Gorgan University of Agricultural Sciences and Natural Resources

Environmental Resources Research (ERR)

Print ISSN: 2783-4832
Online ISSN: 2783-4670

The effect of green spaces on housing prices using Hedonic method in Iran

Gholamhosein Moradi[1*], Elham Operajuneghani[2], Farnaz Dehghan Benadkuki[3], Sajad Ghanbari[4], Mostafa Moradi[5]

[1] Associate Professor, Department of Natural Resources & Desert Studies, Yazd University, Yazd, Iran
[2] MSc student, Department of Economics, Yazd University, Yazd, Iran
[3] MSc student, Department of Economics, Yazd University, Yazd, Iran
[4] Associate Professor, Department of Forestry, Faculty of Agriculture and Natural Resources, University of Tabriz, Ahar, Iran
[5] Associate Professor, Department of Forestry, Faculty of Natural Resources, Behbahan Khatam Alanbia University of Technology, Behbahan, Iran

Article Info

Article type:
Research Article

Article history:
Received: *September 2022*
Accepted: *December 2022*

Corresponding author:
moradi@yazd.ac.ir

Keywords:
Environmental economics
Hedonic pricing model
Park
Non-market services
Urban green space

Abstract

The housing market and related issues are nowadays global matters that have attracted the attention of planners and policymakers. So housing price estimation is fundamental for public and private investors. The environmental characteristics of a place, such as green space, are one of the determining factors in housing prices. Therefore, this research was conducted to investigate the effect of green space on the price of surrounding houses in the Ghadir park of Yazd in central Iran. The sample size was determined using Cochran relation. The data have been collected by a questionnaire, referring to real estate agencies and maps. The ordinary least squares regression method and Eviews 9 software were used to analyze the data. Then, a model was proposed for estimating the hedonic price function of the study area. According to the results, from 15 independent variables, reconstruction, number of floors, number of bedrooms, distance to the main street, distance to the city center, and distance to park have a significant relationship with the price of housing units ($P \leq 0.05$). The adjusted coefficient of determination (R^2) was equal to 0.918. Using the hedonic method, it is concluded that although environmental goods such as parks and green spaces are not exchanged in the market, families pay for them in reality.

Cite this article: Gholamhosein Moradi, Elham Operajuneghani, Farnaz Dehghan Benadkuki, Sajad Ghanbari, Mostafa Moradi. 2022. The Effect of Green Spaces on Housing Prices Using Hedonic Method in Iran. *Environmental Resources Research*, 10 (2), 279-290.

DOI: 10.22069/IJERR.2022.6305
Publisher: Gorgan University of Agricultural Sciences and Natural Resources

Introduction

Economics and the environment are interrelated; change in each of these sectors affects the other. Environmental economics seeks to demonstrate that economics is not limited to the economic system (Pearce and Warford, 1993). Nowadays, there are arious environmental problems and issues in most cities, especially in developing countries. Valuation of the environment in multiple dimensions is a way to eliminate these problems (Matos et al., 2010). Environmental valuation leads to a greater understanding of ecological benefits for humans. In other words, it is necessary to value environmental goods and services using appropriate methods to express their role and importance and convert them into

monetary values. Most of these goods and services are non-market goods because they cannot be traded in the market. Environmental goods are often ignored in environmental decision-making due to the inability to value them in monetary terms (Greenaway-McGrevy and Sorensen, 2021). Nowadays, the housing market and related challenges are global problems that planners and policymakers focus on.

The housing market in each region, is not only influenced by national factors but also by local factors. Therefore, it is necessary to analyze the housing market's performance at the regional level (Oikarinen, 2007). The hedonic method is one of the most essential and famous methods in valuation. In economics, the word hedonic means desirability or satisfaction obtained by the consumer of goods or services. The hedonic price method is one of the apparent preference methods to determine willingness to pay. For instance, the hedonic approach is used to show the value of land, housing, and non-market goods. Goods that are not traded in the market but their characteristics are traded. So this method can be used to estimate values based on actual choices and observed market behavior and is widely used in the real estate market. The hedonic function considers a price model that shows how different variables affect housing prices (Gourieroux and Laferrere, 2009). The hedonic model is based on various forms of regression analysis in which the dependent variable is explained by independent variables (Koohi Kamali and Rajabi, 2010). This method tries to explain price changes using data on the various characteristics of supplied goods to the market, such as environmental amenities (Meraat and Hejazi, 2020).

Many studies have been conducted on green space valuation and its impact on other issues using the hedonic method. For the first time, Ridker and Henning (1967) used the hedonic method for air quality valuation according to real estate value (Ridker and Henning, 1967). The valuation results of parks in Amsterdam using the hedonic method showed that population density in each area and park existence has a positive effect on house prices, in a way that parks increase surrounding house prices by 0.137% (Brander and Koetse, 2016). Investigating the impact of industrial facility hazards on housing prices in France using the hedonic method showed that the willingness of households to pay for industrial hazards could be demonstrated with real estate markets (Grislain-Letrémy and Katossky, 2014). Also, the study of the vegetation effects on residential property value using the hedonic pricing method in Singapore showed a 3% impact of vegetation on property prices (Belcher and Chisholm, 2018). The results of another study conducted to estimate housing value and its influential factors in Spain showed that property location has the most significant impact on its price (Lisi, 2019). Some research has revealed that non-market goods can be valued more accurately using other factors and methods. For instance, combining GIS and the hedonic model can lead to making the right decisions and accurate valuation about suitable places for housing development, neighborhoods, commercial buildings, etc. (Aladwan and Ahamad, 2019). Also, the study of influential factors on the real estate market in China showed that it could be evaluated more accurately by considering some 3D factors such as sky view factor, view quality, property orientation, and sunlight (Ying et al., 2021). The results of air pollution effects on housing prices in Lebanon showed that air pollution negatively affects housing prices (Marrouch and Sayour, 2021).

Some studies have been conducted on economic valuation using the hedonic method in Iran. For example, studying the effects of accessibility and physical variables on housing prices in Sahand city showed that building area, number of apartments per floor, number of floors, distance to surrounding shopping center, and distance to park and green space have a significant effect on a residential housing price (Teimouri et al., 2016). Also, the impact of the lagoon on housing prices using the hedonic method showed that the lagoon negatively affects the price of residential units, and prices increase with

distance (Amirnejad et al., 2016). The study of willingness to pay for pollution control in different provinces of Iran using the hedonic model showed a significantly negative relationship between environmental pollutants and housing prices (Salem and Akaberi Tafti, 2018). Also, the study of effecting factors on land prices showed that distance to the coastline and the city center is the most important factor of land price in Babolsar (Nikpoor et al., 2019). Based on previous studies, it can be concluded that the hedonic price method is one of the best methods for valuing green space and its effect on the housing market. So, various studies have been conducted on the effectiveness factors of housing prices. On the other hand, this research is necessary due to the immigration of people to Yazd and the different effects of variables on housing prices in different parts of the city.

Iran is a developing country where high migration from villages and small towns to larger cities is one of the main problems. Yazd Province is an industrial province facing an increase in population growth compared to other provinces of Iran. So, the high growth of Yazd has caused the improper physical development of the city. Therefore, this research was conducted to investigate the effect of green space on the prices of surrounding houses and to identify the willingness of applicants to pay for the estimation of the housing demand function using the hedonic method.

The main questions of this study were as follows: 1) what is the relationship between environmental services and housing prices? 2) What is the importance of environmental variables? 3) Which of the studied factors may increase housing value? And 3) what is the importance and the proportion of each variable influencing the housing price? Therefore, the research hypothesis was that there is a significant positive relationship between environmental services (parks) and housing prices. The results of this study can be used in urban planning.

Materials and Methods

Study area

This study was carried out in the Ghadir park in Yazd, Central Iran. Yazd is the twelfth most populous city in Iran, with a population of 656474. Ghadir park, with an approximately 6-ha area, has been constructed at 31°54'16" to 31°54'27" latitude and 54°20'18" to 53°20'28" longitude. The presence of tall elm and pine trees has given a beautiful effect to the green space of this park. In addition, the existence of a large library attracts different age groups to the park.

Materials used

Housing is a heterogeneous, durable, immovable capital and consumer commodity that accounts for a large portion of household budgets, expenditures, and gross national fixed investment. Also, housing plays a vital role in the value-added and employment of countries (Bhattacharya Prodyut et al., 2010). The category of urban housing planning was justified from different angles due to its direct role in economic performance, governance stability, and maintaining society's physical and mental security (Azizi, 2004). Land and housing prices are related to various factors and conditions. Therefore, prices will differ at different times and places (Gholizadeh, 2008). Indeed, the price of land and housing in a city varies from region to region based on local and socio-economic characteristics. Housing characteristics are often non-market, so it is necessary to use a method other than supply and demand analysis in the economic valuation of housing (Abedin Darkush, 2015). The hedonic valuation method is one of the common methods in this field. The price of housing represents the maximum amount of money people are willing to pay for better environmental quality, building conditions, and access to urban facilities and services (Tyrväinen, 1997). In other words, the hedonic valuation method estimates the economic value of the environmental benefits that directly affect market prices. This method measures the value of an environmental phenomenon through the market price of similar goods.

Structural Equation Modeling

This study falls in the category of survey-analytical research. Data were collected through a questionnaire through face-to-face interviews with owners of residential units and referring to real estate agencies in the fall of 2019. The sample size was determined according to the information about the region and using a simple random sample and Cochran relation that was equal to 90.

Then, the ordinary least squares regression method (OLS) and EViews 9 software were used to analyze the data. The hedonic method was used to investigate the effect of Ghadir Park on the price of surrounding houses. Indeed, the hedonic model is used to analyze many aspects of the housing market, including taxes, commodity prices, public facilities, and housing construction quality. In this model, the goods have several aspects that include a variety of traits and housing has this feature like composite goods. Therefore, the hedonic method is suitable for the housing market and presents the implicit prices and characteristics of the goods relative to the total price. Thus, this method considers the demand for a good as a function of its features (Jim and Chen, 2007).

In hedonic studies, housing prices indicate the willingness of people to pay for achieving the required facilities inside and outside the housing (physical, environmental, and accessibility factors). In other words, the main reason for the difference in property prices is the difference in housing characteristics (Khalili Araghi and Nobahar, 2012). Therefore, many characteristics of life quality are considered when buying a house, and housing prices show the amount of money people are willing to pay to get a better quality of life (Karlik and Vehbi Olgac, 2011). According to the hedonic price model, individual utility is a function of direct consumer goods (X), physical and structural characteristics (S), environmental characteristics (Q), and neighborhood and accessibility characteristics (N) (Emami Meybodi et al., 2010). Each of these features shows the consumption utility of households, and this utility is as follows.

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

The consumer faces the budget constraints shown in Equation 2.

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

where Y is the household expenditures, X is the value of other goods, and P(Z) is the value of housing unit characteristics. Since consumers maximize their utility in terms of budget level, the maximization process can be written as follows.

$$Max\ U = U(X, Q_j, S_j, Nj) \quad (3)$$

$$St: Y = X + P(Z)$$

$$L = U(X, Q_j, S_j, N_j) + \lambda\ (Y - Ph_i) \quad (4)$$

$$\partial L/\partial Q_j = \partial U/\partial Q_j - \lambda\ \partial Ph_i/\partial Q_j = 0 \quad (5)$$

$$\partial L/\partial X = \partial U/\partial X - \lambda = 0 \quad (6)$$

$$\partial L/\partial X = Y - Phi - X = 0 \quad (7)$$

By dividing equations 5 and 6 to each other and removing λ, we get:

$$\frac{\partial U/\partial Q_j}{\partial U/\partial X} = \partial Ph_i/\partial Q_j \quad (8)$$

where $\partial U/\partial Q_j$ represents the final utility resulting from the consumption of an additional unit of the desired features, and $\partial U/\partial X$ indicates the final utility resulting from the consumption of an additional unit of other consumer goods. Also, $\partial Ph_i/\partial Q_j$represents the final value of the j^{th} property of the i^{th} residential unit. Equation 7 shows that the necessary condition for constrained optimization of hedonic function in an area requires the equality of final value and ultimate utility ratio in each residential unit to the ultimate consumption utility of other goods. The partial derivative of the hedonic function of each property represents its implicit final value. In experimental studies, the final value of each feature of a residential unit is obtained by estimating the coefficients of the hedonic price function. The general form of the hedonic price function can be written as follows:

$$P_{hi} = P(Z) = P(Q_j, S_j, N_j) \quad (9)$$

where P_{hi} is the selling price of housing, Q_j is environmental features, S_j is structural features, and N_j is neighborhood features. This function indicates consumers'

willingness to pay in order to achieve a product with specific characteristics. If the hedonic price function is linear in all features, the implicit price of each feature will be a fixed value, but if it is nonlinear, the final price of the features cannot be constant and depends on their usage levels (Saadatmehr, 2011). Linear, logarithmic, and semi-logarithmic methods estimate the hedonic model. In the present study, the semi-logarithmic model had the best estimation. The semi-logarithmic model means that only the dependent variable appears in logarithmic form (Gujarati, 1998).

Finally, 15 indicators affecting housing prices were considered. They were divided into three categories: indicators of structural-physical characteristics (number of floors, number of units, etc.), neighborhood characteristics (access to commercial, recreational, educational centers, hospital and transportation lines, etc.), and environmental factors (such as proximity to green space and park) (Table 1).

Table 1. Considered indicators for hedonic price model

Indicator	Data type	Variable type	Variable abbreviation
Price per square meter	Quantitative	dependent variable	P_h
Infrastructure area	Quantitative	Independent variable	X_1
The age of the building	Quantitative	Independent variable	X_2
Reconstruction	Quantitative	Independent/virtual variable	X_3
Number of floors	Quantitative	Independent variable	X_4
Number of bedrooms	Quantitative	Independent variable	X_5
Being on the street/alley	Qualitative	Independent/virtual variable	X_6
Being/not being in a dead-end alley	Qualitative	Independent/virtual variable	X_7
Distance to the main street	Quantitative	Independent variable	X_8
Distance to the city center	Quantitative	Independent variable	X_9
Distance to a shopping center	Quantitative	Independent variable	X_{10}
Distance from the educational center	Quantitative	Independent variable	X_{11}
Distance from the treatment center	Quantitative	Independent variable	X_{12}
Habituation to the living environment	Qualitative	Independent/virtual variable	X_{13}
Neighborhood security	Qualitative	Independent/virtual variable	X_{14}
Distance to park	Quantitative	Independent variable	X_{15}

Source: Research findings

So, the following model was proposed for estimating the hedonic price function of the study area:

$$Log\ P_h = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + B_8X_8 + B_9X_9 + B_{10}X_{10} + B_{11}X_{11} + B_{12}X_{12} + B_{13}X_{13} + B_{14}X_{14} + B_{15}X_{15} \quad (10)$$

where β is the coefficient of significant variables and Y is the mean of significant variables in hedonic housing price model estimation.

Results

The descriptive results of the critical variables obtained from 90 questionnaires are presented in Table 2. According to this data, 95.34% of the Ghadir Park visitors were male, and 4.65% were female. The average age of the interviewees was 53.24 years, and they were between 24 to 90 years old, which indicates that the visitors of this park are young. According to Table 2, retired people and freelancers were more inclined to use the park than other occupations. Most of the visitors had under-diploma education, and people with doctoral education accounted for the least number of visitors. Also, visitors' monthly income shows that each person's average monthly income is estimated to be approximately 3.20 million Toumans.

The results of heterogeneity of variance and autocorrelation tests are shown in Table 3. These results indicate that the model does not have heterogeneity of variance and autocorrelation.

Table 2. Descriptive statistics of interviewees

Variables	Average	Standard deviation	Minimum	Maximum	Description
Gender	0.95	0.20	0	1	1=Male, 0=Female
Age	53.24	14.37	24	90	Year
Job	2.25	1.47	1	7	1=Specialist, 2=Freelance, 3=Employee, 4=Housewife, 5=Worker, 6=Other, 7=Retired
Level of Education	4.53	1.68	1	7	1=Doctorate, 2=Master, 3=Bachelor, 4=Associate degree, 5=Diploma, 6=Under-diploma, 7=Uneducated
Monthly income	3.20	0.95	1	4	1= Less than 1 million Toumans 2= 1-2 million Toumans 3= 2-4 million Toumans 4= 4-6 million Toumans

Source: Research findings

Table 3. The results of heterogeneity of variance and autocorrelation test

Test	statistics	Sig.
The heterogeneity of variance (Breusch-Pegan-Godfrey)	1.297947	0.2255
autocorrelation test (Breusch-Godfrey)	11.51482	0.00

Source: Research findings

The result of hedonic price estimation in Yazd using the ordinary least squares regression method (OLS) method showed that from 15 independent variables of the function, six variables had a significant relationship with the price of housing units (Table 4). There was a significant relationship between the price of housing units and the variables of reconstruction, distance to the main street, distance to the educational center, and distance to the Ghadir Park ($P \leq 0.05$), in which reconstruction had the greatest impact.

Table 4. Initial estimation of the hedonic price function

Variable	Variable sign	Expected sign	Coefficient	t-Statistic	Probability
Infrastructure area	X_1	Negative	-0.0001	-1.869	0.065
The age of the building	X_2	Negative	0.0010	0.963	0.338
Reconstruction	X_3	Negative	-0.0367	-2.224	0.029
Number of floors	X_4	Positive	0.0221	2.107	0.038
Number of bedrooms	X_5	Positive	0.0244	2.412	0.018
Being on the street/alley	X_6	Positive	0.0157	0.663	0.509
Being/not being in a dead-end alley	X_7	Negative	-0.0388	-0.234	0.815
Distance to the main street	X_8	Negative	-0.0003	-2.787	0.006
Distance to the city center	X_9	Negative	-0.0001	-2.304	0.024
Distance to a shopping center	X_{10}	Negative	-0.0000	-0.197	0.844
Distance from the educational center	X_{11}	Negative	-0.0000	-0.164	0.870
Distance from the treatment center	X_{12}	Negative	-0.0000	0.488	0.626
Habituation to the living environment	X_{13}	Positive	0.0047	0.434	0.665
Neighborhood security	X_{14}	Positive	0.0004	0.047	0.962
Distance to Ghadir park	X_{15}	Negative	-0.0006	-8.303	0.000
Distance from origin	C	Positive	15.7057	52.174	0.000

$R^2 = 0.935$; Adjusted $R^2 = 0.918$; F= 56.889 (0.000)
DW= 1/87, Heteroscedasticity Test=1/131 (0/344)
Source: Research findings

In this study, the adjusted coefficient of determination (R^2), which shows the explanatory power of the model by the existing variables, was equal to 0.918, which indicates that the variables explain changes in housing price of the study area in the model. In other words, the considered variables in this model explained differences in the dependent variable very well.

According to the results of this study, the variable of reconstruction had a negative coefficient (-0.0367). In other words, houses that had not been reconstructed had a higher price than those that had been reconstructed. The variable of the number of floors had a positive coefficient (0.0221). The number of bedrooms had a positive coefficient (0.0244). The results also showed that there was a negative relationship between housing price and the variable of distance to the main street, and its coefficient was -0.0003. Also, residential housing prices had a reversed relationship with the distance from the city center and Ghadir park, with a coefficient of -0.0001 and -0.0006, respectively. Therefore, according to the results, the pattern of housing price function is as follows in the study area:

$$Log\ P_h = 15.7057 - 0.0367x3 + 0.0221x4 + 0.0244x5 - 0.0003x8 - 0.0001x9 - 0.0006x15 \quad (12)$$

Discussion

This study showed the significant effect of 6 out of 15 independent variables on the price of housing units. Therefore, the price of residential units was affected by the variables of reconstruction, number of floors, number of bedrooms, distance to the main street, distance to the city center, and distance to the park. There was a negative and significant relationship between reconstruction and housing prices. According to the coefficient of reconstruction variable (-0.0367), houses that had not been reconstructed had a higher price than the reconstructed ones. In other words, houses that had been reconstructed were 0.0367 percent cheaper than others because these houses were newer. If a house is more modern, it has more facilities and lower side costs. At the same time, old houses may need reconstruction (Karkoski, 2009). There was a positive relationship between the number of floors and housing price with a coefficient of 0.0221, which is consistent with the results of Varese and Mousavi (2010) and Teimouri et al. (2016). Also, the bedroom number had a positive coefficient (0.0244). In other words, consumers are more inclined to buy houses with more bedrooms which are consistent with the results of Ghorbani, and Afgheh (2017), Aghapour Sabbagi (2011) and Varese and Mousavi, (2010).

Distance to the main street also had a negative and significant relationship with housing prices, which is consistent with the results of Abbasloo and Sina (2005), Varese and Mousavi (2010), and Teimouri et al. (2016), and contradicts the results of Aziz et al. (2020). The coefficient of distance to the main street was -0.0003, which means that the distance to the main street caused a 0.0003 percent per meter reduction in housing price. It can be due to reducing accessibility and increasing transportation costs. A shorter distance to the main street leads to easier and faster access to urban services and facilities, such as sales and commercial centers, which leads to a higher willingness of buyers to pay.

Furthermore, housing prices had a reversed relationship with distance to the city center, and its coefficient was -0.0001. The housing price decreased with increasing distance from the city center (-0.0001 percent per meter). These results are consistent with the findings of Varese and Mousavi (2010), Amirnejad et al. (2016), and Ghorbani, and Afgheh (2017). Residential buildings near the city center had higher access to services, offices, and shopping centers. They also affected the cost of transportation for employees living in this area. Therefore, the price of these residential units was higher. The coefficients of distance from the street and the city center are consistent with the common hypotheses of urban economics that state the price of land decreases with increasing distance from city centers (Evans, 2004).

In addition, the variable distance between residential buildings and the park had a negative relationship with housing prices (with a coefficient of -0.0006). This indicates that residential unit prices decreased by -0.0006 percent per meter distance from the park. Therefore, those residential units near the park were more expensive than those farther away. The results of Merat and Hejazi (2020), Amirnejad et al. (2016), Dökmeci et al. (2003), and Teimouri et al. (2016) confirm these findings. When buying a house, people add value to the quality of their housing environment (Witte et al., 1979; Smith and Palmquist, 1994; Crane et al., 1997), which can be related to higher willingness of people to pay for living in a better environment. These results contradict the findings of Troy and Grove (2008) and are consistent with the findings of Anderson and West (2006), Brander and Koetse (2011), Cho et al. (2006), Kaufman and Cloutier (2006), Luttik (2000), Poudyal et al. (2009), and Tajima (2003). In the present study, the relationship between building age and its price was insignificant, like other studies such as Dökmeci et al. (2003).

Conclusion

Using the hedonic method, it is concluded that although environmental goods such as parks and green spaces are not exchanged in the market, families actually pay for them. In other words, families living near parks and green spaces pay more to buy a housing unit, and families living in more remote areas do not use this environmental utility.

In this study, six factors were identified as the most important influencing housing prices, including reconstruction, number of floors, number of bedrooms, distance to the main street, distance to the city center, and distance to the park. According to the results 50% of the significant variables (three variables) are related to physical variables, and the other 50% are related to accessibility and environmental variables. Based on the results, the research hypothesis is confirmed that an increasing distance from parks and streets leads to lower housing prices.

Therefore, it is necessary to pay attention to these factors in construction plans due to the impact of these features on residential units. Using the Hedonic method on the housing market, it is possible to identify the influential factors on housing units' price. As a result, these results can be considered in housing construction plans and other uses at the macro level, such as tax analysis and the public facilities of urban planning. Housing officials and housing unit builders can use the impact of different variables on housing prices in executive plans. Also, the economic valuation of parks can effectively reveal the values of urban green space. It may also change the views of the public people, professionals, organizations, and business owners into far-sighted ones. Finally, as a result, damage to green space will be reduced.

References

Abbasloo, M., and Sina, F. 2005. Estimation of Hedonic Price Function in Tehran Urban Housing. Journal of Quantitative Economics. 2. 105–135.

Abedin Darkush, S. 2015. Introduction to Urban Economics, 8th edition. Tehran: University Publication Center of Iran.

Aghapour Sabbagi, M. 2011. Evaluation Clean Air Effects on Tehran City Residential Houses Price in 2009. Iranian Journal of Health and Environment. 4(2), 213-222.

Aladwan, Z., and Ahamad, M.S.S. 2019. Hedonic Pricing Model for Real Property Valuation via GIS - A Review. Civil and Environmental Enggineering Reports. 29(3), 34–47.

Amirnejad, H. 2007. Natural resources economics. Tehran: Javdaneh Publication.

Amirnejad, H., Nabizadeh Zolpirani, M., and Heydari Kamalabadi, R. 2016. The Impact of Rasht Eynak Lagoon on Housing Price of the Region by Using Hedonic Pricing Method. Journal of Urban Economic and Management. 4(16), 33–48.

Anderson, S.T., and West, S.E. 2006. Open space, residential property values, and spatial context. Regional Science and Urban Economics. 36(6), 773–789.

Arnott, R. 2008. Housing policy in developing countries. The importance of the informal economy. Riverside: University of California at Riverside. pp.167.

Asgari, A., and Ghaderi, J. 2002. Determination of housing price in urban areas of iran by using hedonic price method (HPM). Journal of Sustainable Growth and Development (The Economic Research). 1(4), 91–108.

Aziz, A., Anwar, M.M., and Dawood, M. 2020. The impact of neighborhood services on land values: an estimation through the hedonic pricing model. GeoJournal. 1-11.

Azizi, M.M. 2004. Density in urban planning. Tehran: University of Tehran Press.

Belcher, R.N., and Chisholm, R.A. 2018. Tropical Vegetation and Residential Property Value: A Hedonic Pricing Analysis in Singapore. Ecological Economics. 149, 149–159.

Bhattacharya Prodyut, P., Pradhan, L., and Yadav, G. 2010. Joint forest management in India: Experiences of two decades. Resources, Conservation and Recycling. 54(8), 469–480.

Brander, L.M., and Koetse, M.J. 2011. The value of urban open space: Meta-analyses of contingent valuation and hedonic pricing results. Journal of Environmwntal Management. 92(10). 2763–2773.

Cho, S.-H., Bowker, J.M., and Park, W.M. 2006. Measuring the Contribution of Water and Green Space Amenities to Housing Values: An Application and Comparison of Spatially Weighted Hedonic Models. Journal of Agricultural and Resource Economics. 31(3), 485–507.

Choumert, J., and Phélinas, P. 2015. Determinants of agricultural land values in Argentina. Ecological. Economics. 110, 134–140.

Chumpitaz, R., Kerstens, K., Paparoidamis, N., and Staat, M. 2010. Hedonic price function estimation in economics and marketing: revisiting Lancaster's issue of "noncombinable" goods. Annals of Operations Research. 173(1), 145–161.

Crane, R., Daniere, A., and Harwood, S. 1997. The Contribution of Environmental Amenities to Low-income Housing: A Comparative Study of Bangkok and Jakarta. Urban Studies. 34(9), 1495–1512.

Cropper, M.L., Deck, L.B., and McConnell, K.E. 1988. On the Choice of Funtional Form for Hedonic Price Functions. The Review of Economics Statistics. 70(4), 668–675.

Dökmeci, V., Önder, Z., and Yavas, A. 2003. External factors, housing values, and rents: evidence from survey data. Journal of Housing Research. 14(1), 83–99.

Emami Meybodi, A., Azami, A., and Haghdoost, E. 2010. Environmental Effective Factors on Houses Prices in Tehran: Hedonic Pricing Approach. Journal of Economic Research. 44(2).

Evans, A.W. 2004. Real Estate and the Supply of Land, Blackwell Publishing, Oxford.

Geoghegan, J. 2002. The value of open spaces in residential land use. Land Use Policy. 19(1), 91–98.

Gholizadeh, A. A. 2008. Housing price theory in Iran in simple language. Hamedan: Noor Alam Publications.

Ghorbani, S., and Afgheh S.M. 2017. Forecasting the house price for Ahvaz city: the comparison of the hedonic and artificial neural network models. Journal of Urban Economics and Management. 5(13), 29-44.

Gobster, P.H., Westphal, L.M., and Nilon, C .1998. People and the River: Perception and Use of Chicago Waterways for Recreation. USDI National Park Service Rivers, Trails, and Conservation Assistance Program, Milwaukee, WI. URL:http://www.ncrs.fs.fed.us /epubs/chicagoriver/

Gouriéroux, C., and Laferrère, A. 2009. Managing hedonic housing price indexes: The French experience. Journal of Housing. Economics. 18(3), 206–213.

Greenaway-McGrevy, R., and Sorensen, K., 2021. A Time-Varying Hedonic Approach to quantifying the effects of loss aversion on house prices. Economic Modelling, 99, 105491.

Grislain-Letrémy, C., and Katossky, A. 2014. The impact of hazardous industrial facilities on housing prices: A comparison of parametric and semiparametric hedonic price models. Regional of Science Urban Economics. 49, 93–107.

Gujarati, D. 1998. Basic econometrics. Translator: Abrishami, H, University of Tehran. Press

Guo, Z., Xiao, X., Gan, Y., and Zheng, Y. 2001. Ecosystem functions, services and their values – a case study in Xingshan County of China. Ecological. Economics. 38(1), 141–154.

Hill, R.J., Melser, D., and Syed, I. 2009. Measuring a boom and bust: The Sydney housing market 2001–2006. J. Housing. Economics. 18(3), 193–205.
Jim, C.Y., Chen, and W.Y. 2007. Consumption preferences and environmental externalities: A hedonic analysis of the housing market in Guangzhou. Geoforum. 38(2), 414–431.
Kain, J.F., and Quigley, J.M. 1970. Measuring the Value of Housing Quality. Journal of the American Statistical Association. 65, 532–548.
Karkoski, J. 2009. A hedonic pricing model of the effect of the amerrican river parkway on home prices in Sacramento Country, California, USA. Sacramento: California State Universty.
Karlik, B., and Vehbi Olgac, A. 2011. Performance analysis of Various Activation function in generalized MLP architectures of NERURAL networks. International Journal of Artifical Intelligence and Expert System. 1(4), 111–122.
Kaufman, D.A., and Cloutier, N.R. 2006. The Impact of Small Brownfields and Greenspaces on Residential Property Values. Journal of Real Estate Financ Economics. 33(1), 19–30.
Khalili Araghi, M., and Nobahar, E. 2012. Predicting Housing Prices for the City of Tabriz: Application of the Hedonic Pricing and Artificial Neural Network Models. Quarterly Journal of Economic Research and Policies. 19(60), 113–138.
Khorshiddoust, A. M. 2009. The Application of Hedonic Pricing Method in Estimating the Hidden Economic Value of Environment: The Case Study of Correlation between Public Services, Pollution, and the Housing Prices in Selected Areas of Tabriz. Journal of Environmental Studies. 35(51), 81-92.
Khoshakhlagh, R., Emadzadeh, M., and Sharifi, M. 2000. Estimation of housing demand Function With Using Hedonic Price. Journal of Economic Research. 34, 99–117.
Kohikamali, M., and Rajabi, M. A. 2010. The Effectiveness of Urban Green Space on Residential Use Value. Journal of GIS and RS Application in Planning. 1(1), 23-31.
Gupta, K., Kumar, P., Pathan, S. K., and Sharma, K. P. 2012. Urban Neighborhood Green Index - A measure of green spaces in urban areas, Landscape and urban planning, 105(3), 325-335.
Lisi, G. 2019. Property valuation: the hedonic pricing model – location and housing submarkets. Journal of Property Investment and Finance. 37(6), 589–596.
Luttik, J. 2000. The value of trees, water and open space as reflected by house prices in the Netherlands. Landscape and Urban Planning. 48(3-4), 161–167.
Marrouch, W., and Sayour, N. 2021. Hedonic housing prices and environmental quality in Lebanon. International Journal of Housing Markets and Analysis. 14(5), 953-968.
Matos, A., Cabo, P., Ribeiro, I., and Fernandes, A. 2010. Economic valuation of environmental goods and services. Proceedings of the IUFRO Landscape Ecology Working Group International Conference. Instituto Politécnico de Braganç, Bragança, Portugal.
Merat B., and Hejazi, R. 2020. Economic Model Presentation Using HPM: Qeitariyeh Park. Journal of Urban Economics and Planning. 9(2), 61-69.
Montazer Hojat, A.M., and Mansouri, B. 2016. An Economic Valuation: Is the Society Willing to pay for Conservation of Hoor-al-Azim Wetland?. Iranian Journal of Economics Studies. 5(1), 79-100.
Oikarinen, E. 2007. Studies on housing price dynamics. Turku: Sarja, Series A.9.
Ozus, E., Dokmeci, V., Kiroglu, G., and Egdemir, G. 2007. Spatial Analysis of Residential Prices in Istanbul. European Planning Studies. 15(5), 707–721.
Panduro, T.E., and Veie, K.L. 2013. Classification and valuation of urban green spaces- A hedonic house price valuation. Landscape Urban Planning. 120, 119–128.
Pearce, D.W., and Warford, J.J. 1993. World without End: Economics, Environment, and Sustainable Development. Oxford: Oxford University Press.
Poudyal, N.C., Hodges, D.G., and Merrett, C.D. 2009. A hedonic analysis of the demand for and benefits of urban recreation parks. Land use policy. 26(4), 975–983.
Ridker, R.G., and Henning, J.A. 1967. The Determinants of Residential Property Values with Special Reference to Air Pollution. The Review of Economics and Statistics. 49(2), 246–257.
Saadatmehr M. 2011. Estimation of Hedonic Price Function for Khoramabad Urbun Housing. Knowledge and Development. 17, 313–339.

Salem, A., and Akaberi Tafti, M. 2018. Calculating the willingness to pay to avoid of pollution harmful effects by using the Hedonic price in different provinces of Iran. Quarterly Journal of Quantitative Economics. 15(2), 23–50.

Senanayake, I.P., Welivitiya, W.D.D.P., and Nadeeka, P.M. 2013. Urban green spaces analysis for development planning in Colombo Sri Lanka. Utilizing THEOS satellite imagery a remote sensing and GIS approach. Urban Forestry and Urban Greening. 12(3), 307-314

Smith, V.K., and Palmquist, R.B. 1994. Temporal Substitution and the Recreational Value of Coastal Amenities. The Review of Economic Statistics. 76, 119–126.

Sue, E.D.W., and Wong, W.-K. 2010. The political economy of housing prices: Hedonic pricing with regression discontinuity. Journal Housing Economics. 19(2), 133–144.

Tajima, K. 2003. New Estimates of the Demand for Urban Green Space: Implications for Valuing the Environmental Benefits of Boston's Big Dig Project. Journal of Urban Affairs. 25(5), 641–655.

Teimouri, I., Hakimi, H., and Hossianpour Shad, V. 2016. The Role of Physical and Accessibility Variables in Determination of Housing Price; Case Study Sahand New Town. Geography and Planning. 20(57), 81–95.

Thériault, M., Des Rosiers, F., and Dubé, J. 2007. Testing the Temporal Stability of Accessibility Value in Residential Hedonic Prices. Scienze. Regionali. 3, 5–46.

Troy, A., and Grove, J.M. 2008. Property values, parks, and crime: A hedonic analysis in Baltimore, MD. Landsc. Urban Planning. 87(3), 233–245.

Tyrväinen, L. 1997. The amenity value of the urban forest: an application of the hedonic pricing method. Landscape and Urban Planning. 37, (3-4) 211–222.

Varese, H.R., and Mousavi, M.N. 2010. An investigation of the factors influencing the housing price using hedonic price model (the case of Yazd third district). Journal of Geography and Environmental Studies. 1(3), 5–12.

Vural, H., and Fidan, H. 2009. Land marketing and hedonic price model in Turkish markets: Case study of Karacabey district of Bursa province. African Journal of Agricultural Research. 4(2), 71–75.

Wallbaum, H., Ostermeyer, Y., Salzer, C., and Zea Escamilla, E. 2012. Indicator based sustainability assessment tool for affordable housing construction technologies. Ecological Indicators. 18, 353–364.

Witte, A.D., Sumka, H.J., and Erekson, H. 1979. An Estimate of a Structural Hedonic Price Model of the Housing Market: An Application of Rosen's Theory of Implicit Markets. Econometrica: Journal of the Econometric Society. 47(5), 1151–1173.

Ying, Y., Koeva, M., Kuffer, M., Asiama, K.O., Li, X., and Zevenbergen, J. 2021. Making the Third Dimension (3D) Explicit in Hedonic Price Modelling: A Case Study of Xi'an, China. Land. 10(1), 24.

Yusuf, A.A., and Resosudarmo, B.P. 2009. Does clean air matter in developing countries' megacities? A hedonic price analysis of the Jakarta housing market, Indonesia. Ecological Economics. 68(5), 1398–1407.

Zarra Nezhad, M., and Anvaari, E. 2006. Estimation of Hedonic Housing Price Function For Ahvaz using Panel Data Analysis. Iranian Journal of Economic Research. 8(28), 139–168.