Impact of the Great East Japan Earthquake and Inbound Tourism Demand across Countries: Similarities and Differences

Dong-Hun Go
Graduate Research Assistant
Applied Economics, Utah State University

Arwin Pang
Assistant Professor
Accounting, National Ching Hisng University, Taiwan

Hernan A. Tejeda
Assistant Professor and Extension Economist
Twin Falls Research and Extension Center, University of Idaho

And

Man-Keun Kim
Associate Professor
Applied Economics, Utah State University
Email: mk.kim@usu.edu
Phone: 735-797-2359

Selected Poster prepared for presentation at the 2017 Agricultural & Applied Economics Association Annual Meeting, Chicago, Illinois, July 30-August 1

Impact of the Great East Japan Earthquake and Inbound Tourism Demand across Countries: Similarities and Differences

Dong-Hun Go, Arwin Pang, Hernan Tejeda, and Man-Keun Kim*

1. Motivation

- The most destructive earthquake struck the Tohoku (northeast) area in Japan on March 11, 2011. The earthquake brought a serious nuclear disaster.

Source: www.geog.cantebury.ac.nz

- The disaster has detrimental impacts on almost every aspects in the nation.
- We are interested in impact of the disaster on the tourism section in Japan (Figure 1), especially how international tourists have responded to the earthquake and a series of events. We investigate whether there are similarities and differences among their responses.
- To achieve the research goals, we build seasonal autoregressive integrated moving average (SARIMA) models and predict the post-earthquake visitor arrivals from the major origin countries. The forecasts are then compared with the actual visitor arrivals.

Methodology - SARIMA

- Seasonal ARIMA (SARIMA)

$$SARIMA(p,d,q)(P,D,Q)_s$$

where p, d, and q are non-seasonal autoregressive order, differencing, and moving average order, and P, D, and Q are seasonal autoregressive order, differencing, and moving average order. The subscript s is the repeating seasonal pattern.

- More formally,

$$\phi(L^s)\phi(L)\Delta_s^d\Delta^d y_t = \theta(L^s)\theta(L)\varepsilon_t,$$

where the non-seasonal components:

$$\text{AR: } \phi(L) = 1 - \phi_1 L - \cdots - \phi_p L^p,$$
$$\text{MA: } \theta(L) = 1 + \theta_1 L + \cdots + \theta_q L^q,$$

the seasonal components are:

$$\text{AR: } \phi(L^S) = 1 - \phi_1 L^{1S} - \cdots - \phi_P L^{PS},$$
$$\text{MA: } \theta(L^S) = 1 + \theta_1 L^{1S} + \cdots + \theta_Q L^{QS},$$

Δ_s^d and Δ^d are the seasonal and non-seasonal differencing order, y_t is a stationary time series and ε_t is the i.i.d. error term.

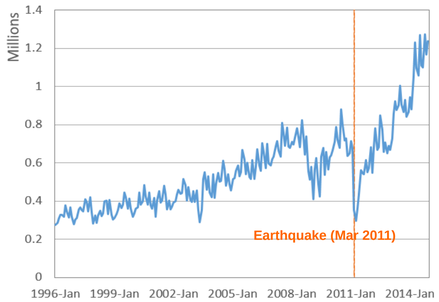


Figure 1. The number of monthly visitor arrivals in Japan (Jan 1996 to Dec 2013)

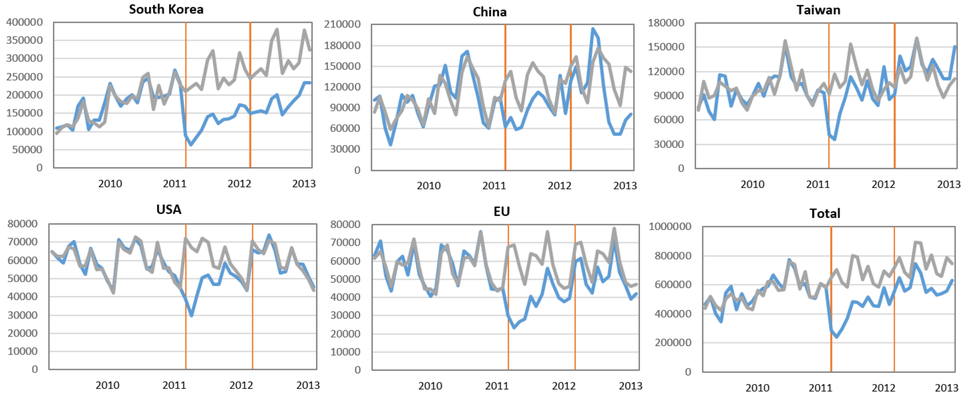
Data

- Aggregate monthly visitor arrivals during the period of January 1996 to December 2013 are available at Japan Tourism Marketing (JTM).
- In this study, the term, aggregate visitor arrivals, is defined as the historical number of visitors from origin countries to Japan with one of the following visiting purposes: tour, business, short excursion and others.

Discussion

- Most of the natural disasters have been believed to have a short-term effect on international tourism demand. However, the 2011 earthquake in Japan may not be the case.
- The results suggest that the recovery patterns of visitor arrivals are different across countries. In particular, visitor arrivals from South Korea have not yet fully recovered, while the arrivals from both China and Taiwan have rebounded with relatively faster pace.
- Possible reasons of the slow recovery rate of Korean visitors in Japan are:
  - Media effect
  - Political issues on nuclear power plants construction in Korea
- The results can provide some useful information for public and private sectors when they face their resource allocation problem in the post-disaster management.

Results -Actual and Estimated Values of Inbound Tourists' Arrivals (Visitors)



Blue line = actual values, Grey line = estimated value, First orange line = March 2011 when the earthquake struck Japan, and second orange line = March 2012 (one year after the earthquake); Total = sum of South Korea, China, Taiwan, Hong Kong (not reported), Thailand (not reported), USA and EU visitors.

- The predicted visits two years after the quake between March 2011 and February 2013.
- The actual number of Korean visitors has been gradually rebounding, but as of February 2013, it has not fully recovered yet.
- The actual number of Chinese visitors recovered quickly in 2011 and fully recovered in 2012.
- Recovery rate of inbound visitor arrivals:

China and Taiwan > USA > EU > Korea

* Authors

* Go and Kim are graduate research assistant and associate professor, respectively, Applied Economics, Utah State University. Pang is assistant professor, Accounting, National Ching Hsing University, Taiwan, and Tejeda is assistant professor, Twin Falls Research and Extension Center, University of Idaho.