

EFFECTS OF ECONOMIC FACTORS ON DEMAND FOR LUXURY HOTEL ROOMS IN THE U.S.

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ABSTRACT

The purpose of this study is to estimate the effects of economic factors on the demand for luxury hotel rooms in the United States during the 16-year period (1998 - 2013). The average daily rate of six types of hotel rooms, gross domestic product and two recessions (2001 and 2007-2009) are considered as independent variables in the sample of the time series data set of 192 points to predict luxury room night stays of customers by ex-post data. Autoregressive Distributed Lag Model is employed to select the best model of luxury hotel demand on its determinants in the short and long run relationships. Findings indicate that in the long run, (1) the US residents would stay more nights in luxury hotels when their income increases; (2) the Canadian and UK might not visit or stay in the luxury hotels in the U.S. when their income or luxury hotel price increases; and (3) the German, Japanese, Korean and Chinese visitors would stay in the luxury hotels in the U.S. when their incomes increase no matter what the luxury hotel price increases. In the short run, the Chinese, Japanese, and Korean might not stay in the luxury hotels in the U.S. when their income or hotel price increases. The English would stay in the luxury hotels when their income or luxury hotel price increases. Finally, the two US economy recessions in 2001 and 2007-2009 do not affect the demand for luxury hotel rooms in the long run.

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INTRODUCTION

Failure to appropriately understand the specific impacts of economic sectors-mainly gross domestic product and price-on the demand for luxury hotel rooms creates major concerns for lodging-industry stakeholders in the United States. The U.S. has been ranked as the top revenue and number of properties in the worldwide luxury hotel market. The luxury hotel receipt of the U.S. was the top in the world with US\$43.9 billion in 2013, which is more than double China's, the second top luxury hotel receipt with \$20.6 billion (Travel and Tourism Intelligence Center, 2014). In the United States in recent years, the expenditures of U.S. residents for lodging were over 6 times more than the international visitors; 728, 748, 777 vs. 126, 139, and 148 billion dollars in 2012, 2013, and 2014, respectively (US Travel Association, 2014). According to American Hotel Lodging Association (2012-2014), the top seven international markets visiting the United States from 2011 to 2013 were Canadian (21.3, 22.7, & 23.4 millions), Mexican (13.5, 14.5, & 14.3 millions), English (3.8, 3.8, & 3.8 millions), Japanese (3.2, 3.7, & 3.7 millions), Germany (1.8, 1.9, & 1.9 millions), Mainland Chinese (1.1, 1.5, & 1.8 million), and South Korean (1.1, 1.3, & 1.4 millions).

Since 1998 the U.S. economy has been experienced two big recessions (March 2001-November 2001 & December 2007-June 2009) that affected the average daily rate of hotel rooms, especially the luxury segment (Figure 1).

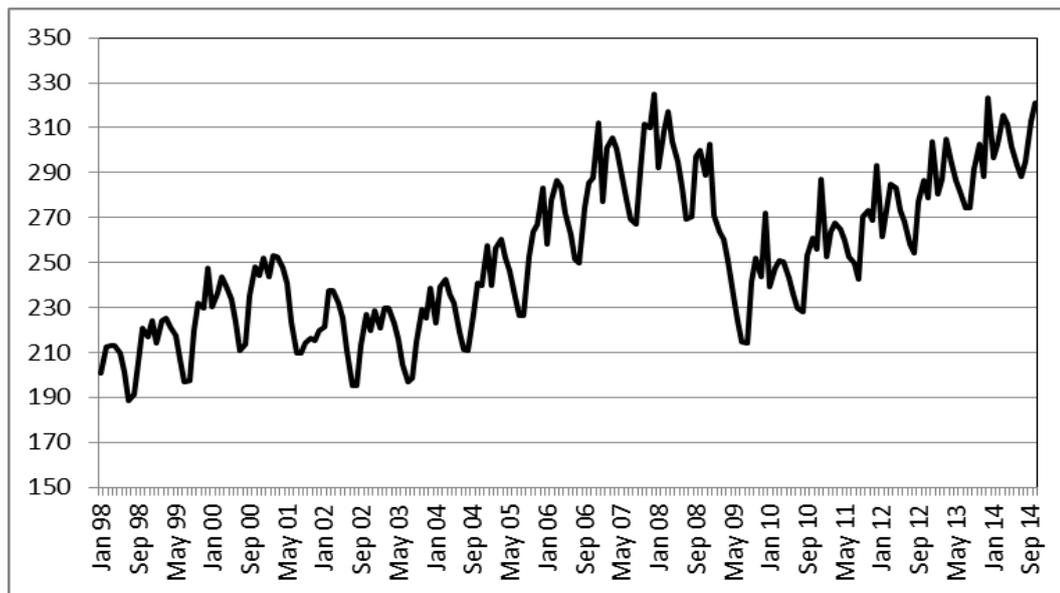


Figure 1. *Average Daily Rate (\$) of luxury hotels under two recessions (2001 and 2007-2009)*

Figure 2 illustrates the relationship between the incomes of U.S. and seven key international markets and luxury room night stays—the measure of luxury lodging demand (ex-post). These series have a strong common trend, although luxury lodging grows at a somewhat faster than gross domestic products (GDPs) of other countries except China's. Figure 3 examines the first differences in each series: GDPs change of 8 countries and change in luxury room stays. The series appear highly cointegrated, with closely matched fluctuations.

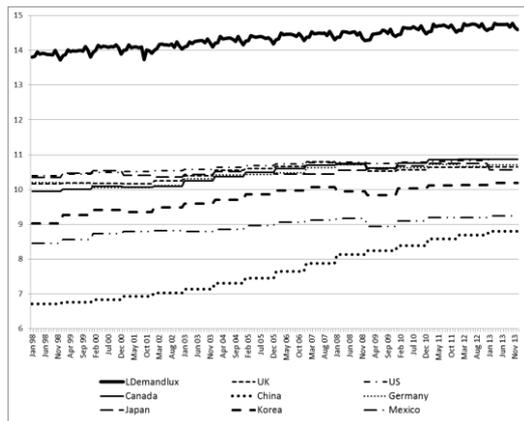


Figure 2. Rooms sold and Gross Domestic Products of US and 7 key international markets in natural logarithm

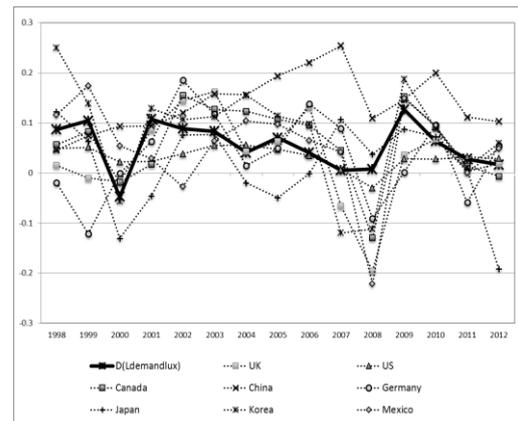


Figure 3. Change in GDP and Change in Demand for Luxury Hotel Rooms

Therefore, incomes of the origin markets, relative prices of luxury hotels and two big recessions are key factors to change the demand for luxury hotels in the United States. The purpose of this study is thus to build a dynamic model of ex-post monthly demand for luxury hotel rooms in the U.S. Econometric methods are employed to measure the demand elasticity for luxury hotel rooms in the U.S. The economic measures are the GDPs of US, UK, China, Japan, South Korea, Germany, Canada, and Mexico, the hotel's average daily rates (ADR) of luxury hotels in the US.

The current study is significant to contribute to hospitality literature and practice. Our data sample retrieved from Smith Travel Research (2014) consists of 70% of total number of guestrooms in the U.S. with 107,122 luxury rooms whose change in price and demand were studied in 192 months across the country. Therefore, the results of eight target markets for luxury hotel demand in the U.S. are a longitudinal reflection for luxury hotel demand across time and geographic locations. They are helpful for academic analysts and luxury hotel investors and owners in the U.S. since the fit model of the study can provide with estimates of

price and income sensitivity of luxury hotel demand. Academic analysts can use the findings to forecast economic growth while investors can evaluate their profits and losses in the U.S. luxury hotels in the future.

The article has three sections. First, contemporary research about demand for luxury hotel rooms in the U.S. will be reviewed. Next, the model and the methodology used to study the determinants of lodging demand will be discussed. Finally, the model estimated for luxury segment in the U.S. will be presented. Consequently, the parameters estimate across properties as a system to illustrate how luxury segments can alter economic factors that in turn, determine demands for rooms.

LITERATURE

Luxury Hotel Demand

The hospitality industry has increased the need for travel accommodations in order that travellers make their dreams of lifestyle fantasies become reality (Curtis, 2001). Thus, for travellers, luxury hotels are more than just a product, but rather an experience (Chu, 2014). The Forbes Travel Guide (2014) (formerly Mobile Travel Guide) defines luxury hotel as a Five Star hotel as follows:

“These exceptional properties provide a memorable experience through virtually flawless service and the finest of amenities. Staff are intuitive, engaging and passionate, and eagerly deliver service above and beyond the guests’ expectations. The hotel was designed with the guest’s comfort in mind, with particular attention paid to craftsmanship and quality of product. A Five Star property is a destination unto itself. Exceptionally distinctive luxury environment offering consistently superlative, personalized service and the ultimate in amenities, make these hotels and inns the best in the U.S. and Canada. Attention to detail and the anticipation of every need are evident throughout this exclusive group of hotels. These hotels are remarkable in every aspect from the flush and elegant guest room design to the unforgettable culinary experiences. The Forbes Five Star category includes such properties as the Peninsula Beverly Hills, the Four Seasons Hotel Chicago, the Ritz-Carlton San Francisco and the Mandarin Oriental New York.” (Forbes Travel Guide, 2014).

In addition, the American Hotel Lodging Association (2014) classifies hotels into six types in value order as follows: Luxury, Upper

Upscale, Upscale, Upper Midscale, Midscale, and Economy. The term luxury hotels used in this study indicates the five-star hotel of Forbes Travel Guide (2014) and luxury hotel of American Hotel Lodging Association (2014).

In terms of supply, the luxury hotel segment has become important in the general hospitality industry due to its recent immense growth. In September 2013, Forbes Travel Guide Star Awards reported that there were increases of 9% and 16.8% for five and four-star hotels in just 6 months. Essentially, one new luxury hotel was built a week. According to Timetric (2013), despite the Asia economic slowdowns, the number of luxury hotels in the Asia-Pacific region increased 18% in 2010 and 11% in 2011. In Western Europe, the number of luxury hotels increased 9% in 2011.

In terms of demand, there has been an extensive amount of research in multiple countries across the world recently. The researchers on luxury hotel demand have mostly analyzed loyalty, behavior, energy, environment, service quality, leadership, and information technology in the world. In Ghana, Narteh, Agbemabiese, Kodua, and Braimah (2013) suggested six relationship marketing techniques for hotel managers to develop customer loyalty in luxury hotels in Ghana whereas in China, Chen and Peng (2014) examined consumer behavior in luxury hotels. Ryan and Stewart (2009) reported the relationship between ecotourism and luxury hotels in Dubai whereas Mohsin and Lockyer (2010) reported the influence of service quality in luxury hotels in India. Then in 2014, Colmenar, Vale, Borge, and Requena (2014) reported solar thermal systems for a luxury hotel in Brazil. Patiar and Mia (2009) researched leadership style in luxury hotels in Austria whereas Karadag and Dumanoglu (2009) analyzed productivity based on competency of information technology in luxury hotels in Turkey and Okumus, Sariisik, and Naipaul (2010) studied the role of women influencing luxury hotels.

Although luxury hotels are emerging worldwide, most of them are in the United States. According to the World Luxury Index (2013), the number of luxury hotels in the United States has occupied 75.5% of the world's luxury hotels. While the consumer satisfaction for luxury hotels has grown by 1.5%, the luxury hotel demand in the US has increased 3.3% per year. Many researchers have focused on the reasons for "why US luxury". Cornish (2003) reported that discretionary income in household incomes has doubled resulting in the demand for luxury hotels is increasing. Silverstein, Fiske, and Burman (2005) have stated that social

and economic forces have affected Americans in their luxury life. The impact of international travelers visiting the United States on the US lodging industry is significant; for example, in 2013, one-fifth of tourist receipts was from international visitors (AHLA, 2014). In 2013, 25.1 million international travelers visiting the United States stayed in a hotel/motel. Of this cohort, it was generally found that the purpose of travel was for leisure/recreation/ holiday (64%) or business/convention (14%). Their hotel stay was also different from the U.S. residents with the average length of stay as 9.7 nights and the average party size as 1.7 travelers. In order to find the key factors affecting the demand for luxury hotels, more than 500 studies have been published since 1960 (Song, Lin, Witt, & Zhang, 2011). The assessment of different models for hotel demand is thus the major consideration to both tourism academics and practitioners.

Models of Hotel Room Demand

Most researchers have recently focused on the relations among demand, income, and price across countries. Uysal and El Roubi (1999), Li, Song, and Witt (2006), and Vogt (2008) have developed forecasting models for these relationships among demand, income, and price. Canina and Carvell (2005) and Choi (2003) have studied the effects of economic variables on hotel room demand. Damonte, Domke-Damonte, and Morse (1998) developed a room demand model for South Carolina using the time series data from December 1992 through November 1995. They found significant price elasticity in Columbia County between 0.8 and 1.8, while Charleston County's price elasticity of demand was insignificant. Hiemstra and Ismail (1993) found that the price elasticity of hotel room demand was -.35 for low-price properties and -.57 for high-price properties. Croes and Vanegas (2005) explored the price elasticity of the lodging demand for tourists from the U.S., Netherlands, and Venezuela in Aruba.

In addition to focusing on income and price, researchers have analyzed econometric techniques in tourism demand analyses. Dritsakis (2004) preferred the dynamic models using vector error correction while dismissing the static models using the least square method.

Alternatively, Kulendran and Witt (2001) used a different model in order to forecast tourism demand more accurately than the least square regression models. They included stationary factors in the diagnostic checking method, which enabled the study of the adoption of cointegration and error correction model. Then Fujii, Khaled, and Mak

(1985) and Hiemstra and Ismail (1993) analyze the effects of taxes on lodging demand whereas Palakurthi and Parks (2000) focus on sociodemographic factors (gender, occupation, age, and income) on lodging demand. Using point analysis to examine the effects of monthly variations of hotel employment on hotel demand in Denmark, Krakover (2000) explained the reason why occupancy rate inversely related to monthly hotel employment whereas Sorensen (1999) explained that seasonality associated with the hotel room demand varied across both time and locations in Denmark whereas Lundtorp (2001) explained the stability of seasonality in the demand for hotel rooms in Denmark from 1989-1998.

Recently, Graf (2011) studied 2824 properties in 25 metropolitan for 43 quarters from 1998 to 2008 using Feasible Generalized Least Squares regressions. Findings indicate that personal low scale segments may trade up to higher scales when their income increase, but when corporate income decrease corporate consumers are not trading down. In addition, low-priced segments substitute to high-priced segments but the inverse is not true. Low-priced properties focus on price differentiation but midscale segments focus on concentration.

Song, Lin, Witt, and Zhang (2011) suggest a model of hotel room demand affected by the income of origin markets, relative prices and economic crises. They found that the income, relative price and economic crises are three key factors have determined the demand for hotel rooms in Hong Kong. Canina and Carvell (2005) studied hotel demand in 22 metropolitan markets during 48 quarters from 1989 to 2000 and found that income is inelastic to the hotel demand. Hotel demand decreased when the room rates increased and other relative prices decreased. Wheaten and Rossoff (1998) used 1969-1994 data and time series to estimate the relationship between demand, supply, price, and income. They found that in the long run the GDP was closely related with hotel room demand; the room rates are low (high) when room demand runs faster (slower) than economic growth.

Research Model

The study focuses on the luxury hotel segment in the U.S. in the sample of the ex post data set of 192 points from January 1998 to December 2013. The sample consists of 3,428,320 guestrooms, 70% of total number of guestrooms in the U.S. in October 2014, in which 107,122 luxury rooms

from Smith Travel Research (2014). Monthly luxury hotel demand was replaced for quarterly data to precisely estimate the relationships among luxury hotel demand, origin market relative prices, incomes of origin markets, and dummy variables (Krakover, 2000). The GDPs of the US, UK, China, Canada, South Korea, Germany, Mexico, and Japan from United Nations (2014) were used to measure the income of origin markets in the model. Dummy variables were used to measure the impact of two recessions during the period of 1989-2014 (Bonham, Edmonds, & Mak, 2006; Kulendran & Witt, 2001).

In order to build a model that describes the causative relationship between luxury hotel demand and its key determinants in the U.S., the research hypotheses for this study are thus as follows:

Hypothesis 1: There would be significant effects of the incomes of the origin markets on the luxury lodging demand in the U.S. in the long run.

Hypothesis 2: There would be significant effects of the relative prices of origin markets on the luxury lodging demand in the U.S. in the long run.

Hypothesis 3: There would be effects of the U.S. economy recessions on the luxury lodging demand in the U.S. in the long run.

METHODOLOGY

The underlying theory for demand modeling is microeconomic of demand that describes the relationship between demand and price. From the beginning, most of researchers explained the determinants of tourism demand based on single equation models (Bechdolt, 1973; Gray, 1966; Shamsuddin, 1995; Stronge & Redman, 1982). The single model exemplifies the approach, regressing tourism demand on income per capita, relative prices, exchange rates, transport costs and dummy variables for one-off events (Sinclair, 1998). The advantages of using single models are simplicity and reflecting the relationship between demand and its determinants under the assumption that time periods are equally disparate. However, tourism and lodging demand relates to time series behavior of consumers that varies over time. As a result, the relationships among time series variables may cause spurious regression, which shows relationship much more than they should at the nominal test level. For example, Gray (1966) reported per capita income elasticities of 5.13 for US demand for tourism the rest of the world; Bechdolt (1973) reported 3.15 for US arrivals in Hawaii; Stronge and Redman (1982) reported 0.45 for US in

Mexico; and Shamsuddin (1995) reported US arrivals 1.57 in Malaysia. Elasticity is the degree to which a factor is sensitive to changes in other factor(s) in a model. For example, income elasticity of demand for luxury rooms sold is measured by $\epsilon = (\Delta \ln \text{luxdemand} / \Delta \ln \text{Income})$ represents the percentage change in luxury room demand with respect to a 1% change in income.

The subjective or non-stationary factors that may be dependent on previous behavior factors can cause problems in statistical inference resulting in imprecise forecasting. In order to overcome the disadvantages of the single models, Sinclair (1998) has suggested a system of equation models reflecting dynamic demand using microeconomic theories of demand with time series data. The econometric model of tourism demand has focused on time series analyses of income, relative price and exchange rates, and lagged explanatory variables. Syriopoulos (1995) estimates a dynamic model by using general to specific approach to separate short-run dynamics from the long-run relationship to measure per capita income elasticity of 3.32 for the US in Portugal. Song, Lin, Witt, and Zhang (2011) have suggested a dynamic model for hotel room demand in Hong Kong and it was adopted in this study as follows:

$$\ln Q_{kt} = \gamma_0 + \sum \beta_Q \ln Q_{kt-j} + \sum \beta_Y \ln Y_{kt-j} + \sum \beta_{RP} \ln RP_{kt-j} + \text{dummies} + u_t \quad (1)$$

where Q_{kt} is the number of luxury hotel room nights sold in the US at the end of month t during the 15-year period (1998-2013). Y_{kt-j} is the per capita income of country k^{th} at time $t-j$, including the US, UK, China, Germany, Canada, Mexico, South Korea, and Japan. RP_{kt-j} is the relative price of luxury hotel rooms for tourists from the k^{th} country at time $t-j$; it is defined as $RP_{kt-j} = RP_{kt} / EX_t^k$ where RP_{kt} stands for the average daily rate of luxury hotel room in the US at time t , and EX_t^k for the exchange rate at time t . u_t is the error term for the demand model. Dummy variables reflect one-off events, including two big recessions in the US (March 2001-November 2001 & December 2007-June 2009).

In order to avoid spurious regression, the variables are required to be transformed into stationary by taking logarithm, differencing, autoregressive and moving average processes. A stationary variable over time is a variable with constant mean and constant variance across time. If Y_t contains non-stationary variable over time, it is called $I(0)$. When Y_t is required to be "differenced" d times to make it stationary, Y_t is said to

contain d “Unit Roots”. It becomes $Y_t \sim I(d)$ which reads “ Y_t is integrated of order d ”. If the non-stationary variable over time is regressed against one or more non-stationary variables over time, their regression relationship may be spurious and inaccurate. Checking cointegration of variables in the time series will best prevent spurious regression. Cointegration is characterized by the property of two or more variables moving together through time. The variables exist in a long-run equilibrium and though they follow their individual trends, they will not drift apart since they remain linked together in some sense. In order to find short and long run relationships, error correction model is used. Error Correction Model uses dynamic short run disequilibrium to resolves the static long run equilibrium relationship of cointegrated time series.

This study used Autoregressive Distributed Lag Model (ADLM) bound and t-tests proposed by Pesaran, Shin, and Smith (2001). This test has advantages since it removes omitted variables and autocorrelation (Narayan, 2004). Moreover, it does not require unit root tests nor a large sample size.

Equation (1) is tested by ADLM as follows:

$$\Delta \ln Q_{kt} = \alpha_0 + \sum^p \Psi_Q \Delta \ln Q_{kt-j} + \sum^p \Psi_Y \Delta \ln Y_{kt-j} + \sum^p \Psi_{RP} \Delta \ln RP_{kt-j} + \sum^p \Pi_j \ln Q_{kt-j} + \sum^p \Pi_j \ln Y_{kt-j} + \sum^p \Pi_j \ln RP_{kt-j} + dummies + \varepsilon t \quad (2)$$

where Δ is the first difference ($\Delta X_t = X_t - X_{t-1}$). Lag p is obtained using Akaike Information Criterion (AIC).

Equation (2) describes the short-run and long-run relationships between the luxury hotel demand and its determinants. The Ψ coefficients describe short run relationships while the Π coefficients describe long run relationships. In order to test the long run relationships, F-test and t-test are employed to test the null hypotheses of no cointegration among variables. Pesaran et al. (2001) provide the critical values of the lower and the upper bounds. If the F-statistic is higher than the upper bound, there may be long-run relationships. If the F-statistic is below the lower bound, there is no long-run relationship. If it is between these bounds, the result is inconclusive. When there is a long-run relationship, t-test is applied with the null hypothesis $\Pi_1 = 0$. If the null hypothesis is rejected, there will be long term relationships among the luxury hotel demand in the US and 8 origin countries (US, UK, China, Mexico, Canada, South Korea, Japan, and German).

RESULTS

Equation (1) was estimated using ordinary least squares for the eight origin markets. Table 1 indicates that all final models have goodness-of-fit, achieving high R^2 and adjusted R^2 values. Table 1 also indicates the statistics of the Luxury hotel demand model for US, UK, China, German, Japan, Canada, Korea, and Mexico. These eight models passed the Durbin-Watson, White, Jarque-Bera and ARCH tests. In the Lagrange Multiplier (LM) test and Ramsey Regression Equation Specification Error Test (RESET), most of targets except Canada, UK, and Japan failed because there may be from high degree of correlation between the lagged explanatory variables and lagged dependent variable (Morley, 2009).

Table 1. *Diagnostic statistics of the hotel demand model by guests from Canada, Japan, Mexico, UK, and US residents.*

Luxury Hotels	Canada	Germany	UK	US	Japan	S.Korea	China
R^2	.908	.902	.905	.912	.899	.913	.902
<i>Adjusted R²</i>	.907	.901	.904	.911	.897	.912	.901
F-stat	114.79	181.62	34.17	29.99	124.18	76.03	76.70
Prob (F-stat)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Durbin-Watson	1.74	1.89	1.85	1.73	1.82	1.82	1.82
LM (lag 4)	7.82**	6.96**	8.30*	10.00*	8.61*	9.40*	8.47*
White	1.352	1.331	0.82	1.12	0.71	1.35	1.69
Jarque-Bera	42.693	18.71	39.62	125.1	48.39	57.03	34.99
ARCH	1.399	2.85	1.92	0.02	1.10	1.41	1.50
RESET	26.462	11.65**	1.22	34.44*	2.43	8.96*	27.55

Note: (1)** and * represent 1% and 5% significance levels, respectively. (2) Durbin-Watson test for autocorrelation (3) LM: Breusch-Godfrey LM test for serial correlation at lag 4; White: for heteroskedasticity; Jarque-Bera test for normality; ARCH: Autoregressive conditional heteroskedasticity for residual auto-correlation; RESET: Ramsey's Regression Equation Error Test with one augmentation term

In addition to the information in Table 1 that all of the final models have met the tests for autocorrelation, heteroskedasticity, normality, and residual autocorrelation, Figure 4 shows that the residuals of the final models are seen to be uncorrelated random variables following a $N(0, 1)$ distribution.

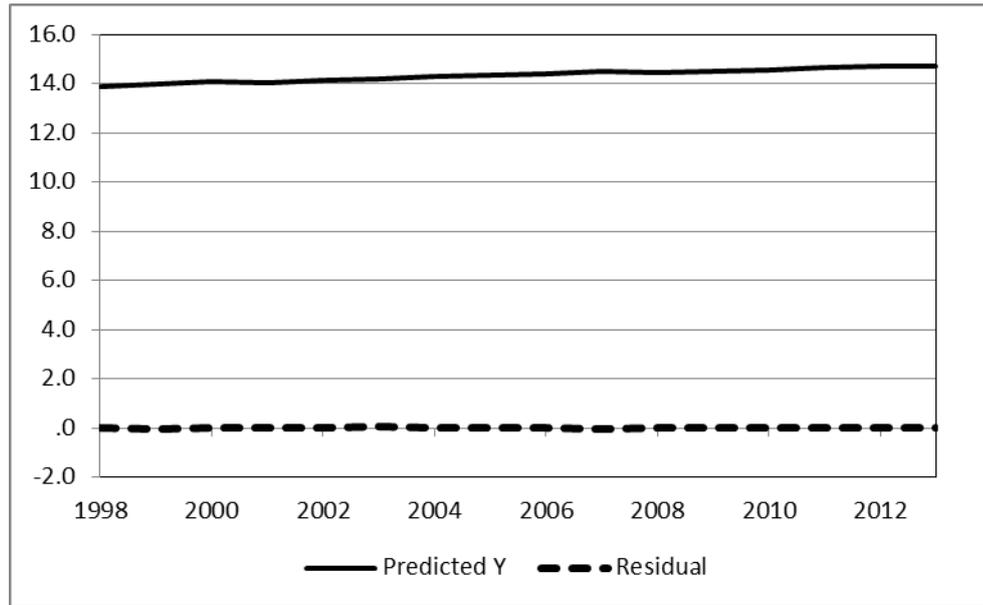


Figure 4. Residuals and fitted lines in the final model.

Table 2 presents the luxury hotel demand elasticities of income and relative price in the final model. Tourists from Canada, Germany, and UK have income and relative price impacts on the luxury hotel demand in the United States. The incomes of U.S. residents, Japanese, and Korean visitors and the relative price of Chinese travelers have impacts on the luxury hotel demand in the United States.

Table 2. Estimates of long-run elasticities for luxury hotels

Country	Income	95% Interval		Relative Price	95% Interval	
		Estimates	Estimates		Estimates	Estimates
Canada	-0.95	-1.31	-0.59	-0.31	-0.52	-0.10
Germany	0.48	0.23	0.72	0.24	0.17	0.32
UK	-0.58	-0.96	-0.20	-0.43	-0.67	-0.19
US	1.23	1.00	1.45	NS*	NS*	NS*
Japan	0.43	0.30	0.56	NS*	NS*	NS*
Korea	0.74	0.50	0.98	NS*	NS*	NS*
China	NS*	NS*	NS*	0.38	0.14	0.62
Mean	0.22	-0.04	0.48	-0.03	-0.22	0.16
Long-haul Markets	0.26	0.01	0.65	0.06	-0.25	0.25
Short-haul Markets	0.14	-0.15	0.43	-0.31	-0.52	-0.1

*NS: Non-significant variables were eliminated in the best model through the general-to-specific modeling.

Table 2 indicates that in the long run, the average values of the income and price elasticity point estimates in the luxury hotel are 0.22 and -0.03, respectively. These inelastic indices indicate that an increase in the income level of a source market or a decrease in the luxury hotel price results in a little increase in the demand for luxury hotels in the U.S.. Canada, Germany and UK are the only three countries whose incomes and relative prices both affect the demand for luxury hotels in the U.S.; the Canadian and UK visitors would not stay in the luxury hotels in the US when their incomes or luxury hotel rate are increasing, but the German visitors would stay in the luxury hotels when their incomes or hotel rates are increasing. The rest of the target markets including the U.S. residents, Japanese, Korean, and Chinese only partly affect the demand for luxury hotels in the U.S.; an increase in American, Japanese, or Korean visitors' incomes would increase their demand for luxury hotels in the U.S.. An increase in luxury hotel price would increase the demand of Chinese visitors for a luxury hotels in the U.S.. Research hypotheses 1 & 2 were supported.

In the final model, constant term and the dummy variable have been removed; the effects of two economy recessions in the US did not affect the demand for luxury hotel demand in the long run. This implies that the impact of September 11 attacks on the luxury hotels in the U.S. is not considerable (Bonham, Edmonds, & Mak, 2006). Research hypothesis 3 was not supported.

Table 3 indicates that in the short run, the average values of the income and price elasticity point estimates in the luxury hotel are -0.40 and -0.02, respectively. These negative inelastic indices indicate that an increase in the income level of a source market or an increase in the luxury hotel price results in a little decrease in the demand for luxury hotels in the U.S., China and UK are the only two countries whose incomes and relative prices both affect the short-run demand for luxury hotels in the U.S.; the Chinese and UK visitors would not stay in the luxury hotels in the US when their incomes or luxury hotel rate are increasing. Japanese and Korean only affect the short run demand for luxury hotels in the U.S. when their incomes change; an increase in Japanese, or Korean visitors' incomes would decrease their demand for luxury hotels in the U.S. in the short run.

Table 3. *Estimates of short-run elasticities for luxury hotels*

Country	Income	95% Interval		Relative Price	95% Interval	
		Estimates			Estimates	
China	-1.15	-1.37	-0.93	-0.55	-1.01	-0.09
UK	0.76	0.39	1.13	0.51	0.13	0.89
Korea	-0.71	-0.98	-0.43	NS*	NS*	NS*
Japan	-0.51	-0.79	-0.23	NS*	NS*	NS*
Mean	-0.40	-0.68	-0.11	-0.02	-0.44	0.40
Long-haul Markets	-0.79	-1.04	-0.53	-0.55	-1.01	-0.09
Short-haul Markets	0.76	0.39	1.13	0.51	0.13	0.89

*NS: Non-significant variables were eliminated in the best model through the general-to-specific modeling.

CONCLUSION

The current study is the dynamic model of luxury hotel that has been built and tested for their validity using econometric methods. The data sample is unique in that we used property-level data for 70% of total number of guestrooms in the U.S. between the years of 1998 and 2013. In addition, the Autoregressive Distributed Lag Model was employed to estimate the effects of economic factors on the demand for luxury hotel rooms in the U.S. In the long run, the U.S. residents typically stay more nights in luxury hotels when their income increases. Findings also indicate that the Canadian and UK might not visit or stay in the luxury hotels in the U.S. when their income or luxury hotel price increases. In addition, the German, Japanese, Korean and Chinese visitors would stay in the luxury hotels in the U.S. when their incomes increase no matter what the luxury hotel price increases. In the short run, the Chinese, Japanese, and Korean might not stay in the luxury hotels in the U.S. when their income or hotel price increases. The English would stay in the luxury hotels when their income or luxury hotel price increases. Finally, the two US economy recessions in 2001 and 2007-2009 do not affect the demand for luxury hotel rooms in the long run.

The study findings are consistent with previous literature when it indicates the cointegration between GDPs and demand for luxury rooms (Wheaton & Rossoff, 1998). In addition, this study provides more specific effects of economic factors on luxury hotel segment in both long run and short run estimate. American guests will switch from non-luxury to luxury hotels when their incomes increase. In addition, the price elasticity is inelastic so that managers in luxury hotels can control prices by increasing room rates without losing their target customers.

The increase in room rate has little impact on the customers of luxury hotels, as they tend to earn a higher income and are insensitive to price. Luxury hotels are able to change the price in the high season without affecting their business. Thus, guests with a higher income will often choose to stay at luxury hotels. The limitation of this study is that it does not focus on the competitive set and geographic locations that affect the model's interpretation in a generalized setting. Future research should aim to conduct a longitudinal study by expanding more markets for comparison.

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