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Article

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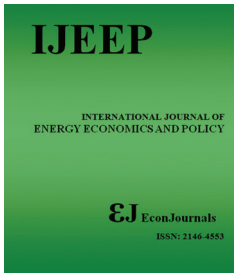

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Oil Price and Fijian Tourism Cycle: A Markov Regime-switching Model

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ABSTRACT

The fluctuation of oil price tends to have adverse effect on the tourism industry of a nation. This paper investigates the dynamic changes of the inbound tourism market for Fiji and the driving forces of the Fijian tourism cycle. A set of fundamental determinants of tourism demand including international crude oil price has been utilized to predict the Fijian tourism cycle for the period of 2000-2017. The Markov regime-switching model identifies two distinct phases of the Fijian tourism cycle which are an expansion and a recession period. The filtered and smoothed probabilities signalled the Fijian tourism development significantly with the transition probabilities supported. The adequate dating evaluation can offer essential information for policymakers, tourism industry players and even the community in decision making for Fijian tourism to enhance the nation's development.

Keywords: Markov-switching Model, Fijian Tourism Cycle, Oil Price Fluctuation, Forecasting
JEL Classifications: Z32, O01, E32

1. INTRODUCTION

With the evolution in airline and travel industries, international tourism has developed into one of the leading industries with rapid growth globally. International tourism is a paramount sector that can be manifested as one of the sources for key foreign exchange earnings, incorporates employment opportunities creation, encourages infrastructures development, generates higher income, provides conducive business activity environment, and generates government revenue. Furthermore, tourism is able to stimulate the nation's development when the tourism interests involve the local communities, indigenous people, industry authorities and government collectively. With this broad spectrum across a country, sustainable tourism can be practised when equilibrium can be strike between limits and usages of the natural resources.

With respect to the World Tourism Organization in the United Nations (UNWTO) (2018), the total worldwide international tourist arrivals have reached up to 1,323 million visitors, bringing about total worldwide international tourism receipts with US$ 1,340 billion. UNWTO reported that international tourism has shown sustainable growth for the past 8 years. This is further supported by the tourism honoured as the world's third largest export category with a total export of US$ 4 billion per day on average from international tourism. The remarkable growth has proven that the emerging tourism sector of Fiji plays a prominent role for the nation. Thus, tourism demand is indeed vital to be anticipated with the significant determinants that are influential towards the development of Fijian tourism market.

Over the past decades, the tourism industry in Fiji has become one of the major revenue contributors to the Fijian economy and as the vanguard for its economic expansion. The Fijian tourism sector contributes approximately 40.4% out of the total gross domestic product (GDP) in 2016. According to the World Travel and Tourism Council (WTTC) (2018), the contribution of Fijian tourism sector is expected to reach about 43.4% of GDP by 2028. The inclusion of several parts such as accommodation, transportation, hospitality

and tourism products comprise a compelling part for the GDP of Fiji. With the increase in inbound tourists, the tourism receipts have increased gradually by 2.3% from 2016 to a total earning of US$ 225 million in 2017 demonstrated by the Fiji Bureau of Statistics. The substantial role of the tourism industry as the principal economic driver and market force for Fiji raised the need to anticipate its tourism demand. Apart from the global economic environment on tourism demand, the fluctuation of oil prices could be one of the significant factors in influencing the tourism market performance, not only on the production costs (Hong et al., 2017). Fluctuation of oil price could harm economic and tourism activities due to the exerted effect on transportation, production costs, economic uncertainty and disposable income (Becken, 2008). Furthermore, the UNWTO (2018) has also raised its concern on the immediate and negative effect of oil price changes on tourism. Therefore, monitoring the driving forces of Fijian tourism sector is crucial in promoting sustainability of the sector.

The vital motivations and implications of this study are twofold. First, the role of Fiji as a "tourism-dependent country" indicates how essential it is to scrutinize its tourism demand for its future prosperity and development. Despite the significant role of economic determinants employed by past studies, the role of non-economic determinants also requires further recognition in tourism demand forecasting (Cho, 2010). Moreover, Habibi (2017) emphasized that inbound tourism with the combination of economic and non-economic determinants is unique to the analysis. Second, a Markov regime switching model is applied to evaluate the transition probabilities of two distinct regimes which are recession and expansion periods. The empirical findings on the tourism cycle forecasting for Fiji can be utilised as a precautionary step to provide remedial measures or at least trim down the impact of stressful episodes on the Fijian tourism market.

2. LITERATURE REVIEW

Although previous studies have contributed in Fijian tourism demand modelling, the current study will enrich the literature by examining the tourism market cycle of Fiji. Narayan (2002) proposed the determinants of Fijian tourism demand whereby the income levels have positive impacts on tourism demand; while relative price and substitute relative prices have negative effects on tourist arrival in the long-term. Followed by the studies of Narayan (2004), the bound test approach has been utilized to evaluate further the Fijian tourism demand. The approach used is the autoregressive distributed lag framework that provides a robust result in small sample sizes. The findings revealed the determinants were consistent with the economic theory. Recently, a tourism demand model for the case of Fiji was designed by Pratt (2014). The findings from a computable general equilibrium model portrayed that the currency devaluation brought significant economy-wide impacts during the determination of the nation's overall benefits.

The non-linear forecasting model was employed by Chaitip and Chaiboonsri (2014) despite on the published literature that showed concern about modelling the tourism demand with a linear model. Furthermore, the research done by Chen et al. (2015) aimed to investigate the Korean inbound tourism cycle using the Markov regime-switching model proposed by Hamilton (1989). The study proved that the analysis findings can provide valuable and informative details for the tourism sector by comprehending the growth rate, duration of different regimes and chronologies of turning points for the tourism cycle. The similar Markov-switching approach was also applied by Ozcan and Ucan (2016) to determine the outbound tourism demand of Turkey. Researchers employed the Markov switching vector autoregressive model into different regimes to achieve a considerable robust result. The empirical results affirmed that the outbound citizens mostly depended on their income and the exchange rates. Valadkhani and Mahony (2018) incorporated the modified capital asset pricing model with the Markov switching model (MsM) to study the relation to the dynamic inbound tourism market in Australia. Apart from the tourism context, Medhioub (2015) proved that the business cycle asymmetries information can be captured using the Markov switching. The prior recognition of the economic recession and expansion by the MsM was considered to be a satisfactory dating evaluation of Tunisia's industrial production.

3. METHODOLOGY

Conventional applications of the tourism demand forecasting were entrusted to a single state relationship among tourist arrivals or tourism receipts with fundamental influential variables. The restricted fundamentals are enacted according to their stability performance from previous studies over the past few decades in tourism demand modelling. On the selected variables, the information was able to be captured consistently from various perspectives such as financial performance, purchasing power, travel costs, favourability for investment and non-economic determinants like the political stability index (PSI). We believe that these indicators possess the ability to forecast tourism demand in Fiji. Most of the available data series were interpolated from quarterly basis to a higher frequency of monthly data using the Chow and Lin (1971) interpolation technique in order to obtain more insightful information. The sources of data were mainly from the CEIC database, WTTC database and U.S. Energy Information Administration. The data employed in this study spans across 2000-2017 where tourist arrivals series is selected as the dependent variable for the Markov regime switching model. This is supported by the research of Valadkhani and Mahony (2018) that recognized tourist arrival as a global composite barometer for the inbound tourism market.

Hamilton (1989; 1990) has popularized the MsM by considering the switching regression for the conventional single state modelling approach. The switching regression for the scheme of MsM is interpreted as below:

$$q_t = \begin{cases} \beta_1 . Z_t + \varepsilon_t \text{ , if } S_t = 1 \\ \beta_2 . Z_t + \varepsilon_t \text{ , if } S_t = 2 \end{cases} \quad (1)$$

Where the time series to be interpreted is represented by q_t, Z_t denotes the vector of exogenous regressors, β_i represents the vector of real numbers that rely on the non-observable state variables S_t, and Gaussian white noise is expressed by ε_t. Furthermore, the

state variable is assumed to obey an ergodic first-order Markov process. The matrix π possesses transition probabilities p_{mj} from state m to state j:

$$\pi = \begin{bmatrix} p_{11} & p_{21} \\ p_{12} & p_{22} \end{bmatrix}, \; p_{mj} = \Pr(S_t = j \,|\, S_{t-1} = m) \tag{2}$$

After defining the model estimated coefficient well, the matrix of transition probabilities will also be estimated accordingly. Thus, the complete series with each date can be referred to. The process continued with the obtaining of filtered and smoothed probabilities where $\Pr(S_t=j\,|q_1,\ldots,q_t)$ of being in state j. For our current research, the chosen fundamentals are denoted in the equation below with state-depending coefficients:

$$y_{i,t} = \begin{cases} \beta_0^{(1)} + \beta_{FDI,t}^{(1)} + \beta_{PSI,t}^{(1)} + \beta_{VE,t}^{(1)} \\ +\beta_{WTI,t}^{(1)} + \beta_{GDP,t}^{(1)} + \varepsilon_t^{(1)} \quad S_t = 1 \\ \beta_0^{(2)} + \beta_{FDI,t}^{(2)} + \beta_{PSI,t}^{(2)} + \beta_{VE,t}^{(2)} \\ +\beta_{WTI,t}^{(2)} + \beta_{GDP,t}^{(2)} + \varepsilon_t^{(2)} \quad S_t = 2 \end{cases} \tag{3}$$

where the variables are predominated based on the previous literature with broader perspective from world indicators and non-economic determinants that are unique for this study. The global tourism barometer, which is the international tourist arrivals denoted by $y_{i,t}$, followed by a series of independent variables comprising foreign direct investment (FDI) to Fiji, the PSI that measures perceptions on the political situation in Fiji which is critical for tourism development, visitor exports (VE) as a proxy for foreign spending and income to be used for future capital investment, crude oil price (WTI) as a proxy variable for travel cost such as flights, and world GDP represents the global income that is prominent to the Fiji tourism demand.

The empirical findings obtained are then undergone a series of Markov-switching diagnostic checks. The diagnostic checks include the plot of residuals against fitted value, the normality probabilities plot for testing the normality distributions of residuals, and the autocorrelation function (ACF) and partial ACF (PACF) are verified to determine the best fit model that is suitable for forecasting. The information obtained can be used for further research in a similar field.

4. EMPIRICAL FINDINGS AND DISCUSSION

The tourism demand modelling employs the Markov regime switching, advocated by Hamilton (1989), to compute the real-time inferences of the Fijian tourism cycle states. As mentioned in previous section, the empirical outcomes are discussed in this session.

Notably, Table 1 portrays the maximum likelihood estimated of the model. Under the expansion state of regime 1, the series of economic determinants, non-economic determinants and the world economic indicator are consistent with the economic theory underlying. All the variables are significant at 1% level with FDI, PSI, VE and GDP reacting positively towards TA, except for WTI. Consistent with the concern of the UNWTO, the fluctuations of oil price bring about immediate and negative effect on tourism as it exerted pressure on transportation, production costs and economic uncertainty. For the empirical results obtained for the recession state of regime 2, the crude oil price is inconsistent with the previous results with its positively estimated coefficient. As a luxurious tourist destination of Fiji, this may be due to the possibility that tourists with higher income level and purchasing power tend to be less affected on their travel decision by the increment of travel cost due to changes in global crude oil price, particularly during periods with bad economic condition. Both regimes of the Markov regime switching results recorded the adjusted R^2 as high as 0.99. This reveals that 99% in variability of dependent variables can be explained by the explanatory variables. The goodness-of-fit shows that the Markov regime switching model has the ability to evaluate the overall performance of Fiji tourism demand in well-mannered.

Table 2 demonstrates the transition probabilities with a two-state transition. The high value of transition probabilities indicates that it is difficult to shift from one regime to another. The expected duration for the growth period is calculated as $1/(1-P_{00})$. Regarding the findings revealed in Table 2, the probability to stay at regime 1 while the tourism cycle is in the first regime is 94.9%. Next, when it shifts from first regime to second regime, it has a probability of 4.4%. The duration of matrix transition probabilities for P_{22} is 19.6 months.

Figure 1 depicts the graphic visualization of the filtered and smoothed probabilities from the Markov regime switching model.

Table 1: Summary results of Markov regime switching (Markov switching model)

Regime 1			
Variable	**Coefficient**	**Standard error**	**P-value**
(Intercept)	0.927	0.028	0.000***
LFDI	0.110	0.005	0.000***
LPSI	0.110	0.015	0.000***
LVE	0.510	0.030	0.000***
LWTI	−0.125	0.010	0.000***
LGDP	0.423	0.010	0.000***
Adjusted R^2: 0.994		α=0.010	
Regime 2			
Variable	**Coefficient**	**Standard error**	**P-value**
(Intercept)	1.382	0.054	0.000***
LFDI	0.014	0.005	0.000***
LPSI	0.105	0.010	0.000***
LVE	0.769	0.040	0.000***
LWTI	0.064	0.008	0.000***
LGDP	0.255	0.011	0.000***
Adjusted R^2: 0.996		α=0.007	

Significant codes: 0.01***, 0.05**, and 0.1*

Table 2: Matrix transition probabilities

	Regime 1	Regime 2	Duration
Regime 1	0.949	0.044	22.7
Regime 2	0.051	0.956	19.6

The model detects the periods of each state perfectly which is consistent with the Fijian tourism cycle. Spanning from 2000 to 2017, a total of 5 cycles have been successfully detected where the transition from recession to expansion are defined accordingly. Chronologically, the Fijian tourism sector has experienced 5 major happenings, namely, Fiji Coup in 2000, bursting of Dotcom Bubble in 2001, Global Oil Price Hike in 2005-2006, Subprime Mortgage Crisis and Constitutional Crisis 2008-2009 dragging till 2014, and the subsequent suspension from the Commonwealth in 2014. Based on the Fijian tourism cycle, the political instability and fluctuation of oil price have brought about adverse impact on its tourism ecosystem. However, there is always a "bounce back" effect from the recession period as mentioned by Medhioub (2015). Thus, the Fijian tourism cycle has the ability in forecasting the development of the Fijian tourism sector. The information gained can act as a guideline for policymakers and tourism industry players in policy establishment and investment in developing the Fijian tourism market.

The next section comprises the diagnostic tests for the model. As shown in Figure 2, the residuals are considerably fitted against the values. Following closely to the normal Q-Q plot in the same Figure 2, the residuals are like white noise and they are moving towards the normal distribution.

Figure 3 expresses the diagnostic results for the plot of the ACF and PACF between different regime functions. A comprehensive idea is shown on both regimes where the graph has a cut off on the PACF curve after the second lag. The blue line represents that the values

Figure 1: Graphic visualization of filtered and smoothed probabilities

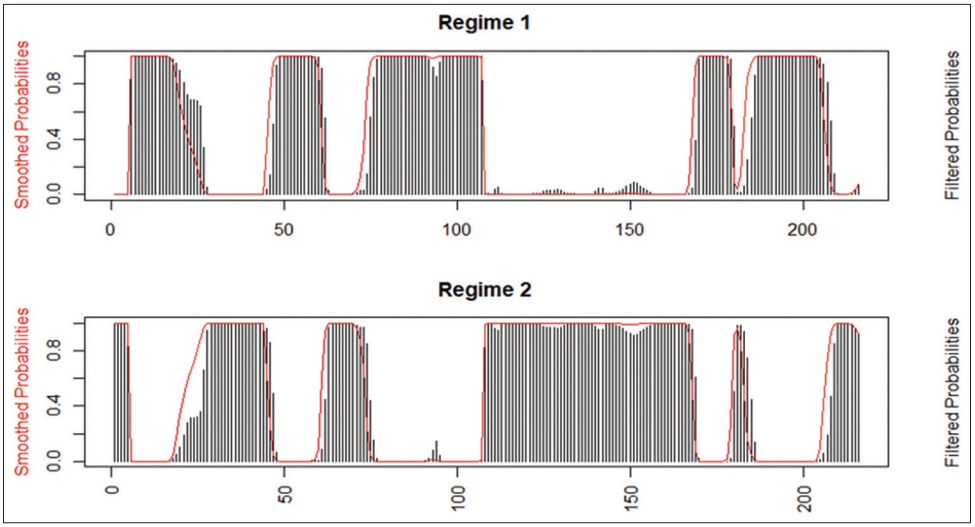


Figure 2: Residuals diagnostic checking results

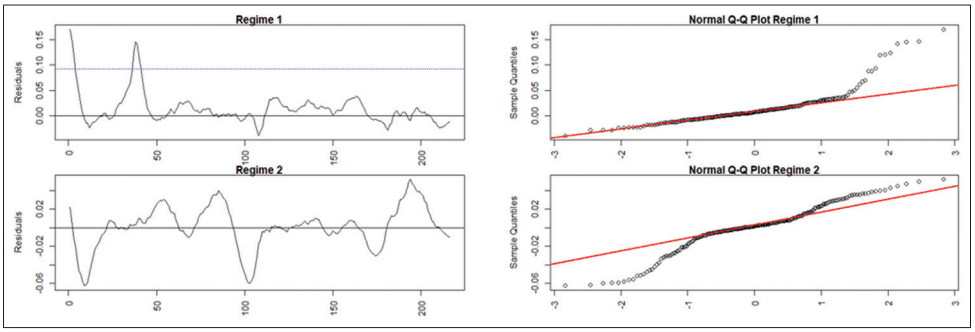
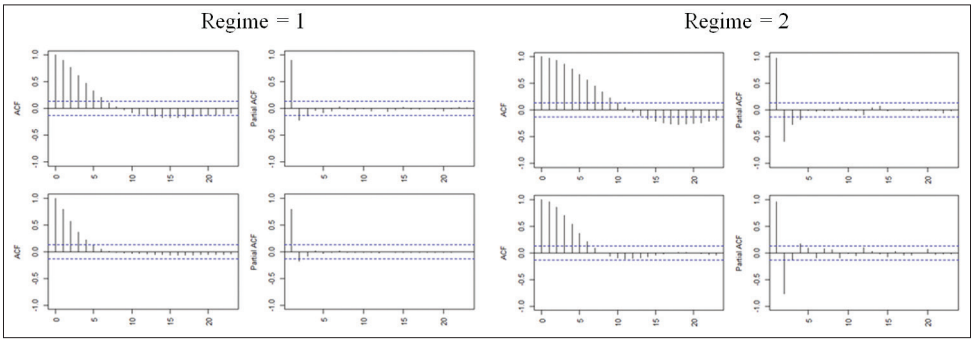


Figure 3: Autocorrelation function (ACF)/partial ACF of residuals



are significantly different from zeros. The cut off on the PACF curve means that this is most probably an AR (2) process. The facts owe to the ACF and PACF plots can provide us with an idea of the best fit model during the prediction. Nonetheless, there is further room for studies to be explored for out-of-sample forecasting.

5. CONCLUSION AND IMPLICATIONS

In brief, this study adopted a similar approach to that of Chen et al. (2015), Ozcan and Ucak (2016) and the recent study by Habibi (2017) to identify the determinants of Fijian inbound tourism modelling and to propose the Markov two-regimes switching to identify the shift probabilities from one regime to another. The empirical findings of using dynamic approach provide more robust results compared to the one state approach. There are a few advantages for established relationships using the Markov-switching regimes. For instance, the model is more stable due to the high persistency of regimes, a better description of data is provided, and the results performed are more robust for several modifications.

Considering the important role of the economy in tourism development, the Fijian government can enact a few initiatives to entice more inbound tourism to Fiji. For instance, a marketing campaign is a potential market driving force that can incorporate tourists' perceptions and consumer behaviours. Furthermore, political stability in the country is vital for the inbound tourists to ensure their security and safety when visiting the country. Tourism policymakers and authorities may utilize the empirical findings for decision making to sustain the Fijian tourism cycle and improve the potential of becoming a coveted tourism destination. Moreover, the government policy that advocate usage of renewable energy sources can improve the efficiency of energy used. In this case, the crisis of oil price hikes may have minimal impact on the tourism industry.

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