



The effect of weather on the demand for rooms in the Taiwanese hotel industry: An examination



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ABSTRACT

Many studies have already been conducted to understand the influence of climate on tourism destination choices. Different from those studies, our study examines the effects of weather on room demand in the hotel industry. We also investigate the moderating effect of weather on the relationship between hotel price and quantity demanded. In our research, weather is measured by the length of typhoons, the temperature, the number of hours of bright sunshine and the number of rainy days. Using panel data methods, our results show that firstly, typhoon and rain are negatively associated with group visitors while temperature and sunshine hours lead to an increase of group visitors. Typhoon and rain affect the relationship between price and room demand. Secondly, typhoon, temperature and sunshine hours have positive and significant effects on free independent travelers (FIT) but rain has a negative effect. The relationship between price and quantity also depends on rain, temperature and sunshine hours.

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1. Introduction

Climate and weather are likely to have significant impacts on tourists' decision-making and also on the successful operation of some economic sectors such as the agricultural and tourism sectors (De Freitas, 2003; Taylor & Ortiz, 2009). The difference between climate and weather is the measure of time. Climate is what conditions of the atmosphere are measured as a long term average while weather is the manifestation of climate over a short period of time (Becken, 2010; Matzarakis, 2006).³ Becken (2010) pointed out that tourists may expect certain climate conditions but experience the actual weather which deviates from the average condition. As a result, climate and weather may affect tourism activities and tourism businesses.

Past tourism studies have shown that climate and weather affect tourism activities. Maddison (2001), Lise and Tol (2002), and Hamilton (2003) found that tourists are sensitive to climate and climate changes. Hall (2005) claimed that climate is one of the key factors influencing travel motivation and destination choice. Klenosky (2002)

treated warm weather as a pull factor in the choice of destinations.⁴ Using the UK tourist time series and weather data from 1980 to 1996, Agnew and Palutikof (2006) found that the hot weather in 1995 led to an increase of 309 million pounds in tourism expenditure. Taylor and Ortiz (2009) estimated the influence of weather conditions on UK domestic tourism and found that the hot weather of summer 2003 led to an increase in UK domestic tourism spending ranging between 14.79 million and 30.32 million pounds. Wilton and Wirjanto (1998) found a similar pattern in Canada. They show that a one degree higher than average temperature in summer results in an increase in domestic tourism expenditure by 4%. Temperature also affects snow depth and coverage and consequently influences winter sport tourism (Abegg, 1996; Harrison, Winterbottom, & Shephard, 1999; Scott, McBoyle, Mills, & Wall, 2001). In addition to temperature, De Freitas (2003) suggested that tourism climate factors should include esthetic (e.g., sunshine, cloudiness and visibility) as well as physical (e.g., rain, snow, ice and air quality) factors. Recently, Day, Chin, Sydnor, and Cherkauer (2013) study the impact of weather variations on several economic indicators in the United States and find that weather impacted economic performance in both the short term and the long term.

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³ The same distinction between weather and climate can be found on the U.S. National Aeronautics and Space Administration (NASA) website (http://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html) and the National Oceanic and Atmospheric Administration (NOAA) website (http://oceanservice.noaa.gov/facts/weather_climate.html).

⁴ The push-pull framework has been used by some researchers for examining the reasons under which tourists make travel decisions or destination choices (Crompton, 1997; Lee, O'Leary, Lee, & Morrison, 2002; Kim, Lee, & Klenosky, 2003; Hsu, Tsai and Wu, 2009). Push factors are social-psychological factors that motivate the individual to travel while pull factors are qualities of destinations that attract tourists (Hamilton, Maddison, & Tol, 2005).

As mentioned earlier, existing studies have highlighted the importance of weather information in tourist destination choices. Wilton and Wirjanto (1998), Agnew and Palutikof (2006), and Taylor and Ortiz (2009) emphasize the effect of temperature on tourism activities. Becken (2013) and Meyer and Dewar (1999) include rainfall as one of the weather factors which may influence tourist behavior and visitor numbers. Specifically, Becken (2013) investigates whether variations in rainfall explain variations in tourist participation (tourist flights) and visitation (visitor center) while Meyer and Dewar (1999) investigate the effect of rainfall on visitor numbers at a visitor center on New Zealand's West Coast. Taylor and Ortiz (2009) find that an increase in sunshine hours is associated with more tourist bed nights. We include temperature, rainfall, and sunshine hours as main weather determinants as these weather factors are usually used in the past literature mentioned above. However, those studies mostly document the effect of weather factors for regions with continental climates and find that temperature and sunshine hours are positively related to tourism activities (with the exception of ski resorts, where lower temperature is associated with increased tourist visits) while the number of rainy days is negatively associated with outdoor tourism activities.

Our research contributes to the hospitality literature in the following respects. First, while earlier studies mostly document the effect of weather on tourist behaviors for regions with continental climates, it is not clear whether those weather factors (temperature, sunshine hours and rainfall) will have the same effects on tourism activities for a region with a different climate such as Taiwan. Our sample allows us to address this question as Taiwan has a humid subtropical climate, which is pretty different from a continental climate. Second, our data contains information on room demand from international tourist hotels as the implicit assumption of this paper is that tourism activities may have an impact on lodging activities. This is pretty different from past related studies which mostly emphasize the effect of climate or weather on the number of tourist visits or on the number of days stayed at a particular destination. Third, since the occurrence of typhoons is frequently observed in Taiwan, especially during the summer season, we include the number of typhoons in our regression analysis to capture this particular climate feature of Taiwan.

The effects of extreme weather events such as very warm summers, mild winters and storms on tourism demand have also been studied by researchers (Bigano, Gorla, Hamilton, & Tol, 2005). However, little attention has been given to how weather factors influence the operation of tourism businesses. To fill this gap, one aim of our research is to describe in a useful and understandable way how weather factors can affect room demand in the Taiwanese hotel industry using data from 2007 to 2009. Recently, Rauken, Kelman, Jacobsen, and Hovelsrud (2010), Rauken and Kelman (2012), and Kelman, Rauken, and Hovelsrud (2012) found that small- and medium-sized enterprises (SMEs) do not perceive themselves to be particularly weather dependent through using data generated from a two-stage interview process with SMEs in Northern Norway. Different from those studies, one main feature of our current study is that we examine the influence of weather on hotel performance using actual weather information and hotels' financial reports rather than information collected from interviews.

The second aim of our research is to identify the weather factors which moderate the relationship between hotel price and room demand. Consumer behavior approach demonstrated that weather influences consumer behavior and that mood can mediate such effects (Barken, Hawton, Fagg, & Jennison, 1994; Kamstra, Kramer, & Levi, 2003; Murray, Muro, Finn, & Leszczyc, 2010). For example, weather can influence individual mood. The customer in a positive mood tends to self-reward and spend more money (Murray et al., 2010). Following their logic, weather affects tourism satisfaction (Coghlan & Prideaux, 2009a, 2009b; Smith, 1993) and may influence price sensitivity via mood. Consequently, weather may play a moderate role on the effect of price on room demand. Recently, Goh (2012) pointed out that climate represent socio-psychological factors of tourism demand but ignored

the role of climate in moderating the price sensitivity in lodging services. Using data from the Taiwanese hotel industry, we find that some weather factors moderate the relationship between hotel price and room demand.

The Taiwan Tourism Bureau has been conducting Tourism Satellite Accounts since 2001 according to the framework proposed by United Nations World Tourism Organization (UNWTO). Moreover, starting from 1999, detailed information on the annual percentage of tourism GDP to national GDP of Taiwan is provided by the Taiwan Tourism Bureau. According to the statistics provided by the Taiwan Tourism Bureau, tourism GDP accounted for about only 1.89 to 2.74 percentage points of overall GDP in Taiwan from 1999 to 2011. Although the economic activities in the tourism sector does not account for a large proportion of the entire Taiwan GDP, they contribute to the economic development of Taiwan. For example, Kim, Chen, and Jang (2006) examine the causal relationship between tourism expansion and economic development and conclude that in Taiwan, tourism and economic development reinforce each other. Chen and Wei (2009) recognize a unidirectional causal relationship from tourism expansion to economic growth for Taiwan. Understanding the impacts of different weather factors on hotel room demand would provide hotel managers and policy makers with useful references as to the best ways of managing or regulating the hotels as they contribute to the overall economic development of Taiwan.

2. Data and methods

2.1. Data

Monthly data for a total of 66 international tourist hotels (ITHs) in Taiwan on average daily rates (ADR), the number of group visitors and free independent travelers (FIT) from January 2007 to December 2009 was obtained from the Taiwan Tourism Bureau. This study does not include international tourist hotel data after 2009 since in July, 2008, Taiwan passed a legislation allowing group visitors from mainland China to visit Taiwan and then opened up the tourism market to independent travelers from mainland China in 2011. By focusing on data before December 2009, this paper avoids complications that may arise due to this structural change. Group visitors are tourists who travel in groups and mostly have their travel schedules planned by travel agencies while FITs are people who favor a more individualistic approach to travel and mostly plan their own trips instead of relying on group tourism or package tours arranged by travel agencies. Travel motivations of group travelers are also different from those of FITs. Since group travelers mostly rely on package tours arranged by travel agencies, the places they visit are mostly restricted to those popular tourist attractions. On the other hand, FITs are more flexible in their schedules than group travelers and may go to places less visited by group travelers. There are also FITs who come to Taiwan for the purpose of visiting relatives, friends, or meeting business clients. According to the hotel grading system issued by the Taiwan Tourism Bureau, the ITHs are equivalent to four- or five-star hotels. By the end of 2009, the number of ITHs located in the three metropolitan areas accounted for 53% of the total number of hotels in Taiwan (Lin & Chen, 2014). The statistics provided by the Taiwan Tourism Bureau show that 54.35%, 52.79% and 47.31% of hotel-staying international tourists chose to stay in ITHs for 2007, 2008 and 2009 respectively. Thus, we focus on ITHs since on average more than 50% of international tourists who stay in hotels while they are in Taiwan choose to stay in ITHs. The Taiwan Tourism Bureau also conducts International Tourist Hotels Operation Reports annually. The 2007, 2008 and 2009 reports show that there were a total of 60, 61, and 64 ITHs in Taiwan and they generated 35.14 billion, 35.05 billion, and 31.44 billion New Taiwan Dollars for the years 2007, 2008 and 2009, respectively. Some existing hotels did not have operating data for certain years. For example, the International Tourist Hotels Operation Report of 2009 shows that Hotel Royal-Nikko Taipei, Hotel

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