EXCHANGE RATES AND TOURISM: EVIDENCE FROM THE ISLAND OF GUAM

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ABSTRACT

Guam is a U.S. territory in the Western Pacific region. It is a small island economy that, like many island economies around the world, lacks diversification and mostly relies on a few economic activities, especially tourism. Worse yet, Guam's tourist markets also lack diversification, with approximately 70% accounted for by tourists from Japan. With the significantly stronger U.S. dollar (USD) and weaker Japanese yen (JPY) since September 2012, the cost to Japanese tourists of visiting Guam had increased by 33%.

Given Guam economy's heavy reliance on Japanese tourism, this study aims to use available time series data and Ordinary Least Squares regression models to quantify the effect of the significantly stronger USD/weaker JPY in the past year on the number of Japanese tourists visiting Guam. The results of this study will be useful in formulating economic policies in Guam and also in other economies that are similar to Guam for their use of the USD as their local currency or as a peg to their local currencies as well as their tourist-oriented economies that cater to Japanese tourists.

INTRODUCTION

Guam is a U.S. territory in the Western Pacific region. It is an island economy that is small both in terms of its economic size (its latest real GDP at $4 billion in 2005 prices) and in terms of its population (160,000 residents according to the 2010 U.S. Census data). Like many island economies around the world, Guam's economy lacks diversification and mostly relies on a few economic activities, one of them being tourism. In 2012, Guam was destination to 1.3 million tourists, with approximately 70% of these tourists visiting from Japan.

In the past year, Japan's central bank, i.e., the Bank of Japan (BOJ), has pursued a policy of increasing money supply in order to boost Japan's economy, which has been sluggish for 15-20 years. This policy is designed to fight the deflationary tendencies of Japan's economy by raising the inflation rate to its target of 2% per year. As a result of this policy, the U.S. dollar (USD) has strengthened and the Japanese yen (JPY) has weakened significantly from 1USD = 77.61 on September 28, 2012 to 1USD to 103.18 JPY on May 23, 2013. This represented a 33% stronger USD/weaker JPY. For Japanese visitors who make purchases in USD, including those who visit Guam and other locations that use the USD as their local currency, the JPY cost had

just increased 33%, even if the USD prices have not change. Since then, the Japanese yen has fluctuated around 100 JPY to 1USD, the exchange rate that the BOJ and many Japan economy experts believe is the exchange rate that will boost domestic spending in Japan's economy sufficiently to yield a 2% inflation rate.

Given Guam's heavy reliance on Japanese visitors, this study aims to quantify and analyze the effect of the significantly stronger USD/weaker JPY in the past year on the number of Japanese tourists visiting Guam. The study is organized as follows. Section II presents an overview of Guam's economy, which highlights its lack of economic diversification. It also provides details on Guam's tourism sector, to which Japanese tourists contribute a large share. Section III starts off more generally by presenting the theoretical background on the relationship between exchange rates and tourism and then proceeds to narrow down the focus to changes in the exchange rates between the USD and the JPY in the past five year but, more importantly, in the past year. Section IV reviews the literature on the relationship between exchange rates and tourism, which confirms that many studies used tourist arrival to a destination economy as the dependent variable, and considered the effects of independent/explanatory variables such as exchange rates (which is the variable of interest in this study), tourists' income and others variables on tourist arrival data. The review of the literature shows that no previous study of this type for Guam exists and that this study fills this gap. Section V constructs an empirical model for analyzing the effect of the exchange rate between the USD and the JPY on Japanese tourist arrival in Guam and discusses the results of using monthly data from October 2003 to July 2013 in Ordinary Least Squares regression models. Section VI concludes the study and discusses policy recommendations.

GUAM'S ECONOMY AND TOURISM

Guam is an island economy that is small both in terms of its economic size (its latest real GDP at $4 billion in 2005 prices, U.S. Department of Commerce, Bureau of Economic Analysis, 2012, September 24) and in terms of its population (160,000 residents according to the 2010 U.S. Census data). These figures suggest Guam's annual per capita real income of USD25,000 in 2005 prices.

Like many island economies around the world, Guam's economy lacks diversification and mostly relies on a few economic activities that serve primarily three groups of customers: local residents, U.S. Federal government (including military) personnel and their families, and tourists.

Local Residents

Local residents provide strong support for retail trade and many different service industries in Guam, including health, education, financial, legal, etc. Another advantage of this class of customers is their contribution to the overall economy tends to be more stable and less

vulnerable to external shocks that affect the other two economic activities, U.S. Federal Government, including Military, which depends on congressional decisions and budgetary resources from Washington, D. C., and also affected by U.S. economic, political and military allies around the world; tourism in Guam depends on economic and other factors (including natural disasters) that affect countries and economies from where tourists originate.

U.S. Federal Government including Military Personnel and Family Members

As a U.S. territory, Guam benefits from receiving funding from the U.S. Federal Government for a wide array of activities, including the military presence on the island. The U.S. Federal Government contributed 41% of Guam's approximately USD4 billion real GDP in 2010 (U.S. Department of Commerce-Bureau of Economic Analysis, 2012 September 24) and accounts for 6.7% of 60,220 total employment in Guam in June 2013 (Guam Department of Labor-Bureau of Labor Statistics).

Tourists

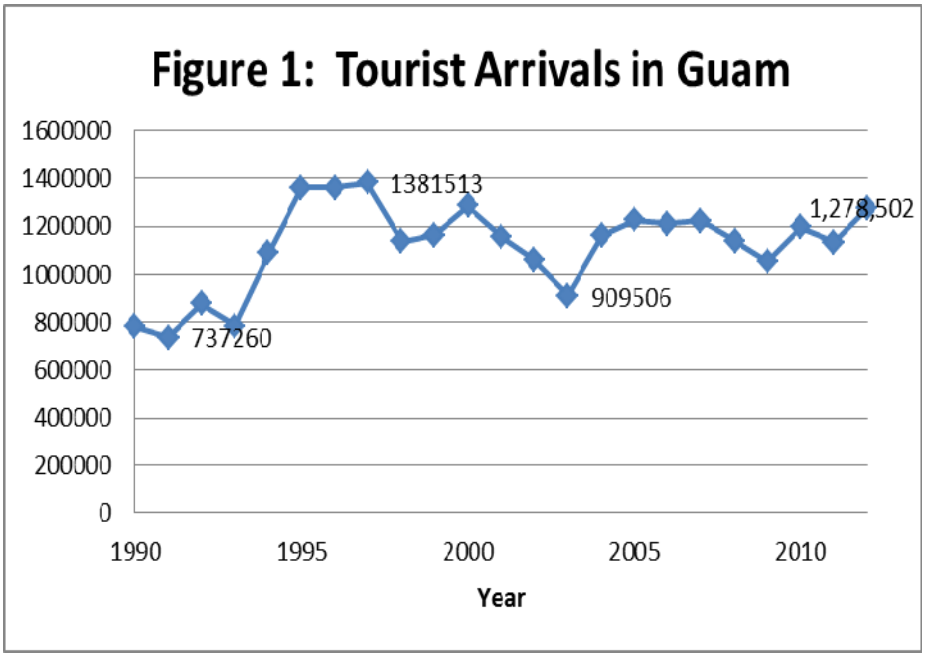


Figure 1 shows the number of annual visitors to Guam between 1990 and 2012. First is to note the overall volatility of the data, which highlights the fact that tourism in Guam and many economies is subjected to many external factors. Second is that Guam has been attracting at least one million visitors per year since 1994, with the exception of 2003. Third is that the peak, i.e., the largest number of visitors to Guam, occurred in 1997, the year of the Asian Crisis, which

explains the sharp decline that followed. Since 2004, tourist arrivals have fluctuated around 1.2 million visitors per year.

Tourist Markets

For years, the majority of visitors to Guam come from Japan, although this share has decreased from as high as 85-90% decades ago. The most recent data for the current fiscal year-to-date (October 2012 to July 2013) show that Guam welcome 1.087 million visitors who arrived by air (a small number, i.e., 7,029 visitors, arrived by sea). Of those who arrived by air, 68.39% were from Japan, 17.45% from Korea, 3.75% from the U.S. Mainland, i.e., the 48 U.S. states, 3.57% from Taiwan, with the remainder accounted for by smaller shares from other origin countries and is reported in Table 1. The share of Japanese visitors is the lowest in decades, or even compared to the last 5 years where it would be as high as 74%.

Table 1 also shows that visitors to Guam who arrived by air increase 6.5% compared to the same period a year ago. In terms of growth of individual origin countries, Table 1 shows that fastest growing tourist segments to be Russian visitors, who have enjoyed eligibility to the Visa Waiver Program to Guam and the U.S. since January 2012. Other fast growing groups to visit Guam are Korean and European visitors (each market grew 41.4% more this year than last year), Chinese visitors from Mainland China (15.9% higher than last year), and from Hong Kong (8.1% higher than last year).

Tourist Spending

One of the economic benefits to the destination economy (Guam, in this case) of tourism is the amount that tourists spend during their visit. Note that this is only part of the total spending that tourists contribute to the destination economy but represents the most direct benefit of tourism to the destination economy. The reason for this is that tourists also have prepaid expenditures, especially for accommodations and meals, which are not factored into the calculation below because of the complexity of calculating how much of the prepaid expenditures ultimately ends up in the local economy, especially when hotels providing the accommodations are foreign-owned and repatriate their revenue and/or profit to their home country.

Table 1: Guam Tourism Data			
	Oct 2012 - Jul 2013	**Share of Total Arrivals**	**% increase from a year ago**
TOURISTS IN GUAM BY MODE OF ENTRY			
Air Arrivals	1,087,211	99.36%	6.50%
Sea Arrivals	7,029	0.64%	44.20%
TOTAL TOURIST ARRIVALS	1,094,240	100.00%	6.70%
TOURISTS IN GUAM BY ORIGIN COUNTRY	**Oct2012-Jul2013**	**Share of Air Arrivals**	**% increase from a year ago**
JAPAN	743,582	68.39%	1.90%
KOREA	189,707	17.45%	41.40%
CHINA	8,540	0.79%	15.90%
HONG KONG	7,742	0.71%	8.10%
TAIWAN	38,799	3.57%	-6.90%
U.S. MAINLAND	40,756	3.75%	-7.00%
HAWAII	7,815	0.72%	-18.50%
CNMI	12,823	1.18%	-11.60%
PALAU	2,539	0.23%	-18.00%
FSM	8,242	0.76%	-1.40%
RMI	750	0.07%	-12.90%
PHILIPPINES	9,060	0.83%	3.40%
AUSTRALIA	2,786	0.26%	-18.70%
CANADA	784	0.07%	13.60%
EUROPE	1,836	0.17%	41.40%
THAILAND	310	0.03%	-7.70%
VIETNAM	72	0.01%	-18.20%
RUSSIA	5,530	0.51%	145.60%
OTHER/UNKNOWN	5538	0.51%	52.90%
TOTAL TOURIST ARRIVALS BY AIR	1,087,211	100.00%	
Source: Guam Visitors Bureau (various issues). Visitor Arrivals Statistics. Retrieved from http://www.visitguam.org			

Table 2 shows an estimate for this amount for Guam to be USD574.28 million for the current fiscal year, which accounts for spending of 90.63% of the total number of tourists that is expected to visit Guam this current fiscal year. Scaled to 100%, the amount comes out to be USD633.65 million of total tourist expenditure in fiscal year 2013. Using the spending multiplier of 1.3 (Ruane, 2011, December), which means every dollar spent on Guam multiplies demand and income in the local economy and ultimately generates an additional 30 cents of

spending and income. Therefore, the USD633.65 million of tourist expenditures for the fiscal year 2013 is expected to increase Guam's Nominal Gross Domestic Product (GDP), which was last estimated in 2010 at USD4.577 billion, by USD823.75 million or 18%.

Table 2: Tourist Expenditure in Guam

	Share of total number of tourists (from Table 1)	**Average days of visit per tourist***	**In-Guam expenditure per tourist***	**Estimated number of tourists for FY2013****	**Tourist expenditure in FY2013****
Japan	68.39%	2.85	$ 496.38	918815	$ 456,081,378.28
Korea	17.45%	3.31	$ 362.87	233057	$ 84,569,393.59
Hong Kong	0.71%	2.31	$ 198.71	9076	$ 1,803,491.96
Taiwan	3.57%	3.35	$ 424.13	46411	$ 19,684,297.43
Russia	0.51%	14.33	$ 1,687.39	7196	$ 12,142,458.44
	90.63%				**$ 574,281,019.70**

Sources:
*Guam Visitors Bureau (2013, April-June). Hong KongVisitor Tracker Exit Profile, prepared by Qmark Research. Retrieved from http://www.visitguam.org
*Guam Visitors Bureau (2013, June). Japan Visitor Tracker Exit Profile, prepared by Qmark Research. Retrieved from http://www.visitguam.org
*Guam Visitors Bureau (2013, July). Korea Visitor Tracker Exit Profile, prepared by Qmark Research. Retrieved from http://www.visitguam.org
*Guam Visitors Bureau (2013, January-March). Russia Visitor Tracker Exit Profile, prepared by Qmark Research. Retrieved from http://www.visitguam.org
*Guam Visitors Bureau (2013, April-June). Taiwan Visitor Tracker Exit Profile, prepared by Qmark Research. Retrieved from http://www.visitguam.org

Notes: ** author's calculation

As the economy expands, more jobs are created. Keeping the estimates to the year 2010 in the absence of more recent data, data show that Guam's USD4.577 billion economy created 62,600 jobs, or 1 job for every USD73,115 worth of economic activity. Based on the estimated increase in Guam's GDP resulting for tourist expenditures for fiscal year 2013, it is expected to have created 8,666 jobs, accounting for 13-14% of jobs in the Guam economy.

In addition to jobs created by tourism, additional taxes are collected by the government of the destination economy, which then finance a wide array of economic and social programs for the local residents. The two most obvious taxes earned by the local government from the additional GDP resulting from tourist expenditures for fiscal year 2013 are Gross Receipts Tax

(GRT) and Hotel Occupancy Tax (HOT). On Guam, the GRT rate is 4% of the total amount spent for most goods and services (including hotel services) and already reflected in the price paid by tourists and other consumers, and the HOT rate is 11% of the amount spent on hotel accommodations. Based on the additional GDP of USD823.75 million noted above, 4% of this is approximately USD33 million worth of GRT for fiscal year 2013. For HOT, the estimate is given by the Guam Visitors Bureau as USD 20.34 million for the period of October 2012 to July 2013, with two months left in the current fiscal year, this amount is estimated to be approximately USD24 million for the entire fiscal year 2013. Note that this tax calculation does not include other taxes, which would include additional personal and corporate income taxes imposed on the increased economic activity and incomes resulting from tourist expenditures estimated above.

All these benefits are summarized in Table 3.

Table 3: Economic Benefits from Tourism in Guam
Based on USD633.65 million of tourist expenditures in fiscal year 2013

Type of Benefit	Estimated amount
Direct, indirect and induced spending and income	USD823.75 million (18% of Guam's GDP)
Taxes due to local government (GRT and HOT)	USD 57 million
Jobs created	8,666 jobs (13-14% of total jobs)
Note: author's calculation	

EXCHANGE RATES AND TOURISM

Theoretical Background

The nominal exchange rate is defined to be the number of local currency used to buy/exchange for a foreign currency. Since this study involves only two currencies (USD and JPY), this measure of exchange rate is appropriate to use. This measure also works well when the inflation rates in the two countries are low, which is the case for the U.S. and Japan, so that the differential inflation rate, when it exists, is minimal; otherwise, the more appropriate measure of exchange rate would be the real exchange rate. If more countries and their currencies are involved, most studies use a weighted average of the changes in the real exchange rates among the currencies involved (Crouch, 1993, page 48).

One sees that the nominal exchange rate represents a bilateral (two-sided) relationship: For Japanese tourists who spend USD during their visit to Guam, their local currency is JPY and foreign currency is USD. To Guam residents, their local currency is USD and foreign currency is JPY. When one currency (in this case, USD) strengthens, the other currency (JPY) weakens, which means one requires more JPY now than before to buy the same 1USD or to pay for products priced in USD, even if the USD price has not changed. For example, an item that is priced USD100 would have cost JPY7,600 in September 2012 but would cost JPY10,000 now

that the exchange rate is around JPY100 to 1USD. As is illustrated in this example, a stronger USD translates to a weaker JPY, which means that the cost to a Japanese visitor to Guam has increased. With this higher cost, it is hypothesized to affect Japanese tourism in Guam in some way (perhaps by Japanese visitors choosing to reduce the length of their visit, reduce their discretionary expenditures, or consider another destination instead of Guam, which would be lower Japanese tourist arrivals in Guam, or other strategies investigated by Boone & de Hoog, 2011).

USD/JPY Trend

Figure 2 shows the trend of the USD/JPY exchange rate over the past five years, highlighting current rates of 100JPY per USD has not been experienced since early 2009.

Figure 2: Five-Year Trend in USD/JPY Exchange Rate
(Source: http://finance.yahoo.com)

Current Situation

This study is timely, given the significant strengthening of the USD/weakening of the JPY since September 2012. In the past year, Japan's central bank, i.e., the Bank of Japan (BOJ), has pursued a policy of increasing money supply in order to boost Japan's economy, which has been sluggish for 15-20 years. This policy is designed to fight the deflationary tendencies of Japan's economy by raising the inflation rate to its target of 2% per year. As a result of this policy, the U.S. dollar (USD) has strengthened and the Japanese yen (JPY) has weakened significantly from 1USD = 77.61 on September 28, 2012 to 1USD to 103.18 JPY on May 23, 2013. This represented a 33% stronger USD/weaker JPY. As noted earlier, for Japanese individuals who make purchases in USD, including those who visit Guam and other locations that use the USD as their local currency, the JPY cost had just increased 33%, even if the USD prices have not change. Since then, the Japanese yen has fluctuated around 100 JPY to 1USD,

the exchange rate that the BOJ and many Japan economy experts believe is the exchange rate that will boost domestic spending in Japan's economy sufficiently to yield a 2% inflation rate.

REVIEW OF RELATED LITERATURE

This paper investigates what factors affect tourism in general and the effect of exchange rate changes on the number of inbound tourists (or tourist arrivals in a destination country), in particular. Given the focus of this paper, the review of the literature has paid more attention on previous empirical work on the relationship between exchange rate and tourist arrival. Attempts are also made to review studies that look into tourism from and to different countries/regions in order to avoid country- or region-specific biases in tourist preferences and behaviors. Also, it should be noted that there exists no such study of this type in the context of Guam, a gap in the literature that this study is attempting to fill.

Vogt (2008) as cited in Cheng, et. al (2013, January) used annual US data from 1973 to 2002 in a partial adjustment error correction model and found that U.S. outbound tourists respond more to real exchange rate changes while U.S. inbound tourists respond more to real income changes. The opposite result (U.S. outbound tourists respond more to real income and U.S. inbound tourists respond more to real exchange rate changes) was found by Cheng, et. al (2013, January) using quarterly U.S. data from 1973 to 2010 in vector autoregressive models. Despite the opposing results found, both studies highlight the importance of two factors, real exchange rate and income, on inbound and/or outbound tourism.

Using monthly data from January 1991 and January 2011 and multivariate conditional volatility regression models, Yap (2011, March 18) investigated the effects of the appreciation of the Australian dollar on visits to Australia by tourists from nine origin countries (China, India, Japan, Malaysia, New Zealand, Singapore, South Korea, the U.K. and the U.S.) and found tourists sensitivity to stronger Australia dollar, with tourist from Malaysia and New Zealand being more sensitive. The study also found that tourists' memories of the currency changes ("shocks") could diminish in the long run, "suggesting that the sudden appreciation of Australian dollar will not have long-term negative impacts on Australia's inbound tourism".

A study by Tourism Research Australia (TRA, 2011, June) assessed the impact and relative importance of economic indicators on the travel decisions of inbound visitors to Australia. The study found that tourists' income is most important in affecting inbound tourism to Australia both in the short run and the long run, with the income elasticity of inbound tourism demand estimated as 0.8 and 1.3, respectively. As regards exchange rates, the study found that "exchange rate volatility has an impact on Australia's tourism competitiveness", with a stronger Australian dollar requiring visitors to "consider increasing their travel 'wallet' or reducing their average length of stay", with visitors still coming to Australia but making either adjustment in the short run but more likely to choose other destinations in the long run.

In response to the global economic and financial challenges since 2007, Bonner & de Hoog (2011) conducted a survey that looked at changes in the behavior of Dutch tourists, more specifically, economizing strategies they adopted in planning their vacations. Their survey included the following strategies (found on page 189 of their paper), with the top three strategies from their survey results noted:

shorter length of stay (ranked #1);
changing the destination (other country) (ranked#2);
choosing a cheaper tour operator;
choosing a self-arranged vacation instead of using a tour operator;
changing the period (earlier or later);
selecting an earlier or later booking moment;
using another means of transport;
carrying out fewer or other activities on the spot (ranked #3)
choosing another type of accommodation;
choosing a cheaper alternative within the same type of accommodation

Nowjee, et. al (2012) using a multivariate vector error correction model applied to annual data from Mauritius from 1981 to 2010 to examine the relationship between exchange rate, tourism and economic growth. Related to the present study, Nowjee, et. al (2012) found that real exchange rate did not Granger Cause tourist arrivals but found that tourist arrivals Granger cause real exchange rate.a statistically significant This means that the number of visitors to Mauritius is unaffected by changes in the exchange rate between the local currency (Mauritian rupee) and the tourists' currency. On the other hand, the number of visitors to Mauritius affects the real exchange rate, given the size of the exchange market for the Mauritian rupee and the significant size of tourism relative to the domestic economy (8.2% in 2012, Statistics Mauritius (2012)).

A study by Wang et al. (2008, November) used the Copula-based measures of dependence structure between international tourism demand and exchange rates in Asia countries constructed from available monthly data and found a negative relationship between international tourists visiting Asia and exchange rate, i.e., a stronger destination currency would reduce the number of international visitors to this destination and vice versa. The study also found an asymmetrical effect of exchange rate on international visitors, with the effect of appreciation of the destination currency stronger than the currency depreciation.

Tse (2001) estimated the impact of economic factors on tourism in Hong Kong. Measuring tourism in terms of real tourist expenditure and using an expectations model, Tse found that "real tourism expenditure depends on expected income, expected exchange rate and price level". Tse also pointed to the importance of defining the "appropriate measure of price" on international tourism. "In practice, 'price' includes the foreign currency price of tourist goods and services in destinations, the transportation cost between countries, the effect of exchange-rate variations on purchasing power. In addition, the opportunity cost of travel time and risk of travel may also be considerations." (p. 281)

Santana-Gallego, et. al (2007, December) analyzed the effect of several *de facto* exchange rate arrangements on international tourism using a gravity equation. Their findings confirm the importance of exchange rate volatility in tourists' decision to travel in that "less flexible exchange rate promotes tourism flows".

Table 4: Exchange Rate, Tourists' Incomes and Other Variables Used in Previous Studies of Tourism		
Explanatory Variables	**Author(s) & Year**	**Effect on Dependent Variable**
EXCHANGE RATE VARIABLE measured as		
Real Exchange Rate (Destination vs. Origin country Goods)	Vogt (2008)	-
Real Exchange Rate (Destination vs. Origin country Goods))	Cheng, et. al (2013, January)	-
Exchange Rate (Origin country vs. Destination country currency, Australian dollar)	Yap (2011)	- but diminishes in the long run
Exchange rate elasticity of international tourism demand	TRA (2011, June)	- with differential adjustments in the short run vs. long run
Real exchange rate (Origin country vs. Destination country, Mauritian, Goods)	Nowjee, et. al (2012, November)	no effect
Exchange rate (Foreign currency vs. Destination country (select Asian country) currencies)	Wang, et. al (2008, November)	- with asymmetrical response, i.e., stronger sensitivity to domestic currency appreciation than depreciation
Expected Exchange Rate	Tse (2011)	
Exchange rate volatility (proxy for *de facto* exchange rate arrangements)	Santana-Gallego, et. al (2007)	-
Exchange rate elasticity of inbound tourism	Crouch (1993)	-
OTHER VARIABLES measured as		
Income	Vogt (2008) used Real Income	+
	Cheng, et. al (2013, January) used Real Income	+
	TRA (2011, June) used Income elasticity of international tourism demand	+ with short-run being more elastic than long-run
	Tse (2011) used Expected Income	
	Crouch (1993) used Income	+
Price Level	Tse (2011)	
Time Period being analyzed	Crouch (1993)	
Relative inflation rates (Origin vs. Destination country inflation rates)	Crouch (1993)	+

The paper by Crouch (1993, December) reviewed empirical studies to-date on the impact of exchange rates on international tourism demand and found the impact to be significant but noted the large variability on the estimates of this impact found by these studies. Using a meta-analytical approach, he then investigated this variability among 286 exchange rate elasticities of demand from 80 empirical studies and found the importance of including (1) tourists' income in the model along with exchange rate because "as the currency of the origin country drops in value, the standard of living and real incomes normally decline. The decline in income and the increase in exchange rates together deter foreign tourism"; (2) relative inflation rates, arguing that "as the currency of the origin country drops in value, inflation normally increases. The price of a destination in the form of relative rates of inflation might therefore decline," and, related to the finding of Santana-Gallego, et. al (2007, December), Crouch found that a change in exchange rate systems might affect trend in exchange rate elasticities of international demand.

Table 4 summarizes the results of those studies just reviewed with regard to the effects of exchange rate and other variables on tourism while Table 5 identifies the dependent variables, time periods and origin/destination countries used in the studies just reviewed.

Table 5: Dependent Variable, Time Period, and Country Groups in Previous Studies

Author(s) & Year	Dependent Variable, Time Period, Origin/Destination Countries
Vogt (2008)	Exports revenue to U.S., 1973-2002 quarterly data
Cheng, et. al (2013, January)	Tourist arrivals to/from eight Asian countries (Japan, China, Korea, Taiwan, Hong Kong, Singapore, Malaysia and Thailand, January 2001-July 2007 monthly data
Yap (2011)	Tourist arrivals to Australia from China, India, Japan, Malaysia, New Zealand, Singapore, South Korea, the UK and the USA, January 1991-January 2011 monthly data
TRA (2011, June)	Tourist arrivals to Australia, 1990-2010 data frequency unknown
Nowjee, et. al (2012, November)	Tourist arrivals to Mauritius, 1981-2010 annual data
Wang, et. al (2008, November)	Exports revenue to U.S., 1973-2010 quarterly data
Tse (2011)	Tourist arrivals to and hotel room rates in Hong Kong, 1973-1998 annual data
Santana-Gallego, et. al (2007)	Log of tourist arrivals to multiple countries grouped according to *de facto* exchange rate regimes , 1995-2001
Crouch (1993)-survey of previous studies	Tourist arrivals, tourist expenditures, multiple time periods and origin and destination countries

EMPIRICAL MODEL OF JAPANESE TOURISM IN GUAM

Given Guam's heavy reliance on Japanese visitors and the significantly stronger USD/weaker JPY in the past year, which for Japanese visitors makes a visit to Guam more expensive, this study uses Ordinary Least Squares regression analysis and monthly data from October 2003 to July 2013 (a period of 115 months) to measure the effect of a stronger USD/weaker JPY on the number of Japanese tourists visiting Guam.

The Empirical Model

In this study, the regression equation is

$$\begin{aligned}&\textbf{Japanese Tourist Arrival in Guam}_t = \\ &a_0 + a_1\,\textbf{USD/JPY}_{t-i} + a_2\,\textbf{Japanese Growth}_t + a_3\,\textbf{Tohoku Disaster} + \\ &a_4\,\textbf{Trend} + a_5\,\textbf{Monthly Seasonality} + a_6\,\textbf{Japanese Tourist Arrival in Guam}_{t-1} + e_t\end{aligned} \quad (1)$$

where the dependent variable is **Japanese Tourist Arrival in Guam$_t$** = number of Japanese tourists arriving in Guam in month t. This variable is consistent with the dependent variables used by several studies in Table 5. Data was taken from various issues of Guam Visitors Bureau's Visitor Arrivals Statistics.

The independent/explanatory variables in the regression equation are

USD/JPY$_{t-i}$ = Nominal exchange rate between JPY and USD (how many JPY is required to buy 1USD) at time t-i, where i= 1 to 12 to indicate 1 to 12 month lagged effect of exchange rate. Data was downloaded from the Federal Research Bank of St. Louis, Federal Reserve Economic Data (FRED2), series ID: EXJPUS.

Japanese Growth$_t$ = Growth of Japanese tourists' real income, proxied by Japan's monthly industrial production index, which was downloaded from the Federal Research Bank of St. Louis, Federal Reserve Economic Data (FRED2), series ID: JPNPROINDMISMEI (2005=100).

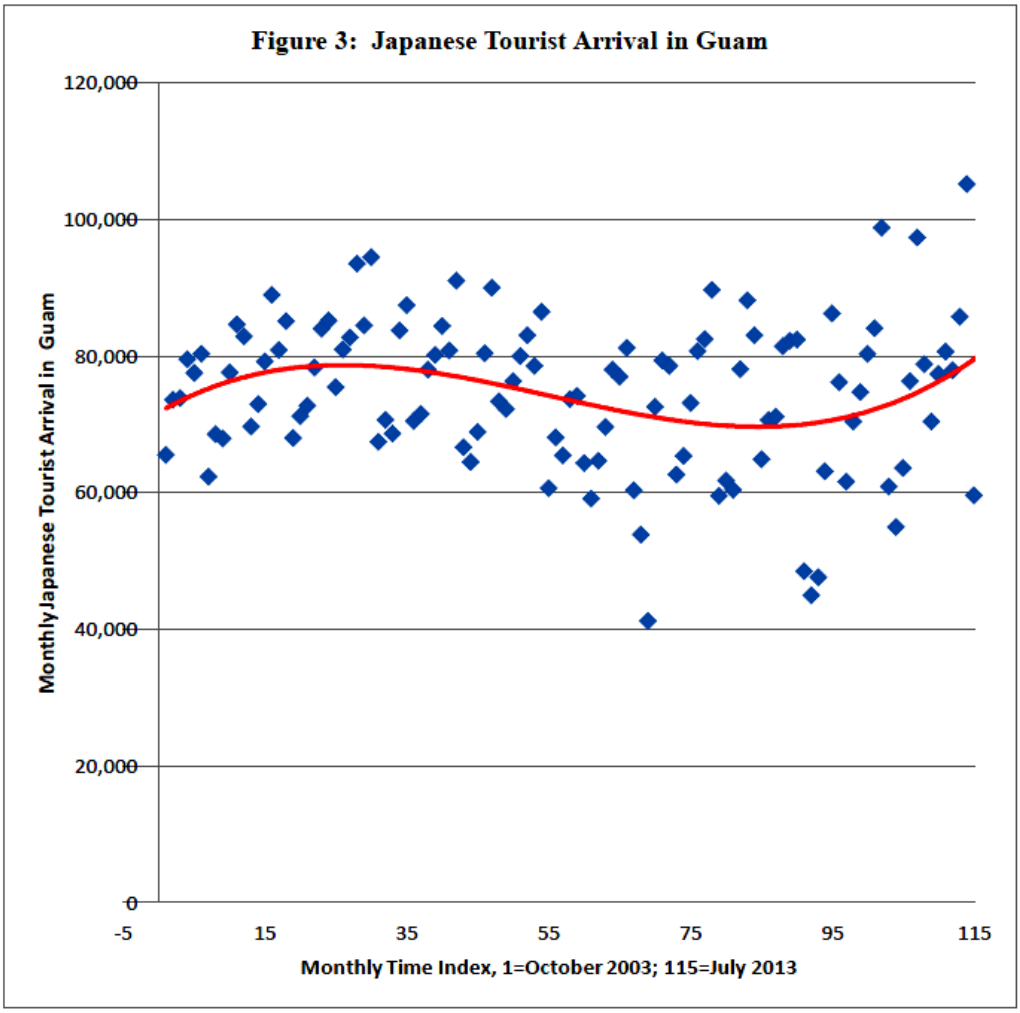
Tohoku Disaster = dummy for the March 2011 earthquake and tsunami disaster in northeastern Japan (Tohoku area), which noticeably reduced the number of Japanese visitors to Guam in the three months following the disaster, i.e., April, May and June 2011.

Trend = index for months of time series data, from 1=October 2003 to 115=July 2013. Figure 3 shows the trend of the dependent variable (Japanese Tourist Arrival in Guam) to mimic a cubic function.

Monthly Seasonality = dummy for the monthly seasonality in the dependent variable (Japanese Tourist Arrival in Guam). Figure 3 shows monthly seasonality around the cubic trend displayed by Japanese Tourist Arrival in Guam. A separate regression analysis shows particular seasonality for the months of January, February, March, April, May, June, August and October compared to the month of December. On the other hand, the months of July, September and November did not show significantly different seasonality than that for the month of December.

Japanese Tourist Arrival in Guam$_{t-1}$ = introduced to capture any autoregressive pattern of the dependent variable

The error term is indicated by **e_t** in the regression equation.



Source: Guam Visitors Bureau (various issues). Visitor Arrivals Statistics. Retrieved from http://www.visitguam.org

The regression equation in (1) is estimated using Ordinary Least Squares and processed using Microsoft Excel/Data Analysis/Regression.

The Test Hypotheses

The empirical model will test the following hypotheses:

H1: A stronger USD/weaker JPY will negatively affect Japanese tourist arrival in Guam ($a_1<0$).

H2: Higher Japanese tourists' income will positively affect Japanese tourist arrival in Guam ($a_2>0$).

H3: The Tohoku disaster in March 2011 has negatively affected Japanese tourist arrival in Guam ($a_3<0$).

H4: Japanese tourist arrival time series displays a cubic trend with respect to time (in this case, months) (a_4 >0 for Trend, <0 for Trend^2 and >0 for Trend^3).

H5: Japanese tourist arrival time series displays monthly seasonality with some months experiencing stronger Japanese tourist arrival and other months experiencing weaker Jpaanese tourist arrival than the reference month (December) (a_5 >0 for months stronger than the reference months; a_5 <0 for months weaker than the reference months).

H6: Lagged Japanese tourist arrival in Guam positively affects current Japanese tourist arrival in Guam (a_6>0).

THE RESULTS

Multiple regression runs were performed in order to identify the effect of the USD/JPY exchange rate of different lags (from one month to twelve months) on the Japanese Tourist Arrival in Guam, as reflected by coefficient $\mathbf{a_1}$ in the regression equation in (1). This study hypothesized $\mathbf{a_1}$ to be negative. Estimates of $\mathbf{a_1}$ for different lags on the USD/JPY are reported in Table 6.

Table 6: Effect of the Stronger USD/Weaker JPY on Japanese Tourist Arrival in Guam

Time Lag (in months)	Estimated value of $\mathbf{a_1}$	p-value	significance
0 (current time)	-159.72	0.1116	None
1	-176.42	0.0786	*
2	-199.98	0.0383	**
3	-152.89	0.1009	None
4	-76.52	0.4003	None
5	-47.51	0.5976	None
6	-84.17	0.3404	None
7	-120.88	0.1644	None
8	-110.9	0.1967	None
9	-163.99	0.0527	*
10	-178.42	0.0326	**
11	-146.38	0.0761	*
12 (1 year earlier)	-136.51	0.0955	*

* indicates a 10% significance level
** indicates a 5% significance level
otherwise, the coefficient is not significantly different from zero

The results reported in Table 6 show negative values of $\mathbf{a_1}$ for USD/JPY for the following lags in months: 2, 3, 9, 10, 11 and 12. The magnitude of this effect ranges from -135.51 using a 12-month lag on the USD/JPY exchange rate to -199.98 using a 3-month lag. These estimates

are to be interpreted as representing the reduction in the number of Japanese tourists visiting Guam per month for every 1JPY that the JPY is weaker vs. the USD. As such, these effects are significant since the JPY has weakened from 76JPY to 100JPY per 1USD, or 24JPY per 1USD, since September 2012. This means that during this period, the estimated reduction in Japanese tourists visiting Guam ranges from 3,252 to 4,799 per month or 39,026 to 57,594 over a 12-month period, which translates to a decline of between 4.25% and 6.27% in the number of Japanese tourist expected to visit Guam during this current fiscal year (October 2012-September 2013).

The economic impact of this estimated reduction in Japanese visitor to Guam in response to the unfavorable exchange rate faced by Japanese tourists would be quite noticeable, especially if not offset by positive contributions by visitors to Guam from other countries. These estimates are calculated using the same methodology presented earlier, which focused on tourist expenditure in Guam. With each Japanese visitor spending in Guam almost USD500 during his/her visit to Guam and expecting between 39,026 to 57,594 less Japanese tourists to visit Guam in fiscal year 2013, this would

reduce tourist expenditure by between USD19.5 million to USD28.8 million
reduce the overall Guam economy by the spending multiplier of 1.3 (approximately between USD25.4 million to USD37.4 million)
reduce the number of jobs by between 346 and 512; and
reduce taxes in the form of the Gross Receipts Tax (GRT) by between USD1 million to USD1.5 million,
and other negative economic impacts not included here because of their calculations would require information beyond what is obtained for this study.

The results reported in Table 6 also suggest that the negative effect of the stronger USD/weaker JPY on the number of Japanese tourists arriving Guam appears to be experienced in the short-run (in this case, 2-3 months after the change in the USD/JPY exchange rate) and later, in the long-run (from 9 to 12 months after the change in the USD/JPY exchange rate). The latter is consistent with those Japanese tourists who make early travel plans (up to one year in advance; Schumann, F.R., 2013, May, personal communication), many of whom book packaged tours (25% booked "full tour packages" while 68% booked "free-time package tours", Guam Visitors Bureau's Japan Visitor Tracker Exit Profile, June 2013, prepared by Qmark Research). The former likely reflects those Japanese tourists who make late travel plans, which they booked themselves (referred to as "individually arranged travel", which accounted for 4% of the respondents to Guam Visitors Bureau's Japan Visitor Tracker Exit Profile, June 2013, prepared by Qmark Research.

Other explanatory variables were also found to have statistically significant effects on the dependent variable, Japanese Tourist Arrival in Guam. As mentioned earlier, multiple regression runs were processed. Tables 7 and 8 report the regression results where the coefficient $\mathbf{a_1}$ has the lowest p-values, which according to Table 6 were those with the USD/JPY exchange rate with a 3-month lag as well as a 10-month lag.

Results reported in Tables 7 and 8. All coefficients were found to be statistically significant at a 1% level, except for **USD/JPY$_{t-i}$** (where i=2 and 10) and **Japanese Tourist Arrival in Guam$_{t-1}$**, which were statistically significant at a 5% level. The R^2 and adjusted R^2 are high (low to mid-80%) and the F-statistics are statistically significant at a 1% level or better, as shown by extremely low p-values.

We reiterate that a stronger USD/weaker JPY reduces the number of Japanese tourists arriving in Guam, a result that was already discussed and for which estimated coefficients corresponding to different time lags were presented in Table 6

Table 7: OLS-Regression Results, USD/JPY exchange rate lagged 2 months

Dependent Variable=Japanese Tourist Arrival in Guam$_t$ (n=115)

Explanatory Variables ↓	**Coefficients**	**Standard Error**	**t Stat**	**P-value**
Intercept	81020.56	10596.64	7.65	1.37E-11
USD/JPY$_{t-2}$	-199.98	95.23	-2.10	0.038384
Japanese Growth$_t$	18170.64	4683.22	3.88	0.000188
Dummy for Tohoku Disaster	-9292.52	3095.51	-3.00	0.003396
Trend	826.78	218.90	3.78	0.000271
Trend^2	-19.16	4.59	-4.17	6.48E-05
Trend^3	0.11	0.02	4.42	2.57E-05
Monthly Seasonality Dummy: January	6152.82	1740.65	3.53	0.000622
Monthly Seasonality Dummy: February	3596.54	1852.25	1.94	0.055015
Monthly Seasonality Dummy: March	11773.51	1818.03	6.48	3.66E-09
Monthly Seasonality Dummy: April	-16451.20	2105.13	-7.81	5.97E-12
Monthly Seasonality Dummy: May	-12492.70	1883.26	-6.63	1.75E-09
Monthly Seasonality Dummy: June	-11298.30	1916.84	-5.89	5.22E-08
Monthly Seasonality Dummy: August	9519.77	1807.45	5.27	8.1E-07
Monthly Seasonality Dummy: October	-8926.82	1818.91	-4.91	3.63E-06
Japanese Tourist Arrival in Guam$_{t-1}$	0.1480	0.067	2.22	0.028755
	R^2	**0.8419**	**F-statistics**	**35.1434**
	Adjusted R^2	**0.8179**	**P-value of F**	**6.61E-33**

We also find that an increase in Japanese tourists' real income, as proxied by growth in Japan's monthly industrial production, encourages visits to Guam, as reflected by a positive estimated for $\mathbf{a_2}$ of approximately 18,000. This means that, for every one-percentage point increase in real income of Japanese tourists, an additional 18,000 Japanese tourists will visit Guam. This result suggests that, Japanese tourists view visiting Guam as a normal good.

Our empirical model also captures the negative impact of the earthquake and tsunami disaster that affected northeastern Japan on March 11, 2011 on the number of Japanese visitors arriving in Guam. The estimates for $\mathbf{a_3}$ of between 9,300 (Table 7) and 10,000 (Table 8) correspond to the reduction in the number of Japanese visitors to Guam during the months of April, May and June, 2011. Figure 3 also clearly shows the data points corresponding to these months to be outliers and significantly below the cubic trend line.

As shown in Figure 3, our regression results confirm that the Japanese tourist arrival time series data exhibits a cubic function with respect to its monthly trend, as reflected in the estimated coefficients for Trend, $Trend^2$ and $Trend^3$.

As also evident in Figure 3, we find that there are monthly seasonality in Japanese tourist arrival in Guam, with March being the busiest month and representing the highest arrivals, followed by August, then January and February and all these months outperforming the months of July, September, November and December. April was found to be the slowest month in terms of Japanese tourist arrival in Guam, followed by May, June and October, with these months corresponding to Japanese tourist arrival in Guam to be lower than those during the months of July, September, November and December.

Table 8: OLS-Regression Results, USD/JPY exchange rate lagged 10 months

Dependent Variable=Japanese Tourist Arrival in $Guam_t$ (n=115)

Explanatory Variables ↓	**Coefficients**	**Standard Error**	**t Stat**	**P-value**
Intercept	81888.82	10688.12	7.66	1.26E-11
USD/JPY_{t-10}	-178.46	82.31	-2.17	0.032583
Japanese $Growth_t$	16046.29	4603.28	3.49	0.000733
Dummy for Tohoku Disaster	-9976.42	3114.21	-3.20	0.001827
Trend	594.39	161.13	3.69	0.000368
$Trend^2$	-14.01	3.24	-4.33	3.6E-05
$Trend^3$	0.0779	0.02	4.40	2.72E-05
Monthly Seasonality Dummy: January	6581.05	1739.82	3.78	0.000266
Monthly Seasonality Dummy: February	4366.27	1868.29	2.34	0.021452
Monthly Seasonality Dummy: March	12485.01	1826.35	6.84	6.75E-10
Monthly Seasonality Dummy: April	-15659.10	2140.74	-7.31	6.82E-11
Monthly Seasonality Dummy: May	-12091.00	1887.05	-6.41	5.03E-09
Monthly Seasonality Dummy: June	-11042.40	1916.31	-5.76	9.4E-08
Monthly Seasonality Dummy: August	9464.63	1804.41	5.24	8.88E-07
Monthly Seasonality Dummy: October	-8987.42	1816.84	-4.95	3.09E-06
Japanese Tourist Arrival in $Guam_{t-1}$	0.1369	0.067	2.04	0.043966
	R^2	**0.8423**	**F-statistics**	**35.2602**
	Adjusted R^2	**0.8184**	**P-value of F**	**5.78E-33**

Our empirical model finds that, on average, Japanese tourist arrival in Guam in any particular month is positively affected by arrival during the previous month, as indicated by the estimated for $\mathbf{a_6}$ of 0.148 (Table 7) and 0.1369 (Table 8).

CONCLUSION AND POLICY IMPLICATIONS

This study aimed at investigating the relationship between exchange rates and tourism using evidence from the Guam economy. Our empirical model confirms that a stronger USD/weaker JPY would discourage Japanese visitors to Guam. The combination of Guam's heavy reliance on the Japanese tourist market, which accounts for approximately 70% of tourist arrival in Guam, the relatively large amount of expenditure by Japanese tourists while in Guam (approximately USD500 per tourist per visit) and the 33% strengthening of the USD vs. the JPY in the past year point to the noticeably large impact on Guam's USD 4 billion economy in terms of the reduced overall income and spending, employment and tax collections by the local governments. Although the exchange rate appears to have stabilized around JPY100 per 1USD, which represents a preliminary target by the Bank of Japan, the worst might not be over since this preliminary target was believed to bring Japan's inflation rate to 2%. As Japan's inflation rate continues to fall below 2%, which reflects continued slow economy and tendencies of deflationary pressures, the possibility remains for another round of JPY depreciation in order to encourage exports from Japan in the hopes that this would boost the sluggish Japanese economy. In this scenario, further weakening of the JPY would mean further strengthening of the USD, which would increase the costs to Japanese tourists of visiting Guam.

On the other hand, to the extent that the further weakening of the JPY would stimulate the Japanese economy, incomes of Japanese tourists would increase, which would create additional purchasing power for Japanese consumers and encourage visits to Guam. Our findings suggest that the exchange rate effect would become visible first, as early as two months after another exchange rate adjustment and certainly within the first year of the adjustment.

Despite what continues to be a heavy reliance of Guam's tourism on the Japanese market, the fact is that the share of Japanese visitors to the total has been reduced to approximately 70% from what was much higher (85-90%), thanks to many years, even decades, of efforts by the Guam Visitors Bureau and its members to diversify Guam's tourism by proactively marketing to other tourist markets. Also contributing to this change are market and institutional factors that increase Guam's accessibility and affordability to tourist from other origin countries. Visitors to Guam from Korea now make up 17.45% of the total, with the Guam Visitors Bureau's plan to increase this figure to 30% in the near future. Only 5 years ago, the share of Korean tourist was as low as 12-13%. Of course, the increased share of Korean tourist also resulted from the weakened U.S. dollar vis-à-vis the Korean won during the same period (Cruz, B.J., 2013, October 3, personal communication). Russia's small share (0.51%) to the total tourist arrival in Guam brings promise of triple-digit growth for some time to come. Fortunately, this growth

prospect is driven largely by pent-up demand for travel by Russian tourists and likely to be immuned from the state of the Russia economy or the exchange rate between the USD and the Russian Ruble for some time to come. Another market with a lot of promise for Guam's tourism is Mainland China, which make up only 0.79% of Guam's tourist market. To this end, there continues to be efforts by the Guam Visitors Bureau and some local policymakers to push to include China in the Visa Waiver Program. These and other efforts combine to offset the negative impact of the stronger USD/weaker JPY on Japanese tourist arrival in Guam. Based on the latest figures, that the overall tourist arrival in Guam manages to increase 7% this fiscal year suggests that these efforts have been effective.

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