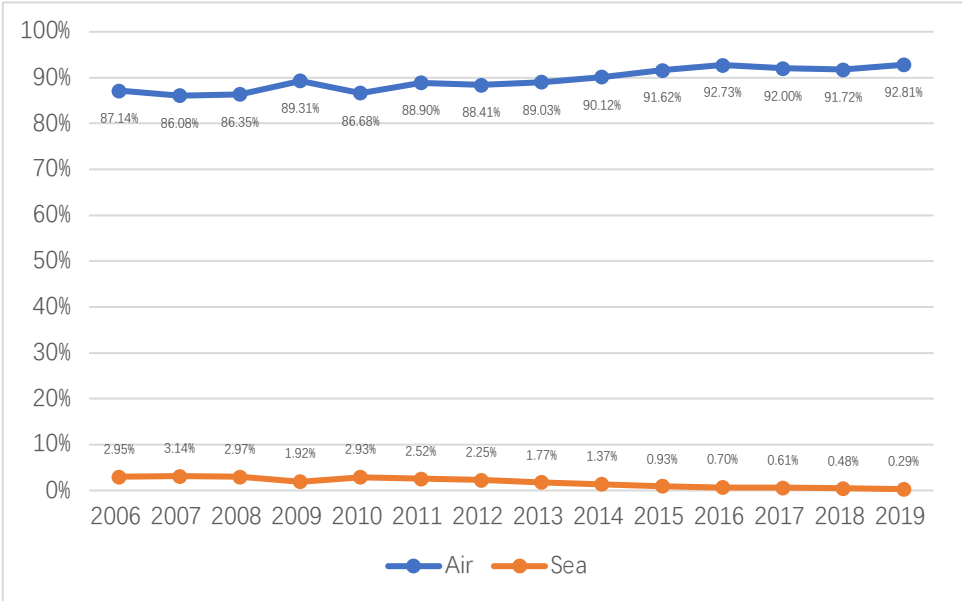
Among the airports and ports where foreign tourists arrive in Japan, the top eight entrances for the number of tourists are Narita Airport, Kansai Airport, Haneda Airport, Fukuoka Airport, Naha Airport, New Chitose Airport, Chubu Airport, and Hakata port. Hakata Port is the only port among them, and the rest are airports. Figure 6 shows the share of foreign visitors to Japan based on the top 8 entrances. The shares of Narita Airport and Chubu Airport have shown a downward trend, while the shares of other entrances have increased year by year. The difference between the entrance shares is gradually narrowing. As shown in Figure 7, the share of air in inbound is also increasing year by year, which has exceeded 90%. Air transportation has become an important transportation route to Japan.

**Figure 6. The share of foreign visitors to Japan based on the top 8 entrances**



*Sources: Japan National Tourism Organization, 2006-2019*

**Figure 7. Trends in the share of air and sea in inbound**

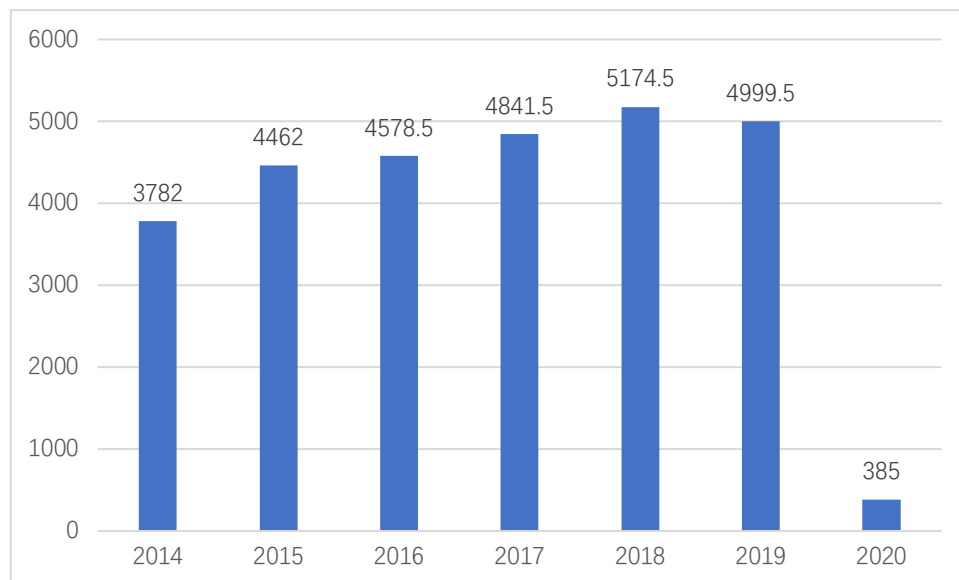


*Sources: Japan National Tourism Organization, 2006-2019*

The frequency of weekly direct international scheduled flights between Japan and other countries is 2765 in 2010 and increased to 5174.5 in 2018. Due to the novel coronavirus, international flights have been restricted by governments. It dropped

slightly to 4999.5 flights in 2019 and sharply to 385 flights in 2020. Figure 8 shows the trends in weekly direct international scheduled flight frequency.

**Figure 8. Trends in weekly direct international scheduled flight frequency<sup>1</sup>**



*Sources: Ministry of Land, Infrastructure, Transport and Tourism, 2014-2020*

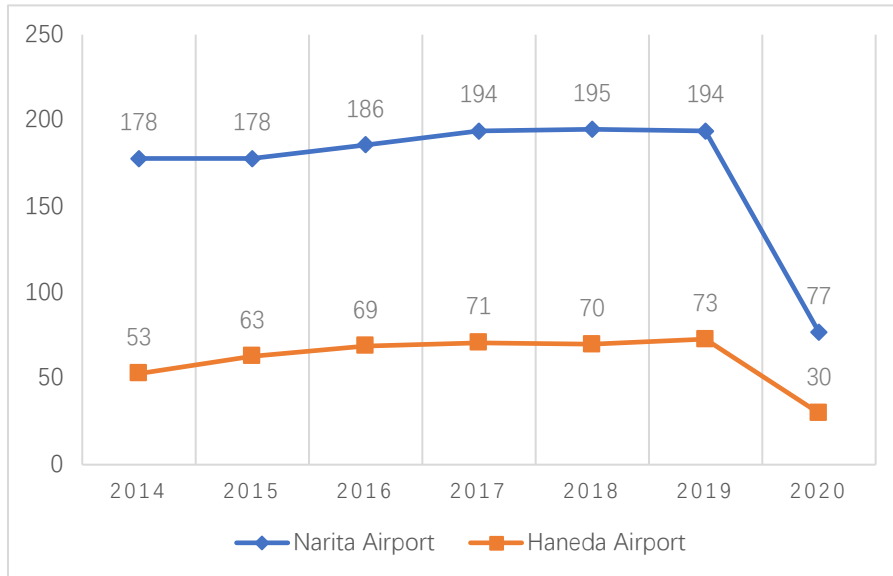
Figure 9 shows the number of winter schedule international regular direct routes between Japan's two major airports and other countries' airports. The number of air routes has increased at a slower rate from 2014. Affected by the COVID-19, the number of routes has been drastically reduced. The number of routes to Narita Airport reached 77 in 2020, which dropped by 60.3%. The number of routes to Haneda Airport reached 30 in 2020, which dropped by 58.9%. Slots are restricted and the number of frequencies is strictly controlled at Haneda airport, which means there is no room for increasing frequencies.

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<sup>1</sup> Departure and arrival count as one flight.



**Figure 9. Number of main air routes between Japan and other countries**



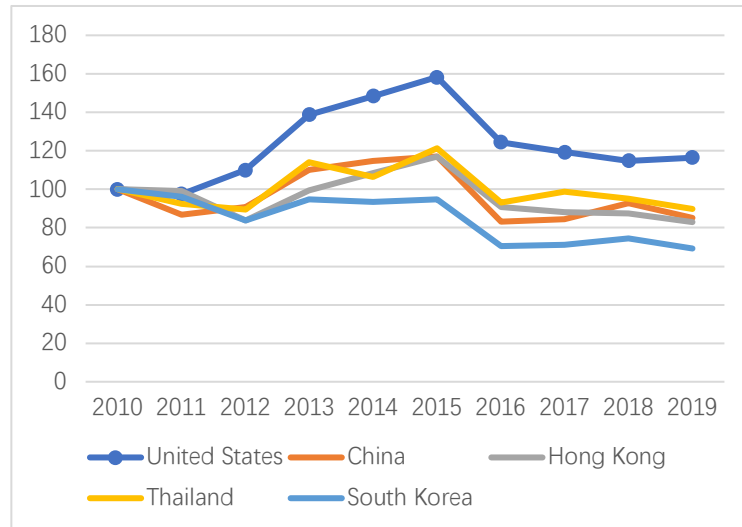
*Sources: Ministry of Land, Infrastructure, Transport and Tourism, 2014-2020*

Figure 10 and Figure 11 shows the round-trip airfare index of foreign visitors to Japan based on the top 7 countries<sup>2</sup>. These data are from the "Survey on Consumption Trends of Foreigners Visiting Japan" by the Japan Tourism Agency. In countries that do not participate in the open skies policy (Germany, Russia), airfare has repeatedly risen and fallen. Among the five countries participating in the open skies policy (South Korea in 2010, China in 2012, Hong Kong in 2011, the U.S. in 2010, and Thailand in 2012), the overall airfare is a trend that first rises and then falls. This shows that the open skies policy may have a lagging effect on airfare.

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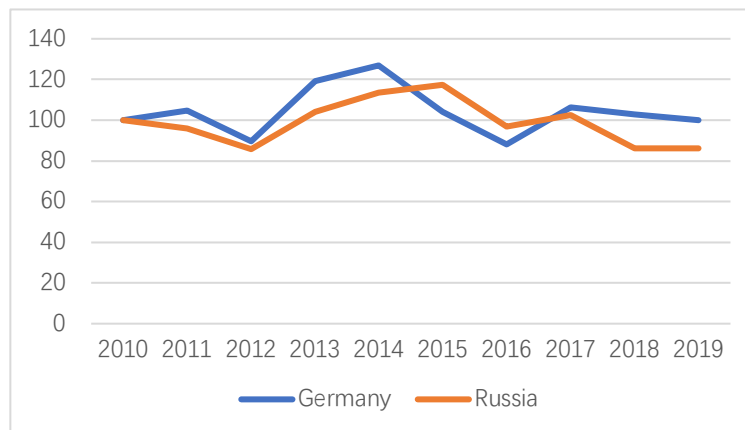
<sup>2</sup> Among the available data.

**Figure 10. Airfare index (2010=100) for countries participating in the open skies policy**



*Sources: Japan Tourism Agency, 2010-2019*

**Figure 11. Airfare index (2010=100) for countries not participating in the open skies policy**



*Sources: Japan Tourism Agency, 2010-2019*

## 2.2 Overview of policies to attract inbound air travelers in Japan

### 2.2.1 Open skies policy

In the beginning, the international air transport management system was unilateral. A country can freely decide whether or not to allow foreign aircraft to fly into, pass through, and leave its airspace based on its subjective wishes. Chicago

Convention on International Civil Aviation was signed in 1944, recognizing that every country has complete and exclusive sovereignty over its territory. Navigation between countries is mainly through the signing of bilateral air transport agreements through negotiations on routes, capacity, and freight and passenger rate. The number of flights, aircraft types, and flight schedules must be determined in advance. Most foreign carriers do not enjoy the fifth freedom<sup>3</sup> right. Freight and passenger rate generally require approval from the aviation authorities of both parties.

Since the 1970s, with the acceleration of world economic integration, the U.S. has implemented liberalization reforms represented by the Open Skies Agreement. The U.S. passed the Airline Deregulation Act in 1978 and the International Air Transport Competition Act in 1979, gradually changing the regulatory framework of traditional bilateral agreements internationally. It signed free-style bilateral aviation agreements with several countries such as the Netherlands, Singapore, and Jamaica to encourage free competition among airlines. These agreements abolished restrictions on routes, capacity, airfare, designated airlines, etc. within the bilateral scope, and expanded the standards for the use of ownership and control. Changing models and increasing the number of flights on any segment of the designated route is no longer restricted. The fifth freedom right is allowed. The freight and passenger rate does not need to be approved or filed by either party. In 1992, the U.S. signed the first open skies agreement with the Netherlands. In 2007, The EU–US Open Skies Agreement was signed. The number of bilateral open skies agreements has gradually increased. The operation of aviation enterprises has gradually transitioned from government management to relying on the power of the market to regulate.

The Japanese government has always adhered to a conservative and cautious policy attitude in international aviation negotiations. The reason is that the Japanese government was worried that open skies are not conducive to the survival and

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<sup>3</sup>The fifth freedom rights refer to a country's airline has the right to carry out transportation in two countries outside its registration, but the origin or destination should be in the country of registration.

development of its own aviation companies. In 1986, the Transportation Policy Committee proposed to promote the diversification of Japanese airlines in international aviation services and launched negotiations with other countries. All Nippon Airways (ANA) and Japan Air System (JAS, merged by Japan Airlines in 2002) start international passenger transportation business. United Airlines, American Airlines, and Delta Airlines were allowed to fly between Japan and American. This is a turning point in Japan's air transport policy.

In 2007, Japan announced the Asia Gateway Concept as one of its growth strategies. The Japanese aviation authority allowed 82 overseas airlines in 41 countries to open scheduled flights and began to carry out open skies at airports outside the metropolitan area. In 2010, Japan announced six major measures for aviation and airports. As part of these, The open skies policy was aim to improve international accessibility by air. In October 2010, Japan and the U.S signed the first open skies bilateral agreement. From the 2013 summer timetable, the open skies policy including the Metropolitan Airport has been realized (270,000 flights at Narita Airport). As of 2021, Japan has signed open skies agreements with 35 countries shown in Table 1.

Under such agreements, foreign airlines are allowed to enter Japanese airports (except Haneda Airport) without capacity restriction and airfare restriction. As a result, airlines from neighboring countries have gradually increased the number of routes and frequencies to Japan, which has promoted inbound tourism.

**Table1. List of open skies agreement in Japan (as of February 2020)**

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	Day of Agreement	Country
1	2010/10/25	United States
2	2010/12/22	South Korea
3	2011/1/19	Singapore
4	2011/2/25	Malaysia
5	2011/5/20	Hong Kong
6	2011/6/9	Vietnam
7	2011/7/14	Macau
8	2011/8/11	Indonesia
9	2011/9/14	Canada
10	2011/9/29	Australia
11	2011/10/28	Brunei
12	2011/11/10	Taiwan
13	2012/1/24	United Kingdom
14	2012/2/16	New Zealand
15	2012/3/23	Sri Lanka
16	2012/6/8	Finland
17	2012/7/9	France
18	2012/8/8	China <sup>4</sup>
19	2012/8/23	Netherlands
20	2012/10/11	Denmark
21	2012/10/11	Norway
22	2012/10/11	Sweden
23	2012/11/22	Thailand
24	2013/7/15	Switzerland
25	2013/9/13	Philippines
26	2013/10/24	Myanmar
27	2014/2/20	Austria
28	2016/5/20	Spain
29	2016/5/23	Laos
30	2016/5/26	Cambodia
31	2016/12/12	Poland
32	2017/4/26	Papua New Guinea
33	2017/9/14	India
34	2019/9/9	Italy
35	2020/1/29	Bangladesh

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*Source: Ministry of Land, Infrastructure, Transport and Tourism, 2020.2.*

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<sup>4</sup> Excludes Beijing and Shanghai, Narita airport and Haneda airport.

### **2.2.2 Visa-waiver policy**

Only foreigners who have issued a valid visa at the consulate of each country before traveling to Japan are allowed to enter Japan. The process of applying for a visa can take a lot of time. Tourists must prepare a visa issuance fee of about 3,000 yen and many related documents.

The Japanese government has extended the visa-waiver policy to some Asian countries since 2003. In 2004, short-term tourist visas for school trip students from South Korea and China were exempted. Students from Taiwan are exempt from visa fees. The policy of exempting short-term stay visas. Tourists from Taiwan are also exempt from applying for short-term visas. In 2005, tourists from South Korea and Taiwan are permanently exempt from applying for short-term visas. Regarding China, tourists from all parts of China can apply for group tourist visas, not just the three provinces and five cities before.

In July 2011, a multi-visas for Okinawa was introduced to China (the first visit to Okinawa, followed by multiple visits to Japan within 3 years). In July 2012, the requirements for multiple tourist visas were relaxed. Chinese tourists can apply for visitor visas to visit the three counties of Iwate, Miyagi, and Fukushima. The longest stay is 90 days, and there is no need to visit the disaster area for the second and subsequent visits to Japan.

Visa relaxation has experienced four stages: single visa relaxation, multiple visas relaxation, visa exemption, and extension of stay according to the visa. Table 2 shows the major visa relaxation implemented after 2000.

**Table 2. Major visa relaxation implemented after 2000**

Time	Traveler's Nationality and Region	Visa relaxation content
2000.9	China	Group tourist visa issuance started (residents of Beijing, Shanghai, and Guangdong)
2004.4	Hong Kong	Visa exemption
2004.9	China	Expansion of group tourist visa issuance areas (residents of Liaoning, Shandong, and Tianjin, as well as Jiangsu and Zhejiang)
2005.3	Korea	Provisional exemption (continuing exemption from March 2006 for an unlimited period)
2005.3	Taiwan	Provisional exemption (continuing exemption from September 2006 for an unlimited period)
2005.7	China	Nationalization of group tourist visa issuance areas
2009.7	China	Started issuing personal tourist visas (3 public halls in Beijing, Shanghai, and Guangzhou)
2010.7	China	Nationalization of areas where individual tourist visas are issued
2011.7	China	Okinawa multiple visa issuance started
2012.7	China	Tohoku three prefectures (Iwate, Miyagi, Fukushima) start issuing multiple visas
2013.7	Thailand	Visa exemption
2013.7	Malaysia	Visa exemption
2013.7	Indonesia	Extension of stay for multiple visas (15 days to 30 days)
2013.7	Philippines	Start issuing multiple visas
2013.7	Vietnam	Start issuing multiple visas
2013.11	Cambodia	Start issuing multiple visas
2013.11	Laos	Start issuing multiple visas
2014.1	Myanmar	Start issuing multiple visas
2014.7	India	Start issuing multiple visas
2015.6	Brazil	Start issuing multiple visas
2015.8	Mongolia	Start issuing multiple visas
2016.10	Qatar	Start issuing multiple visas
2017.1	Russia	Start issuing multiple visas
2018.1	Ukraine	Start issuing multiple visas
2018.8	Pacific Islands	Start issuing multiple visas
2018.10	Azerbaijan,	Start issuing multiple visas
2018.10	Armenia	Start issuing multiple visas
2018.10	Georgia	Start issuing multiple visas
2019.2	Columbia	Start issuing multiple visas

*Source: Ministry of Land, Infrastructure, Transport and Tourism, 2020.2.*

As of 2021, Japan has implemented a short-stay visa exemption for 68 countries and regions, which is shown in Table 3. Visitors from target countries can enter Japan without applying for a short-term tourist visa. The period of stay granted at the time of the landing permission is 90 days for most target countries and regions. To against novel coronavirus, Japan temporarily suspended visa exemption policies for most countries and regions in 2021.

**Table 3. 68 Countries and Regions for Visa Exemptions (Short-Term Stay)**

Asia	Europe		Latin America and the Caribbean
Brunei (14 days)	Andorra	Liechtenstein	Argentina
Indonesia(15 days)	Austria	Lithuania	Bahamas
Malaysia	Belgium	Luxembourg	Barbados
Republic of Korea	Bulgaria	Malta	Chile
Singapore	Croatia	Monaco	Costa Rica
Thailand (15 days)	Cyprus	Netherlands	Dominican Republic
Hong Kong	Czech Republic	Norway	El Salvador
Macao	Denmark	Poland	Guatemala
Taiwan	Estonia	Portugal	Honduras
<b>North America</b>	Finland	Romania	Mexico
Canada	North Macedonia	San Marino	Surinam
United States	France	Serbia	Uruguay
<b>Middle East</b>	Germany	Slovakia	<b>Africa</b>
Israel	Greece	Slovenia	Lesotho
Turkey	Hungary	Spain	Mauritius
United Arab Emirates(30 days)	Iceland	Sweden	Tunisia
<b>Oceania</b>	Ireland	Switzerland	
Australia	Italy	United Kingdom	
New Zealand	Latvia		

*Remarks: Only shadow countries and regions retain visa exemption in 2021.*

*Source: Ministry of Foreign Affairs of Japan*



### 2.2.3 Visit Japan Campaign

In 2002, the number of Japanese tourists traveling overseas was 16.52 million. However, the number of international visitors to Japan was 5.24 million. To narrow this gap, the Japanese government declared "a tourism-oriented country" and started VJC in 2003. And the goal is set to reach 10 million inbound tourists by 2010.

VJC is a variety of tourism promotion activities for foreign tourists visiting Japan. The Campaign includes overseas advertising, publishing information through websites, participating in international tourism fairs, and developing tourist products for visiting Japan in key tourist countries and regions, etc. South Korea, the U.S., China, Hong Kong, and Taiwan became the targets of VJC in 2003. The government supported the VJC by enacting the Tourism Nation Promotion Basic Law in 2006 and Tourism Nation Promotion Basic Plan in 2007. The Japan Tourism Agency was also established in 2008 to support it. Since the start of the campaign, the range of target countries has continued to expand and the number of foreign tourists has steadily increased. It reached a record high of 8.61 million in 2010, although the target was not achieved due to the impact of the Lehman shock and the Great East Japan Earthquake. The original target of 10 million was reached in 2013. As of 2021, the target countries for VJC include 21 priority markets and 1 region, which is shown in Table 4.

**Table 4. List of target countries of VJC**

Year	Countries joining the VJC
2003	South Korea, Taiwan, the United States, China, Hong Kong
2004	the United Kingdom, Germany, France
2005	Thailand, Singapore, Australia, Canada
2010	Malaysia, India, Russia
2012	Indonesia, Philippines, Vietnam
2014	Italy, Spain
2019	Mexico, the Middle East.

*Source: Ministry of Land, Infrastructure, Transport and Tourism.*

Taking into account the differences between countries, Japan has set different goals and carried out VJC activities according to the characteristics of the market. The key countries and regions for VJC are mainly divided into markets of the cradle period and the mature period. Countries that are close to Japan and have high economic levels are more likely to develop into mature markets. For the market in the cradle period, the focus is on raising awareness of Japan as a tourist destination. For the market in the mature period, it focuses on promoting various attractions in Japan and developing diversified tourism products to attract repeat customers.

As of 2018, the Asian market accounted for 80% of Japan's inbound tourists. In the overall guidelines of the 2018-2021 Visit Japan Campaign, the Japan Tourism Agency emphasized attracting tourists from markets around the world outside of Asia, especially Europe, North America, and Oceania, which has a huge overseas tourism market but not many tourists visit Japan. The Asian market, which has a high awareness of visiting Japan, mainly targets a wide range of people and further attracts customers including repeat customers. The main measures are to strengthen the display of different themes of travel promotion in Japan, increase the attractiveness of rural areas to repeat customers, and use mainstream online media in various countries to release information promptly. The European, North American, and Oceanian markets, which have a low awareness of visiting Japan, mainly conduct promotional activities for people who often travel abroad but lack consciousness or enthusiasm for tourism in Japan to increase new Japan's inbound travel demand. The promotion activities center on high-quality content such as attractive activities. The main measures include inviting relevant parties to visit Japan, strengthening effective information dissemination through media, SNS, etc., and expanding exhibitions at international large-scale tourism fairs.

### **3.Literature review**

#### **3.1 Literature review on the gravity model**

The gravity model was first developed from Newton's law of universal gravitation, that is, the attraction of two objects is proportional to the product of their masses and inversely proportional to the square of the distance between them. In the humanities, the gravity model is mainly used in trade between countries. For example, Tingbergen (1962) and Pöyhönen (1963) apply the modified Newtonian gravity model to the field of international trade. Tingbergen (1962) concluded that the trade volume between the two countries is directly proportional to the total economic volume of the two countries and inversely proportional to the distance between the two countries. Pöyhönen (1963) obtained similar results based on data analysis of European countries.

Subsequently, to make the gravity model more suitable for analyzing the tourism economy, many scholars improved the trade gravity model. For example, Crampon (1966) applied it to tourism demand analysis and proposed the most typical tourism gravity model. Wolfe (1972) introduces a distance function into the gravity model, which more accurately reflects the actual observed tourism behavior than the original model. Edwards et al. (1976) conducted a study on inbound tourism in England and used the cost to represent the distance. The empirical results are more accurate. Since then, Ferrario (1979) proposed a market gravity model that is different from the above model. Due to the differences in the levels of different tourist destinations, the tourism potential index is mainly calculated by supply factors and demand factors. The biggest feature of this model is supplied. The factors also include the distance factor as a sub-factor of accessibility. Finally, he used this model to conduct an empirical analysis of South Africa's tourism industry, and the results obtained are more in line with the actual situation. Willam (1973), John (1987), Mayo et al. (1988) modified the gravity model, introducing perceived distance, travel cost,

and actual distance, and proposed the law of distance attenuation of tourist attraction, but the main research objects are self-driving tour.

### **3.2 Literature review on influencing factors of inbound air travel demand**

As of now the research on the influencing factors of inbound air travel demand is relatively mature and mainly from the perspective of economics. Wang and Song (2010) reviewed and commented on 115 articles on air travel demand using various approaches and determinants from 1950 to 2008. Valdez (2015) summarized the most common determinants as inside or outside the control of airlines. Factors inside the control of airlines include price and quality (frequency of departures, load factor, and aircraft size). Factors outside the control of airlines include population, GDP, GDP per capita, total consumption expenditure, distance, structural changes, and public policies (liberalization and open skies agreements, LCCs, trade and foreign direct investment, tourism).

Many studies have analyzed the differences between business and leisure travelers (Kashyap and Bojanic, 2000; Dresner, 2006). Hooper (1993) found it is necessary to establish models for leisure and business travelers separately because they may have different reactions when faced with changes in some factors that affect demand.

Several articles have studied the impact of open skies policies on air travel demand. Micco and Serebrisky (2007) found that Open Skies Agreement has reduced the cost of air transportation, which leads to drops in airfare. Bernardo and Fageda (2017) found that the open skies agreement signed between the EU and Morocco increased the number of seats provided on pre-existing routes and the number of new routes provided. Piermartini and Rousová (2013) examined the impact of air services liberalization using the information on 2300 worldwide Air Services Agreements and found a 5% increase in passenger flows. Oum et.al (2019) indicated Canada's open skies agreements have a positive and lagging effect on bilateral passenger flow, with the effects increasing over time as airlines adjust to the policy changes over time.

Neumayer (2006) suggested that countries use visa restrictions to control the foreigners entering their territories. Akman (2016) stated that visa restrictions hinder the movement of business visitors and have a negative impact on trade and foreign direct investment because of increased monetary and non-monetary costs for visitors to enter the country. The cancellation of visas may stimulate potential tourists to visit. O'Byrne (2001) claimed that the liberalization of the visa regime can be understood as a direct response to the demands of the tourism and market forces. Neumayer (2010) evaluated the impact of visa restrictions on bilateral travel flows from 1995 to 2005. It found an average reduction of bilateral travel flows between 52 and 63 percent. Lawson and Roychoudhury (2016) analyzed the effect of visas on inbound travel flow at the aggregate level and the bilateral level. Inbound travel flow has been reduced by 30% at the aggregate level and 70% at the bilateral level.

Nakazawa (2009) analyzed the Visit Japan Campaign based on the number of tourists visiting Japan from 32 countries from 1996 to 2008. The results show that VJC has achieved certain results in increasing the number of tourists visiting Japan in key markets. It does not affect non-key markets. Endo (2015) analyzed the impact of short-term travel visa-waiver and open skies deregulation on inbound tourism in Japan. The results show that the visa-waiver has an impact on visitors for sightseeing but no impact on visitors for business. The open skies policy has an impact on visitors for sightseeing and business.

Faruk et al. (2013) studied the factors affecting tourist inflows to Turkey, focusing on visas and Turkish soap operas. The other factors are accommodation (total number of the rooms in hotels), border, colony, common language, CPI, distance, GDP, population, religion, and total trade value (exports and imports). The result shows that the visa-waiving policies of the Turkish and the export of Turkish soap operas have increased the tourist inflows to Turkey.

Goto (2019) studied the factors affecting the number of foreign visits to Japan based on the regular international flights from 33 countries to 29 airports in Japan from 2012 to 2016. The selected independent variables are GDP per capita, distance,

government tourism expenses, number of LCC flights at the airport, short-term visa non-exempt countries dummy variables, China dummy variables, and Shinkansen station dummy variables.

Table 5 summarizes past studies on the estimation of inbound demand.

**Table 5. Summary of past studies estimating inbound demand**

Authors	Dependent variable	Independent variable	Result
Faruk Balli et.al (2013)	Tourist inflows	GDP per capita, bilateral trade value, population, relative CPI visa, accommodation, Turkish soap operas, border, colony, common language, religion, distance	Visa-waiver agreements have boosted tourist inflows to Turkey for regular citizens.
Nakazawa (2009)	Inbound visitors	GDP, distance, exchange rate, CPI, oil price, land cost, English, Kanji, China, no visa, Visit Japan Campaign, Financial crisis, Nagano Winter Olympics, airport security enhancement, FIFA World Cup, SARS, Aichi Expo	VJC has been effective in increasing the number of tourists visiting Japan in key markets, but not in non-key markets.
Endo (2015)	Inbound visitors	GDP, distance, visa, open skies policy, exchange rate, the difference between GDP per capita, Visit Japan Campaign	Visa-waiver has a positive impact on visitors for sightseeing but not for business visitors. The open skies policy has a positive impact on visitors for sightseeing and business.
Goto (2019)	Inbound visitors	GDP per capita, government tourism expenses, LCC, non-short-term visa exemption, China, Shinkansen, distance	Non-short-term visa exemption variables are negative and significant.

### **3.3 Hypothesis building**

The open skies policy means that air transportation between countries will no longer be restricted by flights, routes, capacity, and pricing. The open skies policy attracts more airlines to enter, especially low-cost airlines, which are known for their relatively cheap air tickets and service prices. Increasing competition has led to an expanded frequency of international flights and reduced fares, thereby attracting inbound passenger traffic.

Visas are an obstacle that restricts the movement of people between countries. Visitors must obtain a visa before going to Japan. The exemption of visa applications can reduce travel costs, which include money and time costs, thereby stimulating potential tourists to visit Japan.

Therefore, the paper's hypotheses are as follows.

*Hypothesis: The open skies policy and visa-waiver policy will increase Japan's inbound air travel demand.*

## 4. Model and data

### 4.1 Methodology and data

The Factor Endowment Theory shows that the main influencing factors of international trade are physical and social geographic factors. Many empirical studies have shown that the trade flow between different countries is directly proportional to the economic scale and inversely proportional to distance, similar to the law of universal gravitation. It is the basic trade gravity model. Since then, researchers have gradually added factors to the model to modify and expand it.

Zipf (1946) and Stewart (1948) proposed the earliest applied gravity model based on the imitation of Newton's universal gravitation in 1946 and 1948, respectively, and its basic form is equation (1).

$$I = P_1 P_2 / D \quad (1)$$

Among them,  $I$  is the attractiveness index.  $P_1$  and  $P_2$  are the populations of the two cities respectively;  $D$  is the distance between the two cities. In the field of international trade, Tinbergen (1962) and Pöyhönen (1963) revised the variables of the above formula, and proposed a relatively simple and practical gravity model, the basic formula is equation (2).

$$T_{ij} = A \frac{G_i G_j}{D_{ij}} \quad (2)$$

Among them,  $T_{ij}$  represents the trade export value of  $i$  country (region) to  $j$  country (region);  $G_i$  and  $G_j$  respectively represent the gross domestic product of two countries (regions), reflecting the potential economic scale of the two countries (regions);  $D_{ij}$  represents the geographic distance between the capitals, economic centers or ports of two economies, which constitutes resistance to trade between the two countries (regions).  $A$  is a constant. Therefore, it can be inferred that the trade



gravity model is directly proportional to the trade between the two economies and inversely proportional to the geographic distance between the two economies.

With the in-depth research of domestic and foreign research scholars, the research on international trade has been fruitful. At the same time, many scholars have modified the trade gravity model, and are no longer just studying the potential trade effects between two countries or regions, but apply it to a specific industry to be used in the analysis of a certain industry. International tourism activities are similar to international trade flows, and they are also a kind of trade activity. Therefore, in the past 30 years, the gravity model has been devoted to tourism research in foreign countries, and a lot of work has been done from theory to practice. The representative one is to analyze the gravity model with the number of travels between the source country (region) *i* and the destination country (region) *j* as the dependent variable,  $T_{ij}$ , which is expressed as equation (3).

$$T_{ij} = G \frac{P_i A_j}{D_{ij}^b} \quad (3)$$

This model was proposed by Crampon (1966). This model can prove that the gravity model is useful in tourism research.  $P_i$  represents the population size, wealth, or travel tendency of the source country (region) *i*.  $A_j$  represents a certain measure of the tourist attraction or capacity of the destination country (region) *j*.  $D_{ij}$  is the distance between the source country (region) *i* and the destination country (region) *j*.  $G$  and  $b$  are empirical estimation coefficients.

Bergstrand (1985) changed the gravity model to another expression based on previous studies, and its model is expressed as equation (4).

$$PX_{ij} = \beta_0 Y_i^{\beta_1} Y_j^{\beta_2} D_{ij}^{\beta_3} A_{ij}^{\beta_4} u_{ij} \quad (4)$$

Among them,  $PX_{ij}$  represents the trade import value of country *i* (region) from the country (region);  $Y_i$  is the GDP of country *i*;  $Y_j$  is the GDP of country *j*;  $D_{ij}$  is the distance between country (region) *i* and country (region);  $A_{ij}$  represents other factors

influencing the volume of trade transactions between the two countries.  $u_{ij}$  is a log-normally distributed error term with  $E(\ln u_{ij})=0$ .

Since most of the relationships between factors in economic life are geometric rather than arithmetic, the logarithmic form of the gravity model is used to linearize the model in empirical analysis. Take the natural logarithm on both sides of the above-mentioned inbound tourism gravity model and rewrite it as equation (5).

$$\ln PX_{ij} = \beta_0 + \beta_1 \ln Y_i + \beta_2 \ln Y_j + \beta_3 D_{ij} + \beta_4 A_i + \varepsilon_{ijt} \quad (5)$$

The sample for this study is composed of the pooled dataset of 36 countries from 2002 to 2019, with a total of 648 observations. The selected sample countries are as follows:

Australia, Austria, Brazil, Canada, China, Denmark, Finland, France, Germany, Hong Kong, India, Indonesia, Ireland, Israel, Italy, Malaysia, Mexico, Mongolia, Netherlands, New Zealand, Norway, Philippines, Poland, Portugal, Russia, Singapore, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Kingdom, United States, Vietnam.

## 4.2 Model and variables

Based on previous scholars' research on the tourism gravity model, sorting out the various factors affecting Japan's inbound tourism, and considering the availability of data, some new independent variables are introduced to expand the original gravity model. The air travel demand model used in this paper is modeled as follows:

$$\ln INBOUND_{ijt} = \beta_0 + \beta_1 \ln Y_{it} + \beta_2 \ln D_{ij} + \beta_3 ER_{ijt} + \beta_4 CPI_{ijt} + \beta_5 OP_{ijt} + \beta_6 VISA_{ijt} + \beta_7 VJG_{ijt} + \varepsilon_{ijt} \quad (6)$$

The subscript  $i$  represents the source country. The subscript  $j$  represents Japan. The subscript  $t$  represents the year.  $\varepsilon_{ijt}$  is the stochastic error term.  $\ln$  stands for logarithmic form.

$INBOUND_{ijt}$  is the dependent variable, representing the number of passengers visiting Japan from source country  $i$ .

The independent variables are divided into economic factors, geographical factors, and policy factors related to promoting inbound. Year dummies from 2003 to 2019 are also included.

Economic factors include GDP, exchange rate, and CPI.

$Y_{it}$  represents the GDP of source country  $i$  in year  $t$ . The GDP of the source country reflects the overall economic strength of the country, and it has a positive effect on the disposable income of residents. The higher the disposable income of consumers, the greater the demand for cross-border tourism products. Therefore, the expected sign of  $Y_{it}$  is positive.

$ER_{ijt}$  represents the exchange rate of the source country's currency relative to the Japanese yen, that is, the amount of one Japanese yen that can be exchanged for the currency unit of source country  $i$  in year  $t$ . The rise in the exchange rate means the appreciation of the Japanese yen and the increase in travel expenses to Japan, which makes the number of tourists to Japan decrease. Therefore, the expected sign is negative.

$CPI_{ijt}$  represents the consumer price index of Japan relative to source country  $i$  in year  $t$ . The increase in CPI means that the price of goods to Japan is higher than that of the source country, the cost of traveling to Japan is relatively high, and the number of tourists will decrease. Therefore, the expected sign is negative.

Geographical factor is distance.  $D_{ij}$  represents the distance between the main airport of source country  $i$  and the Narita Airport in Japan. The increase in distance means the increase in transportation costs and time costs, which will restrict the travel of residents of the source country to some extent. Therefore, the expected sign is negative. Table 6 shows the main airports of each source country.

**Table 6. List of major airports in each country**

<b>Country</b>	<b>Airport</b>
Australia	Kingsford Smith Airport
Austria	Flughafen Wien-Schwechat
Brazil	São Paulo-Guarulhos International Airport
Canada	Vancouver International Airport
China	Shanghai Pudong International Airport
Denmark	Copenhagen Airport
Finland	Helsinki-Vantaa Airport
France	Charles de Gaulle Airport
Germany	Frankfurt International Airport
HongKong	Hong Kong International Airport
India	Indira Gandhi International Airport
Indonesia	Soekarno-Hatta International Airport
Ireland	Dublin Airport
Israel	Ben Gurion International Airport
Italy	Rome-Fiumicino Airport
Malaysia	Kuala Lumpur International Airport
Mexico	Benito Juárez International Airport
Mongol	Chinggis Khaan International Airport
Netherlands	Amsterdam Airport Schiphol
NewZealand	Auckland Airport
Norway	Oslo Gardermoen Airport
Philippines	Manila Ninoy Aquino International Airport
Poland	Krakow Airport
Portugal	Lisbon Airport
Russia	Domodedovo Airport
Singapore	Singapore Changi Airport
South Korea	Incheon Airport
Spain	Barajas International Airport
Sweden	Stockholm-Arlanda Airport
Switzerland	Zurich International Airport
Taiwan	Taiwan Taoyuan International Airport
Thailand	Suvarnabhumi Airport
Turkey	Istanbul Airport
United Kingdom	Heathrow Airport
The U.S.	Los Angeles International Airport
Vietnam	Hanoi Noi Bai International Airport

Policy factors related to promoting inbound include international air transport deregulation, visa-waiver policy, and VJC.

$OP_{ijt}$  is a dummy variable. It takes 1 for the following year and the subsequent years when Japan signed the open skies agreement with source country  $i$ , and 0 otherwise. The open skies agreement will lead to intensified competition among multinational airlines, which will reduce flight costs and air tickets, and increase the number of tourists. Therefore, the expected sign is positive.

$VISA_{ijt}$  is a dummy variable. It takes 1 if a visa is not required to enter Japan for source country  $i$  in year  $t$ , and 0 otherwise. Visa facilitation is expected to increase inbound travel, as it saves application time and cost for visitors. Therefore, the expected sign is positive.

$VJC_{ijt}$  is a dummy variable. It takes 1 when the source country in year  $t$  is the key target country of Japan's VJC and 0 otherwise. VJC has made efforts to improve facilities for foreign tourists in Japan and provide preferential treatment to tourists by carrying out promotional activities abroad, encouraging tourists to travel to Japan. Therefore, the expected sign is positive.

Table 7 shows descriptions of all variables.

**Table 7. Descriptions of variables.**

Variable	Description	Source	Expected sign
$INBOUND_{ijt}$	The number of travelers visiting Japan by air from the source country	Japan National Tourism Organization	
$Y_{it}$	GDP of the source country	World Bank national accounts data, National Statistics, R. O. C. (Taiwan), and OECD National Accounts data files.	positive
$D_{ij}$	Distance between the main airport of the source country and Narita Airport	Distance calculator ( <a href="https://www.distance.to/">https://www.distance.to/</a> )	negative
$ER_{ijt}$	Exchange rate of the source country's currency relative to the Japanese yen	International Monetary Fund, International Financial Statistics, Eurostat	negative
$CPI_{ijt}$	CPI of the source country relative to Japan	International Financial Statistics (IFS)	negative
$OP_{ijt}$	Open skies dummy variable	Ministry of Land, Infrastructure, Transport, and Tourism	positive
$VISA_{ijt}$	Visa-waiver dummy variable	Ministry of Foreign Affairs of Japan	positive
$VJC_{ijt}$	Visit Japan Campaign dummy variable	Japan National Tourism Organization	positive

## 5. Estimation and results

$ER_{ijt}$ ,  $CPI_{ijt}$ ,  $OP_{ijt}$ ,  $VISA_{ijt}$ ,  $VJC_{ijt}$  are gradually added to the basic equation, which including  $Y_{it}$  and  $D_{ij}$ . A total of six equations have been deduced. The estimation result of total inbound air travel passenger flows is reported in Table 8. The estimation results of leisure inbound air travel passenger flows and business inbound air travel passenger flows are reported in Table 9 and Tables 10 respectively.

All independent variables show the expected signs in both the leisure inbound tourism market and business inbound tourism market. The coefficients of the GDP variable are positive and statistically significant in both markets, represented that the economic size might contribute to the increase of passenger flow. The coefficients of the distance variable are negative and statistically significant in both markets. And it has the greatest impact on the number of foreign travelers visiting Japan among all independent variables. This result suggests that the farther the distance, the fewer tourists come to Japan. The coefficients of the exchange rate variable are negative, which are significant in the leisure inbound tourism market but not in the business inbound tourism market. This result indicates that the higher the exchange rate between Japan and the source country, the fewer inbound leisure air travel passengers. The coefficients of the CPI variable are negative and statistically significant except 1-6 in the leisure market. This shows that the higher the price level of the source country, the greater the number of tourists going to Japan.

The coefficient of the OP dummy variable is highly statistically significant and has a positive sign at the level of 0.1% in both markets. Under other conditions unchanged, the number of leisure inbound air travelers with an open sky policy is 43.2% higher than that without an open sky policy, and the number of business inbound air travelers with an open sky policy is 26% higher than that without an open sky policy. The open skies policy has intensified market competition by promoting cooperation between countries, leading to a decline in airfare. It has also increased the number of routes, providing more choices for leisure and business tourists. The

reduction in airfare and the increase in routes are conducive to the increase in demand for inbound air travel in Japan.

The coefficient of the VISA dummy variable is positive and statistically significant when the leisure level is 0.1% and the business level is 1% or 5%. Under other conditions unchanged, the number of leisure inbound air travelers from countries and regions subject to visa exemption is 63.7% higher than that of countries and regions that are not exempt from visas. The number of business inbound air travelers from countries and regions subject to visa exemption is 12.5% higher than that of countries and regions that are not exempt from visas. The visa-waiver policy reduces the cost and time of visa application, making it easier for tourists to come to Japan.

The coefficient of the VJC dummy variable is highly statistically significant and has a positive sign at the level of 0.1% in both markets. Under other conditions unchanged, the number of leisure inbound air travelers that have become VJC key countries and regions is 126.3% higher than that of non-VJC key countries and regions, and they have become VJC key countries and regions relative to those that have not become VJC key countries and regions. The number of business inbound air travelers that have become VJC key countries and regions is 84.1% higher than that of non-VJC key countries and regions. VJC attracts foreign tourists by vigorously promoting the charm of tourism in Japan abroad, thereby increasing the demand for inbound air travel in Japan. At the same time, it also increases business inbound air travelers by attracting and supporting international conferences.

**Table 8. Estimation result for total inbound air travel passenger flows**

	1-1	1-2	1-3	1-4	1-5	1-6
Constant	10.77*** (0.709)	10.98*** (0.736)	11.72*** (0.814)	11.70*** (0.788)	11.87*** (0.772)	12.34*** (0.640)
lnYit	0.705*** (0.0233)	0.701*** (0.0237)	0.695*** (0.0238)	0.679*** (0.0232)	0.680*** (0.0227)	0.480*** (0.0222)
lnDij	-2.167*** (0.0541)	-2.178*** (0.0549)	-2.179*** (0.0548)	-2.104*** (0.0542)	-2.193*** (0.0557)	-1.674*** (0.0554)
ERijt		-0.000956 (0.000897)	-0.000933 (0.000895)	-0.00144 (0.000870)	-0.000409 (0.000873)	-0.00106 (0.000725)
CPIijt			-0.419* (0.198)	-0.575** (0.193)	-0.384* (0.193)	-0.0685 (0.161)
OPijt				0.594*** (0.0906)	0.465*** (0.0919)	0.379*** (0.0763)
VISAijt					0.424*** (0.0799)	0.314*** (0.0665)
VJCijt						1.161*** (0.0687)
Observations	648	648	648	648	648	648
R <sup>2</sup>	0.789	0.789	0.790	0.804	0.812	0.871
Adjusted R <sup>2</sup>	0.782	0.782	0.783	0.797	0.805	0.866

Remarks: \*\*\*significant at 0.1%, \*\*significant at 1%, \*significant at 5%. Year dummies are not reported. The numbers in parentheses are standard errors.

**Table 9. Estimation result for leisure inbound air travel passenger flows**

	1-1	1-2	1-3	1-4	1-5	1-6
Constant	9.433*** (0.870)	10.43*** (0.891)	11.74*** (0.981)	11.71*** (0.947)	12.01*** (0.902)	12.52*** (0.770)
lnYit	0.724*** (0.0286)	0.704*** (0.0287)	0.693*** (0.0287)	0.673*** (0.0278)	0.675*** (0.0265)	0.457*** (0.0267)
lnDij	-2.158*** (0.0663)	-2.207*** (0.0664)	-2.210*** (0.0660)	-2.114*** (0.0651)	-2.274*** (0.0651)	-1.709*** (0.0667)
ERijt		-0.00457*** (0.00109)	-0.00453*** (0.00108)	-0.00517*** (0.00104)	-0.00334** (0.00102)	-0.00405*** (0.000871)
CPIijt			-0.737** (0.239)	-0.935*** (0.232)	-0.595** (0.225)	-0.251 (0.193)
OPijt				0.754*** (0.109)	0.526*** (0.107)	0.432*** (0.0918)
VISAijt					0.756*** (0.0933)	0.637*** (0.0800)
VJCijt						1.263*** (0.0825)
Observations	648	648	648	648	648	648
R <sup>2</sup>	0.732	0.739	0.743	0.761	0.784	0.843
Adjusted R <sup>2</sup>	0.723	0.731	0.734	0.753	0.776	0.837

Remarks: \*\*\*significant at 0.1%, \*\*significant at 1%, \*significant at 5%. Year dummies are not reported. The numbers in parentheses are standard errors.



**Table 10. Estimation result for business inbound air travel passenger flows**

	1-1	1-2	1-3	1-4	1-5	1-6
Constant	4.601*** (0.577)	4.658*** (0.599)	5.746*** (0.658)	5.733*** (0.645)	5.812*** (0.641)	6.154*** (0.560)
lnYit	0.734*** (0.0190)	0.733*** (0.0193)	0.724*** (0.0192)	0.714*** (0.0189)	0.714*** (0.0188)	0.569*** (0.0194)
lnDij	-1.699*** (0.0440)	-1.702*** (0.0447)	-1.704*** (0.0442)	-1.655*** (0.0444)	-1.699*** (0.0462)	-1.322*** (0.0484)
ERijt		-0.000265 (0.000731)	-0.000232 (0.000723)	-0.000559 (0.000711)	-0.0000624 (0.000724)	-0.000535 (0.000633)
CPIijt			-0.611*** (0.160)	-0.713*** (0.158)	-0.621*** (0.160)	-0.392** (0.140)
OPijt				0.385*** (0.0741)	0.323*** (0.0763)	0.260*** (0.0667)
VISAijt					0.205** (0.0663)	0.125* (0.0581)
VJCijt						0.841*** (0.0600)
Observations	648	648	648	648	648	648
R2	0.798	0.798	0.802	0.810	0.813	0.858
Adjusted R2	0.791	0.791	0.796	0.804	0.806	0.853

Remarks: \*\*\*significant at 0.1%, \*\*significant at 1%, \*significant at 5%. Year dummies are not reported. The numbers in parentheses are standard errors.

## **6. Conclusion and discussion**

Since the middle of the 20th century, tourism has experienced continued growth and deepening diversification. It has become one of the important ways to drive the country's economic development. Japan is no exception. The number of inbound visitors to Japan has expanded rapidly in recent years. However, due to the impact of the novel coronavirus pneumonia epidemic, it has dropped sharply in 2020. As the novel coronavirus infection is gradually brought under control, it is necessary to prepare for the restoration of the number of inbound visitors to Japan in the future. Therefore, it is important to examine factors that may contribute to increasing Japan's inbound air travel demand.

This study examines the factors affecting inbound air travel demand to Japan. It focuses on policy implementation of visa-waiver, international air transport deregulation, and Visit Japan Campaign (VJC) as such factors.

Japan began to relax restrictions on international aviation policies in 2007. In October 2010, Japan and the US signed the first open skies bilateral agreement. As of 2021, Japan has signed open skies agreements with 35 countries. Under such agreements, foreign airlines are allowed to enter Japanese airports (except Haneda Airport) without capacity restriction and airfare restriction.

The Japanese government has extended the visa-waiver policy to some Asian countries since 2003. As of 2020, Japan has implemented a visa-waiver policy for 68 countries and regions. Visa relaxation has experienced four stages: single visa relaxation, multiple visas relaxation, visa exemption, and extension of stay according to the visa.

The VJC is a variety of tourism promotion activities for foreign tourists visiting Japan. The Campaign includes overseas advertising, publishing information through websites, participating in international tourism fairs, and developing tourist products for visiting Japan in key tourist countries and regions, etc. As of 2021, the target countries for VJC include 21 priority markets and 1 region.

Regression analysis based on the gravity model is used to estimate the determinants of inbound air travel demand to Japan for the period of 2002 to 2019. The dependent variable is the number of foreign travelers visiting Japan by air. According to different purposes, the inbound tourism market is divided into leisure inbound tourism market and business inbound tourism market which are separately analyzed by ordinary least squares regression. The independent variables are the GDP of the source country, distance, exchange rate, relative CPI, open skies policy, visa-waiver policy, and VJC. Year dummies are also included.

All independent variables show the expected signs in both the leisure inbound tourism market and business inbound tourism market. GDP has a positive effect. Distance, exchange rate, relative CPI have a negative effect. The open skies policy, visa-waiver policy, and VJC all have a certain promotion effect on leisure inbound air travelers and business inbound air travelers.

In response to the analysis results, the policy recommendations given are as follows. Firstly, the government should continue to promote open skies policy, visa-waiver policy, and VJC. Secondly, although we cannot change the geographical distance between the two countries, we can shorten the travel distance and psychological distance between them. For travel distance, the government can improve airport construction and railroad construction to optimize international travel routes. This can improve the efficiency of transportation and reduce the travel distance for passengers. For psychological distance, the government can focus on promoting the availability and convenience of traveling to Japan when conducting VJC activities such as overseas media and website promotion. Increasing the exposure of travel to Japan is conducive to reducing the psychological distance of traveling to Japan.

Regarding the limitations of this paper, firstly, this paper takes the global market as a whole to study the influencing factors of Japanese inbound tourism. The research results have certain guiding significance for the policy as a whole, but for different regional markets around the world, further research on regional characteristics is

needed. Secondly, in terms of variable selection, I will continue to expand the gravity model in the future. On the one hand, this paper uses VJC as a dummy variable because of the limitation of data acquisition. Japan's specific budget data for VJC can be collected for more detailed research in the future. On the other hand, cultural factors such as immigration and cultural differences can be added to the model in the future.

## **Acknowledgments**

First of all, I would like to express my deepest gratitude to Prof. Endo, my supervisor, for his constant encouragement and guidance both in my study and life over the past two years. In the process of writing the thesis, he spent much time reading through each draft and provided me with helpful suggestions.

Secondly, I would like to express my heartfelt thanks to Prof. Terada and Prof. Okumura for their suggestions for the paper.

Thirdly, I would also like to express my gratitude to JCK project for giving me the opportunity to study in Japan. And thanks to all those who offer great help for my life during my two years of studying in Japan.

Finally, I would like to thank my dear family for their love and great faith in me.

## Appendix 1

### Descriptive statistics of variables

Variable	Observation	Mean	Std.Dev.	Min	Max
INBOUNDijt	648	357418.5	992258.8	5070	9594394
INBOUNDijt-leisure	648	290325.6	888481.6	1958	8575500
INBOUNDijt-business	648	40109.13	75589.62	897	387280
Yit	648	1480.479	2736.653	4.137313	18300.39
Dij	648	7602.138	3343.548	1256.67	18493.56
ERijt	648	8.73194	34.86171	0.0042442	261.0337
CPIijt	648	1.034805	0.222101	0.449938	2.333467
OPijt	648	0.2885802	0.4534523	0	1
VISAijt	648	0.7453704	0.4359894	0	1
VJCijt	648	0.4027778	0.4908356	0	1

The unit of Yit is billion dollars. The unit of Dij is km.

## Appendix 2

### Correlation matrix for total inbound air travel passenger flows

	lnINBOUNDit	lnYit	lnDij	ERijt	CPIijt	OPijt	VISAijt	VJCijt
lnINBOUNDit	1							
lnYit	0.4296	1						
lnDij	-0.6271	0.2224	1					
ERijt	0.0312	-0.2001	-0.2113	1				
CPIijt	-0.2230	-0.1744	-0.0312	-0.0036	1			
OPijt	0.3921	0.0908	-0.1603	0.107	-0.3419	1		
VISAijt	-0.0776	0.1029	0.2728	-0.234	-0.0376	0.0204	1	
VJCijt	0.7814	0.3980	-0.4091	0.0499	-0.3162	0.3172	-0.0400	1

### Correlation matrix for leisure inbound air travel passenger flows

	lnINBOUNDit	lnYit	lnDij	ERijt	CPIijt	OPijt	VISAijt	VJCijt
lnINBOUNDit	1							
lnYit	0.4296	1						
lnDij	-0.6271	0.2224	1					
ERijt	0.0312	-0.2001	-0.2113	1				
CPIijt	-0.2230	-0.1744	-0.0312	-0.0036	1			
OPijt	0.3921	0.0908	-0.1603	0.107	-0.3419	1		
VISAijt	-0.0776	0.1029	0.2728	-0.234	-0.0376	0.0204	1	
VJCijt	0.7814	0.3980	-0.4091	0.0499	-0.3162	0.3172	-0.0400	1

### Correlation matrix for business inbound air travel passenger flows

	lnINBOUNDijt-b	lnYit	lnDij	ERijt	CPIijt	OPijt	VISAijt	VJCijt
lnINBOUNDijt-b	1							
lnYit	0.5587	1						
lnDij	-0.5519	0.2224	1					
ERijt	-0.0011	-0.2001	-0.2113	1				
CPIijt	-0.1389	-0.1744	-0.0312	-0.0036	1			
OPijt	0.2440	0.0908	-0.1603	0.1074	-0.3419	1		
VISAijt	-0.0479	0.1029	0.2728	-0.2339	-0.0376	0.0204	1	
VJCijt	0.7397	0.3980	-0.4091	0.0499	-0.3162	0.3172	-0.0400	1

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