The Estimation of Hotel Room Rate and Proximity to Public Transportation in Bangkok: Case of BTS and MRT

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1. INTRODUCTION

It is quite usual that hotels in the same city with same facilities having different room rates. But why the room rates are very different? It might be that by just having a BTS or MRT near your residence a lot of traveling time could be saved from avoiding the congestion of the city ranked 12th in most congested city in the world. However, there are many other factors other than hotel facilities such as reputation, quality, and location. There are research papers that studied on this topic. A Hedonic Pricing Analysis of Hotel Room Rates (Agmapisarn, 2014; Thrane, 2006; zhang, Lu and Cheng, 2011). Hedonic pricing model is a model that determined the price of goods based on its characteristics. In this case is the facilities and others factors that price the hotel room rate.

However, to the best of our knowledge there are no previous research that take public transportation as a major factor for hotel price in Bangkok. We decided to do a research that mainly focuses on hotel location, and its proximity to public transportation: Case of BTS and MRT. Public transports have huge effect on commuting time, and convenience in transportation. High quality of public transportation will increase the land value of area nearby, and land value has price effect to everything on it. The reason that our group interested on this research topic, as an economist we think that consumers should know that what is the extra amount that they need to pay for convenience in transportation. In addition, from taking more public transports into consideration this research also view Bangkok as a polycentric city instead of monocentric, or having more than one Central Business District (CBD).

The theoretical foundation for this research is the hedonic price model. Three types of hedonic price model (linear, semi-log and log-linear) were used to regress the result and data was collected in cross-sectional type, in a single day on 12 April 2017 to exclude seasonal effect. There are exactly 400 observations of hotel prices (standard room) from one-star to five-star rating were collected, along the BTS and MRT line. We view that as an economist it is crucial for the consumers to know the extra amount that they need to pay for the convenience of public transit while staying a particular hotel. So, they could decide that whether this additional cost worth is it or not on their own preference. Therefore, this article attempts to emphasize the percentage change in hotel price from proximity to BTS and MRT. In this research, three main research questions are stated as follows.

1) Does the proximity of the BTS and MRT affect the hotel room rate?
2) Is public transportation major variable on hotel pricing?
3) How the room rate volatile in different area?

This paper will be separated into 5 sections 1. Introduction 2. Literature Review 3. Methodology 4. Estimation and Results, and 5. Conclusion.

2. LITERATURE REVIEW

There are many works that link between transport and residential property prices including hotel's room rate. These links are represented the distance between hotel and the nearest station of a railroad. Some findings confirmed that the distance from one plot of land to the nearest station has a statistically significant effect on property value of land which give the higher property value closed to the station (Damm, R. Lerman, Lerner-Lam, and Young, 1980 Giuliano 1986; Bajic 1983; Voith 1991). Often in these

researches, they used regression analysis to find significant factors that affect room price, moreover, some researchers use advanced method to make more obvious explanation. Extracting all these researches, hedonic pricing model is used to describe the factors determining heterogeneous characteristics of sample.

Seven studies in various countries recognized the railroad infrastructures importance, however, authors (e.g. Agmapisarn, 2014; Thrane, 2006; zhang, Lu and Cheng, 2011) studied on the relationship of hotel prices and railway station and (Debrezion, Pels, and Rietveld, 2007; D.N. Dewees, 1976) studies on the impact of subway on residential property values used hedonic pricing method and revealed the strong robustness of their results. In details, type of model used to derive the valuation is necessary to explain results, alternative regression techniques such as (Debrezion, Pels, and Rietveld, 2007; Wrigley and Wyatt 2001) Seemingly Unrelated Regression (SUR) technique is used to test for significant differences in regression coefficients between the two equations (Thrane, 2006) and Multivariate regression analysis is used to separate the effect on sale prices of house and neighborhood characteristics from the effect of location and transportation access (D.N. Dewees, 1976) would be used for estimation. One former technique's ease of interpretation is log-linear form (Thrane, 2006), indeed, log-linear regression coefficients can be interpreted as a percentage change in the dependent variable associated with one unit change of independent variable.

Additionally, authors found other advanced analysis techniques that can enhance the results to be more precise, but would not be applied to our research due to technological, budget, and time constraint (Peng and Lu, 2007) such as Geographically weighted hedonic price model (GWR) is used solving the spatial-autocorrelation problem (Zhang, Lu and Cheng, 2011), Geographical information system (GIS) is a new way to provide understanding the interaction of urban land-use and transportation.

The continuous form of proximity to a station which distributes to measure the infrastructure effects on property values, indeed, identifying factors affecting property values should be stated clearly, property means the sort of building; commercial, industrial, residential and others which are occupied to the vacant piece of land (Brigham, 1965). Previous researches have argued on identifying factors that affect property value, the common consensus on factors affecting property values could be categorized into physical, environmental and accessibility factors (Bowes and Ihlanfeldt, 2001; Fujita, 1989).

Moreover, some authors have included the land use patterns and historical factors into their analysis. In three studies on the impact of railway lines on real estate prices, first, et al (1997) argue that the influenced factors of transport on property values depends on four factors; the availability of transport, transport costs, travel time and the convenience of transport modes (Wrigley and Wyatt 2001). Second, one of systematic explanation for the variation is type of railway station (Debrezion, Pels, and Rietveld, 2007), would be estimated as different variable. Third, between the distance and the transportation performance variables, the only transportation which gave reasonable performance results along the two years experimental will be taken into account (D.N. Dewees, 1976), therefore different kinds of transportation would be taken into account in linearity of the effects on prices. Researcher of The Effect of a Subway on Residential Property Values in Toronto (D.N. Dewees, 1976) asserts that the major impact affected property values appears to be distance from the subway stations, rather than distance along the subway line, so proximity to railway stations would be the major variable.

Another explanatory variable usually define accessibility by using automobile travel times to the Central Business District (CBD). Some group of researchers noted that the basic idea behind the bid-rent model is that every agent is prepared to pay a certain amount of money, depending on the location of the

land. This leads to a rent gradient that declines with distance from the CBD for sites that yield equal utility (Debrezion, Pels, and Rietveld, 2007) which associated with transportation cost and travelling determination. Therefore, the basic theory on property price can be determined as follow, as the location becomes more attractive, the bid price is pushed higher due to certain characteristics. The demand for real estate is higher. If it locates near centers of many activities such as CBDs. So, the closeness to the CBD should be considered as an identifying factor affecting the property values. Anyhow, one authors suggested that investment in transport infrastructure could decrease the intense demand friction of property around the CBD to some degree (Fejarang, 1994) by attracting households to settle around the station rather than close to CBD generating more benefit from lower transportation time and cost saving. But, the closer to the station, the higher cost of settling.

However, there are existing of negative effects of proximity to a station found by some authors, for example, transportation noise (Nelson, 2008), crime rate, pollution, unsightliness, and sound (Bowes and Ihlanfeldt 2001) would not be considered, even though, those negative effects will obviously increase precision to the model, the information is still unreachable.

Some authors demonstrated that railway line was not the only impact to reflect real estate value, including hotel price, but facilities are also being important explanatory variable. This is opposite to the effect predicted by naive models which forecast that a transportation improvement should flatten the surface along the facility. In Bangkok, author found that chain hotel, bar and restaurant, distance from hotel to city center and distance from hotel to BTS station have significant effect on hotel's room rate (Agmapisarn, 2014). In Beijing, authors found that star rate, size of hotels, age of hotels and location influence hotel room price significantly in Beijing (Zhang, Lu and Cheng, 2011).

Accessibility remains an important feature for urban properties. When other accessibility modes are included in the underlying studies, railway stations generally have a lower impact on property value. Though, both highways and stations may increase property values, there is a negative correlation to each other on proximity to property values (Debrezion, Pels, and Rietveld, 2007). Highway accessibility is an important competitor to railway accessibility (Voith, 1993) A researcher on proximity to railway station stated, 'The presence of other facilities that increase accessibility like highways, sewer services and other facilities influence the impact area in the same fashion.' (Damm, R. Lerman, Lerner-Lam, and Young, 1980). From these findings, we are going to include another significant variable, which is other accessibility modes of transportation, bus and pier to be prudent on room rate variation.

3. METHODOLOGY

3.1) THE HEDONIC ROOM PRICE SPECIFICATION.

In order to reveal the main factors of hotel pricing and create the equation to estimate the effect of our target variables, we need to consider the model that can cover the pricing characteristics of this property. The hedonic pricing model is introduced in this research. Hedonic pricing model allows us to identify the pricing factors according to the fact that price is determined different characteristics. According to our research on hotel market, the hotel room rate is determined by the internal characteristics of the hotel (chain hotel, spa, bar, swimming pool, TV, Wi-Fi, etc.) and the external characteristics of the hotel (proximity to BTS, proximity to MRT, proximity to CBD, etc.). In this research, three types of hedonic price models are used as follows.

The general functional form of hedonic pricing model.

- $P = f(X1, X2)$

The log-log functional form for a hedonic pricing model.

- $\ln(P) = f(\ln(X1), \ln(X2))$

The semi-log or log-linear form for a hedonic pricing model.

- $\ln(P) = f(X1, X2)$

On the left side of the equation, variable P is denoted as the price or the room rate of hotel. Ln(P) is the natural log of price. The right side of the equation is the function of the internal characteristics and external characteristics of hotel pricing factor. X1 is denoted as the vector of variables justifying the internal characteristics of the hotel and, X2 is denoted as the vector of external characteristics of the hotel.

3.2) MODEL SPECIFICATION

To estimate the hedonic pricing model mentioned in previous section, the regression analysis is introduced to capture the significant effect of each variables. According to previous researches, the regression analysis method is proved to be valid method in estimating the rate of hotel (Zhuang and Zhao, 2013; Thrane, 2006; Zhang, Lu and Cheng, 2011). The regression analysis in this research mainly used to understand the relationship among the independent variables and dependent variable. Precisely, the regression analysis estimates the conditional expectation of the dependent variable given that the independent variables are fixed. However, as mentioned in literature review section, there are methods used in estimating the price for example GWR and GIS.

GWR or "Geographically Weighted Regression" is the method to deal with the spatial nonstationary in regression. It estimates regression coefficients locally using spatially dependent weights. The weight of data points is determined by their distance from each of a given number of estimation locations" (Zhang, Lu and Cheng, 2011). In this research, we would not follow the GWR method as we don't observe the spatial autocorrelation which lead to the use of the GWR method.

The GIS or geographic information system is a computer system for capturing, storing, checking, and displaying data related to positions on Earth's surface. GIS can show many kinds of data on one map. This enables people to easily analyze, understand patterns and relationships of the data, say that; people can compare the locations of different things to discover the relationship of them. The GIS method would give the precise answer to this study, however; we unable to use this method according to the limitations of knowledge and access to this method.

Then, the OLS regression is the most appropriate method in estimating the hedonic pricing model. The following three models of OLS regression is core model used in this research.

***Model I*: Linear regression of one night hotel's room rate.**

(P) = f (distB, distM, pier, bus, cen, chain, star, bar, restau, break, zonea, zoneb, zonec, zoned, zonef)

The first model construct in linear form to acknowledge the intrinsic value of how each independent variable or pricing factor affect the price of hotel room rate.

***Model II*: Semi-log or Log-linear regression of one night hotel's room rate**

In (P) = f (distB, distM, pier, bus, cen, chain, star, bar, restau, break, zonea, zoneb, zonec, zoned, zonef)

The second model is in Semi-log form. This model is introduced to observe the effect of change in intrinsic value of pricing factor to the change in percentage form of the hotel room rate.

***Model III*: Log-log regression of one night hotel's room rate**

$$\ln(P) = \ln(f(distB, distM, pier, bus, cen, chain, star, bar, restau, breakf, zonea, zoneb, zonec, zoned, zonef)$$

The third model is in Log-log form. This model in tend to explain the change in percentage of pricing factor to the change in percentage of hotel room rate.

According to the data and first estimation, Semi-log or Log-linear model is used in explanation of this research. From the premise of Semi-log model, the natural log of dependent variable provides the solution to solve the volatility problem of the rate of hotel since, there are some hotel which set their price much higher and lower than the average rate and it is considered as outlier of data. For example, Erawan hotel set its of 30,000 baht.

3.3) DATA

In this section, characteristic and type of variables stated in the equation are going to explain in detail.

Table 1 presents the description and descriptive statistics of dependent variables.

Table 2 presents the description and descriptive statistics of independent variables.

Table 1: Description and descriptive statistics of dependent variable.

Variable	Description of variable	Mean	Standard Deviation	Min	Max
P	Room rate per night (Baht)	2243.48	2315.221	215	30,080
Ln(P)	Room rate per night (Baht), logged	7.4562	0.6625	5.371	10.312

Table 2: Description and descriptive statistics of independent variables.

Variable	Description of variable	Mean	Standard Deviation	Min	Max
chain	Hotel is associated with a chain = 1, if not = 0	0.415	0.4933	0	1
distB	Proximity between hotel and BTS (km)	0.7998	0.6520	0.008	8.5
distM	Proximity between hotel and MRT (km)	1.9892	1.3757	0.072	7.5
cen	Proximity between hotel and CBD (km)	2.6672	2.1418	0.15	13.1
pier	Pier located in 0.3 km radius = 1, if not = 0	0.04	0.1962	0	1
bus	Bus located in 0.3 km radius = 1, if not = 0	0.5625	0.4967	0	1
breakf	Complimentary Breakfast = 1, if not = 0	0.7025	0.4577	0	1
bar	Hotel has bar = 1, if not = 0	0.4475	0.4978	0	1
star	Star rate of hotel	3.60125	0.8688	1	5
sqmet	Size of room (SQM.)	29.668	11.4323	2.5	100
restau	Hotel has restaurant = 1, if not = 0	0.6825	0.4661	0	1
zonea	Hotel located in Asoke area = 1, if not = 0	0.4075	0.4919	0	1
zoneb	Hotel located in Sathorn area = 1, if not = 0	0.2	0.4005	0	1
zonec	Hotel located in Pathumwan area = 1, if not = 0	0.0825	0.2754	0	1
zoned	Hotel located in Ratchathewi area = 1, if not = 0	0.205	0.4042	0	1
zonef	Hotel located in Thonglor area = 1, if not = 0	0.105	0.3069	0	1

All the data for this research were collected from internet-based search engine. For hotels rate, Agoda (www.agoda.com) is used as based according to Agoda accounted for 30 percent of hotel bookings in much of the Asian market reflecting the precise and large data base collection (Kapoor & Quinby, 2012). Another study also confirms that using internet-based search engine is appropriate method since, it reflects the

customer's willingness to pay and it provides the best available rates (Chen & Rothschild, 2010; Lee & Jang, 2012; Thrane, 2005).

Dependent variable or hotel room rate for a one night stay, checking in on 26th April 2017. These rates are collected two weeks ahead as we performed the booking on 12th April 2017. The data for this current research consists of 400 Bangkok sample hotels randomly selected, via online reservation for a one-night stay in a standard room. The booking was made two weeks in advance, in general, many hotels require this window of time (Kisilevich, Keim, Palivatkel & Rokach, 2011).

There are total of 16 variables selected as factors to determine hotel room rate. According to the hedonic pricing model, the variables is separated into two characteristics which are internal characteristics and external characteristics.

The variables reflect the internal characteristics are chain, breakf, bar, star and restau. Hotel chain (chain) representing the hotel in the association or the group of hotels for example, Marriot, Novotel and Hilton. From previous researcher, the hotel in chain association is able to charges higher price than no association (Thrane, 2006). The facilities and service is one of the most important aspect for hotel, the set of variables representing facilities and service of the hotel are bar (bar), restaurant (restau), complimentary Breakfast (break). Previous researches proved that bar and restaurant are significant determination and can increase the rate (Agmapisarn, 2011; Thrane, 2006). While, there is a research cover the complimentary breakfast and it confirm that it is significant in determining the rate (Agmapisarn, 2011). Including star rate (Star) as one of the factor in model is controversial among many researches. Some of the researchers conclude that including star rate would occur the multicollinearity problem (Agmapisarn, 2011; Thrane,

2006), however; we believe that it is significant to determine the room rate of hotel as confirmed by a research in Beijing (Zhang, Lu and Cheng, 2011).

For external characteristics, we add many distance involved variables and public transportation variables to capture the effect of proximity as mentioned in hypothesis. Distance to Bangkok Mass Transit system or BTS (distB) and distance to Metropolitan Rapid Transit or MRT (distM) are two variables which we added according to the hypothesis also, previous researches confirming that these two public transportations has significant impact on property values (Sirikolkarn, 2008; Thamrongsrisook, 2011) and we also think that it would affect hotel room rate in the same direction. There are researches confirm that hotels near downtown Bangkok, hike up its room price (Agmapisarn, 2011) also, it gets along with the finding in Oslo, where the distance of hotel to downtown and price has negative relationship or the hotel price is more expensive due to it located closer to the downtown area (Thrane, 2006). So, the variable of distance to CBD is included in the model. We measure the distance to CBD (Cen) by choosing the nearest distance between two marked point which are Ratchaprasong intersection and Chong Nonsi bridge. Other public transportations variables are pier (pier) and bus (bus), variables added in form of dummy variables, since, we justify the variables by pier and bus located in the radius of 300 meters or 0.3 kilometers. These two variables are added in the model with the reason of transportation in Bangkok is versatile. To travel around in Bangkok, a person can use many kinds of transportation including taxi, bus, boat, MRT, BTS or motorcycle. From the aspect of condominium, the variety has some level of important so, we add these two public transportations to capture the effect of them in the aspect of hotel rate.

According to the reason of price different between different location around city. Last five variables are the location category of the hotel which we include to eliminate the effect of land price in city. We separate the area into five different zones (Figure 1) which each one contains large pool of hotel. Zone A covers the hotel in Asoke area. Zone B covers the hotel in Sathorn area. Zone C covers the hotel in Pathumwan area. Zone D covers the hotel in Ratchathewi area. Zone F covers the hotel in Thonglor area.

4. ESTIMATION AND RESULT

Table 3 provides the parameter estimates for three OLS models in log-linear form, given their coefficient (Beta), Robust standard error in parentheses and level of significance. In order to interpret an implicit price for hotel in terms of Log-linear model, we calculate by using exponential function. The amount of unit change in independent variable will be multiply by its coefficient, then using its product to be power on natural logarithm. Therefore, using the final value from natural logarithm to multiply expected value of dependent variable, the results will show as the percentage change of dependent variable from dependent variable's unit change.

Table 3: Estimation results of implicit price as percentage change attributes to change in each different characteristic effect (Hedonic pricing)

VARIABLES	Model I: Railway only		Model II: Other Public Transports		Model III: Hotel facilities	
lnprice	Coefficient	Std. Error	Coefficient	Std. error	Coefficient	Std. error
distM	-0.126***	(0.0190)	-0.0893***	(0.0270)	-0.0311**	(0.0131)
distB	-0.147***	(0.0498)	-0.141***	(0.0464)	-0.0635*	(0.0335)
cen			-0.0371**	(0.0166)		
bus			0.112*	(0.0606)		
pier			0.366*	(0.196)		
star					0.397***	(0.0335)
sqmet					0.0148***	(0.00270)
chain					0.0797*	(0.0408)
breakf					0.132***	(0.0398)
bar					0.139***	(0.0380)
restau					0.0403	(0.0415)
Constant	7.824***	(0.0590)	7.768***	(0.0649)	5.484***	(0.104)
Observations	400		400		400	
R-squared	0.114		0.146		0.745	

Robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Firstly, these three models indicated two weeks advanced booking one-night room rate collected on 12 April 2017 in a logarithm as a function of a proximity from each hotel to the nearest railway station in both the Bangkok Mass Transit System or BTS (distB) and Mass Rapid Transit or MRT (distM). Model I only show the effect of railway proximity to hotel, while other variables are omitted, however, there is a problem from omitted variable bias. The results of showed a significant negative impact on hotel room rate on both BTS (distB) and MRT (distM), an R-square of 0.114 meaning that Model I explain only 11.4 percent of the variability of the response data around its mean. Therefore, Model I would not be good model, according to a hotel researcher (Agmapisarn, 2014) 'a global average of R-square, on a hedonic pricing study of hotel room rate, is 0.547 with the range varying from 0.227 to 0.922'.

Secondly, Model II is added independent variable from Model I with other public transportation stations, such as bus station (bus) and pier (pier) and the road way distance from hotel to central business district or CBD (Cen) and omitted other variables. The purpose of this model is to examine whether other transports types and proximity to BTS and MRT stations have impact on hotel price or not, elaborately, impact from only public transports to hotel price. There is statistically concerned from many research that the railway station proximity has smaller influence on hotel price in Bangkok comparing to distance to CBD (Cen), but from second model both BTS (distB) and MRT (distM) have more significant negative impact on hotel room rate than CBD (Cen) by 10.39 percent and 5.22 percent respectively. Moreover, the study showed an R-square of 0.146 which is more a little bit more than Model I, but still not be good fit model.

Thirdly, many studies from hotel room rate founded that hotel facilities are most influence variable to determines hotel room price. Model III try to estimate hotel room rate by showing hotel facilities and proximity to railway stations to see whether proximity to railway stations (distB, distM) is still significant or not if we estimate it with hotel facilities, which only significant variables from previous researches was selected such as star rating (Star), size of room in square meters (sqmet), being chain hotel or not (chain), breakfast (breakf), bar (bar), restaurant (restau) and omitted other variables.

All hotel facilities variables are very significant (positive impact) to hotel room rate excepted restaurant because most hotel has their own restaurant but quite different quality. Furthermore, hotel characteristics seems to absorb impact on hotel room rate from railway proximity, BTS (distB) decrease to 6.35 percent and MRT (distM) decrease to 3.11 percent. Surprisingly, Model III shows an impressed R-square value of 0.745 which is strongly confirmed that hotel characteristic has very strong impact on hotel

price. Therefore, results from first three models confirm that hotel characteristic has more impact on hotel price than public transportation, however, the context in this paper try to find the impact of proximity from hotel to railway station, there were still lack of some control variables which can be driver of railway stations effect. (See Table 4).

Table 4: Estimation results of implicit price as percentage change attributes to change in each different characteristic effect (Hedonic pricing)

VARIABLES	Model IV: **No zone**		Model V: **No CBD**		Model VI: **Total**	
Lnprice	Coefficient	Std. error	Coefficient	Std. error	Coefficient	Std. error
distM	-0.00256	(0.0157)	-0.0545***	(0.0189)	-0.0464**	(0.0213)
distB	-0.0625**	(0.0313)	-0.0584**	(0.0292)	-0.0539*	(0.0278)
cen	-0.0290***	(0.0101)			-0.0138	(0.0176)
bus	0.0541	(0.0341)	0.0645*	(0.0329)	0.0648**	(0.0328)
pier	0.260***	(0.0916)	0.287***	(0.0985)	0.290***	(0.0992)
star	0.385***	(0.0325)	0.372***	(0.0314)	0.372***	(0.0315)
sqmet	0.0144***	(0.00260)	0.0137***	(0.00245)	0.0136***	(0.00245)
chain	0.0984**	(0.0408)	0.0923**	(0.0409)	0.0914**	(0.0408)
breakf	0.129***	(0.0396)	0.134***	(0.0390)	0.133***	(0.0390)
bar	0.154***	(0.0375)	0.162***	(0.0374)	0.164***	(0.0377)
restau	0.0410	(0.0412)	0.0385	(0.0404)	0.0422	(0.0400)
zoneb			-0.0374	(0.0474)	-0.0547	(0.0509)
zonec			0.275***	(0.0738)	0.247***	(0.0823)
zoned			0.145***	(0.0501)	0.114*	(0.0594)
zonef			0.0455	(0.0983)	0.0875	(0.115)
constant	5.505***	(0.100)	5.534***	(0.0995)	5.560***	(0.104)
Observations	400		400		400	
R-squared	0.759		0.770		0.771	

Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

Table 4 provides the model mainly concern with the land price and location of the hotels. Since our observations are collected in five different areas, we include four dummy variables representing the areas mentioned above to eliminate the land price problem that might distort the expect result. In our research, we found that the land parameters (zone) may absorb the significant of the distance to CBD parameter (Cen) so, we regress them separately in model IV and model V to observe this problem. Model IV depicts the model without the zone variable. Model V depicts the model without the distance to CBD variable and Model VI depicts the full estimation with both distance CBD (Cen) and zone variables. The R-square of three models are 0.759, 0.770 and 0.771 respectively, these values of R-square are confirmed to be valid by previous research that a global average of R square on a hedonic pricing study of the hotel room rates is 0.547 (Zhang, Lu and Cheng, 2011). So, these values are reasonable to explain the price in Bangkok hotel.

Model IV estimate with parameter represent the distance to CBD (Cen) without including the land variables. The R-squared of model IV is 0.759 can be concluded that the model fit the regression. There are some highlights from the result of estimating model IV. The distance to MRT station (distM) is not significant affect the price of hotel room rate. The distance to nearest CBD also significantly affect the rate of hotel, the price can be decreased up to 2.90 percent by 1 km far from CBD. Bus station located within 300 meters radius is not significantly determine the rate of hotel, this result is different from model II. Other than mentioned, the results are similar to the estimation in Table 3.

Starting with the internal characteristics, the star rate (Star) of hotel is significant determine the price of hotel said that, the signal of higher quality of hotel can increase price of hotel by 38.5 percent.

Next, the bigger room size significantly higher the room rate, by 1 square meter it increases the rate for 1.44 percent. The higher square meter of room indicates the bigger room size which can provide more comfort and space for consumer. Hotel within a chain significantly affects the rate of hotel. Chain hotel (chain) would be able control the quality and price of hotel in association so, the effect of chain (chain) to the rate is 9.84 percent if it is in group of hotels. The facilities and service of hotel itself also affect the hotel room rate. The estimation found that hotel included with breakfast (breakf) and bar (bar) would increase the price of hotel by 12.9 percent and 15.4 percent, consecutively. In the opposite side, hotel with restaurant seem not to be significantly affect the room rate. The explanation behind this might be the well-known of street food in Thailand would make tourist eager to eat outside the hotel.

For the external characteristics of model IV, distance to BTS station (distB) significantly determines the price of hotel. It can be interpreted as every 1 km far from hotel to BTS station the price decrease by 6.25 percent, in other word; hotel room rate is higher when it is closer to BTS station and cheaper when it is far from BTS station. The CBD also significantly affect the rate of hotel, the price can be decreased up to 2.90 percent by 1 km far from CBD. Result of public transportation parameters are different between two types of public transportation. Pier located within 300 meters radius of hotel significantly affect the rate by raising up 26 percent. The significant parameter involves with the luxury hotel with river view.

Model V regress with all the land parameters excluding the distance to CBD. As mentioned above, the parameter of different area around Bangkok tend to absorb the significant of the parameter representing distance to CBD (Cen). So, we estimate the model with awareness to that issue. From the estimation of

model V, we found some highlight of the result. The result found that the variables described distance of hotel to MRT (distM) becomes significance in determining price of hotel in this model, say that; one kilometer away from the nearest MRT would decrease the price of hotel by 5.45 percent. Next, we found the different result of parameter representing public transportation from model IV as bus station (bus) is significantly determine the price of hotel. Hotel with bus station (bus) within 300 meters radius increases the rate of hotel by 6.45 percent. Other results are similar to model IV with different magnitude of effect.

First, the internal characteristics of hotel, the result of room size or square meters (sqmet) is shown significant effect similar as model IV, bigger room size or higher square meter indicate the increase of 1.37 percent of room rate. The significant effect of hotel within chain or group of hotels is significant in this model. It can be interpreted as the hotel in group of hotels would increase the rate of 9.23 percent. Star rating is significance in determining the rate as shown in model IV, say that; price increases up by 37.2 percent when the hotel depicts one more star. The result of hotel facilities and service are similar with the model IV as hotel with bar and complimentary breakfast significantly increase rate of hotel by 16.2 percent and 13.4 percent while, there is no significant effect found in hotel with restaurant.

The estimation result of external characteristics are as follows. Distance to nearest BTS station (distB) is also significance in this model. For every 1 kilometer, far from BTS station, the price decrease by 5.84 percent. The result of pier and effect of it are similar to model IV as hotel with pier within 300 meters radius is significantly increase the room rate for 28.7 percent.

Last, four variables including in the model to depict five different area around Bangkok. Zone A or Asoke area is omitted to be based case to compare and give explanation to other four zone. The result

of four parameters represent four different areas around Bangkok are as follows. Zone B represents Sathorn found that there is no significance of price between Zone A and Zone B. The result of Zone C or Pathumwan found that there is significance different of price comparing to Zone A. Price increase by 27.5 percent when located in Zone C relative to Zone A. zoned or Ratchathewi also found significance different with Zone A, said that; price of hotels located in Ratchathewi would be more than zonea or Asoke by 14.5 percent. The result of parameters Zone F or Thonglor found that there is no significant different to Zone A.

Final model or model VI includes all the parameters stated in methodology section. This model obtains the r-square value of 0.771 meaning that it is credible of 77.1 percent in explaining the price of hotel.

Firstly, the result of external characteristics of model VI. The estimation result of distance of BTS (distB) and MRT (distM) parameters get along with the hypothesis set in this research as they significantly determine the room rate of hotel. With every 1 km, far from hotel to MRT station and BTS station the rate decrease by 4.64 percent and 5.39 percent, respectively. For the distance to CBD (Cen), we found the result different from model IV as it is no longer significant determine the price of hotel. The insignificance of CBD (Cen) parameter is likely because the land parameters absorb its significance as we expected. The public transportation parameters are also proved in this model that they are significantly determine the rate of hotel. Hotel with Bus station (bus) and pier (pier) within 300 meters radius increase the rate of hotel by 6.48 percent and 29 percent, consecutively.

Moreover, for the internal characteristics parameters, star rating (Star) shows significance in determining the rate of hotel. The higher signal of quality or high star rating increases about 37.2 percent of the price of room. The room size (sqmet) is again proved in this model that it is significantly determine the room rate of hotel with the 1.36 percent higher rate for bigger room size. The result of hotel facilities and service are similar in all three models, offering complimentary breakfast is significantly increase the rate by 13.3 percent and hotel with bar increase the price by 16.4 percent. Still, there is no significance of restaurant in the hotel.

As mentioned about the absorption of significance of distance to CBD by the land parameters, including the location parameters makes Cen insignificance. In this model, Hotel located in Sathorn area has no insignificance different comparing to Zone A. Hotel located in Pathumwan or Zone C area has significance different to Zone A, hotel located in Pathumwan increases the rate by 24.7 percent comparing to Zone A. Hotel located in Ratchathewi area or zoned has significance different to Zone A and it increases the rate by 11.4 percent. Hotel located in Thonglor or Zone F has no significance different comparing to Zone A.

In addition to result from the regression, we compute and compare standard deviation (SD) in each zone separately to find the variation in room rate (see Table6). From the calculation, we are able to rank the volatility in each area. The highest SD is Zone C with SD of 5,437.192 Baht and 33 observations. Second, Zone B with SD of 2,282.482 Baht, 79 observations. Third, Zone A with SD of 1,392.383 Baht, 164 observations, and Zoned with SD of 885.12 Baht, 82 observations. The least is Zone E with SD of

843.491 Baht, 42 observations. Result shown that hotel room rate in zone near both CBD will have relatively higher SD.

5. Conclusion

This research aims to provide best knowledge for pricing the hotel based on different factors focusing on the proximity to BTS and MRT station. According to previous research, hedonic pricing is confirmed to be the appropriate model used in pricing goods with different characteristics (Debrezion, Pels, and Rietveld, 2007; D.N. Dewwes, 1976; Agmapisarn, 2014; Thrane, 2006). Various Data was collected with 400 number of observations, the hedonic pricing model estimates with three forms of OLS regression which are Linear form, Log-Log form and Semi-log or Log-linear form. Semi-log form found to be the most appropriate to interpret the model. Since, this form is the most suitable to deal with volatility in price or dependent variable that was created from extreme outlier, such as Grand Hyatt Erawan with rate of 30,000 Baht per night.

For conclusion of all 6 models, Model I only include railway which are BTS and MRT, for Model II we use model one and include more variables of other public transports and Central Business District. Model III only railways (distM and distB) and Hotel facilities were included in this model. Then Model IV we combine Model III and Model II, excluding only zone. Model V consisted of all variables except CBD, and lastly Model VI or our final model which include all categories of variable (railway, other public transit, hotel star, CBD, and Zone). But we only going to discuss more on the last model.

So, what did we learn from the last model and final model. Model VI is the model with all variables included in. The estimated result shown that the value R-square for this model is 0.771 which mean that it

is credible of 77.1 percent in explaining the hotel room rate. For the major variables that we are very interested which are DistM, DistB, Bus, Pier, and Cen. For distance to BTS and MRT the estimated result implies that with every 1 km away from BTS or MRT what would be the percentage change in price? Which in this case the rate would decrease by 5.39 percent and 4.64 percent, respectively? However, for Central Business District (Cen) which previously was a significant variable in all the model it's appeared in this model in become insignificant, this might be the effect of having both Cen and Zone variable is this model, and zone might already absorb the Cen effect to room rate. For other public transit, hotel with proximity to bus station (Bus) or pier (Pier) with 300 meters radius, will have an effect of increase in price by 6.48 percent and 29 percent, respectively. Surprisingly from such a boost in price from proximity to pier, we think carefully and came up that hotels with pier within 300 meters radius are mostly high-end hotel with river view. So, we concluded that without other factors convenience in boat transit wouldn't increase the price by 29 percent. For other variables such as the facility mostly are significant to the room rate since those variables are the internal factor of the hotel. And we found that zone variable also tells us the price difference between zone with base price of Zone A. The result is highest price fall to Zone C and the cheapest area is Zone B.

Now it's time to answer our research question. First, let us remind you what are our research questions the first question is "does the proximity of the BTS and MRT affect the hotel room rate?" The answer is Yes, since both variable is significant. Then next question is "Is public transportation major variable on hotel pricing?" to the best of our knowledge we couldn't confidently answer this question since our depth of study isn't directly correspond with the question, but what we can answer from the estimation, we got

four public transit variables all of them are significant in this model. So, public transit might or might not be major variable in pricing hotel room rate but surely there are some effect from it. Last, "how the room rate volatile in different area?" for this question we use Stata to compute SD for each zone (Table 6) the result is Zone C (Pathumwan) got the highest volatility in price with SD of 5,263.3 Baht, this might also be the effect of extreme outlier (Grand Hyatt Erawan) and Zone F (Prompong-On Nut) with lowest SD of 843.5 Baht. This imply that the closer the hotel located to CBD the higher volatility in price.

Lastly, this research confirms some aspects done by previous work also, it shows new aspects based on the hypothesis of the railroad proximity and importance of public transportation. However, there are few limitations occur during the working of this research. First, according to the time constraint of three to four months' period, we are unable to cover the all area in Bangkok. In addition, we wanted to cut out the effect of low and high season which could create a seasonal effect in price, so we collected the price in a single day. There is missing characteristic of hotel in the model, the duration that the hotel has been operated (age), which is confirmed significance by other researches (Agmapisarn, 2014; zhang, Lu and Cheng, 2011). The variable is excluded from the model since, the data is missing on the internet.

In conclusion, further and deeper research on this field of topic would be able to capture more factors and precise magnitude in determining the rate of hotel. These findings would give a perfect information to both hotel operator and tourist.

Appendix

Tale 5.1: Correlation between estimated variable

VARIABLE	Correlation Between Estimated Variable (Obs = 400)									
	price	star	sqmet	cen	distM	distB	bus	pier	chain	breakf
Price	1									
Star	0.6042	1								
sqmet	0.6368	0.583	1							
cen	-0.1932	-0.1885	-0.1221	1						
distM	-0.1844	-0.2797	-0.1074	0.6002	1					
distB	-0.1519	-0.1729	-0.0666	0.1668	0.3287	1				
bus	0.1394	0.0971	0.0512	-0.0551	-0.0528	-0.1578	1			
pier	0.1151	0.0644	0.0372	-0.0541	-0.0142	0.0243	0.1286	1		
chain	0.3227	0.3841	0.2319	-0.058	-0.2061	-0.116	-0.0038	-0.0166	1	
breakf	0.2509	0.3722	0.2289	-0.0956	-0.1288	-0.1172	0.0214	0.0212	0.1708	1
bar	0.3643	0.4599	0.2416	-0.103	-0.2484	-0.1923	0.064	-0.0298	0.2114	0.2667
restau	0.2897	0.4541	0.2937	-0.0432	-0.0322	-0.068	0.0047	0.0022	0.1494	0.3667
zonea	-0.0372	0.0703	-0.0365	-0.0015	-0.4903	-0.2824	-0.0994	-0.1174	0.1895	0.05
zoneb	0.0256	0.0497	0.0364	-0.2285	-0.2083	0.0602	0.126	0.2169	-0.066	-0.0027
zonec	0.3919	0.2687	0.3306	-0.2244	-0.0109	-0.085	-0.0653	0.0779	0.1163	0.0361
zoned	-0.1459	-0.1984	-0.172	-0.2441	0.3317	0.2607	0.0359	-0.0721	-0.2015	-0.0217
zonef	-0.1333	-0.1575	-0.0593	0.8234	0.6307	0.107	0.0062	-0.0699	-0.0568	-0.0804

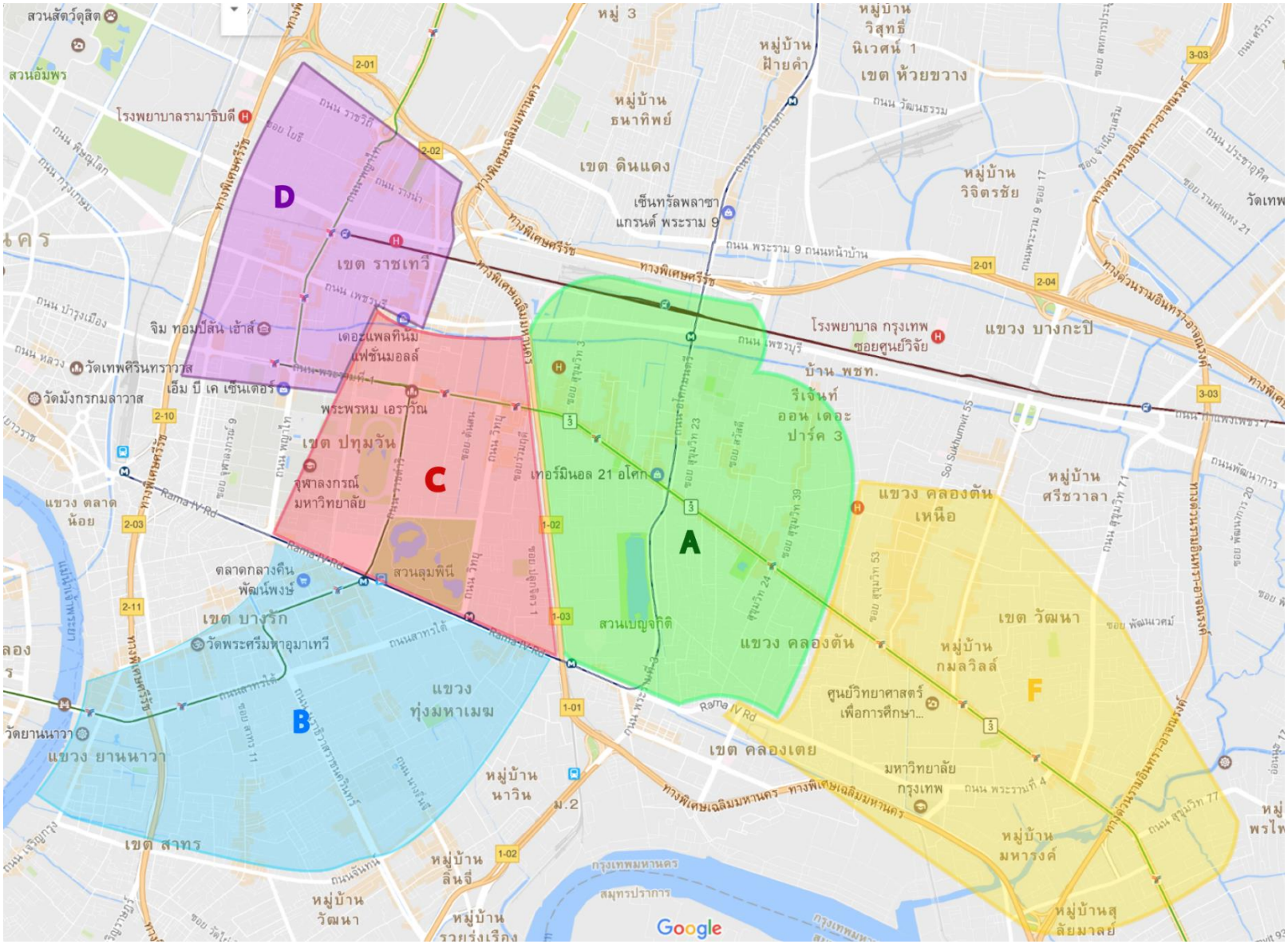
Table 5.2: Correlation between estimated variable (Continue)

VARIABLE	Correlation Between Estimated Variable (Obs = 400)						
	bar	restau	zonea	zoneb	zonec	zoned	zonef
bar	1						
restau	0.4302	1					
zonea	0.1848	-0.0574	1				
zoneb	0.0402	0.0322	-0.4147	1			
zonec	0.0956	0.0874	-0.2487	-0.1499	1		
zoned	-0.2079	0.0271	-0.4211	-0.2539	-0.1523	1	
zonef	-0.1606	-0.0642	-0.2841	-0.1713	-0.1027	-0.1739	1

Table 6: Statistic Values

VARIABLE	ZONE	Statistic Values (Obs = 400)				
		Observation	Average	Std. Dev.	Min	Max
price	zonea	163	2139.718	1392.383	215	7950
	zoneb	80	2362.05	2282.482	446	14150
	zonec	33	5265.303	5437.192	608	30080
	zoned	82	1578.951	885.1202	555	4784
	zonef	42	1343.452	843.4906	415	4500
Total		400	2243.48	2315.221	215	30080

Figure 1: Area or zoning



Source: Google Maps (2017)

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