

HEDONIC ANALYSIS OF HOUSING PRICES IN TURKEY: REGIONAL
DIFFERENCES AND SOME SPECIFICATION ISSUES

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Hedonic Analysis of Housing Prices in Turkey: Regional Differences and
Some Specification Issues

Türkiye'deki Ev Fiyatlarının Hedonic Analizi: Bölgesel Farklılıklar ve diğer
Bazı Etmenler

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ABSTRACT

This study aims to explore the determination of housing prices in Turkey, making use of the structural characteristics of the housing units in the data. As in much as of previous housing market analysis, a hedonic price regression is used to measure the marginal contributions of the characteristics to the price of the unit. The characteristics available in the data include the surface area, number of rooms, floor number, and the province the apartment is located in. The house price data, collected from a web site that performs real estate activities, is chosen such that all geographical regions of Turkey are represented. The empirical results reveal that, as well as physical attributes, the geographic location of the houses is an important factor in the determination of the price. Alternative specifications are experimented with to observe whether “the price per square meter” can also be explained by the model, and whether a semi-log specification produces a better fit than a linear model. Some of the coefficient estimates suggest that the absence of neighborhood characteristics in the data may have led to some biased estimates with regard to certain variables in the model.

ÖZET

Bu çalışma, ülke genelinden elde edilmiş satış fiyatı ve yapısal özellik verilerinden yararlanarak, Türkiye'de konut fiyatlarının belirlenmesi süreçlerini araştırmaktadır. Önceden yapılmış konut piyasası analizlerinin çoğunda olduğu gibi burada da, konutun özelliklerinin fiyata olan marjinal katkılarının ölçülmesi için hedonik bir fiyat regresyonu kestirilmiştir. Veri setinde yer alan özellikler arasında yüzey alanı, oda sayısı, kat sayısı ve konutun bulunduğu il yer almaktadır. Emlak işlerinin yürütüldüğü bir web sitesinden alınan veriler, Türkiye'deki tüm coğrafi bölgeleri kapsayacak şekilde seçilmiştir. Ampirik bulgular, konut fiyatının belirlenmesinde, çalışmada değerlendirmeye alınan pek çok yapısal özelliğin yanı sıra coğrafi konumun da önemini ortaya koymaktadır. Regresyon analizi, "metrekare başına fiyat" değişkeninin eldeki model ile açıklanabilirliğini ölçmek ve yarı-logaritmik spesifikasyonun doğrusal modelden daha iyi sonuçlar üretip üretmediğini sınamak amacıyla alternatif şekillerde tekrar edilmiştir. Bazı katsayı

kestirimleri, eldeki veri setinde çevresel özelliklerin eksik olmasının, modeldeki değişkenlerin bazılarına ilişkin yanlı tahminlere yol açmış olabileceğine işaret etmektedir.

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1. INTRODUCTION

Real estate markets are one of the most unstable asset markets. They are also of macroeconomic importance because real estate constitutes a large fraction of the total wealth in any economy composes of real estate, which generates a significant fraction of banking activity and debt, and strongly affects labor market (Barlas et al, 2004).

Real estate is an investment tool which demonstrates resistance to inflation in most of the developing countries as well as some developed countries (Maher, 1994). Reduction of interest rates and increase of growth rate of the economy encouraged investment in real estate. Due to the decrease of interest rates, the demand in the real estate market increased which resulted in capital gains in investment for real estate. Households whom owned real estate realized wealth effect because of the rise in asset prices and decline in the interest rates. A positive shock to total wealth leads to an increase in their current and future consumption. Although home ownership is a basis of wealth accumulation (Badcock, 1989), housing is an important factor that identify quality of life (Badcock, 1989). Along with the positive developments in the economy and the increase of the demand for real estate, an opportunity is offered for the revival and the development for the real estate sector.

Beginning in 1950s, Turkey has witnessed a major transformation process in its socio-economic structure and physical environment (Dokmeci and Berkoz, 1994). These transformations have brought with them rapid urbanization and differentiation in housing prices. Investment in the Turkish real estate market intensified in the 1990s and gained further speed after the 2001 financial crisis. After the expectations for European Union involvement capital flows increased the supply of funds. Currently, there is an important competition between banks which results lower rates for real estate credits. Conditions for financing of housing to consumers are gaining importance in economy (Binay and Salman, 2007).

In Turkey, population is 72 million. In this population there are 15 million households, in which homeownership percentage is around 60%. This ratio is 67% in England and 40% in Germany which shows that homeownership ratio for Turkey is high enough. 55% of homeownership is unlicensed or built without permission. This ratio indicates that squatter

housing that settled in peripheral areas of the cities has considerable proportion. Because of the low housing prices in these areas there is a large economic loss to the Turkish economy. 20% of the homeownership constitutes of buildings with the age of above 20. Moreover, %40 of the buildings needs amendments. These houses can be the ones that need renovation or restoration. On the other hand, because of the population increase in Turkey, every year there is a necessity for additional 300.000 new houses (www.gmtr.com.tr).

While real estate markets come in to prominence, studies about housing market gained speed. As a result demand for housing indexes is becoming important recently. The hedonic regression has been used widely in the housing market literature while searching the relationship between house prices and housing characteristics. The theoretical advantage of hedonic methods for computing housing price indexes has long been acknowledged (Diewert, 2006). In hedonic pricing model, dwelling is represented by a limited number of observed characteristics, each with their own prices. The combination of characteristics is assumed to identify a dwelling's value. This model is used to follow over time the estimated value of a chosen basket of houses, even if some types of houses in the basket have not been traded in the time period of interest.

Despite the popular interest in the real estate markets, there are still not many empirical studies that investigate the determination of housing prices in Turkey. One of the reasons for this could be the lack of suitable data. The studies on Turkey are usually limited with only one region or city which is commonly Istanbul (Keskin, 2008; Ozus et al, 2007). In a nationwide study on housing prices in Turkey, Selim (2008), uses data from Household Budget Survey. The problem with the HBS data is that the house sales prices are based on the responses given to a survey on household incomes and expenditures. Since many respondents have little or no intention of selling their homes, it is unlikely that they will have good idea of how much their house is worth in the market.

The purpose of this thesis is to investigate the factors that influence the housing prices in Turkey. The housing units in the sample are from 19 provinces among 81 provinces in Turkey which are selected according to the 12-way regional classification of the country

determined by the Turkish Statistical Institute (TurkStat). The price determinants are analyzed by hedonic price regression with the effects of different characters.

The study is composed of five sections. In the next section, the academic studies are reviewed. Also, hedonic pricing model is specified and alternative methods are discussed. Moreover, studies in Turkish housing market are emphasized. In section three, the data used and methodology are explained. The fourth section contains the empirical analysis and presents the model and results. Finally, the concluding part of the paper summarizes the key findings.

2. LITERATURE REVIEW

In real estate field, house market is composed of various different components and research in this field came in to prominence during the past decade. Extensive proportion of the urban areas is covered by residential lands like in most urban areas. The factors that are important to determine the housing price became significant subject to researches, after the use of urban land and relations between the urban market dynamics. (Ding et al, 2000). According to Cho (1996), attainable micro-level data, improvement in the modeling techniques are the reasons for progression in the researches for housing prices.

According to Adair et al. (2000), housing prices can be conceded as a vector of different features containing neighborhood characteristics, structural, qualitative and quantitative characteristics of houses. Structural characteristics (such as type of dwelling, age, size, room number, bath number, heating system of the dwelling), neighborhood characteristics (such as access to health, education and shopping centers, social and economical amenities of neighborhood), and natural and physical attributes (such as view, air and environment pollution, noise) are the factors concerning researches regarding housing prices.

The researches that investigate the structural variables indicate that the price of the housing unit differ according to differences in the structural characteristics of the building (age of the building, type of the building, room number, bath number, size of parking area). (Goodman, Thibodeau, 1995; Millis, Simenauer, 1996; Forret, 1990).

The neighborhood characteristics used in the literature include accessibility to sub centers in the urban, accessibility to other urban and accessibility to working centers affect the housing prices (Danieri, 1994). When the neighborhood characteristics are expanded by including size of household, income levels, occupation group, crime rate, social activities and education levels the impacts on the housing prices differs. (Tse and Love, 2000).

When the impacts of the characteristics of natural and structural environments are investigated different factors (such as view, pollution, climate, and noise) come up and

view has a positive impact on housing prices as a common result (Rodriguez and Sirmons, 1994).

2.1 HEDONIC MODELING OF HOUSING PRICES

Residential housing is an important aspect of the quality of life in any society. Thus, the valuation of specific characteristics is very important in house prices. In order to achieve this objective researchers often specify hedonic models (Ogwang and Wang, 2003). In housing price analysis hedonic price regression of urban house price determinants has been widely used. (Can, 1990; Rosen, 1974; Wilkinson, 1973). This theory can be explained as bundle of functionally related attributes with no observable prices because they are not traded in open markets. The number of housing attributes can be large and vary from house to house. Hedonic housing model is based on consumer theory (Lancaster, 1966). The hedonic approach is based on the assumption that a housing unit consist of various individual components that each has implicit price. The location of the house, accessibility to center of city, and travel time are the primary factors with respect to neoclassical approach. The foundations of these approaches are supported by hedonic price models that assist to analyze the housing preferences of the consumers. Therefore, hedonic price models are explored along with the physical structure of the housing unit and the spatial, demographical and economic structure of neighborhoods. For explaining the local housing system, it is not enough to express the determinants of the housing prices with only these factors. The hedonic models are useful tools for examination of housing price changes as well as to operationalise the urban housing market system. (Keskin, 2008) Hedonic price indicates that economic agents expose implicit prices of different characteristics and specific amounts of attributes related to them (Rosen, 1974). As defined in Janssen and Söderberg (1999), ‘the theory of hedonic price functions provides a framework for the analysis of differentiated goods like housing units whose individual features do not have observable market prices’ (Wilhelmsson and Kryvobokov; 2007). In this case, hedonic pricing model is very important for identifying how the price of a unit of commodity differs with the set of attributes possesses. When the prices of these attributes are known, or can be predicted, the attribute combination of a particular differentiated good is also valued. Hence hedonic pricing model provide a framework for value estimation (Ustaoglu, 2003). Also according to Watkins (2001), the value of each

the individual physical and spatial characteristics of the housing unit determines the price of the houses. The spatial features are the factors that influence the housing prices as well as characteristics of the housing units. In order to reduce estimation errors for submarkets and to improve the predicted market values the spatial relationships in hedonic equations can be included. (Bourassa et al., 2007). Methods for exploring different equations for each submarket are applying a neighborhood effect, including the distance and neighborhood quality.

In another study it is argued that housing market composed of different single markets and different hedonic functions can be estimated for these single markets (Straszheim, 1975). After that research many analysts investigate the occurrence of submarkets. ‘The identification of the submarkets can be done by grouping the administrative boundaries, definition of experts or classification by statistical methods such as cluster analysis.’ (Adair et al., 1996 and Watkins, 2001). According to MacLennan and Tu (1996), the local housing market can be seen as being stratified by sub-markets. Many authors investigate that series of linked quasi-independent sub-markets are more functional than analyzing housing markets (Kiel and Zobel, 1996; Olmo, 1995; Vandell, 1995). Besides, all the cities in Turkey are investigated by unique characteristics; in our study we will analyze housing units in two sub-markets.

Regression is commonly used in researches of apartment prices all around the world. Hedonic regression analysis is widely used to explore relationship between the house prices and housing characteristics (Watkins; 1998). In the regression model, the coefficients are the estimations of the implicit prices of attributes for the dwellings. Also, these coefficients indicate the marginal contribution of each attribute (Can, 1990). Thus, in this hedonic regression, the main factors that affect the value of dwellings can be observed within a given dataset (Clarke and Browne; 2008). Furthermore, changes in house prices from changes in dwelling quality by providing quality-adjusted price indexes can be isolated. The main reasons for this modeling are developing house price indices and household demand for the attributes of houses (Sheppard; 1999). There is not shared opinion for the best appropriate form for the hedonic model (Rosen; 1974). However, in linear model the relationships are obvious and results are easier to compare with other

valuations. In this study we will use two types of ordinary least square. They are linear and log linear models.

2.2 ALTERNATIVE EMPIRICAL METHODS

Although many of the studies investigate and prefer the hedonic price model, there are different researches that identify housing prices and compared with these models. One of the different models is Artificial Neural Network. Unlike other studies on Turkey, Selim (2009) has applied artificial neural network in his study. In this model unknown functional forms with a certain degree of accuracy is implemented. The results are interpreted as more flexible and efficient estimation than hedonic regression. In this research, it is showed that house size, type of house, pool and number of rooms, water system, and location characteristics are the most significant attributes that influence house prices.

Another alternative approaches is the decision tree approach which is implemented by Gang-Zhi et al. (2006). In this study house prices and their attributes are investigated in Singapore. For identifying the important variables of dwellings pattern recognition is defined. According to the researcher, when the models are compared, the linear and non linear relationships between attributes and prices can be analyzed, the regression problems can be minimized and it is easier to identificate important variables.

2.3 REVIEW OF LITERATURE ON TURKEY

As mentioned earlier, Selim (2008) uses data drawn from the 2004 Household Budget Survey to estimate a hedonic regression model for the Turkish housing market. Using a large set of variables that measure the effect of structural characteristics, the author is able to obtain parameter estimates for urban and rural areas separately, as well as for the nationwide sample of housing units, but she is unable to control for provincial effects due to lack of data and month-to-month price fluctuations are also unaccounted for. As opposed to a sample consisting only of apartments used in the present study, her sample includes detached and semi-detached houses as well as apartments. The model estimated by Selim, which relies on a semi-logarithmic functional form, reveals that many of the characteristics considered have a significant effect on the price of the dwelling.

When the studies on the determinants of housing prices in Turkey are reviewed, Turel (1981) was concerned with the analysis of non-squatter housing market in Ankara. In his hedonic rent model, the dependent variable is annual rent of the housing unit and the independent variables are, physical characteristics of the housing unit (number of rooms, floor number), physical characteristics of the building (age of the building, heating system), location characteristics (distance to the employment nodes), lease characteristics and the sub area characteristics (air quality, public services). He concluded that according to the housing market segmentation hypothesis for Ankara, rental prices of housing stock vary in location. He explained this variation by the externalities from location advantages and location preferences of high income groups.

Another study which is done by Ozus et al. (2007) explores the housing price in Istanbul. In this study, spatial variation of housing prices in five districts of Istanbul is studied by including property and sub-market characteristics to identify localized factors. Municipal boundaries are taken as sub-market boundaries. Hedonic housing price model is used to explore the housing prices. In the conclusion of the study, it is explained that among the metropolitan level, sub-market floor area and sea view are the factors that influence the housing prices. High income submarkets have high coefficient of determinations. Because of differences in consumer preferences or initial endowment of attributes number of significant variables is lower for squatter areas.

Hasekioglu (1997) focuses on asset price of housing in terms of the determinants such as income, housing demand, housing credits and real interest rates. In this study the model is generated by the equality of demand and supply prices of the housing unit. In the estimation, two stages are used. They are rent index of Turkey and asset price index statistic. It is stated that there is a negative relationship between the real asset price of housing and the housing stock. Another finding is that real asset price of housing is sensitive to changes in income.

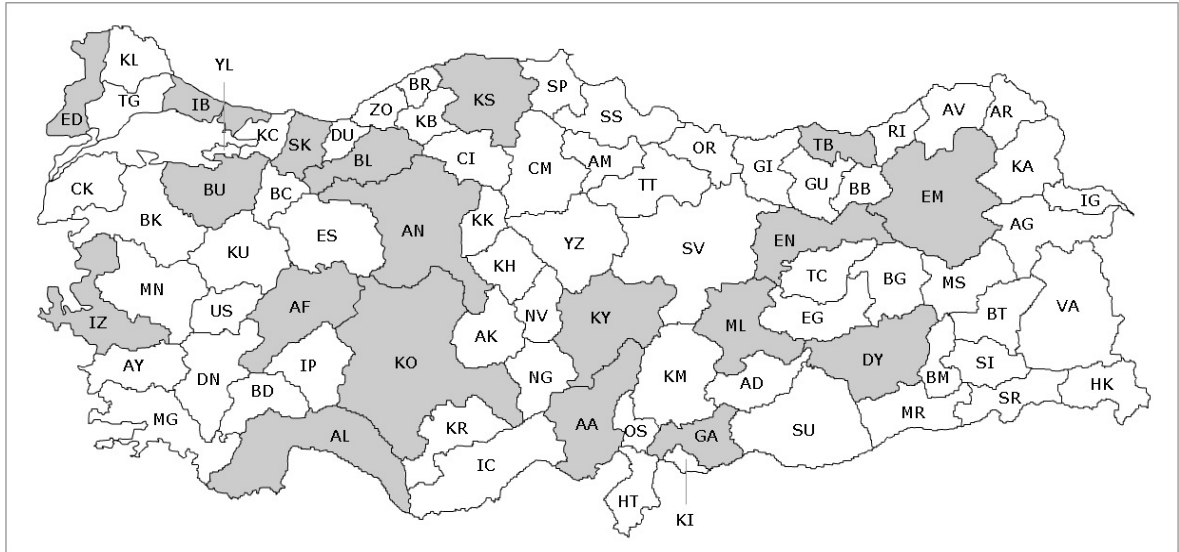
Ustaoglu (2003) investigated the office rent determinants and influences of them on office rent variations in Ankara. Data composed of office buildings which provide professional, financial and business services. By applying cross-sectional data, hedonic price indices were constructed for the demand side attributes of the office property. Also lease

characteristics are included to the analysis. It is concluded that location characteristics are responsible for most of the variations in rental office prices.

3. THE DATA

The data we work with is drawn from the database of *sahibinden.com* which is Turkey's most popular online real estate advertisement site. Our sample, which includes almost 9,000 observations, is restricted to advertisements placed on the website during the year 2009. The housing units that make up our sample are located in 19 of Turkey's 81 provinces. The provinces included in the sample are highlighted on the map of Turkey given in Figure 1. The provinces were chosen such that all of Turkey's major statistical units were represented in the data according to the 12-way regional classification of the country determined by the Turkish Statistical Institute (TurkStat). The twelve TurkStat regions are contiguous and are composed of provinces that are similar in terms of their socio-economic characteristics. They have been formed for the purpose of providing the basis for measuring regional differences and also for obtaining nationwide statistics. With a population in excess of 10 million, the province of Istanbul constitutes a region on its own, whereas the rest of the regions contain more than one province.¹

Figure 1 : Provincial division of Turkey



¹ The official names and the provincial composition of the 12 regions are as follows: TR1 (İstanbul): İstanbul; TR2 (West Marmara): Tekirdağ, Edirne, Kırklareli, Balıkesir, Çanakkale; TR3 (Aegean): İzmir, Aydın, Denizli, Muğla, Manisa, Afyonkarahisar, Kütahya, Uşak; TR4 (East Marmara): Bursa, Eskişehir, Bilecik, Kocaeli, Sakarya, Düzce, Bolu, Yalova; TR5 (West Anatolia): Ankara, Konya, Karaman; TR6 (Mediterranean): Antalya, Isparta, Burdur, Adana, Mersin, Hatay, Kahramanmaraş, Osmaniye; TR7 (Central Anatolia): Kırıkkale, Aksaray, Niğde, Nevşehir, Kırşehir, Kayseri, Sivas, Yozgat. TR8 (West Black Sea): Zonguldak, Karabük, Bartın, Kastamonu, Çankırı, Sinop, Samsun, Tokat, Çorum, Amasya; TR9 (East Black Sea): Trabzon, Ordu, Giresun, Rize, Artvin, Gümüşhane. TRA (Northeast Anatolia): Erzurum, Erzincan, Bayburt, Ağrı, Kars, Iğdır, Ardahan; TRB (Centraleast Anatolia): Malatya, Elazığ, Bingöl, Tunceli, Van, Muş, Bitlis, Hakkari; TRC (Southeast Anatolia): Gaziantep, Adıyaman, Kilis, Şanlıurfa, Diyarbakır, Mardin, Batman, Şırnak, Siirt.

The regional and provincial distribution of the sample is provided in Table 1. In accordance with its large population, Istanbul is heavily represented in the sample. Out of a total number of 8,894 observations, 2,877 come from this province. The sample shares of the remaining regions are also roughly proportional to their population shares (and also the number of advertisements on the website).

Table 1: The Regional and Provincial Distribution of the Sample

TurkStat Region	Sample share (%)	Province	Sample share (%)
TR1 (İstanbul)	32.22	İstanbul	32.22
TR2 (West Marmara)	0.82	Edirne	0.82
TR3 (Aegean)	10.93	İzmir	10.08
		Afyonkarahisar	0.85
TR4 (East Marmara)	12.12	Bursa	8.76
		Sakarya	2.63
		Bolu	0.73
TR5 (West Anatolia)	24.05	Ankara	19.50
		Konya	4.56
TR6 (Mediterranean)	7.78	Adana	2.14
		Antalya	5.64
TR7 (Central Anatolia)	1.98	Kayseri	1.98
TR8 (West Black Sea)	0.93	Kastamonu	0.93
TR9 (East Black Sea)	1.18	Trabzon	1.18
TRA (Northeast Anat.)	0.81	Erzurum	0.50
		Erzincan	0.30
TRB(Centraleast Anat.)	2.04	Malatya	2.04
TRC (Southeast Anat.)	5.15	Gaziantep	2.32
		Diyarbakır	2.83

The sample is restricted to apartments, which are by far the most common type of housing in Turkey, especially in urban areas. Apartments (or ‘flats’ as they are termed in British English) are self-contained housing units that occupy only part of an apartment building. While they are more commonly occupied by the owners, many apartments in Turkey are rented out to tenants. The database our data is drawn from does include advertisements for other dwelling types such as detached houses, but they were left out of the analysis since different variables and parameters are involved in the determination of the prices of different housing types.

The data set contains information about the sales prices of the apartments, in addition to characteristics such as total area, floor level, surface area, the number of rooms, and the age of the building the apartment is located in. It is also important that the number of rooms in a dwelling includes bedrooms and living room (Roseman, 2002). There are also some information on in-house amenities such as the type of heating and the presence of a balcony.

Given that the surface area information is available, there is the option of using the ‘price per square meter’ as the dependent variable rather than the price of the apartment. Therefore, the econometric models are estimated using both variables as the dependent variable, but with the same set of explanatory variables. In such a hedonic price model, explanatory variables which are dummy variables are used in the analysis. The dummy-variable method is commonly used to deal with discontinuous factors and the coefficients of the dummy variables measure differences in intercepts. Coded with a 1 (present) or 0 (absent). For example, for a dwelling unit that is having a sea view, the dummy variable is given the value of 1; otherwise, the value is 0.

Surface area (measured in square meters) appears as an explanatory variable in the ‘per-square price’ model as well since it is possible that larger (or smaller) apartments go at a higher price per square meter.² The remaining explanatory variables in the model include the number of rooms in the apartment, and the age and the total number of floors of the building the apartment is located in. Note that in the presence of the surface area variable, the number of rooms need not be positively related with price. After apartment size is controlled for, having more rooms in the apartment could imply lower prices if people prefer to have larger rooms.

The floor the apartment is on is also included in the model along with the square of the floor figure to allow for the possibility that the price-floor relationship is non-linear. It could be that most people prefer to live at a certain height from the ground, meaning that apartments on lower and higher floors would fetch lower prices. The model also includes dummy variables indicating apartments in newly-built buildings, and those on the ground and top floors of the buildings. Unlike the first one, we expect the latter two characteristics to be associated with lower prices since ground and top floors are generally perceived to be more vulnerable to weather conditions and natural disasters. Generally, the reason not preferring first floor is higher risk of burglary and noise. Top floor is not preferred either because of possible poor conditions of the roof.

² House prices are expected to be more sensitive to net floor area rather than gross floor area. However, it is not known whether sahibinden.com provides data on gross floor area that is composed of usable area of the dwelling and share of the common area in the building or net floor area.

Since the type of heating is also expected to be a good predictor of price, we include dummy variables for apartments with central heating, distinguishing between radiator heating and floor heating which is mainly found in high-end apartments. Other heating types for which we have dummies are: solar powered, geothermal, air condition, central heating boiler, stove heating systems. Apartments with no heating or solar powered heating system make up the base category. The data worked with also allows us to identify the apartments with one or more balconies and a 'view' based on the judgment of the person who placed the advertisement. This information is utilized by introducing two dummy variables in the model. It is expected that the presence of a balcony or a view to have a positive impact of the price of the apartment.

In the original data it is also possible to identify the apartments which are listed under the separate housing-type category of 'residence'. Even though these are the same as apartments in the sense that they are single-floor housing units located in a large building, the term residence is used in Turkey to describe apartments in high-end buildings which are usually part of an apartment building complex. Since many of these complexes offer facilities such as parking lots and swimming pools, it is expect that the residence dummy has a significant positive effect on the price. In the original data, the ages of apartment buildings that are over 30 years old are coded as "over 30". For our estimations, this value was recoded as "35" so that those observations would not have to be left out of the regression analysis. Similarly, the original floor information pertaining to both the apartment and the building it is located in is also bounded from above such that floor numbers which are more than 30 are coded as "over 30". These were also replaced with a value of 35 which seemed like a reasonable average figure for those observations above the value of 30.

Finally, the model includes dummy variables indicating the months of the year in which the advertisement was put out in order to account for possible changes and trends in apartment prices during the year. Province dummies are also present to allow for the fact that average home prices are not uniform across the provinces represented in the sample.

4. METHODOLOGY AND MODEL SPECIFICATION

The hedonic regression has been used widely in the housing market literature while searching the relationship between house prices and housing characteristics especially in the last three decades. This approach is primarily applied for the analyses of household demand and also for constructing housing price indices (Can, 1992).

In this analysis, we rely on regression analysis in which the price of housing unit is a dependent variable and the other characteristics (such as structural or location) are independent variables in order to investigate the dependent variable. The implicit price of each characteristic can be estimated from the coefficients estimated by hedonic function. Besides, the prices paid for distinctive qualities of the housing units can be compared. The hedonic price model assumes that the market is heterogeneous. This gives consumers variety of housing unit options due to the diversity in house prices within a location. Because of the heterogeneity, hedonic multivariate regressions applied. Also, the consumers have various different features. According to their socio-economic distribution, they select different housing structures with characteristics of housing unit such as age of the building, size of the housing unit. With respect to the diversification of housing units and consumer preferences, the urban housing system consists of submarkets. In every submarket, housing attributes have different market price.

In this study the data is collected from 12 regions of Turkey according to Turkstat. Besides, with a population in excess of 10 million, the province of Istanbul constitutes a submarket on its own, whereas the rest of the regions contain more than one province constitutes another submarket. In fact, our preliminary estimations revealed that there were substantial differences between the coefficient estimates obtained for the subsample of observations from the province of Istanbul and those obtained for the rest of the country. Therefore, we estimate the econometric models not only on the full sample of observations, but also on the “Istanbul” and the “rest of the country” sub samples. I will comment on why different patterns may have been observed in the two sub samples after the presentation of the empirical findings.

Figure 2: Distribution of Price per Square meter

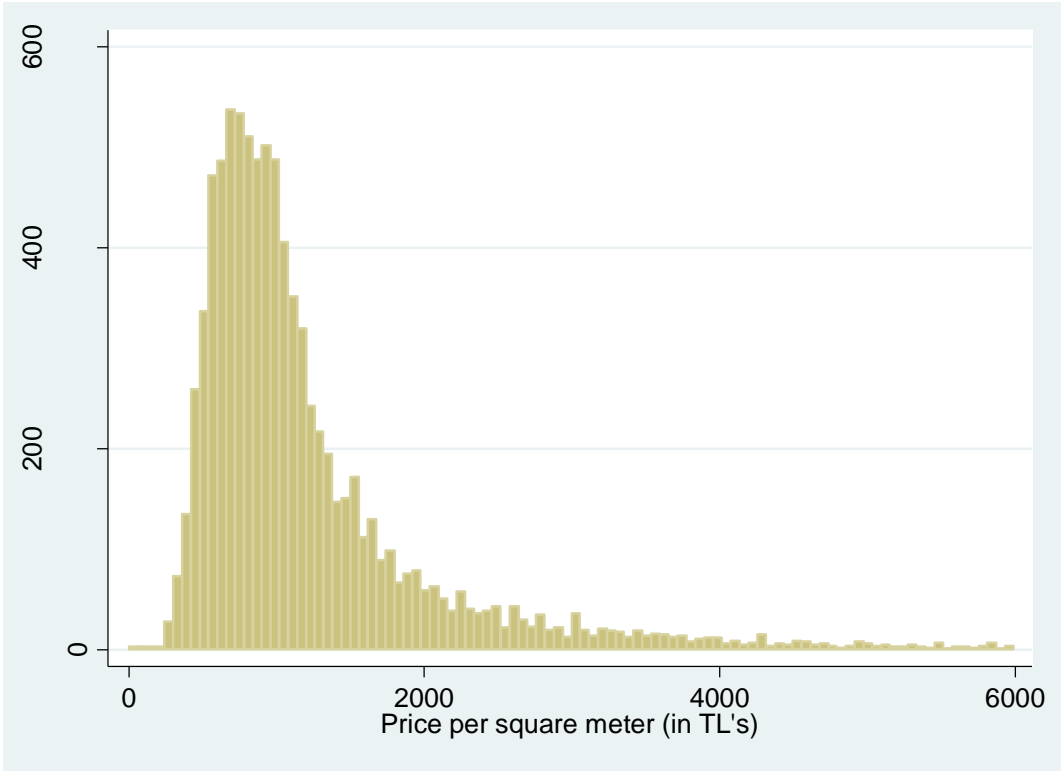
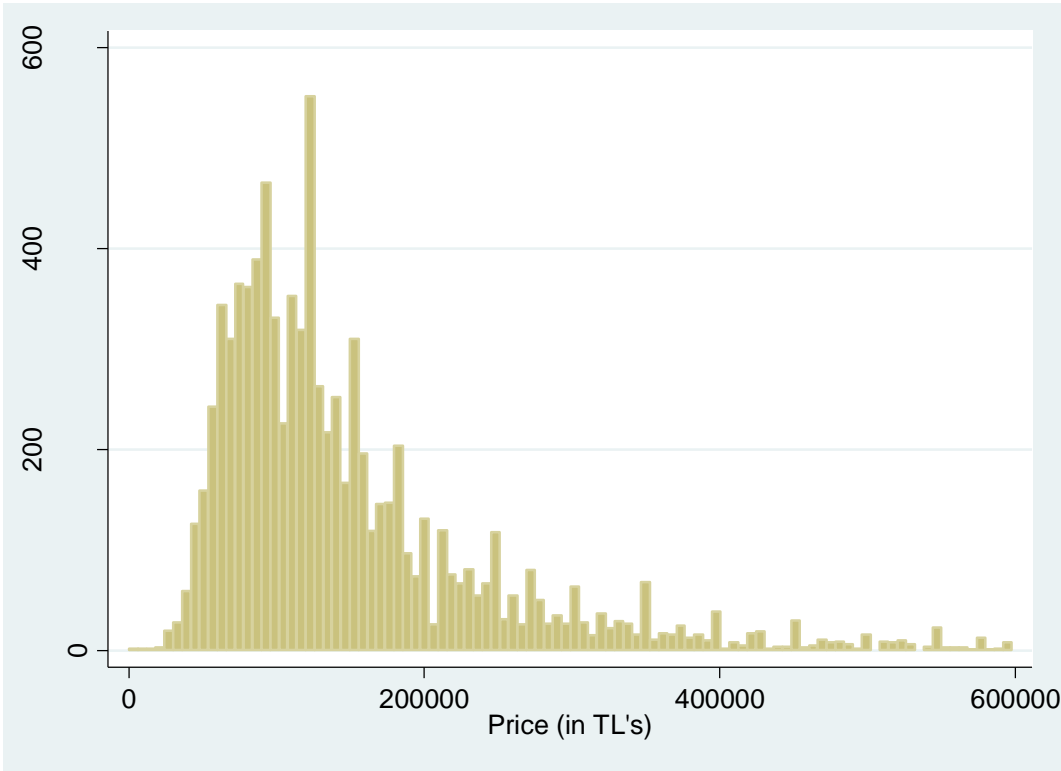


Figure 3: Distribution of Price



In regression analysis, we can choose between two functional forms: linear and semi-logarithmic. As can be seen in Figures 2 and 3 below, the distributions of the dependent variables are skewed to the right, meaning that the semi-log specification is probably more appropriate. In fact, since the linear model produces lower R^2 values, we will be focusing on the results of the semi – log model in the next section, but reporting the linear model's results as well.

To summarize the information above, the estimated econometric model with the semi-log functional form can be represented by the following equation:

$$\text{Log (P)} = \alpha + \beta_1 \cdot \text{SQMETER} + \beta_2 \cdot \text{NUMROOMS} + \beta_3 \cdot \text{FLOOR} + \beta_4 \cdot \text{SQFLOOR} + \beta_5 \cdot \text{GROUND} + \beta_6 \cdot \text{TOPFLOOR} + \beta_7 \cdot \text{VIEW} + \beta_8 \cdot \text{BALCONY} + \beta_9 \cdot \text{NEWLY-BUILT} + \beta_{10} \cdot \text{AGE} + \beta_{11} \cdot \text{NUMFLOORS} + \beta_{12} \cdot \text{RESIDENCE} + \beta_{13} \cdot \text{HEAT-CENTRAL} + \beta_{14} \cdot \text{HEAT-FLOOR} + \beta_{15} \cdot \text{HEAT-AC} + \beta_{16} \cdot \text{HEAT-COMBI} + \beta_{17} \cdot \text{HEAT-GEOTHERMAL} + \beta_{18} \cdot \text{HEAT-SOLAR} + \gamma \cdot \text{PROVINCE} + \theta \cdot \text{MONTH} + \varepsilon.$$

where the dependent variable is natural logarithm of the price of the apartment (or alternatively, the price per square meter) in TL's.

Among the explanatory variables that relate specifically to the apartment in question, SQMETER gives the area of the house in square meters and NUMROOMS is the number of rooms. FLOOR provides the floor information and SQFLOOR is the square of this value. The GROUND dummy indicates that an apartment is on the ground floor (=1 if ground floor, 0 otherwise). Similarly, TOPFLOOR identifies apartments on the top floors of the buildings.

Other independent variable is NUMFLOORS which shows the total number of floors in the apartment.

VIEW is another independent variable which is view of the house. People always like to enjoy the variety of views. These can be especially sea, lake, mountain or forest. The willingness to pay for the view is high. So, it is expected that the view variable should have positive relation with house prices.

The other variable is BALCONY indicating that the apartment has a balcony. In Turkey people prefer to spend their time in the balcony on summer times especially if there is a view. Houses with balcony should have higher prices than houses without balcony.

The next variable is HEAT-CENTRAL to observe the impact of central heating system. Since, the winters particularly in the eastern side of the country are very heavy, the importance of heating system increases. There should be a positive relation with dependent variable.

HEAT-FLOOR is a variable for floor heating system. The system for the heating is placed under the ground. It is a better system for heating because heat is distributed equally which refers to a positive coefficient.

HEAT-AC is another heating variable. Although, it is generally used for cooling, in the south regions of Turkey temperate climate is seen. The winters are short and cool. So, necessity for heating system is moderate indicating that effect of this variable is less than the other ones.

HEAT-COMBI is variable for heating, as well. Although it is a central heating system, every house in an apartment can control the operation of the heating. It is expected that to have positive relation with housing prices.

HEAT-SOLAR is another heating variable. The source of this heating system is solar energy. Some of the regions in Turkey exposed to high volume of sun ray. This low cost system is expected to have positive relation with housing prices.

The last heating variable is HEAT-GEOTHERMAL, indicating that geothermal energy. This is renewable, sustainable and environment friendly energy. As a result it should have a positive relation with housing prices.

The other variable is ROOM. It shows the total number of rooms in a house. The more the room number, the higher price for houses is expected.

NEWLY-BUILT is a variable for the houses which are recently constructed. There are not owners before for that house. Since it is not used formerly, the coefficient of this variable should be positive.

The next variable is AGE for buildings. It presents the number of years after the building is constructed. Negative relation with housing prices is expected.

Finally, PLAKA and MONTH are the vectors of province and month dummies, respectively.

5. EMPIRICAL RESULTS

In this section, we summarize the results of the hedonic price equations estimated using two alternative dependent variables. In hedonic regression models, coefficient estimates are interpreted as the implicit prices of the attributes in question. In other words, coefficients indicate the marginal contributions of the attributes to the price of the dwelling. However, when reporting the results of a semi-logarithmic model, the coefficients are the predicted percentage changes in the dependent variable as a result of a one unit change in the explanatory variable in question. Table 2 presents the estimation results of the semi-log model while Table 3 summarizes the estimation results for the linear specification. In each table, we report the results for the nationwide sample of 8,894 apartments, as well as for the sub samples of Istanbul and rest of the country. The left and right panels of the tables are devoted to the results based on the two alternative dependent variables. The month and province dummies are omitted from the tables for brevity. As expected, there are significant differences between the price levels around the country such that prices are higher in the more developed western coastal provinces. The coefficient on Istanbul, for example, implies that prices are 65 percent higher in this province in comparison to the province of Adana which is the reference category in the model. Some of the month dummies were also significant suggesting that apartment prices did not remain the same throughout the year 2009.

According to the nationwide results, the semi-log specification with log-price has a coefficient of determination with a value of 0.60 which is high enough for a large dataset. Also, the same model has lower R^2 's in the Istanbul sub-sample in comparison to the rest-of-the-country sample. Estimation results denote that about all of the variables have the expected signs as mentioned in the previous section.

The coefficient of the variable 'NEWLY-BUILT' is statistically significant indicating that people prefer to live in a house which is new and constructed recently in specific terms, they are willing to pay a 12 percent higher price for these apartments in the full sample and substantially more in Istanbul with an estimate of around 31 percent.

The other significant variable 'SQMETER' is positively related to housing prices as expected. The coefficient on the surface area of the apartment is surprisingly small;

implying that once the remaining characteristics are controlled for, the size of the apartment has a negligible effect on its price.

VIEW is one of the most important housing attributes. It is defined as sea view for the provinces which are located near the seaside. Perception for view is different for provinces other than seaside. Nature, green fields and lake represents concept of view in these provinces. As it is expected, this variable has positive coefficient. As a result, if house has view, the price of housing unit increases 10%. Especially, importance of view for houses near seaside is huge.

While the AGE of the housing unit is investigated, although houses that are constructed more than 2 years ago are expected to have lower prices than recently built ones; there is an inverse result. Because of the better qualities of new homes, the prices of them expected to be high. However, the buildings with older age are commonly located in the neighborhood where the socioeconomic structure of people is high, qualified as more prestigious area which results for a positive relation with housing price. Furthermore, these neighborhoods are generally located in the center of cities. Regardless of the age of buildings, demand for these housing units is high. People prefer to buy houses in these neighborhoods and renovate in accordance with their tastes. Due to the high population growth settlements moved to the new neighborhoods outside of the cities which are far away from center of the city, resulting for lower prices.

As expected, the dummy variables indicating apartments on the ground and top floors have negative coefficients. In the presence of these two indicators, the FLOOR and SQFLOOR variables are less important and, in many cases, insignificant. Ground floor houses are smaller than the housing units in upper storey in terms of size and generally, they do not have balcony. The tendency for prices to decline when floor number increases in the Istanbul sub-sample might have to do with the anticipation of a major earthquake in that part of the country. This is probably also why the number of floors of the building has a negative effect in Istanbul as opposed to a positive effect in the rest of the country. Also, these houses exposed to negative environmental impacts such as noise and they are under risk of burglary. As a result houses in ground floor are cheaper. Also, people do not prefer

houses that are on the top floor of the apartments. These floors are always warmer in summers and colder in winter times which are the result of poor roof conditions.

BALCONY is another variable. However, this variable is insignificant in logarithmic functional form. If linear regression is analyzed, it becomes significant. Although positive relation is expected for the houses with balcony, this variable has negative coefficient. The reason for this negative relation is including balcony reduces the total area to be used in housing unit. Our interpretation of this finding is that in the absence of information on amenities, these variables serve as proxies for the characteristics that we were unable to control for. A closer inspection of the observations from Istanbul reveal that many of the apartments that do not have balconies or views are the ones located in the most prestigious, central parts of the city. These are also the ones that are located in relatively old buildings which explain why the age variable has a positive coefficient. However, people who are living in Anatolian cities prefer to have larger balconies. Especially in summer times, they spend their time in their balconies. This is a very important attribute in these cities. Therefore, housing units with balcony are more expensive than the others in Anatolian cities. On the other hand, because the square meter of houses in Istanbul is smaller than Anatolian cities, involving balcony decreases the net area in houses. As a result houses with balconies are cheaper than the other ones.

Nowadays, the high rate of urbanization effects is seen in structuring of RESIDENCE. As it is expected, the coefficient of this variable is very high. Residence is composed of apartments with high storey. Because these new structures contain all the facilities for people and makes life easier, they are more expensive than apartments.

The variable HEAT-CENTRAL which is a heating system has a positive coefficient. Since HEAT-SOLAR is base category, having a high coefficient, HEAT-CENTRAL is chosen as a central heating system through the difficult winter conditions in most of the provinces in Turkey. They are 30% more expensive than the houses with HEAT-SOLAR.

If HEAT-FLOOR is analyzed, as expected this variable has higher coefficient than HEAT-CENTRAL. This system is generally used in more expensive houses because of its

high cost while implementing. The heat is evenly distributed in this system. Houses with HEAT-FLOOR are 58% more expensive than houses with HEAT-SOLAR.

HEAT-COMBI is significant with a positive coefficient. This system allows operating at desired time. Because of that reason, kombi is expected to have higher coefficient when compared to HEAT-CENTRAL. However, coefficient is lower than HEAT-CENTRAL.

HEAT-GEOTHERMAL heating system has positive coefficient, as well. Although, it has positive environmental effects, this system can not be implemented to every province. As a result, coefficient of this variable is lower than the other heating systems.

Once surface area is controlled for, the impact of the number of ROOMS varies between Istanbul and the remaining provinces. While the coefficient is negative in the Istanbul sample, the opposite is the case for the rest of the country. The reason for this might be that family sizes are larger in Anatolia due to the greater number of children and the commonness of extended households (i.e. those with members other than the husband wife and children). Another reason can be related to square meter of houses. When the room number increases, square meter per room decreases. People do not prefer small size rooms. Since in rest of the country there are plenty of areas for construction of new buildings, increasing the room number and square meter as well is not a problem. However in Istanbul, structuring of houses is already intensive. There is a high rate of population growth because of migrations. Since houses have smaller size in Istanbul, increasing the room number has negative effect.

Since the other variables have the same effects in all of the country as discussed above, it is not analyzed again. Just the amounts of the coefficients differ between the sub-markets.

Table 2: Regression Results of Housing Prices in Turkey (semi-logarithmic functional form)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Log (Price)			Log (Price per square meter)		
	All sample	Istanbul	Rest of the country	All sample	Istanbul	Rest of the country
SQMETER	0.007 (0.000)	0.010 (0.000)	0.006 (0.000)	0.001 (0.000)	0.004 (0.000)	0.000 (0.940)
NUMROOMS	0.011 (0.394)	-0.050 (0.064)	0.037 (0.002)	-0.028 (0.019)	-0.099 (0.000)	0.008 (0.465)
FLOOR	-0.007 (0.187)	-0.023 (0.033)	0.001 (0.895)	-0.011 (0.037)	-0.029 (0.008)	-0.004 (0.506)
SQFLOOR	0.000 (0.160)	0.001 (0.280)	0.000 (0.444)	0.001 (0.010)	0.001 (0.083)	0.001 (0.072)
GROUND	-0.142 (0.000)	-0.196 (0.000)	-0.112 (0.000)	-0.119 (0.000)	-0.178 (0.000)	-0.091 (0.000)
TOPFLOOR	-0.128 (0.000)	-0.178 (0.000)	-0.102 (0.000)	-0.104 (0.000)	-0.151 (0.000)	-0.081 (0.000)
NUMFLOORS	0.001 (0.775)	-0.010 (0.022)	0.009 (0.000)	-0.002 (0.399)	-0.013 (0.004)	0.007 (0.004)
VIEW	0.097 (0.000)	0.150 (0.000)	0.070 (0.000)	0.101 (0.000)	0.160 (0.000)	0.069 (0.000)
BALCONY	0.017 (0.330)	-0.045 (0.094)	0.115 (0.000)	-0.017 (0.343)	-0.081 (0.002)	0.095 (0.000)
NEWLY-BUILT	0.121 (0.000)	0.308 (0.000)	0.046 (0.000)	0.132 (0.000)	0.321 (0.000)	0.053 (0.000)
AGE	0.009 (0.000)	0.018 (0.000)	0.004 (0.000)	0.010 (0.000)	0.019 (0.000)	0.004 (0.000)
RESIDENCE	0.863 (0.000)	1.332 (0.000)	0.318 (0.001)	0.891 (0.000)	1.372 (0.000)	0.356 (0.000)
HEAT-CENTRAL	0.301 (0.000)	0.560 (0.000)	0.258 (0.000)	0.265 (0.000)	0.506 (0.000)	0.223 (0.000)
HEAT-FLOOR	0.586 (0.000)	1.151 (0.000)	0.506 (0.000)	0.549 (0.000)	1.072 (0.000)	0.471 (0.000)
HEAT-AC	0.106 (0.000)	0.895 (0.029)	0.091 (0.000)	0.108 (0.000)	0.974 (0.024)	0.093 (0.000)
HEAT-COMBI	0.260 (0.000)	0.451 (0.000)	0.281 (0.000)	0.227 (0.000)	0.399 (0.000)	0.248 (0.000)
HEAT-GEOTHERMAL	0.380 (0.000)	- -	0.409 (0.000)	0.339 (0.000)	- -	0.375 (0.000)
Constant	10.075 (0.000)	10.418 (0.000)	10.137 (0.000)	6.179 (0.000)	6.678 (0.000)	6.161 (0.000)
Number of Observations	8,894	2,869	6,025	8,894	2,869	6,025
R-Squared	0.600	0.485	0.618	0.495	0.231	0.429

Table 3: Regression Results of Housing Prices in Turkey (linear functional form)

	(1)	(2)	(3)	(4)	(5)	(6)
Dependent variable:	Price			Price per square meter		
	All sample	Istanbul	Rest of the country	All sample	Istanbul	Rest of the country
SQMETER	2,792 (0.000)	6,247 (0.000)	1,106 (0.000)	5.251 (0.000)	14.941 (0.000)	0.119 (0.813)
NUMROOMS	-21,776 (0.027)	-84,924 (0.001)	-3,840 (0.256)	-99.647 (0.008)	-333.189 (0.000)	6.802 (0.756)
FLOOR	-13,450 (0.039)	-14,821 (0.151)	-5,767 (0.119)	-48.150 (0.004)	-46.199 (0.179)	-18.874 (0.099)
SQFLOOR	1,184 (0.038)	812.291 (0.279)	716.737 (0.057)	3.731 (0.004)	1.385 (0.496)	2.268 (0.037)
GROUND	-31,963 (0.016)	-39,492 (0.108)	-14,212 (0.031)	-220.266 (0.000)	-316.192 (0.002)	-93.020 (0.002)
TOPFLOOR	-42,171 (0.000)	-109,320 (0.000)	-14,118 (0.000)	-173.964 (0.000)	-512.143 (0.000)	-63.973 (0.001)
NUMFLOORS	-3,431 (0.029)	-11,607 (0.001)	2,346 (0.000)	-0.796 (0.908)	-29.777 (0.022)	15.167 (0.000)
VIEW	29,585 (0.000)	105,763 (0.000)	11,499 (0.000)	214.340 (0.000)	692.622 (0.000)	69.113 (0.000)
BALCONY	-24,312 (0.024)	-58,279 (0.000)	9,872 (0.000)	-159.805 (0.001)	-309.266 (0.000)	95.728 (0.000)
NEWLY-BUILT	18,699 (0.004)	85,200 (0.000)	6,636 (0.011)	213.965 (0.000)	670.803 (0.000)	39.082 (0.032)
AGE	2,848 (0.000)	5,802 (0.000)	817.266 (0.000)	20.076 (0.000)	42.120 (0.000)	4.827 (0.000)
RESIDENCE	652,811 (0.000)	1,056,453 (0.000)	76,583 (0.001)	3,181 (0.000)	5,344 (0.000)	456.047 (0.000)
HEAT-CENTRAL	22,844 (0.000)	70,105 (0.000)	33,358 (0.000)	268.005 (0.000)	733.014 (0.000)	233.377 (0.000)
HEAT-FLOOR	82,202 (0.003)	264,005 (0.006)	92,236 (0.000)	676.189 (0.000)	1,982 (0.000)	558.004 (0.000)
HEAT-AC	-9,927 (0.272)	239,304 (0.032)	661.918 (0.882)	63.046 (0.226)	2,566 (0.102)	87.212 (0.033)
HEAT-COMBI	-10,340 (0.223)	13,784 (0.437)	32,932 (0.000)	120.053 (0.004)	427.283 (0.001)	250.681 (0.000)
HEAT-GEOTHERMAL	15,477 (0.480)	0.000 (.)	55,192 (0.000)	257.391 (0.045)	0.000 (.)	420.124 (0.000)
Constant	-231,455 (0.000)	-146,979 (0.002)	-106,367 (0.000)	115.414 (0.403)	793.838 (0.003)	224.896 (0.000)
Number of Observations	8,894	2,869	6,025	8,894	2,869	6,025
R-Squared	0.362	0.462	0.498	0.334	0.283	0.259

5.1 PRICE DIFFERENCE ACROSS PROVINCES

The province dummies are omitted from the tables given earlier, but their coefficients can be found in the appendix. In this subsection, we use that information to discuss the differences in apartment prices across the provinces represented in the data. Since the province of ADANA is chosen as the base category, the coefficients on the rest of the provinces should be interpreted as the differences with respect to that province.

AFYON is an underdeveloped city located in the Central Anatolia of Turkey. It has negative coefficient with value of 17%. Since Ankara is capital and the second biggest city of Turkey, housing prices are 17% higher than ADANA. If ANTALYA is taken into consideration, housing prices are more expensive than ADANA and Ankara. One of the reasons for positive coefficient is ANTALYA located in the southern costal region of Turkey. Tourism is improved in this city. Sea view is another important characteristic of the houses in ANTALYA. Furthermore, migrations from other cities and other countries from Europe are high, as well. Since BOLU is a small city and less developed compared to other cities, BOLU has a negative coefficient. It means that the house prices are cheaper than ADANA. Another city with a highly developed industry is Bursa. It is one of the biggest cities in Turkey. Besides, this city is located close to ISTANBUL which accelerated the developments in industry. As a result, Bursa has a positive coefficient which is 13%. ERZURUM, ERZINCAN, MALATYA, DIYARBAKIR, GAZIANTEP are located in the eastern side of Turkey. They are underdeveloped cities of Turkey. Economy of these cities composed of agriculture and livestock production. There is high supply of housing units in these cities. House prices are low in these provinces and coefficients are negative with respect to ADANA. KASTAMONU, EDIRNE, SAKARYA, TRABZON are the cities with lower population and income of households is low in these cities. Population in these cities is stable which lowers the demand for housing. There is a big migration from these cities to ISTANBUL. As a result negative coefficient is observed.

Some of the provinces in which degree of development is low are KAYSERI ve KONYA. Although these cities are located in central region of Turkey and they are large enough, coefficient of these variables are negative.

ISTANBUL is the largest metropolitan city of Turkey. The most important difference of ISTANBUL from other cities is being a poli-centric city. Every neighborhood in this city composed of different finance sectors with impressive buildings, various shopping malls, and different hotels. As a result, there is high rates of internal migration thus increase the population. This increase created high demand for housing which results high housing prices. House prices are 65% more expensive in ISTANBUL, which is the most industrialized city in Turkey.

IZMIR is the third biggest city of Turkey. Although it is not as big as ISTANBUL, there is high rate of migration to IZMIR, as well. This city is located on the west coast of Turkey. Although this city has developed industry, it has an important place in tourism sector. The coefficient of this variable is 47% which indicates that demand for housing is high again.

In our model, although all the data have unique characteristics, housing units is analyzed in two sub-markets. Istanbul is the largest and the most developed city in Turkey. Its population is nearly 6 times more than Ankara which is the capital of Turkey. Job opportunities, socio-economic situations, income growth are different and advanced in this city. These attributes affects housing prices in Istanbul. Therefore, Istanbul is one sub-market and the rest of the country is the other sub-market. In regression results square meter of houses in Istanbul has higher coefficient than the other cities in Turkey. Because of high population growth in Istanbul, there is an excess demand for housing which is the result for constructing new houses with smaller square meter. On the other hand, there is a stable population growth in other cities and there are sufficient areas for constructions of new buildings.

6. CONCLUSION

This study aimed to analyze housing prices and effects of the determinants on housing prices in Turkey. Apartments, which are by far the most common type of housing in Turkey, especially in urban areas identified as self-contained housing units that occupy only part of an apartment building are used in this study as data sample. This data is drawn from the database of sahibinden.com. 19 provinces among Turkey are used according to 12- way regions determined by Turkish Statistical Institute (TurkStat).

At the beginning of the study, theoretical framework is analyzed. The determinants of housing prices (such as location characteristics) are identified. Also, empirical studies in hedonic prices of housing units are analyzed among the world literature. Since there is scarce study about housing market in Turkey, the existing ones are mentioned.

Hedonic regression analysis was applied for the housing prices. Since there were substantial differences between the coefficient estimates obtained for the sub-sample of observations from the province of Istanbul and those obtained for the rest of the country, the econometric models were estimated not only on the full sample of observations, but also on the “Istanbul” and the “rest of the country” sub-samples. There are significant differences in coefficients of variables in two sub-samples. In Istanbul it is not prefer to have a balcony because of the reduction of total size of house, however in the rest of the country due to the larger sizes and preferences, houses with balcony is preferred. Although it is expected that the age of the building variable should have a negative coefficient, positive one is obtained because of the renovations of houses which are more expensive in the well constituted prestigious neighborhoods. Also, the hedonic equation is specified in the log-linear functional form which performed better than the linear functional form. .

The results suggest that housing price is determined by structural and in-house amenities. In all over the country the most important characteristics of houses are view and whether the age of the building is zero or not. In our two sub samples it is indicated that people always enjoy the view of the houses and their willingness to pay for a housing unit with view is high. It is observed that houses which are located in the ground floor and the top floor of the apartment have negative signs. Possible reasons are poor condition of the roof for top floors and higher risk of burglary and noise for ground floor. In the full sample and the Istanbul sub sample,

presence of central heating system has a positive impact on housing prices. Among the heating systems, floor heating has the highest positive coefficient. The term residence has a significant positive effect on the price because of facilities such as parking lots and swimming pools that residence offers.

The main shortcoming of the data worked with is the absence of information on outside amenities (or neighborhood characteristics) such as the attractiveness of the neighborhood, closeness of commercial centers, or the distance of the building from public transportation or the highway. It should be noted, however, that most Turkish cities, especially the largest ones, are unique in the sense that luxurious high-rise buildings and illegally-built two- or three-storey buildings can be found side by side. It is also possible for one side of a street to be considered as part of a prestigious area while the other side is perceived to belong in a poor neighborhood. In other words, even if more detailed location information were available, it is questionable that it would have added much to the explanatory power of our models.

The results of this study can be used to understand the investments and supply side of housing market. Moreover, urban planners and policy analysts can use the results for understanding the differences in housing market among the country. It can give an idea of present situation in housing market, the evaluation of the factors that identify housing prices. Also, it can offer solutions for determination of house sale prices for both investors and house owners and for real estate agents.

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APPENDIX

Table A-1(a) Regression Results of Housing Prices in Turkey, Dep. Var.: Price

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. xi:reg price sqm room sifir age giris topfl floor sqfl noff resi manzara balko
> n kalo yerden klima kombi jeo i.plaka i.month, robust
i.plaka      _Iplaka_1-61      (naturally coded; _Iplaka_1 omitted)
i.month      _Imonth_1-12      (naturally coded; _Imonth_1 omitted)

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```

Regression with robust standard errors
Number of obs =      8894
F( 46, 8847) =      48.62
Prob > F       =      0.0000
R-squared      =      0.3620
Root MSE      =      2.1e+05

```

price	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	2792.129	307.3098	9.09	0.000	2189.73	3394.527
room	-21776.2	9838.16	-2.21	0.027	-41061.28	-2491.124
sifir	18699.89	6420.446	2.91	0.004	6114.321	31285.45
age	2848.98	481.7129	5.91	0.000	1904.711	3793.249
giris	-31963.75	13224.56	-2.42	0.016	-57886.96	-6040.547
topfl	-42171.69	9272.067	-4.55	0.000	-60347.1	-23996.29
floor	-13450.21	6512.351	-2.07	0.039	-26215.93	-684.4923
sqfloor	1184.464	570.9828	2.07	0.038	65.20566	2303.723
noffloors	-3431.998	1568.867	-2.19	0.029	-6507.342	-356.6532
residence	652811.7	154014.4	4.24	0.000	350907.8	954715.6
manzara	29585.99	6162.32	4.80	0.000	17506.41	41665.57
balkon	-24312.51	10750.25	-2.26	0.024	-45385.5	-3239.53
kalorifer	22844.78	6081.225	3.76	0.000	10924.17	34765.39
yerdenisitma	82202.64	27491.4	2.99	0.003	28313.12	136092.2
klima	-9927.563	9038.921	-1.10	0.272	-27645.95	7790.821
kombi	-10340.49	8477.072	-1.22	0.223	-26957.52	6276.535
jeotermal	15477.48	21937.2	0.71	0.480	-27524.53	58479.49
_Iplaka_3	57501.18	20009.42	2.87	0.004	18278.06	96724.3
_Iplaka_6	113756.8	16608.82	6.85	0.000	81199.65	146314
_Iplaka_7	103894	20107.57	5.17	0.000	64478.5	143309.5
_Iplaka_14	67959.08	18581	3.66	0.000	31536	104382.2
_Iplaka_16	83222.91	13943.01	5.97	0.000	55891.37	110554.4
_Iplaka_21	-31517.05	13056.69	-2.41	0.016	-57111.19	-5922.914
_Iplaka_22	47834.8	17817.99	2.68	0.007	12907.39	82762.2
_Iplaka_24	-45619.85	15930.08	-2.86	0.004	-76846.5	-14393.19
_Iplaka_25	-10969.07	16828.24	-0.65	0.515	-43956.32	22018.19
_Iplaka_27	-21081.62	13524.88	-1.56	0.119	-47593.53	5430.295
_Iplaka_34	257199.7	21255.57	12.10	0.000	215533.9	298865.6
_Iplaka_35	132473.4	11826.34	11.20	0.000	109291.1	155655.8
_Iplaka_37	30198.49	15816.08	1.91	0.056	-804.6932	61201.67
_Iplaka_38	33778.82	13968.83	2.42	0.016	6396.67	61160.96
_Iplaka_42	24237.14	12568.23	1.93	0.054	-399.5192	48873.8
_Iplaka_44	-28022.26	15271.22	-1.83	0.067	-57957.4	1912.886
_Iplaka_54	118322.8	17433.36	6.79	0.000	84149.4	152496.3
_Iplaka_61	46726.06	15274.81	3.06	0.002	16783.88	76668.24
_Imonth_2	-909.6336	25178.24	-0.04	0.971	-50264.83	48445.56
_Imonth_3	37371.81	22182.75	1.68	0.092	-6111.534	80855.15
_Imonth_4	-18389.59	22545.49	-0.82	0.415	-62583.99	25804.81
_Imonth_5	-8877.519	25034.73	-0.35	0.723	-57951.4	40196.37
_Imonth_6	-24466.27	20591.05	-1.19	0.235	-64829.5	15896.97
_Imonth_7	-21376.06	20319.55	-1.05	0.293	-61207.09	18454.98
_Imonth_8	-3953.574	19628.89	-0.20	0.840	-42430.76	34523.61
_Imonth_9	17954.88	17611.57	1.02	0.308	-16567.88	52477.65
_Imonth_10	11754.11	17018.22	0.69	0.490	-21605.56	45113.77
_Imonth_11	9758.31	16971.34	0.57	0.565	-23509.46	43026.08
_Imonth_12	17051.43	17169.38	0.99	0.321	-16604.54	50707.4
_cons	-231455.9	30611.8	-7.56	0.000	-291462.2	-171449.7

Notes to Table A1: The province dummies are indicated by their licence plate numbers as follows: Plaka_1 = Adana, Plaka_3 = Afyon, Plaka_6 = Ankara, Plaka_7 = Antalya, Plaka_14 = Bolu, Plaka_16 = Bursa, Plaka_21 = Diyarbakır, Plaka_22 = Edirne, Plaka_24 = Erzincan, Plaka_25 = Erzurum, Plaka_27 = Gaziantep, Plaka_34 = İstanbul, Plaka_35 = İzmir, Plaka_37 = Kastamonu, Plaka_38 = Kayseri, Plaka_42 = Konya, Plaka_44 = Malatya, Plaka_54 = Sakarya, Plaka_61 = Trabzon. Dummt variables for months are named as follows: Month_1 = January, Month_2 = February, Month_3 = March, Month_4 = April, Month_5 = May, Month_6 = June, Month_7 = July, Month_8 = August, Month_9 = September, Month_10 = October, Month_11 = November, Month_12 = December

Table A-1(b): Regression Results of Housing Prices in Istanbul

Regression with robust standard errors

Number of obs = 2869
F(19, 2849) = 20.88
Prob > F = 0.0000
R-squared = 0.4624
Root MSE = 3.1e+05

price	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	6247.705	776.2362	8.05	0.000	4725.664	7769.747
room	-84924.16	26543.88	-3.20	0.001	-136971.3	-32877
sifir	85200.32	19371.12	4.40	0.000	47217.49	123183.1
age	5802.209	1036.935	5.60	0.000	3768.99	7835.428
giris	-39492.64	24540.04	-1.61	0.108	-87610.68	8625.407
topfl	-109321	25107.06	-4.35	0.000	-158550.8	-60091.1
floor	-14821.48	10311.02	-1.44	0.151	-35039.3	5396.341
sqfloor	812.2906	750.0694	1.08	0.279	-658.4431	2283.024
noffloors	-11607.38	3508.847	-3.31	0.001	-18487.51	-4727.241
residence	1056454	245254.4	4.31	0.000	575559.8	1537348
manzara	105763.8	23741.65	4.45	0.000	59211.26	152316.4
balkon	-58279.42	16310.27	-3.57	0.000	-90260.55	-26298.28
kalorifer	70105.58	18961.13	3.70	0.000	32926.65	107284.5
yerdenisitma	264005.1	96595.21	2.73	0.006	74601.47	453408.7
klima	239304.5	111433.6	2.15	0.032	20805.87	457803.1
kombi	13784.85	17745.47	0.78	0.437	-21010.42	48580.12
_Imonth_2	-3921.661	26383.49	-0.15	0.882	-55654.33	47811
_Imonth_3	2007.643	24244.84	0.08	0.934	-45531.57	49546.86
_Imonth_4	-37616.92	26276.36	-1.43	0.152	-89139.53	13905.68
_cons	-146979.2	48117.73	-3.05	0.002	-241328.4	-52630.14

Table A-1(c): Regression Results of Housing Prices in Turkey except Istanbul

Regression with robust standard errors

Number of obs = 6025
 F(45, 5979) = 62.65
 Prob > F = 0.0000
 R-squared = 0.4981
 Root MSE = 66609

price	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	1106.86	83.53652	13.25	0.000	943.0981	1270.622
room	-3840.983	3381.421	-1.14	0.256	-10469.79	2787.822
sifir	6636.987	2601.182	2.55	0.011	1537.731	11736.24
age	817.2657	169.0852	4.83	0.000	485.7977	1148.734
girisi	-14212.06	6598.844	-2.15	0.031	-27148.18	-1275.949
topfl	-14118.57	2684.657	-5.26	0.000	-19381.47	-8855.679
floor	-5767.351	3694.75	-1.56	0.119	-13010.39	1475.691
sqfloor	716.7373	376.0078	1.91	0.057	-20.37377	1453.848
noffloors	2346.495	544.3874	4.31	0.000	1279.299	3413.691
residence	76583.34	23290.6	3.29	0.001	30925.36	122241.3
manzara	11499.99	1921.625	5.98	0.000	7732.917	15267.07
balkon	9872.681	2274.045	4.34	0.000	5414.731	14330.63
kalorifer	33358.75	2980.118	11.19	0.000	27516.65	39200.86
yerdenisitma	92236.04	15274.2	6.04	0.000	62293.1	122179
klima	661.9176	4445.436	0.15	0.882	-8052.742	9376.577
kombi	32932.93	3420.288	9.63	0.000	26227.93	39637.93
jeotermal	55192.46	12345.42	4.47	0.000	30990.99	79393.93
_Iplaka_3	14332.12	8156.67	1.76	0.079	-1657.894	30322.14
_Iplaka_6	49193.74	6991.033	7.04	0.000	35488.79	62898.69
_Iplaka_7	75524.89	9893.69	7.63	0.000	56129.68	94920.09
_Iplaka_14	14742.62	8117.283	1.82	0.069	-1170.186	30655.42
_Iplaka_16	38830.82	6403.595	6.06	0.000	26277.46	51384.17
_Iplaka_21	-49279.91	5887.767	-8.37	0.000	-60822.05	-37737.76
_Iplaka_22	8449.809	7049.875	1.20	0.231	-5370.49	22270.11
_Iplaka_24	-42700.42	6336.832	-6.74	0.000	-55122.89	-30277.94
_Iplaka_25	-35567.05	7041.638	-5.05	0.000	-49371.21	-21762.9
_Iplaka_27	-30812.11	5759.439	-5.35	0.000	-42102.69	-19521.53
_Iplaka_35	99308.26	6622.182	15.00	0.000	86326.4	112290.1
_Iplaka_37	-8362.059	7486.441	-1.12	0.264	-23038.18	6314.066
_Iplaka_38	-20957.29	5798.508	-3.61	0.000	-32324.46	-9590.122
_Iplaka_42	-768.8743	5664.375	-0.14	0.892	-11873.09	10335.35
_Iplaka_44	-25407.63	6726.971	-3.78	0.000	-38594.92	-12220.34
_Iplaka_54	46570.22	7817.839	5.96	0.000	31244.43	61896
_Iplaka_61	12027.27	7130.169	1.69	0.092	-1950.432	26004.98
_Imonth_2	22254.27	10036.85	2.22	0.027	2578.425	41930.11
_Imonth_3	24136.72	12907.99	1.87	0.062	-1167.607	49441.04
_Imonth_4	3769.378	9123.083	0.41	0.679	-14115.16	21653.91
_Imonth_5	1828.634	10984.3	0.17	0.868	-19704.55	23361.82
_Imonth_6	19.74625	7856.405	0.00	0.998	-15381.64	15421.13
_Imonth_7	1481.276	7925.115	0.19	0.852	-14054.81	17017.36
_Imonth_8	18330.1	7773.522	2.36	0.018	3091.189	33569
_Imonth_9	32377.68	7245.893	4.47	0.000	18173.11	46582.24
_Imonth_10	10340.49	6495.46	1.59	0.111	-2392.96	23073.93
_Imonth_11	-628.0676	6299.856	-0.10	0.921	-12978.06	11721.92
_Imonth_12	17876.6	6638.573	2.69	0.007	4862.604	30890.6
_cons	-106367.1	12069.39	-8.81	0.000	-130027.5	-82706.76

Table A-2(a) Regression Results of Housing Prices in Turkey,
 Dep. Var.: Price per Square meter

```
. xi:reg sqprice sqm room sifir age giris topfl floor sqfl noff resi manzara bal
> kon kalo yerden klima kombi jeo i.plaka i.month, robust
i.plaka      _Iplaka_1-61      (naturally coded; _Iplaka_1 omitted)
i.month      _Imonth_1-12      (naturally coded; _Imonth_1 omitted)
```

```
Regression with robust standard errors                                Number of obs =      8894
                                                                    F( 46,  8847) =      91.73
                                                                    Prob > F      =      0.0000
                                                                    R-squared     =      0.3339
                                                                    Root MSE     =     1032.7
```

sqprice	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	5.250645	.874109	6.01	0.000	3.537188	6.964101
room	-99.6474	37.74267	-2.64	0.008	-173.6318	-25.663
sifir	213.9648	32.35535	6.61	0.000	150.5408	277.3888
age	20.07553	2.224918	9.02	0.000	15.71418	24.43689
giris	-220.2656	46.42853	-4.74	0.000	-311.2763	-129.2549
topfl	-173.9639	38.34258	-4.54	0.000	-249.1242	-98.80351
floor	-48.14954	16.64896	-2.89	0.004	-80.78537	-15.51371
sqfloor	3.731063	1.283241	2.91	0.004	1.215612	6.246514
noffloors	-.7963179	6.912255	-0.12	0.908	-14.34594	12.75331
residence	3181.736	442.4629	7.19	0.000	2314.406	4049.066
manzara	214.3399	30.99646	6.91	0.000	153.5796	275.1001
balkon	-159.8049	47.72598	-3.35	0.001	-253.3589	-66.25086
kalorifer	268.0051	34.5251	7.76	0.000	200.3279	335.6823
yerdenisitma	676.1892	125.8783	5.37	0.000	429.4385	922.9399
klima	63.04648	52.04285	1.21	0.226	-38.9696	165.0626
kombi	120.0534	41.64455	2.88	0.004	38.42047	201.6864
jeotermal	257.3914	128.3562	2.01	0.045	5.783496	508.9993
_Iplaka_3	24.61345	83.26828	0.30	0.768	-138.6117	187.8386
_Iplaka_6	483.7324	63.81934	7.58	0.000	358.6317	608.8332
_Iplaka_7	445.0777	95.01255	4.68	0.000	258.8311	631.3244
_Iplaka_14	75.1381	76.28767	0.98	0.325	-74.40344	224.6797
_Iplaka_16	320.3476	55.07341	5.82	0.000	212.3909	428.3043
_Iplaka_21	-224.2252	51.67512	-4.34	0.000	-325.5204	-122.9299
_Iplaka_22	68.59962	67.19187	1.02	0.307	-63.11205	200.3113
_Iplaka_24	-278.6921	62.04847	-4.49	0.000	-400.3216	-157.0627
_Iplaka_25	-176.5575	66.26307	-2.66	0.008	-306.4485	-46.66651
_Iplaka_27	-209.1948	53.02276	-3.95	0.000	-313.1317	-105.2579
_Iplaka_34	1378.061	89.61916	15.38	0.000	1202.386	1553.735
_Iplaka_35	659.5442	46.20282	14.27	0.000	568.976	750.1125
_Iplaka_37	-49.80179	63.14985	-0.79	0.430	-173.5902	73.98657
_Iplaka_38	-3.616272	51.82469	-0.07	0.944	-105.2047	97.97215
_Iplaka_42	63.65047	52.69891	1.21	0.227	-39.65163	166.9526
_Iplaka_44	-244.4736	58.25094	-4.20	0.000	-358.6589	-130.2882
_Iplaka_54	284.6592	68.12933	4.18	0.000	151.1099	418.2085
_Iplaka_61	80.48135	59.74925	1.35	0.178	-36.64105	197.6037
_Imonth_2	-91.9402	148.4366	-0.62	0.536	-382.9104	199.03
_Imonth_3	230.3315	138.8416	1.66	0.097	-41.83024	502.4932
_Imonth_4	-41.75775	142.8984	-0.29	0.770	-321.8717	238.3562
_Imonth_5	-10.47927	121.7095	-0.09	0.931	-249.0581	228.0995
_Imonth_6	-49.19822	109.7652	-0.45	0.654	-264.3636	165.9671
_Imonth_7	-105.7459	106.5142	-0.99	0.321	-314.5384	103.0467
_Imonth_8	-18.97687	106.138	-0.18	0.858	-227.032	189.0783
_Imonth_9	114.9434	103.9937	1.11	0.269	-88.90843	318.7951
_Imonth_10	-6.165039	100.2445	-0.06	0.951	-202.6675	190.3375
_Imonth_11	-40.45948	99.96575	-0.40	0.686	-236.4156	155.4966
_Imonth_12	13.77932	100.3808	0.14	0.891	-182.9903	210.549
_cons	115.4144	138.1018	0.84	0.403	-155.2972	386.1261

Table A-2(b) Regression Results of Housing Prices in Istanbul,
 Dep. Var.: Price per Square meter

Regression with robust standard errors

Number of obs = 2869
 F(19, 2849) = 25.35
 Prob > F = 0.0000
 R-squared = 0.2831
 Root MSE = 1546.8

sqprice	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	14.94124	2.125059	7.03	0.000	10.77443	19.10805
room	-333.1895	93.24248	-3.57	0.000	-516.0191	-150.3599
sifir	670.8026	97.40785	6.89	0.000	479.8056	861.7996
age	42.11989	4.883968	8.62	0.000	32.54342	51.69636
giris	-316.1916	104.2218	-3.03	0.002	-520.5494	-111.8337
topfl	-512.1427	106.4602	-4.81	0.000	-720.8895	-303.3959
floor	-46.1989	34.33666	-1.35	0.179	-113.5261	21.12832
sqfloor	1.384515	2.031395	0.68	0.496	-2.598637	5.367667
noffloors	-29.77688	12.98369	-2.29	0.022	-55.23526	-4.318499
residence	5344.034	609.4117	8.77	0.000	4149.101	6538.967
manzara	692.6218	121.4721	5.70	0.000	454.4397	930.8039
balkon	-309.2664	76.12945	-4.06	0.000	-458.5408	-159.9919
kalorifer	733.0136	138.2215	5.30	0.000	461.9893	1004.038
yerdenisitma	1982.285	506.2882	3.92	0.000	989.5563	2975.013
klima	2566.024	1566.956	1.64	0.102	-506.459	5638.507
kombi	427.2833	133.315	3.21	0.001	165.8796	688.687
_Imonth_2	-86.31057	157.9638	-0.55	0.585	-396.0455	223.4244
_Imonth_3	143.5773	149.3775	0.96	0.337	-149.3216	436.4763
_Imonth_4	-13.4226	158.0878	-0.08	0.932	-323.4007	296.5555
_cons	793.8379	267.1866	2.97	0.003	269.9393	1317.736

Table A-2(c) Regression Results of Housing Prices in Turkey except Istanbul,
 Dep. Var.: Price per Square meter

Regression with robust standard errors

Number of obs = 6025
 F(45, 5979) = 70.20
 Prob > F = 0.0000
 R-squared = 0.2586
 Root MSE = 482.68

sqprice	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	.1190362	.5038077	0.24	0.813	-.8686086	1.106681
room	6.802071	21.86056	0.31	0.756	-36.05252	49.65666
sifir	39.08243	18.25068	2.14	0.032	3.304516	74.86035
age	4.827026	1.209945	3.99	0.000	2.455098	7.198954
giris	-93.0196	29.99518	-3.10	0.002	-151.821	-34.21821
topfl	-63.97308	19.36727	-3.30	0.001	-101.9399	-26.00624
floor	-18.87404	11.43897	-1.65	0.099	-41.29855	3.550479
sqfloor	2.267907	1.084348	2.09	0.037	.1421937	4.393619
noffloors	15.16714	3.966534	3.82	0.000	7.391305	22.94298
residence	456.0467	130.5937	3.49	0.000	200.0359	712.0576
manzara	69.11305	13.54619	5.10	0.000	42.55763	95.66847
balkon	95.72806	17.24444	5.55	0.000	61.92273	129.5334
kalorifer	233.3768	22.98232	10.15	0.000	188.3231	278.4304
yerdenisitma	558.0043	79.85336	6.99	0.000	401.4629	714.5457
klima	87.21163	40.94418	2.13	0.033	6.94627	167.477
kombi	250.6814	26.10605	9.60	0.000	199.5042	301.8587
jeotermal	420.1245	79.49245	5.29	0.000	264.2906	575.9584
_Iplaka_3	-31.75825	48.6113	-0.65	0.514	-127.0539	63.53744
_Iplaka_6	249.7268	40.58324	6.15	0.000	170.169	329.2846
_Iplaka_7	426.3938	62.99047	6.77	0.000	302.9098	549.8778
_Iplaka_14	2.164274	48.23757	0.04	0.964	-92.39878	96.72733
_Iplaka_16	204.4315	34.621	5.90	0.000	136.5618	272.3011
_Iplaka_21	-280.7088	30.31115	-9.26	0.000	-340.1296	-221.288
_Iplaka_22	-19.26075	41.88809	-0.46	0.646	-101.3765	62.85501
_Iplaka_24	-265.5526	34.0034	-7.81	0.000	-332.2116	-198.8937
_Iplaka_25	-254.9619	37.90338	-6.73	0.000	-329.2662	-180.6576
_Iplaka_27	-212.6342	31.6568	-6.72	0.000	-274.693	-150.5755
_Iplaka_35	620.1847	32.92177	18.84	0.000	555.6461	684.7232
_Iplaka_37	-133.5484	45.17507	-2.96	0.003	-222.1078	-44.98899
_Iplaka_38	-169.7366	33.94408	-5.00	0.000	-236.2793	-103.194
_Iplaka_42	-54.11292	33.80276	-1.60	0.109	-120.3785	12.15269
_Iplaka_44	-179.167	34.69984	-5.16	0.000	-247.1912	-111.1428
_Iplaka_54	113.8418	47.42124	2.40	0.016	20.87909	206.8046
_Iplaka_61	28.70434	41.49646	0.69	0.489	-52.64369	110.0524
_Imonth_2	144.0208	67.04746	2.15	0.032	12.58356	275.458
_Imonth_3	208.8817	75.6344	2.76	0.006	60.61098	357.1524
_Imonth_4	56.66929	54.98074	1.03	0.303	-51.1128	164.4514
_Imonth_5	52.3019	59.50766	0.88	0.379	-64.35458	168.9584
_Imonth_6	65.46236	45.42082	1.44	0.150	-23.57884	154.5036
_Imonth_7	40.32736	45.95031	0.88	0.380	-49.75183	130.4065
_Imonth_8	132.9671	46.02673	2.89	0.004	42.73808	223.1961
_Imonth_9	237.5422	48.30541	4.92	0.000	142.8462	332.2383
_Imonth_10	77.47607	40.45763	1.91	0.056	-1.83549	156.7876
_Imonth_11	3.841846	40.10381	0.10	0.924	-74.77609	82.45979
_Imonth_12	100.6595	40.49088	2.49	0.013	21.28272	180.0362
_cons	224.8956	64.03009	3.51	0.000	99.37349	350.4177

Table A-3(a) Regression Results of Housing Prices in Turkey,
Dep. Var.: Log of Price

```
.
. xi:reg lprice sqm room sifir age giris topfl floor sqfl noff resi manzara balk
> on kalo yerden klima kombi jeo i.plaka i.month, robust
i.plaka      _Iplaka_1-61      (naturally coded; _Iplaka_1 omitted)
i.month      _Imonth_1-12      (naturally coded; _Imonth_1 omitted)
```

```
Regression with robust standard errors                                Number of obs =      8894
                                                                    F( 46,  8847) =    242.21
                                                                    Prob > F          =    0.0000
                                                                    R-squared         =    0.5996
                                                                    Root MSE         =    .43263
```

	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
lprice						
sqm	.0072031	.0002811	25.62	0.000	.006652	.0077542
room	.0108527	.0127398	0.85	0.394	-.0141204	.0358257
sifir	.12133	.0132309	9.17	0.000	.0953943	.1472657
age	.0093208	.0007495	12.44	0.000	.0078516	.0107899
giris	-.1418673	.0180254	-7.87	0.000	-.1772013	-.1065332
topfl	-.1275513	.0140628	-9.07	0.000	-.1551176	-.099985
floor	-.0068134	.0051651	-1.32	0.187	-.0169382	.0033115
sqffloor	.0004992	.0003551	1.41	0.160	-.0001968	.0011952
noffloors	.000678	.0023765	0.29	0.775	-.0039804	.0053364
residence	.8625875	.0862295	10.00	0.000	.6935577	1.031617
manzara	.0972333	.0114731	8.47	0.000	.0747433	.1197233
balkon	.0170775	.0175396	0.97	0.330	-.0173042	.0514593
kalorifer	.3014571	.0200065	15.07	0.000	.2622398	.3406745
yerdenisitma	.5858792	.0501448	11.68	0.000	.4875837	.6841747
klima	.1062853	.0250722	4.24	0.000	.057138	.1554326
kombi	.2600372	.0219495	11.85	0.000	.217011	.3030634
jeotermal	.3797144	.0754788	5.03	0.000	.2317584	.5276703
_Iplaka_3	-.1796499	.0550794	-3.26	0.001	-.2876184	-.0716815
_Iplaka_6	.1738944	.0356152	4.88	0.000	.1040804	.2437085
_Iplaka_7	.2168616	.0518838	4.18	0.000	.1151573	.3185659
_Iplaka_14	-.0943303	.0512091	-1.84	0.065	-.194712	.0060515
_Iplaka_16	.1292674	.0338427	3.82	0.000	.0629279	.195607
_Iplaka_21	-.4112845	.0395963	-10.39	0.000	-.4889025	-.3336666
_Iplaka_22	-.1171584	.0452886	-2.59	0.010	-.2059345	-.0283822
_Iplaka_24	-.4405007	.0492099	-8.95	0.000	-.5369636	-.3440379
_Iplaka_25	-.3670886	.0481763	-7.62	0.000	-.4615253	-.2726519
_Iplaka_27	-.3765906	.0372388	-10.11	0.000	-.4495872	-.303594
_Iplaka_34	.6539536	.0492295	13.28	0.000	.5574524	.7504548
_Iplaka_35	.4754013	.0278541	17.07	0.000	.4208008	.5300018
_Iplaka_37	-.2651934	.0514611	-5.15	0.000	-.3660691	-.1643177
_Iplaka_38	-.1433908	.0357649	-4.01	0.000	-.2134982	-.0732834
_Iplaka_42	-.1639536	.0332912	-4.92	0.000	-.2292121	-.0986951
_Iplaka_44	-.4072942	.0395548	-10.30	0.000	-.4848308	-.3297577
_Iplaka_54	-.1385393	.0375958	-3.68	0.000	-.2122358	-.0648427
_Iplaka_61	-.0286642	.0425923	-0.67	0.501	-.112155	.0548265
_Imonth_2	.0318564	.0468824	0.68	0.497	-.0600441	.1237568
_Imonth_3	.2277591	.0441432	5.16	0.000	.1412283	.31429
_Imonth_4	.1386254	.0486696	2.85	0.004	.0432217	.234029
_Imonth_5	.0519645	.0742093	0.70	0.484	-.093503	.1974319
_Imonth_6	.0214709	.0572013	0.38	0.707	-.0906569	.1335988
_Imonth_7	-.0189762	.055317	-0.34	0.732	-.1274103	.0894579
_Imonth_8	.0839267	.0514656	1.63	0.103	-.0169579	.1848112
_Imonth_9	.1903967	.0462384	4.12	0.000	.0997586	.2810348
_Imonth_10	.0692073	.0438462	1.58	0.115	-.0167414	.155156
_Imonth_11	.0238693	.0431923	0.55	0.581	-.0607976	.1085362
_Imonth_12	.0766726	.0441139	1.74	0.082	-.0098009	.1631462
_cons	10.07461	.0614691	163.90	0.000	9.954113	10.1951

Table A-3(b) Regression Results of Housing Prices in Istanbul,
 Dep. Var.: Log of Price

Regression with robust standard errors

Number of obs = 2869
 F(19, 2849) = 118.14
 Prob > F = 0.0000
 R-squared = 0.4851
 Root MSE = .56155

lprice	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	.0100495	.0005851	17.18	0.000	.0089022	.0111967
room	-.0504831	.0272667	-1.85	0.064	-.1039474	.0029813
sifir	.3081682	.032913	9.36	0.000	.2436325	.372704
age	.0182341	.0014659	12.44	0.000	.0153598	.0211084
giris	-.1962183	.0368318	-5.33	0.000	-.2684381	-.1239985
topfl	-.1777636	.0340842	-5.22	0.000	-.2445957	-.1109314
floor	-.0234027	.0109575	-2.14	0.033	-.0448881	-.0019173
sqfloor	.0006856	.0006339	1.08	0.280	-.0005574	.0019286
noffloors	-.0097865	.0042802	-2.29	0.022	-.0181792	-.0013938
residence	1.332071	.1151213	11.57	0.000	1.106341	1.5578
manzara	.1504227	.0361353	4.16	0.000	.0795686	.2212768
balkon	-.0446617	.0266472	-1.68	0.094	-.0969115	.0075881
kalorifer	.5604278	.0881086	6.36	0.000	.3876648	.7331908
yerdenisitma	1.15102	.1605769	7.17	0.000	.8361612	1.465879
klima	.8946203	.4105294	2.18	0.029	.0896554	1.699585
kombi	.4512413	.086844	5.20	0.000	.2809578	.6215247
_Imonth_2	.0413992	.0498546	0.83	0.406	-.0563555	.1391539
_Imonth_3	.2047044	.0475372	4.31	0.000	.1114936	.2979152
_Imonth_4	.1581	.0525505	3.01	0.003	.0550591	.2611408
_cons	10.41847	.1071411	97.24	0.000	10.20839	10.62856

Table A-3(c) Regression Results of Housing Prices in Turkey except Istanbul,
 Dep. Var.: Log of Price

```
. xi:reg lprice sqm room sifir age giris topfl floor sqfl noff resi manzara balk
> on kalo yerden klima kombi jeo i.plaka i.month if plaka~=34, robust
i.plaka      _Iplaka_1-61      (naturally coded; _Iplaka_1 omitted)
i.month      _Imonth_1-12      (naturally coded; _Imonth_1 omitted)
```

```
Regression with robust standard errors                                Number of obs =      6025
                                                                    F( 45, 5979) =      175.76
                                                                    Prob > F           =      0.0000
                                                                    R-squared          =      0.6179
                                                                    Root MSE          =      .32949
```

	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
lprice						
sqm	.0057251	.000267	21.45	0.000	.0052018	.0062485
room	.0368139	.0117518	3.13	0.002	.0137762	.0598517
sifir	.0463101	.0124551	3.72	0.000	.0218936	.0707266
age	.0036376	.0007041	5.17	0.000	.0022572	.0050179
giris	-.1117827	.0191609	-5.83	0.000	-.1493451	-.0742203
topfl	-.1018349	.0127634	-7.98	0.000	-.1268557	-.076814
floor	.0008411	.0063953	0.13	0.895	-.0116959	.0133781
sqffloor	.0004146	.0005416	0.77	0.444	-.0006472	.0014764
noffloors	.0094814	.0023776	3.99	0.000	.0048205	.0141424
residence	.3181468	.0952548	3.34	0.001	.1314131	.5048805
manzara	.0696358	.0099682	6.99	0.000	.0500946	.089177
balkon	.114834	.0156569	7.33	0.000	.0841408	.1455273
kalorifer	.2583574	.0159731	16.17	0.000	.2270443	.2896705
yerdenisitma	.5064889	.0454744	11.14	0.000	.4173426	.5956352
klima	.0906911	.0232491	3.90	0.000	.0451146	.1362677
kombi	.2808559	.0178006	15.78	0.000	.2459603	.3157516
jeothermal	.409174	.0620708	6.59	0.000	.2874928	.5308552
_Iplaka_3	-.1584674	.0498064	-3.18	0.001	-.256106	-.0608288
_Iplaka_6	.136767	.0318867	4.29	0.000	.0742576	.1992764
_Iplaka_7	.3105141	.0601929	5.16	0.000	.1925143	.428514
_Iplaka_14	-.0726177	.0458013	-1.59	0.113	-.1624047	.0171693
_Iplaka_16	.121465	.0303272	4.01	0.000	.0620128	.1809172
_Iplaka_21	-.4120544	.0353158	-11.67	0.000	-.4812861	-.3428228
_Iplaka_22	-.1093778	.0416004	-2.63	0.009	-.1909296	-.027826
_Iplaka_24	-.4112485	.04414	-9.32	0.000	-.4977788	-.3247181
_Iplaka_25	-.3629486	.0438178	-8.28	0.000	-.4488473	-.2770499
_Iplaka_27	-.3538525	.0336191	-10.53	0.000	-.419758	-.287947
_Iplaka_35	.4879605	.0254769	19.15	0.000	.4380166	.5379043
_Iplaka_37	-.2726854	.0494196	-5.52	0.000	-.3695656	-.1758052
_Iplaka_38	-.1915607	.0333943	-5.74	0.000	-.2570255	-.1260959
_Iplaka_42	-.1707406	.0296479	-5.76	0.000	-.2288612	-.11262
_Iplaka_44	-.3541646	.0355623	-9.96	0.000	-.4238795	-.2844496
_Iplaka_54	-.1751755	.035474	-4.94	0.000	-.2447174	-.1056336
_Iplaka_61	-.020094	.0396937	-0.51	0.613	-.097908	.0577199
_Imonth_2	.1034548	.0865956	1.19	0.232	-.0663039	.2732135
_Imonth_3	.1952341	.0862972	2.26	0.024	.0260604	.3644078
_Imonth_4	.0183524	.0659616	0.28	0.781	-.1109561	.1476609
_Imonth_5	.0187695	.0726665	0.26	0.796	-.1236831	.1612221
_Imonth_6	.0011884	.0546996	0.02	0.983	-.1060426	.1084195
_Imonth_7	-.0280792	.0546704	-0.51	0.608	-.1352528	.0790944
_Imonth_8	.078497	.0506281	1.55	0.121	-.0207523	.1777464
_Imonth_9	.1745468	.0457137	3.82	0.000	.0849316	.2641621
_Imonth_10	.0450584	.0432843	1.04	0.298	-.0397945	.1299113
_Imonth_11	-.0133396	.0424987	-0.31	0.754	-.0966523	.0699732
_Imonth_12	.0514238	.0434284	1.18	0.236	-.0337116	.1365591
_cons	10.13735	.061101	165.91	0.000	10.01757	10.25713

Table A-4(a) Regression Results of Housing Prices in Turkey,
 Dep. Var.: Log of Price per square meter

```
.
. xi:reg lsqprice sqm room sifir age giris topfl floor sqfl noff resi manzara ba
> lkon kalo yerden klima kombi jeo i.plaka i.month, robust
i.plaka      _Iplaka_1-61      (naturally coded; _Iplaka_1 omitted)
i.month      _Imonth_1-12      (naturally coded; _Imonth_1 omitted)
```

```
Regression with robust standard errors

Number of obs =      8894
F( 46, 8847) =    208.61
Prob > F      =    0.0000
R-squared     =    0.4950
Root MSE     =    .43175
```

lsqprice	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	.0014523	.0002552	5.69	0.000	.000952	.0019525
room	-.0281032	.011958	-2.35	0.019	-.0515438	-.0046627
sifir	.1322551	.0131336	10.07	0.000	.1065103	.158
age	.009941	.0007494	13.27	0.000	.008472	.01141
giris	-.1185902	.0179494	-6.61	0.000	-.1537752	-.0834053
topfl	-.1041063	.014239	-7.31	0.000	-.1320181	-.0761944
floor	-.0108485	.0051877	-2.09	0.037	-.0210176	-.0006794
sqffloor	.0009321	.0003623	2.57	0.010	.0002219	.0016422
nofffloors	-.002058	.0024396	-0.84	0.399	-.0068402	.0027241
residence	.8911946	.0837855	10.64	0.000	.7269556	1.055434
manzara	.1008841	.0114278	8.83	0.000	.078483	.1232852
balkon	-.0165762	.0174914	-0.95	0.343	-.0508634	.017711
kalorifer	.2652665	.0200828	13.21	0.000	.2258995	.3046335
yerdenisitma	.5488364	.0491905	11.16	0.000	.4524116	.6452612
klima	.1080253	.0251751	4.29	0.000	.0586762	.1573744
kombi	.2265176	.0220535	10.27	0.000	.1832877	.2697475
jeothermal	.3387578	.0714986	4.74	0.000	.1986039	.4789118
_Iplaka_3	-.138499	.0527868	-2.62	0.009	-.2419733	-.0350247
_Iplaka_6	.2349968	.0332003	7.08	0.000	.1699165	.3000771
_Iplaka_7	.263298	.0514132	5.12	0.000	.1625163	.3640798
_Iplaka_14	-.0630649	.0512407	-1.23	0.218	-.1635086	.0373788
_Iplaka_16	.1767485	.0312276	5.66	0.000	.1155351	.2379618
_Iplaka_21	-.3984534	.03731	-10.68	0.000	-.4715897	-.325317
_Iplaka_22	-.0707752	.0454843	-1.56	0.120	-.159935	.0183846
_Iplaka_24	-.4254596	.0506455	-8.40	0.000	-.5247365	-.3261827
_Iplaka_25	-.3588833	.0475201	-7.55	0.000	-.4520336	-.2657329
_Iplaka_27	-.3499454	.0355593	-9.84	0.000	-.4196498	-.2802409
_Iplaka_34	.7282338	.048211	15.11	0.000	.6337291	.8227384
_Iplaka_35	.5002006	.0262451	19.06	0.000	.4487541	.5516471
_Iplaka_37	-.2526903	.050045	-5.05	0.000	-.35079	-.1545905
_Iplaka_38	-.128528	.0339222	-3.79	0.000	-.1950233	-.0620326
_Iplaka_42	-.141294	.0313183	-4.51	0.000	-.2026852	-.0799028
_Iplaka_44	-.4143655	.0363108	-11.41	0.000	-.485543	-.343188
_Iplaka_54	.0006241	.0369208	0.02	0.987	-.0717492	.0729974
_Iplaka_61	.0115286	.0404669	0.28	0.776	-.067796	.0908532
_Imonth_2	.020178	.0470773	0.43	0.668	-.0721045	.1124605
_Imonth_3	.2083408	.0442651	4.71	0.000	.121571	.2951105
_Imonth_4	.1022398	.0487036	2.10	0.036	.0067695	.1977101
_Imonth_5	.0505277	.0726381	0.70	0.487	-.0918599	.1929154
_Imonth_6	.0321886	.0557762	0.58	0.564	-.0771456	.1415229
_Imonth_7	-.0240732	.0545601	-0.44	0.659	-.1310235	.0828772
_Imonth_8	.0882666	.0502935	1.76	0.079	-.0103204	.1868536
_Imonth_9	.1867007	.0467217	4.00	0.000	.0951153	.278286
_Imonth_10	.0667831	.0442826	1.51	0.132	-.020021	.1535872
_Imonth_11	.0171994	.0436921	0.39	0.694	-.0684472	.102846
_Imonth_12	.0637406	.0445024	1.43	0.152	-.0234944	.1509756
_cons	6.178941	.0607162	101.77	0.000	6.059923	6.297959

Table A-4(b) Regression Results of Housing Prices in Istanbul,
 Dep. Var.: Log of Price per square meter

```
. xi:reg lsqprice sqm room sifir age giris topfl floor sqfl noff resi manzara ba
> lkon kalo yerden klima kombi jeo i.plaka i.month if plaka==34, robust
i.plaka          _Iplaka_1-61          (naturally coded; _Iplaka_1 omitted)
i.month          _Imonth_1-12         (naturally coded; _Imonth_1 omitted)
```

```
Regression with robust standard errors                                Number of obs =    2869
                                                                    F( 19, 2849) =    59.29
                                                                    Prob > F      =    0.0000
                                                                    R-squared     =    0.2306
                                                                    Root MSE     =    .56289
```

lsqprice	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	.0041238	.0005551	7.43	0.000	.0030353	.0052123
room	-.0991317	.0261431	-3.79	0.000	-.150393	-.0478703
sifir	.3211539	.0327941	9.79	0.000	.2568513	.3854566
age	.0188314	.0014744	12.77	0.000	.0159404	.0217224
giris	-.1779155	.0368927	-4.82	0.000	-.2502546	-.1055765
topfl	-.1509573	.0343572	-4.39	0.000	-.2183248	-.0835899
floor	-.0292425	.0110724	-2.64	0.008	-.0509532	-.0075318
sqffloor	.001132	.0006523	1.74	0.083	-.0001469	.002411
noffloors	-.0126038	.0044197	-2.85	0.004	-.0212699	-.0039377
residence	1.371816	.1078229	12.72	0.000	1.160397	1.583235
manzara	.1601928	.0362006	4.43	0.000	.0892108	.2311749
balkon	-.0809522	.0266262	-3.04	0.002	-.1331608	-.0287437
kalorifer	.5058881	.089678	5.64	0.000	.3300478	.6817285
yerdenisitma	1.072385	.1633707	6.56	0.000	.7520484	1.392722
klima	.9736584	.4303726	2.26	0.024	.1297852	1.817532
kombi	.3990354	.0884525	4.51	0.000	.225598	.5724729
_Imonth_2	.0292414	.050207	0.58	0.560	-.0692043	.1276871
_Imonth_3	.188753	.0478487	3.94	0.000	.0949313	.2825746
_Imonth_4	.1271209	.052692	2.41	0.016	.0238025	.2304393
_cons	6.677979	.1075008	62.12	0.000	6.467191	6.888766

Table A-4(c) Regression Results of Housing Prices in Turkey except Istanbul, Dep. Var.: Log of Price per square meter

```
. xi:reg lsqprice sqm room sifir age giris topfl floor sqfl noff resi manzara ba
> lkon kalo yerden klima kombi jeo i.plaka i.month if plaka~=34, robust
i.plaka      _Iplaka_1-61      (naturally coded; _Iplaka_1 omitted)
i.month      _Imonth_1-12      (naturally coded; _Imonth_1 omitted)
```

```
Regression with robust standard errors      Number of obs =      6025
                                           F( 45, 5979) =    109.97
                                           Prob > F      =    0.0000
                                           R-squared     =    0.4289
                                           Root MSE     =    .32795
```

lsqprice	Coef.	Robust Std. Err.	t	P> t	[95% Conf. Interval]	
sqm	.0000178	.0002379	0.07	0.940	-.0004485	.0004841
room	.0080943	.0110787	0.73	0.465	-.013624	.0298126
sifir	.0525739	.012374	4.25	0.000	.0283165	.0768314
age	.0042217	.0007037	6.00	0.000	.0028421	.0056012
giris	-.0913194	.0193368	-4.72	0.000	-.1292265	-.0534123
topfl	-.0809367	.0128126	-6.32	0.000	-.106054	-.0558193
floor	-.0044185	.0066388	-0.67	0.506	-.0174328	.0085959
sqffloor	.0010306	.0005721	1.80	0.072	-.000091	.0021522
noffloors	.0068851	.0023982	2.87	0.004	.0021838	.0115865
residence	.3558834	.0899635	3.96	0.000	.1795224	.5322443
manzara	.069056	.0098378	7.02	0.000	.0497704	.0883415
balkon	.0945973	.0156702	6.04	0.000	.0638781	.1253166
kalorifer	.2225091	.0158279	14.06	0.000	.1914806	.2535376
yerdenisitma	.4710373	.0448437	10.50	0.000	.3831275	.5589471
klima	.0930656	.0233972	3.98	0.000	.0471986	.1389326
kombi	.2478292	.0176052	14.08	0.000	.2133167	.2823417
jeothermal	.375277	.058494	6.42	0.000	.2606076	.4899464
_Iplaka_3	-.1086552	.0472015	-2.30	0.021	-.2011873	-.0161232
_Iplaka_6	.1989359	.0296804	6.70	0.000	.1407516	.2571203
_Iplaka_7	.3473384	.0607759	5.72	0.000	.2281958	.4664811
_Iplaka_14	-.0306891	.0455738	-0.67	0.501	-.1200303	.058652
_Iplaka_16	.1738529	.0279651	6.22	0.000	.1190312	.2286747
_Iplaka_21	-.3985277	.0334984	-11.90	0.000	-.4641967	-.3328587
_Iplaka_22	-.0575328	.0420102	-1.37	0.171	-.139888	.0248223
_Iplaka_24	-.396397	.0453233	-8.75	0.000	-.485247	-.3075471
_Iplaka_25	-.3553593	.0433655	-8.19	0.000	-.4403714	-.2703472
_Iplaka_27	-.3240567	.0326383	-9.93	0.000	-.3880395	-.2600739
_Iplaka_35	.5186329	.0242632	21.38	0.000	.4710683	.5661975
_Iplaka_37	-.2532152	.0483465	-5.24	0.000	-.3479918	-.1584386
_Iplaka_38	-.1761662	.0318423	-5.53	0.000	-.2385886	-.1137438
_Iplaka_42	-.1495283	.0281082	-5.32	0.000	-.2046306	-.094426
_Iplaka_44	-.3521398	.0329235	-10.70	0.000	-.4166818	-.2875978
_Iplaka_54	-.0199763	.034943	-0.57	0.568	-.0884771	.0485245
_Iplaka_61	.0230403	.0381717	0.60	0.546	-.05179	.0978707
_Imonth_2	.0996078	.0885793	1.12	0.261	-.0740397	.2732552
_Imonth_3	.2024133	.0877193	2.31	0.021	.0304518	.3743747
_Imonth_4	.0178885	.0671538	0.27	0.790	-.1137573	.1495343
_Imonth_5	.0310319	.0710498	0.44	0.662	-.1082514	.1703152
_Imonth_6	.0280209	.0538514	0.52	0.603	-.0775472	.1335891
_Imonth_7	-.0143283	.0543324	-0.26	0.792	-.1208395	.0921829
_Imonth_8	.1031109	.0500526	2.06	0.039	.0049898	.2012321
_Imonth_9	.1905843	.0462972	4.12	0.000	.0998251	.2813435
_Imonth_10	.0646677	.0437819	1.48	0.140	-.0211606	.150496
_Imonth_11	.0017986	.0430665	0.04	0.967	-.0826274	.0862245
_Imonth_12	.059304	.0438568	1.35	0.176	-.0266711	.1452791
_cons	6.161131	.060128	102.47	0.000	6.043258	6.279003