

Economic Conditions and Japanese Tourism to Hawaii

by

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Abstract

Spectral analysis is used to investigate the sensitivity of the Hawaiian tourist industry to fluctuations in the Japanese economy. The number of Japanese visitors to Hawaii comoves most strongly with fluctuations in relative prices as measured by the ratio of the Japanese wholesale price index to the Honolulu consumer price index. Compared to qualitative factors, fluctuations in Japanese gross domestic expenditures and in consumer confidence are not strongly correlated with movements in the volume of Japanese tourism to Hawaii.

Economic Conditions and Japanese Tourism to Hawaii

As the structure of the Hawaiian economy has evolved over the past 45 years, the state has become increasingly reliant on tourism. Visitor expenditures totaled just 14 percent of total exports from Hawaii in 1960; by 1992, the export share of visitor expenditures was 56 percent (Hawaii Department of Business, Economic Development and Tourism 1995).

Tourism in Hawaii now accounts for as much as 33 percent of gross state product and nearly half of total employment in the state (Hawaii Department of Business, Economic Development and Tourism 1999).

More than six million people now annually visit the State of Hawaii; nearly one-quarter of these visitors come from Japan (Hawaii Department of Business 2002, p. 16). The demand for international tourism is often assumed to depend, in part, on such economic variables as income in the originating country and the exchange rate between the destination country and origin country's currencies. Since the Hawaiian economy is so strongly dependent on tourism and Japan is a major source of visitors to Hawaii, the purpose of this paper is to investigate sensitivity of the Hawaiian tourist industry to fluctuations in the Japanese economy. This paper takes a time series approach to the relationship between economic conditions and international tourism. If Japanese tourism to Hawaii is strongly dependent on economic conditions in Japan, there ought to be significant comovement over time between the Japanese economy and the volume of Japanese visitors to Hawaii. A measure of dynamic correlation among time series developed by Croux, Forni, and Reichlin (2001) is used to investigate the comovement economic conditions in Japan and between Japanese tourism to Hawaii.

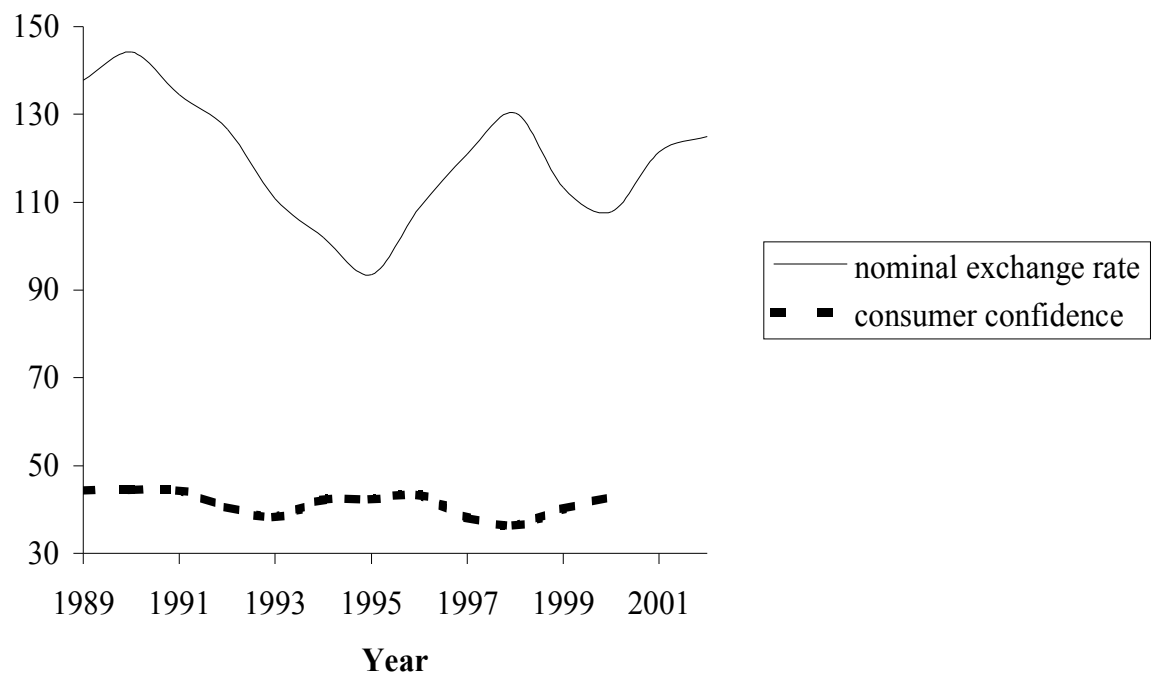
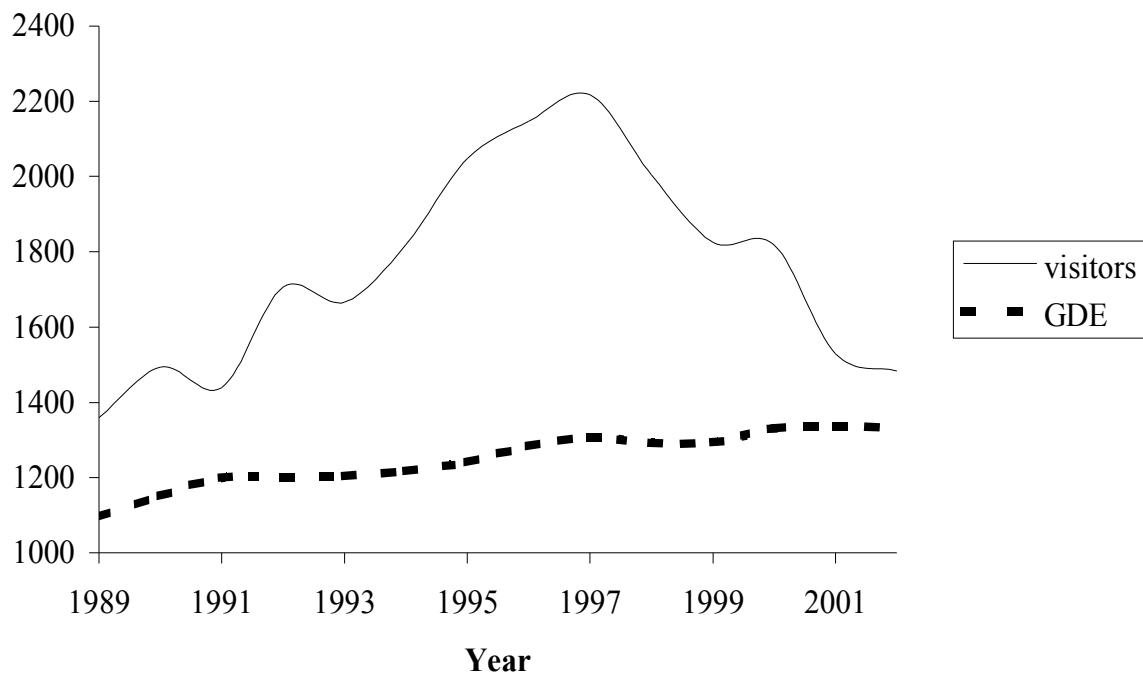
I. Data and Sources

The demand for international tourism is typically modeled as a function of economic and qualitative variables (Lim 1997, p. 838):

$$(1) \quad DT_{ij} = f(Y_j, TC_{ij}, RP_{ij}, ER_{ij}, QF_i),$$

where DT_{ij} is the demand for international travel by origin j for destination i , Y_j is income in the origin country j , TC_{ij} are transportation costs from the origin country j to destination i , RP_{ij} are relative prices between j and i , ER_{ij} is the exchange rate between origin and destination country currencies, and QF_i are qualitative factors attracting visitors to destination i .

In the current context, the demand for Japanese tourism to Hawaii is measured by the actual number of visitor arrivals from Japan to the Hawaiian Islands for the period January 1989 through October 2003, where a visitor is an “out-of-state traveler who stayed in Hawaii for a period of time between one night but less than one year” (Hawaii Department of Business, Economic Development and Tourism 2002, p. 120). Several measures of economic conditions in Japan are utilized: Japanese real gross domestic expenditures (GDE), the US dollar/Japanese yen exchange rate, the Bank of Japan’s consumer confidence index, the ratio of the Japanese wholesale price index to the Honolulu consumer price index, and the real exchange rate between the dollar and the yen. Both quarterly and annual series are utilized, save for the relative price ratio and real exchange rate which are just annual series. The variables are analyzed in log-linear form. The Research and Economic Analysis Division of the Hawaiian Department of Business, Economic Development and Tourism compiled the visitor data. The Japanese data is from the Bank of Japan and the exchange rate comes from the Federal Reserve. Figure 1 plots the untransformed annual data.



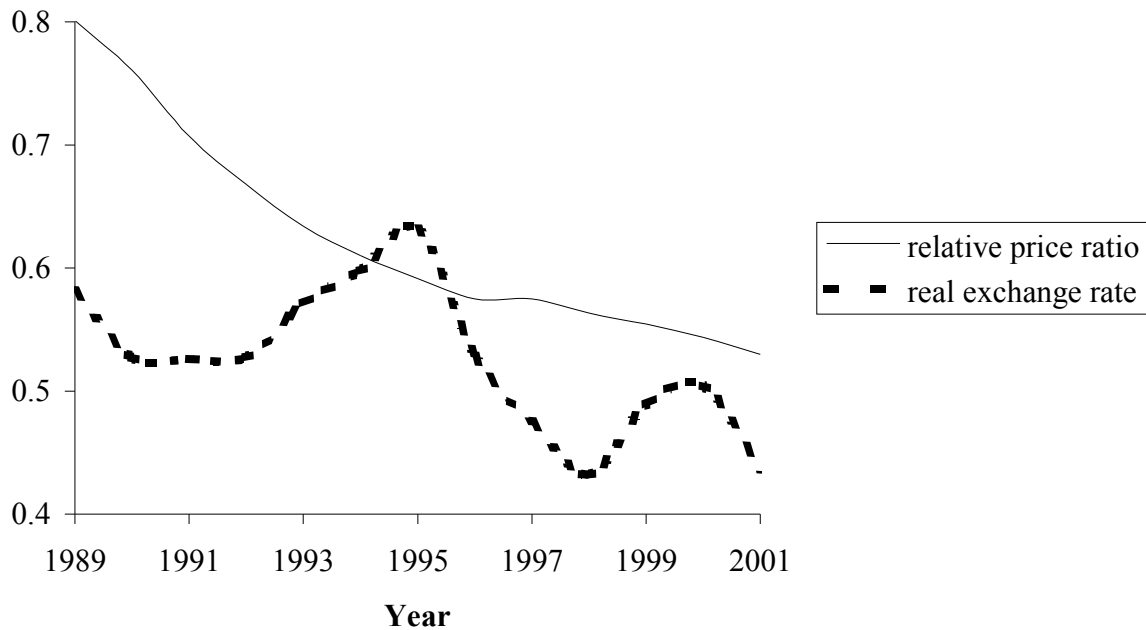


Figure 1. Annual number of Japanese visitors to Hawaii in thousands and Japanese real gross domestic expenditures in hundreds of billion yen, 1989-2002 (top panel), the yen/US dollar exchange rate and Japanese consumer confidence index (center panel), and the ratio of the Japanese wholesale price index to the Honolulu consumer price index and 100 times the real exchange rate between the dollar and the yen (bottom panel).

International tourism is regarded as a normal good, meaning that the demand for international tourism increases with discretionary income. Fluctuations in aggregate income cause discretionary income to move in the same direction. So, there ought to be a positive correlation over time between aggregate income as proxied by gross domestic expenditures and the volume of Japanese visitors to Hawaii. Since consumer spending on luxury goods like international travel is also related to consumer confidence, there should be, as well, a positive correlation between fluctuations in the Japanese consumer confidence index and tourism to Hawaii.

Both the nominal and real exchange rate between the American dollar and the Japanese yen ought to exhibit a positive comovement with the number of Japanese visitors to Hawaii. A rise in the value of the yen makes American goods and services less expensive for Japanese tourists to Hawaii. The relative tourism prices facing Japanese visitors to Hawaii are captured by the ratio of the Japanese wholesale price index to the Honolulu consumer price index. A rise in the ratio means that prices in Japan have increased relative to prices in Honolulu, indicating that the inflation rate in Japan was greater than the Hawaiian inflation rate. Purchases in Hawaii are relatively less expensive for Japanese tourists, encouraging a greater number of visitors to the Islands. The number of Japanese visitors to Hawaii ought to comove in the same direction as the relative price ratio.

II. Methodology

Spectral methods are well suited to investigating the correlation between two time series. Spectral analysis is a method of decomposing the variance of a time series into the variance accounted for by each of the cyclic components of the series. Dynamic correlation indicates the percentage of shared variance between two time series at a particular frequency.

Croux, Forni, and Reichlin (2001) define dynamic correlation at frequency λ as

$$(1) \quad \rho_{xy}(\lambda) = \frac{C_{xy}(\lambda)}{(S_x(\lambda)S_y(\lambda))^{1/2}},$$

where $S_x(\lambda)$ and $S_y(\lambda)$ are the spectral density functions of time series x and y at frequency λ and $C_{xy}(\lambda)$ is the cospectrum for series x and y at frequency λ . Just like the familiar

correlation coefficient, $\rho_{xy}(\lambda)$ takes values between -1 and +1. Dynamic correlation over the frequency band $\Lambda_+ = [\lambda_1, \lambda_2]$, $0 \leq \lambda_1 < \lambda_2 \leq \pi$, is

$$(2) \quad \rho_{xy}(\Lambda_+) = \frac{\int_{\Lambda_+} C_{xy}(\lambda) d\lambda}{(\int_{\Lambda_+} S_x(\lambda) d\lambda \int_{\Lambda_+} S_y(\lambda) d\lambda)^{1/2}} .$$

The series are each pre-whitened by removing a constant, a linear time trend, quarterly dummies where appropriate, and one or two lags, leaving each quarterly series with up to 56 observations and each annual series with up to 13 observations. The pre-whitening is done to ensure that any correlation between the series is not due to some spurious source such as shared trends or shared cycles. The remaining correlation may be due to the causal influence of one series upon the other. A Bartlett window with a span equal to 5 is used to produce the spectral density estimates on the resulting residuals.

III. Results

The estimated dynamic correlations over the entire frequency band are presented in Table 1. The quarterly data correlations are all very low, suggesting that either short-term economic conditions have little impact on Japanese tourism to Hawaii or that there is just too much noise in the quarterly data. Only the dollar/yen exchange rate has a correlation with the volume of Japanese visitors to Hawaii that is not essentially zero. The 95 percent confidence interval for each estimate contains zero. Stronger correlations are obtained with the annual data, so the annual data will be the focus of the remainder of the analysis. All correlations have the expected positive sign. Relative tourism prices as measured by the relative price ratio and the real exchange rate are most strongly correlated over time with the number of Japanese visitors to Hawaii.

Table 1

Dynamic Correlations for Japanese Visitors to Hawaii

The table reports the estimated dynamic correlations over the entire frequency band between each variable and the number of Japanese visitors to Hawaii. The time span for each series is in parentheses.

Quarterly Data	
Gross Domestic Expenditures (89:4-03:1)	0.02
US dollar/yen exchange rate (89:4-03:3)	0.15
Japanese consumer confidence (89:4-01:3)	0.01
American visitors to Hawaii (89:4-03:3)	0.07

Annual Data	
Gross Domestic Expenditures (90-02)	0.18
US dollar/yen exchange rate (90-02)	0.21
Japanese consumer confidence (90-00)	0.20
Relative price ratio (90-01)	0.41
Real exchange rate (90-01)	0.35
American visitors to Hawaii (90-02)	0.39

In order to provide a benchmark for evaluating the importance of the correlations between economic conditions and Japanese tourism to Hawaii in Table 1, an estimate of the dynamic correlation between the non-economic qualitative factors attracting visitors to Hawaii and the number of Japanese visitors to Hawaii is needed. There are a large number of qualitative factors that may influence the demand for Hawaiian tourism. These include the attributes of the visitors themselves and the attractiveness of Hawaii as a tourist destination. Assume that the qualitative factors attracting Japanese visitors to Hawaii are the same as those attracting US visitors. Then, an estimate of the correlation over time between Japanese tourism to Hawaii and any possible qualitative factors can be obtained by calculating the

dynamic correlation between the number of Japanese visitors to Hawaii and the number of American visitors to Hawaii, controlling the American data for US economic conditions. The quarterly American visitor series is pre-whitened by removing one lag, a linear time trend, quarterly dummy variables, current quarter US gross domestic product, and four lagged values of quarterly GDP. One lag, a linear time trend, and the current and two lagged values of annual GDP are removed from the annual visitor series. The dynamic correlations over the entire frequency band between the volume of Japanese and American tourism to Hawaii, controlling the American data for economic conditions, are 0.07 for the quarterly data and 0.39 for the annual data.

Using the annual estimate of the correlation between Japanese tourism to Hawaii and qualitative factors as a benchmark, only the ratio of the Japanese wholesale price index to the Honolulu consumer price index substantially comoves with annual number of Japanese visitors to Hawaii. The dynamic correlation between fluctuations in these relative prices and Japanese tourism to Hawaii is 0.41. All of the other economic variables have correlations below the threshold value of 0.39. The real exchange rate, another measure of the relative prices facing Japanese tourists, is weakly correlated with tourism to Hawaii. The estimated correlation over time is 0.35. Japanese tourism to Hawaii is not strongly sensitive to fluctuations in overall economic conditions as measured by gross domestic expenditures and consumer confidence. The estimated correlations with the number of Japanese visitors to Hawaii are 0.18 and 0.20, respectively.

IV. Conclusion

The volume of Japanese visitors to Hawaii is most sensitive to fluctuations in relative tourism prices as reflected in the ratio of the Japanese wholesale price index to the Honolulu

consumer price index. Compared to qualitative factors, fluctuations in the performance of the overall Japanese economy are not strongly correlated with the amount of Japanese tourism to Hawaii.

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