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Price Sensitivity of Customers in Luxurious Hotels in U.S.

The purpose of the paper is to explore sensitivity of the customers to the prices of luxurious hotels in the United States. This study has applied demand elasticity to the analysis of luxurious hotel rooms in the U.S. Through the use of econometric methods, the study has built and tested a model for the long term estimate of demand elasticity for specific hotels. Findings indicate that luxury hotel management can change prices without losing target markets due to the price inelasticity of their customers' demand.

Key words: ADR, Elasticity, Luxurious Hotel

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Introduction

Failure to appropriately understand the customers' sensitivity to hotel price creates critical issues for hotel management. Hotel managers face room rate pricing decisions daily in order to increase their revenue and profit. If they increase their price, exceeding the expected level of their customers, they will lose their sales because customers will transfer to local competitors, who offer the same room at a much lesser rate. Customers' sensitivity to hotel price is measured by demand elasticity in microeconomics. Numerous researchers have studied demand elasticity in tourism, but few have focused on hotel demand elasticity. Song et al. (2010) uses bias-corrected bootstrap to build and test the demand elasticity for Hong Kong tourism. They found that the demand from long-haul markets and growing economies is elastic to income; the higher income these markets are, the more they want to visit Hong Kong. In addition, the demand from short-haul markets is elastic to prices in Hong Kong; the more expensive, the less tourists from short-haul markets. Lim, Min and McAleer (2008) uses the ARIMAX model to find that Japanese income is elastic to tourism in New Zealand. This finding explains New Zealand has been minimally successful in appealing to Japanese tourists when New Zealand has increased its marketing expenditures in recent years. Ouerfelli (2008) uses co-integration analysis and error correction models (ECMs) to estimate and forecast the long run European tourism demand elasticities and demand. Based on the elasticities to income and price, the study concludes that *tourism in Tunisia is regarded as a luxury by tourists from France and Italy, but increasingly as a necessity according to the tourists from Germany and the UK (p. 136)*. Munoz (2007) estimates a dynamic model for German tourists to Spain. The model provides short and long-run elasticities of price for German demand in Spain, which are -1.06 and -2.16, respectively. The implication of this is that the German customers will be more sensitive to price in the future when they visit Spain. The tourism suppliers in Spain must keep their price more competitive for German tourists in

the future. Li, Wong, Song, and Witt (2006) combine short and long-run approaches to develop a time varying parameter (TVP) and error correction model (ECM). This TVP-ECM method is compared with other econometric methods in terms of forecasting accuracy. It examines the evolutions of the short-run income, own-price, and cross-price elasticities throughout time. For example, the values of the coefficient of substitute price rising from negative to positive from 1978 through 2004 suggest that substitution effects exist among the relationships between France and the other four top U.K. destinations. Especially, the severe competition between France and Spain for U.K. tourists results in the decrease of income elasticities of UK tourist demand in France; less high income English tourists visit France. Croes and Vanegas (2005) explore the elasticities of tourists from the U.S., the Netherlands, and Venezuela in Aruba. The Venezuelan tourists are more elastic to price than the American and the Dutch tourists. The tourists from the Netherlands consider Aruba a more luxurious destination than the American tourists. Dritsakis (2004) criticizes static models using the least square method, opting for dynamic models using vector error correction methods. The income elasticities of German and English tourists are high in Greece; higher income tourists visit Greece in short and long term periods. Kulendran and Witt (2001) use the diagnostic checking method to study the adoption of cointegration and error correction models leading to more accurate tourism demand forecasts than those generated by least squares regression models.

In sum, the elasticity of demand provides important information for tourism organizations and business to manipulate their price in order to increase demand for their tourism products. Since the elasticity relates to human behavior changing over time, researchers have focused on a dynamic model of forecasting rather than a static one. The elasticity is measured in a dynamic model of the demand for luxury hotels in this paper since it relates to the time series behavior of hotel guests. The model for this study uses the

auto regressive (AR) and moving average (MA) processes to capture the current pattern of hotel guests from a particular market based on their own past hotel experiences as well as their random changing errors from previous periods such as their duration of stay in hotels. The explanatory variables such as income, hotel prices, foreign tourists, and inflation rates have also affected the duration of stay for hotel guests. In the study, duration of hotel guests, hotel prices, foreign tourists, and inflation rates appear to be nonstationary and contain a stochastic trend. If the trend is stochastic, the time series of the variables will not reflect a long run trend since innovation shocks have diminishing effects and the forecast variance increases for longer periods. In the case of nonstationary variables, the study uses natural logarithm and takes first differences so that the differenced series would be stationary. When the time series of the variables is trend stationary, the study will use the ordinary least square (OLS) method in linear regression analysis to build the model for demand elasticity.

Minimal research has focused on price sensitivity of customers in hotels as such research is difficult. One reason for this is the relationship between hotel price and guests' demand is meaningful when occupancy is 100%, which occurs only in the high season. The peak season for hotels in the U.S. is usually August and the valley season for the hotels is March. Therefore, the data used for this study are in August. Price that is explained in terms of supply and demand is fair only when it meets both supply and demand. In terms of supply, price consists of cost and profit. When allocating the capacity costs to room rates, hotel managers should assign the hotel depreciation and other capacity costs to the room rate for the high season but not for the low season (Shaw, 1984) resulting in balancing hotel profits in both high and low seasons. In terms of demand, price must match with guests' income. The elasticity of demand is thus changed based on price and income. In addition to their characteristics of seasonal demand and high fixed cost, hotel products are non-storable. The implication is that hotel managers are forced to sell their products by decreasing their price.

In the reality of the high season, hotel guests respond to a price decline by staying more nights in hotels and the degree of hotel guest responsiveness to a price change can vary considerably depending on types of hotel rooms. Hotels are classified into five segments: Luxury, Upper upscale, Upscale, Midscale with Food and Beverage (F&B), Midscale without F&B, and Economy. Since there is a significant difference in construction costs, which represents a barrier to entry between luxury and other segments, the present research divides hotels into two segments: luxury and non-luxury hotels. The availability of substitutes in hotel competition also affects the price elasticity of hotel demand. The demand for a luxury hotel depends on the price of other luxury hotels in close proximity. The number of room nights at luxury hotel A will be influenced not only by the price of hotel A, but also the price of luxury hotel B. A significant reduction in price of hotel B induces guests to switch from hotel A to B. Hotel revenue management considers the importance of guests' demand while determining pricing strategies. The results of elasticity obtained are thus valuable for helping professionals and policy-makers in the decision making process for luxury hotels in the country. Therefore, this paper examines the American sensitivity to luxury hotels during the high season.

Method

In order to find the sensitivity of American guests in luxury hotels in the U.S. during the high season, the study has built a demand function for luxury hotels. The function is based on five influence factors at peak season: income, price, substitute price, the rate of inflation, and the number of foreign tourist arrivals. It is shown in natural logarithm as follows:

$$\text{Log}\,(Q) = \gamma_0 + \gamma_1 \log(ADR_{lux}) + \gamma_2 \log(ADR_{nonlux}) + \gamma_3 \log(I) + \gamma_4 \log(R) + \gamma_5 \log(T) + u_t,$$

Where Q is the number of room nights sold in luxury hotels in the high season;

ADR_{lux} is average daily rate of luxury hotels in the peak season;

ADR_{nonlux} is average daily rate of other hotels different from luxury hotels in the peak season;

I is American guests' level of income measured by the U.S. gross domestic product per capita.

R is the rate of inflation in the hotel high season in the U.S.

T is the number of international tourist arrivals in luxury hotels in the US. in the high season.

U_t is the disturbance term that captures all of the factors that may affect the hotel demand in the high season.

Υ_0 is the coefficient of the product in the model;

$\Upsilon_1, \Upsilon_2, \Upsilon_3, \Upsilon_4, and \Upsilon_5$ are price, income, inflation, and tourist arrivals elasticities of demand for hotels in the U.S. in the high season. For example, $\Upsilon_1 = \Delta log(Q) / \Delta log(ADR_{lux})$ represents the percentage change in demand with respect to a 1% change in price of luxury hotels in the U.S.

The demand for luxury hotels is measured by the luxury hotel room nights sold in August from 1999 to 2009 based on Smith Travel Research (2010). The hotel price is measured by the average daily rate (ADR) of luxury hotels in the U.S. in August from 1999 to 2009 based on Smith Travel Research (2010). The price of substitutes is measured by the average daily rate (ADR) of other hotels including Upper upscale, Upscale, Midscale with Food and Beverage (F&B), Midscale without F&B, and Economy hotels in August during the 11-year period (1999-2009) based on Smith Travel Research (2010). The hotel guests' income is measured by the gross domestic product (GDP) per capita in the U.S. during the 11-year period (1999-2009) based on United Nations Statistics Division (2010). The rate of inflation is measured in August during the 11-year period (1999-2009) based on United

Nations Statistics Division (2010). The number of foreign tourist arrivals during the 11-year-period (1999-2009) is based on the United Nations Statistic Division (2010).

Since the model is a time series model, it is tested by autocorrelating all variables to see whether or not they are stationary. All Box LJung Q (18) statistic values from lag 1 to lag 10 are significant. All dependent and independent variables are not stationary. The variables are transformed to natural logarithm and used differences. As a result, LJung values are not significant and the variables are stationary. The following are the number of rooms sold and autocorrelation functions during the 11-year period before and after transformation and illustrated in the following figures.

Figure 1: The number of room sold for luxury hotels (1999 to 2009) in transformation.

Before After

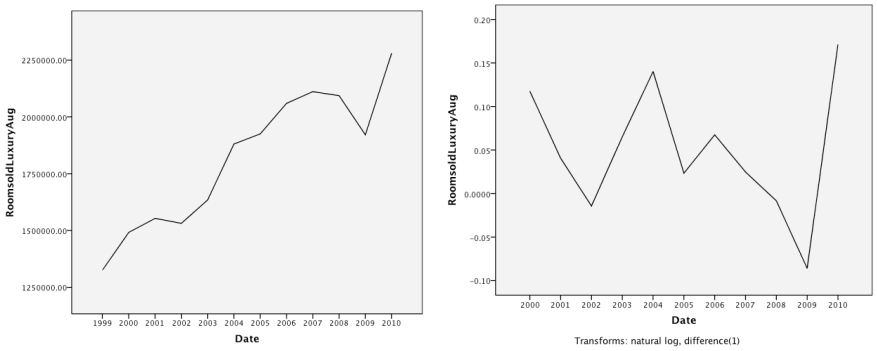

Figure 2. Autocorrelation functions for luxury hotels (1999-2009) in transformation

Before After

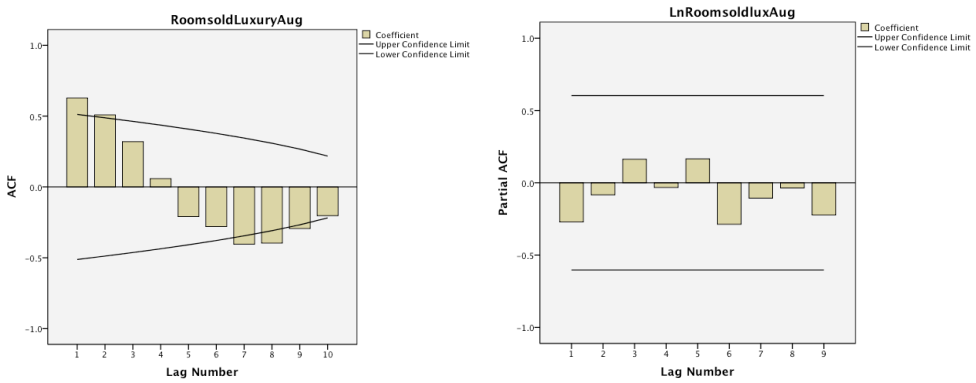

Table 1 indicates all variables in the model as follows:

Table 1

Descriptive statistics for the variables in the price elasticity equation during the 11-year period (1999-2009)

Variable	Minimum	Maximum	Mean	Std. Deviation
ADRLuxAug	203.57	274.68	229	26.01
RoomsoldLuxAug	1.34 mil.	2.28	1.80 mil.	0.28 mil.
Touristarrivals	41.21 mil.	59.7 mil.	50.52 mil.	5.37 mil.
GDP per capita	32,689	46,105	39,687	48,584
Inflation rate	0.10	3.8	2.49	1.02
ADRNoluxAug	81.23	103.54	90.06	8.80

During the 11-year period (1999-2009), the price of luxury hotels measured by average daily rate (ADR) in August is $229 (*SD* = 26.01) and the American guest's income measured by gross domestic product is $39,687 (*SD* = 48,58). In addition, the price of other hotels different from luxury hotels measured by average daily rate in August is $90 (*SD* = 8.8) and the rate of inflation in August during the 11-year period is 2.49% (*SD* = 1.02). The average number of foreign tourist arrivals is 50.52 million people (*SD* = 5.3 mil.)

After the variables were identified as stationary, multiple linear regressions with ordinary least square method were employed to determine which variables could be used to predict hotel guests' demand. Initially, the correlations amongst the variables in the price elastic equation were examined and these are presented in Table 2.

Table 2

Correlations among variables (1999-2009)

Variables	*LnIncome*	*LnTourist*	*LnInflation*	*LnADRlux*	*LnRoomlux*	*LnADRnonlux*
LnIncome		*-.36*	*-.23*	*.76***	*.98***	*.89***
LnTourist			*-.02*	*-.27*	*-.32*	*-.22*
LnInflation				*.25*	*-.27*	*-.27*
LnADRlux					*.68**	*.85***
LnRoomlux						*.82***
LnADRnonlux						

Note. **p*<.05, ***p* < .001;

The correlation between ADR and guests' demand was positive (r=.67). The fact that the ADR positively correlated with the guests' demand is explained by the price inelasticity of customer demand in luxurious hotels. The correlation between Income and guests' demand, which was negative (r=-91), shows that the high-income guests stay fewer days in hotels than the low income. One of the reasons is the high-income businesspersons may stay a short time in hotels during their conferences.

Since the study builds a model by successively adding or removing variables based solely on the t-statistics of their estimated coefficients, a stepwise method was used for the multiple linear regression analyses. The predictors Price of luxury hotels and Income significantly predicted guests' demand, $\beta = -.18$, $t\,(11) = -3.16$, $p < .05$. Income also explained a significant proportion of variance in guests' demand, $R^2 = .98$, $F\,(1, 11) = 351.6$, $p < .001$. The other variables including the number of foreign tourist arrivals, inflation rates, and the price of other non-luxury hotels were excluded from the model, which is illustrated in Table 3. We rebuilt the model with two independent variables: Price (ADRlux) and Income (I) as follows:

$$LnQ = -.307(LnADR) + 1.529(LnI) \qquad (1)$$

Table 3

Standard multiple regression of variables in the price elastic equation during the 11-year period (1999-2010)

Variables	*LnRoom-nights (Corr)*	*B*	*t*	*Durbin-Watson*
LnADR	*.68*	*-.307*	*-3.16**	*2*
LnIncome (I)	*.98*	*1.529*	*18.96***	

Note. $p^{*}<.05$, $^{**}p < .001$;

Durbin-Watson = 2 indicates no autocorrelation; the variables are stationary

The income elasticity of American luxury hotel demand is elastic whereas the price is inelastic to the demand for luxury hotels. The implication is that luxury hotels are considered for high income persons and price is not a concern to the high income customers. In addition, the price of other hotels different from luxury hotels is insignificant to affect the demand for luxury hotels. The inflation rate or the number of foreign tourists is not significantly affecting the demand for luxury hotel.

Conclusion

Most hotel pricing models in previous articles are static and not differentiated so atypical events in hotels cannot be taken into account and they indicate a violation of the assumptions of homogeneity and symmetry of the choice process. The forecasting model of pricing in this study is based on dynamic historic data of the luxury hotels in the U.S. so its results are more precise based on differencing the series to remove the serial dependency.

The most critical issue for hotel managers is an inability to use average daily rate to leverage the strengths of their hotels. Using econometric methods to measure the elasticity of hotel demand is important, especially for luxury hotels with high fixed cost and high barrier

entries. The findings indicate that the price elasticity of luxury hotel demand is inelastic in the high season. That is, American customers in luxurious hotels are not sensitive to price so they hesitate to switch hotels when there is an increase in room rate. In addition, American people consider luxury hotels to be reserved for high income persons since the income elasticity of luxury hotel demand is elastic in the high season. Moreover, in the U.S., income in 2010 increase from 0.7% to 1.8% compared with the previous year (Smith Travel Research, 2010). Therefore, high income travelers in the U.S. may stay more in luxury hotels. Managers in the luxurious segment of hotels can change their price in the high season without affecting their business.

The study is based on a dynamic model forecasting both short and long-run elasticities. However, the present study has two major limitations: it is based on data in August for twelve years and the sample employs ten major markets in the U.S. Future research should expand more markets for comparisons in a longitudinal study based on bootstrap method.

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