An Empirical Investigation of the Housing Price Dynamics across the Districts of Izmir

Tuğçe PEKDOĞAN¹, Gülçin ÖZEN²,
İlker GÜÇÜ³, Mümine GERÇEK⁴

Abstract

The growth in the population of Turkey leads to increasing demand for housing. Therefore, the construction sector within this field gain importance as well as caused huge fluctuations in the prices of buildings. In order to understand the logic behind these economic changes, it is important to examine the parameters affecting the decisions of housing prices. Some of these parameters are the location, physical condition of the house, landscape condition, proximity to public transportation, etc. In the literature, many studies on housing prices have been made and detailed by the architects, city planners, and economists in theoretical and practical terms. The focus has been given on Izmir which is one of the most crowded cities in Turkey and the aim of this study is to investigate the factors affecting the apartment prices of twenty-seven districts in Izmir province. For this purpose, m2 prices compiled from the top real estate websites and data were analyzed by two independent sample t-test methods in Microsoft Excel. The analyses were performed according to nine different parameters. For each analysis, these twenty-seven districts are divided into distinct groups according to their characteristics. The empirical analysis results indicate that, the most important factors affecting housing m2 prices in Izmir are closeness to the sea, settlement around university campuses, mass transit rail system, population density and agricultural and industrial zone.

Keywords: Izmir, Housing Sector, Housing Price, T-Test

Introduction

According to Maslow (1987), there is a hierarchical order of human needs and this order is a pyramidal structure that varies according to the most and the least important needs. The priority is physiological needs, followed by security and belonging. The housing is essential principal for both security, social and personal satisfaction in this pyramid. Houses are the basic symbols of the existence of the cities and, they are not only shelters but also places where the privacy of the person and the family is protected. Besides, it is the

¹ Res. Assist. Izmir Institute of Technology, tugcepekdogan@iyte.edu.tr
² Res. Assist Izmir Institute of Technology, gulcinozen@iyte.edu.tr
³ Res. Assist Izmir Institute of Technology, ilkergucu@iyte.edu.tr
⁴ Res. Assist Izmir Institute of Technology, muminegercek@iyte.edu.tr
place to feel secure, and store energy for maintaining a healthy and quality life. Therefore, housing is the most effective assurance of human existence (Ören and Yüksel, 2013). In fact, housing is a necessity, referring to a structure that is resistant to natural disasters, as well as providing shelter for the individual and qualified life. The main features of housing distinguished from other properties are durability, immovability and heterogeneity.

Payment for living has one of the greatest share in expenditures. Therefore, changing housing prices have an additional effect on national income conditions, and create fluctuations on socioeconomic conditions for both individuals and governments, as well. According to the statistics of housing price index in Izmir, it is observed that; new housing price index is 17.60%, existing housing price index is 20.65% also unit price per square meter in 2016 is 2318.25₺ (The Central Bank of the Republic of Turkey, 2017).

The demand for housing in Turkey is continuously increasing and because of its heterogeneous structure, many factors have effects on housing prices. Some of these factors are the location of the building, the material characteristics, the vista and sizes of the houses. There are many studies in the literature related to housing sales price. The general assumption coming from the literature is the heterogeneous structure of housing, consisting of different properties. Having heterogeneous property means that the number of variables determining the price of a house is more than one. Therefore, the price of a dwelling is equal to the sum of the prices of the characteristics possessed by the dwelling, and the price of each dwelling varies according to the characteristics of the dwelling and the number of these components. For example, the prices of a 4-room residence and a 3-room residence located at the same place are different from each other.

One of the earliest studies on housing demand belongs to Duesenberry and Kristin (1953). In this study, the effect of housing income was investigated. Accordingly, they found that the housing demand is affected by income positively.

Kain and Quigley (1970) try to explain the parameters of house sales price and the house rent price which are dependent variables, with the building quality, the bath number, the room number and the age of building which are independent variables. Initially, they conducted a factor analysis to determine quality criteria for housing. Therefore, the quality of the residential properties, building quality and building quality variables in the restricted model for the tenants were statistically significant, but these variables were meaningless in the restricted model established for the houses.
According to Goodman (1978), the hedonic price function is based on functional assumptions. Goodman emphasized that, the linear model mold is usually much more useful. The results show that, variables have different effects on price in the city center and suburbs, and the prices of the neighborhood and structural characteristics are 20% higher in the city center than the suburbs.

Üçdoğruk (2001) searched the factors affecting the price of housing in İzmir province. In his study, he tried to explain housing sales price with independent variables, which are window joinery, roof insulation, the number of rooms etc. The result of the study is that, number of the rooms was statistically insignificant according to the created models and the variables such as the number of bathrooms, residential area, and age of houses, the number of balconies and number of elevators were statistically significant and had effects on increasing the house prices.

Yiu and Wong (2004), empirical study attempts to identify directly the effects of expected transport improvements on housing price. The results showed that there were positive price expectation effects before the completion of the tunnel. Moreover, results also showed significant increases in price before the completion of the works, although not necessarily at the commencement of the works.

Finally, Kaya’s (2012) study is related with hedonic pricing model and it is applied to the data obtained via the house price index study performed at the Central Bank of Turkey. For the period between December 2010 and June 2012, the results show that under the constant housing features, pure price changes are obtained as 6, 21% for Turkey, 5, 93% for İstanbul, and 5, 05% and 2, 83% for Ankara and İzmir respectively.

Moreover, the prices of similar houses with the same features, that is, the same number of characteristic components, may be different from each other. The main reason for this is the location where the houses are located in.

Accordingly, the main aim of this study is to examine the parameters affecting the price of the apartment per square meter in İzmir. It is also objected to analyze the marginal effects of different characteristics of apartments for sale on m2 prices by following the price changes in the housing market. Within the scope of this aim, the prices of apartments selected from 27 different districts of İzmir province were investigated (Beydağ, Kınık and Kiraz districts are not included in the study due to insufficient data). Square meters of apartments for sale in these districts have been obtained via sahibinden.com and hurriyetemlak.com. In addition, May
2017 data were used for the analyses. These districts were divided into 9 different categories, which are explained as follows:

- Districts located at the seaside or in inner regions,
- Districts located at the north or south of Izmir,
- Districts located in the west or east of Izmir,
- Districts where organized industrial zones are located,
- Districts where university campuses are located,
- Districts with mass transit rail system,
- Core and periphery districts,
- Districts according to the number of people per km2,
- According to the agricultural areas of the provinces.

The analyses in the study were carried out by the two independent sample t-test methods. As a result, mapping of the districts was performed by using parameters mentioned above.

1. Data and Methodology

The housing is defined as a heterogeneous property that has many features. One of the most common methods used to estimate the price of the heterogeneous property is the independent t-test method and this method was used for this study. Microsoft Office Excel’s own t-test calculation method was used for the analysis of the study. Mapping and dendrogram of the districts were performed to reflect price ranges.

The prices of apartments for sale in 27 districts of Izmir province are the main data used in the study. These prices have been obtained from sahibinden.com and hurriyetemlak.com websites. In addition, the prices are in Turkish Lira (₺) and according to the average of May 2017.

The prices of apartment m² for sale in Çeşme district are very high when compared to other districts. For this reason, Çeşme was regarded as an outlier. Therefore, analyses were performed in two ways: With outliers and without outlier.

The districts are grouped separately for nine analyses. The performed analysis and district grouping in the study are as follows:

1.1. North-South Analysis
In order to analyze the apartment prices for the sale of the districts in the southern and northern regions of Izmir, districts are divided into two groups. Aliağa, Bayraklı, Bergama, Bornova, Çiğli, Dikili, Foça, Karşıyaka, Kemalpaşa, Menemen are located in the northern group and Balçova, Bayındır, Buca, Çeşme, Gaziemir, Güzelbahçe, Karabağlar, Karaburun, Konak, Menderes, Narlıdere, Ödemiş, Seferihisar, Selçuk, Tire, Torbalı, Urfıa are located in the southern group.

1.2. West-East Analysis

To analyze the apartment prices for the sale of the districts in the western and eastern regions of Izmir, districts are divided into two groups. Aliağa, Çiğli, Gaziemir, Menderes, Menemen, Balçova, Bayraklı, Çeşme, Dikili, Foça, Güzelbahçe, Karabağlar, Karaburun, Karşıyaka, Konak, Narlıdere, Seferihisar, Urfıa are in the western group and Bergama, Buca, Kemalpaşa, Ödemiş, Tire, Torbalı, Bayındır, Bornova, Selçuk are in the eastern group.

1.3. Coastal-Non-Coastal Analysis

To find the difference between the prices of the apartment located at the seaside and the inner regions, the districts are divided into two groups, coastal and non-coastal. Aliağa, Balçova, Bayraklı, Çeşme, Çiğli, Dikili, Foça, Güzelbahçe, Karabağlar, Karaburun, Karşıyaka, Konak, Menderes, Narlıdere, Seferihisar, Selçuk, Urfıa are located in coastal group and Bayındır, Bergama, Bornova, Buca, Gaziemir, Karabağlar, Kemalpaşa, Menemen, Ödemiş, Tire, Torbalı are located in non-coastal group (Menemen and Bergama have coasted to the sea. However, they are included in the non-coastal group, because most of the population lives in land).

1.4. Core-Periphery Analysis

Two groups are formed as the districts in the core and periphery of Izmir. Balçova, Bayraklı, Bornova, Buca, Çiğli, Gaziemir, Güzelbahçe, Karabağlar, Karşıyaka, Konak, Narlıdere are included in the core group and Aliağa, Bayındır, Bergama, Çeşme, Dikili, Foça, Karaburun, Kemalpaşa, Menderes, Menemen, Ödemiş, Seferihisar, Selçuk, Tire, Torbalı, Urfıa are included in the periphery group.

1.5. University Campus

The districts are divided into two groups, with the university campus and without university campus to analyze the housing prices of the districts with university campuses. Balçova, Bornova, Buca, Çiğli, Karabağlar, Menemen, Urfıa are accumulated in university campus group and the rest of districts form the group without university campus group.
1.6. Population

Analyzing the population’s interest in housing prices, the districts are divided into two groups in terms of the average number of people per km² of the districts is calculated. They were divided into two regions that are below and above this average. Balçova, Bayraklı, Buca, Karabağlar, Karşıyaka, Konak are included in above average group and the rest are included in below average group.

1.7. Agriculture

For the study, the districts having dense or sparse where agricultural land were compared. For this, the surface of districts was divided separately into its agricultural lands and an average was calculated according to these results. Konak, Bayraklı, Gaziemir, Karşıyaka, Çiğli, Karabağlar, Çeşme, Narlıdere, Bornova, Karaburun, Buca, Urla, Güzlebahçe, Foça are accepted as the below average group and Dikili, Bergama, Menderes, Balçova, Seferihisar, Ödemiş, Aliaga, Menemen, Tire, Kemalpaşa, Torbalı, Selçuk, Bayındır are the above average group.

1.8. Organized Industrial Zones

To analyze the housing prices of the districts with organized industrial zone, the districts are divided into two groups, districts with organized industrial zone and without organized industrial zone. Aliaga, Bergama, Buca, Çiğli, Gaziemir, Kemalpaşa, Menderes, Menemen, Ödemiş, Tire, Torbalı are in the members of the group with organized industrial zone and the rest of the districts are included in without organized industrial zone.

1.9. Mass Transit Rail System (MTRS)

The districts are divided into two groups, with MTRS and without MTRS to analyze the housing prices of the districts with MTRS (Izmir Metro and Izban). Aliaga, Bayraklı, Bornova, Buca, Çiğli, Gaziemir, Karabağlar, Karşıyaka, Konak, Menemen, Torbalı form the group with MTRS and the rest are included in the group without MTRS.

2. Empirical Results

The independent t-test assumes the variance of the two groups measured as equal and unequal in the population. Table 1 shows two sections of the output as the analysis result of the independent T-test for the housing price dynamics across the districts of İzmir. The first one is with an outlier district and the other one is described without an outlier. In this test, the effect of location, population, agriculture, the industry also districts with university campuses and mass rail system are identified. P value of the test
for the difference between the means of the two samples Group 1 and Group 2, where tails are 1 (one-tailed) and type takes the values which are two-sample assuming equal variance and two sample assuming unequal variance.

The tests are simply identified as t-tests with confidence as either an equal t-test or unequal variance t-test because the calculation of degrees of freedom from the two samples sizes is different from each other. The treated variable is coded as 1 to 9. In the first test, the districts are located as North and South are analyzed. According to the results, the South districts have significantly higher prices than the North. On the other hand, if this test is analyzed without outlier (Çeşme District) there is no difference between the two samples. The way that first analysis fourth one that is a group of Periphery and Core’s results varies between because of an outlier. Test 2 is analyzed by using the West and the East districts with outlier and without outlier. In both methods, it was observed that there was a clear difference in the west direction. The analysis results of coastal and non-coastal districts are different from each other. Districts are where organized non-industrial zones and, according to the nonagricultural areas of the provinces are significantly greater. When we look at the districts having university campuses around, districts according to the number of people per km², districts with a mass transit rail system, and finally have not significantly difference.

In Table 2a and 2b, mean, standard deviation, max and minimum values of analyses, both with outlier and without outlier are given. According to analysis results with outlier analysis results, mean of whole district price of İzmir is 2581₺, the standard deviation of all districts is 1146.4 ₤, the maximum value is 6913 ₤ and the minimum value is 1207 ₤. The results without outlier show some changes as follows: The mean, standard deviation, and maximum values are decreased to 2414.4, 766.4 and 3913.0₺, respectively. At the same time, minimum values have not changed. When the groups without outlier were examined, significant decreases in mean and standard deviation values were observed. Especially these decreases were strongly observed in the south, west, coastal and agriculture (below average).

<table>
<thead>
<tr>
<th>Table 1. The Results of the T-test analysis according to equal variance and unequal variance with outlier and without outlier</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group 1</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>North</td>
</tr>
<tr>
<td>West</td>
</tr>
<tr>
<td>Coastal</td>
</tr>
<tr>
<td>Periphery</td>
</tr>
<tr>
<td>University (with)</td>
</tr>
<tr>
<td>Population (c.s)</td>
</tr>
<tr>
<td>Agro-industrial (c.a)</td>
</tr>
<tr>
<td>O. Industrial</td>
</tr>
<tr>
<td>MTR (with)</td>
</tr>
</tbody>
</table>

* MTR: mass transfer rail system
* a.s. above average
* b.s. below average
Table 2. Samples Mean, Standard Deviation, Maximum and Minimum values

2a. with outlier 2b. Without Outlier

The districts are defined according to the three price ranges using different colors in Figure 1. The Price ranges are 1000-2000 2000-3000 and 3000 and above, and areas with light gray were not identified due to data incompleteness and are not included in the analyses.

Figure 1: Price Changes
The conclusion obtained from Figure 2 is the identification of two groups of districts, which are city and suburban. The first group is on the left in the dendrograms from Ward method of hierarchical cluster analysis of and includes districts of Karşıyaka, Bornova, Balçova, Foça, Bayraklı, Gaziemir, Karaburun, Güzelbahçe, Narlıdere and Urla. These districts are equally spaced along the Y axis of the dendrogram and represent objects that have an index of objects in the original dataset. The links between objects are shown as inverted U-shaped lines. The length of each inverted U represents the distance (difference) between each node. The cluster weight also represents the total height of the percentage of this figure. These districts follow a trend and feature relatively similar apartment price cycles, and this group exemplify the city, as well. The second group, which can be found on the right-hand side, includes Konak, Menderes, Aliaga, Selçuk, Seferihisar, Buca, Dikili, Çiğli, Menemen, Bayındır, Kemalpaşa, Ödemiş, Tire, Torbali, and Bergama, as representational group of the suburb. Çeşme is uncoupled from the city and suburban’s trend and exhibit more heterogeneous price cycle, as indicated with the length of the vertical lines.
Conclusion

The price of a house in the housing market is determined by the balance of supply and demand. In recent years housing sales prices and rents have shown steady increase. Especially, it is seen that the new legal regulations are effective on the housing market and the urban transformation process is closely related to both price and sales volume. When the developments in the housing price indexes of the three major provinces are evaluated in Turkey, the highest annual change of the year is observed in 2017 when compared to the previous year, according to the survey conducted by the CBRT statistics general directorate of housing prices index of İzmir in March 2017.

In this study, the marginal effects of the different characteristics of the houses on the housing prices are analyzed and the findings are shared to follow the changes in the housing prices in Turkey with a heterogeneous
housing structure. For the province of İzmir, the prices that affect the housing market at the district level were determined and the price changes occurred in the housing prices under fixed properties including sub-markets were calculated comparatively. For this purpose, m2 prices obtained from sahibinden.com and hurriyetemlak.com internet sites were analyzed. The t-test was used as the method of the study and the data generated for each location were analyzed together with the variables determining the price of a house, the number of structural features and components of the property, the location and the characteristics of the districts. In addition, the analysis set used for the study is obtained from the data collected in May 2017. As a result of the study; it is observed that there are clear differences between the districts of east and west, coastal and noncoastal districts, which were determined depending on the examination of 27 districts.

References


