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The effects of monetary policy on housing prices

By Berna AK BİNGÜL [†]

Abstract. Many factors have an impact on housing prices. Among these factors, short term interest rates have significant importance. It is because changes in short term interests are important indicators of the efficiency of the monetary policy and the functioning of the housing prices channel is an important tool for the monetary authority to have an impact on economic activities. The purpose of this paper is to study the efficiency of the housing prices channel in Turkey. In our study, we used VAR method based on data from 2007-2019. As a result of the analysis, we found out that interest rates and the housing credit index directly affect housing prices in Turkey.

Keywords. Housing prices, Monetary transmission mechanism, Housing price channel, VAR analysis.

JEL. E20, E40, E50.

1. Introduction

The impact of changes in money supply or short term nominal interest rates on real variables such as output and employment is explained by the monetary transmission mechanism (Gedikli, 2007: 474). Within the monetary transmission mechanism, the process during which any change in the monetary policy decisions modify asset prices and affect the total demand is defined as the housing prices channel (Erdoğan, 2011: 50). There are three asset categories in the literature with regard to the monetary transmission mechanism (Mishkin, 2001:1);

- i. Share prices channel,
- ii. Housing prices channel, and
- iii. Exchange rates channel.

The housing market is of central importance for monetary policy makers considering its role in the economy. In order to reach the goal of price stability and sustainable employment, when policy tools are designed suitably, the housing prices channel plays an important role in the monetary transmission mechanism (Mishkin, 2007: 1). Changes in interests with regard to the monetary policy housing prices emerge by impacting the use of housing capital cost. Changes in interest rates indirectly impact the real economy by putting an effect on the dynamism of housing prices and housing supply (Mishkin, 2007:1). Briefly, changes in interest rates change the purchasing costs of fixed investments in housing and production

[†]The School of Applied Sciences, Department of Banking and Finance, Kırklareli University, Turkey.

☎. +90(288) 412 84 57-58 ✉.berna.akbingul@klu.edu.tr

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equipment. Asset values also change with changes in the financial costs of fixed assets. When there is a decreasing trend in construction costs, as new housing construction will be relatively more appealing and lucrative, positive developments will be observed in investments in the housing sector (BIS, 2008).

Monetary authorities can choose efficient monetary policy tools and reach their targets when they can make accurate assessments about the impact of policies on the economy. However, as monetary policy practices will impact the product not only through one channel but also triggering multiple channels, it becomes important to determine through which channels monetary policy practices will impact macro variables. It is important to identify which channel among monetary transmission channels functions to what extent on prices and demand in terms of the efficiency of the monetary policy, which makes it more important to conduct studies on the functioning transmission channels.

As there are no sufficient studies on the monetary policy housing prices channel in Turkey and the housing sector is the leading sector which affects the volume of economic activities, it is essential to examine the reflection of changes in the monetary policy on the sector. Findings from empirical studies are important for both measuring the efficiency of the monetary policy and identifying policies towards the housing market. The fact that studies obtained from the monetary policy channel are few in numbers in Turkey should be considered the original contribution of this study.

This study aims at identifying the impact caused by the change in the monetary policy decisions on housing prices and thus, total demand in Turkey between 2007-2019. The study is comprised of two parts. The first part includes a literature survey and the second presents an empirical analysis.

2. Literature review

It can be seen that studies on the effects of monetary policy implementation through the housing prices channel have both results in parallel to the literature and varying results due to the impact of country dynamics. Goodhart & Hofman (2008) provided evidence for a multilateral relationship between housing prices, monetary expansions, personal loans and macroeconomics. Monetary expansion affects housing prices and loans, loans affect money and housing prices and housing prices affect both loans and money.

Gupta & Kabundi (2009) studied how monetary shocks affect housing prices in the US economy. According to the study results, housing prices gave a negative response to positive monetary shocks in general. Dokko *et al.* (2009) used a large scale macroeconometric model and VAR analysis in their macroeconomic study on the developments in housing loans in USA. Analysis results emphasized the role of the monetary policy in the spread of housing explosion and demonstrated the results supported the related literature studies.

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Demary (2009) studied the connection between housing prices and main macro variables such as prices, output and interest rates for 10 OECD countries. It was demonstrated that the monetary policy shock lowered the real housing prices in all 10 countries and interest shock was responsible for 12 to 24 percent of the fluctuations in housing prices, and housing prices went higher after the shock in nine out of ten countries. It was concluded that housing demand shocks were a key factor of the monetary market rates and this channel was empirically relevant.

Gupta, Jurgilas & Kabundi (2009) evaluated the impact of the monetary policy on housing prices using a large data set comprised of 246 series during 1980:01-2006:04 in South Africa. The findings demonstrated that the housing prices inflation had a negative impact on the monetary policy shocks but houses from different price segments had a heterogeneous response. They determined that the housing market in the luxury and medium segment gave a much bigger reaction to monetary policy shocks than the small and medium segment housing.

Chow, Kwan & Choy (2009) examined the monetary policy reaction to asset price fluctuations in the Singaporean economy. They used a monetary VAR model with common factors obtained from a large panel data set covering 122 economic time series and the period between 1980q1 and 2008q2 to better reflect comprehensive information and obtained data demonstrated that the monetary policy could potentially be used against asset price explosions in Singapore. Demary (2010) studied the connection between real housing prices and the price general level, output and interest rates for 10 OECD countries, and demonstrated housing markets had a stronger effect on macroeconomic variables compared to the effect of macro economic variables on the housing markets.

Bjornlanda & Jacobsenb (2010) studied the relationship between the monetary policy and housing prices in Norway, Sweden and England. They demonstrated a systematic interaction between interest rates and housing prices and concluded the impact and its timing would vary between countries and the housing policy could play a different role in the regulation of the monetary policy.

McDonald & Stokes (2013) according to the findings from their study on the housing prices bubble in the US economy, concluded that their findings were consistent with the view that the interest policy of the US Central Bank which lowered down the federal fund rate and artificially kept it low in the period between 2001-2004 was a reason for the housing bubble and as the main result, the monetary policy implemented through the federal fund rate contributed both to the housing price bubble and the decrease in housing prices.

Yang, Wu & Shen (2017) analyzed the effects of the monetary policy on the household consumption through the housing market in China, using the panel VAR method on both national and regional terms. The impacts of the interest rate on consumption are estimated in national and regional markets grouped in five according to regional prices and economy. It was

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demonstrated by the study that the impact of monetary policies on consumption varied between the related regions, while housing prices had a minimum impact on monetary transmission and household consumption, the monetary policy had a strong impact on consumption in cities in the south and west. In eastern regions, on the other hand, household consumption was affected less by the monetary policy change while housing prices played an important role in monetary transmission.

Nocera & Roma (2017) studied the impact of housing demand shocks on the Euro zone countries, and demonstrated that in the Euro zone, except for Ireland and Spain, housing demand shock recorded an significant increase of 0,15% in special consumption in relation to 1% increase in real housing prices, the findings supported the hypothesis that the increase in the household borrowing capacity was a financial accelerator and the cumulative effects of the shocks in housing demand created a real loan growth in all countries included in the study. Moreover, it was concluded that the monetary policy had strong impacts on housing prices.

Ronan (2018), in his study on housing prices in Ireland as from 2000, determined that loan conditions in addition to loan costs were effective in determining the balance in the housing market. Chen, Wei & Huang (2018), studied the impact of monetary policies on housing prices in China. According to the results obtained by the authors, when a contractionary monetary policy is implemented, housing prices will drop. Thus, short term interest rates are an efficient instrument in political practices to be rendered to affect housing prices.

In a limited number of studies on the relationship between the monetary policy transmission channels and housing prices in Turkey, the long and short term relationship between housing prices and macroeconomic variables were studied by Badurlar (2008) using three month data from the period (1990-2006) for Turkey, and it was concluded that there was a balance in the long term between the variables and housing prices in Johansen's Cointegration Test conducted between macroeconomic variables, gross domestic product, money supply, short term interest rates and exchange rate and housing prices.

Yıldırım & Erdoğan (2014) studied the functioning of the housing prices channel in Turkey through VAR analysis with three months data for the period between 2010M01-2013M06. In the VAR analysis, they examined if the changes in the interbank overnight interest rates as a main policy variable had an impact on the product and inflation on housing prices. As a result of the study, it was concluded that housing prices did not react to changes in the policy interest rates in the concerned period, in other words, the housing prices channel did not efficiently function in Turkey in that period.

Erdoğan *et al.*, (2017) used the VAR method for the period between 2010-2016 in their analysis of the impact of the efficiency of the housing prices channel on Turkey. As a result of their empirical analysis in which they used the Housing Unit Prices series calculated by the Central Bank of the

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Republic of Turkey to represent housing prices, they concluded that the housing prices channel was partially efficient.

Darıcı (2018), in his study on the long term relationships between housing prices, money supply, CPI expectation and real exchange rate variables in the period between 2010-2016 in the housing sector, considered to be the locomotive sector in the economic growth process for Turkish economy. It was concluded as a result of this empiric study that the increase in bank reserves and deposits as a result of the expansionary monetary policy would lead to an increase in loan amounts they could offer and companies' investment spending, thus, create an expansionary impact on the total demand. Erdoğan, Mercan & Gedikli (2018), in their empirical study on the impact of the housing prices channel on BRIC countries, demonstrated that the empirical findings on the relationship between short term interest rate decisions and housing prices are an important data source for policy makers and the housing prices channel functioned in BRIC countries.

3. Empirical analysis

The efficiency of the housing prices channel was studied with the VAR method based on annual data for the period between 2007-2019 in Turkey.

3.1. Identification of data set

Annual data for the period between 2007-2019 for Turkey was used in the study. Accessibility was the main criterion in the selection of the time slot of the data. We calculated an estimate for 2019 data using statistical methods. The variables included in the study are housing prices index (HPI), bank credits for private sector (CRE), industrial production index (IPI), interest rates (INT) and consumer price index (CPI). The entire data set was obtained from EVDS, the database of the Central Bank of the Republic of Turkey. No conversion was applied to the index values among the variables included in the study and the logarithm of the variable of bank credit to private sector was included in the study.

The study first examined the stagnation of the series and ADF test was used for stagnation. After identification of stagnation, cointegration and VAR analyses were conducted, respectively.

3.2. Identification of stagnation: Unit root analysis

In a time series, the stagnation of the series means the series mean and variance are time independent and will not change in time (Gujarati, 2004: 712). Non-stationary series lead to the Spurious Regression ² problem and prevents reliability of the analysis. In identification of stagnation, many

² It emerges when the time series has a unit root. If two variables with a unit root are regressed on each other, the high determination coefficient (R^2), high t statistical values and low Durbin-Watson values in the regression analysis eliminates the reliability of test statistics.

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tests are used such as unit root tests (ADF, PP etc...), Q Statistics. If the series are not stationary, they are made stationary by obtaining series differences or logarithms.

Therefore, the study started by conducting the unit root test in the first place. The main and alternative hypotheses in the unit root analysis are demonstrated in the following equation;

$H_0: p=0$ Unit root present in every time series, (series not stationary)

$H_1: p\neq 0$ Unit root not present in every time series, (series stationary)

Table 1. ADF Unit Root Analysis

Series	Level value			Difference value (First Difference)	
	Intercept	Trend and Intercept	None	None	
HPI	-1,13	-2,47	1,29	-3,2	
(prob)	(0,5)	(033)	(0,9)	(0,00)	
CRE	3,28	-1,26	3,96	-5,11	
(prob)	(0,6)	(0,8)	(0,9)	(0,00)	
INT	-1,43	-0,88	-0,21	-3,35	
(prob)	(0,5)	(0,7)	(0,5)	(0,00)	
CPI	-1,74	-2,21	0,87	-5,55	
(prob)	(-0,39)	(0,45)	(0,87)	(0,00)	
Test critical values					
%1*	-4,20	-5,29	-2,81		
%5**	-3,17	-4,0	-1,98		
%10***	-2,72	-3,46	-1,60		

Note: The delay length used in the analysis was calculated according to Akaike Information Criterion.

H_0 main hypothesis cannot be rejected for the variables which are stationary on the level according to ADF test statistical results. In other words, the variables are not stationary and have a unit root. Their differences were obtained to make the series stationary. The study continued with the series which became stationary when their first degree differences were obtained.

3.3. Cointegration analysis

Determination of cointegration is the study of the presence of a long term balance between variables. The series should be stationary on the same level to conduct the cointegration test (Yavuz, 2005: 275). While the stagnation analysis was made previously in the study, it was determined that the series were stationary on the first level. Therefore, the cointegration analysis was made to study of the presence of a long term balance between variables.

$H_0: r=0$ cointegration not available

$H_1: r\neq 0$ cointegration available

Table 2. *Johansen Cointegration Test Results*

Main Hypothesis	Alternative Hypothesis	Statistics	5% Critical Value
Trace Test (trace statistics)			
$r = 0$	$r \geq 1$	2,84	0,08
Maximal Eigenvalue(λ -max) Test			
$r = 0$	3,62	2,51	

Notes: R; cointegrated vector number. The suitable delay number was identified with the Akaike information criterion.

As can be seen in Table 2, the Trace test statistics is 2,84 and 5% critical value is higher than 0,08. Therefore, the hypothesis that there is no cointegration between the variables ($r=0$) is rejected. Similarly, the presence of a long term relationship between the variables according to Maximal Eigenvalue Test statistics was determined.

3.4. VAR Analysis

The VAR analysis was conducted in the last part of the study to demonstrate the interactions between the variables.

The Vector Autoregression (VAR) Analysis is a method developed by Sims (1980), in which the variables are examined in order as dependent variables and itself and other variables are regressed on the delayed values with an optimal delay length. The empirical results of the study are given in Table 3;

Table 3. *Vector Autoregression (VAR) Analysis*

CPI →HPI	2	0.59
INT →HPI	2	0.00
CRE →HPI	2	0.00

After the presence of a long term relationship between the variables is determined with the cointegration analysis, the interaction between the variables was studied with the Vector Autoregression Model (VAR). According to the analysis results, while interest rates and loan housing index directly affected the housing prices in Turkey, there was no significant relationship with the variable of CPI in the period between 2007-2019.

4. Conclusion

According to the analysis results, while interest rates and loan housing index directly affected the housing prices in Turkey, there was no significant relationship with the variable of CPI in the period between 2007-2019.

Findings show that, changes in the monetary policy affect the housing sector. Therefore, monetary authorities have a power to affect and guide expectations. Moreover, it should be noted that the fact that the monetary policy decisions affect the real sector means the monetary authority has established trust in the economic agents. The fluctuations in the housing sector to occur depending on the internal and external shock can be

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stabilized with macroeconomic measures and changes in the related interest decisions.

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