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ABSTRACT

This paper examines the short-and long-run relationships between visitor arrivals to Fiji, real disposable incomes, and own-hotel price and substitute hotel price for the period 1970-2000, using the bounds testing approach to cointegration and error correction models. The paper's main contribution is that it generates bounds F-statistic critical values specific to the study's sample size (31 observations) and finds that critical values are 35.5% higher than those reported in Pesaran *et al.* (2001) for 1000 observations and 17.1% higher than those reported in Pesaran and Pesaran (1997) for 500 observations for a model with 4 regressors and an intercept. In the light of this, we tabulate critical values for sample sizes ranging from 30 observations to 80 observations, which will be useful for future researchers using the bounds testing approach to cointegration.

Keywords: Fiji, tourism, cointegration, error correction models, bounds test

INTRODUCTION

The tourism industry in Fiji has become the largest and fastest growing industry and is in the vanguard of economic development. In a recent study, using a computable general equilibrium model, Narayan (2003) finds that for every 10,000 new visitor arrivals, real gross domestic product (GDP) increases by 0.35 percent while real national welfare of Fijians increases by 0.51 percent.

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 percent in 1980, they increased to around 30 percent by 1990, and in 2001 they were valued at over 38 percent of total export receipts. Similarly, tourism receipts as a percentage of GDP have increased substantially from around 11 percent in 1980 to around 20 percent by 1992, settling at around 25 percent in 2001. The industry provides direct and indirect employment to around 40,000 people (Ministry of Tourism 1997). In this light, the industry is increasingly seen as a catalyst for economic growth and a significant element for structural change in Fiji's economy.

The main sources of tourists for Fiji are Australia, USA, New Zealand, Canada, UK, Europe, Japan, and the Pacific Island Countries. Of these countries, Australia, New Zealand and USA are the major tourist source markets, accounting for over 60 percent of tourists to Fiji (Narayan, 2002).

The central aim of this paper is to examine the determinants of tourist arrivals to Fiji from its three main source countries using the bounds testing approach to cointegration. In using the single equation framework, our study is an advance over existing studies (see, for instance, Gounder, 1991, 2001, 2002; Pattichis, 1999; Tang and Nair, 2002; Tang, 2001, 2002; Fedderke and Liu, 2002; Caporale and Chiu, 1999, Alam and Quazi, 2003; Mah, 2000) using the bounds testing approach because we calculate bounds F-statistic critical values specific to our sample size. This is an important exercise given that existing critical values are based on sample sizes of 500 observations (Pesaran and Pesaran, 1997) and 1000 observations (Pesaran *et al.*, 2001). By calculating critical values specific to our sample size, we ensure that inferences regarding cointegration are correct. Our main finding from this exercise is that the critical values for small samples sizes differ substantially from those available. Hence, we tabulate critical values for sample sizes ranging from 30 observations to 80 observations.

MODEL SPECIFICATION

Consistent with previous empirical studies on tourism demand modelling, the proposed model for Fiji's tourism demand from its main tourist source markets is of the form:

$$\begin{aligned} lnVA_{ij,t} &= \alpha_0 + \alpha_1\, lnGDI_{i,t} + \alpha_2\, lnHPI_{ij,t} + \alpha_3\, lnPFB_t + \alpha_4\, lnTC_{ij,t} \\ &+ \alpha_5 Coup_{j,t} + \varepsilon_t \end{aligned} \qquad (1)$$

where i =1,2,3 (Australia, New Zealand and USA respectively) is the country of origin and j is the destination country (Fiji);

$lnVA_{ij,t}$ is the log of tourist (visitor) arrivals to Fiji in year t;

$lnGDI_{i,t}$ is the log of per capita real gross disposable income of the origin country in year t;

$lnHPI_{ij,t}$ is the log of hotel price index.[1] It is measured as the hotel price in Fiji relative to country i in year t;

$lnPFB_{t}$ is the log of the total cost of holidaying[2] in Fiji relative to Bali for a tourist from country i in year t[3];

$lnTC_{ij,t}$ is the log of the real airfares between Sydney, Auckland and Los Angeles to Nadi (Fiji);

$Coup_{j,t}$ is a dummy variable used to capture the effects of *coups d'êtat* in Fiji, taking the value of 1 in the year of the *coup* and 0 otherwise;

ε_t is the error term; and

$\alpha_1, \alpha_2, \alpha_3$ and α_4 are the elasticities to be estimated.

Previous studies have used either visitor arrivals or visitor expenditures as a dependent variable (Crouch 1994). This study uses the number of visitor arrivals from the origin country (Australia, New Zealand and USA, respectively) to Fiji in the years 1970 to 2000 inclusive.

The selection of independent variables was determined by reviewing previous empirical studies (Kulendran 1996; Kulendran and King 1997; Seddighi and Shearing 1997; Lim and McAleer 2001; among others). In a survey of 100 empirical studies on tourism demand modelling, Lim (1997) found that income and price were the most commonly used explanatory variables. This study includes both of these variables. For the price variable, this study uses the hotel price index as a measure of the costs to a tourist in both the destination and origin country since the bulk of tourist expenditure is on accommodation and food.

Income: Economic theory suggests that one of the major determinants of demand for travel is the income of tourists in the origin country. The per capita real disposable income of the origin country was used in this analysis. Demand theory states that, as per capita incomes rise, more people are likely to travel. An increase in real per capita income in the origin country will increase the number of people visiting Fiji from Australia, New Zealand and USA. Hence, the expected sign of the estimated coefficient on per capita real income is positive.

Substitute price: The World Bank (1995) and the Fiji Ministry of Tourism (1997) identified Bali as one of Fiji's main competitors for tourists from Australia, New Zealand and USA. The underlying assumption is that for residents from these countries, Bali is a good substitute destination for Fiji because Bali and Fiji have many features in common, such as sandy beaches and climate. As the total cost of holidaying in Fiji increases relative to Bali there will be a fall in tourist arrivals to Fiji from its main source markets.

Own-price: The second price variable in the model is the hotel price (hotel price in Fiji relative to the tourist source country) based on the assumption that, with an increase in the cost of hotel price in Fiji relative to its source market, tourists may prefer spending their vacation at home. As the hotel price in Fiji relative to its main source markets increases there will be a fall in tourists to Fiji.

Transport cost: the one-way real economy class airfares between Sydney, Auckland and Los Angeles to Fiji are also incorporated in the model. The underlying assumption is that, as the cost of travel between Fiji and its main tourist source markets increases, there will be a fall in tourists coming to Fiji from these countries.

Demand theory also implies that the demand for tourism is affected by other special factors such as political unrest, economic recession and mega events (Leob, 1982; Lee *et al*, 1996). *Coups d'ê tat* in Fiji is used as a dummy variable to capture its effects on visitor arrivals; its estimated coefficient is expected to have a negative sign. This is because *coups d'ê tat* lead to political instability and threats to personal security, all of which deter tourists from travelling to affected destinations.

Annual data are used for the period 1970 to 2000. Visitor arrival figures and expenditure on accommodation and food are published by the Fiji Bureau of Statistics (FBOS) – *Current Economic Statistics*, while tourist expenditures on accommodation and food for other countries are available from various country-based statistical publications. Gross disposable income for all countries is published in the *OECD Main Economic Indicators*, and data on Bali are extracted from *Statistika Indonesia*. Finally, data on airfares are available in the *ABC World Airways Guide/OAG World Airways Guide (Red Book)*, published by the Reed Group.

METHODOLOGY

The methodology used here is based on the recently developed autoregressive distributed lag (ARDL)[4] framework (Pesaran and Shin, 1995, 1999; Pesaran *et al.*, 1996; Pesaran, 1997; Pesaran *et al.*, 1998) which does not involve pre-testing variables, thereby obviating uncertainty.[5] Put differently, the ARDL approach to testing for the existence of a relationship between variables in levels is applicable irrespective of whether the underlying regressors are purely $I(0)$, purely $I(1)$, or mutually cointegrated. The statistic underlying the procedure is the Wald or F-statistic in a generalised Dickey-Fuller regression, which is used to test the significance of lagged levels of the variables in a conditional unrestricted equilibrium correction model (ECM) (Pesaran *et al.*, 2001: 1).

The estimates obtained from the ARDL method of cointegration analysis are unbiased and efficient given the fact that: (a) it can be applied to studies that have a small sample, such as the present study; (b) it estimates the long-run and short-run components of the model simultaneously, removing problems associated with omitted variables and autocorrelation; (c) the ARDL method can distinguish between dependent and indepedent variables.

Suppose that with respect to our model (equation 1), theory predicts that there is a long-run relationship among $\ln VA$, $\ln GDP$, $\ln HPI$, $\ln PFB$ and $\ln TC$. Without having any prior information about the direction of the long-run relationship among the variables, the following unrestricted error correction (EC) regressions are estimated, considering each of the variables in turn as the dependent variable:

$$\begin{aligned}\Delta \ln VA_{ij,t} &= a_{0VA} + \sum_{p=1}^{n} b_{pVA} \Delta \ln VA_{ij,t-p} + \sum_{p=0}^{n} c_{pVA} \Delta \ln GDI_{i,t-p} \\ &+ \sum_{p=0}^{n} d_{pVA} \Delta \ln HPI_{ij,t-p} + \sum_{p=0}^{n} e_{pVA} \Delta \ln PFB_{t-p} \\ &+ \sum_{p=0}^{n} f_{pVA} \Delta \ln TC_{ij,t-p} + \lambda_{1VA} \ln VA_{ij,t-1} + \lambda_{2VA} \ln GDI_{i,t-1} \\ &+ \lambda_{3VA} \ln HPI_{ijt-1} + \lambda_{4VA} \ln PFB_{t-1} + \lambda_{5VA} \ln TC_{ij,t-1} + \varepsilon_{1t}\end{aligned} \qquad (2a)$$

$$
\begin{aligned}
&\Delta \ln GDI_{i,t} = a_{0GDI} + \sum_{p=1}^{n} b_{pGDI} \Delta \ln GDI_{i,t-p} + \sum_{p=0}^{n} c_{pGDI} \Delta \ln VA_{ij,t-p} \\
&+ \sum_{p=0}^{n} d_{pGDI} \Delta \ln HPI_{ij,t-p} + \sum_{p=0}^{n} e_{pGDI} \Delta \ln PFB_{t-p} \\
&+ \sum_{p=0}^{n} f_{pGDI} \Delta \ln TC_{ij,t-p} + \lambda_{1GDI} \ln VA_{ij,t-1} + \lambda_{2GDI} \ln GDI_{i,t-1} \\
&+ \lambda_{3GDI} \ln HPI_{ij,t-1} + \lambda_{4GDI} \ln PFB_{t-1} + \lambda_{5GDI} \ln TC_{ij,t-1} + \varepsilon_{2t}
\end{aligned}
\qquad (2b)
$$

$$
\begin{aligned}
&\Delta \ln HPI_{ij,t} = a_{0HPI} + \sum_{p=1}^{n} b_{pHPI} \Delta \ln HPI_{ij,t-p} + \sum_{p=0}^{n} c_{pHPI} \Delta \ln GDI_{i,t-p} \\
&+ \sum_{p=0}^{n} d_{pHPI} \Delta \ln VA_{ij,t-p} + \sum_{p=0}^{n} e_{pHPI} \Delta \ln PFB_{t-p} + \sum_{p=0}^{n} f_{pHPI} \Delta \ln TC_{ij,t-p} \\
&+ \lambda_{1HPI} \ln VA_{ij,t-1} + \lambda_{2HPI} \ln GDI_{i,t-1} + \lambda_{3HPI} \ln HPI_{ij,t-1} \\
&+ \lambda_{4HPI} \ln PFB_{t-1} + \lambda_{5HPI} \ln TC_{ij,t-1} + \varepsilon_{3t}
\end{aligned}
\qquad (2c)
$$

$$
\begin{aligned}
&\Delta \ln PFB_{t} = a_{0PFB} + \sum_{p=1}^{n} b_{pPFB} \Delta \ln PFB_{t-p} + \sum_{p=0}^{n} c_{pPFB} \Delta \ln HPI_{ij,t-p} \\
&+ \sum_{p=0}^{n} d_{pPFB} \Delta \ln GDI_{i,t-p} + \sum_{p=0}^{n} e_{pPFB} \Delta \ln VA_{ij,t-p} + \sum_{p=0}^{n} f_{pPFB} \Delta \ln TC_{ij,t-p} \\
&+ \lambda_{1PFB} \ln VA_{ij,t-1} + \lambda_{2PFB} \ln GDI_{i,t-1} + \lambda_{3PFB} \ln HPI_{ij,t-1} \\
&+ \lambda_{4PFB} \ln PFB_{t-1} + \lambda_{5PFB} \ln TC_{ij,t-1} + \varepsilon_{4t}
\end{aligned}
\qquad (2d)
$$

$$
\begin{aligned}
&\Delta \ln TC_{ij,t} = a_{0TC} + \sum_{p=1}^{n} b_{pTC} \Delta \ln TC_{ij,t-p} \sum_{p=0}^{n} c_{pTC} \Delta \ln PFB_{t-p} \\
&+ \sum_{p=0}^{n} d_{pTC} \Delta \ln HPI_{ij,t-p} + \sum_{p=0}^{n} e_{pTC} \Delta \ln GDI_{i,t-p} + \sum_{p=0}^{n} f_{pTC} \Delta \ln VA_{ij,t-p} \\
&+ \lambda_{1TC} \ln VA_{ij,t-1} + \lambda_{2TC} \ln GDI_{i,t-1} + \lambda_{3TC} \ln HPI_{ij,t-1} \\
&+ \lambda_{4TC} \ln PFB_{t-1} + \lambda_{5TC} \ln TC_{ij,t-1} + \varepsilon_{5t}
\end{aligned}
\qquad (2e)
$$

The F tests are used for testing the existence of long-run relationships. When long-run relationships exist, the F test indicates which variable should be normalised. The null hypothesis for no cointegration among the variables in Equation (2a) is $H_0: \lambda_{1VA} = \lambda_{2VA} = \lambda_{3VA} = \lambda_{4VA} = \lambda_{5VA} = 0$ against the alternative hypothesis $H_1: \lambda_{1VA} \neq \lambda_{2VA} \neq \lambda_{3VA} \neq \lambda_{4VA} \neq \lambda_{5VA} \neq 0$. This can also be denoted as: $F_{VA}(VA|GDI, HPI, PFB, TC)$. Similarly, the F test for the nonexistence of the long-run relationship in Equation (2b) $H_0: \lambda_{1GDI} = \lambda_{2GDI} = \lambda_{3GDI} = \lambda_{4GDI} = \lambda_{5GDI} = 0$ is denoted by $F_{GDI}(GDI|VA, HPI, PFB, TC)$, and so forth.

The F-test has a non-standard distribution which depends upon (i) whether variables included in the ARDL model are $I(0)$ or $I(1)$, (ii) the number of regressors, and (iii) whether the ARDL model contains an intercept and/or a trend. Critical values are reported by Pesaran and Pesaran (1997) and Pesaran *et al.* (2001). However, these critical values are generated for sample sizes of 500 and 1000 observations and 20,000 and 40,000 replications, respectively. Given the relatively small sample size in our study (31 observations), we calculate critical values specific to our sample size. To this end, we use the same GAUSS code used to generate the original set of critical values.

The critical value bounds are calculated using stochastic simulations for T=31 and 40,000 replications for the F-statistic. The F-statistic is used for testing the null hypothesis $\psi = \delta_1 = \delta_2 = ... = \delta_k = 0$ in a model with an intercept but no trend. In the Pesaran *et al.* (2001: T3) terminology, a model with an intercept and no trend is referred to as Case II, and has the following form:

$$\Delta y_t = \beta_0 + \psi y_{t-1} + \sum_{i=1}^{k} \delta_i x_{i,t-1} + \varepsilon_t \ . \tag{3}$$

Here, $t = 1,...T$; $x_t = (x_{1t},...,x_{kt})'$ and $z_{t-1} = (y_{t-1}, x'_{t-1}, 1)'$, $w_t = 0$. The variables y_t and x_t are generated from $y_t = y_{t-1} - \varepsilon_{1t}$ and $x_t = \mathrm{P}x_{t-1} - \varepsilon_{2t}$, $t = 1,...,T$, $y_0 = 0$, $x_0 = 0$ and $\varepsilon_t = (\varepsilon_{1t}, \varepsilon'_{2t})$ is drawn as $(k-1)$ independent standard normal variables. If x_t is purely $I(1)$, i.e. integrated of order one, $\mathrm{P} = I_k$. On the other hand, $\mathrm{P} = 0$ if x_t is purely $I(0)$, i.e. if it is integrated of order zero. The critical values for $k = 0$ correspond to those for the Dickey and Fuller (1981) unit root F-statistics. Two sets of critical values are generated and presented. One set refers to the $I(1)$ series and the other for the $I(0)$ series. Here, critical values for the $I(1)$ series are referred to as the upper bound critical values, while the critical values for the $I(0)$ series are referred to as the lower bound critical values.

If the computed F statistics falls outside the critical bounds, a conclusive decision can be made regarding cointegration without the need for knowing the order of integration of the regressors. For instance, if the empirical analysis shows that the estimated $F_{yx}(.)$ is higher than the upper bound of the critical value, then the null hypothesis of no cointegration is rejected. When the computed F statistic falls inside the upper and lower bounds, a conclusive inference cannot be made without knowing the order of integration of the underlying regressors.[6] In other words, unit root tests of the variables need to be conducted before proceeding with the ARDL technique.

Given that a long-run relationship exists, a further two-step procedure to estimate the model is undertaken. These steps are explained below.

Long-run and short-run elasticities

Having found a long-run relationship (cointegration), equation (1) is estimated using the following ARDL (m,n,p,q,r) model:

$$\begin{aligned} lnVA_{ij,t} &= \alpha_0 + \sum_{p=1}^{m}\alpha_1 lnVA_{ij,t-p} + \sum_{p=0}^{n}\alpha_2 lnGDI_{i,t-p} + \sum_{p=0}^{p}\alpha_3 lnHPI_{ij,t-p} \\ &+ \sum_{p=0}^{q}\alpha_4 lnPFB_{t-p} + \sum_{p=0}^{r}\alpha_5 lnTC_{ij,t-p} + \omega_t \end{aligned} \tag{4}$$

Here all variables are as previously defined. The orders of the lags in the ARDL model are selected by either the Akaike Information criterion (AIC) or the Schwarz Bayesian criterion (SBC), before the selected model is estimated by ordinary least squares. We use the SBC criterion in lag selection. For annual data, Pesaran and Shin (1999) recommend choosing a maximum of 2 lags. From this, the lag length that minimises SBC is selected.

In the presence of cointegration, short-run elasticities can also be derived by constructing an error correction model of the following form:

$$\begin{aligned} \Delta lnVA_{ij,t} &= \beta_0 + \sum_{p=1}^{n}\beta_1\Delta lnVA_{ij,t-p} + \sum_{p=0}^{n}\beta_2\Delta lnGDI_{i,t-p} \\ &+ \sum_{p=0}^{n}\beta_3\Delta ln HPI_{ij,t-p} + \sum_{p=0}^{n}\beta_4\Delta ln PFB_{t-p} + \sum_{p=0}^{n}\beta_5\Delta lnTC_{ij,t-p} \\ &+ \beta_6 Coup_t + \psi ECM_{ij,t-1} + \vartheta_t \end{aligned} \tag{5}$$

where $ECM_{ij,t}$ is the error correction term, defined as

$$ECM_{ij,t} = lnVA_{ij,t} - \alpha_0 - \sum_{p=1}^{m} \alpha_1 \, lnVA_{ij,t-p} - \sum_{p=0}^{n} \alpha_2 \, lnGDI_{i,t-p} - \sum_{p=0}^{p} \alpha_3 \, lnHPI_{ij,t-p} - \sum_{p=0}^{q} \alpha_4 \, lnPFB_{t-p} - \sum_{p=0}^{r} \alpha_5 \, lnTC_{ij,t-p} \qquad (6)$$

Here Δ is the first difference operator; β's are the coefficients relating to the short-run dynamics of the model's convergence to equilibrium, and ψ measures the speed of adjustment.

INTERPRETATION OF THE RESULTS

In the first step we estimate equations (2a-2e) to examine the long-run relationships among the variables in model 1. Since the observations are annual, we choose 2 as the maximum order of lags in the ARDL and estimate for the period 1970-2000. The calculated F-statistics for model 1 are reported in Table 1. The critical values are reported in Table 2. The calculated F-statistic when visitor arrivals to Fiji from its main source markets is the dependent variable, $F_{VA}(.)$, is higher than the upper bound critical value at the 5 percent level of significance (4.73, Table 2) for Australia and New Zealand. For example, in the case of Australian demand for Fiji tourism, $F_{VA}(.)$=5.08. In the case of New Zealand demand for Fiji tourism, $F_{VA}(.)$=4.90. In the case of US demand for Fiji tourism, $F_{VA}(.)$=4.16, which is greater than the critical value at the 10 percent level (3.92) of significance. This implies that the null hypothesis of no cointegration cannot be accepted at the 10 percent level or better and that there is indeed a cointegration relationship among the variables in model 1. Notice also that when the other variables in model 1, for all three countries, are used as a dependent variable, the F-statistics are smaller than the lower bound critical values. According to Pesaran *et al.* (2001), this implies that there is a unique long run equilibrium in model 1 for the demand for Fiji's tourism from its source markets.

INSERT TABLE 1

Next we compare the critical values generated with 31 observations and the critical values reported in Pesaran *et al.* (2001) based on 1000 observations. The upper bound critical value at the 5 percent significance level for 31 observations with 4 regressors is 4.73 (Table 2). The corresponding critical value for 1000 observations is 3.49 (Table 3). This indicates that the critical value for 1000 observations is 35.5% lower than for 31 observations.

INSERT TABLES 2-3

Meanwhile, the critical values reported in Pesaran and Pesaran (1997), while close to the critical values generated for 31 observations, are still an underestimation because they are based on 500 observations. For instance, the upper bound critical value at the 5 percent level with 4 regressors is 4.04, which is 17.1 percent less than that for 31 observations.

This comparison reveals two things. One, it justifies our exercise of re-estimating critical values specific to our sample size. In doing so, it is clear that we have achieved a reliable conclusion regarding cointegration. Two, it questions the extant literature which has used the bounds testing approach to cointegration using small sample sizes.[7] Given this, we are motivated to ensure that future studies (both tourism and non-tourism based) draw reliable conclusions regarding cointegration. To this end, we compute a new set of critical values for sample sizes ranging from 30 observations to 80 observations (see Appendix A).

The empirical results of the long-run tourism demand model for Fiji's three main tourist source countries, obtained by normalising on visitor arrivals, are presented in Table 4. All variables appear with the correct sign. Clearly, incomes of origin countries, travel costs, own-price and substitute prices are influential in determining visitor arrivals to Fiji. However, the magnitudes of the estimated elasticities vary across markets.

INSERT TABLE 4

Fiji is likely to gain as gross disposable incomes in origin countries rise: the results imply that a 1% increase in income will lead to 3.6%, 3.1% and 4.3% increases in visitor arrivals from Australia, New Zealand and USA, respectively. New Zealanders seem to be more responsive to an increase in the cost of travel to Fiji (-3.4%). On the other hand, all countries react negatively to an increase in the cost of holidaying in Fiji relative to Bali. The results imply that with a 1% increase in the cost of holiday in Fiji relative to Bali, visitor arrivals from Australia, New Zealand and USA will fall by 2.5%, 2.4% and 5%, respectively. However, this result, while statistically significant at the 1% level for Australian and New Zealand demand for Fiji tourism. From this, we can conclude that Bali is indeed a substitute destination for Fiji tourism with respect to tourists coming from Australia and New Zealand.

Lastly, the hotel price index is also negatively related to visitor arrivals to Fiji. New Zealanders and Americans are less responsive to the hotel price difference than Australians. The message, however, is clear: Fiji needs to maintain price competitiveness for the growth and development of its tourism industry.

The results of the error correction model for Australia, New Zealand and USA are presented in Table 5. The results indicate that growth in income in origin countries impacts positively on visitor arrivals. However, this result is only significant in the case of visitors from USA. The transport cost variable impacts negatively upon visitor arrivals in the short run, the result being significant at the 10% level only in the case of visitors from 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 19 percent, from New Zealand by around 25 percent, and from the USA by around 47 percent.

We applied a number of diagnostic tests to the error correction model (Table 5). There is no evidence of autocorrelation in the disturbances. The model passes the Jarque-Bera normality test, suggesting that the errors are normally distributed. The RESET test indicates that the model is correctly specified, while the F-tests for forecast indicate the predictive power and accuracy of the model.

INSERT TABLE 5

The stability of the regression coefficients is evaluated using the cumulative sum (CUSUM) and the cumulative sum of squares (CUSUMSQ) tesst for structural stability (Brown *et al.*, 1975). The regression equation appears stable as neither the CUSUM nor CUSUMSQ test statistics exceed the bounds at the 5% level of significance.

Granger (1986) notes that the existence of a significant error correction term is evidence of casuality in at least one direction. The lagged error correction term

ECM_{t-1} is negative and significant at the 1% level for all countries. The coefficients of -0.2731, -0.2886 and -0.1658 for Australia, New Zealand and the USA, respectively, indicate a moderate rate of convergence to equilibrium.

Conclusions and policy implications

In this paper, we have used the bounds testing approach to cointegration (developed within an autoregressive distributed lag framework) to investigate whether a long-run equilibrium relationship exists between visitor arrivals, prices and income. The main contribution of this paper is that we calculate critical values for the bounds F-statistics specific to our sample size (31 observations). This as an important exercise as existing critical values are based on either 500 observations (Pesaran and Pesaran, 1997) or 1000 observations (Pesaran *et al.*, 2001). On comparing the critical values generated from estimating a tourism demand model for Fiji, we find that they are 17.1% higher that those reported in Pesaran and Pesaran (1997) and 35.5% higher than those reported in Pesaran *et al.*, (2001) for a model with 4 regressors and an intercept. This result questions the reliability of existing studies. As a remedy, that is, to ensure that future studies applying the bounds testing approach draw reliable conclusions regarding cointegration, we provide a new set of critical values for sample sizes ranging from 30 observations to 80 observations.

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TABLES

Table 1: F-statistics for cointegration relationship in Model 1

Statistic	Australia	New Zealand	USA
$F_{VA}(.)$	5.0777	4.9032	4.1588
$F_{GDI}(.)$	0.2068	1.5884	0.8879
$F_{TC}(.)$	1.1413	1.7115	1.6302
$F_{HPI}(.)$	1.0292	1.3538	1.5047
$F_{PFB}(.)$	1.5969	0.9370	1.3790

Table 2: Critical values for the F-test

Critical values for $I(0)$ series

	Significance level						
k	20%	10%	5%	2.5%	1%	mean	var
0	3.0450	4.0200	5.0650	6.1050	7.4850	2.1000	4.6650
1	1.1800	1.6900	2.2267	2.8133	3.6267	0.7467	1.7633
2	1.2600	1.7350	2.2300	2.7400	3.4150	0.8300	2.0850
3	1.3080	1.7520	2.2040	2.6620	3.2980	0.8820	2.3780
4	1.3300	1.7517	2.1650	2.6000	3.1900	0.9167	2.5850
5	1.1400	1.5014	1.8557	2.2286	2.7343	0.7857	2.2157
6	1.1800	1.5213	1.8763	2.2438	2.7400	0.8250	2.4700
7	1.3733	1.7400	2.1144	2.5000	3.0411	0.9822	3.2478
8	1.3840	1.7480	2.1110	2.4920	2.9980	0.9980	3.5100
9	1.3936	1.7545	2.1282	2.4936	3.0627	1.0145	3.8555
10	1.4000	1.7650	2.1383	2.4983	3.0025	1.0275	4.1450

Critical values for $I(1)$ series

	Significance level						
	20%	10%	5%	2.5%	1%	mean	var
0	4.9200	6.8100	8.7800	10.7200	13.3600	3.0900	8.5900
1	3.8800	5.0900	6.3100	7.5400	9.1400	2.5800	7.5400
2	3.4967	4.4633	5.4333	6.4000	7.8433	2.4200	7.6300
3	3.2825	4.1350	4.9600	5.8625	7.0075	2.3375	7.8525
4	3.1700	3.9220	4.7300	5.5140	6.5600	2.2940	8.3400
5	3.0800	3.8283	4.5600	5.3100	6.3200	2.2767	8.9500
6	3.0557	3.7571	4.4371	5.1314	6.1171	2.2629	9.5571
7	3.0075	3.6850	4.3788	5.0663	6.1375	2.2525	10.3888
8	2.9889	3.6644	4.3167	5.0589	5.9833	2.2511	11.2211
9	2.9690	3.6570	4.3340	5.0060	5.9980	2.2550	12.2210
10	2.9618	3.6364	4.3264	5.0382	6.0509	2.2573	13.3764

Notes: k denotes the number of exogenous variables. Critical values are generated via stochastic simulations using T=31 and 40,000 replications.

Table 3: F-test critical values from Pesaran et al (2001: T1)

	10 percent		5 percent		1 percent	
k	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
4	2.20	3.09	2.56	3.49	3.29	4.37

Source: The critical value bounds are from Table C1.ii (Pesaran et al., 2001: T1). * k is the number of regressors.

Table 4: Econometric results for the long-run model (visitor arrivals is the dependent variable), 1970-2000

Variables	Australia	New Zealand	USA
Constant	13.7927	18.8153	15.5039*
	(0.9622)	(1.2110)	(1.9251)
Income (GDI)	3.5903***	3.0717***	4.3562**
	(3.2212)	(2.9872)	(2.4223)
Cost of travel (TC)	-1.1371*	-3.4159*	-1.9780**
	(-1.9255)	(-1.8992)	(2.2109)
Relative hotel price (HPI)	-2.0067**	-0.5967*	-0.8983*
	(2.4110)	(1.9622)	(1.8622)
Substitute price (PFB)	-2.4941***	-2.4057***	-5.0578^
	(-3.8226)	(-3.1058)	(-1.6223)

*Note: *(**)*** denotes statistical significance at the 10 percent, 5 percent and 1 percent levels* respectively. ^denotes statistical significance at the 20 percent level.

Table 5: The error correction model for Australia, New Zealand and the United States

Variables	Australia	New Zealand	USA
Constant	0.0010	0.0107	-0.2678
	(0.0354)	(0.6017)	(4.8581)***
$\Delta lnVA_{t-1}$	0.0172	-0.3022	-0.0420
	(0.0817)	(-2.3926)**	(0.3585)
$\Delta lnGDI_t$	0.5075	0.3403	2.1325
	(0.7146)	(0.4505)	(3.7720)***
$\Delta lnGDI_{t-1}$	-0.9884		
	(1.1794)		
$\Delta lnTC_t$	-0.3711	-0.3607	-0.3485
	(1.2708)	(1.7254)*	(1.0950)
$\Delta lnPFB_t$	-0.4213	0.2688	-0.4645
	(1.2397)	(1.5110)	(1.5404)
$\Delta lnPFB_{t-1}$		0.5744	
		(2.4515)**	
$\Delta lnHPI_t$		0.0254	-0.0683
		(0.1932)	(-0.4307)
$\Delta lnHPI_{t-1}$	-0.8373	0.21855	0.5024
	(3.0656**	(1.6487)	(3.3771)***
$Coup_t$	-0.1950	-0.2540	-0.4718
	(3.0076)***	(3.8372)***	(5.4920)***
ECM_{t-1}	-0.2731	-0.2886	-0.1658
	(4.0309)***	(6.7588)***	(5.5379)***
Diagnostic tests			
$\overline{R}^2$	0.5480	0.8292	0.6600
σ	0.1023	0.0769	0.1135
$\chi^2_{Auto}(2)$	4.3857	0.3888	5.8598
$\chi^2_{Norm}(2)$	1.0691	1.0657	0.1951
$\chi^2_{White}(17),(17),(15)$	18.2681	21.3236	15.9227
$\chi^2_{RESET}(2)$	4.4940	2.6616	0.2368
$F_{Forecast}(6,19)$	1.0869	2.2713	0.6676

Notes: Where σ is the standard error of the regression; $\chi^2_{Auto}(2)$ is the Breusch-Godfrey LM test for autocorrelation; $\chi^2_{Norm}(2)$ is the Jarque-Bera normality test; $\chi^2_{RESET}(2)$ is the Ramsey test for omitted variables/finctional form; $\chi^2_{White}(17)$, (17), (15) is the White test for heteroscedasticity; $F_{Forecast}$ 6,19) is the Chow predictive failure test (when calculating this test, 1995 was chosen as the starting point for forecasting). Critical value for $\chi^2(2)$= 5.99.

APPENDIX A

A NEW SET OF CRITICAL VALUES

FOR THE BOUNDS F-TEST

Appendix A1: Critical values for the bounds test: Case II: restricted intercept and no trend

1 percent level

n	$k=0$		$k=1$		$k=2$		$k=3$		$k=4$		$k=5$		$k=6$		$k=7$	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
30	7.595	7.595	6.027	6.760	5.155	6.265	4.614	5.966	4.280	5.840	4.134	5.761	3.976	5.691	3.864	5.694
31	7.485	7.485	5.847	6.637	5.075	6.240	4.654	5.920	4.320	5.785	4.071	5.741	3.901	5.611	3.826	5.691
32	7.485	7.485	5.913	6.710	5.065	6.190	4.570	5.928	4.223	5.763	4.057	5.636	3.871	5.571	3.762	5.460
33	7.380	7.380	5.787	6.580	5.048	6.053	4.578	5.864	4.252	5.668	3.990	5.516	3.849	5.476	3.718	5.461
34	7.360	7.360	5.750	6.493	4.943	6.128	4.522	5.792	4.165	5.650	3.960	5.603	3.764	5.431	3.641	5.446
35	7.350	7.350	5.763	6.480	4.948	6.028	4.428	5.816	4.093	5.532	3.900	5.419	3.713	5.326	3.599	5.230
36	7.405	7.405	5.757	6.483	4.968	6.058	4.480	5.700	4.097	5.580	3.867	5.444	3.686	5.310	3.536	5.238
37	7.425	7.425	5.737	6.490	4.920	5.975	4.400	5.664	4.030	5.463	3.810	5.404	3.619	5.286	3.513	5.190
38	7.290	7.290	5.807	6.490	4.895	5.940	4.376	5.690	4.092	5.457	3.881	5.241	3.680	5.148	3.546	5.084
39	7.230	7.230	5.640	9.390	4.833	5.885	4.324	5.642	3.983	5.448	3.796	5.299	3.621	5.184	3.468	5.057
40	7.220	7.220	5.593	6.333	4.770	5.855	4.310	5.544	3.967	5.455	3.657	5.256	3.505	5.121	3.402	5.031
45	7.265	7.265	5.607	6.193	4.800	5.725	4.270	5.412	3.892	5.173	3.674	5.019	3.540	4.931	3.383	4.832
50	7.065	7.065	5.503	6.240	4.695	5.758	4.188	5.328	3.845	5.150	3.593	4.981	3.424	4.880	3.282	4.730
55	6.965	6.965	5.377	6.047	4.610	5.563	4.118	5.200	3.738	4.947	3.543	4.839	3.330	4.708	3.194	4.562
60	6.960	6.960	5.383	6.033	4.558	5.590	4.068	5.250	3.710	4.965	3.451	4.764	3.293	4.615	3.129	4.507
65	6.825	6.825	5.350	6.017	4.538	5.475	4.056	5.158	3.725	4.940	3.430	4.721	3.225	4.571	3.092	4.478
70	6.740	6.740	5.157	5.957	4.398	5.463	3.916	5.088	3.608	4.860	3.373	4.717	3.180	4.596	3.034	4.426
75	6.915	6.915	5.260	5.957	4.458	5.410	4.048	5.092	3.687	4.842	3.427	4.620	3.219	4.526	3.057	4.413
80	6.695	6.695	5.157	5.917	4.358	5.393	3.908	5.004	3.602	4.787	3.351	4.587	3.173	4.485	3.021	4.350

Appendix A2: Critical values for the bounds test: Case II: restricted intercept and no trend
5 percent level

n	$k=0$		$k=1$		$k=2$		$k=3$		$k=4$		$k=5$		$k=6$		$k=7$	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
30	5.070	5.070	4.090	4.663	3.538	4.428	3.272	4.306	3.058	4.223	2.910	4.193	2.794	4.148	2.730	4.163
31	5.065	5.065	4.063	4.653	3.535	4.423	3.256	4.264	3.033	4.188	2.899	4.143	2.780	4.084	2.713	4.094
32	5.025	5.025	4.013	4.637	3.505	4.398	3.208	4.252	3.002	4.150	2.846	4.091	2.741	4.060	2.670	4.047
33	4.960	4.960	4.003	4.593	3.500	4.373	3.198	4.202	3.010	4.105	2.863	4.077	2.749	4.044	2.664	4.004
34	4.985	4.985	3.990	4.573	3.990	4.358	3.160	4.218	2.957	4.117	2.826	4.049	2.729	3.994	2.658	3.973
35	4.945	4.945	3.957	4.530	3.478	4.335	3.164	4.194	2.947	4.088	2.804	4.013	2.685	3.960	2.597	3.907
36	4.980	4.980	3.990	4.590	3.458	4.343	3.170	4.160	2.962	4.062	2.819	3.989	2.696	3.963	2.619	3.921
37	4.975	4.975	3.993	4.533	3.468	4.295	3.152	4.156	2.928	4.042	2.770	3.973	2.663	3.923	2.581	3.887
38	4.960	4.960	3.960	4.513	3.438	4.275	3.130	4.128	2.933	4.043	2.780	3.989	2.663	3.893	2.583	3.849
39	4.945	4.945	3.937	4.483	3.438	4.255	3.116	4.094	2.907	3.982	2.757	3.927	2.641	3.881	2.558	3.846
40	4.960	4.960	3.937	4.523	3.435	4.260	3.100	4.088	2.893	4.000	2.734	3.920	2.618	3.863	2.523	3.829
45	4.895	4.895	3.877	4.460	3.368	4.203	3.078	4.022	2.850	3.905	2.694	3.829	2.591	3.766	2.504	3.723
50	4.815	4.815	3.860	4.440	3.368	4.178	3.048	4.002	2.823	3.872	2.670	3.781	2.550	3.708	2.457	3.650
55	4.795	4.795	3.790	4.393	3.303	4.100	2.982	3.942	2.763	3.813	2.617	3.743	2.490	3.658	2.414	3.608
60	4.780	4.780	3.803	4.363	3.288	4.070	2.962	3.910	2.743	3.792	2.589	3.683	2.456	3.598	2.373	3.540
65	4.780	4.780	3.787	4.343	3.285	4.070	2.976	3.896	2.750	3.755	2.596	3.677	2.473	3.583	2.373	3.519
70	4.750	4.750	3.780	4.327	3.243	4.043	2.924	3.860	2.725	3.718	2.564	3.650	2.451	3.559	2.351	3.498
75	4.760	4.760	3.777	4.320	3.253	4.065	2.946	3.862	2.725	3.718	2.574	3.641	2.449	3.550	2.360	3.478
80	4.725	4.725	3.740	4.303	3.235	4.053	2.920	3.838	2.688	3.698	2.550	3.606	2.431	3.518	2.336	3.458

Appendix A3: Critical values for the bounds test: Case II: restricted intercept and no trend

10 percent level

n	$k=0$		$k=1$		$k=2$		$k=3$		$k=4$		$k=5$		$k=6$		$k=7$	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
30	4.025	4.025	3.303	3.797	2.915	3.695	2.676	3.586	2.525	3.560	2.407	3.517	2.334	3.515	2.277	3.498
31	4.020	4.020	3.273	3.800	2.890	3.680	2.662	3.578	2.518	3.513	2.386	3.479	2.303	3.483	2.256	3.454
32	4.030	4.030	3.273	3.780	2.885	3.670	2.646	3.566	2.493	3.497	2.384	3.469	2.293	3.448	2.238	3.443
33	4.025	4.025	3.260	3.780	2.880	3.653	2.644	3.548	2.482	3.472	2.367	3.447	2.284	3.428	2.229	3.399
34	4.005	4.005	3.240	3.767	2.868	3.633	2.626	3.550	2.465	3.472	2.361	3.433	2.274	3.399	2.216	3.392
35	3.980	3.980	3.223	3.757	2.845	3.623	2.618	3.532	2.460	3.460	2.331	3.417	2.254	3.388	2.196	3.370
36	3.995	3.995	3.247	3.773	2.863	3.610	2.618	3.502	2.460	3.435	2.346	3.384	2.264	3.369	2.206	3.360
37	3.980	3.980	3.253	3.747	2.865	3.608	2.622	3.506	2.458	3.432	2.339	3.396	2.240	3.361	2.187	3.336
38	3.995	3.995	3.243	3.730	2.838	3.590	2.598	3.484	2.448	3.418	2.323	3.376	2.233	3.354	2.172	3.321
39	3.985	3.985	3.230	3.727	2.833	3.570	2.596	3.474	2.442	3.400	2.316	3.371	2.224	3.339	2.169	3.306
40	3.955	3.955	3.210	3.730	2.835	3.585	2.592	3.454	2.427	3.395	2.306	3.353	2.218	3.314	2.152	3.296
45	3.950	3.950	3.190	3.730	2.788	3.540	2.560	3.428	2.402	3.345	2.276	3.297	2.188	3.254	2.131	3.223
50	3.935	3.935	3.177	3.653	2.788	3.513	2.538	3.398	2.372	3.320	2.259	3.264	2.170	3.220	2.099	3.181
55	3.900	3.900	3.143	3.670	2.748	3.495	2.508	3.356	2.345	3.280	2.226	3.241	2.139	3.204	2.069	3.148
60	3.880	3.880	3.127	3.650	2.738	3.465	2.496	3.346	2.323	3.273	2.204	3.210	2.114	3.153	2.044	3.104
65	3.880	3.880	3.143	3.623	2.740	3.455	2.492	3.350	2.335	3.252	2.209	3.201	2.120	3.145	2.043	3.094
70	3.875	3.875	3.120	3.623	2.730	3.445	2.482	3.310	2.320	3.232	2.193	3.161	2.100	3.121	2.024	3.079
75	3.895	3.895	3.133	3.597	2.725	3.455	2.482	3.334	2.313	3.228	2.196	3.166	2.103	3.111	2.023	3.068
80	3.870	3.870	3.113	3.610	2.713	3.453	2.474	3.312	2.303	3.220	2.303	3.154	2.088	3.103	2.017	3.052

Appendix A4: Critical values for the bounds test: Case III restricted intercept and trend

1 percent level

n	$k=0$		$k=1$		$k=2$		$k=3$		$k=4$		$k=5$		$k=6$		$k=7$	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
30	13.680	13.680	8.170	9.285	6.183	7.873	5.333	7.063	4.768	6.670	4.537	6.370	4.270	6.211	4.104	6.151
31	13.360	13.360	7.930	9.140	6.170	7.843	5.320	7.008	4.824	6.560	4.483	6.320	4.199	6.117	4.038	6.138
32	13.410	13.410	8.120	9.390	6.193	7.790	5.333	6.975	4.760	6.602	4.477	6.258	4.180	6.060	4.028	5.904
33	13.080	13.080	7.880	9.100	6.180	7.553	5.285	6.870	4.760	6.438	4.360	6.210	4.137	5.993	3.944	5.993
34	13.220	13.220	7.830	9.015	6.107	7.670	5.230	6.865	4.710	6.406	4.347	6.222	4.043	5.944	3.875	5.846
35	13.290	13.290	7.870	8.960	6.140	7.607	5.198	6.845	4.590	6.368	4.257	6.040	4.016	5.797	3.841	5.686
36	13.270	13.270	7.880	9.000	6.103	7.527	5.183	6.700	4.626	6.386	4.248	6.032	3.979	5.806	3.789	5.669
37	13.200	13.200	7.870	8.935	6.057	7.470	5.085	6.698	4.576	6.262	4.170	5.995	3.909	5.806	3.746	5.636
38	13.150	13.150	7.940	8.950	6.027	7.437	5.108	6.673	4.620	6.224	4.227	5.888	3.959	5.621	3.763	5.504
39	12.880	12.880	7.675	8.690	5.940	8.690	5.023	6.698	4.480	6.226	4.153	5.897	3.893	5.673	3.696	5.489
40	13.070	13.070	7.625	8.825	5.893	7.337	5.018	6.610	4.428	6.250	4.045	5.898	3.800	5.643	3.644	5.464
45	12.930	12.930	7.740	8.650	5.920	7.197	4.983	6.423	4.394	5.914	4.030	5.598	3.790	5.411	3.595	5.225
50	12.730	12.730	7.560	8.685	5.817	7.303	4.865	6.360	4.306	5.874	3.955	5.583	3.656	5.331	3.498	5.149
55	12.700	12.700	7.435	8.460	5.707	6.977	4.828	6.195	4.244	5.726	3.928	5.408	3.636	5.169	3.424	4.989
60	12.490	12.490	7.400	8.510	5.697	6.987	4.748	6.188	4.176	5.676	3.783	5.338	3.531	5.081	3.346	4.895
65	12.400	12.400	7.320	8.435	5.583	6.853	4.690	6.143	4.188	5.694	3.783	5.300	3.501	5.051	3.310	4.871
70	12.240	12.240	7.170	8.405	5.487	6.880	4.635	6.055	4.098	5.570	3.747	5.285	3.436	5.044	3.261	4.821
75	12.540	12.540	7.225	8.300	5.513	6.860	4.725	6.080	4.168	5.548	3.772	5.213	3.496	4.966	3.266	4.801
80	12.120	12.120	7.095	8.260	5.407	6.783	4.568	5.960	4.096	5.512	3.725	5.163	3.457	4.943	3.233	4.760

Appendix A5: Critical values for the bounds test: Case III restricted intercept and trend
5 percent level

n	$k=0$		$k=1$		$k=2$		$k=3$		$k=4$		$k=5$		$k=6$		$k=7$	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
30	8.770	8.770	5.395	6.350	4.267	5.473	3.710	5.018	3.354	4.774	3.125	4.608	2.970	4.499	2.875	4.445
31	8.780	8.780	5.365	6.310	4.237	5.433	3.695	4.960	3.326	4.730	3.120	4.560	2.953	4.437	2.850	4.379
32	8.730	8.730	5.365	6.305	4.213	5.437	3.653	4.965	3.296	4.696	3.087	4.518	2.913	4.416	2.825	4.344
33	8.620	8.620	5.320	6.225	4.183	5.347	3.638	4.908	3.310	4.636	3.078	4.513	2.917	4.387	2.799	4.296
34	8.700	8.700	5.345	6.225	4.180	5.360	3.615	4.913	3.276	4.648	3.058	4.460	2.904	4.336	2.798	4.258
35	8.640	8.640	5.290	6.175	4.183	5.333	3.615	4.913	3.276	4.630	3.037	4.443	2.864	4.324	2.753	4.209
36	8.650	8.650	5.310	6.225	4.153	5.333	3.610	4.870	3.252	4.576	3.023	4.408	2.860	4.303	2.750	4.211
37	8.590	8.590	5.290	6.170	4.183	5.303	3.593	4.865	3.236	4.570	3.005	4.398	2.836	4.271	2.723	4.175
38	8.660	8.660	5.320	6.190	4.167	5.263	3.583	4.828	3.236	4.568	3.008	4.405	2.851	4.266	2.721	4.145
39	8.640	8.640	5.290	6.140	4.137	5.243	3.560	4.798	3.214	4.508	2.995	4.367	2.823	4.237	2.704	4.128
40	8.570	8.570	5.260	6.160	4.133	5.260	3.548	4.803	3.202	4.544	2.962	4.338	2.797	4.211	2.676	4.130
45	8.590	8.590	5.235	6.135	4.083	5.207	3.535	4.733	3.178	4.450	2.922	4.268	2.764	4.123	2.643	4.004
50	8.510	8.510	5.220	6.070	4.070	5.190	3.500	4.700	3.136	4.416	2.900	4.218	2.726	4.057	2.593	3.941
55	8.390	8.390	5.125	6.045	3.987	5.090	3.408	4.623	3.068	4.334	2.848	4.160	2.676	3.999	2.556	3.904
60	8.460	8.460	5.125	6.000	4.000	5.057	3.415	4.615	3.062	4.314	2.817	4.097	2.643	3.939	2.513	3.823
65	8.490	8.490	5.130	5.980	4.010	5.080	3.435	4.583	3.068	4.274	2.835	4.090	2.647	3.921	2.525	3.808
70	8.370	8.370	5.055	5.915	3.947	5.020	3.370	4.545	3.022	4.256	2.788	4.073	2.629	3.906	2.494	3.786
75	8.420	8.420	5.140	5.920	3.983	5.060	3.408	4.550	3.042	4.244	2.802	4.065	2.637	3.900	2.503	3.768
80	8.400	8.400	5.060	5.930	3.940	5.043	3.363	4.515	3.010	4.216	2.787	4.015	2.627	3.864	2.476	3.746

Appendix A6: Critical values for the bounds test: Case III restricted intercept and trend

10 percent level

n	$k=0$		$k=1$		$k=2$		$k=3$		$k=4$		$k=5$		$k=6$		$k=7$	
	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$	$I(0)$	$I(1)$
30	6.840	6.840	4.290	5.080	3.437	4.470	3.008	4.150	2.752	3.994	2.578	3.858	2.457	3.797	2.384	3.728
31	6.810	6.810	4.295	5.090	3.417	4.463	2.995	4.135	2.752	3.922	2.560	3.828	2.434	3.757	2.350	3.685
32	6.850	6.850	4.285	5.090	3.427	4.473	2.985	4.133	2.720	3.926	2.555	3.808	2.429	3.727	2.345	3.678
33	6.840	6.840	4.265	5.050	3.403	4.437	2.975	4.095	2.716	3.888	2.530	3.778	2.417	3.703	2.330	3.641
34	6.810	6.810	4.255	5.060	3.403	4.440	2.968	4.098	2.692	3.902	2.517	3.773	2.410	3.679	2.316	3.621
35	6.810	6.810	4.225	5.050	3.393	4.410	2.958	4.100	2.696	3.898	2.508	3.763	2.387	3.671	2.300	3.606
36	6.830	6.830	4.255	5.060	3.377	4.423	2.948	4.063	2.690	3.868	2.507	3.725	2.390	3.637	2.306	3.588
37	6.740	6.740	4.220	5.015	3.383	4.403	2.955	4.083	2.684	3.870	2.505	3.735	2.380	3.634	2.283	3.573
38	6.850	6.850	4.260	5.030	3.383	4.387	2.938	4.045	2.684	3.846	2.493	3.722	2.366	3.640	2.283	3.564
39	6.770	6.770	4.240	4.985	3.380	4.377	2.940	4.028	2.662	3.830	2.485	3.715	2.361	3.616	2.276	3.551
40	6.760	6.760	4.235	5.000	3.373	4.377	2.933	4.020	2.660	3.838	2.483	3.708	2.353	3.599	2.260	3.534
45	6.760	6.760	4.225	5.020	3.330	4.347	2.893	3.983	2.638	3.772	2.458	3.647	2.327	3.541	2.238	3.461
50	6.740	6.740	4.190	4.940	3.333	4.313	2.873	3.973	2.614	3.746	2.435	3.600	2.309	3.507	2.205	3.421
55	6.700	6.700	4.155	4.925	3.280	4.273	2.843	3.920	2.578	3.710	2.393	3.583	2.270	3.486	2.181	3.398
60	6.700	6.700	4.145	4.950	3.270	4.260	2.838	3.923	2.568	3.712	2.385	3.565	2.253	3.436	2.155	3.353
65	6.740	6.740	4.175	4.930	3.300	4.250	2.843	3.923	2.574	3.682	2.397	3.543	2.256	3.430	2.156	3.334
70	6.670	6.670	4.125	4.880	3.250	4.237	2.818	3.880	2.552	3.648	2.363	3.510	2.233	3.407	2.138	3.325
75	6.720	6.720	4.150	4.885	3.277	4.243	2.838	3.898	2.558	3.654	2.380	3.515	2.244	3.397	2.134	3.313
80	6.720	6.720	4.135	4.895	3.260	4.247	2.823	3.885	2.548	3.644	2.355	3.500	2.236	3.381	2.129	3.289

ENDNOTES

[1] The hotel price index is calculated by dividing the total expenditure (takings) from accommodation and food by the number of room nights sold per person. This gives the cost of accommodation and food per night per person. All data used are extracted from official statistical publications.

[2] Total costs of a holiday in Fiji and Bali are measured as the cost of travel to these countries plus the cost of accommodation and food in these countries for a tourist from anyone of Fiji's main tourist source markets.

[3] I also tried other Pacific Island Countries as substitute destinations not only for the USA but also for Australia and New Zealand. The results indicated negligible effect on the substitute price coefficient. Further in the US model, the RESET test did not support adequate model specification.

[4] For a survey of this literature, see Hendry *et al.*, (1984).

[5] Pre-testing is particularly problematic in the unit-root-cointegration literature where the power of the unit root tests is typically very low, and there is a switch in the distribution function of the test statistics as one or more roots of the x_t process approach unity (Pesaran, 1997: 184).

[6] For a 'unique and stable long-run' relationship, $F_{VA}(.)$ should be greater than the upper bound of the CV and $F_{GDI}(.), F_{HPI}(.), F_{PFB}(.)$ and $F_{TC}(.)$ should be lower than the lower bound of the CV. In this relationship, VA is the dependent variable and GDI, HPI, PFB and TC are the exogenous variables.

[7] Apart from Pesaran et al. (2001), the exponents of the bounds testing approach, this is the first study that generates critical values specific to the sample size. Existing studies which have used the bounds testing approach to cointegration have either used the critical values reported in Pesaran and Pesaran (1997) or Pesaran et al. (2001). These studies include: Pattichis (1999, 20 observations); Tang and Nair (2002, 29 observations); Tang (2001, 25 observations); Tang (2002, 26 observations; Fedderke and Liu (2002, 36 observations); Caporale and Chui (1999, 33 observations); Chou (2000; 64 observations); Bahmani-Oskooee and Ng (2002, 60 observations); Karfakis (2002, 50 observations); Alam and Quazi (2003, 27 observations); Mah (2000, 20 observations); Gounder (1999, 2001, 2002, 29 observations).

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