Amirnejad, Hamid

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The Impact of Rasht Eynak Lagoon on Housing Price of the Region by Using Hedonic Pricing Method

Hamid Amirnejad
Associate Professor, Department of Agricultural Economics, Faculty of Agricultural Engineering, Sari Agricultural Sciences and Natural Resources University, Sari, Iran
Mojtaba Nabizadeh Zolpirani*
Ph.D. Student, Department of Agricultural Economics, Faculty of Agricultural Engineering, Sari Agricultural Sciences and Natural Resources University, Sari, Iran
Reza Heydari Kamalabadi
Ph.D. student, Department of Agricultural Economics, Faculty of Agricultural Engineering, Sari Agricultural Sciences and Natural Resources University, Sari, Iran

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Abstract: One of the most considerable issues in large cities is environmental impacts of lagoons on housing price. Thus, this research investigates the impact of Rasht Eynak Lagoon on housing price of the region by using Hedonic-pricing method. The studied area included residential units of Rasht area 2, district 4 near Eynak Lagoon. In terms of purpose, this research is applied, and it is survey in terms of methodology. Statistical population includes all residential units in area4, district 4 in the city of Rasht. 90 of them were selected as simple random sampling method and Cochran formula as sample. Statistical data were collected through filling questionnaire in autumn 2013 and analyzed by OLS method and Eviews 8 software. The results indicated that Eynak Lagoon (environmental factors) had negative impact on the price of residential units in the region. As distance from the lagoon increases, housing price rises. However, the variables of land area, type of housing, type of skeleton, and access to medical centers had positive impact on housing price. Contrarily, the variables of distance from Main Street, distance to city center, and access to park had negative impact on housing price in the studied area. Moreover, the variable of distance from Eynak Lagoon affected the most on dependent variable.

Keywords: urban economy and management, Hedonic function, Eynak Lagoon, housing price, Rasht
JEL Classification: R21, O18, R31, R32, N95

* Corresponding author: nabizadeh.mojtaba@gmail.com

1- Introduction

Today, housing market and its related issues are global problem. Planners and policy-makers try to solve its related problems in different countries. Access to ideal situation of housing is one of the socio-economic development indicators both in urban and rural areas (Arnott, 2008). Factors including population increase, immigration increase from village, and urbanization growth have changed housing into the most important difficulties in most cities (Aboonori and Ramezani Vakil Kandi, 2002) since housing sector is economically one of the most important sectors in terms of household' expenditure shares and share in production, investment, and its role in macro indicators that not only is affected by changes and evolutions of other sectors, but it also affect it (Sabagh Kermani et al., 2010).

In most countries, buildings include more than half of GDP and housing itself consists of 20 to 30 percent shares in it. Annually, about 20 to 30 percent of the country's fixed capital is created in housing sector in Iran. Correspondingly, a part of country's liquidity is spent in this sector (Jafari Samimi et al., 2007). Thus, changes in housing price for households, enterprises producing housing and government have been important and it affects urban economics and management (Khalili Araghi and Nobahar, 2011). Therefore, estimation of residential units' price can properly reflect effective factors share on housing value, and it can be used in the planning of many urban and regional economy policies (Khalili and Nobahar, 2011).

Generally, effective factors on housing market are divided into two supply and demand parts. Most of the housing market subjects are in demand factors part (Jahani, 2009). The important point in housing market analysis is to recognize the needs of two supply and demand sides to achieve the best planning results. This level of need should be defined based on the features of target group (Bahrami and Morovat, 2013). Influential demand and urban residents' actual needs are effective on urban housing expansion. Therefore, planners and policy-makers should formulate housing programs based on effective demand since housing demand is primarily actual need and it should be met (Khalili Araghi et al., 2012).

Since housing is a heterogeneous and multi-dimensional commodity, it is necessary to consider various features of residential unit like physical, environmental, and access features to investigate different aspects of housing and recognize effective factors on its price because these characteristics lead to difference in consumers' preference in demand for heterogeneous commodity like housing (Gholizadeh et al., 2010). Because of non-market entity of housing features, housing demand information is not directly visible and there are different methods to measure these characteristics. One of the indirect methods of willing to pay (WTP) is to measure revealed preferences with the help of Hedonic method in which the value of non-market commodity is obtained by the analysis of effectiveness of a market commodity such as housing price since Hedonic pricing method uses individuals' actually observed behaviors in real market that is better than direct methods like Contingent Valuation Methods (CVM) which uses hypothetical status (Sadeqi et al., 2008).

Given that environmental resources, like lagoon, are not exchanged in the market, market cannot discover its real

values. Therefore, to price them and investigate their effect on housing price in a region, indirect methods are used. For instance, people living in a city do not pay directly for environmental resources, but they prefer to live in an area with natural landscapes. Finally, this preference leads to change housing demand in that area and it affects housing price. In this regard, it can be stated that people spend indirectly for effective factors on housing price by paying for housing. Thus, one of the ways to achieve the value of effective factors on housing price is to investigate the effectiveness of these factors on housing price including environmental resources (Emami Meybodi et al., 2009).

Due to natural pristine landscape and potentially recreational and environmental facilities, Rasht Eynak Lagoon is one of the best places for tourism and it should be allocated to tourism-recreation land use according to comprehensive plan of Rasht. Berceuse of its particular location in the west of Rasht and its proximity to surrounding residential areas, it can have economically positive impact on the regions' residential houses as an environmental resource. Because of increase in illegal constructions around Eynak lagoon, lack of implementation and uncertainty of tourism project in the region, its visual beauty has been reduced (comprehensive plan of Rasht, 2007).

The effectiveness of Eynak lagoon on residential houses price around it in the city of Rasht has been investigated in this paper with environmental approach and by using Hedonic pricing. Thus, the main research question is "How Rasht Eynal Lagoon affects housing market price in the region?"

Research hypotheses are:

- Eynak Lagoon and its socio-economic features have positive impact on housing price.
- As the distance of residential houses from Eynak Lagoon increases, their prices reduce.
- The variable of Eynak Lagoon has the highest impact on housing price in the area.

2- Literature Review

Several researches have been done in the field of housing price and its effective factors by using Hedonic-pricing method in Iran and other countries. Some of them are as follows:

a) Foreign Researches

Grislain-Letrémy & Katossky (2014) studied the impact of dangerous industrial facilities on housing price in three important cities in France. They stated that families' willingness to prevent against industrial hazards can be represented by real estate markets. A comparison between Hedonic parametric and semi-parametric models in this study indicated that structurally, parametric models may lead to important orientations in estimating value of dangerous factories impact on housing price.

Panduro & Veie (2013) investigated the impact of green space on housing price in the city of Aalborg by using Hedonic-pricing method. They estimated the impact of each of which on housing price by using Generalized Additive Model by dividing green spaces into eight types and concluded that green space in a homogeneous environment is influential rather it is a set of distinctive features and very different impacts on housing price.

Song and Zenou (2012) studied the impact of urban villages on housing market by using Hedonic model. Given

the results, both of them had positive and negative impact on housing price of residential units near urban villages.

Karlik & Olgac (2011) compared Hedonic and Neural Network models in prediction housing price. In this research, because of covering all housing variables, Hedonic method is more successful than Neural Network in the field of predicting housing price.

Cervero & Kang (2011) used Multiple Regression Technique and Hedonic pricing theory. Given the results, the price of residential properties at the distance of 300 meters of BRT has been increased from 0.5 to 10 percent and nonresidential lands and retail stores at the distance of 150 meters from BRT have been increased from 3 percent to 26 percent.

Gourieroux & Laferrere (2009) estimated housing price in different parts of France by using Hedonic price function. According to the results, 16 of 20 features had significant impacts on housing price in France. Infrastructure is the most important of them.

Yusuf & Resosudarmo (2009) priced air quality in Indonesia by using Hedonic method. In this study, pollutants had negative impact on housing rental in different parts of the city.

Wen et al., (2005) categorized 14 variables that had significant impact on housing price based on their effectiveness in five groups by studying different effective factors on housing price in the city of Hangzhou in China.

b) Iranian Researches

Saharkhiz et al., (2014) investigated effective factors on land price with Hedonic method in Tehran district 8. The results were in accordance with urban economics theories and indicated that as distance increases from valuable access centers such as square, park, and highway, land price is reduced while land area, construction legal density, and social rank of neighborhood increase, land price increases as well.

Rahimi Kakehjoob et al., (2013) predicted effective factors on housing price by using Hedonic function. The results indicated that physical factors are more effective than access factors on housing price in the area.

Abdollah Milani and Hadadi (2012) estimated the price function of residential properties in the city of Tehran by using Hedonic function and Spatial Econometrics method. Given the results, the distance of neighborhood center from metro station in spatial model is significant and proximity to metro station did not have extreme negative impact on residential properties price.

Aghapoor Sabaghi (2011) investigated the impact of healthy air on residential houses' price in the city of Tehran by using Hedonic method. In this study, willingness to pay (WTP) for each square meter of houses in areas with lower pollution was between 1120 and 1350 thousand Rials.

Gholizadeh et al., (2010) investigated effective factors on residential units price in Hamedan Province by using Hedonic method and indicated that residential unit features, such as infrastructure, number of rooms, steel and brick structure, annual repairmen, package, elevator, age, gender, education degree, owners' marital status, have positive and significant impact on housing price.

3- Theoretical Principles

Environmental utilities are of commodities that a household use in life process and market cannot consider a price

for these commodities. Thus, it is necessary to have a method to connect between the price of residential houses and lagoon quality. Residential houses are market commodities that their price is specified in market. Its impact on residential units' price can be investigated by creating a connection between residential houses price and lagoon quality. Hedonic pricing model is considered for this purpose (Emami & Meybodi, 2009).

Hedonic model is used to analyze different aspects of housing market including taxes, commodity price, public facilities, racial discrimination, and building quality of housing (Hui et al., 2007). In this model, a commodity has several aspects including a various set of features. Housing has such condition and residential unit is like a composite commodity including portfolio of various properties. Thus, application of Hedonic pricing model is appropriate in housing market (Aboonoori et al., 2008). Hedonic method presents tacit prices and commodity features of the total price. Thus, it can be stated that this method considers a product or commodity demand as a function of its features (Jim & Chen, 2007).

In Hedonic studies, it is assumed that housing price reflects its residents' WTP to achieve access to required facilities inside and outside of housing (physical, environmental and access factors). In other words, it is assumed that the difference in properties price is due to difference in housing features (Khalili Araghi & Nobahar, 2011). Therefore, housing price indicates maximum money that people are willing to pay to obtain better quality of the environment, certain amount of building facilities, and access to facilities and urban services (Karlik, & Olgac, 2011). Thus, many features affecting quality of life are regarded in housing purchase. People's WTP for each of house characteristics can be used to obtain proposal function. Tacit price of housing and each of its features are obtained by estimating the coefficients of model variables. Tacit prices are Hedonic price (Clapham et al., 2006). For instance, a customer may be willing to pay more money to buy a house near lagoon while other features are kept fixed (Sadeqi et al., 2008).

Hedonic price of housing and its features are obtained via allocation of housing price on residential unit features and payments that a household spends considering his demand to access to one residential unit (Kaplan & Austin, 2004).

According to Hedonic pricing model, each individual's utility is a function of different consumption commodities (X), a vector of environmental features (Q), a vector of physical and structural features (S), and a vector of neighborhood and access features (N) (Emami et al., 2009). If a household consumes a category of housing features and other commodities, this will have a level of utility for consumer. This utility can be shown as equation (1):

$$U=U(X ,Q_j ,S_j , N_j) \quad (1)$$

A consumer confronts with budget limitation as equation (2):

$$Y=X+P(Z) \quad (2)$$

In this equation, P(Z) is the value of residential unit features, X is the value of other commodities, and Y is household's expenditures. Since consumers maximize their utility considering budget level, the process of maximizing is bound to equation (3):

$$\text{Max} : U=U(X ,Q_j ,S_j , N_j)$$

$$\text{St} : Y=X+P(Z)$$

$$L=U(X ,Q_j ,S_j , N_j) + \lambda(Y – X – Ph_i) \quad (3)$$

$$\frac{\partial \mathrm{L}}{\partial \mathrm{Q_j}} = \frac{\partial \mathrm{U}}{\partial \mathrm{Q_j}} - \lambda \frac{\partial \mathrm{Ph_i}}{\partial \mathrm{Q_j}} = 0 \quad (4)$$

$$\frac{\partial \mathrm{L}}{\partial \mathrm{X}} = \frac{\partial \mathrm{U}}{\partial \mathrm{X}} - \lambda = 0 \quad (5)$$

$$\frac{\partial \mathrm{L}}{\partial \mathrm{X}} = \mathrm{Y} - \mathrm{Ph_i} - \mathrm{X} = 0 \quad (6)$$

By dividing equations (5) and (6) and removing λ, we will have:

$$\frac{\frac{\partial U}{\partial Q_j}}{\frac{\partial U}{\partial X}} = \frac{\partial Ph_i}{\partial Q_j} \quad (7)$$

In this equation, $\frac{\partial U}{\partial Q_j}$ represents final utility of consumption of one extra unit of intended feature and $\frac{\partial U}{\partial X}$ represents final utility of consumption of one extra unit of other consumption commodities. However, $\frac{\partial Ph_i}{\partial Q_j}$ indicates final value of j-th feature of i-th residential unit. Equation (7) represents that essential condition of constrained optimization of Hedonic function for each area requires that the ratio of marginal utility of each residential unit feature to marginal utility of consuming other commodities is equal with final value of intended feature. In fact, partial derivative of Hedonic function of any property represents implicit marginal value of that property. In experimental studies, marginal value of each residential unit features is obtained by estimating function coefficients of Hedonic price. Hedonic pricing function is obtained by solving equations 4, 5, and 6. Hedonic pricing function is applied by different function forms to estimate the impact of independent variables (Table1).

Table1. Hedonic price model functional forms with partial derivatives (implicit price) of each model

Type of shape	Equation	Implicit price
Linear	$P_h = \alpha_0 + \sum \beta_i X_i$	$\frac{\partial P_h}{\partial X_i} = \beta_i$
A quasi-log	$Ln\ P_h = \alpha_0 + \sum \beta_i X_i$	$\frac{\partial P_h}{\partial X_i} = \beta_i P$
Lin-log	$P_h = \alpha_0 + \sum \beta_i\ LnX_i$	$\frac{\partial P_h}{\partial X_i} = \frac{\beta_i}{X_i}$
Log-Log	$Ln\ P_h = \alpha_0 + \sum Ln\beta_i X_i$	$\frac{\partial P_h}{\partial X_i} = \beta_i \frac{P_h}{X_i}$
Quadratic	$P_h = \alpha + \sum \beta_i X_i + \frac{1}{2}\sum_{i=1}^{N}\sum_{j=1}^{N} \delta_{ij} X_i X_i$	$\frac{\partial P_h}{\partial X_i} = \beta_i + \frac{1}{2}\sum_{j \neq i} \delta_{ij} X_i + \delta_{ii} X_i$

Reference: (Sadeghi et al., 2008)

General form of Hedonic pricing function can be stated as equation (8):

$P_{hi}=P(Z)= P(Q_j ,S_j ,N_j)$ (8)

In which, P_{hi} is housing price, Q_j is environmental features, S_j is structural feature, N_j is neighborhood feature.

If Hedonic-pricing function is linear compared to all features, implicit price of each feature will be a fixed amount; but if Hedonic-pricing function is non-linear, marginal price of features will not be fixed and it depends on their use level (Saadatmehr, 2010).

Introducing the Studied Area

Eynak Lagoon has 2630 meters lengths and 120 meters width that has been located in the western part of Rasht and in the beginning of connecting path of this city to Fooman. This Lagoon is

Iran's largest urban lagoon and the second large lagoon in Gilan province (Map1).

Eynak Lagoon with an area about 120 hectares has been divided into three distinct parts including eastern, central, and western basins. Eynak Lagoon is one of the natural attractions of Rasht. It is of great importance in terms of recreation and natural aesthetics, type of plants, marshlands, fisheries, and birds. Considering exclusive features of this lagoon, pristine and beautiful nature, potentially recreational and environmental facilities, and need of urban, regional, and trans-regional population, according to the comprehensive plan approved in 1990, it has been decreed that Rasht Eynak Lagoon to be allotted to a recreational-touristic complex and its surrounding lands to be allocated to touristic- entertainment uses. The lagoon fulfills natural ecosystem of the area and it balances natural system with environmental value so that any unprincipled intervention will disturb natural system of the region (comprehensive plan of Rasht).

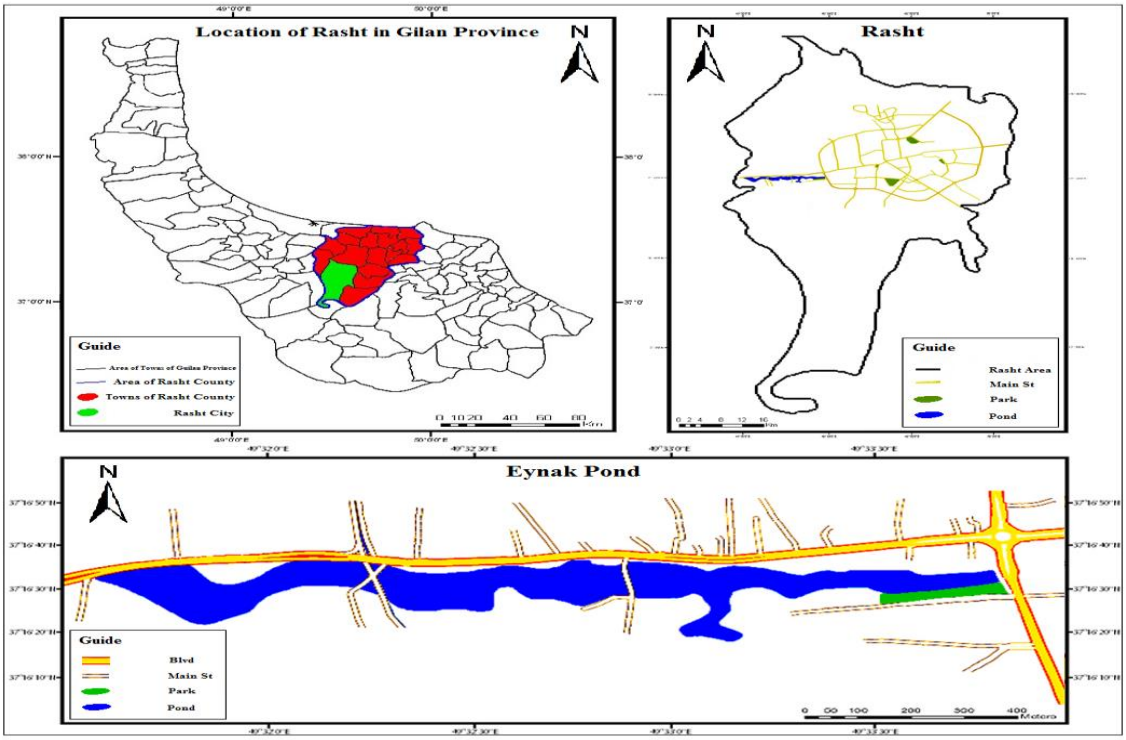

Fig1. Geographic location of Rasht Eynak lagoon

Reference: (Comprehensive Plan of Rasht, 2007)

4- Research Methodology

In terms of purpose, this research is applied and methodology is survey-analytical. Statistical population includes residential units of Rasht area 2; district 4 where Rasht Eynak Lagoon is located in it. Since there is no exact statistics of residential units number in the area, statistical population was considered based on number of households in the area (N=11758). Data and statistics were collected by questionnaire, interview with residential units' owners, and visiting real estate agencies in autumn 2013. Sample size was obtained as n=90 given pre-information of questionnaire, number of studied households in the area, and by using simple random sampling and

Cochran formula (equation9). Thus, in order to increase the reliability of results, 100 questionnaires were completed and analyzed. For data analysis, ordinary least squares regression method (OLS) was used.

$$n = \frac{N(t.s)^2}{Nd^2 + (t.s)^2} \quad (9$$

$$= \frac{11758\,(1.96 \times 0.0973)^2}{(11758 \times (0.02)^2) + (1.96 \times 0.0973)^2} \approx 90$$

For data analysis, OLS and Eviews 8 software were used. In fact, to estimate linear regression models, ordinary least squares method is the simplest and most popular method. The viewpoint of ordinary least squares method is that model coefficients take values that regression model would have sample closest to the observations Y1 ... Y2. In other words, it shows the least deviation from above observations. The criterion of OLS is that coefficients should be estimated so that sum of squared residuals i.e. $\sum_{i=1}^{n} e^2$ to be minimized. OLS does not need any condition on disruption to estimate coefficients. However, classic set of assumptions is required in order that estimated coefficients to be unbiased and inference to be feasible on them (Gajrati, 2009).

According to the previous studies with Hedonic method, there is no certain theory to select proper form of Hedonic model, and researchers use linear, logarithmic linear, and double logarithmic based on use of model and type of statistical data. In this research, since some variables are virtual; and their logarithm cannot be calculated; logarithmic form of demand function cannot be used. Thus, linear and linear-logarithmic forms were selected to estimate Hedonic housing price function. According to the econometric results and estimation of above forms, the best possible result is obtained from a linear function. Therefore, suggested model to estimate Hedonic-pricing function of studied area is presented as equation 10:

$$P_h=\beta_0+\beta_1X_1+\beta_2X_2+\beta_3X_3+\beta_4X_4+\beta_5X_5 +\beta_6X_6+\beta_7X_7+\beta_8X_8+\beta_9X_9+\beta_{10}X_{10}+\beta_{11}X_{11} +\beta_{12}X_{12}+\beta_{13}X_{13}+\beta_{14}X_{14}+\beta_{15}X_{15}+\beta_{16}X_{16} +\beta_{17}X_{17}+ \beta_{18}X_{18} \quad (10)$$

Dependent variables in this study are residential unit price (based on Rials on square meter) and explanatory variables including three physical or structural, environmental, and access or neighborhood variables as these variables are represented in table2. The variable of effective environmental factors on housing selection is an index of four distinct options including Eynak Lagoon near home, types of pollutants (rubbish, construction waste materials) in lagoon, low neighborhood safety, residential houses in comprehensive plan of Eynak Lagoon, habit and interest in neighborhood and living environment that their values were specified with five items (very low, low, average, high, and very high) and the average value of these items were based on Likert scale. However, variables of access to shopping centers, access to educational centers, access to medical centers, and access to park were coded separately based on Likert scale (very low=1, low=2, average=3, high=4, and very high=5) (Emami Meybodi et al., 2009)

Table2. Introduction of explanatory variables used in the study

Variable type	Variable name	Variable descriptions	Symbol
Physical or structural variables	Land area	Quantitative variable: according to square meters	X_1
	Building age	Qualitative variables: less than 10 years = 0, more than 10 years = 1	X_2
	Home type	Qualitative variables: villas = 0 , apartments = 1	X_3
	Structure type	Qualitative variables: concrete = 0, metal = 1	X_4
	Number of rooms	Quantitative variable: according to number	X_5
	Building facades	Qualitative variables: cement and brick = 0, Other = 1	X_6
	Building side	Qualitative variables: one side = 0, more than one side = 1	X_7
	Backyard	Qualitative variables: There is no = 0, there is = 1	X_8
	Parking	Qualitative variables: There is no = 0, there is = 1	X_9
	Warehouse	Qualitative variables: There is no = 0, there is = 1	X_{10}
Environmental variables	Environmental factors	Qualitative variables: Likert Scale (very low = 1, low = 2, average = 3, much = 4, very much = 5)	X_{11}
Access variables	Distance to main street	Quantitative variable: according to square meters	X_{12}
	Distance to downtown	Quantitative variable: according to square meters	X_{13}
	Distance to Eynak lagoon	Quantitative variable: according to square meters	X_{14}
	Access to shopping centers	Qualitative variables: Likert Scale (very low = 1, low = 2, average = 3, much = 4, very much = 5)	X_{15}
	Access to training centers	Qualitative variables: Likert Scale (very low = 1, low = 2, average = 3, much = 4, very much = 5)	X_{16}
	Access to health centers	Qualitative variables: Likert Scale (very low = 1, low = 2, average = 3, much = 4, very much = 5)	X_{17}
	Access to park	Qualitative variables: Likert Scale (very low = 1, low = 2, average = 3, much = 4, very much = 5)	X_{18}

Reference: (Researchers' findings)

5- Research Findings

In this study, linear model of Hedonic pricing function was used to determine the impact of Rasht Eynak Lagoon on housing price of the studied area. Firstly, linear and linear-logarithmic models were unbiased and adjusted index (with the highest value) and classical hypothesis tests, including heteroskedactisity disturbance terms, correct specification of the model, and normal distribution of disturbance terms, was compared and linear model was selected as the best one by using Schwartz Bayesian and Akaike Information Criterion (AIC) criteria (with the least value).

The results of estimating the best linear model have been represented in table 3 by using OLS method for 110 observations. It is noteworthy that other introduced explanatory variables in table 2 that are not in estimated model is for the reason that none of them was significant statistically and their removal did not lead to considerable changes on significance level of explanatory variables and other statistics. In other words, those variables that their significance level was more than 10 percent (0.1) were eliminated by using trial and error from the fit model since not only these variables reduce model degree of freedom, they do not affect independent variable and they cannot be interpreted. The adjusted coefficient of determination $\bar{R}^2$ in table 3 that indicates explanatory power of the model by variables in it is equal to 0.78 and it indicates that 78 percent of changes

in residential units' price in the studied area are explained by existing variables in the model. F statistic and significance levels of coefficients indicate that inserted explanatory variables in the model explain dependent variable changes properly. To determine the model properly, heteroskedactisity of disturbance terms, correct specification of the model, and normal distribution of disturbance terms are used. The results indicate that classical hypotheses in the fitted model are true. Normality test statistic with the value of 5.11 indicated that estimated pattern of disturbing elements has normal distribution at the significance level of less than 5 percent. The test of model functional form with the statistic value of 0.32 indicated that the fitted model does not have specified error. However, heteroskedactisity test with the statistic value of 1.92 indicated that estimated pattern of disturbing elements of variance is identical. Given that serial autocorrelation occurs in time series data and since data are cross-sectional in this research, serial autocorrelation is automatically rejected.

Table3. Results of estimated linear form of Hedonic price function of housing prices

Variable	coefficients	Significant level	t statistic
Land area	0.16**	2.48	0.01
Home type	0.23***	9.02	0.00
Structure type	0.03**	2.12	0.03
Environmental factors	-0.04**	-1.85	0.05
Distance to main street	-0.06***	-4.10	0.00
Distance to downtown	-0.0046***	-2.99	0.00
Distance to Eynak wetland	0.36***	10.9	0.00
Access to health centers	0.02**	2.15	0.03
Access to park	-0.02***	-2.86	0.00
constant	1.39***	3.20	0.00
$\bar{R}^2$ = 0.78	F = 46.54 [0.00]		
R^2 = 0.81	Functional Form CHSQ= 0.32 [0.56]		
Normality CHSQ= 5.11 [0.08]	Heteroscedasticity CHSQ= 1.92 [0.12]		
Note: 1. *** and ** denote significant level at 1% and 5% respectively.			

Reference: (Researchers' findings)

According to the results in table3, all explanatory variables are statistically significant at the level of $\alpha \leq 0.05$. Among explanatory variables affecting housing price, distance to Eynak Lagoon has the most impact on dependent variable. Moreover, the variables of land area, type of house, type of structure, distance to Eynak Lagoon, and access to medical centers have positive impact on housing price. The variables of environmental factors, distance to the main street, distance to the city center, and access to park have negative impact on dependent variable. As expected, the variable of land area of residential house has direct and significant relationship with housing price of the studied are. The coefficient of this variable is equal to 0.16 and given that the price of each square meter of housing based on questionnaires has been inserted with 10 thousand Tomans in estimating data, it indicates that as each square meter increase in land area of residential house and assuming that all variables are constant, housing price will be increased

about 1600 Tomans in the studied area. Generally, according to the real estate agencies, households living in the studied area often look for large houses. In other words, large houses have more demand in the studied area. This demand increase results in rise in the price of each square meter. In other words, increase in house area has direct relationship with each square meter of housing price.

Residential house variable has positive and significant relationship with housing price in the studied area. This indicates that apartments lead to increase more on housing price rather than villa houses. Most apartments are new constructed in the studied area with more welfare facilities and newer design and façade. Households are more willing to have apartments. Thus, apartments are more expensive than villa houses.

According to table3, the variable of residential house structure has direct and significant relationship with housing price in the studied area i.e. residential units with steel structure affect housing price more than concrete structure. In other words, households living in residential units of the studied area are more willing to have buildings with steel structure and these buildings create much utility for households since, according to some construction employers in the studied area, building houses with steel structure is cheaper than concrete structure.

According to the results, the variable of environmental factors affecting housing selection (Eynak Lagoon) has negatively significant relationship with housing price in the studied area and it does not confirm main research hypothesis based on positive impact of Eynak Lagoon on residential units' price in the studied area. Thus, residential units that environmental factors of Eynak Lagoon affecting in their selection reduce housing price more than those residential areas that environmental factors have less impact on their selection. It should be mentioned that the results are in accordance with reality since conditions of Eynak Lagoon are in a way that it has changed into a place for types of wastes. Moreover, because of proximity of houses around lagoon in comprehensive plan of this lagoon, housing market (buy and sell) of this area experiences more downturn than other Rasht residential houses. Furthermore, low security in this region, because of inattention to lagoon and its pollution, has resulted in the reduction of housing price in this area. Totally, these factors made environmental factors have negative impacts on housing price.

The variable of distance from residential house to Main Street has significant inverse relationship with housing price in the area. The coefficient of this variable is -0.06 i.e. given that housing prices have been estimated with the unit of 10 thousand Tomans; therefore, as the distance of residential units increase a meter from main street, assuming all variables are constant, housing price is reduced nearly 600 Tomans. In other words, residential units that are closer to the main street are more expensive than those ones that are further than Main Street. Therefore, it can be stated that those buildings that are closer to the main street have more impact on housing price because of proximity to shopping centers, more access to service centers and commercial use of them.

However, the distance from residential building to city center has significant inverse relationship with housing price in the studied area. The coefficient of this variable is -0.0046 that based on what has been previously stated for housing price

unit (10 thousand Tomans), housing price is reduced nearly 46 Tomans in the studied area by increasing distance of residential unit from city center by each meter i.e. residential units that are closer to the city center in the studied area are more expensive than ones that are further than city centers since residential buildings closers to the city center have more access to service, office, and shopping centers and their commercial use is more. Moreover, it affects residents' transportation cost living in residential unit. Thus, the price of these residential units is more expensive than those ones that are further ones. The variable of distance of residential building to Eynak Lagoon has significantly positive impact on housing price in the studied area. The coefficient of this variable is 0.36 and given housing price unit in estimation, this means that the price of residential units increases about 3600 Tomans by increasing a meter distance of residential unit from Eynak Lagoon. In other words, residential units closer to Eynak Lagoon are cheaper than further ones. This is against our thought and expectation of environmental factor in an area since the Lagoon in the area has reduced the price of residential units close to it. According to the observations and interview with the residents, it can be stated that currently Eynak Lagoon situation is undesirable due to not implementation of recreational-tourism plan of this lagoon, and it has been remained undecided over the years. The variable of access to medical centers was significant and it has direct relationship with housing price in the studied area. This indicates that as access to medical centers increases, housing price increases. Therefore, it can be stated that residential buildings having more access to these centers affect housing price more in this area than less access ones. The variable of access to park has inverse relationship with housing price in the studied area and it is significant i.e. housing price decreases in the studied area by increasing access to park. This is in accordance with observations in the studied area since this park has improper environment, many addicts gather there, it has negative impact on residential units closer to the park. Finally, estimated model of Hedonic pricing function of Rasht, area 2, district 4 that is located in the area, has been estimated as equation (11):

$$P_h=1.39+0.16X_1+0.23X_3+0.03X_4-0.04X_{11}-0.06X_{12}+0.0046X_{13}+0.36X_{14}-0.02X_{17}+0.02X_{18} \quad (11)$$

6- Conclusion

This research aims to investigate the impact of Rasht Eynak Lagoon on housing price in Rasht area2, district4, by using Hedonic-pricing method. For this purpose, the role of each effective features on housing price in three groups of physical, environmental, and access features were investigated. At first, linear and logarithmic linear models were unbiased. Adjusted index and classical hypotheses tests including Heteroskedactisity disturbance terms, correct specification of the model, and normal distribution of disturbance terms were compared by using Schwartz Bayesian and Akaike (AIC) criterion and linear model was selected as the best one. Adjusted coefficient of determination ($\bar{R}^2$), F statistic, and significance levels of coefficients indicate that inserted explanatory variables in the model explain independent variable changes properly. The results of heteroskedactisity tests of disturbance terms, correct specification of the model, and normal distribution of disturbance

terms indicate that classical hypotheses in the fitted model are true.

The variable of "land area" of residential building has direct and significant relationship with housing price in the studied area. The results of Rahimi Kekehchoob et al., (2013), Saadatmehr (2010), Akbari et al. (2004), Varesi and Mousavi (2010), Abbaslou and Sina (2005), indicated that land area has positive relationship with housing price, but it has inverse relationship in Esfandirai (2004). The variable of residential house has positive and significant relationship with housing price in the studied area. In other words, apartments increase housing price more than villas. The variable of residential building structure has direct and significant relationship with housing price in the studied area and it is in accordance with the results of Abbaslou and Sina (2005), and Saadatmehr (2010), but it is not the same as Emami Meybodi et al. (2009). According to the results, the variable of effective environmental factors on housing selection has negative and significant relationship with housing price in the studied area; therefore, main research hypothesis based on positive impact of Eynak Lagoon on residential units' price in the studied area is not confirmed. The results of Saadatmehr (2010), Emami Meybodi et al., (2009), and Akbari et al. (2004) indicate that environmental factors have direct and positive relationship with housing price and it is in accordance with the expectation of environmental factors impact in urban space. The variable of residential building distance to Main Street has inverse and significant relationship with housing price in the studied area that is in accordance with Aboonoori & Ramezani Vakil Kandi (2002), and it is against with Abbaslou & Sina. The variable of residential building distance to city center has inverse and significant relationship with housing price in the studied area i.e. as distance from city center increases, housing price reduces. The results of Saadatmehr (2010), Khoshakhlagh et al, (1999), and Aboonoori & Ramezani Vakil Kandi (2002) indicate negative and significant relationship between housing price and residential building distance to city center. The variable of residential building distance to Eynak Lagoon has positive and significant relationship with housing price in the studied area. It can be stated that because of non-implementation of recreational-tourism project of this Lagoon and it uncertainty during last years, currently, Eynak Lagoon is not in a good situation. Access to medical centers is significant and it has a direct relationship with housing price in the studied area, but the results of Aboonoori & Ramezani Vakil Kandi (2002) indicate inverse relationship between housing price and access to medical centers. The variable of access to park has inverse relationship with housing price in the studied area and it is significant as the results of Aboonoori & Ramezani Vakil Kandi (2002) confirm it.

According to the results, the condition of Eynak Lagoon leads to reduce surrounding housing price and as distance of residential units increases from lagoon, the price increases. Several problems including construction wastes, low security of surrounding neighborhoods, non-implementation of comprehensive plan of Eynak Lagoon, and illegal constructions had negative impact on housing market in this area. Thus, it is necessary for planners and builders to take into consideration applicants' priorities and the importance

of these factors in construction. In this regard, it is suggested that as it has been decreed since 1990 that Rasht Eynak Lagoon to be allotted to a recreation-tourism complex and its surrounding land to tourism-entertainment land use, and this matter has been unplanned and without progress so far, it is better to take necessary actions in order to discover the reasons of this stop and to implement this project faster. Thus, following suggestions are recommended:

- More cooperation and coordination of governmental and public institutes responsible for implementation of recreation-tourism project of Eynak Lagoon, removing its legal and administrative barriers, and presenting strategies to facilitate implementation process
- Pathology of different investment aspects by officials and updating rules and regulations to facilitate private sector participation
- Granting necessary and easy facilities without legally difficult process to investors to participate in this project
- Informing and advertising about economically potential capacity to absorb investment and its importance via the media
- Collecting wastes and pollutants near the Lagoon
- Preventing illegal constructions around Eynak Lagoon and buying surrounding houses through cooperation and consultation with dignitaries and residents
- Enhancing environmental security of areas via collecting addicts and attention to its direct impact on housing market
- More attention of official and authorities to environmental factors in urban spaces and using their potential in order to improve environmental-economic conditions of cities and considering the impact and value of these factors on households' demand in housing market

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