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Housing Price Index Dynamics in Turkey[1]

Türkiye'de Konut Fiyat Endeksi Dinamikleri

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Abstract: This paper investigates the dynamics between house price index and GDP, foreign exchange rates, interest rates and returns on Borsa İstanbul (BIST 100) in Turkey. The empirical results of the ARDL model covering the period between 2010 and 2018 verify that a co-integrating relation exists among the selected variables. The Vector Error Correction Model (VECM) established to analyze the dynamic adjustments in the house price index displayed stability in the long-run. An increase of returns in Borsa İstanbul significantly contributes to decline in house prices which reveal the value of housing as a long term investment tool in Turkey. The effect of lagged exchange rates on house prices signals a source of vulnerability that may lead to macroeconomic imbalances due to exchange rate volatility. It is concluded that policy precautions aiming to stabilize exchange rate movements should also contribute to assuaging irregularities in house prices in the long run.

Keywords: House Price Index, ARDL Model, Bounds Test, VECM, Turkey

Özet: Bu çalışmada Türkiye'de konut fiyat endeksi dinamikleri ile GSYİH, döviz kuru, faiz oranı, Borsa İstanbul 100 Endeksi getirisi arasındaki ilişki incelenmektedir. 2010-2018 dönemi için aylık veri kullanılarak ARDL modeli uygulanmıştır. Ampirik sonuçlar konut fiyat endeksi ile seçili makroekonomik göstergeler arasında uzun vadeli eş bütünleşme ilişkisi bulunduğunu ortaya koymaktadır. Vektör Hata Düzeltme Modeli uygulanarak Türkiye'de konut fiyat endeksinin dinamik uyarlamaları incelenmiştir. Uygulanan VECM modeli konut fiyatlarında direnç etkisine işaret etmektedir. Borsa İstanbul 100 Endeksi getirilerindeki bir artış konut fiyat endeksindeki düşüşe anlamlı katkı sağlamakta olup Türkiye'de konut talebinin barınma ihtiyacının yanı sıra uzun vadeli yatırım olarak da değer taşıdığına işaret etmektedir. Ayrıca döviz kurlarının konut fiyatları üzerindeki gecikmeli etkisi döviz kuru volatilitesinin makroekonomik dengesizliklere yol açmak suretiyle kırılganlık kaynağı oluşturabileceğini göstermesi açısından önem taşımaktadır. Döviz kuru hareketlerini istikrarlandırmayı amaçlayan politika tedbirlerinin konut fiyatlarındaki dengesizliklerin de uzun vadeli dinamik durağanlığa ayarlanmasında katkı sağlayacağı sonucuna varılmaktadır.

Anahtar Kelimeler: Konut Fiyat Endeksi,, Sınır Testi, ARDL Modeli, Vektör Hata Düzeltme Modeli (VECM)

1. Introduction

Real estate that holds a noteworthy share of private household wealth represents dual value both as accommodation and as investment and so provides a viable alternative to other types of investments. Hence the changes in house prices with important macroeconomic implications concern various stakeholders such as households, residential market, policy makers and economists.

Widespread consensus admits the crucial role played by the housing bubble fueled by expansionary policies played a central role originating from the US in the formation of the global financial crisis of 2007. The innovations in financial securitization accompanied by financial deregulation bolstered the vulnerabilities and the burst of the housing bubble triggered the global financial crisis through contagion and spillover effects. Yet the immediate response of the FED and the ECB resulted in global liquidity flowing towards emerging and developing economies and created a potential for deepening asset price misalignments in emerging economies for the last decade. Hence the residential property price index constitutes a crucial tool in helping the economic policymakers to monitor any potential macroeconomic imbalances and the risk exposure induced by credit expansion.

The factors affecting house prices are investigated extensively in the literature (Sutton 2002, HM Treasury 2003, Tsatsaronis and Zhu 2004, Girouard et. al. 2006, Beltratti and Morana 2010, Nneji, Brooks and Ward 2013). Determinants of house prices are identified as real income (Holly and Jones 1997, Hilbers et al. 1998), construction costs (Poterba 1991, Abraham and Hendershott 1996, Jud and Winkler 2002), real interest rates or housing loan rates (Apergis and Rezitis 2004, Egert and Mihaljek 2007), demographic indicators (Case and Shiller 1990, Quigley and Raphael 2004) along with other macroeconomic variables such as various indicators of employment, money supply etc.

The real estate sector in Turkey enjoyed an era of unprecedented growth owing much to excess global liquidity and low interest rates since the global financial crises of 2008. Yet the taper tantrum followed by the economic recovery in advanced economies has been long signaling the risks associated with the end of positive spillovers of quantitative easing for developing countries. Although the abundance of global liquidity was expected to come to an end eventually Turkey did not prepare well for the forecasted decline in foreign capital inflows. Instead of focusing on structural reforms that address the dependency of production on imports, low domestic savings and persistently high current account deficit, the Turkish economy displayed a path of growth based on foreign financing.

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The house price index in Turkey has displayed an increasing trend and contributed to growth in the construction sector consistently with the global liquidity observed in the last decade. Coşkun et. al. 2017 tested the existence of house price bubble in Turkey is tested but no significant empirical evidence is found indicating bubble formation. The observed increase in house prices over and above construction costs in Turkey can be explained by the rise in GDP and expansion in credit volume.

As the global liquidity started to flee away from emerging and developing economies Turkey, with comparatively low domestic savings and remarkable current account deficit to GDP ratios still remains highly dependent on foreign debt for financing growth. The dependency on foreign financial capital inflows escalates the vulnerability of the economy to exchange rate volatility. Foreign exchange rates have displayed noteworthy volatility recently. Hence the paper intends to contribute to understanding the impact of exchange rates on house prices in the Turkish housing market. The paper investigates the existence of a significant association among the USD/TL exchange rate and house prices in Turkey. The slump in domestic currency against the USD motivates the concerns regarding the movements in the USD/TL exchange rate and house prices. Understanding the fundamentals of the dynamics between foreign exchange rates and house price index is expected to be of use in developing policy recommendations for removing macro imbalances and maintaining stability of exchange rates.

On the other hand, the recently observed sharp increase in the USD/TL exchange rate has motivated the initiation of a new campaign in the real sector. The launch of the big savings campaign in the real sector aimed to provide momentum to the real estate and construction sectors in Turkey, incentivize savings and discourage maintenance of USD denominated deposit accounts. Hence the outcomes expected by the launch of the campaign is manifold ranging from stabilizing the volatile exchange rate to ensuring long term savings of private households. In this regard various elements of the campaign includes %10 discount on house prices, reduction of required down payment which was %20 at a minimum to as low as %10 and setting the interest rate at a record low of % 0,98. Moreover additional compensation mechanisms are put in order so that the households feel safe in converting the gold and foreign currency savings to TL. Presented as a campaign of patriotism and an exemplary self-sacrifice the campaign is supported by a large group of stakeholders and is announced to last for only two months. Another precaution taken in this regard has been the promulgation of a presidential decree published on the Official Gazette dated September 12th 2018, stating that all property sales and rental agreements should be signed in Turkish lira and all the prior agreements should be converted to TL in a maximum of 30 day limit.

In addition to the foreign exchange rate that is expected to affect house prices economic theory determines a large set of explanatory variables for the movement in house prices such as income level, available mortgage credit, interest rates, and demographic factors. Therefore we aim to analyze co-integration among the house prices, GDP, foreign exchange rates, interest rates and the BIST 100 index by employing the ARDL model.

Controlling the stability of the USD/TL exchange rate is crucial in maintaining the stability of real estate prices in Turkey. This paper provides a contribution to the existing literature that usually focuses on determinants of housing demand and supply but tend to neglect the impact of foreign exchange rates on the housing market. Employment of the ARDL model enables testing for possible long-term relationships. Also the inclusion of the rate of return in Borsa Istanbul takes into consideration the substitution effects induced by the return of alternative investment tools.

The paper comprises five sections which introduces, provides a concise overview of the associated literature, outlines the data and the model, displays the empirical results and concludes consecutively. The paper contributes to the literature by employing the ARDL model and the VECM to the housing market in Turkey and enlarging the data set of available observations. The foreign exchange rates that affect both construction costs and alternative costs of investments are taken into consideration as well as the Borsa Istanbul returns (BIST 100 index) to represent return rates of alternative investment tools.

2. Literature Review

Halicioglu (2005) argues that real income, house prices and urbanization level are most significant explanatory variables in estimating housing demand function in Turkey for the period 1964-2004.

Selim (2008) analyzes the determinants of house prices in Turkey by employing hedonic regression and 2004 Household Budget Survey data. Selim argues that the characteristics and the type of the building are the most significant variables not only in local house price analysis but also for the extended version of the analysis including all the house prices in Turkey.

Badurlar (2008) employs Johansen cointegration test and VECM and detects bidirectional causality between house prices and interest rates and exchange rates for the period 2000 – 2006 in Turkey.

Analyzing the factors affecting the demand and the supply in the Turkish housing market Öztürk and Fitöz (2009) conclude that the demand for houses is positively correlated with house prices and interest rates contrarily to what is expected in theory and explain this by arguing that housing is preferred as a precautionary investment against inflation and in case of constant house supply in the short term increase in interest rates raise house prices. The authors argue that demographic factors do not significantly affect demand for housing as per capita income, house prices and interest rates (Öztürk and Fitöz, 2009).

Dilber and Sertkaya (2016) analyze the macroeconomic variables affecting house prices in Turkey between the periods 2008- 2014 and detect two way causality between foreign exchange rate and house price index and one way causality from house price index to interest rates. Dilber and Sertkaya employ VAR model by using quarterly data between

2008 and 2014 and conclude that house price index in Turkey is explained mostly by real effective exchange rates, then by the mortgage interest rates.

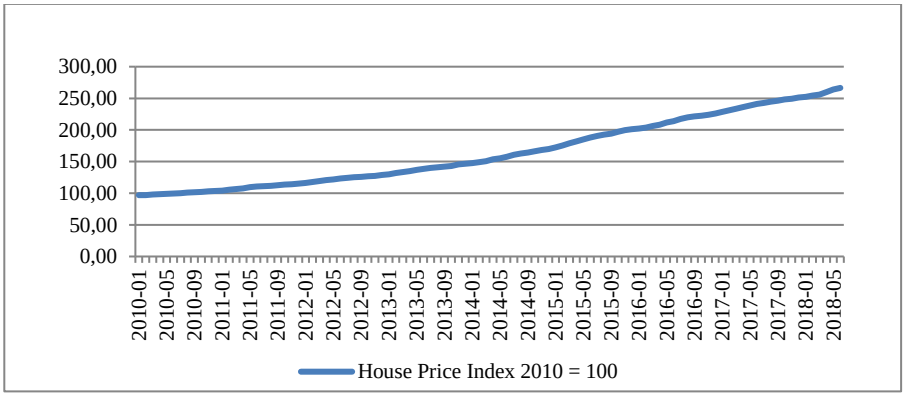
Solak and Kabadayı (2016) employ ARDL model and detect a positive relationship between house prices and housing demand in Turkey for the period 1964- 2014 and justify this relationship by emphasizing that housing is also an investment good in Turkey.

Coşkun et.al (2017) verify long term cointegration between house price index and housing rent, construction cost and real mortgage interest rate by employing bounds test and investigate a possible bubble in the Turkish housing market. The authors argue that although the housing market in Turkey has experienced some overvaluation recently there is not any bubble formation by employing Kalman Filter and ARIMA Models (Coşkun et. al. 2017).

This paper investigates the relationship between house price index in Turkey and gross domestic product, real exchange rate, interest rate and returns in Borsa İstanbul 100 Index by using monthly data from 2010 to 2018. Interest rates have direct effect on house prices as a decline in mortgage credit rate increases demand for housing and also increase in real interest rates work in the direction of increasing the cost of construction on the supply side and increasing the alternative cost of buying houses on the demand side. Hence the interest rate is included in the model as an exogenous variable because it is expected to affect house price index directly (Apergis, 2003). The effect of foreign exchange rates on house price index in Turkey is not analyzed in depth in the empirical literature. In economic theory increasing interest rates are expected to result in appreciation of the domestic currency according to the covered interest rate parity. Hence the forecasted transmission mechanism from interest rates towards exchange rates implies a decline in house prices as a result of appreciation of the domestic currency and vice versa. Zhu (2006) argues foreign exchange rates have significant influence on house prices in countries with flexible exchange rate systems. Hence the primary motivation for this paper is to explore the association between the house prices and selected macroeconomic indicators in Turkey.

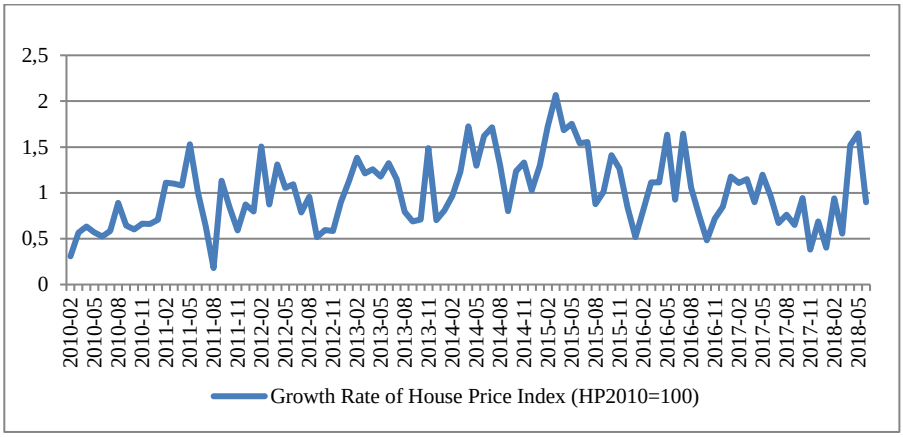
3. Data and the Model

House Price Index (2010 = 100) is obtained from EVDS Data Central database of the Central Bank of Turkey. Graph 1 indicates the increase in monthly house price index since 2010. Although the house prices have been on the rise the growth rate of house price index has displayed volatility as shown in Graph 2. In the aftermath of the 2008- 2009 Global Financial Crisis, increasing global liquidity induced by generous stimulus packages provided a favorable environment for the construction sector and hence low interest rates led to raise in house prices in Turkey. Yet the signals for the approaching end of quantitative easing along with domestic macroeconomic developments in advanced economies slowed down the pace of growth in the housing market. Hence the annual growth rates of both house price index and the hedonic house price index indicate that the growth rate of house prices have been slowing down since 2015 as shown in Graph 3.



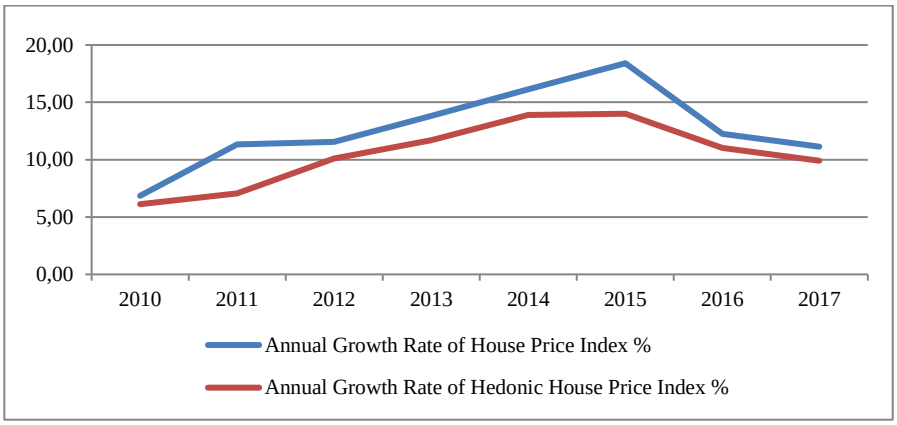
Graph 1. House Price Index (2010 = 100)

Source: https://evds2.tcmb.gov.tr/index.php?/evds/serieMarket



Graph 2. Growth Rate of House Price Index

Source: Author's calculation based on data taken from EVDS database of Central Bank of Turkey



Graph 3. Annual Growth Rate of House Price Index and Hedonic House Price Index

Source: Author's calculation based on data taken from EVDS database of Central Bank of Turkey

The dataset comprises monthly data between January 2010 and August 2018 due to limited data availability before 2010 regarding house price indices in Turkey. The data includes house price index, gross domestic product, interest rate, return of Borsa Istanbul 100, foreign exchange rate and consumer price index. The data is downloaded from the database of the Central Bank of Turkish Republic (EVDS).

The ARDL approach to cointegration by Pesaran and Shin (1999) and Pesaran et al. (2001) is chosen because compared to alternative techniques it does not require integration of same order for all variables.

Since there are various types of housing alternatives there are different kinds of house price indices, such as the hedonic house price index, new house price index, existing house price index etc. Two ARDL models are constructed by using the logarithm of the house price index and the logarithm of the hedonic house price index as endogenous variables separately while all the exogenous variables are kept as before. The results for the ARDL model constructed by employing hedonic house price index are reported in the paper because the VECM model constructed by using the house price index indicated no convergence towards equilibrium whereas the VECM model constructed by using the hedonic house price index turned out to be a more preferable model in terms of dynamic stability and significance of the speed of adjustment. The reason for selecting hedonic house price index as dependent variable can be justified on the grounds that the prices are adjusted for quality changes with respect to the specific attributes. House Price Index (HPI) on the other hand is constructed by using the stratified median price method for all the houses covering the whole country[1]. Hence the aim to use the hedonic house price index is to distinguish the quality affect that can be described as the effect of housing quality on house prices.

The logarithm of the weighted average interest rates for deposits denominated in TL up to one year is used for the interest rate variable. The interest rate data is also obtained from EVDS.

The logarithm of the average of daily USD buying and selling exchange rates obtained from the Central Bank of Turkey is used as an indicator of the exchange rate series.

The return indices for Borsa İstanbul BIST-100 All Shares Index, According to Closing Price-Level is downloaded from EVDS.

Quarterly GDP by Expenditure Approach at current prices is obtained from EVDS (Data Central) of the Central Bank of Turkey. Because monthly GDP series do not exist, quarterly data is transformed into monthly data by making use of the low to high frequency conversion of Litterman in E-views 9. The logarithm of the GDP series is taken and the data is de-seasonalized using Census- X 12 in E-views 9.

The long run relationship between the house price index and gross domestic product, foreign exchange rate, interest rate, consumer price index, return on Borsa İstanbul 100 Index is investigated by employing the ARDL model over the period 2010:01-2018:08. The ARDL bound test method is preferred due to its advantages in coexisting series of different order of integration following widespread practice in the recent literature. The result of the ARDL bound test reveals a long term cointegration among the variables.

4. Results

The analysis is performed on the general empirical model: hpi = f (int, fex, bist, gdp)

As a first step in applying the ARDL model, the stationarity properties of the series is tested by employing the Augmented Dickey – Fuller test. The results of the Augmented Dickey- Fuller (1979) unit root test are presented in Table 1. The series lnhpi, lnint, lnfex, bist and lngdp that denote the logarithm of the hedonic house price index, logarithm of interest rates, logarithm of the foreign exchange rate, the return index for Borsa İstanbul BIST-100 All Shares Index and the logarithm of the de-seasonalized gdp respectively are all I(1) at % 1 significance level. Hence it is verified that the co-integration test within the ARDL framework can be processed.

Table 1. Augmented Dickey Fuller Unit Root Test Results

Series	Level p value		First Difference p value	
	Intercept	Intercept and Trend	Intercept	Intercept and Trend
lnhpi	0.9565	0.4695	0.0003*	0.0025*
lnint	0.9967	0.9874	0.0000*	0.0001*
lnfex	0.9996	0.6181	0.0000*	0.0000*
bist	0.8658	0.5302	0.0000*	0.0000*
lngdp	0.9933	0.3997	0.0004*	0.0026*

*indicates significance at %1

Using the ARDL model in the form of (1) the co-integration relationship between the variables is tested.

$\Delta \text{lnhpi}_t = \alpha + \sum_{i=1}^{p} \text{bi}\, \Delta\, \text{lnhpi}_{t-1} + \sum_{i=0}^{q} \text{bi}\, \Delta \text{lnint}_{t-1} + \sum_{i=0}^{q} \text{bi}\, \Delta\, \text{lnfex}_{t-1} + \sum_{i=0}^{q} \text{bi}\, \Delta \text{bist}_{t-1} + \sum_{i=0}^{q} \text{bi}\, \Delta \text{lngdp}_{t-1} + \delta_1\, \text{lnhpi}_{t-1} + \delta_2\, \text{lnint}_{t-1} + \delta_3\, \text{lnfex}_{t-1} + \delta_4\, \text{bist}_{t-1} + \delta_5\, \text{hlngdp}_{t-1}$ (1)

The optimal lag structure is chosen based on the Akaike Information Criterion by comparing lag legth criteria and the results presented in Table 2 indicate that there exists significant empirical evidence in favor of a long-term co-integrating relationship between the variables analyzed. As the F statistic calculated for the joint significance of the parameters of the lagged level variables exceeds the upper bound critical value it is concluded that there exists co-integration between the selected variables.

Table 2. Bounds Test Result for Cointegration in the Specified ARDL Model

Dependent Variable (lnhpi)	F- Statistic	95 % Lower Bound	95% Upper Bound	Outcome
ARDL (2,0,0,0,0)	4,7226023	3,890000	4,570000	Cointegration

Table 3 indicates the estimated long term coefficients and error correction coefficients for the ARDL (2,0,0,0,0) model. In order to set up the vector error correction model (VECM) the residual series are formed and the unit root test is conducted to verify that the residual series is stationary at level.

Table 3. Estimated Long Term Coefficients and Error Correction Coefficients for ARDL (2,0,0,0,0) Model

Estimated Long Term Coefficients (Dependent variable: *lnhpi*)		
Variables	**Coefficient**	**T Statistics**
lnint	- 0.028442	-1.084378
lnfex	0.107682	2.243386**
bist	- 0.000001	4.050207*
lngdp	-0.755847	-6.157130*

c	0.015603	10.326138*
Estimated Error Correction Coefficient (Dependent Varaible: *lnhpi*)		
Variables	**Coefficient**	**T Statistics**
Ect	- 0.123467	- 4.648995*
Diagnostic Checking		
F_{BG}	0.745283[0.4776]	
JB_{NORM}	0.426181[0.808083]	
F_{WHITE}	0.000755[0.9781]	
F_{RAMSEY}	2.300984[0.1328]	
Notes: * and ** indicates %1 and %5 significance level respectively. Ect denotes error correction term. F_{BG}, JB_{NORM}, F_{WHITE} F_{RAMSEY} indicates autocorrelation, normality, heteroskedasticity and Ramsey reset tests.		

The estimated long term coefficients of the ARDL model indicates that the logarithm of the foreign exchange rate, returns in Borsa İstanbul 100 index and the logarithm of the de-seasonalized gdp are significant in explaining the logarithm of the hedonic house price index in the long term. Since the empirical evidence proved that a significant co-integrating relationship exists between the variables the Vector Error Correction Model (VECM) is established. The error correction term obtained from the VECM model is consistent with the error correction term obtained from the ARDL model[2].

5. Conclusion

Expansion in private sector credit focusing especially on mortgage loans may produce financial stability threatening implications by deteriorating the macroeconomic balances in residential market. The imbalances in house prices reveal a potential source of vulnerability that may be threatening financial stability in case of the burst of the housing bubble.

The paper investigated the association among house prices and selected macroeconomic indicators such as gdp, interest rate, foreign exchange rate, returns in Borsa İstanbul 100 Index in Turkey. The data set included monthly observations between 2010:01 and 2018:08. The empirical tests verified co-integration between the house price index and the selected variables in the long term. The ARDL model disclosed strong inertia in house prices in Turkey. In other words house prices pertaining to previous periods significantly affect house prices with lags. The estimated long term coefficients of the selected ARDL model indicated that a depreciation in domestic currency denoted by an increase in the foreign exchange rate (USD/TL) increases house prices in the long-run. The impact of the lagged exchange rates suggests that volatility in exchange rates may destabilize macroeconomic balances in the housing sector as well. Hence policy precautions aiming stabilization of exchange rate volatility are expected to smooth out irregularities in house prices. An increase in the rate of return in Borsa İstanbul 100 Index has a significant decreasing effect on house prices in the long-run. The substitution effect displayed by the BIST 100 Index confirms the value of housing not only as consumption good but also as an investment good in the long run. The logarithm of the weighted average interest rates for deposits denominated in TL up to one year is used for the interest rate variable which is empirically reported to be insignificant in explaining house price index in the long run.

The VECM model established indicated that the speed of adjustment towards long run equilibrium is approximately %13 each period. The diagnostics of the VECM Model displayed no serial correlation and the model demonstrated dynamic stability in the long-run.

Another noteworthy finding concerns the empirical outcomes of the VECM established by employing the same variables with the only difference of house price index replacing the hedonic house price index. The VECM model built by employing house price index instead of hedonic house price index turned out to be dynamically instable. This result can be justified by the intrinsic distinction between the two series concerning the adjustment for quality changes among various characteristics of houses. Hence the adjustment for the quality effects in house prices proved to be effective in adjusting the deviations from the long run equilibrium back to its long run equilibrium again. Employing the hedonic house price index instead of the house price index provides a maneuver to eliminate extra noise in house price dynamics that turn to be diverting from long run equilibrium.

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NOTES

1. http://www.tcmb.gov.tr/wps/wcm/connect/b8f5d6e6-2a1e-4b8d-8b9b-d83199181600/HPI-Metadata.pdf?MOD=AJPERES&CACHEID=ROOTWORKSPACE-b8f5d6e6-2a1e-4b8d-8b9b-d83199181600-m8KAKyK
2. The VECM Model is tested for robustness. The model does not suffer from serial correlation and the result of the CUSUM test indicates that the model is dynamically stable. The speed of adjustment towards the long- run equilibrium indicate that approximately %13 of the departures from the long run equilibrium is corrected each period. The speed of adjustment is significant at %1 as expected. Details are available upon request.