International incentive travelers arrival to Thailand: Forecasting by using time-series analysis

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ABSTRACT

This research is to study the international incentive travelers in Thailand. The purpose of this research is to study which forecasting models are the best for predicting the international travelers who choose Thailand to be their destination. The data was collected by Thailand Convention and Exhibition Bureau(TCEB) in quarterly since 2004 – 2015. The methodologies, that are used in this research, are Markov-switching vector autoregressive model(MS-VAR), Autoregressive model(AR), Autoregressive-bootstrapping approach, and Autoregressive-Bayesian approach. After testing the time-series data with seasonal unit root test, the MS-VAR is employed to divide the data into two regimes which are high season, and low season. The next step is to find which model will predict the future Incentive traveler accurately. The result show that in the high season period can use the Autoregressive-Bayesian approach to predict the future trend of Incentive travel. However, unfortunately, the low season of Incentive travel is only occurred in a quarter among the 48 variables. So that, there are no model that could use to forecast the low season of Incentive travel.

Keywords: MICE, Seasonal Fluctuations, Forecasting Trends, Time-Series Analysis
JEL Classification: C01, C11, C22, C52

1. Introduction. Tourism in Thailand has been grown up from the previous years. It is not benefit only the tourism business itself but also affects to the other business such as transportation, accommodation, food and entertainment, tour guide, advertising and public relation, and so on. Moreover, it helps to improve the economy in the country by creating the job for people who is own the business and people in the society. Thailand gained the tourists more than they expected which is increase about 20 percent from the recent year. However, a few years ago, tourism in Thailand has been develop. We have the new tourism category called incentive travel. The incentive travel is a reward for employees who reach the requirement of its company or organization. There are many organizations giving a meaning of this travel. All of them have the same idea and objective. It is a tool that helps to improve the employees' working performance and strengthen the relationship among workers and between employee and employer.

According to the TCEB, the total number of incentive traveler in 2004 - 2015. Thailand gained a large number of incentive traveler about 125,100 which is 50.77 percent from the year that we firstly do the data collection until the recent year in 2015. On one hand, the amount of visitor is always fluctuation depend on the effect of internal and external factors. The depression period was on 2007 which fell about 19.8 percent because of the political crisis in Thailand. On the other hand, the incentive travel arrival trend was growing about 62 percent in 2006, 25.03 percent in 2008 and grows in 5.65 percent in 2015. We expect to gain more of incentive traveler in current year. So that, we would like to do the forecasting of the incoming incentive traveler in the future. Also, it helps Thailand preparing the future incentive travel trend.

2. Literature review. Based on the data and information about the incentive travelers, there are some previous research studies that used the non-linear forecasting model. For example, Chaitip and Chaiboonsri (2014) Clements et al., (2004), Ricci and Holland (1992), Rodier and Johnston (1996), Terasvirta, (2016). Moreover, the research paper did study about the general detail and motivation of incentive travel which is benefit to the future researchers understanding the concept and the systematic of the new tourism trend. Shinew and Backman (1995) give the meaning and its characteristic. Also, another research Ricci and Holland (1992) did the research on the new trend of tourism. Moreover, a good work on" changing trends in business tourism" by Owen (1992) which is benefit for the young research in the tourism field to study what happened in that period of time.

3. Methodology

3.1 Research Framework. The research framework of this study use time series analysis to forecast the seasonal data of international incentive traveler arrival to Thailand since 2004 - 2015. Since the data is quite fluctuation, we decide to divide the data in to two parts. The first part of data is including the linear model and the second part we will consider about the non-linear model. So that, in the second part, we divide the data into two sessions which are high season and low season. After that, we will forecast each type of data by its appropriated model.

3.2 Methodological Approach. In this research, we use the econometric time series theories to analyze the data in this research that have been collected since 2004 – 2015 in quarterly. However, before we predict the international Incentive travelers' arrival to Thailand, we need to test the stationarity of data by using the seasonal unit root test. If the data is stationarity, then we separate the seasonal data by using the Markov- switching Vector Autoregressive Model. After that, the data will be predicted by the its appropriate models.
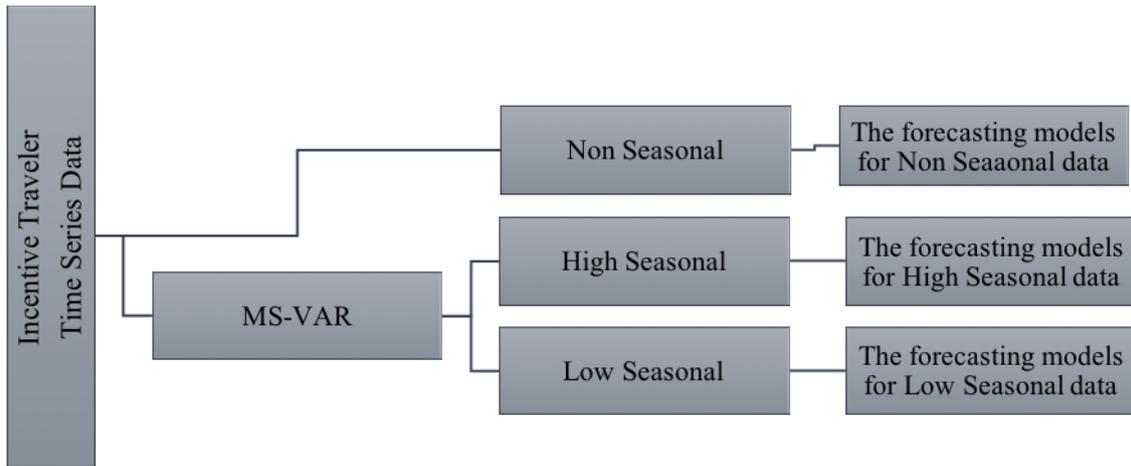
Figure 1. Research Framework

3.2.1 Seasonal Unit Root Test. In this study we use the Seasonal Unit Root test for making sure that the data is stationary or non-stationary. The seasonal unit root test using in this paper is based on HEGY test by Burridge and Taylor (2001). The HEGY test is used in time-series analysis to test the null hypothesis in the order integrated time-series.

3.2.2 Markov Switching Vector Autoregressive model (MS-VAR). Markov switching is used to analyze the behavior of variables for predicting the future behavior of the variable. As, the equation (1) is the basic equation of Markov switching vector autoregressive model. Moreover, the equation is used to separate the two type of data; high season and low season of the incentive travel trend. The first term will be defined the bull market or high season and the second term is defined the bear market or low season of the incentive travel trend. Equation (1) is the basic Markov switching vector autoregressive model and S_t is express the MS-VAR state.

$$y_t = B_{S_t} Y_{t-1} + \varepsilon_t \tag{1}$$

and

$$\varepsilon_t \approx N(0, \Sigma_{S_t}) \tag{2}$$

$$\Sigma_{m_t} = \begin{bmatrix} \sigma^2_{1,S_t} & \sigma_{1,2,S_t} \\ \sigma_{1,2,S_t} & \sigma^2_{2,S_t} \end{bmatrix} \tag{3}$$

3.2.3 Autoregressive linear Model (AR model). This model is autoregressive model with exogenous inputs. Exogenous variable is an independent variable that affects a model. It means that the model related the current value of a time series where one would like to explain or predict to both past value of the same series and current and past value of the driving series.

$$y_t = \alpha_0 + \alpha_1 y_{t\text{-}1} + \alpha_2 y_{t\text{-}2} + \cdots + \alpha_n y_{t\text{-}n} + \varepsilon_t \tag{4}$$

3.2.4 Autoregressive Model bootstrapping approach. The bootstrapping approach relies on random sampling with data replacement. It allows assigning measures of accuracy to sample estimates. According to the equation (5,) Y_t is defined as the incentive traveler number visiting Thailand since 2004 -2015

$$y_t = \emptyset_1 M_{t-1} + \emptyset_2 M_{t-2} + \cdots + \emptyset_p M_{t-p} + \varepsilon_t \tag{5}$$

3.2.5 Autoregressive Model Bayesian approach. In this research the Bayesian method has been employed according to the Bayes theorem which uses the statistical term to evaluate the uncertain data. Stamps and Frankenhuis (2016) also uses to define the complex data. The equation (6) is from the basic Bayesian model which is normally based on the probability of data. Probability is personal confidence in any one event. Before using the probability theory, we need to do conceptual experiment that is always coupled with the trial if the data is without any conceptual reasonable enough, it cannot take probability theory to the frequency used.

$$y_t = \beta + \emptyset_1 y_{t\text{-}1} + \emptyset_2 y_{t\text{-}2} + \cdots + \emptyset_n y_{t\text{-}n} + \varepsilon_t \tag{6}$$

4. Data. Before we do the forecast process, we need to get the appropriate data in order to accurately estimate the MICE tourism future trend. The data is a secondary data which is observed and collected by Thailand Convention and Exhibition Bureau (TECB). They compile the data in quarterly in each year. Also, this data is a time-series data which is consists of the number of MICE travelers visiting Thailand in 2004 until 2015 in quarterly.

5. Results. The data using in this research calculation is indicated the incentive visitor arrival to Thailand since 2004 – 2015 in quarterly. The observation of this calculation is 48. The maximum and minimum among the incentive tourists visiting is 86,064 on 2013 in quarter 2 and 17,518 on 2004 in quarter 4. After the calculation we confirm that these time-series data are a seasonal unit root as the result. The seasonal unit root test is the verification that during the period of that we expected to use the data to forecast, is stationary. Therefore, it implies that international incentive traveler coming over to Thailand is rely on seasonal period of time rather than visiting Thailand in yearly.

5.1 The result of Markov Switching Vector Autoregressive

The equation 6 and equation 7 implied the result of MS-VAR estimation.

$$\boldsymbol{y_{t_I}} = \mathbf{21.4} \boldsymbol{y_{t\text{-}1}} + \boldsymbol{\varepsilon_t} \quad \text{(High Seasonal)} \tag{7}$$

$$\boldsymbol{y_{t_I}} = \mathbf{-7.5} \boldsymbol{y_{t\text{-}1}} + \boldsymbol{\varepsilon_t} \quad \text{(Low Seasonal)} \tag{8}$$

From the equation above, it can be implied about the volatility of each regime. In the bull market or high season of incentive travel will take place a bit shorter than the bear market or low season of incentive travel. The matrix 1A and 1B are the transition probabilities matrix between two state.

$$p = \begin{bmatrix} 0.00 & 0.94 \\ 1.00 & 0.06 \end{bmatrix} \tag{1A}$$

$$\Sigma_{S_t} = \begin{bmatrix} \sigma^2_{1,S_t} & 0.20 \\ 0.21 & \sigma^2_{2,S_t} \end{bmatrix} \tag{1B}$$

5.2 Model selection for High season of international Incentive Traveler in Thailand

The table 1 below show the result of three models estimation in each markets such as Autoregressive model, Autoregressive model Bootstrapping approach, and Autoregressive model Bayesian approach in bull market of high seasonal. As the result, the appropriate state for forecasting in High season of Incentive travel in Thailand is on the second state.

TABLE 1. The model selection for forecasting international incentive traveler to Thailand for the high seasonal or bull market

	AR- Model (MLE) (RMSE)		AR-Model Bootstrap approach (MLE) (RMSE)		AR-Model Bayesian approach (Bayesian Factors)	
	Model 1 (Y_{t-1})	Model 2 (Y_{t-2})	Model 1 (Y_{t-1})	Model 2 (Y_{t-2})	Jeffreys' scale of evidence for Bayes factors	
					Model 1	Model 2
	31.37	29.48	29.48	29.48	19.5	0.0514
Model selection	(Y_{t-2})		(Y_{t-2})		(Y_{t-2})	

Source: Calculated by the another on the basic of Thailand Convention and Exhibition Bureau

5.3 Model evaluation of international incentive travelers to Thailand

This section is to define which model among the three chosen models estimation in each markets such as Autoregressive model, Autoregressive model Bootstrapping approach, and Autoregressive model Bayesian approach. The result recommends that the best model for bull market or high seasonal is Autoregressive model Bayesian approach.

TABLE 2. The model evaluation for forecasting international incentive traveler to Thailand

	AR- Model (MLE) (1)	AR-Model Bootstrap approach (MLE) (2)	AR-Model Bayesian approach (3)
High seasonal (RMSE)	29.96556335	34.13975903	29.79848791
Low seasonal (RMSE)	-	-	-
	Model evaluation		
High seasonal	(3) > (1) > (2)		
Low seasonal	-		

Source: Calculated by the another on the basic of Thailand Convention and Exhibition Bureau
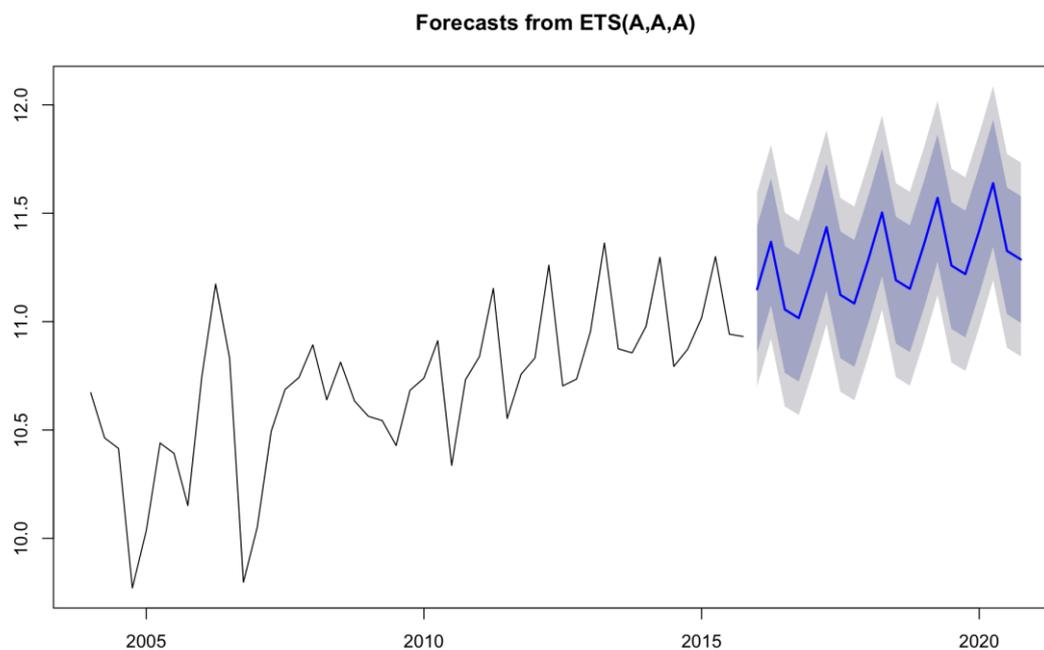
Source: Calculated by the another on the basic of Thailand Convention and Exhibition Bureau

Figure 2. International incentive travelers to Thailand from 2016 - 2020

6. Conclusions. All the models which are mentioned in this research can be used to forecast the time-series data of international incentive traveler arrival to Thailand in quarterly. The suitable model for forecasting the high season period can be used the Autoregressive-Bayesian approach. This may be the reason of the cost saving in each incentive trip, since the

incentive travel is a large group of people. If the travelers make a plan on high season, the cost might be double. In addition, in the next 15 years, the trend of international incentive travelers' arrival to Thailand in quarterly become the pattern. As the contrasting of incoming incentive traveler and tourist in each quarter, Thailand will need to deal with the promotion, campaign and tourism policy cautiously since the future trend of incentive travel is growing continuously. That mean, we will gain the more of incentive tourists in the future than the recent year.

As the result, this research will be benefit to any public and private sector in Thailand. They can prepare the policy and the equipment that are appropriate for the incoming incentive traveler. Also, this technique can help to predict the future travelers and help to manage and improve the tourism performance in the country. Moreover, Thailand government might need to promote the campaign that would persuade the incoming incentive tourists in the future. In addition, this research paper can be adapting to use with the future forecasting.

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