Research Letter

# Tourism boom on island regions in Japan during the 70s and 80s:
## Analyzing with Cochrane-Orcutt estimation

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**Abstract**

*This study discusses the relationship between market growth and the tourism boom that occurred in island regions from 1970 to the 80s, the economic growth period in Japan. The Izu Islands and Okinawa were selected as the target areas for this study because they became well-known tourist destinations during this period. Monthly data were used to construct a regression model addressing the relationship between market expansion and tourism demand. In general, time-series models, such as monthly data estimated by ordinary least squares, could lead to errors due to serial correlation. Hence, this study used Cochrane-Orcutt estimation to overcome this issue. The empirical results show that the domestic market has a positive effect on tourism demand in Okinawa, whereas it has a negative impact on the Izu Islands. Based on the results, peripheral areas, such as island regions, may be spotlighted as tourism destinations along with domestic economic growth. However, the demand for tourism has not developed domestic tourism destinations. Overall, this study concludes that the influence of investment by the private sector likely causes contradictory results between regions.*

**Keywords**

*Cochrane-Orcutt estimation, domestic market expansion, peripheral area tourism boom, Izu Islands, Okinawa*

### 1. Introduction

Increased disposable income affects tourism growth. The tourism market has expanded in some Asian, South American, and African countries, and Japan experienced the same situation from the 1960s to the 90s. Domestic tourism destinations developed during this period. Soshiroda [2005] pointed out that the tourism market in Japan grew in the 1960s to 70s due to public investment and national events such as the Olympics or the Universal Exposition. Along with this movement, rural areas have been developed to reduce differences with urban areas. In addition, innovations in facilities and transportation systems have improved the link between metropolitan and rural areas.

At the same time, people have become interested in recreational activities due to changing lifestyles. Along with this social change, tourism has become one of the options for spending a holiday. Yamada [2008] suggested that people in metropolitan areas began focusing on rural sites as tourism destinations in the 1960s and 70s and that some regions developed as tourism destinations. Based on this trend, small island regions have become popular among younger generations who prefer outdoor activities such as camping or marine sports. According to Miyauchi [2009], the first popular site as a tourist destination was the Izu Islands, near Tokyo, in the 1960s. Other islands, such as Okinawa, became popular in the late 70s. Miyagi [2010] mentioned that several factors, such as media strategy, investment by the private sector, and the Okinawa Promotion and Development Special Measures Act, supported the tourism environment in Okinawa after 1975, when the International Ocean Exposition took place. Although tourism demand has increased in several island regions, such as the Izu Islands and Okinawa, during economic development in Japan, competitiveness as a tourism destination has also intensified. Hence, each island had a different experience throughout this period, although the overall tourism market size expanded.

This study discusses the nexus between market growth and tourism demand in two island regions, the Izu Islands and Okinawa, which are representative of the tourism boom for the islands during the economic growth period in Japan. Although this study focuses on Japan, similar phenomena have occurred in some Asian, South American, and African countries. In addition, this study uses a statistical approach to investigate the interrelationships between social change and tourism demand in small regions. This perspective has been less prevalent in previous studies. Therefore, this study may be useful as a case study for developing countries and significant for demonstration studies in the field of tourism.

### 2. Literature review

From an economic perspective, the tourism-led growth hypothesis is a significant theme in discussing the impact of tourism on the regional economy. This approach uses econometric analysis to demonstrate the interrelationships between tourism demand and regional economic growth. This hypothesis is applied to regions where tourism industries are essential to regional economic activities such as the case of Spain [Balaguer and Cantavella-Jorda, 2002].

Likewise, this hypothesis applies to many island regions where tourism will likely become the main economic activity. Seetanah [2011] uses panel data approaches to explore the contribution of tourism to economic growth on islands in the Caribbean Sea and Pacific Oceans. The results show that tourism contributes significantly to the islands' economy. Shirkhani et al. [2021] focus on tourism-related loans to the economy in Northern Cyprus and demonstrate the causalities using a sta-

tistical model. These studies show that the tourism-led growth hypothesis applies to small island regions.

At the same time, these studies deal with tourism demand and economic growth within one region. However, the island economy is generally influenced by outside regions, such as nearby land with a vast market [Kakazu, 2018].

In the case of the Izu Islands, social situations influenced tourism development in the mainland. According to Takada [1996], shipping companies that had a route from Tokyo to the islands played the main role in promoting island tourism in the early twentieth century, and Izu Oshima, one of the biggest islands in the Izu Islands, became a popular site before the war began. Young generations who were born in the late 1940s had grown up until the late 1960s, and outdoor activities such as surfing or camping became popular at that time, and other islands such as Nijima also became popular destinations [Ochiai et al., 1982].

Although the Izu Islands developed and became popular tourism destinations, other regions, such as Okinawa, started attracting tourism destinations after the 1970s. In contrast to the Izu Islands, Okinawa developed based on a policy background. According to Miyagi et al. [2016], a development plan was implemented to reduce economic differences with the mainland in 1972, when it returned to Japan. This plan included tourism development, and the private sector in the mainland began to tap into Okinawa's market for development. Airplane companies are an example of investments in Okinawa. According to Sugita and Mizoo [1998], tourism development in Okinawa has been influenced by airplane companies that implemented fare policies. Furthermore, they participated in resort development together with other development companies, and several resorts were constructed in all regions.

As these studies show, both island regions were affected by the situation on the mainland, although the development processes differed. This study analyzes the relationships between tourism demand on each island and the social situation during the development period. Previous studies were mainly conducted using qualitative approaches, with limited emphasis on statistical methods. Therefore, the present study uses a statistical model to examine the relationship between social changes in countries and island tourism demand. Hence, this study's contribution is significant for tourism research, especially in the field of tourism development.

## 3. Data and methodology

To investigate the relationship between tourism demand and social change, this study used the following regression model:

$$log\,(TD_t) = a + b_1\,log\,(POP_t) + \varepsilon_t \quad (1)$$

where "$a$" and "$b$" are the parameters, interpreted as elasticity, since the variables are transformed to logarithm. "$t$" is time, and "$\varepsilon$" is the error term, that is, the residuals between observed and theoretical values. "$TD_t$" is the tourism demand in each of the islands, and "$POP_t$" is the total population in Japan.

As Equation (1) shows, time-series data were used for the estimation. The ordinary least squares method is generally used to estimate the parameters. However, serial correlation is a concern for time-series data estimations because ordering is significant, unlike with cross-section data. Hence, one of the crucial ordinary least squares assumptions, namely, the independence of the error terms, may not hold. To address this issue, this study calculates the Durbin-Watson statistic to confirm the serial correlation:

$$DW = \Sigma\,(\varepsilon_t - \varepsilon_t - 1)^2 / \Sigma\varepsilon_t^2 \quad (2)$$

DW is the statistical value of the Durbin-Watson test. "$\varepsilon$" is the error term estimated by Equation (1). This statistical value ranges between zero and four, with a value around two implying little serial correlation, whereas serial correlation is observed when the value is different from two.

If serial correlation is found using this test, the Cochrane-Orcutt estimation is performed. Several steps were required for this estimation. First, an ordinary least squares analysis was performed for Equation (1). The residual errors were then calculated, and the model below was estimated:

$$\varepsilon_t = \rho\varepsilon_{t-1} + v_t \quad (3)$$

In Equation (3), "$\rho$" was estimated by ordinary least squares. Then, Equation (1) was transformed as:

$$log\,(TD_t) - \rho log\,(TD_{t-1}) = a\,(1 - \rho) + b_1\,[log\,(POP_t) - \rho log\,(POP_{t-1})] + \varepsilon_t \quad (4)$$

Finally, ordinary least squares (OLS) analysis was performed using Equation (4) to estimate the parameters.

Table 1 presents the data used in the empirical analysis. In line with previous studies [Witt and Witt, 1995; Song and Li, 2008], this study used the number of tourists to indicate the demand for tourism on each island. Data were obtained from official documents published by each prefectural government. The tourist handbook published in 1992 describes the tourist numbers in Okinawa. Monthly data from 1972 were used in this study. Tourist numbers on the Izu Islands were obtained from the Tokyo Tourism News and Tokyo Tourism and Recreation Times. These documents are a continuation of studies published until 1993. The present study analyzed monthly visitors from 1973 to 1987 when domestic mass tourism developed in Japan.

Meanwhile, the population in Japan, based on monthly data, along with the dependent variable, is a proxy variable for market size. The relevant data were obtained from the e-stat portal site, which provided official statistics in Japan reflecting the original population information published by the Ministry of Internal Affairs and Communications.

In this study, each island is considered to be influenced by

Table 1: List of variables

| Variables | Description | Resource |
|---|---|---|
| TD in Okinawa | Tourist Handbook in 1992.<br>The data were taken from the paper-based report published in 1992.<br>Monthly data for every year were summarized in this report. | Okinawa-ken Roudou Syoukoubu Kankoka (Okinawa Prefectural Government, Labor, Commerce and Industry Department, Tourism Division) |
| TD in the Izu Islands | Tokyo Tourism News (1973-1981).<br>Paper-based data. The monthly data were written in each of the years. | Bureau of Citizens and Cultural Affairs, Tokyo Metropolitan Government |
| | Tokyo Tourism and Recreation Times (1982-1987).<br>This was a continuing paper from Tokyo Tourism News.<br>Paper-based data. The monthly data were written in each of the years. | |
| POP | The total population in each month is written.<br>The data were taken every month, including population numbers from 1973 to 1987. | e-Stat (portal site of official statistics of Japan) |

growth in market size across nations. It can be hypothesized that Okinawa has been highly influenced by growing tourism demand and social changes in the domestic market. Meanwhile, the Izu Islands are considered to have declining tourism demand due to the emergence of other island tourism destinations, such as Okinawa.

## 4. Results

Table 2 presents the estimation model results. First, the OLS results are shown on the left-hand side of Model 1. These statistical values may exhibit serial correlation since the Durbin-Watson test is 1.42 and 1.31, respectively. Therefore, Cochrane-Orcutt estimation was performed. The results are shown in the central part of Table 2 in Model 2. Durbin-Watson statistics in Model 2 are 1.88 and 1.96, respectively, close to the value of two, indicating results that outperform Model 1. Therefore, the results of the Cochrane-Orcutt test were adopted.

The coefficients of the population variables were –4.57 for the Izu Islands and 9.36 for Okinawa, both significant. Market growth was related to both islands, but tourism demand grew in Okinawa with market growth, while it declined in the Izu Islands.

Model 3 on the right-hand side of Table 2 shows the results with the monthly dummy as the control variable. $R^2$ shows that this model outperforms the model without the monthly dummy, but the coefficients of the population variables are slightly changed. The coefficients are –4.04 in the Izu Islands and 9.21 in Okinawa, respectively. The results of Models 2 and 3 are discussed in the following section

## 5. Discussion

This study examines how domestic market growth has affected tourism demand in Japan's island regions during the 1970s and the 1980s. The model shows that the domestic population, used as a proxy for the domestic market, is significantly related to tourism demand in both regions. The coefficients were –4.57 in Model 2 and –4.04 in Model 3 for the data of the Izu Islands. Meanwhile, the coefficients were 9.36 in Model 2 and 9.21 in Model 3 for the data of Okinawa. It is considered that these results were relatively stable even though several estimation methods were carried out, such as adding the control variables. However, the sign of the coefficient in the Izu Islands is negative around –4.00 while coefficients of Okinawa was positive around 9.00.

The reason for this difference between the islands is likely to be the influence of the private sector. In Okinawa, many companies from mainland Japan have invested in tourism development. Takahashi [2024] has shown that accommodations in Okinawa were limited to locations concentrated in the city area, such as Naha, the capital city of Okinawa, in the 1970s.

Table 2: Results of estimation

| | Model 1 | | Model 2 | | Model 3 | |
|---|---|---|---|---|---|---|
| | Izu Islands | Okinawa | Izu Islands | Okinawa | Izu Islands | Okinawa |
| POP | –4.27 (1.05) *** | 9.64 (0.65) *** | –4.57 (1.437) ** | 9.36 (0.93) *** | –4.04 (0.48) *** | 9.21 (1.36) *** |
| Intercept | 61.10 (12.26) *** | –100.75 (7.53) *** | 64.53 (16.76) *** | –97.47 (10.85) *** | 57.92 (5.54) *** | –95.82 (15.84) *** |
| Monthly dummy | | | No | No | Yes | Yes |
| *N* | 180 | 180 | 179 | 179 | 179 | 179 |
| Adj $R^2$ | 0.08 | 0.55 | 0.05 | 0.36 | 0.94 | 0.78 |
| $\rho$ | | | 0.29 | 0.34 | 0.45 | 0.75 |
| DW | 1.42 | 1.31 | 1.88 | 1.97 | 1.99 | 1.92 |

Note: Standard errors shown in parentheses. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

However, many companies were involved in tourism development in the early 80s, and peripheral areas, such as the west coast of Okinawa, were also developed [Miyagi, 2010]. Hence, these investments have contributed to the development of the tourism market, increasing tourism demand in Okinawa.

In contrast, fewer private firms have invested in the Izu Islands. Tokai Kisen, which operates sea routes starting from Tokyo, is the main contributor to tourism development [Takada, 1996]. However, the attraction of the Izu Islands is an outdoor activity based on wild nature that attracts younger generations. Therefore, the Izu Islands have attracted less investment than Okinawa, and tourism demand has not increased significantly.

## 6. Conclusion

This study analyzes the relationship between domestic market growth in Japan and tourism demand in two island regions using regression analysis. The results show that market growth is statistically related to tourism demand in both regions. However, the relation with tourism demand in Okinawa is positive, whereas that in the Izu Islands is negative. This study assumes that the difference in this estimation results is caused by investment in the private sector.

This study focuses on the past economic boom in Japan. This period was one of the turning points in Japan's tourism development at the regional level. The study focuses on island regions, showing that tourism development needs to consider regional characteristics, which may be diversified and related to tourism development. Today, other countries may face similar regional differences. This study suggests that irrespective of the development model, regional characteristics should be considered, and targeted development should be carried out for each region.

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Received: October 7, 2024
Revised: November 4, 2024
Accepted: November 11, 2024
Published: November 30, 2024



https://doi.org/10.37020/jgtr.9.2_145