A tourism demand model for Fiji, 1970–2000

Paresh Kumar Narayan

Despite the growing importance of the tourism industry, little is known about the determinants of tourism demand in Fiji. The major findings of analyses of the 1970–2000 period are that growth in income in Fiji’s main source countries for tourists leads to an increase in visitor arrivals, while relative prices and substitute prices negatively impact visitor arrivals in the long run. This implies that Fiji needs to maintain price competitiveness. Empirical evidence was also found that coups impede the short-run growth of the industry.

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The tourism industry in Fiji dates back to the early 1930s, but it has only emerged as a force in the last decade or so when it has become the largest and fastest growing industry in the country. The tourism industry—which affects the hospitality, accommodation and transport industries—comprises a significant part of Fiji’s economy in terms of its contribution to gross domestic product (GDP), employment, investment, and its capacity to earn foreign exchange. It is increasingly seen as a catalyst for economic growth and a significant element for structural change in Fiji’s economy.

Tourism earnings in Fiji have increased substantially—from F$108 million in 1980 to F$521 million in 2001. Total receipts from tourism as a proportion of total export receipts have also been at healthy levels: valued at around 25 per cent in 1980, they increased to around 30 per cent by 1990, and in 2001 they were valued at over 38 per cent of total export receipts. Similarly, tourism receipts as a percentage of GDP have increased substantially from around 11 per cent in 1980 to around 20 per cent by 1992, and settling at around 25 per cent in 2001. The industry provides direct and
indirect employment to around 40,000 people (Ministry of Tourism 1997). The main sources of tourists for Fiji are Australia, the United States, New Zealand, Canada, the United Kingdom, Europe, Japan, and other Pacific island countries. Of these countries, Australia, New Zealand and the United States are the major tourist source markets, accounting for over 60 per cent of tourists coming to Fiji (Reserve Bank of Fiji 2002).

Despite the key role of tourism in Fiji’s economic development, little is known about the determinants of Fiji’s tourism demand. The aim of this paper is to delineate both the short-run and long-run relationships between visitor arrivals to Fiji from its major source markets, and income and prices. In so doing, it attempts to test the World Bank (1995) and the Fiji Ministry of Tourism (1997) assertion that Bali is a substitute destination for Fiji tourism.

This study is the first quantitative economic analysis of Fiji’s tourism demand. It uses cointegration methodology with an error-correction model. This approach avoids the ‘spurious’ regression problem— inherent in other tourism demand studies (Akis 1998; Icoz, Var and Kozak 1998; Lee, Var and Blain 1996; and Qu and Lam 1997)— and offers a parsimonious time series approach.

Overview of the literature

Empirical studies of tourism demand modeling have used one of the following as the dependent variable

- number of tourist arrivals from an origin country to a destination country
- tourist expenditure/receipts by visitors from an origin country to a destination country.

The income variable has emerged as a major determinant of tourism demand. Lim (1997) reviewed hundreds of empirical studies of tourism demand and found that income and prices were the most commonly used explanatory variables. Demand theory implies that, as per capita incomes rise, more people are likely to travel, and demand for tourism is a positive function of income. This hypothesis has been supported by many empirical studies on tourism demand modeling (see, for example, Gray 1966; Artus 1972; Jud and Joseph 1974; Loeb 1982; and Vanegas and Croes 2000).

There are generally two elements of the price of tourism: the cost of travel to the destination and the costs of living for tourists at the destination. It is likely that tourists are responsive to changes in prices in potential destination countries and that the effect of relative prices is significant as a determinant of the demand for tourism in a particular destination (Loeb 1982). Relative price indexes can also account for substitution between tourist visits to the foreign destination and domestic tourism. Demand theory suggests that the demand for travel is an inverse function of relative prices. That is, the greater the cost of living in the destination country relative to the origin country, the lower the tourism demand, ceteris paribus. Previous studies that have used such a relative price variable in explaining tourism demand include Uysal and Crompton 1984; Lathiras and Siriopoulos 1998; and Song, Romilly, and Liu 2000.

Economic theory suggests that the price of substitutes may be an important determinant of demand. For example, an increase in holiday prices in Bali (Indonesia) may increase demand for holidays in Fiji. Substitute prices have been represented by specifying the tourists’ cost of living variable as a destination value relative to a weighted average value calculated for a set of alternative destinations, or by specifying a separate weighted average substitute destination cost variable (Witt and Witt 1995; Song and Witt 2000; and Kulendran and Witt 2001).
Empirical results presented by Martin and Witt (1987) suggest that the exchange rate-adjusted consumer price index is a reasonable proxy for the cost of tourism, but the exchange rate on its own is not a good proxy. Recent empirical studies on tourism demand modeling that have used the exchange rate-adjusted consumer price index in measuring the costs of tourism include Kulendran 1996; Lathiras and Siriopoulos 1998; Song et al. 2000; and Kulendran and Witt 2001.

Transportation costs have entered the model either as fares in real terms or as expenditure on fares (Martin and Witt 1987). Bond and Ladman (1972) used a weighted average one-directional airfare cost as a proxy for how the cost of a whole trip might vary through time. Those studies that have included a transportation variable in the model have found mixed results. Some studies have found transportation cost to be statistically significant in explaining tourism demand (Kulendran 1996; Kulendran and King 1997) while others (Gray 1966; Jud and Joseph 1974; Quayson and Var 1982; Martin and Witt 1988; and Kim and Song 1998) have found transport costs to be statistically insignificant.

Demand theory also implies that the demand for tourism may be affected by other special factors such as political unrest, economic recession and mega events (Leob 1982; Lee et al. 1996). Dummy variables can be included in international tourism demand functions to allow for the impact of ‘one-off’ events. Many studies, for example, have used dummy variables to capture the impact of the 1973 and 1979 oil crisis on tourism demand. The coups in Fiji could be expected to reduce tourist numbers to the country.

**Model specification and data**

Consistent with previous empirical studies on tourism demand, the proposed long-run model for tourism demand in Fiji from Australia, New Zealand and the United States is of the form

\[
\ln VA_{ij,t} = \alpha_0 + \alpha_1 \ln GDP_{ij} + \alpha_2 \ln RPI_{ij} + \alpha_3 \ln SPI_{ij} + \alpha_4 \ln TC_{ij} + \alpha_5 \text{Coup}_{ij} + \epsilon_t
\]  

where \(i=1,2,3\) (Australia, New Zealand and the United States respectively) are the countries of origin and \(j\) is the destination country (Fiji); \(\ln VA_{ij}\) is the log of tourist (visitor) arrivals in Fiji from country \(i\) in year \(t\); \(\ln GDP_{ij}\) is the log of per capita real GDP of the origin country in year \(t\); \(\ln RPI_{ij}\) is the log of the consumer price index in relative form for a tourist from country \(i\) in year \(t\); \(\ln SPI_{ij}\) is the log of the consumer price index in Fiji relative to Bali for a tourist from country \(i\) in year \(t\); \(\ln TC_{ij}\) is the log of the real economy class airfare from Sydney, Auckland and Los Angeles to Nadi (Fiji); \(\text{Coup}_{ij}\) is a dummy variable used to capture the effects of coups d’etat in Fiji, taking the value of 1 in the year of the coup and 0 otherwise; \(\epsilon_t\) is the error term; and \(\alpha_0, \alpha_1, \alpha_2, \alpha_3, \alpha_4\) and \(\alpha_5\) are the elasticities to be estimated. The model is estimated using annual data from 1970 to 2000 inclusive.

The choice of the log-log form is often preferred because the estimated coefficients can be interpreted as elasticities. In the above model, the coefficients—except that for the dummy variable—are taken to be elasticities. Thus, the estimated coefficients represent the percentage change in the dependent variable for a 1 per cent change in the corresponding explanatory variable.

Consistent with economic theory, per capita real GDP is expected to have a positive effect on visitor arrivals, while prices (RPI, SPI and TC) are expected to have a negative effect. Coups, which bring about political instability and threaten personal security, are expected to have a negative effect on visitor arrivals.

Data on visitor arrivals were obtained from the Reserve Bank of Fiji and real per
capita GDP and CPI were obtained from the World Bank’s World Tables. Economy class airfares are obtained from the ABC/OAG World Airways Guide published by the ABC International Division.

Cointegration analysis and error-correction models

Error-correction models are associated with Sargan (1984), Hendry and Anderson (1977) and Davidson, et al. (1978). The essence of an error-correction model is to capture the adjustments in a dependent variable which depend on the extent to which an explanatory variable deviates from an equilibrium relationship with the dependent variable (Banerjee et al. 1993). Error-correction models provide a way of combining both levels and differences of variables, and hence capture the dynamics of both short-run (changes) and long-run (levels) adjustments.

The notion of cointegration was introduced by Granger (1981) and Granger and Weiss (1983). It was further extended and formalised by Engle and Granger (1987). Cointegration describes the existence of an equilibrium or stationary relationship among two or more time series, each of which is individually non-stationary. The advantage of the cointegration approach is that it allows one to integrate the long-run and short-run relationships between variables within a unified framework. Since the seminal work of Engle and Granger (1987), research on cointegration techniques has multiplied, with a focus on determining the number of statistically significant long-run relationships between visitor arrivals and its determinants. The Johansen approach to cointegration is based on vector autoregression (VAR).

Johansen’s approach derives maximum likelihood estimates of the cointegrating vectors for an autoregressive process with independent errors. The \( \Pi \) can be written as the product of \( \theta \) and \( \beta \), two \( (n \times r) \) matrices each of rank \( r \), such that \( \Pi = \beta \theta' \). The rank \( r \) of the long-run matrix determines...
how many linear combinations of \( Y_t \) are stationary. If \( r = 0 \) so that \(\Pi = 0\), Equation 3 translates into a first-differenced VAR model. For \( 0 < r < n \), there exist \( r \) cointegrating vectors—
that is, \( r \) stationary linear combinations of \( Y_t \). The cointegrating vector \( \theta \) has the property that \( \theta Y_t \) is stationary even though \( Y_t \) is non-stationary. In this light, Equation 3 can be rewritten as

\[
\Delta Y_t = \alpha + \sum_{k=1}^{p-1} \Gamma_k \Delta Y_{t-k} + (\beta \theta)'Y_{t-1} + \epsilon_t \quad (4)
\]

Johansen (1988) and Johansen and Juselius (1990) have developed two tests for determining the number of cointegrating vectors: these are the likelihood ratio trace test and the maximum eigenvalue test. The likelihood ratio test (trace test) for the hypothesis that there are at most \( r \) cointegrating vectors is given by

\[
\lambda_r = -T \sum_{i=q+1}^{p} \log (1 - \hat{\lambda}_i) \quad (5)
\]

where \( T \) is the number of observations used for estimation, and \( \hat{\lambda}_i \) is the \( i \)th largest estimated eigenvalue. The null hypothesis is that the number of cointegrating vectors is less than or equal to \( r \), where \( r = 0, 1, 2, \ldots \) etc.

On the other hand the maximum eigenvalue test is of the form

\[
\lambda_{\text{max}} = -T \log (1 - \hat{\lambda}_r) \quad (6)
\]

for testing the null hypothesis of \( r - 1 \) cointegrating vectors against the alternative of \( r \) cointegrating vectors. Both tests have non-standard distributions and critical values are tabulated in Johansen and Juselius (1990:208–9). Evievs (version 4.0 1997) also reports the critical values.

The error-correction model

The Granger representation theorem states that in the presence of a cointegrating relationship among variables, a dynamic error correction representation of the data exists. Following Engle and Granger (1987) we estimated the following short-run model.

\[
\Delta \ln VA_{ij,t} = \beta_0 + \sum_{q=0}^{m} \eta_q \Delta \ln GDP_{t,r-q} + \sum_{q=0}^{m} \theta_q \Delta \ln RPI_{t-r-q} + \sum_{q=0}^{m} \zeta_q \Delta \ln SPI_{t-r-q} + \sum_{q=0}^{m} \phi_q \Delta \ln TC_{ij,t-r-q} + \gamma \text{Coup} + \delta \epsilon_{t-r-q} + \mu_t \quad (7)
\]

All variables in Equation 7 were defined previously. \( \mu_t \) is the disturbance term; \( \Delta \) is the first difference operator; \( \epsilon_{t-1} \) is the error correction (lagged one period) generated from the Johansen multivariate procedure (Sedgley and Smith 1996), and \( m \) is the lag length. A ‘test down’ procedure is employed repeatedly until the most parsimonious specification is achieved. The econometric technique adopted here is also used by other recent studies (see Kale 2001; Lal and Lowinger 2002a, 2002b; and Abdulai and Jaquet 2002).

Equation 7 captures both the short and long-run relationship between visitor arrivals to Fiji and a set of explanatory variables. The long-run relationship is captured by the lagged value of the long-run error correction term, expected to be negative, reflecting how the system converges to the long-run equilibrium as implied by Equation 1; convergence is assured when \( \delta_1 \) is between zero and minus one.

Empirical results

Testing for cointegration among several variables requires a test for the presence of unit roots of individual series, namely visitor
arrivals, real per capita GDP, transport costs and relative/substitute prices, using the Augmented Dickey-Fuller (ADF) test based on the auxiliary regression (Dickey and Fuller 1979, 1981).

\[ \Delta y_t = \alpha + \delta \Delta y_{t-1} + \sum_{i=1}^{k} \psi \Delta y_{t-i} + \mu_t \]  

(8)

\( \Delta y_{t,1} \) is the lagged first differences to accommodate serial correlation in the errors, \( u_t \) and \( \alpha, \delta, \beta \text{ and } \psi \) are the parameters to be estimated. The null and the alternate hypotheses for a unit root in \( y_t \) are

\[ H_0: \beta = 0 \quad H_1: \beta < 1 \]

Tables 1–3 present the results of the ADF tests. The calculated ADF statistics for the real per capita GDP, visitor arrivals, transport costs and relative/substitute prices do not exceed the critical values, implying that these variables are non-stationary. Thus the null hypothesis of a unit root is not rejected.

However, taking the first difference renders each series stationary, with the ADF statistics in all cases being greater than the critical value at the 5 per cent significance level—implying that all variables used in modeling tourism demand for Fiji are integrated of order one.

Having ascertained that the variables are \( I(1) \), next the Johansen approach is applied to test whether there are any cointegrated relationships among the selected variables in level form. The results of the Johansen test for cointegration are summarised in Table 4. The testing strategy begins with \( r = 0 \). In all cases, using both the trace and the \( \lambda_{\text{max}} \) test statistics, one can reject the null \( r = 0 \) against the alternative \( r = 1 \), but cannot reject the null \( r \leq 1 \) against the alternative \( r = 2 \). This implies that there exists a unique cointegrating vector between visitor arrivals from Australia, New Zealand and the United States, and income and prices.

The long-run elasticity estimates obtained by normalising with respect to visitor arrivals are reported in Table 5. The results here are consistent with previous studies on tourism demand and conform to economic theory. Income growth in Fiji’s main tourist source countries has a positive influence on visitor arrivals—the elasticity is greater than one in all cases, with tourists from Australia and the United States more sensitive to income than those from New Zealand.

Overall, while all visitors are sensitive to prices, results indicate that Americans and New Zealanders are more responsive to prices than are Australians. The significant variations in the price elasticities across markets may be explained by differences in travel motives. In general, individuals who travel on holiday are known to respond to prices more sharply than those who travel for other reasons, such as visiting friends and relatives or for personal and business reasons (Gray 1970). If one analyses visitor arrivals by purpose of visit, 80 per cent of visitors from New Zealand come for holidays as opposed to 76 per cent and 72 per cent from Australia and the United States, respectively. A caveat applies though: tourism prices, as mentioned earlier, are proxied by the consumer price index. If available, a tourism (hotel) price index would likely provide a more accurate estimate of price elasticities.

The empirical results support the views of the World Bank (1995) and the Fiji Ministry of Tourism (1997) that Bali is one of Fiji’s main competitors. The results imply that when prices rise in Fiji relative to Bali for Fiji’s three main source markets, there is a fall in the number of tourists coming to Fiji.

The information provided by the Johansen maximum likelihood test can now be used to construct error correction models to obtain the short-run elasticities of tourism demand for Fiji. The changes in (difference of) the relevant variables represent short-run elasticities, while the coefficient of the error correction term represents the speed of adjustment back to the long-run relationship among the variables (Table 6).
Table 1  Dickey-Fuller test results for Australia

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF lag length</th>
<th>ADF statistic</th>
<th>Critical value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnVA</td>
<td>0</td>
<td>3.1613</td>
<td>3.5670</td>
</tr>
<tr>
<td>lnGDP</td>
<td>0</td>
<td>3.5670</td>
<td></td>
</tr>
<tr>
<td>lnPA</td>
<td>0</td>
<td>2.3094</td>
<td>3.5670</td>
</tr>
<tr>
<td>lnTC</td>
<td>1</td>
<td>3.5699</td>
<td>3.5731</td>
</tr>
<tr>
<td>lnPI</td>
<td>0</td>
<td>2.8082</td>
<td>3.5670</td>
</tr>
<tr>
<td>ΔlnVA</td>
<td>0</td>
<td>8.6799</td>
<td>2.9665</td>
</tr>
<tr>
<td>ΔlnGDP</td>
<td>1</td>
<td>7.5568</td>
<td>2.9705</td>
</tr>
<tr>
<td>ΔlnPA</td>
<td>2</td>
<td>5.7211</td>
<td>2.9750</td>
</tr>
<tr>
<td>ΔlnTC</td>
<td>1</td>
<td>4.4309</td>
<td>2.9705</td>
</tr>
<tr>
<td>ΔlnPI</td>
<td>1</td>
<td>6.7900</td>
<td>2.9705</td>
</tr>
</tbody>
</table>

Table 2  Dickey-Fuller test results for the United States

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF lag length</th>
<th>ADF statistic</th>
<th>Critical value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnVA</td>
<td>1</td>
<td>3.0687</td>
<td>3.5731</td>
</tr>
<tr>
<td>lnGDP</td>
<td>0</td>
<td>3.3372</td>
<td>3.5670</td>
</tr>
<tr>
<td>lnPI</td>
<td>2</td>
<td>3.2955</td>
<td>3.5796</td>
</tr>
<tr>
<td>lnTC</td>
<td>1</td>
<td>2.3754</td>
<td>3.5731</td>
</tr>
<tr>
<td>lnPH</td>
<td>0</td>
<td>2.9290</td>
<td>3.5670</td>
</tr>
<tr>
<td>ΔlnVA</td>
<td>0</td>
<td>8.2410</td>
<td>2.9665</td>
</tr>
<tr>
<td>ΔlnGDP</td>
<td>4</td>
<td>4.4298</td>
<td>2.9850</td>
</tr>
<tr>
<td>ΔlnPI</td>
<td>1</td>
<td>6.5874</td>
<td>2.9750</td>
</tr>
<tr>
<td>ΔlnTC</td>
<td>1</td>
<td>4.3984</td>
<td>2.9750</td>
</tr>
<tr>
<td>ΔlnPH</td>
<td>0</td>
<td>9.5059</td>
<td>2.9665</td>
</tr>
</tbody>
</table>

Table 3  Dickey-Fuller test results for New Zealand

<table>
<thead>
<tr>
<th>Variable</th>
<th>ADF lag length</th>
<th>ADF statistic</th>
<th>Critical value*</th>
</tr>
</thead>
<tbody>
<tr>
<td>lnVA</td>
<td>2</td>
<td>2.1451</td>
<td>3.5796</td>
</tr>
<tr>
<td>lnGDP</td>
<td>1</td>
<td>3.2780</td>
<td>3.5731</td>
</tr>
<tr>
<td>lnPI</td>
<td>1</td>
<td>3.4862</td>
<td>3.5731</td>
</tr>
<tr>
<td>lnTC</td>
<td>1</td>
<td>2.3754</td>
<td>3.5731</td>
</tr>
<tr>
<td>lnPZ</td>
<td>0</td>
<td>2.9290</td>
<td>3.5670</td>
</tr>
<tr>
<td>ΔlnVA</td>
<td>0</td>
<td>10.1466</td>
<td>2.9705</td>
</tr>
<tr>
<td>ΔlnGDP</td>
<td>0</td>
<td>9.2291</td>
<td>2.9705</td>
</tr>
<tr>
<td>ΔlnPI</td>
<td>0</td>
<td>10.5712</td>
<td>2.9705</td>
</tr>
<tr>
<td>ΔlnTC</td>
<td>1</td>
<td>4.3984</td>
<td>2.9750</td>
</tr>
<tr>
<td>ΔlnPZ</td>
<td>0</td>
<td>9.5059</td>
<td>2.9665</td>
</tr>
</tbody>
</table>

Notes: * The critical values are given for the 5 per cent level of significance. The lag lengths were selected using the Schwarz criterion.
Source: Author’s calculations from Eviews 4.0 (1997).
In the short run, income is the only significant determinant in the case of tourists coming from Australia. Both relative and substitute prices are insignificant in explaining tourism demand except in the case of tourists from Australia. This follows from the fact that the short-term changes in prices are unlikely to influence travel decisions significantly as most foreign trips are planned in advance.

Surprisingly, an increase in prices in Fiji relative to Bali increases tourist flows from Australia to Fiji. This result, while contrary to demand theory, is consistent with empirical short-run findings of Kim and Song (1998), Daniel and Ramos (2002) and Song et al. (2000). This anomaly may be due to the inability of the CPI to capture the full effects of price changes related to tourist consumption of goods and services. However, transport costs have a negative effect on visitor arrivals to Fiji from all sources and is significant at the 1 per cent level for New Zealand, implying the importance of travel costs in tourism demand (Table 6).

In the error correction model, the sign of the error correction term ($e_{t-s}$) is significant in the case of both Australia and New Zealand, and a negative coefficient in all cases ensures that the series is non-explosive and that long-run equilibrium can be attained. In the case of tourists from Australia, for instance, a deviation from long-run tourism demand in one period is corrected by about 54 per cent in the next; however, the first period correction is only 13 per cent in the case of Fiji’s tourism demand by New Zealand.

Finally, as expected, coups tend to have a significant negative effect on visitor arrivals. In the year of a coup visitor arrivals from Australia fall by around 35 per cent, from New Zealand by around 44 per cent, and from the United States by around 47 per cent.

The short-run model behaves well as indicated by the diagnostic tests (Table 7). Diagnostic tests for serial correlation,
Table 5  Long-run elasticities of Fiji's tourism demand, 1970–2000

<table>
<thead>
<tr>
<th>Visitor arrivals from</th>
<th>Income</th>
<th>Relative prices</th>
<th>Substitute prices</th>
<th>Transport costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>3.346</td>
<td>−0.379</td>
<td>−0.182</td>
<td>−0.806</td>
</tr>
<tr>
<td></td>
<td>(0.498)</td>
<td>(0.149)</td>
<td>(0.132)</td>
<td>(0.130)</td>
</tr>
<tr>
<td>United States</td>
<td>3.207</td>
<td>−3.116</td>
<td>−2.898</td>
<td>−0.404</td>
</tr>
<tr>
<td></td>
<td>(0.352)</td>
<td>(0.696)</td>
<td>(0.509)</td>
<td>(0.305)</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2.164</td>
<td>−2.847</td>
<td>−1.130</td>
<td>−2.875</td>
</tr>
<tr>
<td></td>
<td>(0.541)</td>
<td>(0.376)</td>
<td>(0.306)</td>
<td>(0.414)</td>
</tr>
</tbody>
</table>

Note: Standard errors in parenthesis.

Source: Author’s calculations from Eviews 4.0 (1997).

Table 6  Error correction model of tourism demand for Fiji; dependent variable is visitor arrivals (Δ lnVA), 1970–2000

<table>
<thead>
<tr>
<th>Variables</th>
<th>Australia</th>
<th>New Zealand</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>−0.000</td>
<td>0.083</td>
<td>0.103</td>
</tr>
<tr>
<td></td>
<td>(0.012)</td>
<td>(2.485)**</td>
<td>(1.838)*</td>
</tr>
<tr>
<td>Δ lnVA(–1)</td>
<td>−0.612</td>
<td>−0.430</td>
<td>0.302</td>
</tr>
<tr>
<td></td>
<td>(3.459)***</td>
<td>(1.830)*</td>
<td>(1.383)</td>
</tr>
<tr>
<td>Δ lnGDP</td>
<td>1.269</td>
<td>0.802</td>
<td>−1.024</td>
</tr>
<tr>
<td></td>
<td>(2.158)**</td>
<td>(1.297)</td>
<td>(1.191)</td>
</tr>
<tr>
<td>Δ lnPI</td>
<td>0.288</td>
<td>0.212</td>
<td>0.033</td>
</tr>
<tr>
<td></td>
<td>(2.825)**</td>
<td>(1.781)</td>
<td>(0.151)</td>
</tr>
<tr>
<td>Δ lnTC</td>
<td>−0.281</td>
<td>−1.313</td>
<td>−1.251</td>
</tr>
<tr>
<td></td>
<td>(0.748)</td>
<td>(3.055)***</td>
<td>(1.740)*</td>
</tr>
<tr>
<td>Δ lnPA</td>
<td>−0.018</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.085)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Δ lnPZ</td>
<td></td>
<td>−0.377</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.150)**</td>
<td></td>
</tr>
<tr>
<td>Δ lnPH</td>
<td></td>
<td></td>
<td>−0.395</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>(0.760)</td>
</tr>
<tr>
<td>Coup</td>
<td>−0.345</td>
<td>−0.436</td>
<td>−0.466</td>
</tr>
<tr>
<td></td>
<td>(4.674)***</td>
<td>(5.419)***</td>
<td>(3.331)***</td>
</tr>
<tr>
<td>( E_{t-1} )</td>
<td>−0.537</td>
<td>−0.128</td>
<td>−0.089</td>
</tr>
<tr>
<td></td>
<td>(2.934)***</td>
<td>(4.673)***</td>
<td>(0.878)</td>
</tr>
</tbody>
</table>

Notes: *(**) significance at the 10 per cent and 1 per cent level respectively. The figures in parenthesis are the t-statistics.

Source: Author’s calculations from Eviews 4.0 (1997).
Table 7  Results of diagnostic tests for the error correction model presented in Table 6

<table>
<thead>
<tr>
<th>Diagnostics</th>
<th>Australia</th>
<th>New Zealand</th>
<th>United States</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\sigma^2)</td>
<td>0.641</td>
<td>0.671</td>
<td>0.512</td>
</tr>
<tr>
<td>(\chi^2_{\text{Auto}}(2))</td>
<td>5.905</td>
<td>1.040</td>
<td>4.458</td>
</tr>
<tr>
<td>(\chi^2_{\text{Norm}}(2))</td>
<td>2.144</td>
<td>1.850</td>
<td>1.155</td>
</tr>
<tr>
<td>(\chi^2_{\text{White}}(13))</td>
<td>10.565</td>
<td>11.705</td>
<td>10.185</td>
</tr>
<tr>
<td>(\chi^2_{\text{RESET}}(2))</td>
<td>4.965</td>
<td>1.420</td>
<td>2.285</td>
</tr>
<tr>
<td>(F_{\text{Forecast}(6,19)})</td>
<td>0.934</td>
<td>0.871</td>
<td>0.835</td>
</tr>
</tbody>
</table>

Notes: Where \(\sigma\) is the standard error of the regression; \(\chi^2_{\text{Auto}}(2)\) is the Breusch-Godfrey LM test for autocorrelation; \(\chi^2_{\text{Norm}}(2)\) is the Jarque-Bera normality test; \(\chi^2_{\text{RESET}}(2)\) is the Ramsey test for omitted variables/functional form; \(\chi^2_{\text{White}}(11)\) is the White test for heteroscedasticity; \(F_{\text{Forecast}(6,19)}\) is the Chow predictive failure test (when calculating this test, 1995 was chosen as the starting point for forecasting).

Critical values for \(\chi^2(2)= 9.21\) and \(\chi^2(13)=27.68\)

Source: Author’s calculations from Eviews 4.0 (1997).

heteroscedasticity, misspecification of functional form and normality of the residuals were applied. None of these tests found any significant evidence of deviations from standard assumptions. The explanatory power is also reasonable.

Conclusions and policy implications

In this article, error-correction and cointegration techniques were applied to construct a tourism demand model for Fiji from its main source markets—Australia, New Zealand and the United States—covering the period 1970–2000.

Among key economic variables, income was found to be a major factor influencing visitor flows to Fiji (with long-run elasticities ranging from 2.16 to 3.34). During the 1970–2000 period, world tourism grew by 5.5 per cent per annum (World Tourism Organisation 2001). The long-run result for Fiji’s tourism demand implies that during this period of growth in income in Fiji’s main source markets, Fiji received increased visitors. If this can be generalised for future years, it augurs well for the development of the Fiji tourism industry.

The long-run relative price elasticities ranged from –0.37 to –3.11 while the substitute price elasticities ranged from –0.18 to –2.89. The results indicate that Bali is a substitute destination to Fiji for tourists from Australia, New Zealand and the United States. The long-run results indicate that when prices in Fiji increase relative to those in Bali, the number of tourists coming to Fiji falls. This finding confirms the World Bank (1995) and Fiji Ministry of Tourism view. Generally, these findings emphasise the importance of prices in maximising visitor inflows. From a policy point of view, Fiji’s tourism industry needs to maintain its price competitiveness in order to maintain or increase the volume of tourists coming into the country.

One issue constraining tourism development in Fiji is the NLTB Act which requires a payment (2.5–3.5 per cent of gross turnover) to landowners, in addition to the normal lease payment. The other is an agreement to
employ members of the village, where appropriate, within the business (Narayan 2000; King and McVey 1997). The imposition of this extra rental, making investment and reinvestment options less attractive, creates an added cost for hotel operations. It is recommended that the government review such controversial clauses under the NLTB Act. This, it is envisaged, will add to Fiji’s endeavours toward maintaining price competitiveness.

Long-run results regarding the transport cost (airfares) show that elasticities range from –0.40 to –2.87. These results emphasise the importance of the cost of travel to Fiji. In this regard, the Fiji Visitors Bureau could play a key role by working closely with the major airline operators such as Qantas, Air Pacific and Air New Zealand.

Apart from the positives and the potential for development of the Fiji tourism industry, there are several warnings that need to be considered. The vulnerability of the global tourism industry has never been greater than in the aftermath of 11 September 2001. Overemphasis on tourism as a basis for growth and development may expose the economy to the industry’s vulnerability to external shocks such as terrorism (which increase the risk of travel) and the associated recessions in overseas markets. It is important that Fiji devotes resources toward the diversification of potential export sectors. This will ensure that the impact of external shocks is minimised.

The increasing influx of tourists into the country places increasing pressure on and competition for natural resources between agriculture, industry, education, housing and tourism (see Narayan 2000 for more on the disadvantages of overemphasising tourism development).

Finally, the limitations of this study should be noted. It does not incorporate a tourism marketing expenditure variable in modeling tourism demand. Marketing expenditure could have had a significant influence on tourism demand elasticities, given Fiji’s vigorous marketing efforts, particularly in the aftermath of the coups (see Berno and King 2001 for the importance of marketing in tourism development).

In addition, in the absence of a hotel price index, the study used the consumer price index—a traditional measure of tourism prices in the literature on tourism demand. The use of the consumer price index is problematic in that it does not fully capture the true effects of tourism prices. In the light of these deficiencies, it is recommended that data collecting agencies in Fiji devote resources towards compiling these data sets. Given the importance of the tourism industry to Fiji’s economy, up-to-date data on hotel prices and marketing expenditure will help in understanding the behaviour of the industry better which will, in turn, aid policymaking.

The contributions of this paper are twofold. First, it provides policymakers in Fiji with an empirical model of tourism demand, a model which can be extended or updated as new datasets are constructed. Second, by paying particular attention to unit roots in the data series and using the cointegration and error-correction techniques, we have corrected for spurious regressions; hence, this study is an advance on many previous studies on tourism demand modeling.

Notes

1 Yule (1926) suggested that regressions based on non-stationary series are known as ‘nonsense’ regression. Granger and Newbold (1974) termed this problem as ‘spurious’ regressions. They were critical of the specifications of regression equations in terms of the levels of economic time series. Granger and Newbold contend that the levels of many economic time series are non-stationary; hence, regression equations based on levels of time series often produce high $R^2$ and display highly autocorrelated residuals (low
Durbin-Watson (DW) statistic); hence, the usual $t$-and $F$-tests on the regression parameters may be very misleading. This is because the distributions of the conventional test statistics are very different from those derived under the assumption of stationarity.

However, using exchange rates alone in demand functions can be very misleading because, even though the exchange rate in a destination may become more favourable, this could be counterbalanced by a relatively high inflation rate.

For a comprehensive discussion on the range of ‘one-off’ events which have been accommodated by dummy variables, see Martin and Witt (1987).

The research on cointegration has essentially taken two routes: single equation based tests and systems of equations based tests. The former owes to the work of Engle and Granger (1987); Phillips and Ouliaris (1990); Hansen (1992), and Park (1990) while the latter has roots to the work of Johansen (1988, 1991) and Stock and Watson (1988), amongst others.

References


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Reserve Bank of Fiji, various years. Reserve Bank of Fiji Quarterly, Reserve Bank of Fiji, Suva.


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