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How Las Vegas' tourism could survive an economic crisis?

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ABSTRACT

During the global recession of 2008, the demand for international tourism decreased. However, even during the recession, some tourism destinations benefitted from stabilized or even increasing international tourism demands. This paper analyzes factors which contribute to the growing international tourism demand in a destination. The empirical results identified three factors that helped Las Vegas survive the recession with the growing international demand: (1) the combined effect of the greater income elasticity of the visitors from Asia and Oceania due to fast income growth in the region, (2) Las Vegas' tourism product diversification through its high adaptive capacity which intensified its unique attractiveness and resulted in inelastic demand response to tourism price change, (3) "word-of-mouth" effect from the international visitors with a higher satisfaction level from diversified tourism products. Above all, diversification of tourism products and visitor origins was key to distribute the risk during an economic crisis with growing uncertainty and to stimulate a faster recovery thanks to the within-sector diversification in the tourism industry. Las Vegas' successful recovery was possible due to its adaptive capability in complex adaptive system (CAS). Highly specialized service-oriented regional economies can enhance regional resilience by improving adaptive capacity towards within-sector related variety.

1. Introduction

After the struggle during the global recession of 2008, worldwide tourism demand started to grow again. According to 'Travel & Tourism Economic Impact 2018 World',[1] the total contribution of travel and tourism to world GDP (Gross Domestic Product) was 10.4% (USD 8272.3 billion) in 2017 and is expected to grow to 11.7% by 2028. Travel demand for international destinations has grown by 235% from 1996 to 2017. This growth pattern presents opportunities for worldwide tourism destinations and it also indicates the growing competition among them. International tourists from various countries have diversified demands at a destination based on their cultural and institutional backgrounds. Benur and Bramwell (2015) suggest a strategic development of tourism products through diversification and intensification. Frenken, Van Oort, and Verburg (2007) discussed two types of variety as a driving force for regional economic growth. While related variety within sectors trigger Jacobs externalities, unrelated variety between sectors are more closely linked to the portfolio argument. A portfolio produced by unrelated variety protects a region from external shocks during a recessionary period, whereas related variety within a sector helps a region to stimulate employment growth in a recovery period. A regional economy that is highly specialized in a service industry, like Las Vegas' tourism, intrinsically lacks in portfolio and is therefore vulnerable to external shocks during a recession. However, a region with an excessive concentration in a specific industry, e.g., tourism industry in Las Vegas, can successfully recover from external shocks by enhancing variety within a sector, e.g., diversification within the tourism industry in Las Vegas. Worldwide tourism destinations have been competing to accommodate the evolving tourism demands and successful destinations often provide diversified tourism products for visitors. Martin (2011) attributed the positive hysteretic outcomes of recessionary shocks to 'adaptive' resilience found in complex adaptive systems theory. Consequently, a successful recovery of a regional economy and even faster growth after a recession largely depends on how a regional economy self-reorganizes, also known as 'adaptive capability of a system'. Often, the self-organization process is driven by evolutionary interactions during recessionary periods with growing uncertainty among various elements and stakeholders. In the case of the globally competitive tourism industry, diversified demands from shifts in visitor origins may stimulate such a self-organization process as long as a destination is well-equipped with high adaptive capability.

During the global recession that started in 2008, international travel demand declined sharply by 3.8%. International travel is considered a

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[1] https://www.wttc.org/-/media/files/reports/economic-impact-research/regions-2018/world2018.pdf.

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luxury good that is sensitive to the economic cycle (Crouch, 1995). Recently, Gunter and Smeral (2016) found that the effect of macroeconomic fluctuations on tourism demand generally declines over time. However, in a recent study by Smeral (2018), the use of an asymmetric model considering the speed of economic growth shows the different responses of tourism demand to income changes over business cycles. This study also shows the country-specificities regarding the luxury characteristics of tourism demands facing macroeconomic fluctuations from 2010 to 2015. These studies clearly show the decline of international tourism demand measured by outbound traveling from origin countries during a recessionary period. The competition among the worldwide tourism destinations escalates further in recessionary periods.

The macroeconomic shock on tourism demand is much harder in highly specialized tourism destinations like Las Vegas, Orlando, Hawaii, etc. Among the international tourism destinations, Las Vegas got a massive shock with shrinking demand in tourism for the first time. Even with the shocks to the tourism industry in Las Vegas during the early 1980s and early 2000s, Las Vegas had never stopped its rapid growth. Land and Land (2004) described the history of Las Vegas, mainly focusing on its rapid expansion since the railroad establishment in 1905. Las Vegas has continuously experienced successful paradigm shifts motivated by innovative and entrepreneurial approaches enabling rapid growth, at least until the 2008 Great Recession. For example, during the Great Depression in the 1930s, Las Vegas became the promised land for the jobless with the massive investment in the Boulder Dam project (later renamed Hoover Dam). Las Vegas's evolution continued as Bugsy Siegal's dreamland with mob-operated casinos was taken over by a prominent and successful businessman from California, Howard Hughes, in the 1960s. Later in the 1960s and 1970s, three other young businessmen arrived in Vegas with new ideas and business models that accelerated the growth of Las Vegas making it into the world capital of entertainment. They were Jay Sarno of Caesar Palace, Kirk Kerkorian of MGM, and Steven Wynn of Wynn Resort. In the late 1980s, Sheldon Adelson purchased Sands Hotel and constructed a massive scale Sands Expo and Convention Center in 1990 which attracted conventions and exhibitions to Las Vegas. Over the last 20 years, Las Vegas' mega-resort firms were quite successful in setting new trends for resort development and creating new types of demand for entertainment businesses until the Great Recession. Though the subprime mortgage crisis in the finance industry was the main cause of the Great Recession, Las Vegas became the epicenter of the recession, as described by Rick Harrison, a famous reality show star from Pawn Stars of History Channel (Schumacher, 2015). Massive job losses from 'Construction' and 'Leisure & Hospitality' industries in Las Vegas caused by the collapsing mega-resort projects and liquidation problems of mega resort firms, caused financial difficulties for many Southern Nevada residents. This triggered massive home foreclosures and a huge number of chapter 7 filings.

However, even during economic downturns, some destinations experienced stable or increasing international tourism demands. For instance, international visitation to Las Vegas from 2007 to 2009, increased by 12.7%, while the overall international travel demand decreased by 1.9% for the same period (LVCVA, 2018[2]). Las Vegas could survive the significant drop in domestic tourism demand thanks to the increasing international visitor volumes during the global economic recession of 2008. Las Vegas was one of the few destinations that benefitted from the increasing long-haul international visitors during the recession. Lessons from Las Vegas's tourism industry will guide other competing tourism destinations to better prepare for economic downturns in the future. This paper aims to study why international tourism demand for Las Vegas increased despite the decline in global tourism during the recent economic crisis. With the cyclical nature of international tourism demand to macroeconomic conditions, a thorough examination of the factors that affected international tourism demand is key to understanding how a successful destination like Las Vegas responded to an economic crisis.

In this paper, a set of proposed dynamic models estimates the tourism demand elasticities of international visitors to Las Vegas and the models quantifies the relative importance of the determinants in international tourism demand. The origin-destination specific demand models in this research contribute to drawing relevant lessons to understand how Las Vegas could survived the global recession facing the diversifying demand of international tourists. Also, the analysis of the origin-specific demand elasticities will provide valuable inputs for the destination product development strategies aiming to accommodate the diversified demand in a destination.

In Section 2, previous studies on tourism demand are reviewed, followed by Section 3 that summarizes recent trends in international tourism in Las Vegas. Section 4 introduces the model specification with the description of data. Estimation results and findings from the proposed models are analyzed in Section 5. Finally, Section 6 concludes with a discussion of economic and policy implications for how a tourism destination can survive an economic crisis.

2. Literature review

With the growing importance of the tourism industry, academic research on tourism has grown over the decades. Growing competitions among global tourism destinations stimulates further tourism product development and diversification in destinations to attract more tourists. Benur and Bramwell (2015) suggested the tourism product development strategies in a destination based on the degree of concentration and integration, and diversification and these strategies are crucial for enhancing competitiveness and sustainable development of tourism destinations. More specifically, a tourism destination's capacity to effectively respond to local and global changes is a key to survival in a global tourism market with growing competition. Among others, Brouder and Eriksson (2013) and Sanz-Ibáñez and Clavé (2014) highlighted the potential synergies between evolutionary economic geography (EEG) and tourism research. Path- and place-dependent evolutionary process in EEG can be utilized to understand the evolutionary reorganization and/or product diversification of tourism destinations. This links to the adaptive capacity of tourism destinations for regional economic resilience as explained by Martin (2011).

Using LVCVA's visitor profile data, Kwon, Lim, and Kim (2019) found that the tourism product diversification in Las Vegas during the early recovery period from the Great Recession of 2008 was mainly driven by the evolving demand of middle-income class visitors from Southern California. Also, they demonstrated that evolving demands varies greatly by the three grouped origins of the visitors to Las Vegas, southern California, rest of the United States, and foreign countries. Though their study did not formally test how the diversified demand from foreign visitors attributed to the product diversification; shifts in the major origin among the rapidly growing foreign visitors to Las Vegas are also believed to impact the path towards product diversification in Las Vegas.

Estimation and forecast for tourism demand have attracted much attention (Kim & Lee, 2017; Peng, Song, Crouch, & Witt, 2015; Song & Li, 2008). The mainstream tourism studies focus on modeling and forecasting for the demand in many destinations by applying various techniques and empirical data (Gunter & Smeral, 2016, 2017; Smeral, 2010; Smeral & Song, 2015). Demand estimation is an essential step to develop a forecasting model. A recent article by Isik, Dogru, and Sirakaya-Turk (2018) tested the causal relationships between tourism demand, renewable energy, and economic growth for the seven countries including United States. The estimation results vary by countries for instance, authors found no causal relation between tourism demand

[2] Las Vegas Convention and Visitor Authority's Visitor Statistics, source: https://www.lvcva.com/stats-and-facts/visitor-statistics/.

and overall economic growth in United States, France, and Italy while the causal relation in Germany was found to be strong. Other studies tested such causal relations between domestic tourism demand and economic growth. For instance, Songling, Ishtiaq, and Thanh (2019) found the empirical evidence supporting the unilateral causal relation from tourism demand to regional economic growth in Beijing. It is believed that such causal relations between tourism demand and economic growth can be better analyzed when the spatial unit of analysis is downsized to sub-national regions, especially highly specialized tourism destinations like as Las Vegas, Orlando, or Hawaii.

The tourism demand can be measured by the number of tourists, tourism expenditure, length of stay, and so forth. Most empirical studies utilize the number of visitors as a measure for estimating tourism demand (Crouch & Shaw, 1992). However, recent studies on tourism demand models tend to utilize tourism export and/or import measured in monetary terms (e.g., Gunter & Smeral, 2016, 2017).

Income and prices are the most important factors in estimating tourism demand (Crouch, 1995; Lim, 1997; Peng et al., 2015). Income is the most critical determinant for tourism demand (Crouch, 1994). Disposable income should be used in the econometric model, but GDP or GNP per capita is more widely used due to the data accessibility (Peng et al., 2015). Industrial production index (IPI) is also used for a proxy of real income (Seo, Park, & Yu, 2009), however, Dogru, Sirakaya-Turk, and Crouch (2017) found the limitation of IPI for estimating and forecasting tourism demand. Lu, Chen, and Kuo (2018) estimated income elasticities of international visitors to seven Asian countries, and compared the pre- and post-economic crisis income elasticities of the visitors. Their findings indicate that visitors became more sensitive to income fluctuation during economic crisis and the higher income elasticities tended to last even during the recovery period.

The prices in the tourism demand model consist of tourism goods and service prices, exchange rates, and transportation cost (Webber, 2001; Witt & Witt, 1995). The tourism goods and service prices in a destination are relative terms in comparison to the cost of living in the origin of a tourist. Therefore, most demand models include relative prices between destination and origin regions. The ratio of consumer price index (CPI) is commonly used as a proxy for relative tourism price (e.g., Akis, 1998; Muchapondwa & Pimhidzai, 2011; Song, Wong, & Chon, 2003). Increases in tourism goods and service prices negatively affect tourism demand in a destination, as shown in many empirical studies (Hiemstra & Wong, 2002; Garin-Munoz & Montero-Martín, 2007; Patsouratis, Frangouli, & Anastasopoulos, 2005). However, few other studies found there was no significant relationship between price and tourism demand (e.g., Muchapondwa & Pimhidzai, 2011). Exchange rates affect the purchasing power of international tourists, if the currency of tourists' origin country is depreciated against the currency in a destination, the inbound tourism demand decreases due to the loss in price competitiveness (De Vita & Kyaw, 2013; Lim, 1997). However, not all studies show a significant impact of exchange rates on tourism demand. Hui and Yuen (1998), Muchapondwa and Pimhidzai (2011) and Webber (2001) did not find the importance of the exchange rate in tourism demand estimations. More recently, Dogru, Isik, and Sirakaya-Turk (2019) found that the depreciation of the U.S. dollars helped the U.S. tourism trade balance with Canada, U.K., and Mexico. However, the long-term effect from the appreciation of the U.S. dollars on the trade balance varied by trading partner countries, specifically the appreciation did not affect the trade balance with Mexico in the long-run. Transportation cost could be a factor to determine tourism price albeit not always used in tourism demand models. Airfare, an instrumental variable for transportation cost, was also found to be a significant determinant of tourism demand in an empirical study by Nelson, Dickey, and Smith (2011). Also, the price of substitutes plays an important role in demand systems. Tourist would choose one among many competing destinations. Some studies included the tourism prices in other destinations to test a substitute effect (Song & Li, 2008).

The inclusion of a lagged dependent variable in an econometric model would prevent structural instability, poor predictions, and spurious regression or failure to consider possible changes in consumer preferences over time (Habibi, 2017). The lagged variable can explain the tourists' persistent consumption behaviors and “word-of-mouth” effect which causes spreading of information about destinations or influencing other people's choice behavior (Bieger & Laesser, 2004). The lagged term can be utilized to differentiate the long-term effect from the short-term effect (Habibi, Rahim, Ramchandran, & Chin, 2009; Lu et al., 2018).

Others assumed that the tourism demand could be affected by marketing expenditure or investments of infrastructures (Crouch, 1994; Naudé & Saayman, 2005; Ouerfelli, 2008). Dummy variables are also incorporated to capture seasonality or special events such as the global financial crisis in tourism demand estimation (Dogru et al., 2017; Song, Li, Witt, & Fei, 2010). Travel distance is a key factor to determine international tourism volume. McKercher and Mak (2019) found that travel to a land neighbor dominates outbound travel accounting for over 53% of all international tourism.

Peng et al. (2015) conducted a thorough review of existing literature on the empirical estimation of international tourism elasticities. They found the average international income elasticity to be 2.526, indicating that international tourism was a luxury good. In a few case studies, the income elasticities are found to be less than unity, however, none of the empirical studies found that international tourism is inferior good. The estimated income elasticities vary largely by empirical studies. The estimated income elasticities of the meta-regression are affected by origin-destination pairs, time period, model specification, and the measure of demand (Peng et al., 2015). From the empirical study on European outbound tourism, Gunter and Smeral (2017) found the income elasticity is elastic at 1.6427 during slow growth period (SGP) between the first quarter of 2004 and the first quarter of 2014. However, the estimated income elasticity during fast growth period (FGP) is not elastic at 0.6492 during the same period. They successfully demonstrated the asymmetric income elasticities facing macroeconomic fluctuation. Smeral (2010) developed the demand forecasting model based on symmetrical elasticities across business cycles, but he further advanced the forecasting model by incorporating the asymmetric income effect over business cycles (Smeral, 2018).

The average price elasticity in the meta-analysis by Peng et al. (2015) is −1.281, indicating that international tourists are sensitive to price change. In their meta-regression, the average price elasticities vary by origin-destination pairs, time period, model specification, the purpose of travel, tourism product, and the measure of demand. Still, most of the price elasticities are greater than (negative) unity. Similar to income elasticity of tourism demand, recent studies show that the price elasticity varies by time period with the fluctuation in macroeconomic conditions (Gunter & Smeral, 2016). The U.S. tourism demand in the 1990s to European countries was elastic to price change based on the estimation by Han, Durbarry, and Sinclair (2006); however, the authors also found the previous estimations mainly in 1980s were inelastic to price change, especially among U.S. tourism demand to France and Italy. Over time, the competition among European destinations had increased with the growing substitution effects among U.S. visitors. When a destination lacks a unique attractiveness, price elasticity of the destination increases due to the growing substitution effects. This implies the rising importance of the strategic development of tourism products through diversification and intensification as suggested by Benur and Bramwell (2015). The wide variety of tourism products in a destination enhances the overall utility of tourists. According to ‘the

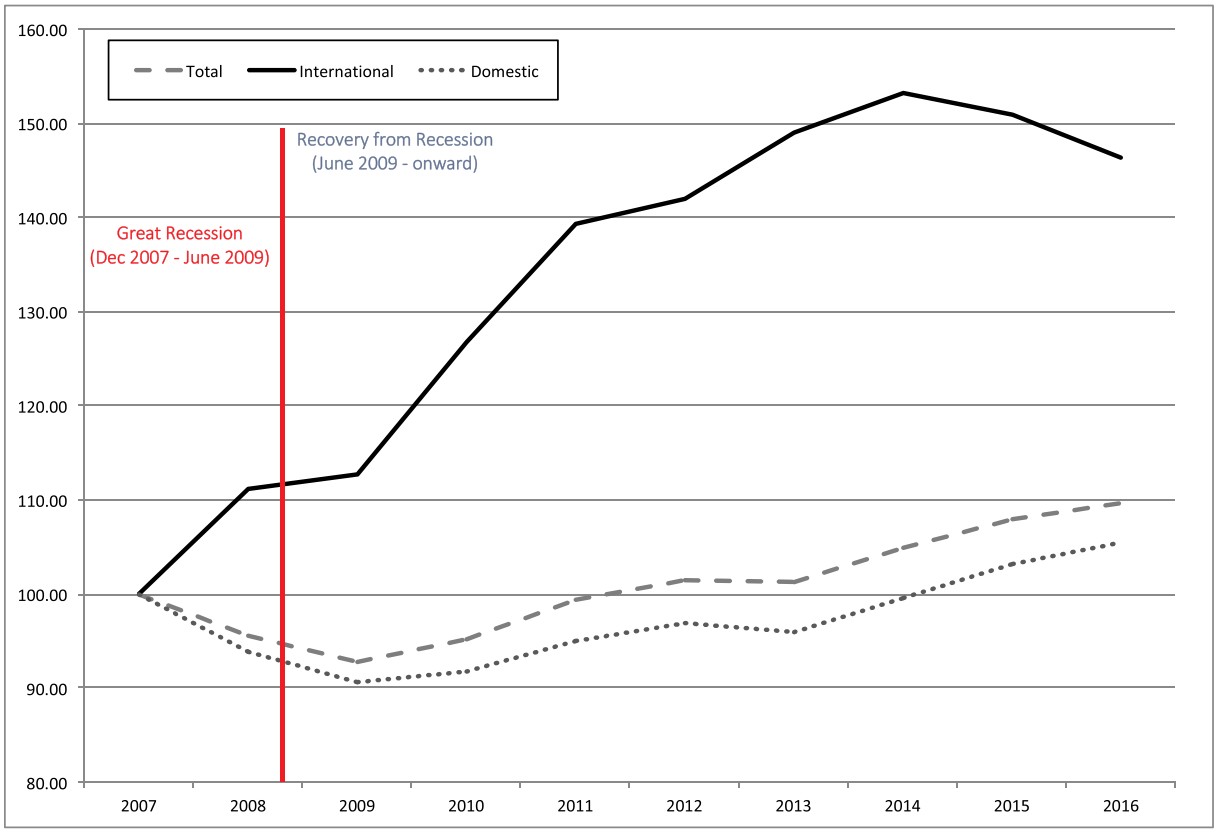

Fig. 1. Visitor volume growth index to Las Vegas (2007–2016), level in 2007 = 100.

love of variety theorem' in tourism demand, with the greater variety, the tourists have a higher willingness to pay that expands profits of the firms in a tourism destination (Andergassen & Candela, 2013).

3. Las Vegas tourism during the Great Recession and its aftermath (2007–2016)

Las Vegas is one of the most popular tourist destinations in the world with a wide variety of tourism products including casinos, world-class entertainment, food and beverage services, and the nearby popular national parks. The tourism industry is the most important sector for local/regional economies in Las Vegas and surrounding areas. Previous empirical studies on Las Vegas tourism mainly focus on the identification of the success factors as a tourism destination. For instance, Douglass and Raento (2004) attributed the success of Las Vegas to its tradition of invention, in contrast to the invention of tradition.

Since the peak of 39.2 million annual visitors in 2007, it took five years for Las Vegas to recover to the previous peak with 39.7 million visitors in 2012 (LVCVA, 2018). BLS (Bureau of Labor Statistics) data shows that during the five years between 2007 and 2012, the unemployment rate in Las Vegas Metro fluctuated greatly; it rose sharply from 4.5% in 2007 to 13.8% in 2010, then stabilized and went down to 11.3% in 2012. Construction and Leisure & Hospitality activities were the main drivers of the more-than tripled unemployment rate during the Great Recession in Las Vegas. According to BLS labor market data, 'Leisure & Hospitality' lost more than 21,000 jobs (7.9% loss) and 'Construction' lost more than 71,000 jobs (65.6% loss) during the recession. Both industries had been strongly supported by the continuous growth of visitation to Las Vegas before the Great Recession. Growth in tourism demand stimulated the massive investment in megaprojects which collapsed during the recession. Schumacher (2015) in his book, reviewed the history of modern Las Vegas and listed the series of bankrupted and near-bankrupt mega projects during the Great Recession, including $4.6 billion Echelon project by Boyd Gaming, MGM's CityCenter project rescued by the injection of investment from Dubai and eight banks, the half-completed Cosmopolitan project that the first developer lost, and the Fontainebleau project that had suspended in 2009 and finally went bankrupt in 2010. This series of collapsed mega projects laid off a large number of construction workers and the financial difficulties forced the mega-resort corporations to lay off a large number of their employees in the resort corridor. Struggling local labor markets endangered many local homeowners and Las Vegas metro had the highest share of underwater mortgages (69.5% in 2009) among the 50 largest metros in the U.S. based on Zillow Research data. Overall, this vicious circle put the Las Vegas' regional and Nevada's state economies in the worst recession in history.

During the Great Recession of 2008, the total visitor volume in Las Vegas had fallen by 7.1% for the two consecutive years from its peak at 39.2 million in 2007, down to 36.4 million in 2009 (LVCVA, 2018). For the same period, domestic visitors had decreased by 9.5%, whereas the international visitor volume rose by 12.7%. Las Vegas benefitted from the buffer provided by the increasing international tourism demand during the Great Recession (see Fig. 1). International visitors to Las Vegas had increased by 4.6% annually for the 10-year period (2007–2016) and more than 5.7 million international tourists arrived in 2016.

Though the share of international visitors to Las Vegas ranged from 10% to 12%, a sharp increase in international visitors to Las Vegas definitely served as a buffer to absorb the negative shock from the declining domestic demand. Among the top 16 origin countries of international visitors, only two countries, Canada and Mexico, continuously send over 1 million visitors annually. As shown in Fig. 2, Las Vegas tourism export to the two neighboring countries in the NAFTA market had grown by approximately 16.6% during the Great Recession. For the same period, visitor volume from other origins had grown as well. While European visitor volume grew by 6.7% with a fluctuation,

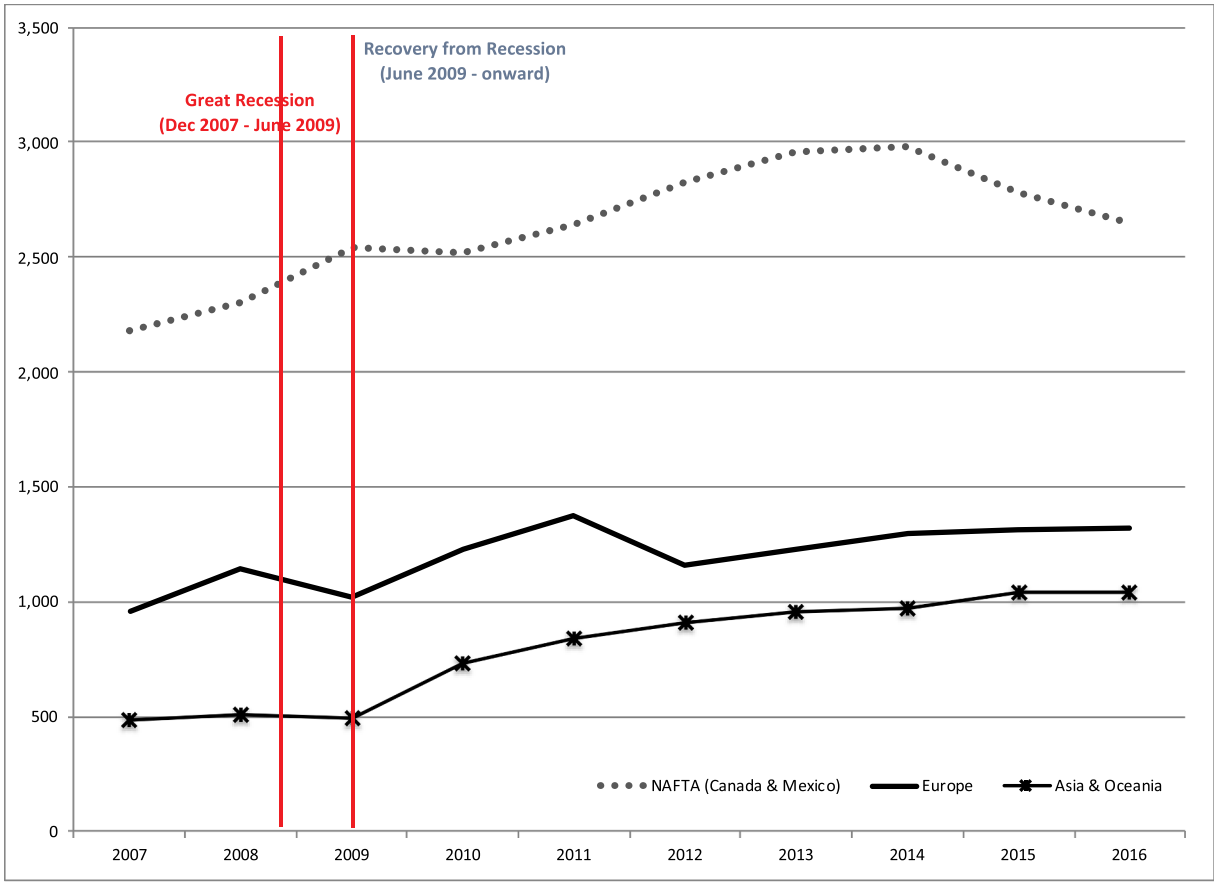

Fig. 2. International visitor volume to Las Vegas (2008–2016).

visitor volume from Asia and Oceania had virtually no change from 2007 to 2009. Since 2009, visitor volume to Las Vegas from Canada and Mexico rose by 4.2% until 2016, while the visitor volume from Europe, Asia, and Oceania grew at much faster rates. Export of Las Vegas tourism to Asia and Oceania rapidly increased by 113.3% from 2009 to 2016, while the export to Europe grew by 29.2%.

Traditionally, UK, Germany, Japan, and Australia are the major origins with the largest numbers of international visitors to Las Vegas (Fig. 3). However, the recent trend clearly indicates the sharp increase in non-traditional origins such as Brazil, China, Republic of Korea, and India. For instance, compared to annual visitors in 2007, China had over 3.4 times larger visitor volume, followed by 3.4 times more from Korea, and 2.6 times from India in 2016 (Fig. 4). NAFTA countries, Canada and Mexico, were still the top two origins of international visitors to Las Vegas in 2016 and other countries such as UK, Germany, Japan, and Australia still remained as the largest non-NAFTA export market of Las Vegas tourism.

The temporal shift in major origins of international visitors to Las Vegas has been dramatic within a relatively short period since the Great Recession and during the global economic crisis mainly among EU countries.

4. Methodology & data

This study employs a set of multivariate dynamic models for the estimation of income and price elasticities of international visitors to Las Vegas with the aim to examine the international tourism demand during an economic crisis. The multivariate dynamic models are widely employed for empirical studies estimating tourism demand (Dogru et al., 2017). In terms of static and dynamic, static regression models can suffer from a number of problems, including structural instability, forecasting failures and spurious regression results (Witt & Song, 2001; Garin-Munoz & Montero-Martín, 2007). With the aim to control the temporal variation in consumer preferences, a demand model can include previous demand as an explanatory variable (Garín-Munoz, 2006; Lu et al., 2018), which transform the static model into a dynamic model. The previous demand can take control of the effects of tourists' familiarity with the destination and collected information about a destination from “word-of-mouth” effect, as described by Bieger and Laesser (2004).

The multivariate dynamic model of tourism demand function takes the following form:

$$Q_{i.t} = \mathrm{f}(Q_{i.t-1}, GDP_{i.t}, GDP_{i.t-1}, P_{i.t}, P_{i.t-1}, D_i) \quad (1)$$

where,

$Q_{i.\ t}$: number of tourists arriving Las Vegas from country i during year t;
$GDP_{i.\ t}$: gross domestic product per capita in an origin country i;
$P_{i.\ t}$: relative price of tourism in Las Vegas;
D_i: flight distance from counties largest city or capital to Las Vegas.

As Becken and Schiff (2011) indicated that tourism demand is highly influenced by tourism price and tourist income. Our study measures international tourism demand by the number of arrivals from top origin countries and employs as the dependent variable, $Q_{i.\ t}$. In Eq. (1), we specified the tourism demand to Las Vegas, $Q_{i.\ t}$, as a function of the income level in an origin country *i* and the relative tourism price in Las Vegas. The previous year's tourism demand ($Q_{i.\ t-1}$) is also included as a regressor which makes the function a dynamic model. The GDP per

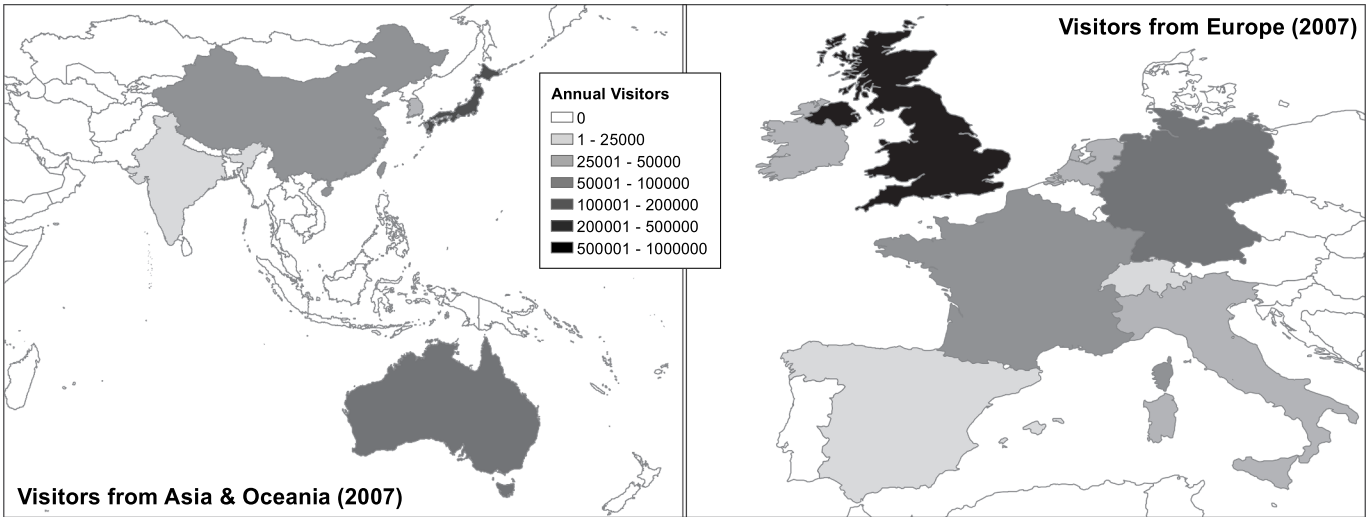

Fig. 3. Annual visitor volume to Las Vegas from top international origin countries (2007).

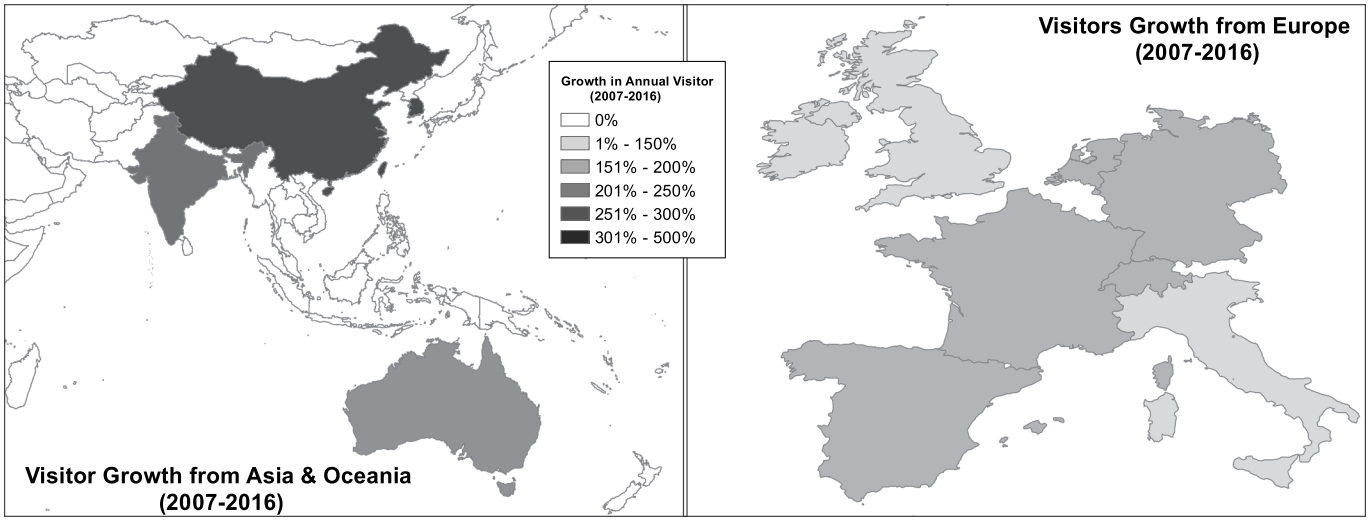

Fig. 4. Growth rate of international visitors to Las Vegas (2007–2016).

capita of each origin country ($GDP_{i.\ t}$) has been employed as the tourists' income level. The tourism price variable ($P_{i.\ t}$) in this study is a relative price taking into account purchasing power parity and exchange rate.[3] For the income and price variables, the lagged terms ($GDP_{i.\ t-1}$ and $P_{i.\ t-1}$) are also included in the model since it is possible to detect the response in demand to the previous year's income and price levels. Song et al. (2003) also developed models with the time-lagged income and price variables to estimate the demand for tourism in Hong Kong.

Distance between an origin country and Las Vegas is also included to control the distance decay in international tourism flows which McKercher and Mak (2019) tested and confirmed in their empirical study. Other factors that may influence tourism demand such as the marketing expenditure in the origin country and the change of consumer taste towards a destination are not included in this study, because the data was not available.

Several multivariate dynamic functional forms can be utilized to estimate international tourism demand as shown in a general form in Eq. (1). The most widely used functional form in the previous empirical literature is the double logarithmic form. Hence, the specific tourism demand function can be rewritten as shown in Eq. (2).

$$lnQ_{i.t} = \alpha + \beta_1 lnQ_{i.t-1} + \beta_2 lnGDP_{i.t} + \beta_3 lnGDP_{i.t-1} + \beta_4 lnP_{i.t} + \beta_5 \ln P_{i.t-1} + \beta_6 \ln D_i + \mu_i + \varepsilon_{i.t} \quad (2)$$

where,

$\nu_{i.\ t}$ ($\equiv \mu_i + \varepsilon_{i.\ t}$): fixed effects decomposition of the error term;
μ_i: country-specific error;
$\varepsilon_{i.\ t}$: i.i.d. error term

In Eq. (2), time-invariant origin country characteristics, such as geography may be correlated with the explanatory variables, and the presence of the lagged dependent variable, $\ln Q_{i.\ t-1}$ gives rise to autocorrelation, which can be embedded in country-specific effect error, μ_i (Baltagi, Fomby, & Carter Hill, 2001). When $\ln Q_{i.\ t-1}$ becomes correlated with the country-specific effect error, μ_i, ordinary least squares

[3] $P_{i.t} = \frac{PL_{us.t}}{PL_{i.t}} \bullet \frac{EX_{i.t}}{EX_{us.t}} = EX_{i.t}/PPP_{i.t}$

Purchasing power parity ($PPP_{i.t}$) of an origin country i reflects the rates of currency conversion that equalize the purchasing power of different currencies by eliminating the differences in price level among countries. Since purchasing power parity ($PPP_{i.t}$) is measured in terms of 1 US dollar, $PPP_{i.t}$ is a ratio of price level for origin country ($PL_{i.t}$) to that for US ($PL_{US.t}$), as shown in equation above. $EX_{i.\ t}$ is the exchange rate of currency in origin country i against US dollar, whereas $EX_{us.\ t}$ is 1. Increased $P_{i.\ t}$ means the travel cost to Las Vegas gets more expensive relative to the country's price level.

(OLS) estimator is not consistent anymore and results in biased estimation (Garín-Munoz, 2006). To resolve this problem, first difference transformation is applied to remove the country-specific effect error, μ_i.

Therefore, Eq. (2) can be rewritten as Eq. (3):

$$\Delta lnQ_{i.t} = \beta_1 \Delta lnQ_{i.t-1} + \beta_{2\Delta} lnGDP_{i.t} + \beta_3 \Delta lnGDP_{i.t-1} + \beta_4 \Delta lnP_{i.t} + \beta_5 \Delta lnP_{i.t-1} + \Delta\varepsilon_{i.t} \quad (3)$$

where,

$\Delta \ln Q_{i.\ t} = \ln Q_{i.\ t} - \ln Q_{i.\ t-1}$ and, analogously, for the other variables.

Time-invariant variable, $\ln D_i$ and μ_i dropped out.

However, even with the first difference, $\Delta lnQ_{i.\ t-1}$, error term ($\Delta\varepsilon_{i.\ t}$) still possibly generates serial correlation. If OLS is employed to estimate Eq. (3), unbiased estimation cannot be obtained. In order to solve the serial correlation problem, Arellano and Bond (1991) proposed GMM (Generalized Method of Moments) with instrumental variables (IV) for the consistent and efficient estimates, using the lagged dependent variable (two or more period) as instruments. Roodman (2009) and Soto (2009) recommend the GMM as the most precise approach with the presence of the potential bias due to the issues with the small time-series in panel structure.

The final form of multivariate dynamic model in this study is shown in Eq. (3). Because the equation is double logarithmic form, the coefficients are interpreted as elasticities. Also, it is a dynamic model, and the estimated coefficients are the short-run elasticities. Long-run elasticities can be obtained by dividing each coefficient by $(1 - \beta_1)$. A further advantage of the use of the differenced form is that the non-stationarity problem can be avoided (Garin-Munoz & Montero-Martín, 2007).

The multivariate dynamic model with panel data measures not only the temporally varying effects of variables for countries but also the effects of spatial variability across origin countries (Garin-Munoz & Montero-Martín, 2007). The top 16 origin countries of international visitors to Las Vegas are selected, which take up 90% of total international tourists. The estimated elasticities in tourism demand models vary by origins as shown in a meta-analysis by Peng et al. (2015). Due to the lack of time-series data for individual countries, this paper specifies three demand models based on three sets of origin countries: (a) top 16 origin countries ($i = 1, \cdots, 16$), (b) 8 European origin countries ($i = 1, \cdots, 8$), and (c) 5 Asian and Oceania countries ($i = 1, \cdots, 5$). In each model, annual visitor volume for a 10-year period ($t = 2007, \cdots, 2016$) from each country represents tourism demand in Las Vegas from a set of countries.

Las Vegas annual visitor data for each country were collected from LVCVA.[4] GDP per capita is measured in 2010 constant US dollars, obtained from the World Bank. The data on the exchange rate and PPP (Purchasing Power Parity) were collected from the main economic indicators of OECD (Organisation for Economic Co-operation and Development) and the economic data of FRB (Federal Reserve Board). Distance between origin country's largest city and Las Vegas was measured by flight distance. The largest airport in each country is selected for the measurement. Descriptive statistics for the variables in this study are listed in Table 1. During the last decade, 297,870 annual visitors have arrived in Las Vegas from the 16 origin countries on average. The visitor volume from the four Asian countries and Australia is a little more than that of the eight European countries. The average GDP per capita is $35,570 dollars across the 16 countries. The relative price is 1.25 on average, which means that the cost of living in Las Vegas is slightly more expensive than the cost of living in all the 16 origin countries, while the cost of living for the European countries is more expensive than Las Vegas. The average distance from 16 countries' main airport to Las Vegas is 5450 km. Geographically, the European countries are closer than the Asia and Oceania countries in this study.

[4] http://www.lvcva.com/includes/content/images/media/docs/2016-International-Visitation-Country-Region.pdf.

5. Findings/results

This section presents and discusses the empirical results from the model estimation. Three demand models are estimated: (a) with all 16 countries, (b) with 8 European counties and (c) with 5 Asian and Oceania countries. Canada and Mexico are the countries with the largest tourism volume to Las Vegas, but these two countries are included only in model estimation for all 16 countries. Model estimation only for these two countries is not reliable due to the small sample size. Brazil is the only country in South America among the top 16 origins. Again, due to the small observation of a single country in South America, this paper does not estimate a regression model for Brazil.

5.1. Estimation results

Eq. (3) estimates the demand function of international visitors to Las Vegas with difference GMM estimator. Table 2 shows the estimation results of the three models by different regions.

The diagnostic tests support the estimated models. The autocorrelation tests (AR tests) show the sign of first-order serial correlation, while no second order of autocorrelation is detected. Sargan tests do reject the null hypothesis of the joint validity of the instruments, indicating there can be potential issues of over-identification, but proposed models are not weakened by many instruments. Preferred test for over-identification is Hansen test in this case, which does not reject the null hypothesis of the joint validity of instruments (Roodman, 2009). It is also found that the estimated coefficients are not affected by instrumental variables in the models.

Most variables in all three models are statistically significant with the expected signs. The only exceptions are with the coefficients for the variable $lnP_{i.\ t-1}$ in models (a) and (c). These coefficients still have expected signs but are not statistically significant. The main determinants of the international tourism demand in Las Vegas are the income of tourists, the tourism price, and the lagged dependent variable.

Income of tourists, proxied by GDP per capita ($lnGDP_{i.\ t}$), was positive and statistically significant across all three models. This indicates that income growth in an origin country increases the tourism demand for Las Vegas, while the increased income of an origin country in the previous year has negatively affected tourism demand for Las Vegas. For instance, 1% increase in income of an origin country i in the model (a) induces 2.59% increase in tourist volume from the country to Las Vegas. The matching rates for visitors from European and from Asia and Oceania countries are 2.72% and 4.09%, respectively. Since the impact of income change in a given year for the tourism demand for Las Vegas is largely captured during the same year, the income growth of the year tends to decrease tourism demand of foreign visitors to Las Vegas in the following year. This can be partially explained by the growing competitions among destinations due to the low probability to revisit the same international destination in two consecutive years. These findings with income variable corroborate the empirical findings by Song et al. (2003) where they found the positive income effect and negative lagged income effect for tourism demand in Hong Kong from Canada, Japan, and the USA.

Tourism price, the relative ratio of living costs in a destination (e.g., Las Vegas) to living cost in an origin i expressed in 2010 U.S. dollar term ($lnP_{i.\ t}$), negatively affects tourism demand and is found to be statistically significant. A price increase in a given year decreases the international tourism demand in Las Vegas during the same year for all three models, while price increase in a given year would increase the international tourism demand in Las Vegas in the following year.

Table 1
Descriptive statistics of variables.

Variable	Description	Mean			S.D.		
		(a)	(b)	(c)	(a)	(b)	(c)
$Q_{i.\ t}$	Annual tourist arrival from origin country (thousand)	297.87	150.87	159.53	431.91	215.87	104.44
$GDP_{i.\ t}$	GDP per capita (2010 constant US $1000)	35.57	46.48	25.60	20.24	13.47	21.03
$P_{i.\ t}$	The relative tourism price (standardized price)	1.25	0.93	1.70	0.69	0.15	1.02
Rm_t	Room inventory in Las Vegas (thousand)	147.17	147.17	147.17	5.55	5.55	5.55
D_i	The flight distance from the origin country to Las Vegas (1000 km)	5.45	5.52	6.74	1.60	0.34	0.99
N	Number of sample	160[a]	80[b]	50[c]	160[a]	80[b]	50[c]

[a] In panel structure, there are 16 top origin countries over a 10-year period (2007–2016). The 16 top origin countries are Australia, Brazil, Canada, China, France, Germany, India, Ireland, Italy, Japan, Korea (ROK), Mexico, Netherlands, Spain, Switzerland, and the United Kingdom.
[b] In panel structure, there are 8 European countries over a 10-year period (2007–2016). The 8 European countries are France, Germany, Ireland, Italy, Netherlands, Spain, Switzerland, and the United Kingdom.
[c] In panel structure, there are 5 Asian and Oceania countries over a 10-year period (2007–2016). The 5 Asian and Oceania countries are Australia, China, India, Japan, and Korea (ROK).

Table 2
GMM estimation results.

	(a) Model (all countries)		(b) Model (European countries)		(c) Model (Asian & Oceania countries)	
	Coefficient	S.E.	Coefficient	S.E.	Coefficient	S.E.
Variable						
$lnQ_{i.\ t-1}$	0.6371***	0.0572	0.4878***	0.0825	0.7066***	0.1193
$lnGDP_{i.\ t}$	2.5927***	0.4399	2.7244***	0.4637	4.0986***	1.1550
$lnGDP_{i.\ t-1}$	−1.6434***	0.4499	−2.0218***	0.4519	−3.5552***	1.1063
$lnP_{i.\ t}$	−0.5470***	0.1530	−0.8215***	0.2092	−0.5315*	0.2463
$lnP_{i.\ t-1}$	0.1586	0.1667	0.6257***	0.2038	0.2281	0.2501
Diagnostic test						
Wald test	81.09	[0.001]	16.68	[0.001]	55.16	[0.001]
Sargan test	40.05	[0.001]	36.95	[0.001]	25.27	[0.032]
Hansen test	14.97	[0.309]	4.32	[0.987]	0.00	[1.000]
AR(1) test	−4.19	[0.001]	−2.63	[0.006]	−2.05	[0.040]
AR(2) test	−1.57	[0.117]	−1.64	[0.109]	−0.29	[0.775]
N	128		64		40	

*** significant at 1%, ** significant at 5%, * significant at 1.

However, the latter pattern is significant only among the visitors from European countries, as shown in the model (b). This needs to be formally tested; still, the best speculation would be that the delayed (or postponed) demand due to the higher price level in the previous year got realized in the current year. One percent increase in tourism price reduces 0.54% of visitor volume to Las Vegas from a country *i* in the model (a). The matching figure for European countries is 0.82% reduction, while that for Asia and Oceania countries is 0.53% reduction. The estimated price effects confirm the earlier findings by Song et al. (2003) where they found the negative price and positive lagged price effect for tourism demand in Hong Kong from Australia, Indonesia, and Malaysia.

Another significant variable is the lagged-dependent variable ($lnQ_{i.\ t-1}$). Especially, the lagged-dependent variable has been widely used as a good estimator for tourism demand in other empirical studies (among others, see Garin-Munoz & Amaral, 2000; Rodriguez, Martinez-Roget, & Pawlowska, 2012; Song et al., 2003). A possible explanation is that the risk-aversive behavior of international tourists due to higher opportunity costs associated with unfamiliarity with a foreign destination. Song et al. (2003) used the term, 'word-of-mouth' to describe the importance of gained knowledge about a destination from previous visitors. The lagged-dependent variables are positive and statistically significant in all models, while the coefficient in the model (b) is relatedly smaller than those in other models, which means 'word-of-mouth' in European visitors is not as effective as in the other countries.

Table 3
Estimated demand elasticity.

Elasticity type	Time-span	Model (a)	Model (b)	Model (c)
Income elasticity	Short-run	0.95	0.70	0.54
	Long-run	2.62	1.37	1.85
Price elasticity	Short-run	−0.39	−0.20	−0.30
	Long-run	−1.07	−0.38	−1.03

5.2. Elasticity of demand

The estimated price and income elasticities for all three models are summarized in Table 3. The estimated short-run income elasticity in all models is less than 1, indicating that these visitors are less sensitive to income change. The short-run income elasticity is 0.95 in model (a) indicating that 1% increase in income of an origin country i induces 0.95% increase in tourist volume from the country to Las Vegas in short-run. The short-run income elasticity is for European visitors is higher at 0.70, compared to international visitors from Asia and Oceania countries at 0.54, which means that Asia and Oceania visitors are less sensitive to the economic conditions of the origin countries than the European visitors in the short-run. The long-run income elasticities

are greater than the short-run elasticities in all three models. People tend to change their habits and find alternatives more over a longer time-span. Comparisons of short-run and long-run income elasticities between European visitors and Asia and Oceania visitors reveal interesting facts. First, income elasticity among European visitors does not change much from short-run to long-run, and this indicates that the income shock is largely captured in short-run and does not last long. Second, income elasticity among Asia and Oceania visitors increases greatly from short-run (0.54) to long-run (1.85), which indicates that income shock lasts much longer than European visitor cases. The global economic recession could cause a much bigger negative shock to tourism demand of European visitors to Las Vegas in the short-run, compared to the negative shock to tourism demand of Asia and Oceania visitors. However, in the long-run, the reverse holds.

The estimated short-run price elasticity in the model (a) is −0.39 and in models (b) and (c), short-run price elasticities are −0.20 and −0.30, respectively. Though negative elasticities show the reduced demand facing a price increase, it is inelastic with the absolute value less than 1. The international tourists to Las Vegas are not sensitive to the tourism price level in the short run. Also, long-run price elasticities are bigger than the short-run elasticities and slightly higher than unity in models (a) and (c). However, long-run price elasticity in model (b) for European visitors is still very inelastic at −0.38. Long-run price elasticity among Asia and Oceania visitors jumps up by 3.4 times from short-run price elasticity, while the long-run elasticity is 1.9 times bigger than the short-run elasticity among European visitors.

The estimated elasticities of visitors from the top 16 origin countries can be compared with the results from the meta-analysis by Peng et al. (2015). The long-run income and price elasticities for other tourism destinations in America in the meta-analysis are 2.27 and −1.55, respectively. The estimated long-run income elasticity in this study is 2.62 that is slightly higher and the price elasticity of visitors from the top 16 origins is at −1.07, close to unity (see Model (a) in Table 3). The higher income elasticity of visitors from the top 16 origins countries can be attributed to the dominant effect of visitors from Canada and Mexico. The visitors from these two neighboring countries may behave more similarly with the domestic visitors than long-haul international visitors to Vegas.

International tourists to other destinations in America are elastic to price change as shown in Peng et al. (2015), but those to Las Vegas are less sensitive as estimated in this study. Las Vegas has the unique attractiveness as a travel destination with a wide variety of tourism products including gambling, mega entertainments, high-end food and beverage services, clubs, and nearby national parks. The diversified tourism activities in Las Vegas have been evolving over time and are well structured to accommodate the heterogeneous demands of international visitors from various cultural and institutional backgrounds. With the enhanced utility from 'love of variety' in a destination, the international visitors are willing to pay more for the diversified tourism products in Las Vegas. As a result, international visitors to Las Vegas have not been very sensitive to the tourism price changes.

The combined share of visitors from Canada and Mexico over the 10-year period (2007–2016) is 55.4% on average. When the visitors from these two neighbors are omitted from the estimation, both elasticities significantly drop (see Model (b) and (c) in Table 3). The estimated demands in models (b) and (c) may vary greatly due to the heterogeneous cultural and institutional background among the visitors, i.e. European visitors demand in the model (b) might differ from the demand of Asia and Oceania visitors in the model (c). In terms of income elasticity, both groups of visitors are elastic; however European visitors are less sensitive to income change with the long-run elasticity of 1.37, compared to visitors from Asia and Oceania whose income elasticity is 1.85 in the long-run (see Table 3). Facing price change, both groups show negative but inelastic demand change. In the long-run, visitors from Asian and Oceania are more sensitive to a price change (−1.03) than European visitors with the price elasticity of −0.38.

5.3. Contributing factors for surviving tourism during economic crisis

The estimation results in this study reveal the lower long-run income elasticities of tourism demand among European, and Asia and Oceania visitors to Las Vegas than the long-run income elasticity of international visitors to American tourism destination estimated by Peng et al. (2015). In the short-run, the inelastic income elasticities among international visitors to Las Vegas had served as a buffer to the massive shock driven by the significant drop in domestic tourism demand during the recession and the recovery period until 2014. This can be largely attributed to the following two reasons. First, diversified origin countries of the growing international visitors to Las Vegas played an important role in distribution of the potential risk during the study period. Specifically, the newly emerging tourism export market in Asia and Oceania contributed to minimizing the shock from the global recession of 2008. Second, the macroeconomic condition in emerging exports markets in Asia and Oceania performed much better than U.S. and EU economies. Overall, the economic shock to the Asian and Oceanian countries was milder compared to the shocks to the rest of the world. Also, the recovery from the global recession was much faster among the Asian and Oceanian countries than the recovery in the U.S. and EU countries (Arias & Wen, 2015). For EU countries, real income dropped by 5.4% during the recessionary period (2007–2009), while income in Asia and Oceania increased by 5.1%. Additionally, the income growth in the recovery period after the recession was much faster at 33.3% for the 7-year period (2009–2016) in Asia and Oceania compared to the growth in EU at 10.0%. Consequently, the combined effect of the greater income elasticity of the visitors from Asia and Oceania with the fast income growth in Asia and Oceania after the recession significantly amplified the increased international tourism demand in Las Vegas.

Tourism demand in Las Vegas also responded to the price changes for international visitors. The price effect on international tourism demand can be explained by the following: first, during the recession and recovery period, the falling relative price of Las Vegas tourism was a major contributor to the tourism demand increase among international visitors. The mega resorts and hotels in Las Vegas reduced the average room rate by about 30% from 2007 to 2009 and this was a strategic move to survive the global recession. The weak U.S. dollars against other major currencies further reduced the relative price for international visitors. Second, Las Vegas is well known for providing a variety of tourism products to its visitors. Lam and Crossley (2014), in their comparative study with Macao, showed the diversified Las Vegas tourism with the growing role of events, festivals, and other non-gambling recreation attractions over the study period (2007–2012). Tourism products in Las Vegas have been continuously evolving and this intensifies its unique attractiveness as a tourism destination. Third, the price competitiveness of Las Vegas during the recession attracted the large number of visitors from close neighbors, Canada and Mexico. The visitors from NAFTA market preferred Las Vegas with lower price tags to their long-haul foreign travel options during the recession.

Another factor that helped Las Vegas sustain its tourism demand was "word-of-mouth" effect. The diversified tourism products in Las Vegas enhance the overall satisfaction of visitors longing for love-of-variety. The higher level of service in Las Vegas with the increased satisfaction among the visitors spread to potential visitors. This will increase the familiarity with Las Vegas among the risk-aversive consumers by reducing the expected opportunity cost. The famous marketing slogan by LVCVA in 2003, "What happens in Vegas, stays in Vegas", was incorrect. Rather, "what happened in Vegas, spread around the world through a 'word-of-mouth' effect".

6. Conclusion

During the Great Recession of 2008, Las Vegas maintained its tourism industry with rapidly growing international demand even with

the sharp decline in domestic visitors. This paper analyzes the factors that contributed to the growing international tourism demand in Las Vegas by developing a set of tourism demand functions. The specified models estimate short-run and long-run income and price elasticities for all foreign visitors, European visitors and visitors from Asian countries and Australia.

There are three main contributors that helped Las Vegas tourism survive with the growing international demand in the midst of the global economic crisis: (1) income effect mainly through the visitors from Asian and Oceania with rapid income growth, (2) price effect mainly through visitors from Canada, Mexico and EU countries attracted by relative price decrease, and (3) the "word-of-mouth" effect from international visitors with a higher satisfaction level from diversified tourism products.

During the global recession, all the European countries in this study experienced net loss in real income, whereas China, India, and the Republic of Korea had a net gain in real income for the same period. The growing international tourism demand for Las Vegas during the global economic recession and recovery period can be attributed to the lower income elasticity among European visitors, and higher income elasticity among Asian visitors who enjoyed rapid income growth. Our finding on international tourism demand in Las Vegas provides supportive evidence for preferred future development paths for tourism destinations.

Rapidly growing demand from developing countries is evident and these countries may serve as a buffer during an economic crisis with relatively rapid income growth. Provision of diversified tourism products and services for the visitors from developing countries will attract more demand that has not reached the saturation point yet and help a destination distribute risk during an economic downturn.

The struggling U.S. economy during the Great Recession of 2008 lowered the relative price in Las Vegas compared to all top European countries and the negative price elasticity increased the demand among European visitors. Even with the higher relative price of Las Vegas among Asian visitors, the response to a price increase yielded limited effect on the demand decrease. The possible explanation for the inelastic demand to the relative price change can be attributed to the unique attractiveness of tourism in Las Vegas with a wide variety of choices. Las Vegas has been playing the leading role to actively accommodate the diversifying tourism demands and more importantly, it is well known for the tradition of invention (Douglass & Raento, 2004). Las Vegas has created new types of tourism products by offering various activities such as mega-events, sports venues, and high-end food and beverage services for visitors. This helped Las Vegas continuously benefit from increasing international visitors even during the global economic recession. With the growth of international visitors to Las Vegas, it could successfully distribute the risk during the recent global economic crisis.

Findings in this study are in line with the policy implication proposed by Kennedy (1998) that encourages diversification within the Irish tourism industry. He suggested the diversification would limit the decrease in tourism demand during an economic downturn. Las Vegas is well-known for its entrepreneurial spirit for diversified tourism product development and recent shifts in terms of origin countries of international visitors further stimulated the variety in the Las Vegas tourism industry. During the recession and early recovery periods, diversified demands among international visitors with diverse cultural and institutional backgrounds served as a driving force to reorganize the tourism industry. Las Vegas is a good model for other regional economies with specialized service industries in that purposive adaptation by various economic agents and policymakers can enhance regional resilience demonstrated by positive hysteretic outcomes after recessionary shock and this process is well summarized by Martin (2011). He pointed out the importance of variety, strategic selection, path dependence, and self-organization for evolutionary approach to regional economic resilience. Through the Las Vegas example, other highly specialized service-oriented regional economies can learn how to enhance regional resilience by improving adaptive capacity towards within-sector related variety.

Other international tourism destinations should learn the lessons from Las Vegas on how diversification both in terms of tourism products and origins of visitors could help sustain the tourism of the destinations. Risk distribution of a tourism destination is crucial preparation for the growing uncertainty given the complex nature of the interconnected global economy. Las Vegas' successful recovery was possible due to its adaptive capability in complex adaptive system (CAS). As Hartman (2016) suggested, adaptive tourism can be determined by the diversity in tourism products, experiences and firms in a tourism destination. His theoretical discussion is well proven by the successful recovery of the tourism industry in Las Vegas, which demonstrates the importance of strategic planning and governance for adaptive capacity enhancement. In a highly specialized regional economy, between-sector diversification of industrial structure within a short period of time is almost impossible, especially facing recessionary shocks. However, within-sector diversification pursuing variety in a specialized industry of a region accelerates recovery and strengthens regional economic resilience as shown in Frenken et al. (2007). Unlike their study, our study proves low-skilled service industries, like tourism, can also enhance regional economic resilience by promoting the within-sector related variety.

Like many other studies, this study has limitations. One of the limitations is the inability of this study to analyze the country-specific tourism demand. Due to the lack of sufficient time-series data under panel structure, this paper cannot estimate the individual countries-demand for the tourism services/products of Las Vegas. Even within a same continent and/or neighboring region, there may exist heterogenous tourist behaviors based on social and institutional differences among the individual countries. However, once sufficient time-series data is accumulated for these countries, the same model framework can be applied to individual countries to estimate their elasticities for tourism demand in Las Vegas. With such dataset, this study could be expanded to include models that estimate the time-varying parameter.

CRediT authorship contribution statement

Jaewon Lim:Conceptualization, Supervision. **DooHwan Won**:Methodology, Investigation.

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References

Akis, S. (1998). A compact econometric model of tourism demand for Turkey. *Tourism Management, 19*(1), 99–102.

Andergassen, R., & Candela, G. (2013). Less developed countries, tourism investments and local economic development. *Review of Development Economics, 17*(1), 16–33.

Arellano, M., & Bond, S. (1991). Some tests of specification for panel data: Monte Carlo evidence and an application to employment equations. *The Review of Economic Studies, 58*(2), 277–297.

Arias, M. A., & Wen, Y. (2015). Recovery from the great recession has varied around the world. *Middle East, 11* 48-31.

Baltagi, B. H., Fomby, T. B., & Carter Hill, R. (2001). *Nonstationary panels, panel cointegration, and dynamic panels.* Emerald Group Publishing Limited.

Becken, S., & Schiff, A. (2011). Distance models for New Zealand international tourists and the role of transport prices. *Journal of Travel Research, 50*(3), 303–320.

Benur, A. M., & Bramwell, B. (2015). Tourism product development and product diversification in destinations. *Tourism Management, 50*, 213–224.

Bieger, T., & Laesser, C. (2004). Information sources for travel decisions: Toward a source

process model. *Journal of Travel Research, 42*(4), 357–371.
Brouder, P., & Eriksson, R. H. (2013). Tourism evolution: On the synergies of tourism studies and evolutionary economic geography. *Annals of Tourism Research, 43*, 370–389.
Crouch, G. I. (1994). The study of international tourism demand: A review of findings. *Journal of Travel Research, 33*(1), 12–23.
Crouch, G. I. (1995). A meta-analysis of tourism demand. *Annals of Tourism Research, 22*(1), 103–118.
Crouch, G. I., & Shaw, R. N. (1992). *International tourism demand: A meta-analytical integration of research findings.* Mansell Publishing175–207.
Dogru, T., Isik, C., & Sirakaya-Turk, E. (2019). The balance of trade and exchange rates: Theory and contemporary evidence from tourism. *Tourism Management, 74*, 12–23.
Dogru, T., Sirakaya-Turk, E., & Crouch, G. I. (2017). Remodeling international tourism demand: Old theory and new evidence. *Tourism Management, 60*, 47–55.
Douglass, W. A., & Raento, P. (2004). The tradition of invention: Conceiving Las Vegas. *Annals of Tourism Research, 31*(1), 7–23.
Frenken, K., Van Oort, F., & Verburg, T. (2007). Related variety, unrelated variety and regional economic growth. *Regional Studies, 41*(5), 685–697.
Garín-Munoz, T. (2006). Inbound international tourism to Canary Islands: A dynamic panel data model. *Tourism Management, 27*(2), 281–291.
Garin-Munoz, T., & Amaral, T. P. (2000). An econometric model for international tourism flows to Spain. *Applied Economics Letters, 7*(8), 525–529.
Garin-Munoz, T., & Montero-Martín, L. F. (2007). Tourism in the Balearic Islands: A dynamic model for international demand using panel data. *Tourism Management, 28*(5), 1224–1235.
Gunter, U., & Smeral, E. (2016). The decline of tourism income elasticities in a global context. *Tourism Economics, 22*(3), 466–483.
Gunter, U., & Smeral, E. (2017). European outbound tourism in times of economic stagnation. *International Journal of Tourism Research, 19*(3), 269–277.
Habibi, F. (2017). The determinants of inbound tourism to Malaysia: A panel data analysis. *Current Issues in Tourism, 20*(9), 909–930.
Habibi, F., Rahim, K. A., Ramchandran, S., & Chin, L. (2009). Dynamic model for international tourism demand for Malaysia: Panel data evidence. *International Research Journal of Finance and Economics, 33*(1), 208–217.
Han, Z., Durbarry, R., & Sinclair, M. T. (2006). Modelling US tourism demand for European destinations. *Tourism Management, 27*(1), 1–10.
Hartman, S. (2016). Towards adaptive tourism areas? A complexity perspective to examine the conditions for adaptive capacity. *Journal of Sustainable Tourism, 24*(2), 299–314.
Hiemstra, S., & Wong, K. K. (2002). Factors affecting demand for tourism in Hong Kong. *Journal of Travel & Tourism Marketing, 13*(1–2), 41–60.
Hui, T. K., & Yuen, C. C. (1998). An econometric study on Japanese tourist arrivals in British Columbia and its implications. *Service Industries Journal, 18*(4), 38–50.
Isik, C., Dogru, T., & Sirakaya-Turk, E. (2018). A nexus of linear and non-linear relationships between tourism demand, renewable energy consumption, and economic growth: Theory and evidence. *International Journal of Tourism Research, 20*(1), 38–49.
Kennedy, V. (1998). Risk management in the Irish tourism industry: The contribution of a portfolio investment approach. *Tourism Management, 19*(2), 119–126.
Kim, J., & Lee, C. K. (2017). Role of tourism price in attracting international tourists: The case of Japanese inbound tourism from South Korea. *Journal of Destination Marketing & Management, 6*(1), 76–83.
Kwon, Y., Lim, J., & Kim, E. (2019). Diversifying visitor demand and its impact on Las Vegas's tourism industry during recovery from the Great Recession. *Regional Science Policy & Practice*. https://doi.org/10.1111/rsp3.12216.
Lam, C. S., & Crossley, J. (2014). Las Vegas versus Macao as diversified travel destinations. *Journal of Tourism Insights, 5*(1), 1–26.
Land, B., & Land, M. (2004). *A short history of Las Vegas.* University of Nevada Press.
Lim, C. (1997). Review of international tourism demand models. *Annals of Tourism Research, 24*(4), 835–849.
Lu, C. L., Chen, S. T., & Kuo, H. I. (2018). International tourism demand in Asia: Before and after the economic crisis. *Asia Pacific Journal of Tourism Research, 23*(11), 1073–1085.
LVCVA (2018). Las Vegas convention and visitor authority's visitor statistics. source https://www.lvcva.com/stats-and-facts/visitor-statistics/.
Martin, R. (2011). Regional economic resilience, hysteresis and recessionary shocks. *Journal of Economic Geography, 12*(1), 1–32.
McKercher, B., & Mak, B. (2019). The impact of distance on international tourism demand. *Tourism Management Perspectives, 31*, 340–347.
Muchapondwa, E., & Pimhidzai, O. (2011). Modelling international tourism demand for Zimbabwe. *International Journal of Business and Social Science, 2*(2), 71–81.
Naudé, W. A., & Saayman, A. (2005). Determinants of tourist arrivals in Africa: A panel data regression analysis. *Tourism Economics, 11*(3), 365–391.
Nelson, L. A., Dickey, D. A., & Smith, J. M. (2011). Estimating time series and cross section tourism demand models: Mainland United States to Hawaii data. *Tourism Management, 32*(1), 28–38.
Ouerfelli, C. (2008). Co-integration analysis of quarterly European tourism demand in Tunisia. *Tourism Management, 29*(1), 127–137.
Patsouratis, V., Frangouli, Z., & Anastasopoulos, G. (2005). Competition in tourism among the Mediterranean countries. *Applied Economics, 37*(16), 1865–1870.
Peng, B., Song, H., Crouch, G. I., & Witt, S. F. (2015). A meta-analysis of international tourism demand elasticities. *Journal of Travel Research, 54*(5), 611–633.
Rodriguez, X. A., Martinez-Roget, F., & Pawlowska, E. (2012). Academic tourism demand in Galicia, Spain. *Tourism Management, 33*(6), 1583–1590.
Roodman, D. (2009). How to do xtabond2: An introduction to difference and system GMM in Stata. *The Stata Journal, 9*(1), 86–136.
Sanz-Ibáñez, C., & Clavé, S. Anton (2014). The evolution of destinations: Towards an evolutionary and relational economic geography approach. *Tourism Geographies, 16*(4), 563–579.
Schumacher, G. (2015). Sun, sin & suburbia: The history of modern Las Vegas, revised and expanded. University of Nevada Presshttps://www.muse.jhu.edu/book/42459.
Seo, J. H., Park, S. Y., & Yu, L. (2009). The analysis of the relationships of Korean outbound tourism demand: Jeju Island and three international destinations. *Tourism Management, 30*(4), 530–543.
Smeral, E. (2010). Impacts of the world recession and economic crisis on tourism: Forecasts and potential risks. *Journal of Travel Research, 49*(1), 31–38.
Smeral, E. (2018). Variations in seasonal outbound travel across the business cycles. *Journal of Travel Research, 57*(7), 936–946.
Smeral, E., & Song, H. (2015). Varying elasticities and forecasting performance. *International Journal of Tourism Research, 17*(2), 140–150.
Song, H., & Li, G. (2008). Tourism demand modelling and forecasting—A review of recent research. *Tourism Management, 29*(2), 203–220.
Song, H., Li, G., Witt, S. F., & Fei, B. (2010). Tourism demand modelling and forecasting: How should demand be measured? *Tourism Economics, 16*(1), 63–81.
Song, H., Wong, K. K., & Chon, K. K. (2003). Modelling and forecasting the demand for Hong Kong tourism. *International Journal of Hospitality Management, 22*(4), 435–451.
Songling, Y., Ishtiaq, M., & Thanh, B. T. (2019). Tourism industry and economic growth nexus in Beijing, China. *Economies, 7*(1), 25.
Soto, M. (2009). System GMM estimation with a small sample. Unpublished, source https://www.recercat.cat/handle/2072/41978.
Vita, G. D., & Kyaw, K. S. (2013). Role of the exchange rate in tourism demand. *Annals of Tourism Research, 43*, 624–627.
Webber, A. G. (2001). Exchange rate volatility and cointegration in tourism demand. *Journal of Travel Research, 39*(4), 398–405.
Witt, S. F., & Song, H. (2001). Forecasting future tourism flows. In S. Medlik, & A. Lockwood (Eds.). *Tourism and hospitality in the 21st century*. Oxford: Butterworth Heinemann.
Witt, S. F., & Witt, C. A. (1995). Forecasting tourism demand: A review of empirical research. *International Journal of Forecasting, 11*(3), 447–475.