

Appraisal of Apartments in Albania using Hedonic Regression

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Abstract: - Valuation of property is an important part of the land organization framework since it has a direct impact on people's lives. The adjustments within the property estimation can dramatically change the abundance of the organizations and their ability for development. A variety of people may benefit from a better property valuation framework in our society because it reduces the risk of investing in this division and encourages lower interest rates on loans. The aim of this paper is to empirically demonstrate that, aside from location and address of properties, there are other major factors that influence the price of flats in Albania by developing a hedonistic pricing model. The capital city of Tirana and also Durrës were selected for this research paper in order to develop a hedonic price model based on the data collected by properties sold at one of the largest real estate agencies, "Century 21" in the country. According to the findings, apartment attributes such as area of living, number of bedrooms and other factors influence the price. The findings also revealed the marginal influence of the number of apartment spaces, which was dependent on the living area of the apartment. This is the first empirical study to present the results obtained from a hedonic regression built using data pertaining to Albania.

Key-Words: - Hedonic regression, appraisal of apartments.

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1 Introduction

The real estate sector is an extremely critical part of the national economy of a country and firmly related with different sectors of the economy, confirming the amount of development. When we mention the housing market, the word is not only about the property but also about the complementary sectors that this market creates. The electrical services, construction of water, shopping centers and other community services are some of the sectors that successfully generate additional employment and financial gain. Focusing on the housing market as a capital asset, it helps in the development of business enterprises, providing stable long run rental income and also acts as a credit collateral for business endeavors.

The housing market, however, is distinct from other consumer commodities in that it demonstrates durability, variety, and geographical fixity. According to the hedonic price model, products are

generally marketed as a bundle of intrinsic characteristics, [1].

Since the real estate market is a significant sector in a national economy and also affects different other sectors in it, the research for modelling housing pricing turns into a very important matter. As one of the components of the land organization framework, a productive real estate valuation system ensures clarity and consistent (symmetrical) distribution of data on the price of the property, [2].

The adjustment of the property estimation may adequately influence the abundance of organizations and their ability for development. Progression of real estate valuation system improvement may be helpful to various interest groups in the community, in such a way that may lessen the risk of investment in the housing market and furthermore support lower rates of interest on loans, [3].

From all studies done until now about hedonic appraisal of apartments in Tirana only, there is no

record on attributes of sold properties and their position cannot be distinguished by a geographic data framework, [15].

The objective of this paper is to empirically demonstrate that, aside from location and address of properties, there are other major factors that influence the price of flats in Tirana and Durres by developing a hedonistic pricing model.

2 Literature Reviews

The hedonic price method, or hedonic regression, recognizes that heterogeneous commodities can be specified by their attributes or characteristics. The model is used for estimating the value of this good or the demand for a good, which indirectly affects its market price.

Even though most of the scholars agree that it was the Court, [31] who first used the hedonic price model (HPM) to decide the hedonic price index of cars, there is no consensus among them as to who first introduced this model. Haas, [32] and Wallace, [33] first displayed the model with the evaluation of agricultural land. One reason to consider the Court's study as a substantial contribution is that it deals with problems of nonlinearity and with changes in underlying goods bundles, [5].

Robert and Shapiro, [6], are two other scholars that contended about the Court's methodology, by stating that "implicit price components for each of a bundle of product characteristics are established by a regression operation that phrases the price of a product as a function of the coefficients associated with each characteristic. The price of a new product (or different product can then be compared with that of the previously existing product when one utilizes these coefficients..."

There is also a theory stated by Colwell and Dilmore in [7] which shows that Haas conveyed a hedonic study more than fifteen years prior to Court, even though he never used the term 'hedonic'. Haas analyzed price/acre adjusted for year of sale, road type and city size, using data on 160 sales transactions gathered from farm sales in Minnesota. While the depreciated cost of building per acre, land classification index, soil productivity index and distance to the city center were included as independent variables. There are also many other scholars who contributed to the HPM over the years. Authors in [8] raised the HPM by further developing Court's study. His work imprinted technological change and novelty into hedonic prices through quality of goods. Griliches, [9], worked on

automobile price indices using automobile models as a unit of analysis, and his study attracted substantial consideration, [10], [11].

Lancaster's consumer theory and Rosen's model are considered important contributions to the development of HPM. In [12] the authors characterized the idea of utility of the items through the value of their extraordinary qualities, considering that a linear relationship. Their review depends on the hypothesis of utilization, under which the demand for a heterogeneous item, for example, real estate, relies upon its attributes. According to this research, the Lancasterian index is more appropriate for consumer goods. According to authors in [13], properties are heterogeneous and the absolute value is made up of the total of each property's characteristic value, implying that HPM ought to be nonlinear. Rosen's model looks appealing to estimate demand for durable goods.

Rosen's model is divided into two stages. By relapsing the cost of a product on its qualities, the first stage estimates the marginal price for the attribute of interest. The first stage establishes a price measure but does not show the inverse demand function immediately. The inverse demand curve, also known as the marginal willingness to pay function, is generated from the implicit pricing function calculated in the first step of estimation, [14].

Because Rosen factored income into the consumer's budget constraint, as income rises, so does the consumer's marginal willingness to pay for a specific implicit feature. The buyer's demand or desire to pay for a characteristic is considered to be a function of the buyer's utility level, wealth, and other variables that impact tastes and preferences, such as age, education, and so on. Rosen believes that utilizing the marginal price as an endogenous variable in the second-stage synchronous condition may be used to estimate the inverse demand function, which considers changes in revenues and utility levels. If the inverse demand function can be traced back utilizing the implicit marginal price function, the utility change with regard to specific quality modifications may likewise be calculated by coordinating the inverse demand function, [14].

Bartik, [30], disagreed with Rosen's method for estimating the hedonic price model, claiming that the hedonic estimation issue is not the consequence of demand-supply interaction, because individual consumers cannot influence providers.

Because of the diverse environment in which the model takes place, determination of housing characteristics in the hedonic model is different in various countries. The existence of a lift, a garage or

air conditioning creates a favorable link with the value of the house.

The house value is also positively affected by the view; trees or park, [16] or if the property is located by the sea or river. It is negatively affected when the house is located near a cemetery, [14].

In the Albanian literature, most of the studies on the housing market are conducted mainly at the macro level. Rebi in [27] tried to find the impact of housing prices on mortgages; Bozdo in [26] on the stability of the financial system, while authors in [24] studied the factors that have an impact on the construction sector in Albania.

Thanasi, in his study for the hedonic price model in Tirana, using a database of 1421 apartments obtained through the real estate magazine "Celesi", found that location was the factor which seemed to affect mostly the housing prices, [4]. Asilkan, [25] used a sample of 200 properties in Tirana, taking into consideration factors of location, structure and neighborhood. Shehu in [28] brought up the result that the number of rooms, property conditions and balconies affect house prices, but the prices are affected negatively if the apartment is located away from the city center. According to the age of the building, Shehu and Afezulli [29], on another study, using data on some office buildings in Tirana, found that, by remaining constant all the other factors, the effect of the age of the building on the price of the apartments in it is very small, only 0.3% if the building is one-year-old, [17].

3 Hedonic Pricing Models Explanatory Variables

The application of the hedonic price model to the real estate market is predicated on a number of key assumptions. Real estate products should be viewed as heterogeneous since they can be distinguished based on locational, structural or neighborhood characteristics, as well as other factors such as the type of the property.

One other underlying assumption is that the market is perfectly competitive with a large number of buyers and sellers. This statement is supported by the fact that there are a large number of purchasers looking for houses in the market, as well as a large number of housing developers. As a result, no single buyer or seller can obtain a major influence on the price of the properties since individual unit purchases or sales make up such a small part of the market.

Although one may argue that complete knowledge is hard to obtain in reality, the premise that purchasers and dealers have the ideal data about real estate product and pricing is fair. Purchasing a home necessitates a significant financial investment. As a result, buyers will try to gather as much information as possible about the features of the units they want before making a purchase. The majority of the pertinent information, such as availability of the real estate unit, its price, and its characteristics, may be found in newspapers or received from brokers and real estate agents. Suppliers, on the other hand, may enhance their profitability and utility by having a complete understanding of their core business and market pricing. Such complete information, on the other hand, may never be fully achieved in practice. Lastly, the hedonic pricing model only works if market equilibrium is assumed, and there are no interrelationships between the implicit costs of characteristics in the model, [18]. Because of the flaws in the real-world property market, market equilibrium is implausible. The assumption that the price vector would adapt instantly to changes in demand or supply at any point in time is ideological. The idea that there are no interrelationships between attribute implicit prices is likewise false since it suggests that an attribute's implicit price does not change across all regions and property types.

Despite these questionable assumptions, which require significant simplification and abstraction from a complicated reality, the hedonic price model has been widely used in housing market analysis, [19].

The data may be insufficient; variables are measured with error; and empirical variable definitions are rarely exact, as Freeman correctly remarked, but this does not render the approach useless for empirical purposes.

Its major benefit is that it just requires a few pieces of information, such as the property price, the composition of dwelling characteristics, and a thorough explanation of functional connections. The marginal attribute prices are determined by calculating the hedonic pricing function's parameters.

Authors in [20] are recognized as being the first to use the hedonic price method in residential real estate. They examined the connection between air quality and property prices, but there was Freeman, [21] who was credited as being the first to provide a theoretical justification for employing this approach in housing. He utilized the hedonic pricing equation to calculate marginal implicit prices and willingness to pay for property characteristics like environmental quality.

Residential properties are multifaceted commodities with characteristics such as durability, structural rigidity and geographical fixity, [22].

Housing characteristics are usually divided into three categories; locational attributes, structural features and neighborhood qualities. These characteristics include both quantitative and qualitative characteristics, [23]. As a result, the property's market values may be stated as a function of its location, structure and neighborhood. The implicit price of each home characteristic may be calculated from the regression results, *ceteris paribus*.

3.1 Albania Housing Market History

The real estate market is an open market, easily accessible to anyone with enough liquidity to become the owner of a real estate property. Like in every sector of the economy, the development of the real estate market is cyclical and goes through several stages. Although there is no safe manner to predict its development, being aware of the general market's trends is important to make a smart investment in real estate. History has discovered that the past and the present can tell so much about the coming future.

While in the communism time frame, the state has made the reallocation of the houses to the individuals. With the breaking down of the cooperatives, the rural area dealt with a few problems after the 90's. Being said, an internal migration started to take place in Albania. People were moving from the rural areas toward the metropole Tirana. Because of this segment structure change, there was an increase in the demand for houses as well as an increase in the prices.

Recovery is the renaissance of the real estate market cycle. In Albania this phase coincides with years 1998-2000, which is the period directly after the recession. Year 1997 in Albania is the year of the crisis, which directly affected the demand for houses by decreasing it. Devaluation of the local currency also brought a devaluation in the real estate market. Being said that, in these two years, the real estate market in Albania was trying to reach the balances. The levels of construction until 2000 are considered to be the lowest ones in the 20 years old history of development of the real estate market. In 1998, more than 778,000 square meter new surfaces were built.

After the '97 crisis, Albania has experienced high rates of economic growth. In 2000, the invested funds in real estate increased with 89,1% in

comparison with 1997. This boom was also accompanied with optimistic hope for the future prices of the apartments, which also brought an increase in loans in Albania. In 2005, there was an increase in loans to buy houses, with 74% or in value 52 mil ALL.

The prices of apartments were increasing until 2007, when it was first shown a slight decrease in the real estate sector. Also, a decrease of 13,7% in sales volume of apartments was shown. The decrease in the new building being constructed showed that the market was facing a decrease in the demand for real estates, which eventually brought a slight decrease also in the prices of the apartments.

4 Methodology

The database includes 4,009 apartments sold in Tirana and Durres real estate market for the period from 2015 until May 2021. The collected data include the status of the property, defining it as new or used; the year when it was sold; the city where it is located; does it has or not an elevator; the price of the apartment; the interior area; the gross area; square meters of the common area; the number of bedrooms; the number of balconies, the number of toilets and the number of the floor of the apartment. Even though the data collection was carefully made, there are missing values at some of the variables taken under consideration.

4.1 Hypothesis

The paper's theoretical foundation is built on describing the factors that influence the price of the apartment. This hypothesis is based on the information presented above, more specifically the dependent variable price and the independent variables year sold, common area, status, other rooms, city, balcony, bathrooms and bedrooms. The other factors such as elevator, furnished or unfurnished, number of floors of the building and number of floors of the apartment, land area and gross area, kitchen, and living room are not included in the regression since they were not important.

Multiple linear regression is used for this analysis between the dependent variable and the other independent variables. This form of regression permits the evaluation of the relationship's strength between the sold price of the apartments as a dependent variable and the other variables as independent ones. Below, the hypothesis are described:

Null hypothesis: The factors taken into consideration (status, city, year sold, bedrooms, bathrooms, other rooms, common area, balcony, interior area) do not affect the price of the apartments sold.

Alternative hypothesis: Some of these factors or all of them (status, city, year sold, bedrooms, bathrooms, other rooms, common area, balcony, interior area) affect the price of the apartments sold.

4.2 Regression Model

The below equation is constructed in order to explain the regression:

$$\text{Logprice} = \alpha_0 + \alpha_1\text{ST} + \alpha_2\text{CT} + \alpha_3\text{BED} + \alpha_4\text{BATH} + \alpha_5\text{OTHER} + \alpha_6\text{COMM} + \alpha_7\text{YEAR} + \alpha_8\log\text{BAL} + \alpha_9\log\text{INT} \quad (1)$$

where:

Logprice - price of the apartments sold, denoted in EUR, which is taken into logarithm in order to interpret in percentage terms;

ST - the status of the apartment; new, used or in project;

CT - the city Tirana or Durres, denoted as 1 and 0 in the regression;

BED - the number of Bedrooms;

BATH - the number of Bathrooms;

OTHER - the number of Other rooms (storage, security, laundry, entertainment);

COMM - the common area;

YEAR - the year when the apartment is sold, from 2015 until 2021;

LogBAL - the balcony area taken as logarithmic so that the interpretation is done in percentage terms;

LogINT - the interior area taken as logarithmic so that the interpretation is done in percentage terms;

5 Results

Table 1. Descriptive Statistics

	Min	Max	Mean	Std. Dev.
Price	10500	10500	98376	76637
Interior Area	12	430	90.09	34.385
"Gros Area"	32	540	100	42.714
Balcony Area	0	313	1.55	11.820
Bedroom	1	4	1.82	.684
Bathroom	1	4	1.38	.522
Other Rooms	0	5	.14	.471

From table 1, the price, which is the dependent variable, has an average value of 98,376 EUR. The

prices of the apartments vary from 10,500 EUR to 1,050,000 EUR. For price, we have a very large standard deviation since the difference between the minimum and maximum values are very big, leading us to think that these data may not follow the normal distribution, while for the common area the standard deviation goes near to the mean. We have to mention that the outliers affect the standard deviation as well as the mean. We have tried to remove the outliers from our database. As for the independent variable of interior area, the descriptive statistics shows the minimum value 12 square meters and the maximum value 430 square meters. The mean interior area is 90 square meters with a standard deviation of 34.39 square meters.

After completing the descriptive analysis of the variables taken into consideration, the regression model is done. This multiple linear regression is executed with the help of SPSS and the results are summarized in the following tables.

The R value represents the simple correlation and for the current data is 0.825 which indicates a high degree of correlation.

Table 2. Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.825a	.681	.662	.15644

So, 68.1% of the price can be explained from the city where it is located, the year it is sold, the number of bedrooms, bathrooms and other rooms, the square meters of interior, common area and balcony and finally the status of the apartment.

Table 3. ANOVA table

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	7.695	9	.855	34.934	.000b
	Residual	3.598	147	.024		
	Total	11.292	156			

This indicates the statistical significance of the regression model that was studied. Here, $p < 0.0001$, which is smaller than 0.01 and indicates that, overall, the regression model statistically significantly predicts the price variable.

Table 4 provides us with the necessary information to predict the price (dependent variable) from the city where it is located, the year it is sold, the number of bedrooms, bathrooms and other rooms, the square meters of interior, common area and balcony and finally the status of the apartment. But also, it shows us whether these independent

variables contribute statistically significantly to the model. (p are less than 0,0001 which is less than 0.01). Only for this research paper purpose, is chosen a 90% confidence interval, so the significance level remains 0.1. So, if we choose to accept or reject the null hypothesis, we compare this significance level 0.1 with the p-value of the regression. The best alternative would be to reject the null hypothesis and to accept the alternative hypothesis which says that the independent variables of our study have an important impact on the price of the apartment sold.

Table 4. Regression Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	3.014	.192		15.719	.000
Status	.036	.020	.089	1.834	.069
City	.068	.032	.108	2.136	.034
Bedrooms	.028	.024	.091	1.189	.236
Bathrooms	.066	.030	.160	2.200	.029
Other Rooms	-.076	.040	-.096	-1.902	.059
Common Area	-.002	.002	-.066	-1.402	.163
Year Sold	.044	.026	.081	1.667	.098
logBalcony Area	.066	.024	.141	2.748	.007
logInterio Area	.857	.111	.560	7.742	.000

As we can observe from table 4, the status has a p-value of 0.069 which is less than the significance level of 0.1 and 0.05, meaning that this variable is statistically significant. In other words, the status is a very important factor in the determination of the price of the apartment. The positive coefficient of 0.036 indicates the positive correlation between the price and the status, explaining that, the newest the apartment, the greater is the price. City is also statistically significant in our study. This factor has a p-value of 0.034 which is less than the significance level of 0.1. In other words, the status is a very important factor in the determination of the price of the apartment.

Halvorsen and Palmquist have found another way to obtain the semi elasticity for a dummy regression by firstly taking the antilog of the differential intercept. Subtract it from 1 and multiply it by 100. The median price for apartments sold in Tirana is 17% higher than the median price of the apartments sold in Durres. Based on the obtained results, 72,3% of the apartments are sold in Tirana while only 27.7% are sold in Durres.

The number of bathrooms is a very important factor in the determination of the price of the apartment. The positive coefficient of 0.028 indicates the positive correlation between the price and the number of bathrooms, explaining that, for 1 unit (bathroom) increase, the price is increased with 0.028%. Other rooms and the Common Area have a negative impact. People want more bedrooms or more space in the living room/kitchen rather than the rooms for laundry or storage.

Year sold is statistically significant since it has a p-value of 0.098 which is less than the significance level of 0.1. The positive coefficient of 0.044 indicates the positive correlation between the price of the apartment and the year it is sold.

Also, as we can observe from table 4, the balcony area has a p-value of 0.007 which is less than the significance level of 0.1. This means that this factor is statistically significant. The positive coefficient of 0.066 indicates the positive correlation between the price of the apartment and the balcony area.

Interior area is statistically significant since it has a p-value 0.000 which is less than 0.1. The positive coefficient of 0.857 indicates the positive correlation between the price of the apartment and the interior area. If the interior area is increased by 1%, the price of the apartment is increased by 0.857%.

6 Conclusion and Discussion

The hedonic pricing model is a scientific instrument that can be highly beneficial. With enough and right data, we can evaluate each effect of various property characteristics on housing prices by using this method. Being

said that, the hedonic pricing model is the most common scientific approach for observing the impact of one or more housing characteristics on housing prices while keeping all other variables constant. That makes it possible to comprehend the behaviour of agents in the housing market as well as showing how the market itself functions.

At the end of this study, is it empirically proven that the price of the apartments in Tirana and Durres are affected by factor such as status of the apartment, city, number of bathrooms, bedrooms, other rooms, year when it is sold, the common and interior area and the area of the balconies.

Literature showed that one of the most important factors was the location or the zone of the apartment. In my study the geographic space is not included since this is a different study that is planned to be developed at another moment. R square equal to 68.1% is a very satisfying result, because 31.9% of the price is clearly explained only by the location.

Being said that, the model in this study needs to be improved.

As a future work, we aim to include the geographic position (not how much away from the centre, but to divide Tirana into preferred and no preferred zones) by switching into a spatial hedonic model. Later on, the model will expand also in other cities, where the demand for apartments will be increasing.

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