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The response of hotel performance to international tourism development and crisis events

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ABSTRACT

This study uses panel regression tests to examine the response of hotel performance to international tourism development and crisis events in Taiwan. Hotel performance measures are revenue (revenue per available room and occupancy rate), profitability (return on assets and return on equity) and stock performance. The crises were the earthquake on September 21, 1999 (the 9/21 earthquake), the terrorist attacks of September 11, 2001 in the US (the 9/11 terrorist attacks) and the outbreak of Severe Acute Respiratory Syndrome on April 22, 2003 (the SARS outbreak). This study makes four major contributions. First, test results confirm that international tourism development (ITD), proxied by the growth of total inbound tourist arrivals, has a more direct influence on hotel sales and profitability than it does on hotel stock performance. Second, this study identifies that the absence of a strong tie between ITD and hotel stock returns that was found in previous studies is due to the time-varying discount rate caused by investors' changing expectations for the prospect of future cash flows from holding hotel stocks. Third, this study finds new evidence that while the poor performance of hotel stocks caused by the 9/21 earthquake and the 9/11 terrorist attacks was attributed to the loss of hotel sales revenue, the adverse effect of the SARS outbreak on hotel stock returns is attributed not only to decreased hotel sales revenue but also to the increased discount rate. Lastly, this study is the first to investigate whether the response of hotel stock returns to ITD depends on the state of economy and concludes that the response of hotel stock performance to ITD in business cycle contraction is statistically different from that in business cycle expansion. Further, although the influence of ITD on hotel stock performance is still irrelevant during expansion periods, ITD can significantly enhance hotel stock returns during contraction periods.

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1. Introduction

Many countries have attempted to build their international tourism industry because of its potential to contribute to the national economy through foreign exchange earnings. Economic benefits generated from international tourism development include tax revenues, increased employment, and additional sources of income (Archer, 1995; Dritsakis, 2004; Durbarry, 2002; Sinclair, 1999; West, 1993). A strong association between international tourism development and economic performance is hence generally assumed.

A strong link between international tourism development and economic growth has been found in Taiwan. Research studies reported that the tourism industry was one of major contributors to Taiwan's economic growth. Chen et al. (2009), Kim et al. (2006) and Jang and Chen (2008) revealed that the tourism sector has contributed more than the agriculture sector to the gross domestic product (GDP) in Taiwan. According to the World Travel and Tourism Council (2009), the aggregate tourism earnings accounted for 3.46% and 3.34% of Taiwan's GDP in 2007 and 2008, respectively. The World Economic Forum (2009) indicated that Taiwan's foreign exchange earning from tourism was US$5.1 billion in 2007 and represented 1.34% of the GDP, which is higher than the corresponding figures in the US, Canada, Germany, Japan, South Korea and China. Kim et al. (2006) and Chen and Chiou-Wei (2009) further showed that international tourism development in Taiwan could promote economic growth.

Knowing an imperative impact of international tourism development on the national economy, the Taiwanese government has implemented several tourism strategic plans to promote international tourism. In 2002, the Doubling Tourist Arrivals Plan (DTAP) was introduced as part of the National Development Plan named "Challenge 2008," which was designed to reinforce Taiwan's overall economy. The DTAP aims to double the number of foreign tourist arrivals to Taiwan and particularly attract 5 million international visitors to Taiwan by 2008. In 2005, the Tourism Bureau of Tai-

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wan further introduced another tourism promotion plan, called the Tourism Flagship Plan, to promote the nation's top attractions and cultural festivals (Tourism Bureau of Taiwan, 2005).

However, the number of total foreign tourist arrival was only 3.85 million. The failure of the DTAP may due to the poor global economic performance, the terrorist attacks on September 11, 2001 in the US and the outbreak of severe acute respiratory syndrome (SARS) in 2003. To promote international tourism and attract more foreign tourists, the Taiwanese government introduced another plan, called Project Vanguard or Excellence in Tourism. This project aims to attract 4 million international visitors to Taiwan in 2009 and make Taiwan as one of major tourist destinations in Asia.

At the same time, the expansion of international tourism market in Taiwan increases demand for local hotels and hospitality services. The number of general hotels has increased from 2973 in 1985 to 3750 in 2009, whereas the number of tourist hotel has increased from 44 in 1985 to 95 in 2009 (Tourism Bureau of Taiwan, 2009). The 95 tourist hotels are classified into two groups: 31 general tourist hotels and 64 international tourist hotels. International tourist hotels are much more upscale than general tourist hotels and general hotels, providing better quality of facilities, management and service. The first hotel stock traded in the Taiwan stock market was the stock of the Hotel Holiday Garden (international tourist hotel) in 1965. Since then, seven hotel stocks have been listed on the Taiwan Stock Exchange and two hotel stocks are traded in the over-the-counter market.

As the international tourism industry expands, hotel companies are expected to benefit from the expansion of the inbound tourism market due to high occupancy rate, which means better sales earnings and corporate performance. Nonetheless, although the financial performance of hotel firms is expected to be closely related to the expansion of inbound tourism, previous research studies have found no significant relationship between tourism expansion and stock performance of hotel firms (Chen, 2007a,c). Chen (2007a) investigated the impact of some selected economic variables and inbound tourism expansion factor on the stock performance of hotel companies in Taiwan. Hotel stock returns were found to be more sensitive to general economic state variables. Inbound tourism expansion had a positive but not statistically significant effect on hotel stock performance. Similarly, inbound tourism expansion variable could not satisfactorily describe hotel stock returns in China (Chen, 2007c).

While Chen (2007a) and Chen (2007c) identified the disconnection between inbound tourism growth and hotel stock performance, neither study was able to offer clear explanations for this result. This study argues that the insignificant link between hotel stock returns and inbound tourism expansion may be attributed to the following reason. The price of a stock (*Price*), based on the dividend discount model, is determined by the future earnings/dividend stream and the discount rate used in valuing expected earnings flows (Bodie et al., 2009; Ross et al., 2008):

$$Price_t = \sum_{t=1}^{\infty} \frac{Dividend_t}{(1+k)^t}, \tag{1}$$

where

$$Dividend_t = q \times Net\ Income_t,$$

$$Net\ Income_t = EBIT_t - IP_t - Tax_t,$$

$$EBIT_t = Sales_t - Cost_t - Depreciation_t,$$

EBIT is earnings before interest and taxes, *Cost* is cost of goods sold, *Tax* is the tax payment, *IP* represents interest payments on the firm's debt, q is the dividend payout ratio and k is the discount rate used in valuing expected earnings flows (i.e. the perceived riskiness of cash flows from holding a stock), which is generally assumed to remain constant. Thus, oscillations in stock price can be affected not only by changes in corporate earnings, but also by changes in the discount rate.

The increasing inflow of foreign tourist arrivals is expected to benefit hotel sales earnings directly by raising hotel occupancy, but it may not have a significant influence on the discount rate. If stock investors can alter their perceptions of the riskiness of a given stock's cash flows, the discount rate will be time-varying rather than constant. Accordingly, no matter how much earnings generated from strong expansion in inbound tourism market, a non-constant discount rate can break the link between inbound tourism expansion and hotel stock performance. This may explain why previous studies failed to find a significant tie between inbound tourism expansion and hotel stock returns.

The goal of this study is hence to examine the response of hotel performance to the development of international tourism in Taiwan. Unlike Chen (2007a) and Chen (2007c) who examined the effect of inbound tourism expansion only on hotel stock performance, this study investigates the impact of inbound tourism growth on various hotel performance measures, including revenue and profitability in addition to stock return. Two performance measures of revenue are revenue per available room and occupancy rate, whereas return on assets and return on equity are measures of profitability.

This study contributes to the literature by testing the following hypotheses and offering explanations for the empirical findings that are missing from past studies. First, inbound tourism expansion would have a more direct impact on sales revenue and profitability of hotel companies than it would on hotel stock return (Hypothesis I). The first hypothesis is then tested through an examination of the influence of international tourism development on several hotel performance measures, including sales revenue, profitability and stock return.

Second, the absence of a significant relationship between foreign tourist inflows and the stock market valuation of hotel companies noted in previous studies may be due to the time-varying discount rates, i.e. time-varying degrees of perceived riskiness in hotel earnings. To test the second hypothesis, the current study examines whether inbound tourism growth can significantly impact the discount rate used in valuing expected earnings flows, proxied by risk of hotel stock returns. Specifically, if inbound tourism growth has a strong influence on hotel sales earnings but not on hotel stock returns, it is expected to have no significant impact on risk of hotel stock returns (Hypothesis II) since both changes in sales revenue and changes in the discount rate can affect hotel stock returns.

Third, several studies have reported that the international tourism development in Taiwan had been seriously harmed by natural disasters, terrorism and epidemics (Chen, 2007b; Chen et al., 2005, 2007; Huang and Min, 2002; Kim et al., 2006; Wang, 2009). The damage to inbound tourism development caused by the earthquake on September 21, 1999 (the 9/21 earthquake), the terrorist attacks of September 11, 2001 in the US (the 9/11 terrorist attacks) and the outbreak of Severe Acute Respiratory Syndrome on April 22, 2003 (the SARS outbreak) through a sharp drop in the foreign visitors to Taiwan is expected to weaken the sales/earnings and financial performance of Taiwanese hotel companies. Empirical studies have confirmed this expectation.

Chen et al. (2005) showed that the 9/21 earthquake, the 9/11 terrorist attacks and the SARS outbreak significantly hurt Taiwanese hotel stock returns. The authors associated the negative impact of three crisis events on hotel stock performance with the decrease in the number of international tourists and thus in hotel sales earnings. This study argues that the plunge in foreign tourist arrivals

caused by the three crises not only weakened hotel revenue, but also increased the perceived risk of investments in hotel stocks. Therefore, investors' perceived riskiness of cash flows from holding hotel stocks soared and led to an upward revision in the discount rate after the three crisis events. This study hypothesizes that the destructive effect of the three crisis events on hotel stock returns could be attributed both to decreased hotel sales earnings and to the increased discount rate (Hypothesis III). Similar to the test of Hypothesis II, whether these three crisis events have a significant influence on risk of hotel stock returns is examined to test the third hypothesis.

Finally, this study hypothesizes that there is a cyclical variation in the response of hotel stock performance to international tourism development, i.e. the response of hotel stock returns to inbound tourism expansion depends on the state of the economy (Hypothesis IV). Specifically, the effects of inbound tourism growth on hotel stock returns are expected to be stronger in business contraction than in business expansion. The rationales for the fourth hypothesis are as follows.

When the hotel industry is anticipated to perform well in an expanding economy, the beneficial influence of expansion in inbound tourism market on hotel sales may be relatively weaker than the effects from the improved business conditions and other factors and hence has no strong influence on the discount rate. As stated earlier, a time-varying discount rate caused by investors' changing perceptions about the riskiness of cash flows can still break the link between hotel stock performance and inbound tourism expansion. Nonetheless, as hotel sales revenue deteriorates in economic downturns, the growing inflow of foreign tourist arrivals is very good news during business cycle contraction. The good news from inbound tourism market may have a relatively stronger influence on investors' perceptions about the riskiness of cash flows holding hotel stocks in business contraction than in business expansion. Thus, while inbound tourism growth cannot significantly affect hotel stock performance as found in previous studies, it may have a strong impact on hotel stock returns during business contraction.

The rest of the paper is organized as follows. Section 2 reviews the literature. Section 3 presents the data and panel data methodology. Empirical results are reported in Section 4. Discussions of the major findings and policy implications are addressed in Section 5. Section 6 concludes the paper and offers some future research directions.

2. Literature review

Many developed and developing countries have turned to tourism as a vehicle for economic growth. Tourism as a development strategy has several advantages over exports. Mihalic (2002) noted that local products are less expensive because of lower or no transportation or insurance costs, and can therefore be sold to foreign tourists at a higher price. Further, some perishable goods, due to insufficient export capability and global marketing expertise, can only be sold to foreign tourists in the domestic market. Proenca and Soukiazis (2008) stated that international tourism development has direct and indirect spillover effects on many economic activities, such as transport, commerce, construction, lodging, and food and beverage industries.

On the one hand, several researchers have offered theoretical explanations for the link between inbound tourism expansion and economic growth. Copeland (1991) illustrated a significant impact of inbound tourism development on output and welfare in the host country based on a general equilibrium international trade model. Hazari and Sgro (1995) employed a dynamic growth model to show that inbound tourism expansion can raise foreign imported capital accumulation and hence improve domestic welfare by increasing consumption.

On the other hand, many research studies hypothesized the positive connection between international tourism development and economic growth and empirically tested the tourism-led growth that tourism plays a key role in achieving higher economic growth. Balaguer and Cantavella-Jorda (2002) investigated the causal relationship between tourism receipts and economic growth to test the tourism-led growth hypothesis in Spain. Cointegration test result indicated a long-run link between tourism receipts and gross domestic product (GDP). Causality test result found a one-way causality from growth in tourism receipts and GDP growth. These findings imply that tourism expansion can cause economic growth and thus support the tourism-led hypothesis.

The one-way causal relation from tourism expansion and economic development is also found in Nicaragua (Croes and Vanegas, 2008), Turkey (Gunduz and Hatemi-J, 2005) and some African countries (Fayissa et al., 2008). However, Oh (2005) argued that the tourism-led growth existed in Spain because Spain was one of the world's top international tourist destinations. The contribution of tourism development to South Korea was not as high it was to Spain. He detected no long-term relationship between tourism and economic growth and a one-way causality from economic growth to tourism development in South Korea. That is, there is an economically driven growth instead of a tourism-led growth hypothesis in South Korea.

In comparison, Dritsakis (2004) and Kim et al. (2006) showed that the causality between tourism expansion and economic growth is two-way, not one-way. Dritsakis (2004) found a long-term connection between tourism receipts and GDP in Greece and a two-way causality between tourism receipts and GDP growth. This implies that the two variables could reinforce each other. Kim et al. (2006) examined the causal relationship between expansion in inbound tourism (proxied by the growth rate of total foreign tourist arrivals) and economic growth in Taiwan. Cointegration and Granger causality test results indicate a long-term relationship and a two-way causality between tourism and economic growth. The findings revealed that the growing inflow of foreign visitors to Taiwan could promote economic development and an expanding economy could lead to expansion in inbound tourism market.

Chen and Chiou-Wei (2009) used an EGARCH-M (exponential general autoregressive conditional heteroscedasticity in mean) model with uncertainty factors to re-examine the causal relationship between inbound tourism expansion and economic growth in Taiwan and South Korea. Test results indicated a one-way causality from tourism expansion to economic growth in Taiwan and a reciprocal causality between the two factors in Korea. In other words, the tourism-led growth hypothesis was supported in both Taiwan and South Korea. To sum up, empirical findings from studies above validate the assumed affiliation between international tourism development and economic growth by showing a one-way causality from international tourism development to economic growth, i.e. expansion in inbound tourism market can significantly improve the state of an economy.

In addition to the examination of the causal link between international tourism expansion and economic development, Chen (2007b) and Tang and Jang (2009) investigated the causality between economic conditions and performance of the individual tourism industry. Both studies identified a strong contribution of economic growth to the development of the tourism industry. Chen (2007b) studied interactions between business conditions and stock performance of tourism firms in Taiwan. Empirical results based on cointegration and Granger causality tests demonstrated that an improving business environment improves stock performance of airline and hotel companies in Taiwan. Similarly, Tang and Jang (2009) found that economic growth could significantly

strengthen sales performance of four US tourism-related industries: airlines, casinos, hotels, and restaurants. Both Chen (2007b) and Tang and Jang (2009) confirmed that an improved economic condition can strengthen the financial performance of the hotel industry.

Recently, several research papers have concentrated on the impact of economic and non-economic variables as well as inbound tourism growth factor on stock performance of hotel companies. Chen et al. (2005) confirmed that some unexpected events, such as the 9/21 earthquake, the 9/11 terrorist attacks in the US and the SARS outbreak had an adverse influence on Taiwanese hotel stock performance. Chen (2007c) tested whether inbound tourism expansion factor (growth rate of foreign tourist arrivals), some selected economic and non-economic variables have a significant influence on the stock performance of Chinese hotel companies. Chinese hotel stock returns were found to be more sensitive to general economic state variables (monetary policy factors and industrial production growth) and non-economic events (the SARS outbreak and political issues). Although inbound tourism expansion factor had a positive effect on hotel stock performance, the effect was not statistically significant. Chen (2007a) showed that inbound tourism expansion variable could not satisfactorily explain hotel stock returns in Taiwan, either.

Chen et al. (2005), Chen (2007a,c) anticipated that inbound tourism expansion, the 9/21 earthquake, the 9/11 terrorist attacks in the US and the SARS outbreak could affect hotel stock returns because those four factors would have a direct impact on sales or earnings performance of hotel firms. However, those three studies did not actually test whether inbound tourism expansion and three crisis events significantly affected hotel sales and other performance measures of hotel companies.

Moreover, variations in stock prices reflect not only changes in corporate earnings, but also in the discount rate used by stock investors. Indeed, the discount rate used by stock investors reflects investors' perceived riskiness of stock cash flows from holding stocks. If investors alter their perceptions of the riskiness of a given stock's cash flows, it can cause a changing instead of constant discount rate. Thus, while inbound tourism growth is expected to have a direct influence on hotel sales, it may not significantly affect the discount rate used to discount hotel stock's cash flows, which still can break down the connection between hotel stock performance and inbound tourism expansion.

In the same way, a destructive effect of the 9/21 earthquake, the 9/11 terrorist attacks in the US and the SARS outbreak on hotel stock prices reported in previous studies might result from an adverse impact of three crisis events on hotel sales or on the discount rate or on both factors. Drakos (2004) evaluated the influence of the 9/11 terrorist attacks in the US on airline stocks listed on different international stock markets. The author illustrated that the risk of airline stocks has soared since September 11, 2001. By using the market model as the relevant return-generating mechanism and event study methodology to determine whether there is a significant change in risk of airline stock returns, he detected a structural break in risk of airline stock returns since the 9/11 terrorist attacks in the US. He asserted that the increased risk of airline stock returns reflected increased uncertainty surrounding the airline industry.

Kim and Gu (2002) examined the impact of the 9/11 terrorist attacks on return and risk of both US and non-US airline stocks traded on US stock markets, including New York Stock Exchange (NYSE), American Stock Exchange (AMEX) and National Association of Securities and Dealers Automated Quotation (NASDAQ). The authors tested whether returns and risk of airline stocks were significantly different before and after the 9/11 terrorist attacks. Test results revealed that risk of airline stock returns increased significantly after the event, but mean returns of airline stocks remained much the same.

Furthermore, this study is the first to investigate whether the response of hotel stock returns to inbound tourism expansion depends on the state of the economy. The state dependence in the response of stock returns to economic news has been a popular research topic. McQueen and Roley (1993) found strong evidence of a cyclical variation in the reaction of stock market responds to news about inflation and real activity. Boyd et al. (2005) showed that the stock market's reaction to unemployment news depends on the state of the national economy.

This study argues that there is a cyclical variation in the response of hotel stock returns to inbound tourism expansion. While previous studies found no evidence that inbound tourism growth has a strong influence on hotel stock performance, it is suspected that the connection between the two factors may be state-dependent. Therefore, business cycle variation is incorporated into the analysis of the response of hotel stock returns to inbound tourism growth.

3. Data and methodology

3.1. Data and hotel performance measures

This study covers five publicly traded tourist hotels: Ambassador Hotel, First Hotel, Grant Formosa Regent Taipei, Hotel Holiday Garden, and Leofoo Corporation. All accounting or financial data of hotel companies over the period from the second quarter of 1997 to the first quarter of 2008 are retrieved from the financial database of the Taiwan Economic Journal.

The growth rate of the number of total foreign tourist arrivals (*GTA*) is used as a proxy for tourism expansion (Chen, 2007a,c; Chen, 2010; Chen and Chiou-Wei, 2009; Kim et al., 2006; Wang and Godbey, 1994):

$$GTA_t = [\ln(TA_t) - \ln(TA_{t-1})] \times 100\%.$$

It is commonly assumed that *GTA* can raise a hotel's occupancy rate and sales revenue and hence strengthen the financial performance of hotel companies. Accordingly, a high *GTA* is expected to improve hotel performance.

Two commonly used performance measures of sales revenue are revenue per available room and occupancy rate (Gray and Liguori, 2003; Stutts and Wortman, 2006). Revenue per available room (*RevPAR*) and occupancy rate (*Occupancy*) are computed as:

$$Occupancy = \left(\frac{NRO}{NRA}\right) \times 100\%$$

and

$$RevPAR = Average\ room\ rate \times Occupancy,$$

where *RevPAR* is in thousand new Taiwan dollars (NT$), *NRO* is the number of rooms occupied and *NRA* is the number of rooms available.

Two popular measures of profitability are return on assets (*ROA*) and return on equity (*ROE*) (Brealey and Myers, 2004; Ross et al., 2008):

$$ROA = \left(\frac{Net\ Income}{Total\ Assets}\right) \times 100\%.$$

and

$$ROE = \left(\frac{Net\ Income}{Total\ Equity}\right) \times 100\%.$$

Hotel stock performance or stock return is derived as:

$$HSR_t = [\ln(HSP_t) - \ln(HSP_{t-1})] \times 100\%,$$

where *HSP* is the closing share price at the end of each quarter. *HSR* can be also used to evaluate the performance of the supply-side investments in the tourism industry (Cavea et al., 2009). Risk of

Table 1
Descriptive statistics of all variables.

Variable	Mean	Maximum	Minimum	Standard deviation
GTA	1.00	101.39	−129.05	26.29
Occupancy	0.70	0.93	0.14	0.14
RevPAR	1866.43	4385.57	215.24	1100.86
ROA	1.09	7.55	−10.79	1.97
ROE	1.25	9.89	−16.92	2.72
HSR	2.91	52.11	−36.64	12.86
RISK	10.65	45.94	0.00	8.59

hotel stock returns (*RISK*) is computed as the standard deviation of the monthly hotel stock returns during the corresponding quarter.

Table 1 presents the descriptive statistics of variables. Ranging from −129.05% to 101.39%, the sample mean of *GTA* is 1% with a high volatility 26.29%. The occupancy rate ranges from 14% to 93% with a mean of 70%. The *RevPAR* varies from 215.24 NT$ to 4385.57 NT$ with a mean of 1866.43 NT$ and a standard deviation of 1100.86 NT$. *ROA* and *ROE* are less volatile, ranging from −10.79 to 7.55 with a mean of 1.09 and from −16.92 to 9.89 with a mean of 1.25, respectively. The *HSR* is also volatile, varying from −36.64% to 52.11% with a standard deviation of 12.86%. The *Risk* of sample hotel firms ranges from 0% to 45.94% with a high mean of 10.65% and a standard deviation of 8.59%.

To test the hypothesis concerning the cyclical variation in the response of hotel stock performance to inbound tourism expansion, this study needs a variable to proxy for the state of the economy. Accordingly, the business cycle series is constructed based on the standard National Bureau of Economic Research (NBER) business cycle turning points (www.businesscycle.com). Expansion and contraction of the business cycle series are summarized in Table 2.

As shown in Table 2, there are six business expansions and six business contractions from the second quarter of 1997 to the first quarter of 2008. The business cycle dummy variable *Cycle* is constructed to represent expansion and contraction of the business cycle, which takes the value of 1 during the expansion periods and 0 otherwise. Moreover, the dummy variables of three crisis events are incorporated into the test regressions to examine their influence on several hotel performance measures.

3.2. Panel data methodology

Unlike the previous studies that used the ordinary least squares regression, this study uses panel regression tests to carry out all examinations. Hsiao (2003) and Klevmarken (1989) list several benefits of using panel data. First, panel data can control for an individual firm's heterogeneity. Second, panel data give more informative data, less collinearity among the variables, more degrees of freedom and more efficiency. Third, panel data can better study the dynamics of adjustment. Fourth, panel data can better identify and measure effects that are simply not detectable in pure cross-section or pure time series data. Further, three estimation methods (pooled ordinary least square, fixed effects and random effects) are tested and performed to ensure that all estimation results are unbiased.

Table 2
Expansion and contraction of the business cycle: 1997/Q2–2008/Q1.

Series	Expansion or contraction	Periods	*Cycle*
1	Expansion	1997/Q2	1
2	Contraction	1997/Q3–1998/Q4	0
3	Expansion	1999/Q1–1999/Q2	1
4	Contraction	1999/Q3–2001/Q1	0
5	Expansion	2001/Q2–2002/Q2	1
6	Contraction	2002/Q3–2003/Q1	0
7	Expansion	2003/Q2–2004/Q1	1
8	Contraction	2004/Q2–2005/Q2	0
9	Expansion	2005/Q3–2005/Q4	1
10	Contraction	2006/Q1–2007/Q1	0
11	Expansion	2007/Q2–2007/Q3	1
12	Contraction	2007/Q4–2008/Q1	0

Note: *Cycle* is the business cycle dummy variable and takes the value of 1 during the expansion periods and 0 otherwise.

3.2.1. Tests of Hypotheses I, II and III

The following panel regression tests using a balanced panel data of five tourist hotels based on Eqs. (2)–(6) are performed to investigate the response of hotel performance to inbound tourism expansion:

$$Occupancy = a_{10} + b_{11}GTA + \sum_{i=1}^{3}\beta_{1i}Dummy_i + e_1, \quad (2)$$

$$RevPAR = a_{20} + b_{21}GTA + \sum_{i=1}^{3}\beta_{2i}Dummy_i + e_2, \quad (3)$$

$$ROA = a_{30} + b_{31}GTA + \sum_{i=1}^{3}\beta_{3i}Dummy_i + e_3, \quad (4)$$

$$ROE = a_{40} + b_{41}GTA + \sum_{i=1}^{3}\beta_{4i}Dummy_i + e_4, \quad (5)$$

$$HSR = a_{50} + b_{51}GTA + \sum_{i=1}^{3}\beta_{5i}Dummy_i + e_5, \quad (6)$$

where *Occupancy, RevPAR, ROA, ROE, HSR* and *GTA* are stationary processes, a_{n0} is a constant ($n = 1, \ldots, 5$), and the residual e_n is Gaussian white noise with zero mean and constant variance. $Dummy_i$ is a crisis event dummy variable ($i = 1$, 2 and 3). $Dummy_1$ denotes the dummy variable of the 9/21 earthquake in Taiwan (September 1999). $Dummy_2$ and $Dummy_3$ represent the dummy variable of the 9/11 terrorist attacks in the US (September 2001) and the dummy variable of the SARS outbreak (April 2003). The dummy variable $Dummy_i$ takes the value of 1 during the corresponding quarter on the event date and 0 otherwise.

According to the panel regression test equations above, the reaction of hotel performance to tourism expansion is statistically significant if b_{j1} ($j = 1, \ldots, 5$) is significantly different from zero. For instance, the response of hotel occupancy rate to inbound tourism expansion is statistically significant if $b_{11} = 0$ is rejected. Similarly, inbound tourism expansion can significantly affect *RevPAR*, *ROA*, *ROE* and *HSR* if $b_{21} \neq 0$, $b_{31} \neq 0$, $b_{41} \neq 0$ and $b_{51} \neq 0$, respectively. The Hypothesis I is supported if $b_{11} \neq 0$, $b_{21} \neq 0$, $b_{31} \neq 0$, $b_{41} \neq 0$ and $b_{51} = 0$.

To examine whether tourism expansion has a significant effect on risk of hotel stock returns, the panel regression based on Eq. (7) is performed:

$$RISK = c_1 + d_1GTA + \sum_{i=1}^{3}\gamma_i Dummy_i + \varepsilon, \quad (7)$$

where *RISK* is the standard deviation of the monthly hotel stock returns during the corresponding quarter. Accordingly, d_1 is expected to be negative. This implies that tourism growth should present good news to the hotel industry and decrease investors' perceived riskiness of cash flows of hotel stocks, resulting in a downward revision in the discount rate. Moreover, if the coefficient d_1 is not significantly different from zero ($d_1 \neq 0$), it is concluded that inbound tourism growth has no significant influence on risk of hotel stock returns and support the Hypothesis II.

In addition, whether the coefficients β_{1i}, β_{2i}, β_{3i}, β_{4i} and β_{5i} (i = 1, 2 and 3) in each corresponding equation (2)–(6) are significantly different from zero can be used to check if the crisis event dummy variables are critical factors affecting hotel performance. For example, if β_{11} is significantly different from zero, it implies that the dummy variable $Dummy_1$ has a significant impact on hotel occupancy rate. Similarly, $Dummy_2$ and $Dummy_3$ can significantly influence hotel occupancy rate if $\beta_{12} \neq 0$ and $\beta_{13} \neq 0$, respectively.

To determine whether three crisis event dummy variables are relevant causes increasing the risk of hotel stock returns, this study tests if the coefficients γ_i (i = 1, 2 and 3) in Eq. (7) are significantly different from zero. The 9/21 earthquake is found to significantly raise the risk of hotel stock returns if γ_1 is positive and significantly different from zero. In the same way, the 9/11 terrorist attacks in the US and the SARS outbreak can significantly increase the risk of hotel stock returns if both γ_2 and γ_3 are positive and significantly different from zero. Hypothesis III is supported if $b_{51} = 0$, $\beta_{1i} \neq 0$, $\beta_{2i} \neq 0$, $\beta_{3i} \neq 0$, $\beta_{4i} \neq 0$ and $\gamma_i \neq 0$ (i = 1, 2 and 3).

3.2.2. Tests of Hypothesis IV

To examine whether there is cyclical variation in the impact of tourism expansion on hotel stock performance, the current study exploits a dummy variable for the state of business cycle. This allows us to see how the influence of tourism expansion factor on hotel stock returns differs during various business conditions. The following panel regression test based on Eq. (8) is performed:

$$HSR = a_{10} + b_{11}GTA \times Cycle + b_{12}GTA \times (1 - Cycle) + \sum_{i=1}^{3} \beta_{1i} Dummy_i + v_1, \quad (8)$$

Similar to tests of Hypotheses I and II, panel regression tests according to Eqs. (9)–(13) are performed to examine whether the impact of international tourism development on hotel sales revenue and risk of hotel stock returns varies during different business cycle periods. Test results can provide the possible explanations for the cyclical variation in the impact of tourism expansion on hotel stock performance.

$$Occupancy = a_{20} + b_{21}GTA \times Cycle + b_{22}GTA \times (1 - Cycle) + \sum_{i=1}^{3} \beta_{2i} Dummy_i + v_2, \quad (9)$$

$$RevPAR = a_{30} + b_{31}GTA \times Cycle + b_{32}GTA \times (1 - Cycle) + \sum_{i=1}^{3} \beta_{3i} Dummy_i + v_3, \quad (10)$$

$$ROA = a_{40} + b_{41}GTA \times Cycle + b_{42}GTA \times (1 - Cycle) + \sum_{i=1}^{3} \beta_{4i} Dummy_i + v_4, \quad (11)$$

$$ROE = a_{50} + b_{51}GTA \times Cycle + b_{52}GTA \times (1 - Cycle) + \sum_{i=1}^{3} \beta_{5i} Dummy_i + v_5, \quad (12)$$

$$RISK = a_{60} + b_{61}GTA \times Cycle + b_{62}GTA \times (1 - Cycle) + \sum_{i=1}^{3} \beta_{6i} Dummy_i + v_6, \quad (13)$$

where *Cycle* is the business cycle dummy variable and takes the value of 1 during the expansion periods and 0 otherwise. According to the panel regression test Eqs. (9)–(13), the coefficient b_{k1} captures how tourism expansion affect hotel performance during expansion periods, while the coefficient b_{k2} captures the same during contraction periods (k = 1, . . ., 5).

Whether $b_{k2} - b_{k1}$ is statistically different from zero is tested to examine how effects of tourism expansion on hotel performance differ during business cycle contraction and expansion. If $b_{k2} - b_{k1}$ is positive and statistically different from zero, it indicates that effects of inbound tourism growth on hotel performance are stronger in business contraction than in business expansion and hence supports the fourth hypothesis (Hypothesis IV) that there is cyclical variation in effects of tourism expansion on hotel performance. The test procedure is described as follows.

Assume $D_k = C_k - B_k$, where C_k is estimated coefficient of $\hat{b}_{k2}$ and B_k is estimated coefficient of $\hat{b}_{k1}$. Consider testing the hypothesis that $D_k = 0$. Based on the delta method (Greene, 2003), the variance of D_k is estimated as:

$$Var(D_k) = D_{kB}^2 \times Var(B_k) + D_{kC}^2 \times Var(C_k) + 2 \times D_{kB} \times D_{kC} \times Cov(B_k, C_k), \quad (14)$$

where $D_{kB} = (\partial D_k / \partial B_k)$, $D_{kC} = (\partial D_k / \partial C_k)$ and $Cov(B_k, C_k)$ is the covariance between B_k and C_k. Accordingly, the z-value is computed to test the hypothesis that $D_k = 0$,

$$z = \frac{D_k}{\sqrt{Var(D_k)}}, \quad (15)$$

and refer to a standard normal table to check if the hypothesis should be rejected.

3.2.3. Estimation of panel regression tests

The estimation of panel data regression tests is based on three methods: pooled ordinary least square (OLS), the fixed effects model, and the random effects model. The pooled OLS estimates a common constant for all cross-sections. In the fixed effects model, the constant is treated as section-specific. The constants of the random effects model for each section are random parameters, which is the major difference between the fixed effects model and random effects model.

The fixed effects estimator is also called the least squares dummy variables estimator because the fixed effects method uses a dummy variable for each hotel to allow for different constants for each hotel. Consider the following model in the matrix notation:

$$Y = Da + Xb + E, \quad (16)$$

where Y is a dependent variable matrix, X is independent variable matrix, the dummy variable D enables us to take different group-specific estimates for each of the constants for every different section, $i = 1, \ldots, n$ and $t = 1, \ldots, T$. n is the number of hotels (n = 5). T and k represent the time periods and the number of the independent variables, respectively. T = 44 and k is equal to 4 for Eqs. (2)–(7) and 5 for Eqs. (8)–(13). Thus, 220 sample observations

Table 3
Test results of the response of hotel revenue measures to inbound tourism development.

Dependent variable: *Occupancy*	Coefficient	*t*-Statistics [*p*-value]	Dependent variable: *RevPAR*	Coefficient	*t*-Statistics [*p*-value]
Panel A			Panel C		
Constant	0.6952	10.53 [0.00]***	*Constant*	1.8619	9.07 [0.00]***
GTA	0.0016	6.45 [0.00]***	*GTA*	0.0045	5.72 [0.00]***
F-statistics [*p*-value] = 50.73 [0.00]***		$\bar{R}^2 = 0.53$	*F*-statistics [*p*-value] = 53.03 [0.00]***		$\bar{R}^2 = 0.92$
Panel B			Panel D		
Constant	0.7127	12.77 [0.00]***	*Constant*	1.9165	10.81 [0.00] ***
GTA	0.0013	6.37 [0.00]***	*GTA*	0.0034	5.35 [0.00]***
$Dummy_1$	−0.0288	−1.15 [0.25]	$Dummy_1$	−0.1319	−1.66 [0.10]*
$Dummy_2$	−0.0554	−2.22 [0.03]**	$Dummy_2$	−0.1660	−2.10 [0.04]**
$Dummy_3$	−0.2936	−11.73 [0.00]***	$Dummy_3$	−0.8789	−11.05 [0.00]***
F-statistics [*p*-value] = 65.86 [0.00]***		$\bar{R}^2 = 0.71$	*F*-statistics [*p*-value] = 49.43 [0.00]***		$\bar{R}^2 = 0.95$

Note: *Significance at the 10% level. **Significance at the 5% level. ***Significance at the 1% level.

(5 hotels times 44 quarters) are available for the panel regression test.

In addition, *F*-test is used to determine whether the fixed effects model outperforms the pooled OLS. The null hypothesis is that all the constants (the respective intercepts of 5 hotels) are the same (the pooled OLS model is more appropriate than the fixed effect model), $H_0 : \alpha_1 = \alpha_2 = \cdots = \alpha_n$. The *F*-statistic is $((R^2_{FE} - R^2_{CC})/(n-1))/(1 - R^2_{FE})/(nT - n - k) \sim F(n-1, nT - n - k)$, where R^2_{FE} is the coefficient of determination of the fixed effects model and R^2_{CC} is the coefficient of determination of the pooled OLS model. The fixed effects model is more appropriate than the pooled OLS model if the null hypothesis is rejected (*F*-statistic is greater than *F*-test critical value).

To avoid the spurious regression, the panel unit root tests of Breitung (2000) and Im et al. (2003) are performed to examine the stationary of all variables prior to all panel regression tests. Results of both tests (not reported here) reveal that *Occupancy*, *RevPAR*, *ROA*, *ROE*, *HSR*, *Size* and *GTA* are all stationary.

The *F*-test results from panel regression tests according to Eqs. (2)–(6) and Eqs. (9)–(13) (not reported here) are significant at the 1% level, implying that the null hypothesis is rejected and the fixed effects model is appropriate. In contrast, the *F*-test results from panel regression test based on Eqs. (7) and (8) are not statistically significant. This indicates that the pooled OLS model is appropriate for regression Eqs. (7) and (8). Therefore, it is necessary to check whether the fixed or random effects model is more suitable for regression Eqs. (2)–(6) and Eqs. (9)–(13).

In the random effects model, the intercepts of different hotels are random and independently drawn from the population. Focusing on arbitrary individuals that have certain characteristics, the random effects model enables us to make inferences with respect to the population's characteristics. The random effects model in the matrix notation can be written as:

$$Y = a + Xb + \mu + E, \tag{17}$$

where a is the random intercept, μ is the error term of the random intercept, $\mu \sim iid\,(0, \sigma^2_\mu)$.

The Hausman (1978) test is used to compare the fixed effects model with the random effects model. The null hypothesis is that μ and X are uncorrelated and hence random effects are consistent and efficient: $H_0 : E(\mu, X) = 0$. The test statistic is $(\widehat{\beta}_{FE} - \widehat{\beta}_{RE})'[Var(\widehat{\beta}_{FE}) - Var(\widehat{\beta}_{RE})]^{-1}(\widehat{\beta}_{FE} - \widehat{\beta}_{RE}) \sim \chi^2(k)$, where $\widehat{\beta}_{FE}$ ($\widehat{\beta}_{RE}$) is the estimator of the fixed effects (random effects) model. The null hypothesis that the random effects model is consistent can be rejected if the test statistic is greater than the critical value for the chi-square distribution. This implies that the fixed effects model outperforms the random effects model. The Hausman test results for regression Eqs. (2)–(6) and Eqs. (9)–(13) (not reported here) reveal that the null hypothesis can be rejected at the 5% or 1% level. Accordingly, the fixed effects model is used for panel regression Eqs. (2)–(6) and Eqs. (9)–(13).

4. Empirical results

4.1. Test results of Hypotheses I, II and III

Test results of the response of hotel revenue measures (occupancy rate and revenue per available room) to inbound tourism development are summarized in Table 3. The coefficient of *GTA*, as shown in panel A, is positive and statistically significant at the 1% level. This implies that *GTA* can significantly promote hotel occupancy rate, supporting the assumption that increasing inbound tourism demand can increase corporate earnings of hotel companies. The coefficient is 0.0016, indicating that a 1% increase in *GTA* can leads to a 0.0016% increase in hotel occupancy. The explanatory power of *GTA* on *OPR*, indicated by adjusted R^2 value, is high at 53%. The influence of *GTA* on *Occupancy* remains significant after the crisis event dummy variables are incorporated into test equation (see panel B). These results indicate that *GTA* is a strong explanatory factor of occupancy rate of hotel companies.

Results in panel C reveal that *GTA* has a positive effect on *RevPAR* and the effect is statistically significant at the 1% level, suggesting that *GTA* can significantly improve hotel *RevPAR*. The coefficient 0.0045 suggests that 1% increase in *GTA* can increase *RevPAR* by 4.5 (0.0045×1000) NT dollar. The explanatory power of *GTA* on *RevPAR* is as high as 92%, indicating that *GTA* is a very strong explanatory factor of *RevPAR*. The significant influence remains when test equation includes the crisis event dummy variables (see panel D).

Table 4 shows test results of the response of hotel profitability measures to inbound tourism development. The coefficients of *GTA* on *ROA* (panels A and B) and *ROE* (panels C and D) are both positive and statistically significant at the 1% level, with and without other control variables. In other words, expansion in inbound tourism can strongly strengthen hotel profitability. Specifically, a 1% in *GTA* can leads to a 0.0094% increase in ROA and a 0.0135% increase in ROE. The overall explanatory power of *GTA* on *ROA* and *ROE* is also high at 48% and 45%, respectively.

While *GTA* has a positive effect on *HSR*, the effect is not statistically significant based on test results presented in Table 5. The overall explanatory power of *GTA* on *HSR* is very low, i.e. the goodness-of-fit for the estimated regression equation is very poor and the independent variable *GTA* explains very little proportion of variation in *HSR*.

Panel regression test results of the response of hotel performance to inbound tourism development in Tables 3–5 confirm that inbound tourism growth can significantly benefit hotel occupancy rate, revenue per available room, ROA and ROE, but have no significant influence on hotel stock performance. The findings

Table 4
Test results of the response of hotel profitability measures to inbound tourism development.

Dependent variable:ROA	Coefficient	*t*-Statistics [*p*-value]	Dependent variable: ROE	Coefficient	*t*-Statistics [*p*-value]
Panel A			Panel C		
Constant	1.0799	11.21 [0.00]***	*Constant*	1.2342	9.10 [0.00]***
GTA	0.0094	2.57 [0.01]***	*GTA*	0.0135	2.62 [0.01]***
F-statistics [*p*-value] = 40.59 [0.00]***		$\bar{R}^2 = 0.48$	*F*-statistics [*p*-value] = 37.23 [0.0000]***		$\bar{R}^2 = 0.45$
Panel B			Panel D		
Constant	1.1287	10.80 [0.00]***	*Constant*	1.3105	8.92 [0.00]***
GTA	0.0085	2.27 [0.02]**	*GTA*	0.0121	2.30 [0.02]**
$Dummy_1$	−0.2794	-0.60 [0.55]	$Dummy_1$	−0.3318	−0.50 [0.61]
$Dummy_2$	−0.2722	-0.58 [0.56]	$Dummy_2$	−0.5525	−0.85 [0.40]
$Dummy_3$	−0.5009	-1.07 [0.29]	$Dummy_3$	−0.7636	−1.16 [0.25]
F-statistics [*p*-value] = 25.42 [0.00]***		$\bar{R}^2 = 0.47$	*F*-statistics [*p*-value] = 23.43 [0.00]***		$\bar{R}^2 = 0.45$

Note: *Significance at the 10% level. **Significance at the 5% level. ***Significance at the 1% level.

hence support the first hypothesis (Hypothesis I) that international tourism development should have a more direct impact on hotel sales and profitability instead of hotel stock return.

Table 5 also displays test results of the impact of inbound tourist market development on risk of hotel stock returns. The coefficient of *GTA*, as shown in panel C, is negative, indicating that the inbound tourist market development can decrease investors' perceived riskiness of cash flows of hotel stocks and hence lower the discount rate. However, this influence is not statistically significant. The explanatory power of *GTA* on *Risk* is low at 5%. Similar results are found after the crisis event dummy variables are included into test equation (see panel D). That is, inbound tourism growth cannot significantly affect risk of hotel stock returns over the full sample period and supports Hypothesis II that inbound tourism growth is expected to have no significant impact on risk of hotel stock returns.

Among three crisis events, the 9/11 terrorist attacks in the US and the *SARS* outbreak significantly hurt hotel occupancy rate (see panel B in Table 3). The 9/21 earthquake had a significantly negative effect on occupancy rate, but the effect was not statistically significant. Results in panel D of Table 3 indicate that all three crisis events substantially harmed revenue per available room. Although the 9/21 earthquake, the 9/11 terrorist attacks and the *SARS* outbreak significantly hurt hotel revenue, they inflicted no strong damage on hotel profitability (see Table 4). All three events had an adverse impact on ROA (panel B) and ROE (panel D), the negative impact is not statistically significant. As found in the previous studies, all three events had a significantly negative influence on hotel stock returns (see panel B in Table 5).

Table 5
Test results of the response of hotel stock return and risk to inbound tourism development.

	Coefficient	*t*-Statistics [*p*-value]
Dependent variable: *HSR*		
Panel A		
Constant	2.8851	3.27 [0.00]***
GTA	0.0284	0.86 [0.39]
F-statistics [*p*-value] = 0.73 [0.39]		$\bar{R}^2 = 0.00$
Panel B		
Constant	3.1630	3.49 [0.00]***
GTA	0.0750	1.46 [0.15]
$Dummy_1$	−14.6590	−2.59 [0.01]***
$Dummy_2$	−14.8865	−2.62 [0.01]***
$Dummy_3$	−14.9832	−1.73 [0.08]*
F-statistics [*p*-value] = 2.45 [0.05]**		$\bar{R}^2 = 0.06$
Dependent variable: *Risk*		
Panel C		
Constant	10.5287	17.93 [0.00]***
GTA	−0.0127	−0.39 [0.39]
F-statistics [*p*-value] = 0.73 [0.39]		$\bar{R}^2 = 0.05$
Panel D		
Constant	10.3968	9.42 [0.00] ***
GTA	−0.0096	−0.29 [0.77]
$Dummy_1$	0.8567	0.23 [0.82]
$Dummy_2$	2.5389	0.66 [0.51]
$Dummy_3$	9.5647	1.65 [0.10]*
F-statistics [*p*-value] = 2.35 [0.02]**		$\bar{R}^2 = 0.06$

Note: *Significance at the 10% level. **Significance at the 5% level. ***Significance at the 1% level.

Test results of the impact of inbound tourism expansion on the risk of hotel stock returns in Table 5 reveal that among the three events, only the *SARS* outbreak significantly increased investors' perceived riskiness of cash flows of hotel stocks and raised the risk of hotel stock returns (see panel D). The 9/21 earthquake and the 9/11 terrorist attacks also increased the risk of hotel stock returns, but their effects were not statistically significant. The response of *RISK* to the SARS outbreak is more than 9 times of the size of the response to the 9/21 earthquake and more than 3 times of the size of the response to 9/11 terrorist attacks in the US.

In summary, while most of the negative effect of the 9/21 earthquake and the 9/11 terrorist attacks on hotel stock returns was caused by the damage of both events on hotel sales revenue, the adverse impact of the SARS outbreak on hotel stock performance resulted from the influence of the SARS outbreak on both hotel sales and investors' perceived riskiness of cash flows from holding hotel stocks. The findings partially support Hypothesis III that the damage of hotel stock returns by three crisis events could be attributed to both decreased hotel sales/earnings and to the increased discount rate.

4.2. Test results of Hypothesis IV

Tables 6–8 show test results of asymmetric response of hotel performance to inbound tourism development. The results in panel A of Table 6 demonstrate that hotel occupancy has a stronger reaction to inbound tourism expansion in contraction. Note that the coefficient b_{k1} (b_{k2}) indicates the impact of expansion in inbound tourism market on hotel performance during business cycle expansion (contraction).

Test results of asymmetric effects of tourism expansion on hotel stock performance are presented in Table 6. The coefficient b_{11}, representing the impact of expansion in inbound tourism market on *HSR* during business cycle expansion, is positive but is not statistically significant. On the contrary, the coefficient b_{12}, representing the impact of inbound tourism growth on HSR during business cycle contraction, is 0.3693 and statistically significant at the 1% level. In other words, while tourism expansion has no substantial impact on hotel stock return during business cycle expansion, a 1% increase

Table 6
Test results of asymmetric impact of inbound tourism development on stock performance.

Dependent variable: *HSR*	Coefficient	*t*-Statistics [*p*-value]
Panel A		
Constant	2.5928	2.99 [0.00] ***
b_{11}: *GTA* × *Cycle*	0.0400	0.82 [0.49]
b_{12}: *GTA* × (1 − *Cycle*)	0.3693	2.94 [0.00] ***
$b_{12} - b_{11} = 0.3293^{***}$ ($z = 2.8072$)		
F-statistics [*p*-value] = 4.32 [0.02]**		$\bar{R}^2 = 0.03$
Panel B		
Constant	3.0544	3.40 [0.00]***
b_{11}: *GTA* × *Cycle*	0.0431	0.82 [0.41]
b_{12}: *GTA* × (1 − *Cycle*)	0.3273	2.65 [0.01]***
$b_{12} - b_{11} = 0.2842^{**}$ ($z = 2.1236$)		
$Dummy_1$	−9.7820	−1.72 [0.08] *
$Dummy_2$	−13.2726	−2.33 [0.02]**
$Dummy_3$	−15.1730	−1.70 [0.09] *
F-statistics [*p*-value] = 2.79 [0.03]**		$\bar{R}^2 = 0.07$

Note: *Significance at the 10% level. **Significance at the 5% level. ***Significance at the 1% level.

in tourism expansion can significantly causes a 0.3693% increase in *HSR* during business cycle contraction. The response of *HSR* to tourism expansion in contraction is about 9 times the size of the response in expansion. The difference between b_{11} and b_{12} is 0.3293 and statistically significant at the 1% level. The difference between regression coefficients is still statistically significant at the 5% level when the regression test equation includes dummy variables.

Table 7 depicts the test results of asymmetric impact of inbound tourism development on hotel revenue measures. The coefficient b_{21} is 0.0016 and statistically significant at the 1% level, implying that 1% increase in tourism expansion during business expansion leads to a 0.0016% increase in hotel occupancy rate (see panel A). The coefficient b_{22} is 0.0024 and statistically significant at the 1% level, suggesting that hotel occupancy rate rises by 0.0024% in response to 1% growth in inbound tourism market during business contraction. The response of hotel occupancy to tourism expansion in contraction is 1.5 times the size of the response in expansion. However, the difference between regression coefficients, representing the response of hotel occupancy in contraction and expansion, is not statistically significant. Similar results are found when regression test equation includes dummy variables (see panel B).

Test results in panel C of Table 7 also show that *RevPAR* has a stronger reaction to inbound tourism expansion in contraction than in expansion. Both b_{31} and b_{32} are positive and statistically significant at the 1% level. A 1% increase in tourism expansion during business expansion increases *RevPAR* by 4.2 (0.0042 × 1000) NT dollar. In contrast, *RevPAR* jumps by 9 (0.0090 × 1000) NT dollar in response to a similar tourism growth during business contraction, which is more than double the size of the response in expansion. The difference between regression coefficients is 0.0048, but is not statistically significant. Similar results are found after regression test equation includes dummy variables (see panel D).

Table 8 summarizes test results of asymmetric effects of tourism expansion on *ROA* and *ROE* of hotel firms. As shown in panel A of

Table 7
Test results of asymmetric impact of inbound tourism development on hotel revenue measures.

Dependent variable:*Occupancy*	Coefficient	*t*-Statistics [*p*-value]	Dependent variable: *RevPAR*	Coefficient	*t*-Statistics [*p*-value]
Panel A			Panel C		
Constant	0.6945	10.44 [0.00]***	*Constant*	1.8579	9.02 [0.00]
b_{21}: *GTA* × *Cycle*	0.0016	5.99 [0.00]***	b_{31}: *GTA* × *Cycle*	0.0042	5.11 [0.00]***
b_{22}: *GTA* × (1 − *Cycle*)	0.0024	2.53 [0.01]***	b_{32}: *GTA* × (1 − *Cycle*)	0.0090	3.11 [0.00]***
$b_{22} - b_{21} = 0.0008$ ($z = 0.8778$)			$b_{32} - b_{31} = 0.0048$ ($z = 1.6236$)		
F-statistics [*p*-value] = 42.36 [0.00]***		$\bar{R}^2 = 0.53$	*F*-statistics [*p*-value] = 44.59 [0.00]***		$\bar{R}^2 = 0.92$
Panel B			Panel D		
Constant	0.7118	12.45 [0.00]***	*Constant*	1.9103	10.56 [0.00]***
b_{21}: *GTA* × *Cycle*	0.0012	6.09 [0.00]***	b_{31}: *GTA* × *Cycle*	0.0032	4.88 [0.00]***
b_{22}: *GTA* × (1 − *Cycle*)	0.0019	2.29 [0.03]**	b_{32}: *GTA* × (1 − *Cycle*)	0.0075	2.73 [0.00]***
$b_{22} - b_{21} = 0.0007$ ($z = 0.6659$)			$b_{32} - b_{31} = 0.0043$ ($z = 1.5755$)		
$Dummy_1$	−0.0254	−0.95 [0.34]	$Dummy_1$	−0.0761	−0.88 [0.38]
$Dummy_2$	−0.0657	−2.66 [0.01]***	$Dummy_2$	−0.1618	−2.05 [0.04]**
$Dummy_3$	−0.2865	−11.65 [0.00]***	$Dummy_3$	−0.8760	−11.05 [0.00]***
F-statistics [*p*-value] = 59.14 [0.00]***		$\bar{R}^2 = 0.73$	*F*-statistics [*p*-value] = 44.76 [0.00]***		$\bar{R}^2 = 0.95$

Note: *Significance at the 10% level. **Significance at the 5% level. ***Significance at the 1% level.

Table 8
Test results of asymmetric impact of inbound tourism development on hotel profitability measures.

Dependent variable: *ROA*	Coefficient	*t*-Statistics [*p*-value]	Dependent variable: *ROE*	Coefficient	*t*-Statistics [*p*-value]
Panel A			Panel C		
Constant	1.0634	10.99 [0.00]***	*Constant*	1.2120	8.90 [0.00]***
b_{41}: *GTA* × *Cycle*	0.0080	2.10 [0.04]**	b_{51}: *GTA* × *Cycle*	0.0116	2.17 [0.03]**
b_{42}: *GTA* × (1 − *Cycle*)	0.0292	2.09 [0.04]**	b_{52}: *GTA* × (1 − *Cycle*)	0.0401	2.03 [0.04]**
$b_{42} - b_{41} = 0.0212$ ($z = 1.4670$)			$b_{52} - b_{51} = 0.0285$ ($z = 1.3960$)		
F-statistics [*p*-value] = 34.37 [0.00]***		$\bar{R}^2 = 0.48$	*F*-statistics [*p*-value] = 31.49 [0.00]***		$\bar{R}^2 = 0.46$
Panel B			Panel D		
Constant	1.0976	10.27 [0.00]***	*Constant*	1.2680	8.43 [0.00]***
b_{41}: *GTA* × *Cycle*	0.0073	1.91 [0.06]*	b_{51}: *GTA* × *Cycle*	0.0105	1.94 [0.05]**
b_{42}: *GTA* × (1 − *Cycle*)	0.0286	1.85 [0.07]*	b_{52}: *GTA* × (1 − *Cycle*)	0.0396	1.82 [0.07]*
$b_{42} - b_{41} = 0.0203$ ($z = 1.4562$)			$b_{52} - b_{51} = 0.0291$ ($z = 1.4978$)		
$Dummy_1$	−0.0026	−0.01 [0.99]	$Dummy_1$	0.0472	0.06 [0.95]
$Dummy_2$	−0.2511	−0.54 [0.59]	$Dummy_2$	−0.5236	−0.80 [0.43]
$Dummy_3$	−0.4863	−1.04 [0.30]	$Dummy_3$	−0.7435	−1.13 [0.26]
F-statistics [*p*-value] = 22.88 [0.00]***		$\bar{R}^2 = 0.47$	*F*-statistics [*p*-value] = 21.08 [0.00]***		$\bar{R}^2 = 0.45$

Note: *Significance at the 10% level. **Significance at the 5% level. ***Significance at the 1% level.

Table 8, both b_{41} and b_{42} are positive and statistically significant at the 5% level. Given that b_{41} is 0.0080 and b_{42} is 0.0292, 1% growth in foreign tourist arrivals increases *ROA* by a 0.0080% in expansion and a 0.0292% in contraction. This also reveals that *ROA* has a stronger reaction to tourism growth in contraction than in expansion. The response of *ROA* to tourism expansion in contraction is more than 3 times of the size of the response in expansion. The difference between b_{41} and b_{42} is 0.0212, but is not statistically significant. When dummy variables are added into regression test equation, b_{41} and b_{42} are positive and statistically significant at the 5% level (see panel B). However, the difference between regression coefficients is still not statistically significant.

The influence of tourism expansion on *ROE* is similar to that of tourism expansion on *ROA* (panels C and D in Table 8). Both b_{51} and b_{52} are significantly positive at the 5% level. A 1% increase in tourism expansion causes a 0.0116% (0.0401) increase in *ROE* during business cycle expansion (contraction). *ROE* reacts more strongly to tourism growth in contraction than in expansion and the response of *ROE* to tourism expansion in contraction is more than 3 times the size of the response in expansion. The difference between b_{51} and b_{52} is 0.0285 and not statistically significant. Similar results are found after dummy variables are incorporated into regression test equation.

Table 9 shows test results of asymmetric effects of tourism expansion on risk of hotel stock returns. The coefficient b_{61} is 0.1058, but not statistically significant (see panel A), implying that expansion in inbound tourism market has no significant impact on risk of hotel stock returns during business cycle expansion. In comparison, the coefficient b_{62} is −0.0486 and statistically significant at the 5% level, suggesting that risk of hotel stock returns decreases by 0.0486% in response to 1% growth in inbound tourism market during business contraction. This also illustrates that *RISK* has a stronger reaction to inbound tourism growth in contraction than in expansion. The difference between b_{61} and b_{62} is −0.1544 and statistically significant at the 10% level. When dummy variables are added into regression test equation, similar results are found (see panel B). The difference between regression coefficients becomes more pronounced and still statistically significant at the 10% level.

Table 9
Test results of asymmetric impact of inbound tourism development on risk of hotel stock returns.

Dependent variable: *Risk*	Coefficient	*t*-Statistics [*p*-value]
Panel A		
Constant	10.5589	18.65 [0.00]***
b_{61}: *GTA* × *Cycle*	0.1058	1.34 [0.18]
b_{62}: *GTA* × (1 − *Cycle*)	−0.0486	−2.21 [0.03]**
$b_{62} - b_{61} = -0.1544^{*}$ ($z = -1.7605$)		
F-statistics [*p*-value] = 3.99 [0.00]***		$\bar{R}^2 = 0.08$
Panel B		
Constant	10.3681	17.09 [0.00]***
b_{61}: *GTA* × *Cycle*	0.1149	1.37 [0.17]
b_{62}: *GTA* × (1 − *Cycle*)	−0.0472	−.11 [0.04]**
$b_{62} - b_{61} = -0.1621^{*}$ ($z = -1.8702$)		
$Dummy_1$	1.5857	0.42 [0.68]
$Dummy_2$	2.4857	0.66 [0.51]
$Dummy_3$	8.7422	1.64 [0.10]*
F-statistics [*p*-value] = 2.73 [0.01]***		$\bar{R}^2 = 0.07$

Note: *Significance at the 10% level. **Significance at the 5% level. ***Significance at the 1% level.

Overall, the results reported in Tables 6–9 show strong evidence of a statistically significant difference between the reactions of hotel stock returns and risk of hotel stock returns to inbound tourism growth in business expansion and contraction. However, the impact of inbound tourism growth on occupancy, revenue per available room, ROA and ROE is not significantly different in business contraction and expansion. These findings support the fourth hypothesis (Hypothesis IV) that there is cyclical variation in the response of hotel stock performance to international tourism development and the impact of inbound tourism growth on hotel stock returns is stronger in business contraction than in business expansion.

5. Discussion and policy implication

International tourism development can have a beneficial impact on hotel performance in a dual manner. First, there is a direct effect on hotel earnings by raising hotel occupancy rate and sales. Second, an improved economic environment caused by international tourism development can exert an indirect effect on the development of hotel industry. The reason is that as the economy expands, business activity boosts and corporate earnings ascent accordingly. In other words, expansion in inbound tourism market can enhance economic activity and increase expected future cash flows of hotel companies. Hence, hotel performance would respond to international tourism development in a positive way and the existence of a strong link between two factors is generally assumed.

Empirical studies, however, have found no significant connection between inbound tourism expansion and hotel stock returns. This study conjectures that expansion in the inbound tourism market should have a more direct impact on sales revenue and/or profitability of hotel companies than on hotel stock returns. The hypothesis is tested by examining whether the response of various hotel performance measures, including sales revenue, profitability and stock return, to the growing foreign tourist arrivals is statistically significant.

As mentioned, the movement of hotel stock price relies on not only a hotel firm's current and future expected cash flows (measured by net income), but also on the perceived riskiness of stock cash flows from holding stocks (the discount rate). The underlying factors that determine net income, as given in Eq. (1), include hotel firm's sales revenues, expenses, interest payments and taxes. While inbound tourism growth can strengthen a hotel firm's net income through increasing hotel sales and profitability (higher cash flows in the future), investors' changing perceptions about the riskiness of cash flows from holding hotel stocks due to some market factors, causing a non-constant or time-varying discount rate, can still lead to the insignificant response of hotel stock performance to inbound tourism expansion.

This can be particularly true in Taiwan where the emerging stock market has historically been characterized by high volatility (Titman and Wei, 1999; Kassimatis and Spyrou, 2001; Chen and Bidarkota, 2004). Titman and Wei (1999) stated that the noise trading or investor sentiment was the most plausible explanation for the high volatility observed in the Taiwan stock market. The reason is that if many individual noise traders traded on irrelevant information, it can bring volatility to the stock market (DeLong et al., 1990; Summers and Summers, 1989). Thus, if investors trade hotel stocks based on irrelevant information in the stock market, they would make no strong upward revision in their forecast of hotel earnings despite of expansion in the inbound tourism market. This has no great impact on investors' expectations for future changes in current and future expected cash flows

of hotel companies and hotel stock prices will not significantly improve.

Panel regression test results reveal that among three hotel performance measures, only sales revenue and profitability react significantly to international tourism development. The response of hotel revenue (occupancy rate and revenue per available room) and profitability (return on asset and return on equity) to expansion in the inbound tourism market is positive and statistically significant. Nonetheless, the response of hotel stock performance to inbound tourism growth is positive but insignificant. Specifically, inbound tourism expansion can explain a very large proportion of hotel revenue and profitability measures. In contrast, tourism expansion explains no variation in hotel stock returns. These findings confirm that international tourism development has a more direct influence on hotel sales and profitability than on hotel stock performance.

Test results also indicate that foreign tourist inflows can decrease risk of hotel stock returns, but the effect is not statistically significant, suggesting that inbound tourism growth has no significant impact on investors' perceptions about the riskiness of cash flows of hotel stocks. This finding thus supports the hypothesis that the absence of a strong tie between inbound tourism expansion and hotel stock returns found in previous studies is mainly due to the time-varying discount rates caused by investors' changing expectations for the prospect of future cash flows from holding hotel stocks. The result also offers the explanation for the missing connection between inbound tourism growth and hotel stock performance as found in Chen (2007a) and Chen (2007c).

The response of various hotel performance measures to crisis events is also scrutinized. As Rittichainuwat and Chakraborty (2009) noted, the perception of safety and security plays a major role in tourists' travel decisions. Incidents of natural disasters, terrorism and disease can lead to an upswing in international tourists' perception of travel risks, which can cause the cancellation or change of travel plans. Therefore, previous empirical studies generally attributed the negative influence of crisis events on hotel stock returns to the negative impact of the three crisis events on hotel sales revenues due to the plunge in foreign tourist arrivals (Chen, 2007c; Chen et al., 2005).

The current study provides a more comprehensive explanation for the adverse impact of three crisis events on hotel stock returns found in the literature. As the three events substantially weakened hotel revenue through a sudden drop in inflows of inbound foreign visitors to Taiwan, investors' perceived riskiness of cash flows of hotel stocks accelerated, resulting in an upward revision in the discount rate. In other words, the unexpected deterioration in the international tourism development can also alter the discount rate used by hotel stock investors. Consequently, not only a sharp decline in expected corporate earnings of hotel industry but also the increased discount rate can lead to poor hotel stock performance.

Test results indicate that the 9/11 terrorist attacks in the US and the SARS outbreak in 2003 harmed hotel occupancy and all three events had a profound negative effect on revenue per available room. Especially, the damage of the SARS outbreak on revenue per available room is more than six times of that of the 9/21 earthquake and more than five times of that of the response to 9/11 terrorist attacks in the US. This result reflects the fact that international tourism expansion in terms of the number of total foreign visitors was the most seriously devastated by the SARS outbreak in 2003 among three unexpected crisis events. Specifically, the quarterly total foreign tourist arrival after the SARS outbreak substantially dropped by 72.48% in just one quarter, from 755,863 in the first quarter to 208,013 in the second quarter of 2003.

Empirical test results of the impact of inbound tourism expansion on the risk of hotel stock returns further detect that only the effect of the *SARS* outbreak was strong enough to significantly alter investors' perceived riskiness of cash flows of hotel stocks and raise the risk of hotel stock returns. The reaction of risk of hotel stock returns to the SARS outbreak is more than nine and three times of the size of the reaction to the 9/21 earthquake and 9/11 terrorist attacks in the US, respectively. These findings are consistent with the anticipation that the bigger damage in the inbound tourism market development caused by crisis events, the less hotel sales revenue and the higher investors' perceived riskiness of cash flows from holding hotel stocks. To conclude, the poor performance of hotel stocks caused by the 9/21 earthquake and the 9/11 terrorist attacks is mainly due to the impact of both events on hotel sales revenue. This is consistent with the explanations in Chen (2007c) and Chen et al. (2005). In comparison, this study presents new evidence that not only decreased hotel sales revenue but also an increase in the discount rate led to the destructive effect of the SARS outbreak on hotel stock performance.

Moreover, this study identified the state dependence in the response of hotel stock performance to international tourism development. As corporate earnings plunge during business cycle contraction, an expansion in international tourism market is more likely to alter investors' estimates of hotel firms' expected future earnings. Especially, following the valuation relationship given in Eq. (1), if stock investors make an upward revision in their forecast of firms' earnings and a downward revision in the discount rate due to good news from the inbound tourism market, hotel stock price will soar accordingly. Thus, the positive reaction of hotel stock returns to inbound tourism growth is expected to be stronger in business contraction than in business expansion. To test the hypothesis that there is cyclical variation in reactions of hotel stock returns to international tourism development, this study examines whether the impact of inbound tourism growth on hotel performance in business contraction is statistically different from that in business expansion.

Test results support the hypothesis by showing that the response of hotel stock performance to inbound tourism growth in business contraction is statistically different from that in business expansion. In addition, although the influence of inbound tourism expansion on hotel stock returns is still irrelevant during expansion periods, inbound tourism growth can significantly enhance hotel stock returns during contraction periods. Specifically, the response of hotel stock returns to international tourism development in contraction is even more than nine times of that in expansion.

The reaction of sales revenue (occupancy rate and revenue per available room) and profitability (return on assets and return on equity) to inbound tourism growth is not significantly different in business contraction and expansion. While the growing inflow of foreign tourists has no significant impact on risk of hotel stock returns during business expansion, it can significantly reduce risk of hotel stock returns during business contraction. In summary, this study identifies that the state dependence in the response of hotel stock performance to international tourism development is caused by investors' changing expectations for the prospect of future cash flows from holding hotel stocks.

The findings in this study offer several imperative policy implications for Taiwanese government tourism authorities and hotel business owners and managers. As mentioned, the Taiwanese government has used several strategic tourism plans to promote international tourism. Previous studies (Kim et al., 2006; Chen and Chiou-Wei, 2009) have indicated that international tourism development in Taiwan could cause significant economic growth. This study shows that international tourism development can contribute to the performance of Taiwanese hotels. Thus, it is appropriate for the Taiwanese government to develop the long-term strategic tourism plans to promote the hospitality and tourism industry and improve the Taiwanese economy.

Empirical results further reveal that the occupancy rate, revenue per available room, return on assets and return on equity of Taiwanese hotels rely heavily on international tourism development. In particular, inbound tourism growth can describe as high as 53% of variation in hotel occupancy, 92% of variation in revenue per available room, 48% of variation in return on asset and 45% of variation in return on equity. For tourism authorities and hotel business managers, the findings do not only demonstrate the substantial influence of international tourism development on hotel performance, but also suggest that hotel revenue and profitability in Taiwan could suffer during downturns of the tourism industry or low demand for tourism. The significantly negative effects on hotel performance caused by a sharp drop in demand for tourism due to three crises, such as the 9/21 earthquake, the 9/11 terrorist attacks in the US and the SARS outbreak are good examples.

Accordingly, the Taiwanese government needs to be aware that the failure of the DTAP, i.e. low demand for Taiwan's foreign tourism market, may lead to poor performance of the hospitality and tourism industries and the overall economy. To enhance the impact of tourism expansion or ameliorate the adverse impact during downturns of the inbound tourism market, Taiwanese tourism authorities and policymakers on the one hand must set priority for allocating limited resources to international tourism development when implementing other strategic tourism plans. On the other hand, they can apply the practical findings in Jang and Chen (2008) as guidelines for diversification or risk management in the Taiwanese tourism market. Jang and Chen (2008) examined how Taiwan can obtain optimal foreign tourist market mixes by minimizing variability in foreign tourist arrivals based on the financial portfolio theory. They showed that to achieve the goal of the DTAP, the Taiwanese government should shift available resources to Japan to achieve a maximum growth of inbound tourism growth.

In addition, test results indicate that hotel occupancy rate, revenue per available room and stock performance were sensitive to the 9/21 earthquake, the 9/11 terrorist attacks in the US and the SARS outbreak, showing the fragility of the hotel industry toward incidents of natural disasters, terrorism and disease. To minimize the possible adverse effect of future similar unexpected crisis events on hotel sales revenue and stock prices, hotel management and tourism authorities in Taiwan should work together to alleviate the impact of the crisis events.

For example, after an event, the government must disclose the information regarding the actual damage of the event and correct biased and distorted images to minimize the spillover effect as part of its crisis management process because media coverage sometimes creates unnecessary fear and exaggerates the perceived risks (Mansfeld, 2006). This crisis management can help sustain the confidence level of safety and security of travelers by reducing the uncertainty in the tourism market and hence avoid a decline in foreign tourist arrivals during crisis period. Further, as Rittichainuwat and Chakraborty (2009) noted, although marketers believe that price is a critical factor in destination recovery, this may not be always true. Hotel business managers need to know that low-cost tour packages did not motivate tourists to visit the affected destination (Rittichainuwat, 2006). Rittichainuwat and Chakraborty (2009) stated that discounting may create a negative image of low-cost travel destinations and it could be hard to alter the negative image after the destination has fully recovered. Instead, it is more important to convey enhanced safety and security information to increase tourists' sense of personal security.

6. Conclusion and future research

This study uses panel regression tests to examine the response of hotel performance to international tourism development and crisis events in Taiwan and identifies that expansion of inbound tourism market and tourism-related crisis events have a significant impact on various hotel performance measures. Empirical panel regression test results reveal four key findings.

First, international tourism development has a more direct influence on hotel revenue (occupancy rate and revenue per available room) and profitability (return on asset and return on equity) than it does on hotel stock performance. Second, this study identifies that the absence of a strong tie between inbound tourism expansion and hotel stock returns that was found in previous studies is due to the time-varying discount rate caused by investors' changing expectations for the prospect of future cash flows from holding hotel stocks.

Third, this study finds new evidence that while the poor performance of hotel stocks caused by the 9/21 earthquake and the 9/11 terrorist attacks was attributed to the loss of hotel sales revenue, the adverse effect of the SARS outbreak on hotel stock returns is attributed not only to decreased hotel sales revenue but also to the increased discount rate.

Fourth, this study is the first to investigate whether the response of hotel stock returns to inbound tourism expansion depends on the state of economy and concludes that the response of hotel stock performance to inbound tourism growth in business cycle contraction is statistically different from that in business cycle expansion. Further, although the influence of inbound tourism expansion on hotel stock performance is still irrelevant during expansion periods, inbound tourism growth can significantly enhance hotel stock returns during contraction periods.

Future researchers can conduct similar examinations using data from other countries to draw general conclusions. For example, expansion in the inbound tourism market could significantly promote economic development in Spain (Balaguer and Cantavella-Jorda, 2002), Greece (Dritsakis, 2004), Nicaragua (Croes and Vanegas, 2008), Turkey (Gunduz and Hatemi-J, 2005) and some African countries (Fayissa et al., 2008). In consequence, inbound tourism expansion is expected to have both direct and indirect effects on hotel performance in those countries. Similarly, the hotel industry in China and Hong Kong was significantly hurt by the SARS outbreak. It is worth examining whether test results based on data from those countries would be similar to the empirical findings in this study. Moreover, Oh (2005) showed that international tourism development in South Korea could not cause significant economic growth. However, Chen and Chiou-Wei (2009) supported the tourism-led growth hypothesis in South Korea. Thus, it will be interesting to see how hotel performance responds to the development of international tourism in South Korea.

Finally, future studies can extend the examination to other hospitality sectors, such as airline, restaurant and travel or tourism industries. Corporate performance in airline, restaurant and travel or tourism industries is also expected to be closely tied to international tourism development and tourism-related crisis events. It will be interesting to see how various performance measures in those hospitality industries respond to international tourism development and crisis events. Since the majority of international tourists travel by air, compared to other hospitality industries, corporate performance in the airline industry may have a stronger response to international tourism development and crisis events.

References

Archer, B., 1995. Importance of tourism for the economy of Bermuda. Annals of Tourism Research 22 (4), 918–930.

Balaguer, L., Cantavella-Jorda, M., 2002. Tourism as a long-run economic growth factor: the Spanish case. Applied Economics 34 (7), 877–884.

Bodie, Z., Kane, A., Marcus, A.J., 2009. Investments, 8th ed. McGraw Hill, New York.

Boyd, J., Hu, J., Jagannathan, R., 2005. The stock market's reaction to unemployment news: why bad news is usually good for stocks. Journal of Finance 60 (2), 649–672.

Brealey, R.A., Myers, S.C., 2004. Principles of Corporate Finance, 7th ed. McGraw Hill, New York.
Breitung, J., 2000. The local power of some unit root tests for panel data. In: Baltagi, B. (Ed.), Nonstationary Panels, Panel Cointegration, and Dynamic Panel, Advances in Econometrics, vol. 15. JAI, Amsterdam, pp. 161–178.
Cavea, J., Guptab, K., Lockeb, S., 2009. Supply-side investments: an international analysis of the return and risk relationship in the Travel & Leisure sector. Tourism Management 30 (5), 665–673.
Chen, M.H., 2007a. Hotel stock performance and monetary conditions. International Journal of Hospitality Management 26 (3), 588–602.
Chen, M.H., 2007b. Interactions between business conditions and financial performance of tourism firms: evidence from China and Taiwan. Tourism Management 28 (1), 188–203.
Chen, M.H., 2007c. Macro and non-macro explanatory factors of Chinese hotel stock returns. International Journal of Hospitality Management 26 (4), 991–1004.
Chen, M.H., 2010. The economy, tourism growth and corporate performance in the Taiwanese hotel industry. Tourism Management 31 (5), 665–675.
Chen, M.H., Bidarkota, P.V., 2004. Consumption equilibrium asset pricing in two Asian emerging markets. Journal of Asian Economics 15 (4), 305–319.
Chen, C.F., Chiou-Wei, S.Z., 2009. Tourism expansion, tourism uncertainty and economic growth: new evidence from Taiwan and Korea. Tourism Management 30 (6), 812–818.
Chen, M.H., Jang, S.C., Kim, W.G., 2007. The impact of SARS outbreak on Taiwanese hotel stock returns: an event study approach. International Journal of Hospitality Management 26 (1), 200–212.
Chen, M.H., Kim, W.G., Kim, H.J., 2005. The impact of macroeconomic and non-macroeconomic forces on hotel stock returns. International Journal of Hospitality Management 24 (2), 243–258.
Chen, M.H., Kim, W.G., Liao, C.N., 2009. The impact of government weekend policy changes and foreign institutional holdings on weekly effect of tourism stock performance. Journal of Hospitality and Tourism Research 33 (2), 139–160.
Copeland, B.R., 1991. Tourism, welfare and de-industrialization in a small open economy. Economica 58 (232), 515–529.
Croes, R.R., Vanegas, M., 2008. Cointegration and causality between tourism and poverty reduction. Journal of Travel Research 47 (3), 94–103.
DeLong, J.B., Shleifer, A., Summers, L.H., Waldmann, R.J., 1990. Positive feedback investment strategies and destabilizing rational speculation. Journal of Finance 45 (2), 379–395.
Dritsakis, N., 2004. Tourism as a long-run economic growth factor: an empirical investigation for Greece using causality analysis. Tourism Economics 10 (3), 305–316.
Drakos, K., 2004. Terrorism-induced structural shifts in financial risk: airline stocks in the aftermath of the September 11th terror attacks. European Journal of Political Economy 20 (2), 435–446.
Durbarry, R., 2002. The economic contribution of tourism in Mauritius. Annals of Tourism Research 29 (3), 862–865.
Fayissa, B., Nsiah, C., Tadasse, B., 2008. Impact of tourism on economic growth and development in Africa. Tourism Economics 14 (4), 807–818.
Gunduz, L., Hatemi-J, A., 2005. Is the tourism-led growth hypothesis valid for Turkey? Applied Economics Letters 12 (8), 499–504.
Greene, W.H., 2003. Econometric Analysis, 5th ed. Pearson Education, Inc., Upper Saddle River, NJ.
Gray, W.S., Liguori, S.C., 2003. Hotel and Motel Management and Operations, 4th ed. Pearson Education, Inc., New Jersey.
Hausman, A., 1978. Specification tests in econometrics. Econometrica 46 (5), 1251–1271.
Hazari, B.R., Sgro, P.M., 1995. Tourism and growth in a dynamic model of trade. Journal of International Trade and Economic Development 4 (2), 243–252.
Hsiao, C., 2003. Analysis of Panel Data. Cambridge University Press, Cambridge, NY.
Huang, J.H., Min, C.H., 2002. Earthquake devastation and recovery in tourism: the Taiwan case. Tourism Management 23 (2), 145–154.
Im, K.S., Pesaran, M.H., Shin, Y., 2003. Testing unit roots in heterogeneous panels. Journal of Econometrics 115 (1), 53–74.
Jang, S.C., Chen, M.H., 2008. Financial portfolio approach to optimal tourist market mixes. Tourism Management 29 (4), 761–770.
Kassimatis, K., Spyrou, S.I., 2001. Stock and credit market expansion and economic development in emerging markets: further evidence utilizing cointegration analysis. Applied Economics 33 (8), 1057–1064.
Kim, H.Y., Chen, M.H., Jang, S.C., 2006. Tourism expansion and economic development: the case of Taiwan. Tourism Management 27 (5), 925–933.
Kim, H., Gu, Z., 2002. Impact of the 9/11 terrorist attacks on the return and risk of airline stocks. Tourism and Hospitality Research 5 (2), 150–163.
Klevmarken, N.A., 1989. Panel studies: what can we learn from them? Introduction. European Economic Review 33 (2–3), 523–529.
Mansfeld, Y., 2006. The role of security information in tourism crisis management: The missing link. In: Mansfeld, Y., Pizam, A. (Eds.), Tourism, Security & Safety from Theory to Practice. Elsevier, Butterworth-Heinemann, Burlington, MA.
McQueen, G., Roley, V.V., 1993. Stock prices, news, and business conditions. Review of Financial Studies 6 (4), 683–707.
Mihalic, T., 2002. Tourism and economic development issues. In: Sharply, R., Telfer, D.J. (Eds.), Tourism and Development: Concepts and Issues. Channel View Publications, Clevedon, pp. 81–111.
Oh, C.O., 2005. The contribution of tourism development to economic growth in the Korean economy. Tourism Management 26 (1), 39–44.
Proenca, S., Soukiazis, E., 2008. Tourism as an economic growth factor: a case study for Southern European countries. Tourism Economics 14 (4), 791–806.
Rittichainuwat, B.N., 2006. Tsunami recovery: a case study of Thailand's tourism. Cornell Hotel and Restaurant Administration Quarterly 47 (4), 390–404.
Rittichainuwat, B.N., Chakraborty, G., 2009. Perceived travel risks regarding terrorism and disease: the case of Thailand. Tourism Management 30 (3), 410–418.
Ross, S.A., Westerfield, R.W., Jordan, B.D., 2008. Fundamentals of Corporate Finance, 8th ed. Irwin/McGraw-Hill.
Sinclair, M., 1999. Portfolio models of tourism. In: Baum, T., Mudambi, R. (Eds.), Economic and Management Methods for Tourism and Hospitality Research. Wiley, Chichester, pp. 25–37.
Stutts, A.T., Wortman, J.F., 2006. Hotel and Lodging Management: An Introduction, 2nd ed. John Wiley & Sons, Inc., New Jersey.
Summers, L.H., Summers, V.R., 1989. When financial markets work too well: a cautious case for a security transaction tax. Journal of Financial Services Research 2 (3), 163–188.
Tang, C.H., Jang, S., 2009. The tourism-economy causality in the United States: a sub-industry level examination. Tourism Management 30 (4), 553–558.
Titman, S., Wei, K.C.J., 1999. Understanding stock market volatility: the case of Korea and Taiwan. Pacific-Basin Finance Journal 7 (1), 41–66.
Tourism Bureau, 2005. Annual Report on Tourism 2004. Ministry of Transportation and Communication, Republic of China.
Tourism Bureau, 2009. Ministry of Transportation and Communication, Republic of China. http://www.taiwan.net.tw.
Wang, P., Godbey, G., 1994. A normative approach to tourism growth to the year 2000. Journal of Travel Research 33 (1), 32–37.
Wang, Y.S., 2009. The impact of crisis events and macroeconomic activity on Taiwan's international inbound tourism demand. Tourism Management 30 (1), 75–82.
West, G.R., 1993. Economic significance of tourism in Queensland. Annuals of Tourism Research 20 (3), 490–504.
World Economic Forum, 2009. The travel and tourism competitiveness report 2009.
World Travel and Tourism Council, 2009. Tourism research. http://www.wttc.org/.