MODELLING TOURISM DEMAND IN FIJI

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Abstract

Being the major foreign exchange earner and a major source of job creation for Fiji, tourism is without a doubt an important industry for Fiji. Given the importance of the industry, the aim of the paper is to model the demand for tourism in Fiji. Cointegration and error correction techniques were used to construct a tourism demand model for Fiji. Both the long-run and short-run results indicate that income of our major trading partners is positively related with tourism demand. Contrary to expectations, relative prices were found to have a positive relationship with tourism demand. Unsurprisingly, coups are a major deterrent to the demand for tourism. However, major cyclones were not significant in explaining tourism demand.

1.0 Introduction

Tourism brings obvious economic benefits, with the two most important being the generation of foreign exchange and the creation of jobs. Therefore, it is no surprise that tourism is an important economic activity in many parts of the world, including here in Fiji.

Fiji's tourism industry had its origins in the trans-Pacific shipping trade in the early twentieth century but it was not until the 1940s that the development foundations were laid down, particularly the construction of the international airport in Nadi in 1941 (Britton, 1983). Since those early days, the tourism industry has developed into the major foreign exchange earner for Fiji, surpassing sugar in the early 80s.

In 2003, tourism receipts totalled around $639 million[1], almost double the amount earned a decade ago and currently representing around 15 percent of GDP. According to the Ministry of Tourism and Transport et al. (1997), the industry provides employment to over 30,000 people. Moreover, it has provided Fiji with extensive international transport and communications networks, and facilitated the upgrading and expansion of local infrastructure.

Historically, Australia has been Fiji's biggest source market for tourists and continues to be tourism's largest export market. In 2003, visitors from Australia reached a record high of around 142,000 visitors, making up 33 percent of total visitor arrivals. New Zealand, the United States (US) and the United Kingdom make up the other major source markets.

[1] Source: Fiji Islands Bureau of Statistics

Given the importance of the industry, the aim of this paper is to model the demand for tourism, using the cointegration and error correction approach. An earlier tourism demand study by Narayan (2002) focussed on modelling tourism demand separately by the major source markets (Australia, New Zealand and the US). This paper extends the research in this area by looking at total tourism demand for Fiji.

The paper is divided into three parts. The first part of the paper outlines the evolution of the tourism industry in Fiji, while the second part outlines the model used in the study and discusses the results obtained from this model. The third part concludes the paper.

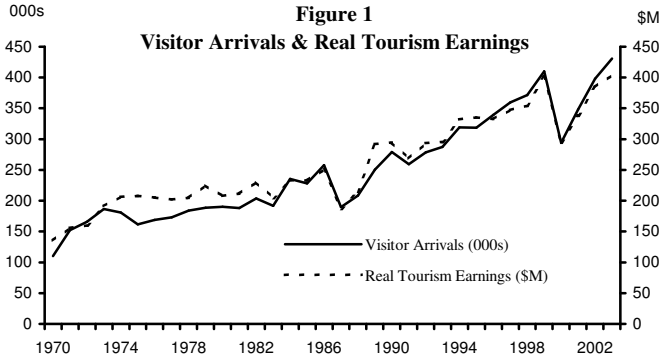
2.0 Tourism in Fiji

Tourism has come a long way since the early days of the Grand Pacific Hotel, which was built in 1914. Improvements to the local infrastructure, such as the Nadi International Airport and the Queens Highway, as well as improving accommodation facilities and services was witnessed between the late 40s and the early 60s. However, it was not until the late 60s to early 70s that Fiji experienced what may be considered a "tourism boom", on account of the expansion of hotel rooms, development of the aviation sector, duty free shopping incentives and the increased marketing initiatives undertaken by the Fiji Visitors Bureau (FVB). Visitor arrivals almost tripled during the 5-year period (1965-1970). (Tourism Council of the South Pacific, 1992).

Since the 70s, visitor arrivals have grown steadily (Figure 1), averaging around 4 percent in the last 30 years (1974-2003). Not accounting for the decline in visitor arrivals during the coups of 1987 and

2000, the average rate of growth is higher at around 6 percent. In fact, total visitor arrivals reached a record high of around 431,000 visitors in 2003 and are expected to surpass current levels in the years to come. As depicted in Figure 1, real tourism earnings have largely tracked the trend in visitor arrivals, reaching a historical high in 2003. On average, tourists spent approximately $170 a day and stayed for about 9 days in 2003[2].

Figure 1
Visitor Arrivals & Real Tourism Earnings



Source: Fiji Islands Bureau of Statistics

As indicated earlier, Fiji's major source markets are Australia, New Zealand and the US, which together accounted for around 64 percent of total visitor arrivals in 2003. During the early 90s, Japan emerged as an important source market for Fiji tourism, becoming the third largest export market in the mid-90s. However, in recent years, visitors from Japan have waned and now make up the 5th largest export market for tourism. Interestingly, visitors from the United Kingdom, a long-haul market, have risen in the past decade and are currently the 4th largest source market.

[2] Source: Fiji Islands Bureau of Statistics

Undoubtedly, tourism is an important industry for Fiji, being one of the major forces driving the country's economic expansion. Moreover, even with the industry's vulnerability to both adverse internal and external factors, it has been quite resilient. For instance, despite the coup in 2000 and several adverse external shocks (the September 11 terrorist attacks in the US in 2001, the spread of the Severe Acute Respiratory Syndrome virus in Asia and the US-Iraq conflict in 2003), visitor arrivals and hence, tourism earnings peaked in 2003.

3.0 Model

Most studies modelling the demand for tourism have either used visitor arrivals or tourism earnings as a dependent variable (Narayan, 2002). For the purposes of this study, visitor arrivals will be used as the dependent variable.

The tourism demand function is also estimated in log-log form so that the estimated coefficients can be interpreted as elasticities. The basic framework for the tourism demand function is as follows:

$$\ln VA = \mu + \beta_1 \ln TPRGDP + \beta_2 \ln REER + \beta_3 CP + \beta_4 CY + \varepsilon$$

where VA is visitor arrivals;

TPGDP is the trade-weighted real gross domestic product of Fiji's major trading partners;

REER is the real effective exchange rate;

CP is the dummy variable used to capture coups in Fiji, taking the value of 1 in the year of the coup(s) and 0

otherwise; and

CY is the dummy variable used to capture major cyclones in Fiji, taking the value of 1 in the year of the cyclone(s) and 0 otherwise.

In terms of the major factors influencing the demand for tourism, income and prices are the most commonly used variables (Lim, 1997). As their income increases, people are more inclined to travel. As a proxy for foreign income, the weighted average real gross domestic product (GDP) of Fiji's major trading partners is used.

Tourists are also sensitive to prices, either in the form of transportation costs (airfares), or cost of living (accommodation, meals etc) at the destination country. As historical data on airfares is not readily available, this variable is omitted from the model.

Potential tourists may be deterred from taking a vacation in Fiji if our costs are relatively high – they may opt to pursue tourism options within their country. Ideally, an index measuring relative prices of hotels and restaurants would be the most appropriate variable to use. However, in the absence of such an index, this paper uses the real effective exchange rate as a proxy. The assumption here is that the prices of hotels and restaurants move in line with domestic prices. Therefore, if the domestic exchange rate was not maintained at a competitive level, potential tourists would be dissuaded to travel to Fiji.

Finally, one-off shocks could also impact the demand for tourism. In Fiji's case, political crises can be a major deterrent for tourists. Hence, a dummy variable is used to account for the coups in 1987 and 2000. Natural disasters could also deter potential tourists and given that Fiji has

experienced a number of severe cyclones in the past, a dummy variable for the major cyclones is also accounted for.

3.1 Data

The paper applies annual data from 1970 to 2002[3]. Before proceeding to the cointegration analysis, the unit root characteristics of the data are examined. Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP)[4] unit root tests are carried out on the series. The results suggest that all variables appear to be integrated of order one (Table 1).

Table 1: ***Unit Root Tests***

Variables	Augmented Dickey-Fuller Test		Phillips-Perron Test	
	Level	First Difference	Level	First Difference
Visitor Arrivals	-0.0987	-5.9305*	-1.8197	-9.3869*
Trading Partner Real GDP	-1.9733	-4.8693*	-2.1851	-4.8461*
Real Effective Exchange Rate	-2.5882	-4.8843*	-2.7012	-4.8571*

The * indicates rejection of the null hypothesis of a unit root at the 1 percent significance level. The respective lag length(s) were selected based on the Akaike Information Criteria and the Schwarz Criteria – the test statistic was then compared with the resultant critical value at the 1 percent significance level.

3.2 Cointegration Analysis

Since the variables are considered to be I(1), cointegration analysis, using an error correction model (ECM), is appropriate to model the tourism demand for Fiji. The theories of cointegration and ECMs are linked, formalised in *Granger's Representation Theorem* (Engle and Granger,

[3] See Appendix A for a detailed description of the data.
[4] See Dickey & Fuller (1979) and Phillips & Perron (1988).

1987), which states that if there is cointegration between a set of variables, their relationship has an error correction representation. Conversely, if a data generating mechanism is an error correction model, and the data are cointegrated, then cointegration is present.

Several methods have been developed to model cointegrating relationships. For the purposes of this paper, the methods developed by Johansen (1988, 1991) and Johansen and Juselius (1990), are applied. The Johansen procedure, as it is known, obtains maximum likelihood estimates of the cointegrating vectors and adjustment parameters directly (as opposed to the two-step Engle-Granger procedure). Moreover, this method allows for speed of adjustment parameters.

Therefore, given that the variables are I(1), the Johansen approach is applied to test whether there are any cointegrated relationships among the variables in level form. This approach to cointegration is based on a vector autoregression (VAR) framework.

Variables *lnVA*, *lnTPRGDP* and *lnREER* are entered as endogenous variables, while *CP* and *CY* are treated as exogenous variables. A constant is also included. The lag order is not known *a priori* so tests of the lag order are needed to ensure sufficient power of the Johansen procedure. Based on various information criteria[5], it is statistically acceptable to simplify the model to a first order VAR.

The cointegration tests are applied to this first order VAR and the results are reported in Table 2. The maximal eigenvalue and trace eigenvalue statistics (λ_{max} and λ_{trace}) reject the null hypothesis of no

[5] The Akaike, Schwarz and Hanna-Quinn information criteria, amongst others, were used.

cointegration in favour of at least one cointegrating relationship. The eigenvalue associated with the first vector is indeed dominant over those corresponding to other vectors, thus confirming that there exists a unique cointegrating vector between visitor arrivals and income and prices.

Table 2: ***Cointegration Analysis***

Cointegration Test[1]			
Null Hypothesis[2]	*r=0*	*r=1*	r=2
Eigenvalue	0.504	0.244	0.000
λ_{max}[3]	21.75	8.69	0.00
95% Critical Value	20.97	14.07	3.76
λ_{trace}[3]	30.44	8.69	0.00
95% Critical Value	29.68	15.41	3.76
Long-run Elasticities			
Variable	*lnTPRGDP*	*lnREER*	*Constant*
Elasticities	1.105***	0.101	1.116

1. *r* stands for the number of ranks.
2. The statistics λ_{max} and λ_{trace} are Johansen's maximal and trace eigenvalue statistics for testing cointegration. The null hypothesis is in terms of the cointegration rank *r* and rejection of *r*=0 is evidence in favour of at least one cointegrating vector. The critical values are taken from Osterwald-Lenum (1992).

The long-run elasticity estimates are obtained by normalising *lnVA* as one (see Table 2). Consistent with previous studies on tourism demand, income in our major trading partner countries are positively related to the demand for tourism. As income increases, demand for tourism also increases, with the elasticity greater than one. However, contrary to expectations, relative prices are positively related to tourism demand. This means that despite an increase in relative prices (an increase in the REER index; loss in competitiveness), demand for tourism rises. A possible explanation could be that increases in long-term prices do not deter tourists, this is particularly true for "high-budget" tourists. It should also be noted

that the REER index is only a proxy – a hotel price index would be a more appropriate and accurate estimate of price elasticities.

Using the information provided by the Johansen cointegration test, an ECM is constructed to obtain the short-run elasticities. Modelling the short-run dynamics will provide information concerning how adjustments are taking place among the various variables, to restore long-run equilibrium, in response to short-term disturbances in the demand for tourism in Fiji. The unrestricted ECM is as follows:

$$\Delta \ln VA_t = \beta_0 + \sum_{i=0}^{n} \beta_1 \Delta \ln TPGDP_{t-i} + \sum_{i=0}^{n} \beta_2 \Delta \ln REER_{t-i} + \beta_3 CP_t + \beta_3 CY_t + \alpha_1 EC_t + \varepsilon_t$$

The long-run relationship is captured by the error correction term (*EC*), generated by the Johansen procedure. The coefficient of this term will indicate the speed of adjustment; in other words, how quickly the system returns to equilibrium after a random shock. It is expected to be negative to ensure convergence. Following the general-to-specific approach, the unrestricted ECM is reduced to a parsimonious specification. This procedure entails the sequential removal of those variables exerting no influence in the model. The results of the parsimonious ECM are shown in Table 3.

In the short-run, as expected, current income is positively related to tourism demand – a 1 percent increase in our major trading partners' GDP raises tourism demand (visitor arrivals) by around 1.6 percent. Even income from a year ago impacts the current demand for tourism. As was the case in the long-run, relative prices are positively related to tourism

demand. In the short-term, higher prices are not likely to discourage tourists from travelling, as most holidays are planned well in advance.

Table 3: ***Parsimonious Error Correction Model***

Error Correction Model			
Constant	-0.031		
	(-1.529)		
$\Delta lnTPGDP$	1.584***		
	(3.997)		
$\Delta lnTPGDP_{t-1}$	1.492**		
	(3.583)		
$\Delta lnREER$	0.262*		
	(1.965)		
CP	-0.323***		
	(-10.712)		
CY	-0.011		
	(-0.289)		
EC	-0.499***		
	(-6.074)		
Summary Statistics			
Adjusted R^2	0.829		
σ	0.049		
Diagnostic Tests			**Probability**
Normality			
Jarque-Bera statistic	χ^2-statistic	2.129	0.345
Serial Correlation			
Breusch-Godfrey LM test statistic	χ^2-statistic	14.772	0.000
Autoregressive Conditional Heteroskedasticity			
ARCH LM test statistic	χ^2-statistic	0.687	0.407
Heteroskedasticity			
White's test statistic	χ^2-statistic	22.984	0.290
Stability			
Chow's forecast test (1997-2002)	LR statistic	6.578	0.362
Specification Error			
Ramsey's RESET test	LR statistic	2.746	0.253

1. ***(**) denotes significance at the one (five) per cent levels. * denotes significance at the 10 percent level.
2. t-values are in parenthesis.

As expected, coups are a major deterrent to the demand for tourism.

In the year of a coup(s), visitor arrivals are estimated to fall by around 32 percent. On the other hand, major cyclones are insignificant in explaining tourism demand. This is probably because of the speedy recovery from cyclones, in terms of tourism infrastructure and hotel operations. Travel decisions are also not dependent on natural phenomena such as tropical cyclones.

The *EC* term is significant and the negative coefficient guarantees that the series is not explosive and that in the long-run, convergence is achieved. The coefficient of this term implies that a deviation from long-run tourism demand in one period is corrected by around 50 percent in the next.

Diagnostic tests indicated the presence of serial correlation[6] so the Newey-West method is used to obtain standard errors that are corrected for autocorrelation – these are reported in Table 3. Otherwise, tests for normality, heteroskedasticity, specification error and stability suggest the model is well specified.

4.0 Conclusion

Tourism is clearly an important industry for Fiji, being the major foreign exchange earner for the country. Moreover, the industry employs a considerable number of Fiji's work force and contributes immensely to Fiji's economy. Given the importance of the industry, the aim of the paper was to quantitatively ascertain the determinants of the demand for tourism

[6] The presence of serial correlation could be because of omitted variables such as transportation costs (airfares) and substitution prices.

in Fiji. In this light, cointegration and error correction techniques were used to construct a tourism demand model for Fiji.

In the long-run, the results suggest that income in our major trading partner countries are positively related to the demand for tourism, with a long-run elasticity of around 1.11 percent. However, in contrast to expectations, an increase in relative prices raises tourism demand. This could be explained by the fact that increases in long-term prices do not deter tourists, particularly "high budget" tourists.

In the short-run, current income is positively related to tourism demand. Even income from a year ago impacts the current demand for tourism. As was the case in the long-run, relative prices are positively related to tourism demand – higher prices are not likely to discourage tourists from travelling, as most holidays are planned well in advance. As expected, coups are a major deterrent to the demand for tourism. On the other hand, major cyclones are insignificant in explaining tourism demand.

However, it should be noted that there are certain limitations of this study. Firstly, the use of the REER index as a proxy for relative prices may distort results, given that it does not truly capture relative *tourism* prices – a hotel price index would have been preferred. The model also does not take into account transportation costs, such as airfares, and substitution prices, such as those offered in Bali (considered as one of Fiji's main competitors). It also does not account for FVB's marketing expenditure. These omitted variables could have had a significant influence on the model.

Appendix A Data Sources and Construction

Series	Construction and Sources
Visitor arrivals	Total visitor arrivals to Fiji. Bureau of Statistics, Statistical News, *Visitor Statistics*, various issues.
Trading partner gross domestic product	Calculated as the trade-weighted average constant price gross domestic product of Fiji's five major trading partners: Australia, New Zealand, the UK, the US and Japan. IMF *International Financial Statistics CD-ROM* (January 2004). Bureau of Statistics, *Overseas Merchandise Trade Statistics*, various issues. Reserve Bank of Fiji, *Quarterly Review*, various issues.
Real effective exchange rate	Real effective exchange rate as calculated by the Reserve Bank of Fiji, using the trade-weighted consumer prices indices and bilateral exchange rates of Fiji's five major trading partners. IMF *International Financial Statistics CD-ROM* (January 2004). Bureau of Statistics, *Overseas Merchandise Trade Statistics*, various issues. Reserve Bank of Fiji, *Quarterly Review*, various issues.

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