Global journal of multidisciplinary and applied sciences

Available online at www.gjmas.com

The Investigation of Factors Affecting on Apartment-Housing Prices in Hashtgerd New Town (Iran)

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ABSTRACT: This study aimed to identify various aspects of housing and to determinate the factors that affect its price, considering the different features of an apartment-housing unit, such as physical characteristics, environmental, and access to the residential units. In this regard, this research was conducted to study the factors that influence the price of residential properties in Hashtgerd New Town (35°58′57″N 50°44′30″E). The information required for this study was gathered from 275 households in Hashtgerd New Town. The housing pricing function was estimated by applying the Hedonic-pricing model based on two-sided logarithmic functions. The results showed that of the sixteen studied variables, eight variables had significant effects on prices of housing units. Among these variables, the variables such as gross floor area, unit's distance from city center, stone facade and land area with +0.82, -0.10, +0.08, +0.07 rates of elasticity, respectively, had the greatest impact on setting the price of an apartment-housing unit.

***Keywords*:** Hedonic, price, apartment housing.

INTRODUCTION

Housing has always been considered to be a fundamental need in the economy of every society. Hence, the development of the housing sector has largely influenced other divisions of the economy. The role housing market played in the recent financial crisis in Europe and USA clearly indicates such reality (Gholizadeh, 2000).

The word Hedonic is derived from the Greek "Hedonikos", meaning delight. In welfare economics literature, Hedonic means favorability of goods or services, or satisfaction of consumer with them. The hedonic method was first applied by Grilliches (1961) to analyze the demand in housing market and environmental economics, and was popularized by the works of Lancaster (1966) and Rosen (1974). In the hedonic demand model, several dimensions are assumed for a product. Regarding that it applies to housing as well, i.e. a residential unit like any composite commodity has various features, it is, therefore, appropriate to apply hedonic model to demand in housing market. The base for hedonic pricing function for the payments a household makes to get its demanded residential unit emanates from factors characterizing the housing unit (Hill, 2011).

Several studies have been done in the area of home pricing by using hedonic model. The research performed by Arimah (1992) on the structure of home pricing in the Nigerian city of Abidjan is one of those studies. In this research, the author initially estimated the hedonic pricing function by utilizing logarithmic form, and then applied hedonic function to approximate the implicit prices. Afterwards, he employed implicit prices to extract the housing demand function (Arimah, 1992).

Dokmeci et al. (2002) used a hedonic model to estimate the housing demand function in Istanbul. The results of this study showed that the average price boosted 191 dollars per extra square meter. In addition, increase in the number of rooms had positive impact on home price. Moreover, while the age and the type of residential building did not have statistically meaningful influence on buildings prices, construction permits and legal title did. Furthermore, heating system variable had an effect on house prices.

When a product already has a market, the supply and demand conditions can provide valuable information about the benefits and values of commodities and services. In contrast, non-market products require information about the demand. Housing is a

non-market commodity whose demand information is not directly available and requires using the existing methods for estimating its price. Therefore, this research was performed to estimate the effects of physical, environmental, and locational factors on home price, and also to determine the aspects that particularly influence home prices in Hashtgerd New Town.

MATERIALS AND METHODS

To estimate the demand for home in Hashtgerd New Town, the present study applied hedonic pricing method based on two-sided logarithmic functions. Since housing is a multidimensional and heterogeneous commodity, hedonic pricing method can be used to determine the impact of each housing features on the demand for home (Hill, 2011; Shihomi, 2007). In regard to purchasing a house or a housing unit, the hedonic pricing method considers a collection of residential unit's characteristics that influence utility and quality of life. In other words, the taste and priorities of an applicant regarding a residential unit will be manifested in the price they will pay for it (Hill, 2011).

Hashtgerd New Town in Alborz Province is located on the southern slopes of Alborz Mountains, and on the northern edge of central desert of Iran. In 1989, the Higher Council of Urbanism and Architecture of Iran approved the construction of the city and its location. Hashtgerd New Town, which covers an area of 4800 hectares, is one of the four cities surrounding Tehran, and is 65 kilometers west of Tehran metropolis and 24 kilometers west of Karaj. The overall structure of the town is composed of two parts: the first part is a residential site that covers an area of 4312 hectares in the north side of Tehran-Qazvin freeway. The second part is a 350-hectare industrial site (industrial town) in the southern part of Tehran-Qazvin freeway. The area between these two sections is covered by an afforested space and Tehran-Qazvin freeway (Wikipedia, 2012; Anonymous, 2007).

An interview questionnaire with 95.2% validity has been used as data collection instrument. In this research, Hashtgerd New Town is considered as an infinite population, and its residential units are taken as the research's statistical units. Since the standard deviation for the population was not clear, the number of samples (276) was calculated with respect to the number of population and based on Morgan technique at a confidence level of 99% and Margin of error of 0.01 (Krejcie and Morgan,1970). Besides, multistage sampling method was applied. The samples were selected based on the detailed plan of Hashtgerd New Town, and in regard to each of the urban phases (1, 2 and 3) and garden city.

The followings were taken as independent variables in order to estimate the hedonic pricing function: The followings were taken as independent variables in order to estimate the hedonic pricing function: the age of the building or residential unit in years (ABRU); the material of kitchen cabinets (MKC; MKC=1 for wooden or MDF kitchen cabinet and MKC=0 for metal and other types of kitchen cabinets); the distance to the nearest educational center in meter (DNE); the distance to the nearest medical center in meter (DNMC); the distance to the first main street in meter (DFMS); the distance to the nearest park in meter (DNP); the distance to downtown in meter (DD); type of floor covering (TFC); land area in square meter (LA); elevator (EL; EL=1 if available or EL=0 if not available); number of the floors of the building (NFB); Parking(P; P=1 if available or P=0 if not available); stone facade (SF; SF=1 for stone facade and SF=0 for other types of facade); brick facade (BF; BF=1 for brick facade and BF=0 for other types of facade); the floor the unit is located on (FUL) and gross floor area of residential unit in square meter (GFARU). The estimation of hedonic pricing function was carried out based on two-sided logarithmic functions and using EVIEWS software.

RESULTS AND DISCUSSION

The results of the estimation of hedonic function for the residential units in Hashtgerd New Town were obtained using two-sided logarithmic functions and the findings are presented in the Table 1. In this study, double-log model was used since it possessed such characteristics as reducing the influence of outlying observations, reducting the intensity of collinearity, and simplicity of changing the parameters. Arimah (1992) and Gholizadeh (2000), Askari and Ghaderi (2002) have also used double-log model. However, Tiwari and Parikh (1998), and MC-Dougal (1976) applied linear form to estimate the hedonic home price, Lodhi and Pasha (1991) have employed Box-Cox model. According to Arimah (1992), double-log form has superiority over other forms because of its explanatory power (R2), diagnosis ability, stability of the hedonic coefficients, application in setting the implicit prices of the characteristics, downward trend in final prices, and dependencies between housing's characteristics. The model's assumptions, including phenomenon of autocorrelation of errors, were studied before performing statistical analysis. The value of Durbin-Watson (DW) statistics showed that there was no autocorrelation between the errors, and a hedonic function could be fitted using ordinary least squares for residential units in Hashtgerd New Town (Table 1).

The findings revealed that ten out of sixteen variables had significant impacts on setting the home prices. Hence, those coefficients that were not meaningful in initial estimation at 5% error level were removed from the original model, and then the final pattern was re-estimated using the eight variables with significant coefficients. The variables 'the age of the building or residential unit in years (ABRU)', 'the distance to the nearest park in meter (DNP)', 'the distance to downtown in meter (DD)', 'land area in square meter (LA)', 'Parking(P)', 'stone facade (SF)', 'the floor the unit is located on (FUL)' and 'gross floor area

of residential unit in square meter (GFARU)' were included in the final pricing model, and were considered to be the most influential variable and factors in setting the price(Table1).

Table 1. Estimation of the Hedonic pricing function for housing units in Hashtgerd New Town

			Initial model		Final model	
Variables	parameters	Excepted Sign	Coefficient	t-Statistic	Coefficient	t-Statistic
C	α_0	Unknown	1.911202	12.07711**	1.925444	12.67624**
ABRU	α_1	Negative	-0.063426	-2.985468*	-0.069414	-3.574250*
MKC	α_2	Positive	0.004564	0.468184^{Ns}	-	-
DNE	α_3	Negative	-0.016412	-1.180886^{Ns}	-	-
DNMC	α_4	Negative	-0.011644	-0.968166^{Ns}	-	-
DFMS	α_5	Negative	-0.000251	-0.029706^{Ns}	-	-
DNP	α_6	Negative	-0.017092	-2.118859*	-0.017505	-2.256412*
DD	α_7	Negative	-0.087533	-5.085676**	-0.092723	-6.712051**
TFC	α_8	Positive	0.017923	1.783769^{Ns}	-	-
LA	α_9	Negative	-0.066864	-2.763388**	-0.076522	-3.455030**
EL	α_{10}	Positive	0.016330	0.765393^{Ns}	-	-
NFB	α_{11}	Positive	0.050651	1.046510^{Ns}	-	-
P	α_{12}	Positive	0.023422	1.925662*	0.027713	2.352544*
SF	α_{13}	Positive	0.075620	4.365282**	0.079044	5.176937**
BF	α_{14}	Positive	0.027571	1.869555	-	-
FUL	α_{15}	Negative	-0.052874	-2.579572**	-0.048968	-2.451601**
GFARU	α_{16}	Positive	0.795787	13.16141**	0.810234	13.78603**
Statistics of model						
R-squared	-	-	0.635348	-	0.616179	-
Adjusted R-squared	-	-	0.612734	-	0.604636	-
Durbin-Watson	-	-	1.766422	-	1.664668	-

ABRU, the age of the building or residential unit in years; MKC, the material of kitchen cabinets ; DNE, the distance to the nearest educational center in meter; DNMC, the distance to the nearest medical center in meter; DFMS, the distance to the first main street in meter; DNP, the distance to the nearest park in meter; DD, the distance to downtown in meter; TFC, type of floor covering; LA, land area in square meter; EL, elevator; NFB, number of the floors of the building; P, Parking; SF, stone facade; BF, brick facade; FUL, the floor the unit is located on; GFARU, gross floor area of residential unit in square meter. ns: non significant; *, **: Significant at 5 and 1% levels of probability, respectively.

The final estimate of the optimal form of the function in this study was obtained as follows:

$$LOG(PRICE) = a_0 - a_1 LOG(ABRU) - a_5 LOG(DFMS) - a_6 LOG(DD) - a_9 LOG(LA) + a_{12} LOG(P) + a_{13} LOG(SF) - a_{15} LOG(FUL) + a_{16} LOG(GFARU) + U$$

In this function, a_0 to a_{16} are the coefficients of the function's parameters, and U is the residuals predicate.

Coefficient of determination of the model (R^2) was high and equal to 0.64. This shows that 64% of changes in the values of residential units are related to the housing characteristics included in the final model and 36% of those modifications are explained by other factors (Table1).

With respect to the results obtained from the Hedonic pricing model estimation in Hashtgerd New Town, among the studied variables, factors such as 'gross floor area of residential unit in square meter, 'the distance to downtown' 'stone facade' 'land area in square meter' with 0.810, -0.093, 0.079 and -0.076 rates of elasticity have had the highest influence on the price of housing units. The floor the unit is located on with -0.049 rates of elasticity, parking with -0.028 rates of elasticity, the distance to the nearest park with -0.017 rates of elasticity and the the age of the building or residential unit in years with -0.069 rates of elasticity hold the following ranks. In addition, all independent variables have expected mark (Table1).

Chris and Wallace (2002), Arimah (1992), Tiwari and Parikh (1998), Gholizadeh (2000) and Askari and Ghaderi (2002), hedonic techniques have also been used to estimate the implicit prices associated with the attributes of housing products.

As the estimation of the coefficients of the hedonic pricing function in Hashtgerd New Town has been performed in the form of a logarithmic function, the obtained coefficients, then, account for the elasticity. Each of these elasticity values contains valuable information for constructors in terms of cost-benefit, awareness of buyers and sellers of residential units, policymakers, and planners in housing sector. For example, an increase of one percent in the gross floor area of residential units in Hashtgerd

New Town has raised housing unit price 0.81 on average. Moreover, each of the estimated coefficients can be interpreted similarly.

CONCULSION

Accordingly, by using the results obtained from the quantitative analysis and having the implicit price, which actually is the marginal propensity of households to pay for each feature, a practical guidance can be provided in order to plan for production and supply of housing. It is so because by determining the tendency to pay, the priorities of households are, in fact, recognized. Therefore, those factors for which there is the highest tendency for payment can be considered in designing and planning of housing.

ACKNOWLEDGEMENT

Thanks to the Mr. Mohammadreza Shiri for his kind supports, helps and suggestions during this research work. This study is a part of research work conducted during Ph.D. Thesis of Hatam Sanjari.

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