The Hedonic Method in Evaluating Apartment Price: A Case of Ho Chi Minh City, Vietnam

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Abstract

The study examines factors affecting apartment prices in the real estate market of Ho Chi Minh City, Vietnam. The study uses primary data based on surveys of customers who have traded successfully, and collects transaction data from real estate trading companies that are the top investors in Ho Chi Minh City real estate market. The collected data include 384 observations in a total of 24 districts, detailing that each district surveyed on a minimum of four projects, each project carried out a survey on a minimum of four apartments. The survey collected 339 valid questionnaires for analysis and model testing. This study employs multivariate regression with the data of 339 observations. The research results reveal that five significant factors affect positively the price of apartments in Ho Chi Minh City – apartment area, toilet and bedroom, apartment floor, reference price, and apartment interior. Besides, there are three significant factors affecting negatively the price of apartments – next price trend, distance to city center, and potential building. From the results, the research proposes solutions in the pricing of apartments in the real estate market in Ho Chi Minh City – better information system, a real estate transaction index, and stricter management of small brokerage activities.

Keywords : Hedonic Method, Price, Apartments, Real Estate, Vietnam

JEL Classification Code: D04, D12, D40, D90

1. Introduction

Ho Chi Minh City is the most densely populated city in Vietnam, and is also an important economic cultural and educational hub of the nation. Located in the transition zone between the Southeast and Southwest of Vietnam, Ho Chi Minh City today consists of 19 inner districts and five suburban districts, with a total area of 2,095.06 km². According to the 2014 census of the Bureau of Population Statistics, the city population had reached 7,955,000.

However, if taking unregistered residents into account, the actual population of the city exceeds 10 million. Thanks to favorable natural conditions, Ho Chi Minh City now becomes an important transportation hub of Vietnam and the Southeast Asia, including roads, railways, waterways and airways. Ho Chi Minh City also plays the most crucial roles in the fields of education, media, sports and entertainment.

But Ho Chi Minh City is facing the problems any large city with high population growth rate has to deal with, which is housing demands for its residents in the city. However, the key challenge here, when real estate markets such as houses, apartments, rooms for rent, hotels, etc. can still provide for residents or tourists wishing to buy or rent, is that the investors or owners of these properties keep increasing their selling or renting rates excessively, following no rules at all. This causes great difficulties for those who really need to buy or rent houses and apartments, and intend to settle down permanently in Ho Chi Minh City.

Besides, there were some scientific studies such as one by Cebula (2009), with 591 observations in Historic Landmark district during 2001-2005, assessing the impact of 24 independent variables on housing prices. Another research by Eda (2003) in Ankara, using cross data of 244

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observations, found out the factors affecting buildings' rental prices. Son and Kim (2000) included 238 observations in Seoul, studying office rental prices using the Hedonic method. Nguyen, Nguyen, Quach and Nguyen (2012) used 210 observations to determine the variables affecting rental prices in Can Tho city, also using the Hedonic method. Luc (2014) used OLS stepwise combined with Hedonic to conduct the valuation of commercial housing's construction, while Tran and Nguyen (2011) published the study *Factors affecting real estate prices in Ho Chi Minh City*.

With the current situation, this study was based on viewpoints of people with real housing needs in order to investigate the determining factors affecting apartment prices in Ho Chi Minh City with the Hedonic method to establish a scientific foundation for more accurate pricing in the real estate market.

2. Theoretical Framework

2.1. Supply – Demand Theory

The reciprocal relationship between supply and demand determines the goods produced and the price to buy and sell them. Demand for goods and services, according to Pindyck et al. (1992), describes the quantity of a good or service that consumers will buy at different prices in a given time, while other factors remain unchanged. The demand function is inverse and has the form: $QD = a + bP$ ($a < 0$: because the demand curve is sloping downwards, the demand function has a negative gradient).

Supply of goods and services, according to Le et al. (2011), also describes the quantity of goods or services that sellers (or producers) will supply, bringing the output to the market at different prices over a specific period of time and place, while other factors remain constant. The supply function is a linear function, which looks as follows: $QS = a + bP$ ($a > 0$: because the supply curve slopes upwards, it has a positive gradient). The market reaches the point of equilibrium when the goods are traded at a specified price and quantity. Prices and quantities in the equilibrium market are called equilibrium prices and equilibrium quantities.

2.2. The Hedonic Method

The Hedonic valuation method is defined as the regression analysis technique used to determine the value of relevant attributes (latent values) on goods on the market in specific stages. The key idea of this method is directly related to the theory of supply and demand. These attributes come, not only from within the intrinsic value of the product, but also from the natural attributes of the external environment that indirectly impact the product – called the hidden price.

According to Griliches (1971), the Hedonic method is based on the price of a heterogeneous good determined through attributes related to those goods. Therefore, the Hedonic regression function takes the form: $p_i = h(c_i)$, where p_i is the price of the goods and c_i is the vector of goods-related properties. According to Triplett (1986), the Hedonic valuation method has been developed and applied extensively to determine the price index before it is built into a complete framework. This method is widely used in the analysis and valuation of real estate.

In short, the Hedonic method is used in studies that are based on the criteria of consumers' product evaluation, the way they concern tangible features of the product such as color, technical specification (technology) and related utilities. As for special real estate products, such as apartments, land, houses or offices for rent, etc. the interested characteristics surveyed based on the opinion of consumers are surrounding utilities, living environment, location, space size and facilities.

2.3. Factors Affecting Apartment Prices

2.3.1. Location and Distance

Project distance to the center: The most convenient distance for different types of vehicles to shopping malls, schools, and hospitals with the lowest and most economical travel costs. According to John et al. (2008), the distance is expected to be inversely proportional to the apartment price.

2.3.2. Structural Features

Apartment area: According to Hoang (2009), this variable has a direct influence on the price of an apartment because an apartment will be more useful when the area is relatively large.

Number of toilets and bedrooms of an apartment: The number of toilets and bedrooms of an apartment has a certain meaning for the price of the apartment. An apartment with only one toilet and one bedroom will be much lower in price than one with two toilets and two or more bedrooms. According to Melichar, Vojacek and Rieger (2009), the greater the utility of this inherent structure, the higher the apartment price will be.

Top floor: The higher you go, the more fresh air you get, the landscape and the view are also wider and more beautiful. According to Rosen (1974), apartment floors tend to be proportional to the total value of real estate in the same project. That means, the bigger the number of floors, the higher the apartment price will be and vice versa.

Apartment interiors: According to Ratchatakulpat, Milner and Marchant (2009), apartment interiors are divided into two segments: high-end interiors and budget interiors.

Apartment view: According to Luc (2014), each apartment offers a different view that will lead to investment decisions, so the selling price of apartments will also vary. If the view from the apartment is towards the river, lake or pool, or park areas, then that apartment will have a higher transaction price than those overlooking other projects, a vacant lot, or a hospital.

2.3.3. Surrounding Environment

Facilities of the project area: If the project has many utilities right inside it, designed by the initial planning such as swimming pool, spa, gym, canteen, etc., then the apartment will be priced higher than projects that only reserve the entire land for apartment construction and internal traffic. According to Rosen (1974), the price of a project evaluated by the Hedonic method will be proportional to the surrounding utilities and living environment.

Investor: According to Hoang et al. (2008), the investor is considered credible when the brand value of the business in the market is confirmed by the completion of the projects, bringing status and good quality for users. From there, the confidence of buyers in the products by that investor will increase. Simultaneously, the variable “Investor” is also the risk variable in the research of Ratchtakulpat et al. (2009).

Legal status of the apartment: Projects after completion will experience a certain delay in obtaining legal documents (pink book). In Vietnam, the average time is five years from the date of handover to buyers for newly-built projects. For other apartment projects, legal documents (pink books) may be faster, according to the law (Housing and Real Estate Business Law, 2014); it takes approximately forty-five days from the date of registration. According to Ratchtakulpat et al. (2009), transactions with available legal document will bring good feeling, creating a sense of security for buyers and sellers.

Potential works: According to Ratchatakulpat et al. (2009), surrounding utilities such as schools, shopping malls, etc., are essential elements that make people who live nearby feel comfortable and well settled. Therefore, the presence of these constructions in the future will increase the price of apartments and houses in the area higher and faster.

Reference price: The reference price of apartments in the same segment, area and ecological environment, etc., with completed transactions will have a great impact on the price of apartments targeted by the consumers. The price will influence customers’ purchase intention (Nguyen, Bui, & Nguyen, 2019; Nguyen, Dang, & Ngo, 2019). According to Nguyen et al. (2012), the higher the past transaction prices of the real estate under the same conditions, the higher the current transaction price will be and vice versa.

Trends: The next price trend of the real estate market, in general, or of houses, lands and apartments, in particular,

plays an indispensable role in affecting the current prices. According to Luc (2014), and Nguyen and Nguyen (2017) the speculation for the next trend of sellers, buyers, or researchers will make an impact on current trading prices.

Apartment time used: According to Saksith and Kaiwan (2009), because of the longer time used or the higher the age of the building, the rental price will be deeply depreciated or falling very low. This holds true for used apartments. The important factor is the time used of the apartments: the longer the apartment has been used, the lower the apartment’s current price will be compared to the same segment in the project, under the same conditions.

3. Research Method

3.1. Research Data

The study uses primary data based on surveys of customers who have traded successfully, and collects transaction data from real estate trading floors and companies that are the top investors in Ho Chi Minh City real estate market. The sample consists of selected apartment projects, all are different according to size and differentiation set out by investors. The data was collected on a large scale with 384 observations in a total of 24 districts, detailing that each district surveyed on a minimum of four projects, each project carried out a survey on a minimum of four apartments. However, compared to the initial estimate, the survey only collected 339 valid questionnaires for analysis and model testing, accounting for 88.3%.

3.2. Research Model

Based on the literature review, previous research, and the Hedonic method, we have the following model:

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \beta_6X_6 + \beta_7X_7 + \beta_8X_8 + \beta_9X_9 + \beta_{10}X_{10} + \beta_{11}X_{11} + \beta_{12}X_{12} + \beta_{13}X_{13} + \varepsilon.$$

Variables description and affect expectation are shown in Table 1

4. Research Results

4.1. Descriptive Statistics

Some variables receive the lowest value and others the highest value by a specific number, which are quantitative variables such as DIS (distance from one project to Ho Chi Minh City post office), which received the lowest value of 890m. The highest value (the furthest project) is in District 12, 17.76 km from the Ho Chi Minh City post office. Attribute

Table 1: Variables Description

No	Group	Variables	Description	Measurement	Expectation
Dependent Variable (Total Amount)			Total apartment value (billion VN Dong)		
Independent Variables					
1	Location Distance	DIS (km)	Distance from one project to the city center	Km quantity from one project to the city center.	-
2	Structural Characteristics	SQUA (m ²)	Apartment area	Meter square (m ²)	+
3		WCBR (room)	Number of apartment toilets and bedrooms	WC, BR quantity	+
4		FLO (floor)	High/low floor	Apartment floor quantity	+
5		FUR	Apartment interiors	1: high-end, 0: budget	+
6		VIEW	Apartment view	1: river, lake, park; 0: not river, lake, park	+
7	Surrounding Environment	IN – ENVI	Utilities provided by apartment projects	1: have Gym center, swimming pool, supermarket; 0: not have.	+
8		INVESTOR	Apartment project investor	1: implement at least 2 projects, 0: only 1 project.	+
9		LEG	Apartment legal status	1: have pink book, 0: not yet have pink book.	+
10		UL-STRUCTURE	Potential work in the following year	1: have supermarket, school, administrative office, etc. project next year; 0: not have.	+
11		RE-PRICE (billion VN Dong)	Reference price	Billion Dong/m ²	+
12		TREND	Trend	1: uptrend, 0: reverse trend.	+
13		TIME-USED (year)	Apartment time used	Number of years using the apartment	-

“SQUA” (apartment area) is ranked from the smallest of 36m² to the largest of 154 m² and the average area of the apartment is 78.89 m². Attribute “WCBR” is the number of toilets and bedrooms in the same apartment; the study carried out a survey of apartments with one toilet and one bedroom to apartments with up to three toilets and three bedrooms, so the average apartment has two toilets and two bedrooms. Attribute “FLO” (floors of the apartment), surveyed from the lowest floor, which is the first, and the highest floor, which is the 22nd. Next is attribute “RE PRICE” (reference price); this variable has the smallest value of VND650 million/apartment (cheap apartment or social house) such those in Nha Be, Thu Duc, Binh Chanh, etc., with the highest value of VND5.5 billion/apartment (high-end apartment) in some central districts like districts 1, 2, 3, Binh Thanh, Phu Nhuan, etc. Attribute “TIME USED” (apartment time) ranges from a minimum price of 0, for a unit that has not been used for residential purpose, up to a maximum value of 20, for apartments used for up to 20 years (see Table 2).

4.2. Multicollinearity Test

In many cases of the coefficient correlation among the independent variables, the most noticeable one is the case of the correlation between the area factor of the apartment “SQUA” and the factor of toilet, bedroom of the apartment “WCBR”; the coefficient of correlation in this case is quite high (0.835) with sig <0.01. Therefore, the model will be implemented in two cases (see Table 3).

Model 1: Analysis performed with the number of toilets, bedrooms “WCBR” without the area factor “SQUA”.

Model 2: Analysis performed with an area factor of “SQUA” without factor of toilet and bedroom “WCBR”.

4.3. Regression Results

Based on the regression results (see Table 4), we analyzed the variables with statistical significance in the research model as follow:

Table 2: Descriptive statistics of Variables in the research model

	Unit	Observation quantity	Lowest value	Highest value	Mean value
TOTAL AMOUNT	Billion VN dong	339	0.579	5.35	2.964
DIS	Km	339	0.89	17.76	7.4371
SQUA	m ²	339	36	154	78.89
WCBR	WC, BR quantity	339	1	3	2.08
FLO	Floor quantity	339	1	22	11.90
FUR	Binary variable (1,0)	339	0	1	0.31
VIEW	Binary variable (1,0)	339	0	1	0.43
IN – ENVI	Binary variable (1,0)	339	0	1	0.63
INVESTOR	Binary variable (1,0)	339	0	1	0.72
LEG	Binary variable (1,0)	339	0	1	0.69
UL-STRUCTURE	Binary variable (1,0)	339	0	1	0.34
RE-PRICE	Billion VN dong	339	0.65	5.50	2.2309
TREND	Binary variable (1,0)	339	0	1	0.52
TIME-USED	Number of years used	339	0	20	3.23

Table 3: The correlation regression matrix among variables

	FUR	VIEW	IN-INVI	INVEST	LEG	UL-ST	TREND	TIME-USED	FLO	WCBR	DIS	SQUA	RE-PRICE
FUR	1												
VIEW	.345**	1											
IN-INVI	.403**	.500**	1										
INVEST	.329**	.206**	.405**	1									
LEG	-.011	-.067	-.240**	-.241**	1								
UL –ST	.445**	.427**	.393**	.363**	-.046	1							
TREND	.108*	.157**	.152**	.103	-.102	.209**	1						
TIME-USED	-.152**	-.172**	-.365**	-.365**	.584**	-.125*	-.176**	1					
FLO	.104	.079	.154**	.122*	.008	.144**	-.009	-.273**	1				
WCBR	.185**	.100	.110*	.047	.087	.022	-.086	-.027	.296**	1			
DIS	-.414**	-.284**	-.053	-.037	-.268**	-.378**	.044	-.238**	-.040	-.025	1		
SQUA	.312**	.165**	.164**	.081	.186**	.136*	-.041	.017	.357**	.835**	-.182**	1	
RE PRICE	.624**	.273**	.228**	.171**	.213**	.294**	-.015	.198**	.049	.412**	-.597**	.551**	1

Table 4: Results of OLS regression analysis

A	Model 1		Model 2	
	B	Significance	B	Significance
Constant	-0.189	0.267	-0.157	0.297
DIS	-0.059***	0.000	-0.065***	0.000
FLO	0.047***	0.000	0.031***	0.000
TIME-USED	0.012	0.311	0.015	0.162
RE-PRICE	0.565***	0.000	0.464***	0.000
FUR	0.324***	0.000	0.324***	0.000
VIEW	0.056	0.397	0.045	0.443
IN-ENVI	-0.011	0.875	-0.020	0.759
INVEST	0.009	0.899	0.027	0.666
LEG	0.009	0.897	-0.071	0.281
ULSTRUCTURE	-0.145**	0.044	-0.167***	0.009
TREND	-0.083	0.133	-0.091*	0.065
WCBR	0.379***	0.000		
SQUA			0.016***	0.000
Significance (Sig.)	.000		.000	
R	.910a		.929a	
R Square	.829		.863	
Adjusted R Square	.823		.858	

4.3.1. Variable “ULSTRUCTURE” (potential works):

Model 1 has a statistical significance of 5% and Model 2 is 1%, acting inversely to the initial expectation of the study. According to Ratchatakulpat et al. (2009), the larger the construction with supermarkets and surrounding infrastructure, the higher the total value of the apartment. However, this result reflects the true nature of the apartment market in Ho Chi Minh City when the owner of the apartment surveyed did not appreciate the presence of grand structures and construction in the future. The problems concerned buyers have: the status of legal documents, time of project completion, the size of the project leading to delay in compensation, etc.; all these make this factor not highly appreciated.

4.3.2. Variable “DIS” (distance from one project to the center):

Both models have a statistical significance of 1%, in line with the initial expectations. Even the study by Luc (2014) shows the same expected results. Among all the expectations of investors, speculators, or buyers in general, the distance from the project to the city center plays a key role in their purchase decision. Projects located near the center always

attract buyers due to the convenience to commune, study, work, etc.

4.3.3. Variable “FLO” (number of floors of apartments):

Both models have a statistical significance of 1%, in line with the initial expectations. According to Rosen (1974), apartment floors tend to be proportional to the total value of real estate in the same project. In fact, when buying a house or a land plot, buyers do not care about this factor, but when they are involved in an apartment project, their interest in the higher floor will be taken into account. Basically, the higher the apartment is located, the greater its total value compared to the apartment in the same area and with the same view on a lower floor. One of the reasons is due to access to fresher air, better health, and more beautiful apartment view.

4.3.4. Variable “RE-PRICE” (reference price):

Both models have a statistical significance level of 1%, as initially expected. Nguyen et al. (2012) studied the issue of house renting price in Can Tho city. This clearly shows that the reference price before deciding to buy or sell apartments has a certain impact on the total value. If the initial reference

price of the apartment is high compared to others in the same segment, time and quality, then when making the next transaction, the apartment price will be calculated from the reference price onwards.

4.3.5. Variable “FUR” (apartment interiors):

Both models have a statistical significance of 1%, consistent with expectations and also with the research by Ratchatakulpat et al (2009). High-end projects, with large investment in luxurious branded interiors used in Grade A buildings, are always priced higher than projects in the mainstream segment with budget furnitures, purely invested for the purpose of accommodation. However, currently in Ho Chi Minh City, apartment price depends on many factors, and the interior of the apartment is only one of the factors that have a relative impact.

4.3.6. Variable “WCBR” (number of toilets and bedrooms):

Model 1 has a statistical significance of 1%, in line with the initial expectations of the study. The more toilets and bedrooms the apartment has, the higher the price of that apartment in the same project (applicable to all segments from mainstream to high-end) according to Melichar et al. (2009) and Baek et al. (2019). This is one of the essential factors or one of the criteria when choosing an apartment, along with other elements like kitchen, balcony, and laundry. The number of toilets and bedrooms plays an extremely important role: the more toilets and bedrooms, the higher the price of apartments.

4.3.7. Variable “SQUA” (apartment area):

Model 2 has a statistical significance of 1%, in line with the initial expectation. According to Hoang (2009), the larger an apartment is, the higher its price. This is completely true of the apartment market in Ho Chi Minh City. The apartments that have extra area for balcony, drying area, laundry or spacious walkways, will definitely make the apartment feel more comfortable and airy than those with small areas with fewer amenities.

4.3.8. Variable “TREND” (next price trend):

For Model 2, this variable has a statistical significance of 10%, in contrast to the initial expectation of the research and survey by Luc (2009). This is a big difference between the two models when conducting the analysis. This is consistent with the study by Celbula (2009) in that if the trend of predicting the next price of an apartment increases, then the price of apartments will increase. The reason for the change

that is contrary to the initial expectation, in the results of the survey and statistics, is that the number of respondents predicting the rise, a plateau or a fall is almost the same with the average value of 0.52; 50% of the respondents said the price will rise and 50% of the respondents said it will not. Respondents, who also carried out transactions in the secondary apartment project, did not have an accurate answer to the next trend for apartment prices in all segments, either mainstream or high-end at the time of the survey.

The following variables are not statistically significant in the model: “TIME-USED”, apartment time used; “VIEW”, view from the apartment; “IN-ENVI”, utilities provided by apartment projects; “INVEST”, reputation of the investor; “LEG”, the legal value of the apartment. Regression results are expressed in Table 4 as follow:

5. Conclusion and Policy Recommendations

5.1. Conclusion

The study examines the factors affecting apartment prices in Ho Chi Minh City, Viet Nam. The main method used was the Hedonic method, followed by multivariate regression, with data from 339 observations in Ho Chi Minh City. The research found five significant factors affecting positively the price of apartments in the Ho Chi Minh city real estate market: apartment area (+), toilet and bedroom (+), apartment floor (+), reference price (+), and apartment interior (+). Besides, there are three significant factors affecting negatively the price of apartments: price trend next (-), distance to city center (-), and potential building (-). Finally, the five remaining factors have no effect at all.

5.2. Policy Recommendations

From the above results, the research proposes the following policies:

Completing the information system: Real estate transactions on the market today are aggregated and statistically analyzed at the trading floors, statistics from the investors, relevant ministries and agencies, etc. However, the key and important sets of information such as the exact transaction price of previous purchases, news of infrastructure planning, even the issues of compensation, are important aspects related to the transaction which cannot be accessed via any formal approaches. Therefore, the formulation of an information system covering all information relevant to the project and planning will help buyers a great deal when deciding to enter the transaction.

Building a real estate transaction index: Like the stock market, the real estate market needs a specific and practical parameter to assess the impact of the market daily, weekly, monthly and annually. Thereby, the buyer will have a more

specific and accurate reference channel for each individual project and the overview of the overall market.

Strict management of small brokerage activities: The management of transactions and brokerage activities at the trading floors has been improving significantly. The regulations require that the monthly transactions be notified when the transaction occurs as well as the establishment of rules for the trading floors, the minimum capital, the required certificate for becoming a broker, etc., have gradually worked. However, the management of small brokerage activities is still very loose. Motorbike drivers, street vendors, drink sellers, etc., can all become brokers without any sanctions or regulations. This has disturbed the price of houses and apartments significantly.

Prompt intervention of the Government: We all want every markets to comply with the market rules, then the market will be transparent and complete. However, some individuals or organizations with strong financial capacity still intervene in the market to gain benefits for themselves only. Government does not have to emphasize market protection, but somehow, they should have timely regulations and measures to prevent and handle cases that may lead to real estate bubbles and excessive deflation of the market like Nguyen et al. (2019)'s study mentioned.

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