Is There a Housing Bubble or a Quality Boom in Turkey? Evidence from Hedonic Price Adjustment

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Abstract

In the 2010-2014 period, housing prices increased more than 50 percent in Turkey, which raises concerns over a potential property bubble. This increase is widespread across the country where prices are even doubled in some regions. Our study performs a hedonic price adjustment for housing market in Turkey, where we control for the price effects of increases in observed house characteristics in time. Results show significant increases in quality of houses sold, which in turn suggests that identifying all the price increase as real appreciation may be misleading. In particular, we estimate that one fourth of total price changes stems from quality improvements.

Keywords: property price indices; characteristic prices; asset price bubbles.

1. Introduction

A housing bubble is a type of financial bubble that takes place in the housing markets. It is derived from rapid increases in prices of housing until they reach unsustainable levels to individuals' income. In fact, the most important trigger for the global financial crisis commonly believed to have begun in July 2007 was the booming of a house price bubble in the United States. The devastating effects of the crisis on global economy demonstrated the need of a strong and rigorous housing market for both economy and society. Due to the outstanding influence of property prices on economic dynamics, it is crucial for authorities including central banks to have a reliable index for monitoring the fluctuations in house prices.

Housing market is inherently heterogeneous in terms of its characteristics such as location, number of rooms, age, size, etc. On the other hand, differences in quality across properties at a given point in time may be challenging to control for because of the high heterogeneity. Therefore, changes in property prices can reflect pure price changes as well as changes in the quality of houses. Increases in a property price index might result from at least one of these two factors and identifying big changes as a bubble may be misleading if the main driver of the increase is the latter. Several approaches have been proposed in the literature to distinguish these two factors, e.g. hedonic methods, repeat-sales methods, and hybrid methods.[1] Hedonic methods, on the other hand, include time dummy and characteristic prices approaches, where the former performs a single regression for the full time horizon and assumes that quality improves in time and is indifferent in characteristics while the latter uses sequential regressions and computes intertemporal differences in quality.

[1]Since houses in Turkey still don't have unique ID, repeat-sales method is not applicable. On the other hand, quality changes often occur for the exact same house and hence repeat-sales method is still prone to the same issue. Therefore, we use another widely accepted method that is hedonic prices.

In this study, we propose a residential property price index to analyze the fundamentals of Turkish housing market by using the hedonic method. Hedonic regression method makes it possible to control for the many observed characteristics of a property and measures pure price changes as well as price effects of quality changes. Our results show that residential property prices in Turkey increased by 68.3 percent between January 2010 and November 2014, while 15.8 percentage point of this increase is caused by the quality changes in property characteristics and the rest is caused by pure price changes. Even though some discrepancies across regions are observed, one fourth of each price increase can be attributed to quality improvements in general.

The hedonic price model is first developed by Griliches (1961, 1971) and Rosen (1974). Several early studies discussed location effects on house prices after these seminal papers. Later, the method of applying hedonic quality adjustments in house prices has been extensively used.[2] In the Turkish case, using the same dataset, Kaya (2012) employs the multiperiod time dummy approach in analyzing Turkish housing market for the period between December 2010 and June 2012. Her findings suggest that of the 18.9 percent change in property prices, pure price changes contribute to 6.2 percent whereas we compute that as 14.5 percent by using the characteristic prices approach.

The rest of the paper is organized as follows. Next, we explain the data source, scope and methodology of hedonic price index model used in the study and gives information on "House Price Index for Turkey (THPI)". Section 3 provides our estimation results and conclusions are drawn in section 4.

2. Data and Methodology

In this study, we use monthly THPI data compiled by the Central Bank of the Republic of Turkey (CBRT), which covers the period from January 2010 to November 2014. THPI is compiled from valuation reports prepared by real estate appraisal companies at the stage of approval of individual housing loans extended by banks. Therefore, the actual sale of the property and utilization of the loan is not required and all appraised residential properties are included in the scope.[3] On the other hand, our dataset is rich in variety of observable property characteristics. In particular, it has information about buildings including location (city, sub-city, neighborhood and block information), year of construction, build quality, availability of an elevator and whether the building resides in a gated community where security staff protects the site 24/7. Moreover, it also has information about the apartment in the building such as gross area of use, heating type, and number of rooms, bathrooms and balconies. This rich dataset enables us to identify shadow prices of each quality component and to compute pure price changes by keeping average characteristics constant.

THPI uses the (geographically) stratified median price method to measure price movements in Turkish housing market. In the current THPI implementation, properties are grouped together to form homogenous strata and median unit price for each stratum is weighted by number of residential properties sold to reach the overall price index. In determining the geographical stratification, sub-cities with sufficient number of observations are determined as strata.[4] THPI relies on the assumption that the median unit price of appraised properties is indicative of the median unit price of all properties sold. In that, a unit price is the appraisal value divided by its gross area of use and the median unit price is calculated by using a quarterly dataset of unit prices including reference month, preceding and succeeding months -by excluding extreme values- in each stratum.

[2]See, for example, Straszheim (1973, 1974). For more recent studies, see Wilhelmsson (2008) and Widlak and Tomczyk (2010).

[3]For detailed information, see the "Methodological Information on the House Price Index" at CBRT website, www.tcmb.gov.tr

[4]In case of insufficient number of observations for sub-cities, NUTS-Level 2 regions constitute one stratum. If any stratum has a sample size which is smaller than 50 appraisal reports in a period, this stratum is excluded and its weight is distributed to other stratums in the geographical region.

THPI is calculated by using the Chain Laspeyres Index method:

$$I^{ty} = \frac{\sum_i w_i^y p_i^{ty}}{\sum_i w_i^y p_i^{12(y-1)}} I^{12(y-1)}, \tag{1}$$

where I^{ty} is the price index for the reference month t in year y, w_i^y is the weight for stratum i, p_i^{ty} is the median price of all properties in i. We denote reference month as ty while $12(y-1)$ denotes 12th month of the previous year.

In this paper, we use characteristic prices based hedonic regression method. The basis of the hedonic hypothesis is that a good is characterized by the set of all its characteristics. High heterogeneity of the housing market necessitates this approach. In the housing context, regression methods can be used to estimate shadow prices of the features of a property.[5]

In particular, our log-linear regression model is as follows:

$$lnp_n^t = \beta_0^t + \sum_k \beta_k^t z_{nk}^t + \varepsilon_n^t, \tag{2}$$

where p_n^t is the price of property n and z_{nk}^t is characteristic k of the property.

Because base period is important and avoiding potential problems in initial data, we use January 2012 as the base period ($t = 0$) to construct our Turkey Hedonic Residential Property Price Index (THRPPI). Then, we run separate regressions for all periods and keep estimates of regression coefficients, $\widehat{\beta_k^t}$. To compute fixed-characteristics prices, we use $\widehat{\beta_k^t}$ along with average characteristics for the base period, $\overline{z_k^0}$. From this perspective, average characteristics for the base period resembles "standardized property with fixed characteristics". Our Laspeyres-type index for each stratum i is as following:

$$P_i^t = \frac{exp(\widehat{\beta_0^t}) exp[\sum_k \beta_k^t \overline{z_{nk}^0}]}{exp(\widehat{\beta_0^0}) exp[\sum_k \beta_k^0 \overline{z_{nk}^0}]}, \tag{3}$$

where P_i^t is the hedonic house price index, $\overline{z_{nk}^0}$ is average characteristics for the base period. Equation (3) expresses the quality adjusted property price index because characteristics are kept constant in time. Next section presents our results.

3. Results

According to regression results given in Table 1, all independent variables used in regressions are statistically significant and signs of all coefficients are consistent with the economic theory. In other words, all shadow prices, i.e. additional contribution of a coefficient to appraisal value, result in increasing the house price. For example, keeping other physical characteristics constant, a 100 square meters larger house is 50 percent more expensive than average. Higher quality houses are valued at a 10.9 percent higher price while an elevator in the building adds 13.3 percent to its value. Security is another important characteristic, if a house receives a 24/7 security service within a gated community then one would expect its price to be 33.3 percent higher on average.

Our regression results indicate an increasing trend of THRPPI starting from the beginning, similar to THPI. Figure 1 shows that, THRPPI has increased by 52.5 percent while THPI has increased by 68.3 percent in

[5] According to the "Residential Property Price Index Handbook" (Eurostat, 2011), the hedonic prices approach can be used to obtain estimates of willingness to pay the different characteristics and to construct quality-adjusted price indexes.

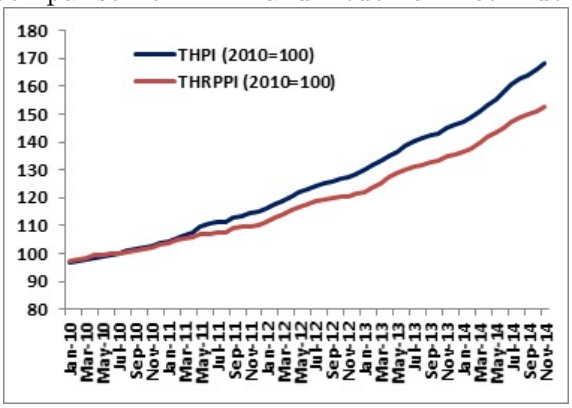
Table 1: House Price Estimation Results

Characteristic	Estimates
Gross area of use (Sq. m.)	0.005
	$(0.000)^{***}$
Quality of construction	0.109
	$(0.022)^{***}$
Year of construction	0.003
	$(0.001)^{**}$
Number of rooms	0.033
	$(0.017)^{**}$
Number of bathrooms	0.084
	$(0.029)^{***}$
Number of balconies	0.071
	$(0.017)^{***}$
Security service	0.333
	$(0.032)^{***}$
Heating	0.118
	$(0.045)^{***}$
Elevator	0.133
	$(0.028)^{***}$
Constant	5.655
	$(2.040)^{***}$
Number of observations	621
R-squared	0.641

Notes: (1) Dependent variable lnP_i^t is the logarithm of total appraisal value of the house in Turkish Liras. (2) The numbers in parenthesis are standard errors while (**) and (***) denotes significance at 5% and 1% level, respectively. (3) Quality of construction is a dummy variable equal to 1 for higher quality houses and 0 for lower. (4) Security service is a dummy variable equal to 1 if the house resides in a gated community. (5) Heating denotes central heating and wall hung gas boiler systems. (6) Elevator denotes whether the building has an elevator or not. (7) Sample regression covers one of the sub-cities of Istanbul with one quarter data. More regression results are available upon request.

almost five years.[6] These findings suggests that, 15.8 percentage point of the increase is emerged from quality improvements in housing characteristics in Turkey.

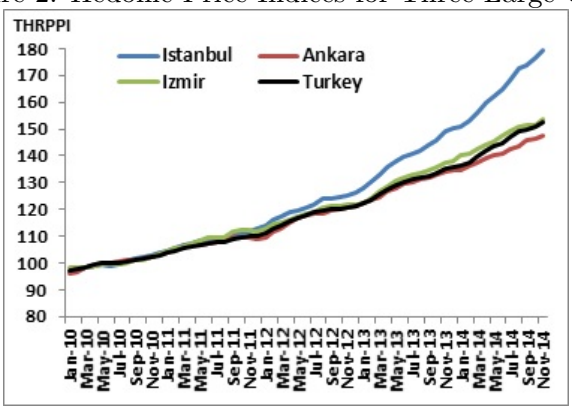
Figure 1: Comparison of THPI and Hedonic Price Index for Turkey



The general tendency of hedonic prices in the three largest cities in Turkey, i.e. Istanbul, Ankara and Izmir, diverges the same pattern by the beginning of 2013. Following a period of similar inflation rates, hedonic

[6]THRPPI is rebased into 2010 from January 2012 to make a comparison with THPI.

Figure 2: Hedonic Price Indices for Three Large Cities



prices in Istanbul show a faster pace and dissociated from the others as shown in Figure 2. In particular, the highest increase in five years is seen in Istanbul by 79.3 percent, while increases in Ankara and Izmir are 47.5 and 53.4 percent, respectively. These numbers are not surprising because respective official THPI increases are 98.7, 51.4 and 63.6. One can see that the lowest quality change is observed in Ankara with only 3.9 percentage points (less than one tenth of total change) whereas average house quality increase observed in Istanbul is 19.4 (almost one fifth of total price increase).

4. Conclusions

Regarding financial stability, excessive property price movements can be a threat for financial stability because houses are considered as the largest part of household wealth. Therefore, price movements in housing markets have a major role in policymaking and needs to be monitored by a reliable statistic. Due to potential quality changes in residential properties, house prices can reflect these effects and might result in misinterpretation of big increases as a -false- price bubble.

Since Turkish house price index computed by CBRT includes abovementioned effects, we construct a quality adjusted property price index by using hedonic regression. In other words, we distinguish quality changes and pure price increases in the index. According to our results, one fourth of each property price increase can be attributed to quality improvements in general.

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