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Research Note

Determinants of the Taiwanese tourist hotel industry cycle

Ming-Hsiang Chen

Department of Finance, National Chung Cheng University, Chia-Yi, Taiwan, ROC

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ABSTRACT

This paper contributes to the tourism literature by examining determinants of the Taiwanese tourist hotel industry (THI) cycle. This study uses a Markov-switching model (MSM) proposed by Hamilton (1989) to analyze the Taiwanese tourist hotel industry cycle. The MSM decomposes the tourist hotel industry cycle into two distinct states: high-growth and low-growth (HGS and LGS). The mean growth rate of HGS is 1.5% and the average growth rate of LGS is 0.07% during the period from December 1999 to February 2011. The corresponding standard deviations in the two regimes are 0.008% and 0.038%, implying that HGS is more stable than LGS. Moreover, the probability of staying in HGS is 94% and the probability of remaining in LGS is 65%. The expected durations of HGS and LGS are about 16 and 3 months, respectively. Further, the paper investigates the factors that keep the THI in HGS. Empirical test results show that growth in the international tourism market and industrial production growth rate are two key factors that keep the THI in HGS, but the SARS outbreak in 2003 has had an adverse effect.

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1. Introduction

The tourist hotel industry (THI) in Taiwan has grown rapidly. According to the Annual Report of the Tourism Bureau of Taiwan (TBT, 2011), there were 44 tourist hotels in 1985.1 Since then the number of tourist hotels has risen by 186.4% to 106 at the end of 2011.

The Taiwanese government’s efforts explain the rapid expansion of THI in Taiwan. Taiwan has traditionally been an export-oriented country, not a popular international tourist destination. However, understanding that the proceeds from tourism expansion can represent a significant income source for the national economy (Kim et al., 2006), the Taiwanese government has begun developing its international tourism market. Moreover, Chen (2011) showed that the development of the Taiwanese THI relies on the growth of the tourism market, proxied by the growth of total foreign tourist arrivals. Specifically, the tourism market expansion could explain 53% of occupancy rate, 92% of revenue per available room, 45% of return on asset and 48% of return on equity of tourist hotels in Taiwan.

Since 2002, the Taiwanese government has implemented many tourism strategic plans to promote international tourism. In that year, the TBT introduced the “Doubling Tourist Arrivals Plan” (DTAP), designed to strengthen the national economy by attracting 5 million international visitors to Taiwan by 2008. Although the DTAP was a casualty of poor global economic performance and the outbreak of Severe Acute Respiratory Syndrome (SARS) in 2003, the TBT introduced several more tourism promotion plans to promote international tourism and attract more foreign tourists. In 2005, the Tourism Flagship Plan was launched to promote the nation’s top attractions and cultural festivals. The Tour Taiwan Years 2008–2009 Plan introduced at the end of 2007 was intended to attract 4.25 million foreign visitors to Taiwan by 2009.

Moreover, Taiwan opened its tourism market to Chinese tourists in 2008. The Taiwanese president Ma Ying-Jeou has endorsed stronger economic ties with China since taking office in May 2008 (TBT, 2008). One of his policies was to re-open direct flights between Taiwan and China, which had been banned since 1949. Taiwan and China signed the agreement to restore regular direct flights between the two regions on June 13, 2008 and direct flights resumed on July 4, 2008. Since then, up to 3000 Chinese tourists a day are allowed to visit Taiwan and the number increased from 3000 to 7200 after May 2009. In 2011, Chinese tourists were allowed to visit Taiwan without having to join tour groups. According to the Annual Statistics of Tourism 2010 (TBT, 2011), the total number of foreign visitors to Taiwan has increased from 1.022...
million in 2001 to 3.246 million in 2010, approximately a 218% growth rate over the 10-year period. This phenomenal growth of the tourism market growth is expected to create a significant demand for hotels, thereby improving the corporate performance of the Taiwanese tourist hotel companies.

The fast-growing THI in Taiwan has attracted academic researchers’ attention and spurred many empirical research studies. Although previous studies have made different contributions to the body of research on THI in Taiwan, no empirical work has analyzed the Taiwanese THI cycle. This study makes another contribution to the tourism literature by examining determinants of the Taiwanese tourist hotel industry cycle. The examination follows two steps.

First, this study uses a Markov-switching model (MSM) proposed by Hamilton (1989) to analyze the Taiwanese THI cycle. Based on an MSM, this study can estimate the probabilities of high- and low-growth THI states, each with its specific characteristics (i.e., unique mean and variance). This analysis can shed light on the characteristics of the Taiwanese THI and empirical findings provide valuable information and have important implications for hotel business owners and managers in Taiwan. Note that although the references to the MSM within the context of tourism demand are sparse, this study is not the only work in the tourism industry. The remainder of this article is organized as follows. Section 2 describes the data and the Markov-switching model. Section 3 presents empirical test results. Section 4 shows the determinants of the Taiwanese THI cycle. Section 5 concludes the study with a discussion of major findings.

2. Data and model

2.1. Data

This study uses the total sales revenue of the Taiwanese tourist hotels to analyze the Taiwanese THI cycle. Taken from the Taiwan Economic Journal database, the aggregate sales revenue data of the tourist hotels were only available on a monthly basis. The study sample covers December 1999 to February 2011. Fig. 1 plots the total sales revenue of tourist hotels over the period under analysis.

As shown in Fig. 1, the terrorist attacks of September 11, 2001 in the US had a negative impact on the sales revenue of the tourist hotels in Taiwan. The Taiwanese THI experienced the sharpest decline in total sales revenue in 2003 in the wake of the outbreak of SARS on April 22, 2003. Since then, the Taiwanese THI maintained an upward growth trend until 2008. The 2008 global financial crisis caused significant declines in personal income and travelers/tourists, which then created a decline in sales of the THI. However, the sales of the Taiwanese THI have made a strong recovery since the last six months of 2009.

In addition, the monthly data of sales revenue of the tourist hotels is seasonally adjusted to account for the issue of seasonality. Before the analysis, the unit root test proposed by Elliott, Rothenberg, and Stock (1996) is performed to examine the stationarity of the monthly sales revenue data. Test results indicate that the null hypothesis of one unit root cannot be rejected for levels, but is rejected for their first differences, suggesting the nonstationarity of the monthly sales revenue data. The summary statistics of the monthly sales growth rate of tourist hotels (SGt = (Sales t − Sales t−1)/Sales t−1 × 100%) are as follows. The mean value of SGt over the entire sample period is 1.351%, ranging from −36.768% to 46.328% with a standard deviation of 11.102%.

2.2. The Taiwanese THI cycle model

As stated earlier, an MSM is used to model the business cycle of the Taiwanese THI. Consider the following two-regime Markov-switching model of the THI cycle:

\[
SG_t - \alpha_s = \sum_{i=1}^{q} \phi_i (SG_{t-i} - \alpha_{s_i}) + \epsilon_t,
\]

\[
\alpha_s = \alpha_0 (1 - S_t) + \alpha_1 S_t,
\]

where \( \phi \) is the coefficients on the autoregressive terms, \( S_t = 0 \) or 1 represents the unobserved state of the THI cycle, and \( \epsilon_t \sim i.i.d.N(0, \sigma^2) \). \( \alpha_0 \) and \( \sigma_0 \) are the state-dependent conditional mean and standard deviation of \( SG_t \) respectively. Thus, \( \alpha_0 (\alpha_1) \) is the mean growth rate of state 0 (state 1) and \( \sigma_0 (\sigma_1) \) is the standard deviation of state 0 (state 1) of THI.

The appropriate lag length of the autoregressive specification AR(q) as given in Eq. (1) is selected based on the smallest value of Schwarz’s Bayesian Criterion (Schwarz, 1978): 

\[
SBC = n \log(\text{ssr}) + k \log(n),
\]

where \( n \) is the number of observations, \( \text{ssr} \) is the sum of squared residuals and \( k \) represents number of regressors. Further, the conditional distribution of \( SG_t \) given \( S_t \) is modeled as:

\[
f(SG_t | S_t = i; \theta) = \frac{1}{\sqrt{2\pi \sigma^2_i}} \exp\left(-\frac{(SG_t - \mu_i)^2}{2\sigma^2_i}\right),
\]

where \( f(\cdot) \) is the normal density and \( \theta \) is a vector for parameter, \( \theta = (\alpha_0, \alpha_1, \sigma_0, \sigma_1, \phi_0, \phi_1) \). The variables are estimated based on the Maximum Likelihood Estimation (MLE) approach (Hamilton, 1989).

The specification above shows that the state of THI cycle would follow a two-state Markov chain. The transition from one state to the other is modeled as a Markov chain process and depends on probabilities of transition between the two regimes. A two-state Markov process with fixed transition probability matrix is given as follows:

\[
P = \begin{bmatrix} P_{00} & P_{01} \\ P_{10} & P_{11} \end{bmatrix},
\]

where \( P_{00} = \Pr[S_t = 0 | S_{t-1} = 0] \), \( P_{10} = \Pr[S_t = 1 | S_{t-1} = 0] = (1 - P_{00}) \).
3. Empirical test results

According to the Schwarz’s Bayesian Criterion, the appropriate lag length of autoregressive specification AR(q) as given in Eq. (1) is 1 and an AR(1) model is used to analyze the Taiwanese THI cycle. Table 1 summarizes the parameter estimates from the MSM using maximum likelihood estimation. As shown in Table 1, the model separates the sales growth rate of the Taiwanese tourist hotels into two distinct states. In addition, the average growth rate of state 0 is 1.5% and that of state 1 is 0.7%, indicating that state 0 is the high-growth state (HGS) and state 1 is the low-growth state (LGS). Accordingly, the standard deviations of HGS and LGS are 0.8% and 3.8%, respectively. The parameter estimates for the transition probabilities are as follows: $P_{00}$ = 0.94 and $P_{11}$ = 0.65, suggesting that $P_{01} = 0.06$ and $P_{10} = 0.35$.

Fig. 2 plots the smoothed probability of the THI being in the HGS and LGS. Following Hamilton (1989), we can infer the periods of the THI in state 0 or state 1 and determine the turning point of the THI cycle.

$$P_{11} = \Pr[S_{t} = 1|S_{t-1} = 0].$$

$$P_{01} = \Pr[S_{t} = 0|S_{t-1} = 1] = (1 - P_{11}).$$

$P_{00}$ ($P_{11}$) denotes the probability (denoted by Pr) of staying in state 0 (state 1) and $P_{10}$ ($P_{01}$) represent the probability of switching from state 0 (state 1) to state 1 (state 0). Following Hamilton’s (1989) suggestion, we can use the smoothed probability to check whether the THI is in state 0 or state 1 and determine the turning point of the THI cycle.

4. Determinants of the Taiwanese THI cycle

To examine determinants of the Taiwanese THI cycle, we run the following regression test:

$$\text{Pr}(\text{bull})_{t} = a_{0} + a_{1}\Delta TA_{t} + a_{2}\text{UEP}_{t} + a_{3}\Delta \text{EX}_{t} + a_{4}\text{INF}_{t} + a_{5}\Delta MS + a_{6}\Delta IP_{t} + a_{7}\text{SMR}_{t} + a_{8}\text{D911} + a_{9}\text{DSARS} + e_{t},$$

where $\text{Pr}(\text{bull})$ is the smoothed probability of the THI being in the HGS, and $\Delta TA$, $\text{UEP}$, $\Delta \text{EX}$, $\text{INF}$, $\Delta MS$, $\Delta IP$ and $\text{SMR}$ denote growth rate of foreign tourist arrivals, changes in unemployment rate, percentage changes in exchange rate (measured by the New Taiwan Dollar/Dollar), respectively.

$$E_{t} = \sum_{k=1}^{\infty} kP_{00}^{k-1}(1 - P_{00}) = \frac{1}{1 - P_{00}} = 15.96.$$  

Similarly, the expected duration of LGS is

$$E_{t} = \sum_{k=1}^{\infty} kP_{11}^{k-1}(1 - P_{11}) = \frac{1}{1 - P_{11}} = 2.89.$$  

To examine if indeed there are switching states, this study tests the null hypothesis $H_{0}$: $a_{0} = a_{1}$. Under this hypothesis, SG follows a stochastic process as described by model with the mean growth rate the same in both states. If $a_{0} = a_{1}$, it implies no switching states because the states have the same mean growth rate. A Wald statistic for testing the null hypothesis is given by:

$$\frac{(\hat{a}_{0} - \hat{a}_{1})^{2}}{\text{var}(\hat{a}_{0}) + \text{var}(\hat{a}_{1}) + 2\text{cov}(\hat{a}_{0}, \hat{a}_{1})} = \chi^{2}(1).$$

The Wald test statistic is 6.56. Given that the 5% critical value of a $\chi^{2}(1)$ is 3.84, the null hypothesis is rejected at the 5% significance level, implying that there are switching states.

Table 1: Estimation results.

| Parameter | Coefficients (standard error) | p-Value |
|-----------|-------------------------------|---------|
| $a_{0}$   | 0.015 (0.002)                 | 0.000***|
| $a_{1}$   | 0.007 (0.000)                 | 0.000***|
| $a_{2}$   | 0.008 (0.001)                 | 0.000***|
| $a_{3}$   | 0.036 (0.002)                 | 0.000***|
| $a_{4}$   | 0.153 (0.084)                 | 0.089** |
| $P_{00}$  | 0.940 (0.100)                 | 0.000***|
| $P_{11}$  | 0.650 (0.030)                 | 0.000***|

Note: *significance at the 10% level. **Significance at the 1% level.

Fig. 2: The smoothed probability of the THI being in the HGS and LGS.
Hotel business managers are concerned with the overall economic condition because a good economic condition or development would have a positive effect on hotel firms. A positive economic impact usually leads to an increase in sales and hence improves the performance of hotel firms. For example, Chen, Kim, and Kim (2005) found that UEP and ΔMS had a significant influence on the Taiwanese hotel stock returns. Chen (2007) demonstrated that ΔIP could significantly promote financial performance of hotel companies. In addition to the general economic variables, Chen (2010) argued that tourism market growth, proxied by ΔTA, could have a strong and positive effect on hotel performance. On the one hand, ΔTA can directly enhance the development of hotel industry by raising the occupancy rate and sales revenue. On the other hand, ΔTA can significantly improve economic condition, which has an indirect impact on the corporate performance of hotel firms.

The potential impact of some mega events related to the tourism industry is likewise taken into consideration. Chen et al. (2005) and Chen (2010, 2011) reported that the terrorist attacks of September 11, 2001 in the U.S. and the SARS outbreak in April 2003 in Taiwan had a significant influence on various measures of corporate performance of the Taiwanese hotels. Thus, the test equation includes two dummy variables D911 and DSARS that represent the terrorist attacks of September 11, 2001 in the US and the SARS outbreak in April 2003, respectively. Two non-economic event dummy variables take the value of 1 during the corresponding month on the event date and 0 otherwise.

This study uses the approach of Newey and West (1987) to attain consistent estimates by correcting for the possible presence of autocorrelation and heteroscedasticity in Eq. (8). Empirical results in Table 2 illustrate that ΔTA, ΔIP and DSARS have significant effects on Pr(bull). These results contribute to the literature of the empirical studies on the Taiwanese tourist hotel industry by showing that ΔTA, ΔIP and DSARS are three significant factors that keep the THI in HGS. Specifically, the influences of ΔIP and ΔTA are positive and the effect of DSARS is negative, both of which are consistent with results in Chen (2007, 2010). The adjusted R-squares suggest that among three significant factors, ΔTA explains the highest percentage of the variation in Pr(bull). Specifically, ΔTA, ΔIP and DSARS can explain approximately 20%, 9% and 13% of the variation in Pr(bull), respectively.

5. Conclusion

This study uses a two-regime MSM to analyze the Taiwanese THI cycle. The model explicitly decomposes the THI cycle into HGS and LGS. The characteristics of both regimes and some important implications are presented. First, the mean growth rates of HGS and LGS are 1.5% and 0.07%, respectively. In other words, the mean growth rate of HGS is more than 20 times of the size of LGS. These results imply that the industry has somehow avoided entering a recession for the past 12 years because even the mean growth rate of LGS was positive. Moreover, the standard deviation (risk) in two regimes is 0.008% and 0.038%, meaning that HGS is more stable than LGS.

Second, the probability of the industry staying in HGS is 94% and the probability of remaining in LGS is 65%, meaning that the probability of the industry going from HGS (LGS) to LGS (HGS) is 0.06% (35%). The findings indicate that the industry has a high tendency to stay in HGS and low tendency to shift from HGS to LGS. Third, the expected duration of HGS is about 16 months, and that of LGS is about three months. This shows that the Taiwanese THI cycle is asymmetric and especially the expected duration of HGS of THI is about five times longer than that of LGS.

The interesting characteristics of the THI cycle found in the study suggest that the THI is a promising sector in Taiwan. Furthermore, given that sales growth and profitability of the Taiwanese tourist hotels depend on the international tourism market growth (Chen, 2011) and the financial success of tourist hotels can significantly improve Taiwan's GDP growth (Chen, 2007), it is indeed appropriate for the Taiwanese government to use long-term tourism strategic plans to promote the international tourism market and THI, which can strengthen Taiwan's national economy.

In addition, the study tests what factors keep the THI in HGS. Empirical test results show that ΔTA, ΔIP and DSARS are three significant determinants. Note that the SARS outbreak is the unexpected crisis event, whereas ΔIP and ΔTA can be viewed as economic and industry-specific factors, respectively. Among three factors, ΔTA is the major force that keeps the THI in HGS. The proportion of the variation in the probability of the THI being in the HGS explained by industry factor ΔTA is more than twice that explained by the economic factor ΔIP. These findings reinforce the importance of the Taiwanese government’s tourism strategic plans to enhance the tourism market growth and keep the THI in HGS.

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**Table 2**

| Regression test results. | Regression I | Regression II | Regression III | Regression IV |
|--------------------------|--------------|---------------|----------------|---------------|
| Constant                 | 0.815 (22.20)** | 0.265 (4.35)** | 0.779 (19.63)** | 0.047 (22.44)** |
| ΔTA                     | 0.004 (3.43)** | 0.005 (2.283)** | -              | -              |
| UEP                     | -0.178 (-1.08) | -              | -              | -              |
| ΔEX                     | -0.001 (-0.02) | -              | -              | -              |
| INF                     | 0.003 (0.25)   | -              | -              | -              |
| ΔMS                     | 0.003 (0.26)   | -              | -              | -              |
| ΔIP                     | 0.067 (3.33)** | -              | 0.082 (4.39)*** | -              |
| SMR                     | 0.005 (1.50)   | -              | -              | -              |
| D911                    | -0.109 (-0.42) | -              | -              | -              |
| DSARS                   | -0.761 (-4.98)** | -              | -0.628 (-7.79)***** | -              |
| F-statistic [p-value]    | 12.749 [0.00]** | 17.568 [0.00]***** | 12.777 [0.00]***** | 20.429 [0.00]***** |
| Adjusted R²             | 0.408         | 0.199          | 0.085          | 0.130          |

Note: figures in parentheses are t-values. *Significant at the 10% level, **significant at 5% level, ***significant at 1% level.

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3 Data on gross domestic product (GDP) are normally used as the proxy for economic conditions and however usually available on a quarterly basis. Industrial production (IP) measures business development that is more narrowly focused on the manufacturing side of the economy. Using IP data that is a monthly measure can hence provide more sample observations.
Finally, while $\Delta TA$, $\Delta IP$ and DSARS are found to be significant factors of the THI cycle, the three factors together can only explain about 42% of the variation of the THI in HGS. This indicates that a large portion of the probability of the THI in HGS is still unexplained and could be impacted by other factors. One potential determinant is the development of the global economy, which is expected to have a strong influence on $\Delta TA$. Future studies can examine whether the global economic condition or some other factors could significantly affect the THI cycle.

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Ming-Hsiang Chen, PhD, is a professor of finance at the National Chung Cheng University, Taiwan. Areas of research are hospitality finance and tourism economics (http://www.ccunix.ccu.edu.tw/~finmhc/).