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The Response of Hotel Room Occupancy Rate in Fiji to Shocks: Empirical Evidence from Unit Root Tests with Endogenous Multiple Structural Breaks

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ABSTRACT

Despite the political coup in December 2006 and Global Financial Crisis (GFC) in 2008, the tourism industry in Fiji has proven to be quite resilient. This article examines the response of hotel room occupancy rate in the tourism industry to domestic and external shocks using annual time series data from 1969 to 2019. We employ a suite of unit root tests accommodating for single and multiple endogenous structural breaks, and find that occupancy rate is a stationary process. The break dates coincide with the political coup in 1987 and Global Financial Crisis in 2007/2008. The results suggest that shocks are likely to have a temporary impact on the room occupancy rate in Fiji's tourism industry and the series will return to its trend path following an adverse shock.

Keywords: Fiji, Hotel Room Occupancy Rate, Structural Breaks, Tourism, Unit Root
JEL Classifications: C22, C29, Z30

1. INTRODUCTION

With the recent COVID-19 pandemic, the Fijian economy being dependent on the tourism sector has experienced a significant economic slowdown. Over the period 2010-2019, average tourism earning has been around $1.6 billion and a major source of foreign earnings for the small island economy[1]. Since 2010, the number of visitor arrivals has exceeded 600,000 and in 2016, Fiji attracted 792,320 visitors and resulting in tourism earnings of over $1.6 billion (Government of Fiji, 2017a; Reserve Bank of Fiji, 2018). In 2019, Fiji attracted close to 900,000 visitors and had tourism earnings of about $2.1 billion (Reserve Bank of Fiji, 2021). Therefore, the tourism sector has a significant influence on the macroeconomic performance of the Fijian economy. However, the international travel restrictions due to the pandemic have led to a significant fall in tourism earning from $2.1 billion in 2019 to $349m in 2020 (Reserve Bank of Fiji, 2021).

The main objective of this study is to investigate the response of room occupancy rate in Fiji to external and domestic shocks. There are three main reasons for focusing on Fiji's tourism industry. First, data on hotel occupancy rate in Fiji was available for a large sample period compared to other Pacific Island Economies. Second, over the last past 10 years, Fiji's economy has increasingly become dependent on the tourism industry, as the traditional sugar industry has been on a severe decline. However, despite various policy reforms over the recent years, the room occupancy rate for the period 2006-2015 has been below 60 percent (Reserve Bank of Fiji, 2018). In 2019, turnover from hotels accounted for about 63 percent of total earnings from the tourism sector (Fiji Islands Bureau of Statistics, 2021). The hotel occupancy rate, therefore is not only an important indicator for the industry but also has significant implications for earnings, investment and long-term viability of the industry.

1 The earnings are measured in Fijian dollars.

Third, several studies have been conducted on Fiji's tourism industry. This includes: impact of devaluation on tourism (Pratt, 2014), the relationship between tourism and poverty (Scheyvens and Russell, 2012a; 2012b), the effect of political instability on tourism (Fletcher and Morakabati, 2008; Narayan 2005a; 2005b), the influence of climate change on tourism (Becken, 2005), the economy – wide impact of tourism (Narayan, 2004), determinants of tourism demand and tourist expenditure (Narayan, 2002; 2003; 2004), and issues, challenges and performance of the tourism industry (Narayan and Prasad 2003; Narayan, 2000; Rao, 2002), the relationship between tourism and growth (Kumar and Kumar, 2012; Narayan and Prasad, 2003). However, no major empirical study has investigated the response of room occupancy rate in Fiji to external and domestic shocks[2]. This paper fills this gap in the literature and extends upon the above-mentioned studies. The major contribution of this paper, therefore is that it provides new insights on the response of hotel occupancy rate following various domestic and external shocks, effectiveness and design of policy reforms in the tourism industry, the transmission of shocks from hotel occupancy rate to related sectors, modeling, testing and forecasting of hotel occupancy rate in Fiji.

Our study has several important policy and research implications. First, the empirical finding will enable us to understand whether external and domestic shocks are likely to have a permanent or transitory impact on the room occupancy rate in Fiji. If room occupancy rate is a stationary series, then shocks to room occupancy rate will have transitory effects and the series will return to its trend path over time following a shock (see for example, Ozcan, 2013; Shahbaz et al., 2014). This implies that positive policy shocks or policy reforms to improve occupancy rates will be less effective. However, if the room occupancy rate is a non-stationary series, shocks to room occupancy rate will have permanent or persistent effects. Thus, it follows that any adverse shock emanating from an external or internal source will have a permanent or persistent impact on the room occupancy rate. This presents a strong case for policy intervention, as positive policy shock will have positive permanent effects and likely to improve hotel room occupancy rate (Barros et al., 2013; Gozgor, 2016; Lean and Smyth, 2014; Shahbaz et al., 2014).

The empirical results from this paper will provide new insights on how external shocks such as the Global Financial Crisis (GFC), Asian Financial Crisis (AFC), imposition of adverse travel advice by foreign governments after political coups, and domestic shocks such as political coups, natural disasters, and policy reforms are likely to affect room occupancy rate in Fiji. If effects are found to be permanent, then there is a strong case for policy intervention, not only to safeguard investment in the hotel sector but also for sake of the macroeconomic performance. In other words, policy measures are required to ensure the resilience of the hotel industry. The presence of a unit root in room occupancy rate would also imply that that permanent policy changes to improve room occupancy rate are likely to be more appropriate than temporary policy changes (Gozgor, 2016). Hence, the finding of this study is of enormous importance for understanding the effects of shocks, designing and evaluating of policy reforms in the hotel sector. Second, understanding the unit root properties of room occupancy rate is also important for understanding the transmission process. Depending upon the extent to which room occupancy rate is strongly linked with other sectors of the economy, any adverse shock to room occupancy rate will be transmitted to other related variables such as hotel turnover, employment in the hotel sector, tourism earnings, and real GDP, etc. (Barros et al., 2013; Gozgor, 2016; Ozcan, 2013). This is based on the argument by Hendry and Juselius (2000) who point out that: "variables related to the level of any variable with a stochastic trend will inherit that non-stationary, and transmit it to other variables in turn."

Third, understanding the unit root properties of room occupancy rate is essential for modeling, testing, and forecasting its future path. In particular, our finding has important implications for future econometric work on modeling the determinants of room occupancy rate. This can be quite important, as understanding the determinants is the key to improving room occupancy rates and stimulating investment and growth in the hotel sector through policy intervention. If room occupancy rate is a stationary process, then this implies vector autoregressive (VAR) or structural vector autoregressive (SVAR) technique can be employed to understand its determinants of room occupancy rate. Variance decomposition and impulse response analysis can be employed to understand the sources of variation and influence of different domestic and external shocks on room occupancy rates. The stationary of room occupancy rate series also reduces the chances of obtaining spurious results (Narayan and Narayan, 2010). The presence of non-stationary series implies that researchers should exercise caution in selecting the econometric methodology. For instance, if room occupancy rate is found to be a non-stationary process, this implies that modeling should be undertaken within a cointegration framework. If the room occupancy rate is a non-stationary variable and is regressed against other non-stationary variables, in absence of cointegration, then the estimated regression would be spurious and therefore result in misleading policy implications.

Fourth, this study has implications for studies on forecasting room occupancy rates. Given that room occupancy rate is one of the key indicators of the industry and tends to be an important input in the planning process, future studies on forecasting room occupancy rate should carefully analyze stationarity properties of the data. If room occupancy rate is a non-stationary process, this implies that the past behavior of its series is of little or no use for forecasting and the researcher would need to look at alternative factors influencing room occupancy rate. On other hand, if hotel room occupancy rate is found to be a mean (trend) reverting process, this implies that the series will return to its mean value following shocks and past behavior can be used to formulate a forecast of occupancy rate (Barros et al., 2013; Gozgor, 2016; Lean and Smyth, 2013; Narayan and Narayan, 2010; Öztürk and Aslan, 2015; Shahbaz et al., 2014). In addition, this study also employs unit root tests that identify the break dates endogenously. Since there could be several sources of a structural break in room occupancy rate series, correct identification of breaks is essential

2 A similar line of argument holds in an international context.

for adopting a proper specification of econometric models (Ewing and Wunnava, 2001).

The rest of the paper is structured as follows. Section 2 provides an overview of recent reforms in Fiji's Tourism Industry. Section 3 outlines the data and methodology, while Section 4 discusses the empirical results. Section 4 discusses the conclusion and policy implications.

2. RECENT REFORMS IN FIJI'S TOURISM INDUSTRY

Following the Global Financial Crisis (GFC) in 2008, the industry has witnessed many policy reforms. In 2009, the government came up with several policy measures to support the hotel sector. The new hotel incentive package provided 10-year tax holiday for the Short Life Investment Package (SLIP), where capital investment not below $7million, exemption of import duty on capital goods not available in Fiji, and 55% investment allowance on capital expenditure conditional upon no movement of revenue abroad (Government of Fiji, 2008). To promote hotel development in Vanua Levu and maritime islands, investment with minimum of 25% equity by indigenous Fijian qualified for 20 years of tax holiday (Government of Fiji, 2008).

In the 2010 budget, the government indicated the introduction of Super Yacht Charter Policy to regulate the operations of Super Yacht in Fiji and 3-6 months of the marketing campaign by Tourism Fiji in overseas markets (Government of Fiji, 2009). The government implemented the registration of the Surfing Areas Decree as well as the Denarau Development Decree to support the growth of the industry and allocated $23.5m in the 2012 budget to Tourism Fiji as a marketing grant (Government of Fiji, 2011). In addition, Tourism Fiji continued with its global marketing efforts through National Geographic and CNN TV networks (Government of Fiji, 2011). Between 2009 and 2012, the government has allocated nearly $106 million in promoting Fiji as a tourist destination in countries such as India, China, the United Arab Emirates (Government of Fiji, 2012).

For 2014 and 2015, the government allocated operating grants and transfers of $6m and $47m towards Marketing Grant to Tourism Fiji, respectively (Government of Fiji, 2013; 2014). The government expanded the definition of "project" in the Eleventh Schedule of the Income Tax Act to incorporate the purchase and sales of residential units in hotels and integrated tourism development (Government of Fiji, 2014). In addition, the government announced the inclusion of new apartments in the SLIP incentives and amended the Fourth Schedule of the VAT Decree to extend the Tourist VAT Refund Scheme to Lautoka Wharf and Nausori International Airport (Government of Fiji, 2014).

In 2015, the government introduced the environmental levy on tourism-related activities, which was expected to rake in $69.6m in 2016, and introduced the VAT Refund Scheme (TVRS) License, and allocated operating grant of $3.8m and a marketing grant of $30m to Tourism Fiji (Government of Fiji, 2015). In addition, the government announced changes in the SLIP and Investment Allowances under which the existing hotels will not be included from 2017. However, new hotels will get SLIP with 4 years tax holiday (Government of Fiji, 2015). In 2016, the government allocated a massive $8.3m operating grant and $27.6m market grant to Tourism Fiji (Government of Fiji, 2016). For the financial year 2017-2018, the government allocated a massive $10.4m operating grant and $33.1m marketing grant to Tourism Fiji (Government of Fiji, 2017b). Hence, over the recent years, the government has undertaken tax-related reforms, and increased marketing grant and vigorous marketing abroad to encourage hotel investment and improve tourist visitor arrivals.

3. DATA AND METHODOLOGY

3.1. Data and Sample Period

The data for the room occupancy rate (ROR_t) is extracted from World Bank's Country Economic Reports (World Bank, 1977; 1980; 1995) and Current Economic Statistics (Fiji Islands Bureau of Statistics, 1985; 1986) and Statistical Annex and Quarterly Review (Reserve Bank of Fiji, 2017; 2021). The sample period is restricted to 1969 to 2019. The choice of sample period is dictated by data availability.

3.2. Methodology

To achieve our research objective, this paper employs a battery of unit root tests with and without structural breaks. Unit root tests have been increasingly used in tourism economics literature to understand whether different external and domestic shocks have a permanent or transitory impact on tourist visitor arrival (for instance, Lean and Smyth, 2009; Narayan, 2008; Smyth et al., 2009; Solarin, 2015; 2016, Tan and Tan, 2014), and convergence in tourism market (for instance, Hepsag, 2016; Narayan, 2006; Ozcan and Erdogan, 2017; Yilanci and Eris, 2012). This group of studies provided useful insights on whether the external and domestic shocks have a permanent or transitory impact on tourist visitor arrivals, convergence, and effectiveness of marketing strategies.

The empirical analysis starts by investigating the order of integration of room occupancy rate (ROR_t) series using the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979), and Phillip-Perron (PP) unit root test (Phillips and Perron, 1988). The details of these two unit root tests are not provided since they are well-known in the literature. An important aspect of our analysis is that we allow for structural breaks. This is an important consideration, as the tourism industry in Fiji, since its independence has been through a number of economic and political shocks. These include political coups in 1987, 2000, and 2006, Asian Financial Crisis in 1997-1998, Global Financial Crisis in 2008, and devaluation of the Fijian dollar by 20 percent in 2009, to name a few others. These shocks need to be considered, as failure to account for structural breaks can bias the unit root test towards non-rejection of unit root hypothesis (Perron, 1989).

3.2.1. Zivot-Andrews (1992) unit root test

This unit root test is implemented by estimating the following equation:

$$\Delta ROR_t = \alpha_0 + \varphi y_{t-1} + \beta T + \delta_1 DU_t + \phi_1 DT_t + \sum_{j=1}^{k} \tau_j \Delta ROR_{t-j} + \nu_t \quad (1)$$

The terms in equation (1) are defined as follows: ROR_t is hotel room occupancy rate; T represents the time trend variable; while α_0 is the constant term; Δ is the first difference operator, $v_t \sim iid(0, \sigma^2)$, $t=1\ldots n$. Note, the term ΔROR_{t-j} is included in equation (1) is to account for autocorrelation and ensure that the error term is white noise. DU_t is an indicator dummy variable for a mean shift occurring at time TB, while DT_t is the corresponding trending shift variable, where DU_t=1 and DT_t=t–TB if t>TB; otherwise 0.

The main parameter of interest is ϕ. We follow Zivot and Andrews (1992) and set the "trimming region" to: [0.15, 0.85]. The break date is determined by selecting the value of TB for which the ADF t-statistic (absolute value of the t-statistic for ϕ) is maximized. Equation (1) is the Model C version of the Zivot-Andrews (1992) unit root test that allows a change in both slope and intercept. The null hypothesis is that the series is an integrated process without a structural break against the alternative hypothesis that the series is a trend that is stationary with a structural break in the trend function that occurs at an unknown time. Our decision to consider the Model C version test is based on the findings of a seminal study by Sen (2003), that demonstrated the Model C version of the test minimizes the loss of power and is relatively superior to Model A.

3.2.2. Narayan and Popp (2010) unit root test with two structural breaks

This study implements the unit root test developed by Narayan and Popp (2010) to account for multiple structural breaks. While other unit root tests that allow for multiple structural breaks (e.g., Lee and Strazicich, 2003; Lumsdaine and Papell, 1997), in a recent study Narayan and Popp (2013) have found that unit root test developed by Narayan and Popp (2010) has better size and high power and identifies break dates more correctly. Narayan and Popp's (2010) unit root test was implemented by estimating the equations (2-3). Model 1 allows for two breaks in the level, while Model 2 allows for two breaks in the level and the slope. We estimate both models for the sake of consistency[3].

The unit root null hypothesis of ρ=1 is tested against the alternative hypothesis of ρ<1. In Model 1 and 2, the t-statistic of $\hat{\rho}$ is denoted by $t_{\hat{\rho}}$. The break dates in the room occupancy rate (ROR_t) series are determined by either grid search or sequential procedure. However, break dates are not much different, and sequential procedure is less computationally demanding (Narayan and Popp 2010).

Model 1

$$ROR_t^{M1} = \rho ROR_{t-1} + \alpha_1 + \beta * t + \theta_1 D(T_B^{'})_{1,t} + \theta_2 D(T_B^{'})_{2,t} + \delta_1 DU'_{1,t-1} + \delta_2 DU'_{2,t-1} + \sum_{j=1}^{k} \beta_j \Delta ROR_{t-j} + \varepsilon_t \quad (2)$$

3 I wish to thank Professor Paresh Narayan for generously sharing Gauss Code to implement Narayan and Popp's (2010) unit root test. Any remaining errors are my responsibility.

Model 2

$$ROR_t^{M2} = \rho ROR_{t-1} + \alpha_2 + \beta * t + \kappa_1 D(T_B^{'})_{1,t} + \kappa_2 D(T_B^{'})_{2,t} + \delta_1 * DU'_{1,t-1} + \delta_2 * DU'_{2,t-1} + \gamma_1 * DT'_{1,t-1} + \gamma_2 * DT'_{2,t-1} + \sum_{j=1}^{k} \beta_j \Delta ROR_{t-j} + \varepsilon_t \quad (3)$$

4. RESULTS AND DISCUSSION

4.1. Unit Root Test Results without Breaks

Table 1 reports the ADF and Phillips-Perron unit root test results for room occupancy rate in Fiji. All the empirical analysis in this paper is undertaken in Eviews 11.0 and Gauss 21.0 packages. The test results indicate that the null hypothesis of a unit root is rejected in levels, as the ADF test statistic is significant at 1% level. However, the Phillips-Perron test statistic is not significant, and it is not possible to reject the null hypothesis that the series has a unit root at 5% level. However, both ADF test statistic and Phillips-Perron test statistic are significant and the null hypothesis of a unit root is rejected at 1% significance level when the occupancy rate series is expressed in the first difference. The ADF unit root test results imply that the room occupancy rate is a stationary series, while the PP unit root test results indicate that the room occupancy rate is a non-stationary series. Thus, ADF and PP unit root test results are inconclusive, perhaps because we have not yet accounted for structural breaks in the series. Therefore, this study considers unit root tests developed by Zivot and Andrews (1992), and Narayan and Popp (2010). These tests allow us to check if allowing for structural breaks can provide more conclusive evidence on the unit root properties of occupancy rate.

4.2. Unit Root Test Results with a Single and Multiple Structural Breaks

Table 2 – Panel A reports the unit root test results allowing for a single break. The unit root test is based on the Model C version of the Zivot-Andrews (1992) Unit Root Test that allows for a change

Table 1: Unit root test results

Variable	In Level			
	ADF		Phillips-Perron	
	C	C & T	C	C & T
ROR_t	–2.979** (0.044)	–4.586*** (0.003)	–2.637* (0.093)	–2.924 (0.165)
Variable	**In First-Difference**			
	ADF		**Phillips-Perron**	
	C	**C & T**	**C**	**C & T**
ΔROR_t	–6.353*** (0.000)	–6.353*** (0.000)	–10.078*** (0.000)	–13.325*** (0.000)

The reported values are test-statistics. Figures in the bracket are probability values. ***Indicates statistical significance at 1% level. **Indicates statistical significance at 5% level. *Indicates statistical significance at 10% level. C denotes constant; C& T denotes constant and trend

Table 2: Unit root tests with structural breaks results

Panel A: Zivot-Andrews (1992) unit root test					
Variable	**Model**	**Test-statistic**	**Break date**		***k***
ROR_t	C	–5.241**	2008		1
Panel B : Narayan and Popp (2010) Unit Root Test Results					
Variable	**Model**	**Test -statistic**	**TB1**	**TB2**	***k***
ROR_t	1	–5.743***	1986	2007	8
ROR_t	2	–5.801**	1986	2008	1

The reported figures are test-statistics. ***Indicates statistical significance at 1% level; **Indicates statistical significance at 5% level. TB1 denotes the first break date; TB2 denotes the second break date. For Narayan and Popp (2010), the critical values for Model 1:1% (–5.259); 5% (–4.514). The critical values for Model 2:1% (–5.949); 5% (–5.181). The critical values were extracted from Narayan and Popp (2010). *k* is the optimal lag length

in both slope and intercept. The computed test statistic is –5.241 and the estimated break date is 2008 and coincides with the Global Financial Crisis. Since the computed test-statistic of -5.241 is greater than the critical value of –5.080 at 5% significance level, the null hypothesis of a unit root with a structural break in both the intercept and trend is rejected in the levels at 5% level. This implies that the room occupancy rate is a stationary variable. To see, if our results are intact, we also consider multiple structural breaks.

In Panel B of Table 2, we report results using Narayan and Popp's (2010) Unit Root Test. Model 1 allows for two breaks in the level, while Model 2 allows for two breaks in the level and the slope. The unit root hypothesis is rejected in the levels of the series regardless of the choice of model. The estimated first break date according to results reported in Panel C is 1986 and this is close to Fiji's first political coup in 1987. The estimated second break date is 2007/2008, and corresponds to Global Financial Crisis. This confirms the conclusion from the Zivot-Andrew test results. Overall, the room occupancy rate is best described as a stationary process, I(0) implying that different (internal or external) shocks are likely to exert a temporary impact on the room occupancy rate. Following shocks, the room occupancy rate is likely to return to its trend path.

5.CONCLUSION AND POLICY IMPLICATIONS

Despite the adverse external conditions owing to the Global Financial Crisis and domestic political developments, tourism has been a billion-dollar industry for the Fijian economy. Over the recent years, a growing body of empirical literature has investigated the link between tourism and macroeconomic performance in Fiji. However, no empirical study has systematically examined the behavior of room occupancy rate in Fiji's tourism industry following external and domestic shocks. This article fills this gap. Using a suite of unit root tests, allowing for single and multiple endogenous structural breaks, the main contribution of this paper is that, it shows room occupancy rate is a stationary process.

Our evidence of stationarity reveals that different external and domestic shocks will have temporary impact on the room occupancy rate. Thus, this implies that adverse external and domestic shocks are likely to have a temporary, and not permanent impacts on the room occupancy rates in the Fijian tourism industry. This finding is reassuring and suggests that the room occupancy rates is likely to return to its trend path following future adverse shocks. It is important for Fiji to gradually tap into different tourism markets, and offer new tourism services such as cruise tourism, sports tourism, and honeymoon tourism to make the industry even more resilient.

Our finding has important implications for future forecasting work on room occupancy rates. Given that room occupancy rate is a stationary variable, its past values will be useful for forecasting. One limitation of the present study is that it was restricted to Fiji. Future studies can undertake a similar analysis for other tourism-dependent economies. It would be also interesting for future studies to examine if hotel occupancy rate in other Pacific countries responds differently to external and domestic shocks.

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