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Determination of the Impact of Parks and Playgrounds on House Prices in the City of Erzurum, Turkey

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Abstract

Parks and playgrounds are important places in a city where various functions are performed. The subject of this study was to determine if parks and playgrounds have economical effects on the house prices in the city of Erzurum. The correlation between parks and playgrounds and house prices was analysed by using hedonic pricing method. With this aim, in three different sites (e.g. the city centre, Yenisehir and Dadaskent districts), the prices and distances from nearby parks and playgrounds of the residences were detected. Residence-owners were interviewed and the features of the residences effective on the prices and environmental compounds were classified. Hedonic pricing method indicated that the most significant factors affecting the prices of the houses in the city of Erzurum are those related to the features of the residences. However, playgrounds were effective on house prices but park areas did not have significant effect on house prices in Erzurum in Turkey.

Key words: Hedonic price, parks, playgrounds, residential features, Erzurum, Turkey

INTRODUCTION

A city is composed of structured areas and open spaces. While buildings represent structured areas; public and private parks, playgrounds, sport areas, roads, squares and other surrounding component areas are in open space forms. Green areas offer recreative areas (parks, playgrounds, sport areas etc.) for different age groups [1-4]. Parks and playgrounds are common places designed by the city administration so that people and children in the city can walk, relax, play, enjoy and perform other recreation activities.

Parks and playgrounds have many beneficial aspects, such as social, economic and environmental [4]. Many of these recreational areas may yet prove to be valuable community assets in the new millennium [5]. The availability of parks, sport areas, playgrounds etc. is an important quality of life factor for corporations choosing where to locate facilities and for well-educated individuals choosing a place to live [6].

Parks provide green space close to residential areas and offer places for active and passive recreation [7]. Parks and other green spaces are of a strategic importance for the quality of life of our urbanized society [8]. Parks provide recreational and leisure opportunities, and some landscaping improvements for public spaces. A new view on urban parks, however, sees them as part of the broader structure of urban development, including housing and commercial redevelopment, workforce development and environmental infrastructure [9]. Parks as an urban landscape feature serve many functions as providers of active and passive recreation, environmental benefits, and wildlife habitat [2]. According to the Bold (1918), the provision of parks and playgrounds pays a city in increase of land values, attraction of population, improvement of the public health, and reduction of delinquency [5]. In addition to all these features, parks and playgrounds also have the effects from the economical respect on a city. Open spaces such as public parks, playgrounds, natural areas and golf courses may have an influence on the sale price of homes in close proximity to those resources [1].

Different techniques can be used to value the environmental amenities and green structure. Perhaps the most common of them are travel cost, contingent valuation and hedonic pricing method. The hedonic pricing method is used to estimate the value of environmental amenities that affect prices of marketed goods. Most applications use residential housing prices to estimate the value of environmental amenities. The method is based on the assumption that people value the characteristics of a good or the services it provides, rather than the good itself. Thus, prices will reflect the value of a set of characteristics, including environmental characteristics that people consider important when purchasing the good [10,11-12].

Many studies have been carried out using hedonic pricing method. Some recent applications of the method have focused on the analyses of the recreational values of the forest, lake and natural restoration areas [13,10-14] applied this methodology to evaluate the valuation of urban parks. [10] estimated urban parks to influence property prices up to 600 meters from houses.

Hedonic pricing method has been used to evaluate; environmental amenities [15], the implicit prices of outdoor recreation goods [16], city quality life [17], property price near the urban forest amenities [18-19], open spaces [20] and different types of open space land uses [21-22]. [12] used hedonic price methodology to link between housing prices and urban green areas endowments. [11,23-24] studied to explore the effect of different environmental factors on estate pricing. [25]_used this method to explore the impact of the land-use

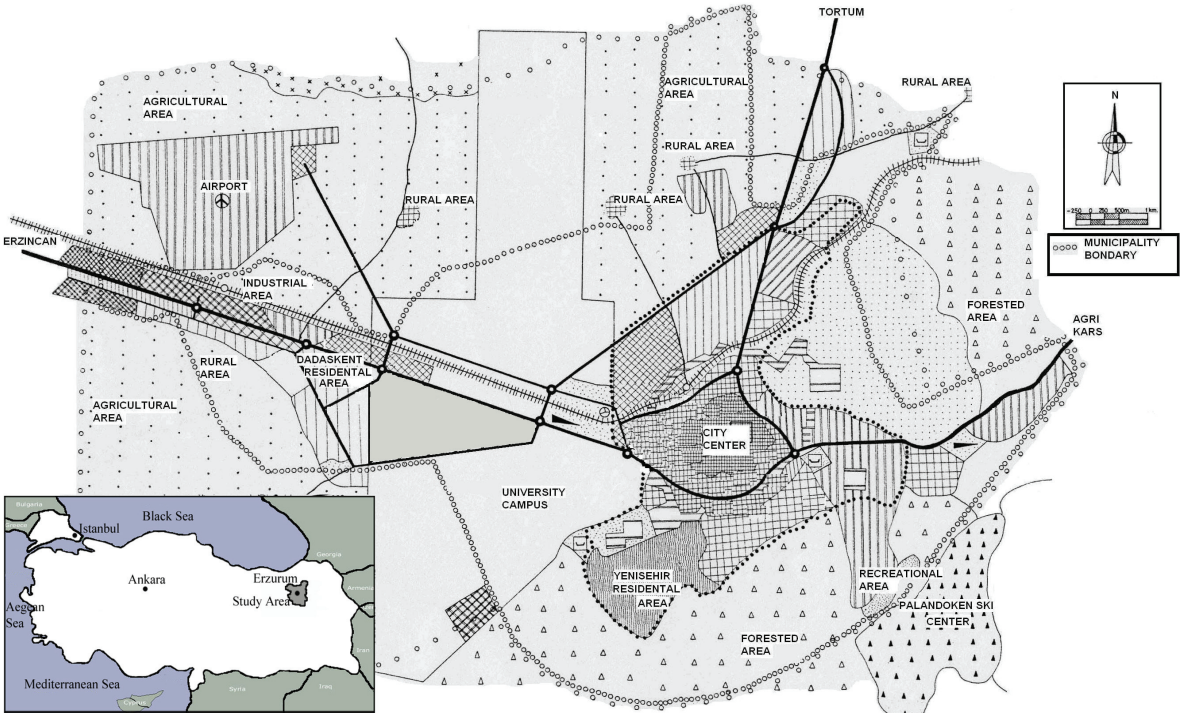

Figure 1. Location of Erzurum city in Turkey

planning system (and land supply) on housing prices and [14-22] used it for estimating the economic benefits of proximity to urban open spaces. However, related studies about the topic [e.g. 26,27-28] in Turkey are very limited.

The aim of this study was to determine if the parks and playgrounds affect the house prices in Erzurum city (Turkey), using the hedonic pricing method.

STUDY AREA

Erzurum is located in the Eastern Anatolia Region of Turkey (39°55; 41°46) (Fig 1). The average altitude is 1860 m; Erzurum city centre has an area of 3850 acres. The city is situated among steep mountains that are mostly higher than 3000 meters ranging on the direction from east to west. The statistics of the last 71 years show that the annual rainfall is 400 mm, annual temperature is 5.2°C, humidity is 64.3 %, and the number of days when the ground is covered by snow is 94.7 on the average [29].

After the first reconstruction plan carried out by Lambert in 1939, Erzurum has experienced a rapid urbanisation process and the city has extended towards the directions of west, north and south. While some of the housing areas were being developed by establishing an organic balance with environmental elements, most of them lacked this tie. According to the figures revealed by Turkish Republic State Institute of Statistics, the population in the city centre was 133.644 in 1970 reaching 246.053 in 1985 and 366.962 in 2000 census [29]. The economy in the city is mostly dependent on agriculture and husbandry, however; recently tourism and service sectors have also been improving rapidly. The city has gained a new fame with the winter tourism improved in recent years.

METHODOLOGY

The hedonic method used to measure the monetary value of parks and playgrounds in this study follows pioneering study of [30]. Rosen, in his work, proposed a model of market behaviour that described the workings of markets for differentiate goods. According to Rosen, the housing unit (a bundle of characteristics) commands a price in the market. Various bundles and their associated prices reveal the implicit prices of characteristics, known as hedonic prices. These prices can be determined from regression of price on characteristics. This regression is known as hedonic price model (*HPM*). Thus, in the case of housing prices, let $z_i = (z_1, z_2, \ldots, z_n)$ be vector of housing characteristics and $P(z)$ be a hedonic price function, *HPM* is expressed as ;

$$P(z)=P(z_1, z_2, \ldots, z_n)$$

This function shows a price set defined by housing characteristics and helps to find what portion of the price is determined by each characteristic. Partial derivatives of this function with respect to each characteristic provide information on the marginal willingness to pay for an additional unit of each characteristic, hence it is possible to deduce implicit price of each one of them [12].

$$P_{z_i}(z_i, z_{-i}) = \frac{\partial P(z)}{\partial z_i}$$

Since, housing characteristics are not subject to trade individually apart from the differentiated good in the market, it is accepted that only implicit prices are being formed.

In empirical analysis, firstly a model is specified and then its parameters are estimated. Model specification consists of some formal stages. First of these is selection of variables entering the model. For the hedonic model of housing prices, dependent variable is housing prices. Housing prices are either selling price or rental price of the sample houses. This study takes selling price as dependent variable. All variables explaining housing prices are candidate for being independent variable. These variables can be separated into two groups: (1) Structural

variables, which come from construction of house such as size of house, number of rooms and so forth, (2) Environmental variables which are all factors come from location of house such as distance from central business district, shopping centre, green areas and so forth. Environmental factors usually include distance from environmental components and show degree of usage of them for residents of house.

Second stage is the choice of functional form of equation. Functional form is not clear in a hedonic model. Rosen [30] has indicated that hedonic regression equations may not take a linear functional form. The broad consensus of the literature is that the choice of functional form in HPM's is likely to be empirically determined. However, the present study determines functional form empirically among linear-linear, log-log and log-linear functional forms. In this paper, it is found that log-linear (semi-logarithm) functional form provides best fitting for the data. Thus, HPM for this study was written as:

$$lnP_i = b_0 + b_1 z_{1i} + b_2 z_{2i} + b_3 z_{3i} + \ldots + b_k z_{ki} + u_i$$

where b_j (j=1, 2, …, k) are parameters which measure proportional change in housing price for a unit change in the value of concerned regressor.

In the third stage of model specification, theoretical or priory expectations on the direction of relationships (i.e. sign of parameters) and the magnitude of parameters are determined if there are such expectations. After the model specification, model parameters are normally estimated using the ordinary least squares (OLS) method.

Estimation process is required data measured objectively. For this aim, the data from real estate offices and title deed inventories are often used. Because of the fact that such inventories cannot be found, a method of obtaining the data from a survey was chosen. Because there are no inventories present related to the title deed and real estate.

House prices were obtained from the surveys completed by the owners of the houses bought between 2002 and 2004. The subjects interviewed are those who have bought houses in the last two years. Because the residence prices were updated according to the inflation of the last two years, the prices in the study refer to the prices of the residences in the house marketing in May 2004 term. In addition to the house prices, the distances of the houses to surrounding parks and playgrounds were detected in situ. The features of the residences were determined by the means of questionnaires.

Questionnaires were completed in three different sites, which are city centre and the districts of Yenisehir and Dadaskent. The district of Yenisehir, a site 2 km from city centre, was formed in order to stop distorted urbanisation. The district of Dadaskent established 5 km from the city centre is a collective housing area. Totally, 250 questionnaires were completed due to the fact that the number of the residences bought over the last two years (2003-2005) was limited. Questionnaires were administered by the house owners by interviewing them face to face.

RESULTS AND DISCUSSION

This study uses housing prices to obtain monetary value of parks and playgrounds in Erzurum city. Dependent variable is housing prices transacted in the period between January 2003 and May 2005 in Erzurum. During this period Turkey has experienced an inflationary process in her economy. Housing

Table 1. Variables considered in regression for hedonic price analysis

Variables	Description
Ln price	Log of housing price, dependent variable
Living area	Living area of the dwelling, in square meters.
Distance for CBD	Distance from the housing to the Central Business District in city (in meter).
Basement	Lower floor of the building. Dichotomous variable that takes value of 1 if the house is on the basement and value 0 otherwise.
Central heating	The heating system of the floor. Dichotomous variable that takes 1 if the heating system is central heating and 0 otherwise.
Decoration position	Decoration position of the flat. Dichotomous variable that takes 1 if the house is decorated with some fix component when buying and 0 otherwise.
Main road	Location of building (on the main road). Dichotomous variable that takes 1 if the house is on main road and 0 otherwise.
Yenisehir district	One of the districts of Erzurum (survey area). 2 km from city centre Dichotomous variable that takes 1 if the house is in Yenişehir district and 0 otherwise.
Dadaskent district	One of the districts of Erzurum (survey area). 5 km away from city centre Dichotomous variable that takes value of 1 if the house is in Dadaskent district and value is 0 otherwise.
Age of house	Housing age in years. Dichotomous variable that takes 1 if the house is constructed in 1996-2004 and 0 otherwise.
Park distance	The distance from the nearest park area to the housing (in meter).
Playground distance	The distance from the nearest playground to the housing (in meter).
Closed garage	Variable that takes value 1 if the garage is closed and value 0 otherwise.
View of house	Dichotomous variable that takes 1 if the housing overlooks empty (not a green area, waste area) area and 0 otherwise.

prices were also affected from this process and differentiated due to factors rather than housing characteristics. Housing prices item in consumer price indices of Turkey show that housing prices increased almost about at a 35.8 percent level from the beginning to the end of the underlying period. These differentiations should be removed in order to analyse prices correctly. So, transaction prices are deflated using housing price indices in consumer prices taken from the Turkish Republic State Institute of Statistics. Explanatory variables are housing characteristics obtained from survey. Some of these variables are numeric while others are dichotomous produced from non-numeric characteristics. In the result of several trials, an ideal model was reached. According to the model, 4 numeric and 9 dichotomous variables were seen. Among them, 3 numeric and 9 dichotomous variables were determined to have a significant effect on house prices. These variables and their descriptions were given in Table 1.

Table 2 shows the evaluation of the components about house and recreational areas (parks and playgrounds) in log-linear model. At 5% significance level, living area, distance from central business district (CBD), basement, central heating, decoration position, Yenisehir district and age of house were important (Table 3). In some other studies, similar results were found, for instance, while [12] found living area, distance for central business district, age of house significant, Chiesure [18] found living area, age of house, [22] found percentage of urban green space and [28] found living area, age of house, heating system significant.

Table 2. Housing price determinants

Variable	Coefficient		*t*- ratio	*P*-value
	B	Std. Error		
CONSTANT	3.033	0.119	25.559	0.000
LIVING AREA	3.148E-03	0.001	4.140	0.000
DISTANCE FOR CBD	-9.241E-05	0.000	-5.186	0.000
BASEMENT	-0.662	0.113	-5.886	0.000
CENTRAL HEATING	0.287	0.95	3.012	0.003
DECORATION	0.157	0.054	2.933	0.004
MAIN ROAD	9.436E-02	0.048	1.964	0.51
YENISEHIR	-0.142	0.052	-2.732	0.007
DADASKENT	-4.190E-02	0.118	-0.356	0.722
AGE OF HOUSE	0.243	0.065	3.711	0.000
PARKDIS	-4.671E-05	0.000	-0.874	0.383
PLAYGROUNDDIS	-7.823E-05	0.000	-1.108	0.269
CLOSED GARAGE	0.185	0.101	1.833	0.068
VIEW OF HOUSE	-0.116	0.064	-1.804	0.072

R^2=0.549, adjusted R^2=0.524, n=250

At 10% significance level, main road, playgrounds, closed garage and view of house were also significant on house prices.

Results indicated that the vast area in front of on house causes reduction in the housing prices. Properties of the houses are more effective on the house prices than surrounding components in Erzurum city. Although parks and playgrounds are among the most important recreational areas in cities, it was determined for this study that parks but playgrounds have direct effects on the house prices in Erzurum city (Table 3).

Table 3. Price determinants after eliminating collinear regressors

Variable	Coefficient		*t*- ratio	*P*-value
	B	Std. Error		
CONSTANT	3.032	0.117	25.938	0.000
LIVING AREA	3.060E-03	0.001	4.077	0.000**
DISTANCE FOR CBD	-9.540E-05	0.000	-6.518	0.000**
BASEMENT	-0.657	0.112	-5.890	0.000**
CENTRAL HEATING	0.286	0.092	3.092	0.002**
DECORATION	0.155	0.053	2.909	0.004**
MAIN ROAD	8.838E-02	0.047	1.864	0.064*
YENISEHIR	-0.132	0.048	-2.763	0.006**
AGE OF HOUSE	0.250	0.063	3.934	0.000**
PLAYGROUNDDIS	-1.036E-04	0.000	-1.702	0.090*
CLOSED GARAGE	0.178	0.101	1.767	0.078*
VIEW OF HOUSE	-0.115	0.063	-1.807	0.072*

R^2=0.547, adjusted R^2=0.526, n=250
*Significant at 10% significance level
**Significant at 5% significance level

CONCLUSIONS

Urban open-green spaces have several functional, aesthetic and economic aspects. In the present study, it was attempted to evaluate the effects of the park and playground areas on residence prices in the city of Erzurum.

House prices may change depending on several factors such as features of a given house and environmental compounds. The variables having statistically significant affects on residence prices were; living area, distance from central business district (CBD), basement, central heating, decoration position, main road, Yenisehir district, age of house, playgrounds, closed garage, view of house. Properties of the houses are more effective on the house prices than other surrounding components in Erzurum city. It was concluded that playgrounds in the city of Erzurum have favourable affects on the prices but the parks do not have favourable affects on the prices.

This is mainly caused by the socio-economical conditions of the interviewed subjects. Improvements in the socio-economical conditions in the future will, no doubt, increase the importance of the green areas in whole city. In addition, by this way, vitality of the open-green spaces will be realised in the urban character. Additionally, park areas were randomly selected in the urban character, they are not in the adequate size and densely present in some parts of the city decreases the importance of the green areas. Existing open-green spaces are not in a size adequate to improve the quality of the environment. Open-green areas of the city must be brought a level that can improve urban ecosystem, aesthetics and economics.

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