

Spatial Analysis of the Proximity Effects of Land Use Planning on Housing Prices (Case Study: Tehran, Iran)

Amin Safdari Molan(✉) and Ebrahim Farhadi

Tehran University, Tehran, Iran
{a_safdari, e.farhadi71}@ut.ac.ir

Abstract. The concept of housing in the urban planning and economy of countries is very important because the highest percentage of urban usage is residential use, which today accounts for about 40% of land use in residential areas, while the highest percentage of household cost in developing countries such as Iran is According to economic studies, housing accounts for over 50% of household income. According to the results of this study, the research is of the applied type, considering the nature of the main approach to the current paper, is descriptive-analytical. According to the study area and the nature of the subject of the research, Quantitative methods and techniques (Geographical Weighting Regression Model). Several factors affect the price of housing is one of the factors, proximity to a variety of land use, which plays Has a key impact on housing prices. In TehranCity, Because of the combination of land use and special features that user this city, we have evaluated the effects of each application on housing prices. By identifying the effects of each type of usage on housing prices, it would be possible to find a way to plan for housing and housing economics in the city and to draw on future studies on this issue. Given that the topic of housing economics is an inclusive and interdisciplinary topic (politics, economics, management, geography, etc.), so this article further discusses the influence of geographic factors (types of uses) on housing prices. It was found that: green land-use and parks with R^2/87, urban land-use services with R^2/80, access to gardens and farmland with R^2/36, and commercial and administrative Land-Use with R^2/24 respectively, have the highest impact on housing prices in level city.

Keywords: Spatial analysis · Housing economics · Land use · Geographic weight regression model · Tehran city

1 Introduction

Housing as an economic commodity has characteristics that differentiate it from other commodities and complicates supply and demand analysis and markets. On the one hand, housing is a commodity that after food and clothing is considered to be the most basic human need and the most expensive household commodity, and on the other hand, as a durable, durable immovable commodity, is the capital of investment in which is the largest portion of the household's assets. In addition to households, it is

© Springer Nature Switzerland AG 2019
S. Misra et al. (Eds.): ICCSA 2019, LNCS 11621, pp. 642–659, 2019.
https://doi.org/10.1007/978-3-030-24302-9_46

also a great attraction for businesses. In particular, in terms of inflation, which ensures lower investment returns in other sectors, buying and building housing is a safe and secure investment that is more cost-effective in the long run than other forms of investment. In addition, the uncertainty about the future and the lack of a proper social security system make housing a household income in old age and disability [25]. Housing and its issues today are a global issue and planners and policymakers in different countries are trying to solve their problems [6]. Lack of adequate resources, lack of economic management, lack of comprehensive housing planning and other shortcomings in the economic infrastructure on one hand, and rapid population growth on the other hand, has made it difficult and multifaceted to provide shelter in these countries [27]. Housing relative to other goods due to characteristics such as non-replaceable, capital-worthy, durable, cost-effective and immovable [12] can be a major factor in inequality and, at the same time, social solidarity. Housing ownership is a clear demonstration of the level of living. Hence, the rate of achieving desirable housing status is considered as one of the indicators of economic development in the world [4]. Housing therefore has a fundamental importance in human [20]. Housing satisfies the basic needs of the human being and It therefore affects the lives of citizens and can be easily linked to living conditions and cause them to rise. Economically, housing accounts for over 50% of household income. In addition to economic aspects, the socio-cultural aspect of housing is also very important [18]. The housing sector is a leading sector in the economy, which, in addition to its social and cultural effects, is also important economically. Housing is a durable and costly commodity (50% of the financial and income potential of each person is spent on housing during their lives), and it is considered an investment, saving, and source of income and increase in income in Iran (Currently, in Iran, one of the important indicators in identifying wealthy people is not the amount of income, but the amount of assets, possessions and capital). This sector greatly affects economic fluctuations by creating economic growth and creating employment in the construction sector and other parts of the building sector, through its impact on consumption and investment, changes in GDP and inflation. Regarding the economic conditions of Iran and inflation, there is no reasonable relationship between the annual salary of a person and the basic costs in Iranian society; therefore, reviewing the policies of housing and providing social welfare plays a major role in rewriting the type of cultural and economic look to housing in Iranian society, which shows that the inefficiencies that occurred in the housing planning system and the resulting results are the same. The issue of housing in urban economics and urban planning is important in several respects: first, in terms of urban land use, since the highest urban land use is the residential use, which today accounts for about 40% of land use, consisting of residential areas, on the other hand, because of this The highest percentage of household expenditure in third-world nation will be allocated to it. There is no doubt that the first and most important factor in the construction of housing is the “factor of the earth”. In Iran, the price of land accounts for a large share of the price of housing. In most cases, the share of land prices exceeds 50% for the whole building, sometimes reaching 80 to 85%. There are several factors affecting housing prices, one of which is the types of land uses that play a key role in determining housing prices. In the city of Tehran, due to the combination of user and special features that govern the use of this city and the different prices of housing, we are

investigating the effects of each usage on the price of housing, so that by identifying the effects of each type of usage on the price of housing, appropriate planning for housing and housing economy city. Given that the economy of housing is a comprehensive and interdisciplinary topic (politics, economics, management, geography, etc.), this article discusses the impact of geographic factors (types of uses) on housing prices.

2 Theoretical Foundations

2.1 Background of the Research

See Table 1

Table 1. The background to the economic issues of housing in Iran is given in the following table.

Researchers	Title of research	Summary of results
FardinYazdani	An Introduction to Theoretical The Relationship between Macroeconomic Policies and Housing	The models presented show that the government, through financial and monetary policies, has significant effects on the supply and demand of housing, it seems that a significant part of the developments in recent years can be explained using these patterns
Mahmoud Jahani	Housing market stagnation and exit strategies	Following the unprecedented growth of investment in the housing sector, which reached about 60% in 2007 at constant prices, since August 2008, the declining trend of production and investment in housing has started to emerge in Tehran, and with its prolonged spread to the whole country, a comprehensive and complete recession on the housing sector prevailed
Mohsen Ebrahimi	The relationship between stock price fluctuations and housing prices	The relationship between the growth rate of housing prices and stock prices by seasonal data of 1997 shows that there is no strong relationship between the growth rates of these two markets, but more than anything else, the variance of these two variables, which has had a meaningful relationship

(*continued*)

Table 1. (*continued*)

Researchers	Title of research	Summary of results
Ali Akbar Gholizadeh	The bubble of housing prices and its determinants in Iran	The rapid growth of liquidity, if other factors are steady, causes the formation of a housing bubble. Therefore, in the absence of liquidity absorption in the capital market, the likelihood of its transfer to the housing market and the price shock in the housing market are high. In this situation, monetary authorities can prevent it by implementing prudent monetary policies
Saeed Abedin in Kush, Sarah Rahimian	Analysis of factors influencing housing prices in urban areas of Iran during the period (1991–2006) with emphasis on urban grouping	One of the most important results of this study is the point that the effect of economic variables on housing prices varies from city to city. For example, in Tehran, variables such as the volume of liquidity and household income have a greater impact on housing prices than other cities, and in contrast to the comparison of the elasticity of variables, it is likely that the manufacturing cost variable may have a greater role in housing prices in small and large urban areas than Tehran Plays
Reyhane Sadat Shojaee	Investigating the relationship between land prices and the use of urban land in Tehran's three Jamalabad, Yousefabad and Yakhche Abad neighborhoods	In statistical surveys between land prices and other variables, it was determined that land use price has the highest correlation coefficient. In the sample of this research, land prices are inversely related to diversity of use and the correlation coefficient between these two variables is negative
Younessalmani, Sarah Sadeghi	Investigating the effect of oil income shocks on housing prices in Iran through the Dutch disease mechanism of the SVAR model	Based on the results of the immediate response and analysis of variance, oil revenue shocks, along with its intrinsic shocks, are the most important determinant of the relative price of housing
Ali Chegani, Ali Ghaedi	Review the cycles of the boom and the recession in the housing sector	The results of this study show that despite the relative increase in the volume and real value of

(*continued*)

Table 1. (*continued*)

Researchers	Title of research	Summary of results
		transactions carried out in the housing market in 2014, the data on value added and investment in the housing sector, construction permits and housing prices indicate a stagnation in this sector in 2013 and Continue to 2014
Bahram Sobhani, Mohsen Tartar	Factors affecting the price of residential land in Tehran	The results of the study show that liquidity, oil revenue, stock price index and inflation in short term have a significant effect on land prices, but the effect of exchange rate on land prices in the short run is not significant. The variables of liquidity and oil revenue in the long run also have a significant effect on land prices, but the effect of stock price index on land prices in the long run is not significant
Ali Ghaedi	Assessment of the relationship between investment in the housing sector and gross domestic product	The results indicate that there is a twofold causality between investment in the housing sector and the business cycle, and adopting policies that boost investment in the housing sector can create economic prosperity and vice versa

Source: Research findings: 2019.

2.2 Satisfaction of Citizens from the Residential Environment

Concepts of residential satisfaction are closely related to concepts such as standard of living, well-being, livability, quality of place, quality of life associated with health and quality of life. In fact, these concepts are overlapping and sometimes synonymous [28]. Planning systems play an important role in increasing the supply of affordable housing through financing. The supply of land involves a large part of the cost of affordable housing. It is also one of the major challenges for countries. Recent research has shown that remote sites limit people's access to urban facilities and workplaces [29] and additional behavioral costs that are not feasible for low-income families.

Residential satisfaction is essentially the provision of the needs of residents in line with their aspirations (perceptions and mental aspirations and individual characteristics), taking into account the realities of society (the actual perception of the status quo). Important factors affecting residential satisfaction as a multifactor concept are definite. Therefore, in order to better assess residential accommodation and its

influential factors, many modeling has been done so far. The results of the research show that the important factors affecting the level of housing satisfaction, including the characteristics of the inhabitants of the socio-cultural and economic factors of housing and society and, most importantly, the coherence of needs and aspirations. And many of these factors follow the cultural and social characteristics of the country and society under study. Therefore, residence satisfaction is a function of the characteristics of the individuals living in the objective and subjective features of the habitat of the needs and aspirations of individuals as socioeconomic, cultural and physical factors of housing and society [16]. The factors affecting the satisfaction of residential space can be summarized in the following graph (Fig. 1).

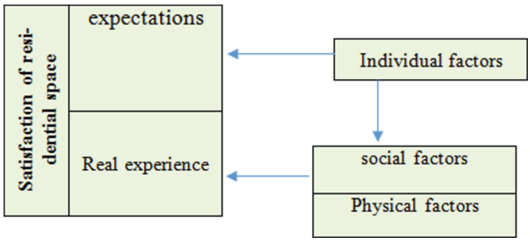


Fig. 1. Source: Ghafourian and Hesari, 2016: 6

2.3 Housing Economy

Housing sector is one of the most important economic sectors in the country because, on the one hand, the market slump is bad for the negative impact on investment in this sector and the decline of economic growth for economic policymakers and statesmen, and on the other hand, rapid boom and rapid growth. The price is never desirable for politicians and policymakers because of their severe impact on increasing household expenses and social dissatisfaction [14]. Because housing accounted for a significant portion of the net wealth of the private sector, as well as housing costs, such as renting or mortgage lending, constitute the most important part of household expenses. Also, rent is the most important component and in the assessment of price risk and stability, the important factor (CPI) is the price index for goods and services. Meanwhile, the periodic fluctuations of the housing market are affecting the investment of the housing sector, the supply side of this commodity and the labor market, and the mobility and mobility of the workforce [27]. Finally, housing is a precious commodity whose purchase involves borrowing from the banking system of the country, and the main problem facing the banking system in providing housing loans is that the purchase of housing requires long-term credits, while housing loan sources in the banking system of Iran are short-lived. This problem has caused the mortgage coverage to be low [1]. Several basic features, the theory of demand, distinguishes housing from other economic markets. First, housing is completely non-homogeneous. The theoretical root of the non-homogeneity of the commodity is the difference in the service it provides to its holders. Second, housing is a durable commodity. Third, there are different motives for

buying housing. Fourth, housing commodities, unlike many other commodities, can be provided in two types of property and leases, and ultimately the cost of housing finance among the essential commodities has the highest share of household income and it is inevitable for the household to provide. In general, housing demand can be subdivided into demand for housing and demand for housing. In housing demand, it is only household shelter, while in the demand for housing, investment returns and other factors such as bourgeoisie, lease and … are the main motivations of housing demand. Simply put, housing demand is the demand for housing as much as households need shelter [14].

2.4 The Structural Characteristics of the Housing Market

1. The staggering growth of housing prices: According to the Central Bank Statistics released between 69 and 85, the housing price growth chart does not fit entirely into the growth of inflation, and its curve has a staggering trend that fluctuates around the inflationary axis. On the basis of this, it can be said that, in addition to the general inflationary pressures on the economy, other factors have also contributed to the change in housing prices [23]. The housing market is not the only market for production, and an important part of the activities of this market is devoted to the transfer and redevelopment of existing residential units. The increase in prices in this part of the housing market leads to the diversion of capital from the manufacturing sector to the service sector (buying and selling) of housing. Other factors also affect pricing. The way housing deals are conducted mainly by intermediaries (trading companies) and because these intermediaries can determine prices and prices in harmony with each other. Price levels affect the supply and demand mechanisms of the housing market [10].
2. The gap between supply and demand: According to economic laws, demand for more goods from each supply will increase the price of that commodity. One of the reasons for the crisis in housing prices in Iran is a large difference between the supply and demand in the housing market. The demand for housing can be divided into two parts: actual demand (demand) and capital demand. There are various reasons for the high demand in the Iranian housing market. One of these reasons is the demographic structure of the country. Placing a significant part of the age pyramid of the population at the age of matrimonial housing is facing a potential demand which, due to the periodic depreciations of the building sector and the lack of response to housing needs over the past years, has led to the accumulation of demand and its subsequent delivery. Is Undoubtedly, part of this demand can never become a reality due to the low purchasing power of families. However, the actual demand, given the supply of this section, can easily lead to a price crisis [19].
3. A high share in the household's household basket: One of the most important economic indicators used in assessing the housing situation in different countries is the share of housing costs in the household income basket, which can be the basis for policy-making in the housing sector. In countries that have a successful experience in solving the housing problem of different classes of society, the share of housing costs in the household basket is less than 15%, while in our country this

share is 53% reported, reaching 63.8% for the lower deciles. In our country, a high percentage of household income is spent on paying rent or installments [23].

2.5 The Most Important Factors Affecting Housing Prices

The factors influencing housing prices are multiplicative in terms of micro factors and macro factors. The macroeconomic factors, such as monetary policy, have a huge impact on housing prices, which should be considered as important in changing housing prices. In general, factors affecting housing prices can be divided into two categories: first, the fundamental factors determined by the supply and demand forces of the market, and the second is the non-fundamental factors that are not related to the economic performance of the housing, but include those outside the function of the housing sector Affect housing prices. Fundamental factors on a macro scale may include factors such as monetary policy and interest rates on bank deposit yields. On a small scale, factors such as construction density affect the housing pattern [5]. In the neighborhoods, there is another factor that can be considered: the effect of the mixing of applications and its undeniable impact on housing prices. Thus, in residential neighborhoods, the proximity to retail outlets can add value to housing prices, which is why services are offered with better conditions. Also, in traditional housing price considerations, changing the distance from the city center and main access is considered to be a major factor in the difference in housing prices, and according to that distance from the city's commercial center, housing prices are subject to spatial changes [14]. Other important factors influencing housing prices are, of course, also referred to as housing production factors: land prices, construction materials, labor costs, and technology. In terms of physical indicators, these indicators are of economic, social, cultural and technical dimensions. Among the physical indicators that affect housing prices, we can point to the density of land and land area. The price of housing and land is usually directly related to congestion, both in construction and in demographic terms. In other words, the higher the price of housing and land, the greater the density of the city. The increase in land prices due to its constraints and unsustainability of supply against demand, as well as the necessity of its optimal use, leads to an increase in construction density followed by a demographic density (with a constant occupancy). Accordingly, due to the significant contribution of land prices to residential dwellings, fluctuations in land prices have a decisive impact on land area and housing infrastructure and, as a result of construction, density [5]. The variables that affect housing prices are as follows:

1. Physical or structural variables such as land area, number of rooms, old buildings and floor area.
2. Access variables such as access to the workplace, training centers, access to shopping malls, etc.
3. Economic and social variables such as income and.
4. Spatial variables [2].

The main macro and micro factors affecting housing prices are designed in the following graph (Fig. 2).

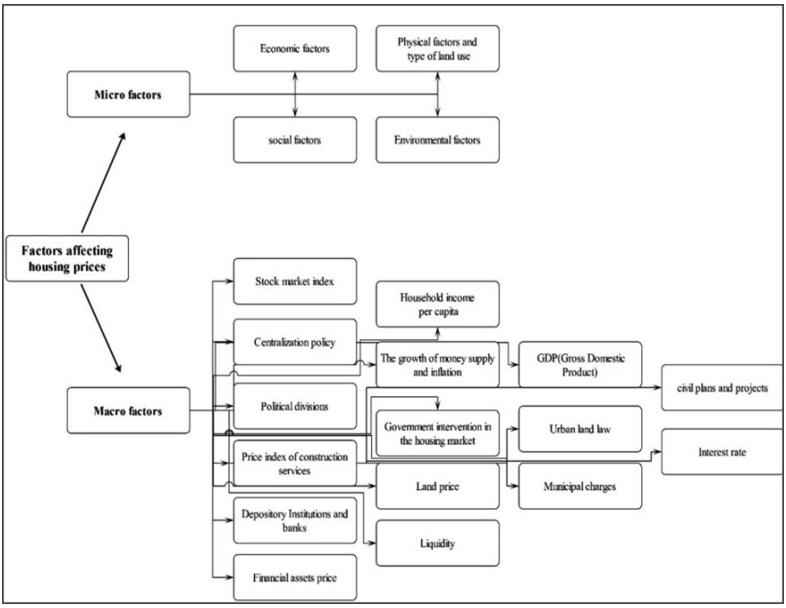


Fig. 2. Factors affecting housing prices. Source: Research findings, 2019

3 Study Area

Tehran is the capital of Iran with a geographical position of 51° 5 min to 51° and 36 min east and 35° 35 min to 35° and 50 min' north latitude and its elevation is from sea level between 1800 m in the north to 1200 The meter is in the center and 1050 m in the south. Tehran between the Alborz Mountains and the northern margin of Iran's

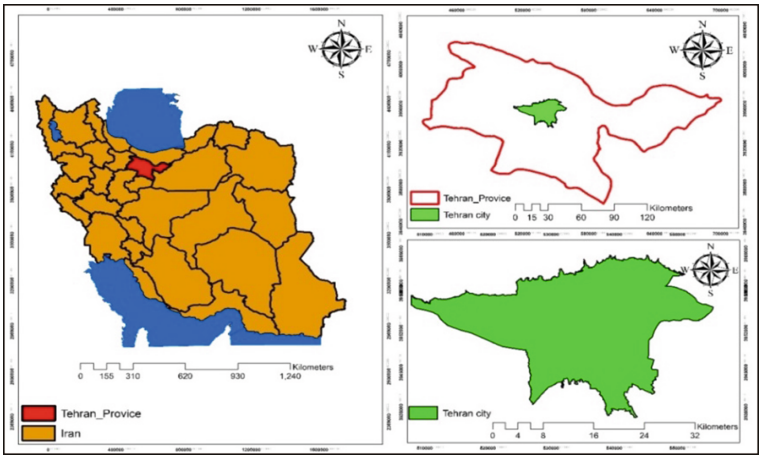


Fig. 3. Map of the study area. Source: Draw the authors, 2019

central desert is fairly flat in the plain. Its area is 594 km (22 districts) with an area of 2,000 km^2 and 8 million inhabitants (with its 12 million city-states) (Fig. 3).

4 Methodology of Research

The present research is objective, applied and developmental, and, as far as the method is concerned, is descriptive-analytical. In order to do this paper and determine the effects of each land use on housing price, the dependent variable of this study was the first phase of the GIS file for the price of residential in the summer of 1395 (2016) that taken from the Iranian Statistics Organization. Each type of the GIS land use files of the region, including green and parks land-uses, commercial and office land-uses, industrial and workshop land-uses, vacant and non-built-in land-uses, military uses, urban service utilities, gardens and farmland as variables Independent were considered. To obtain the relationship between the independent variable and the dependent variable, we obtained the ArcGIS software using the Geographically Weighted Regression model to the results of the study. The GWR model is described in detail below.

4.1 Geographic Weights Regression

Carlton, Brandson and Fudringham introduced the term geographic weight regression [8]. In linear regression, spatial data is assumed in a static process. The general linear regression is as follows [24]:

$$Y_i = \beta_0 + \sum\nolimits_k \beta_k x_{ik} + \varepsilon_i \qquad i = 1, 2, \ldots, n \tag{1}$$

Here Y_i is the estimated value of the dependent variable for viewing i, β_0 is the constant coefficient, β_k is the estimated parameter for k, x_{ik} is the kthest variable for i and ε_i is the error component that is assumed to be distributed normally. Estimates of the parameters in the measurement of these models in the space are constant.

$$\beta' = (X^T X)^{-1} X^T Y \tag{2}$$

Extensive geographic weight regression model is a general regression framework. The main essence of this model is as follows.

$$y_i = \beta_0(u_i, v_i) + \sum \beta_k(u_i, v_i) X_{ik} + \varepsilon_i \qquad i = 1, 2, \ldots, n \tag{3}$$

Where u_i, v_i represents the coordinates of the i-th point in space, k(u_i, v_i) β is a continuous function of k(u, v) β at every point i, and $X_{i1}, \ldots, X_{ip}$ are the explanatory variables at point i and ε_i is an error. For the given data set, the regional parameters k(u, v) β are estimated using the least squares weighting steps. W_{ij} weights for $j = 1, 2, \ldots, n$. In each position (u_i, v_i), the continuous function of the intervals between points i and other data points is obtained.

$$\beta = \begin{bmatrix} \beta_0(u_1, v_1) & \beta_1(u_1, v_1) & \cdots & \beta_p(u_1, v_1) \\ \vdots & \vdots & \ddots & \vdots \\ \beta_0(u_n, v_n) & \beta_1(u_n, v_n) & \cdots & \beta_p(u_n, v_n) \end{bmatrix}$$

This matrix is a regional parameter matrix. Each row is derived from the following equation.

$$\beta'(i) = \left(X^T W(i) X\right)^{-1} X^T W(i) Y \tag{4}$$

As i = 1, 2, . . ., p represents the matrix rows, X is the matrix of independent variables, Y is the dependent variable and W(i) is the space weight n × n matrix as follows:

$$\mathrm{W}(i) = diag\lfloor W_{i1}, W_{i2}, \ldots, W_{in} \rfloor \tag{5}$$

$$W(i) = \begin{bmatrix} W_{i1} & 0 & \cdots & 0 \\ 0 & W_{i2} & \cdots & 0 \\ \vdots & & \ddots & \vdots \\ 0 & \cdots & \cdots & W_{in} \end{bmatrix}$$

Estimates in Eq. (4) are estimates of least squares, but the weight matrix is not constant. Therefore, W(i) must be calculated (mean Eq. 5) for each point i and W_{ij} represents an approximate value from any point of data in position i. The data points near i have a higher weight in estimating the parameters β(i) than the points farther away. Different weight functions are definitely defined. The most common is the Gaussian kernel function and the bi-square weight function.

Some of the advantages of geographic weight regression are [8]:

- Achieving precision and details (geographic weight regression allows a researcher to make a local analysis in front of an overview) [21].
- The coefficients of each of the predictors vary across space. An analysis of how different relationships across space and the spatial pattern recognition of local estimates are possible for a proper understanding of possible contributing factors [11].

The separation of the general coefficient of determination (R2) from local coefficients and their geographical distribution analysis allows for less or more independent variables to be able to detect explanatory power [11, 21]. In most cases, the estimated errors by geographical weight regression are smaller than the estimated errors by the regular regression and the spatial correlation problem is eliminated or reduced [15]. The implementation of this technique in the GIS facilitates the production of a wide range of maps (dependent and independent variables, local R2, local coefficients, t values and standard residual values) using generated results [24]. The production of interpolated surfaces is possible to identify the spatial contiguous distribution of parameters and to apply the principles of prediction to find the values of the missing observations [3]. Geographic weight regression facilitates identification of the spatial structure of the model, which measures the degree of spatial dependence in the model

and the identification of data clusters. The results provided for each location are used as a criterion for local policies and decisions. This is why this technique is often based on location [30].

Although the geographic weight regression model is a relatively new method for analyzing spatial data, it has been used in many different subjects, including [8]:

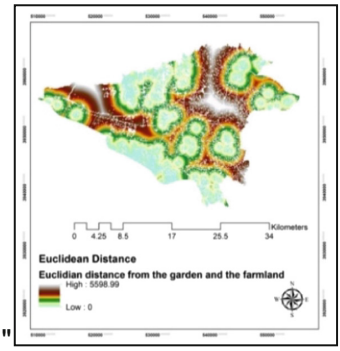
- Foresters [1, 9, 26, 33]
- User and Ground Coverage [31, 32]
- Health [33]
- Crime [7]
- Urban space [13, 17, 22].

5 Findings of the Research

Euclidian Distance of Different Urban Land-Uses in Urban Space

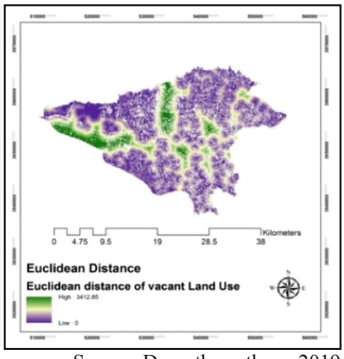
In this section, we analyze the effects of land-use patterns on housing prices. For this purpose, the Euclidean distance of various urban land-use was presented in the form of the following maps as independent variables.

Euclidian Distance Map city of garden and farmland



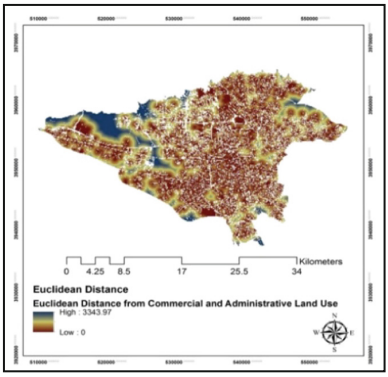
Source: Draw the authors, 2019

Euclidian Distance Map city of vacant land-uses



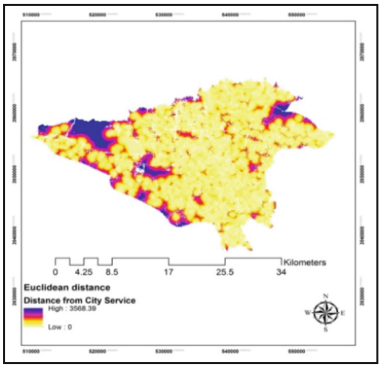
Source: Draw the authors, 2019

Euclidean distance map city of commercial and office user



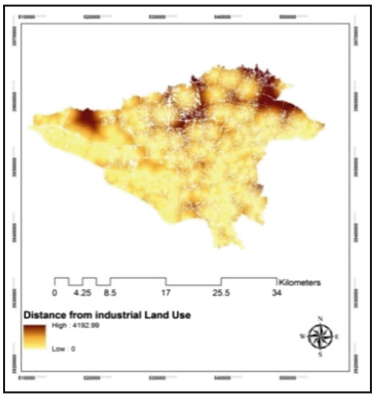
Source: Draw the authors, 2019

Euclidean distance map of service user



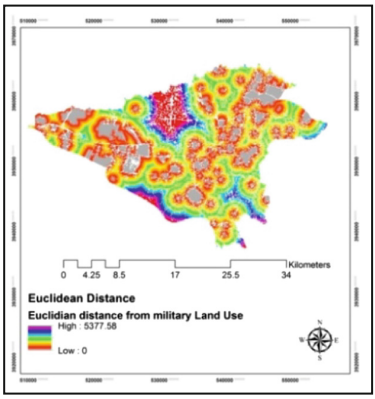
Source: Draw the authors, 2019

Euclidean distance map of the city of industrial uses



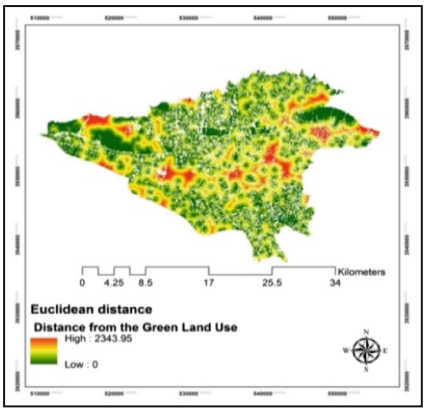
Source: Draw the authors, 2019

Euclidean distance map of the military uses



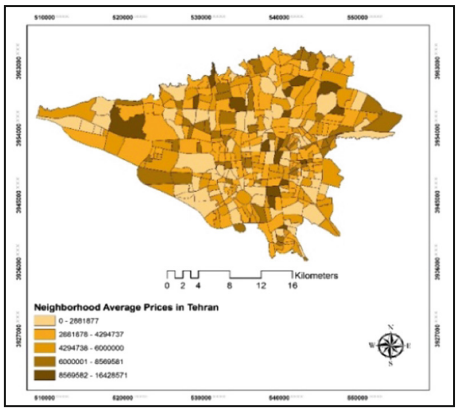
Source: Draw the authors, 2019

Map of Euclidian City Distance from Urban Green Utilities



Source: Draw the authors, 2019

Average housing prices in the neighborhoods



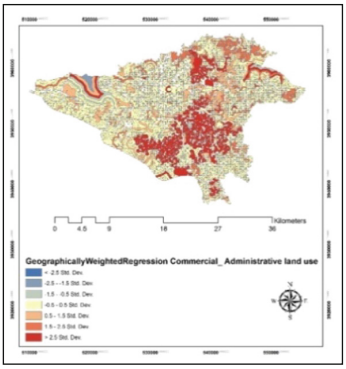
Source: Draw the authors, 2019

According to the following map, which is a dependent variable in this research, each of the effects of the use on the price of housing is determined. Finally, geographic weight regression maps mapped out the effects of each application on housing prices.

In this section, we use geographic weight regression maps to analyze the effects of land use patterns on housing prices.

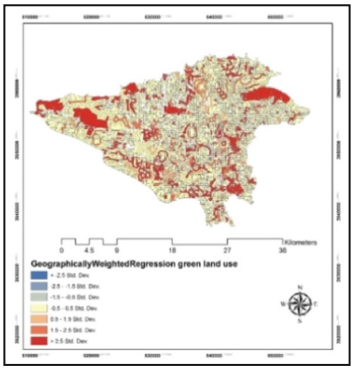
5.1 The Impact Each of Land-Use on Housing Prices

Impact of Commercial land-use on Housing Prices.



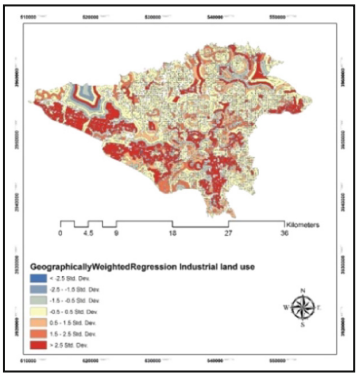
Source: Draw the authors, 2019

Impact of green land-use and park on housing prices.



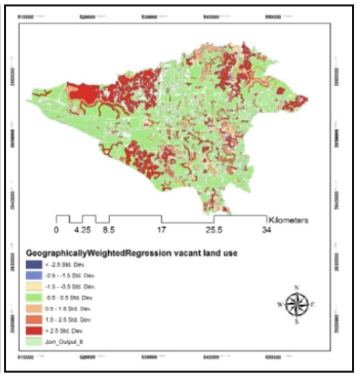
Source: Draw the authors, 2019

Impact of industrial land uses on housing prices



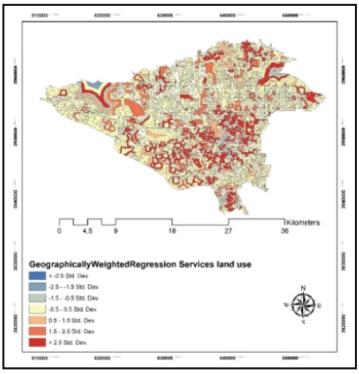
Source: Draw the authors, 2019

Impact of vacant land uses on Housing Prices



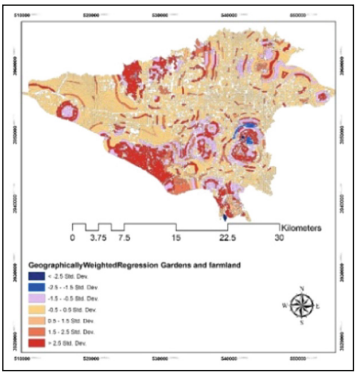
Source: Draw the authors, 2019

Impact of city utilities on housing prices



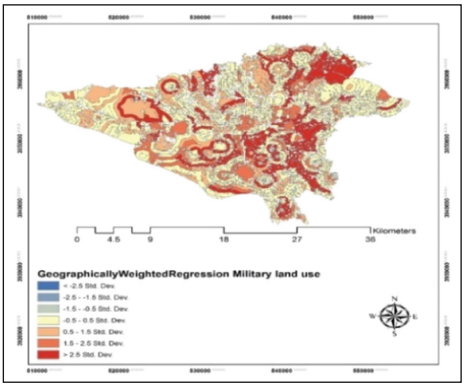
Source: Draw the authors, 2019

Impact of access to gardens and farmland on housing prices



Source: Draw the authors, 2019

The impact of military use on housing prices



Source: Draw the authors, 2019

The trend of regression model in determining land-use patterns and its effect on housing prices in Tehran shows that the output of model parameters confirms the high predicted value. The most important values here are R^2 and R^2 Adjusted values, which in fact represent the goodness and accuracy of the model used. Whatever these values are closer to 1, it means that the descriptive variables used can explain well the changes of the dependent variable. Regarding the high coefficient of R^2 (0.87), it can be said that green land-use and parks have greatly influenced housing prices and have led to a rise in housing prices in these areas. Regarding the commercial and administrative land-use, considering the coefficient of R^2 (0.24), it can be said that commercial and administrative land-use had less effect on housing prices and had less effect on the rise in housing prices in these areas. At the same time, considering the coefficient of R^2 (−0.21), industrial land-use on housing prices, it can be said that the effect of this user on the price of housing has been reversed and reduced its amount in these areas. vacant and not built land-use, in this regard, considering the coefficient R^2 (−0.28), the user has been negatively affected by the housing price and, like the industrial one, has reduced the price of housing in these areas. In this regard, the urban services land-use of the city, given the high coefficient of R^2 (0.80), can be said to have had a significant impact on housing prices and has led to a rise in housing prices in these areas. At the same time, given the coefficient of R^2 (0.36), it is possible to say that gardens and farmland have had less impact on housing prices and have had less effect on the rise in housing prices in these areas. Regarding the high and the reverse of R^2 (−0.72), it can be said that access to military user, terminals and storage facilities has had significant inverse on housing prices and has led to lower housing prices in the vicinity of these areas (Table 2).

Table 2. The effects of land use on housing prices in Tehran

Band with	Residual squares	Effective number	Sigma	AICc	R2	R2Adjusted	Dependent field	Explanatory field
8456.66	6.76622	15.0350	1481216	96867.6	0.87	0.87	Housing prices in Tehran	Green and parks
1600.88	2.19610	214.189	3094196	82183.5	0.24	0.17		Commercial and administrative land-use
1441.84	8.41138	232.583	2178467	64331.1	−0.21	−0.11		Industrial land use
1107.34	8.77761	360.936	1734069	103727	−0.28	−0.20		Vacant land use
1263.46	6.97	257.819	1407321	117812	0.36	0.36		Gardens and farm land
3727.76	7.60733	54.1520	1666603	87977	0.80	0.79		Urban land use services
12142.0	1.13841	7.73766	2817321	46929.1	−0.72	−0.72		Military land use

Source: Research findings: 2019.

6 Conclusion

The factors affecting on housing price at the neighborhood level, in addition to macro factors, can be considered as another factor, and the effect of the mixing of uses and its undeniable effect as a factor on the price of housing. Thus, in residential neighborhoods, the proximity to retail outlets can add value to housing prices, which is why services are offered with better conditions. Also, in Traditional theories housing prices, changing the distance from the city center and main access is considered to be a major factor in the difference in housing prices, and based on that the distance from the city's commercial center Causes housing prices to spatial changes. Other important factors influencing housing prices are, of course, also referred to as housing production factors: land prices, construction materials, labor costs, and technology has been used. In terms of physical indicators, these indicators are of economic, social, cultural and technical dimensions. Among the physical indicators that affect housing prices, we can point to the density Floor area ratio and land area. The price of housing and land is usually directly related to congestion, both in construction and in demographic terms.

Given that the topic of the housing economy is a comprehensive and interdisciplinary topic (politics, economics, management, geography, etc.), this paper discusses the impact of geographical factors (types of uses) on housing prices, and thus it was found that in Tehran metropolis city that User mixing at its maximum, the following uses had the most impact on housing prices, respectively:

1. Green land-use and parks with R^2/87
2. urban services land-use with R^2/80
3. Access to gardens and farmlands with R^2/36
4. commercial and administrate land-use with R^2/24

In this regard, in order to prevent the stagnation of housing prices in Tehran and citizens' satisfaction and facilitate access to urban housing, the proposals are presented as follows:

1. Facilitate and discounted construction permits and give incentives to build
2. Discount on housing costs for real housing applicants
3. Managing the resources of all financial institutions, including pension funds, social security, insurance and investment in housing construction
4. Use of new financing tools
5. Strengthening effective demand through saving policy
6. Paying facilities for half-finished projects
7. Supporting Housing investment companies and developers to build housing through the assignment of land, company licensing and payment facilities.

Acknowledgments. Thanks to the organization from Iranian researchers and technicians for assistance and support in the preparation of this article: The Iranian National Science Foundation (INSF).

References

1. Abedin Dercoosh, S., Rahimian, S.: Analysis of factors influencing housing prices in urban areas of Iran during the period (2006 -1991). Econ. Hous. Q. (46), 11 (2010). (In Persian)
2. Emadzadeh, A.N., Ali, M.V.R.: Factors affecting housing prices in Mashhad. Spatial econometric approach in Hadanik Method. Q. J. Econ. Res. **11 & 12**, 81–99 (2004)
3. Anselin, L.: Spatial Econometrics: Methods and Models. Kluwer Academic Publishers, Dordrecht (1988)
4. Arnott, R.: Housing policy in developing. Countries: the importance of the informal economy. World Bank Commission on Growth and Development (2008)
5. Azizi, M.M.: Position of housing indicators in the housing planning process. Beautiful Arts J. **17**(17), 31–42 (2004). (In Persian)
6. Buckley, R., Jerry, K.: Housing policy in developing countries: conjectures and refutations. World Bank Res. Obs. **20**, 233–257 (2005). Fall 2005
7. Cahill, M., Gordon, M.: Using geographically weighted regression to explore local crime patterns. Soc. Sci. Comput. Rev. **25**(2), 174–193 (2007)
8. Cardozo, O.D., García-Palomares, J.C., Gutiérrez, J.: Application of geographically weighted regression to the direct forecasting of transit ridership at station-level. Appl. Geogr. **34**, 548–558 (2012)
9. Clement, F., Orange, D., Williams, M., Mulley, C., Epprecht, M.: Drivers of afforestation in Northern Vietnam: assessing local variations using geographically weighted regression. Appl. Geogr. **29**(4), 561–576 (2009)
10. Daneshpour, A., Hosseini, S.: The place of physical factors in the reduction of housing prices. Arman. Shahr Arch. Urban Dev. Q. **5**(9), 61–71 (2012). Autumn and Winter 2012
11. Fotheringham, A.S., Brunsdon, C., Charlton, M.E.: Geographically Weighted Regression: The Analysis of Spatially Varying Relationships. Wiley, Chichester (2002)
12. Gallent, N., Robinson, S.: Local perspectives on rural housing affordability and implications for the localism agenda in England. J. Rural. Stud. **27**, 297–307 (2011)
13. Gao, J., Li, S.: Detecting spatially non-stationary and scale-dependent relationships between urban landscape fragmentation and related factors using geographically weighted regression. Appl. Geogr. **31**(1), 292–302 (2011)
14. Gholizadeh, A.A.: Theory of Housing Prices in Iran in Simple Language. Noor Alam Publications, Hamadan (2008). (In Persian)

15. Hadayeghi, A., Shalaby, A.S., Persaud, B.N.: Development of planning level transportation safety tools using geographically weighted poisson regression. Accid. Anal. Prev. **42**(2), 676–688 (2010)
16. Ali, H.N., Mojtaba, R., Hussein, Z.: Examination of individual variables affecting citizens' satisfaction with the quality of life environment (case study: comparison of old and new text in Shiraz city). Geogr. Dev. **8**(17), 63–82 (2010)
17. Hanham, R., Spiker, J.S.: Urban sprawl detection using satellite imagery and geographically weighted regression. In: Jensen, R.R., Gatrell, J.D., McLean, D.D. (eds.) Geo-Spatial Technologies in Urban Environments, pp. 137–151. Springer, Berlin (2005). https://doi.org/10.1007/3-540-26676-3_12
18. Hatami Nejhad, H., Seifadini Frank, M.M.: An investigation of indicators of informal housing in Iran (case study: Sheikh Abad Quarter of Qom). J. Geogr. Res. **38**(58), 129–145 (2006)
19. Karami, A.: Study of the Housing Market in Iran (with Emphasis on Government Policies). Tadbir Economics Research Institute (2007). Printing: 1
20. King, P., Aldershot, A.: A social philosophy of hosing. Habitat Int. **29**, 603–611 (2005)
21. Lloyd, C.D.: Local Models for Spatial Analysis. Taylor & Francis, Boca Raton (2010)
22. Luo, J., Wei, Y.H.D.: Modeling spatial variations of urban growth patterns in Chinese cities: the case of Nanjing. Landscape and Urban Planning **91**(2), 51–64 (2009)
23. Mashhad Municipality Economical Studies Group: Investigation of IRAN Housing Market and Influential Factors on it. Management of the Expansion and Researches of the Mashhad Municipality, Mashhad (2010)
24. Mennis, J.: Mapping the results of geographically weighted regression. Cartogr. J. **43**(2), 171–179 (2006)
25. NajiMeidani, A.A., Fallahi, M.A., Zabihi, M.: Investigating the dynamic effect of macroeconomic factors on housing price fluctuations in Iran during the period (1990 to 2007). Knowl. Dev. **17**(31), 158–184 (2010)
26. Pineda, N.B., Bosque-Sendra, J., Gómez-Delgado, M., Franco, R.: Exploring the driving forces behind deforestation in the state of Mexico (Mexico) using geographically weighted regression. Appl. Geogr. **30**(4), 576–591 (2010)
27. Pourmohammadi, M.R.: Housing Planning. Tehran University Press, Tehran (2008). (In Persian)
28. Rafieian, M., Asgari, A., Asgarizadeh, Z.: Assessment of citizens' satisfaction from urban habitat. Environ. Sci. **7**(1), 57–68 (2009)
29. Riazi, M., Emami, A.: Residential satisfaction in affordable housing: a mixed method study. Cities **82**, 1–9 (2018)
30. Smith, M.J., Goodchild, M.F., Longley, P.A.: Geospatial Analysis. A Comprehensive Guide to Principles, Techniques and Software Tools. Matador, Leicester (2009)
31. Tu, J.: Spatially varying relationships between land use and water quality across an urbanization gradient explored by geographically weighted regression. Appl. Geogr. **31**(1), 376–392 (2011)
32. Tu, J., Guo, X.: Examining spatially varying relationships between land use and water quality using geographically weighted regression I: model design and evaluation. Sci. Total Environ. **407**(1), 358–378 (2008)
33. Zhang, L., Shi, H.: Local modeling of tree growth by geographically weighted regression. For. Sci. **50**(2), 225–244 (2004)