TESTING FOR BUBBLES IN THE HOUSING MARKET: FURTHER EVIDENCE FROM TURKEY

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Abstract

In this study whether bubbles exist in the three biggest cities housing market, İstanbul (TR10), İzmir (TR31) and Ankara (TR51) which are important parts of Turkish housing market is investigated. Besides, SADF and GSADF unit root tests developed by Phillips et. al. (2011, 2012) is used in order to detect bubbles in the housing market in the period between January-2010 and June-2014. The results show that real estate bubbles do not exist in the Turkish housing market and price increases above the average are experienced only for the short terms, not over the long terms permanently. In this context, efficient market hypothesis is valid for Turkish housing market and it verifies that Turkish housing market experienced the 2008 Mortgage crisis rather slightly than many other countries. These findings indicate stability in the housing market by sustaining its correct house pricing policy after the crisis.

Keywords: Real Estate Bubbles, Housing Market, SADF, GSADF, Turkey

JEL Classification: C22, R31

1. Introduction

One of the most primary studies about the definition and determination of bubbles in the housing market belongs to Case and Shiller (2004). In this study, Case and Shiller based the reason of price increases in the housing market on the expectations of individuals who want to buy house. The rise in the demand of people who expect increase in the house prices for current housing market causes price increase in the housing market. Buying a house instead of saving becomes an appealing choice due to the expectations of

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price increase in the future period. Furthermore, the ones who wish to buy a house create an impulsive force as they have the fear that they cannot afford to buy a house in the future if they do not buy it now. The anticipation that house prices will not decline for long term makes housing purchasing more appealing as an investment. Moreover, Shiller (2007) states that many different thoughts and emotions lie behind the people's decision whether to buy a house or not, in his another study. People's fear which is caused by an incident resulting from terror or war, or changes in the macroeconomic demonstrations of the states have an impact on house demands and correspondingly on the house prices.

Along with all these, increasing of house prices cannot continue increasingly to forever and this is economically impossible. Hence, the bubbles in the housing market emerge at this point. As expectations of price increase in the housing market change inversely, the demand for house will decline and as a result of this house prices also decrease too, which pave the way for bubbles in the house pricing.

Besides, decreases of the interest rates and increases in the level of income in a state also play a role in price rises in the housing market. But according to study of Case and Shiller (2004), if the price increases in the housing market can be explained through basic indicators such as increase in the levels of income and demographic data, the price increases in such sector do not show the existence of bubbles.

When the Mortgage crisis, the biggest economic crisis of recent years, and its effects are taken into consideration; speculative bubbles in the housing market are one of the potential reasons of economic crisis both locally and globally (Oliveira et. al., 2014). The basic factor which lies behind the all financial crisis is disappearance of financial bubbles in asset markets, which triggers the crisis.

As it is remembered, the primary focus of the 2008 crisis was speculative bubbles in American housing market. The most essential reason of bubbles created by careless and inflated housing credits can be explained through the interest rate which has declined nearly to 1% since 2001 and subprime credits due to the increase of excess funds in the market (Eraslan and Bayraktar, 2012).

In his assertion in July, 2014; eminent economist Prof. Dr. Nouriel Roubini who is the leader of Turkish branch of IMF, which is known as augur of crisis, warned people that there may be bubbles in housing market in 18 countries including Turkey. According to

Roubini, along with the fact that this situation derives from many reasons in developing countries but especially countries like Turkey the main reason is inflation and generally in countries such as Turkey, India, Indonesia and Brazil that struggle with high inflation rates, people have limited financial instruments for investment purposes and to increase their financial assets without being affected by inflation, as a result owning a house is seen as a safe harbor and they prefer to buy houses to protect against the cost of high inflation during the recession periods. (Roubini, 2014). It is sensible to associate increase in house prices with the increasing demand, instead of searching the reasons in factors which are based on supply (Erol, 2013). Low interest rates of banks is also another cause of this demand. Furthermore, persistence related to political stability in these rates lead investors to buy houses. Another factor which causes financial bubbles in housing can be ranked as extension of credit volumes in banking system (Kargı, 2013).

In this context, it is essential to detect explosive attitudes in house price (Pavlidis et. al., 2013). When the studies carried out in literature are examined, it is seen that such tests like unit root, cointegration and causality are used. Moreover, Rolling ADF (RADF), Sup ADF (SADF) and Generalized Sup ADF (GSADF) tests developed by Phillips et. al. (2011, 2012) in recent years are used commonly for this purpose. On the other hand, these tests are not only used for detection of bubbles in housing market but also used for determination the bubbles in stock market. The studies carried out through these new unit root tests used to determination of bubbles in housing sector are presented in literature review part of paper.

2. Literature Review

Chen and Funke (2013) used recursive unit root test and they tried to examine the existence of bubbles in German housing market. In this study, any finding indicates the existence of speculative house price bubbles were not found between the 1987Q3 – 2012Q4 periods. However, in another study, they (2013) detected the bubbles in the Chinese housing market.

Pavlidis et. al. (2013) analyzed real estate bubbles related to the housing prices of 22 countries by using SADF and GSADF tests. As a result of the study, in most of the countries in which there is the housing bubble and it was observed that synchronized explosive behavior occurs.

Gonzalez et. al. (2013) state that there are housing bubbles in Colombian housing market by using the SADF test, besides applying CPI and the housing rent index as a deflator in their studies.

Yiu et. al. (2013) investigated housing market in Hong Kong and they found that there are many positive bubbles which are existed in 1995, 1997, 2004 and 2008; and negative bubbles emerged in 2000 and 2001.

In addition to these, Engsted et. al. (2014) analyzed 18 different countries, as a result of that they reached the presence of real estate bubbles and their findings are supported with co-explosive VAR test.

In another study, Oliveira et. al. (2014) went into Brasilian housing market with using monthly data between 2008 and 2013 periods and by recursive SADF and GSADF tests. The outcomes proved the being of bubbles in two biggest cities of Brasil (Rio de Janeiro and Sao Paolo).

Chang and Gupta (2014) analyzed the being of bubbles in BRICS countries by using both SADF and GSADF tests. According to SADF test results, bubbles existed in only Brasil and South Africa, although outcomes of GSADF test show that bubbles in housing obtained in all BRICS countries.

Gallager et. al. (2015) examined the existence of real estate bubbles in Republic of Ireland and Northern Ireland and exposed the entity of bubbles in both two countries. In the light of the results, it is predicted that there can be possible spillover effect between these two countries.

As it can be seen, the number of studies carried out with new technics such as RADF, SADF and GSADF is quite little in housing market. Along with this, any study which examines the housing market in Turkey with these new techniques has not been done yet. The fact that it is the first study which uses these new technics in order to examine Turkish housing market puts forward the original side of this article.

3. Data and Methodology

The study which examines the existence of bubbles in housing market in İstanbul, İzmir and Ankara, the three biggest cities of Turkey, covered the monthly data from the period between January-2010 and June-2014. House price index data which were obtained from the database of Turkish Republic Central Bank contained a period consisting of 54 periods.

Determination of presence and location of speculative bubbles is a challenging process which carried out through historical data. Recent studies about this topic are based on standard present value formulation, which is used by Shiller (2000), Mikhed and Zemcik (2009) in order to detect the relation between the cash flow arising from welfare and house prices.

Testing the stationarity of price/rent rate is a way to define the existence of bubbles. As a result of this, the researchers of this field seek for new ways to find whether this rate is stationary or not. In this context, unit root tests which is used by using autoregressive models are commonly used to detect stationarity of series. Conventional left-sided Dickey Fuller test, which is used for accomplish to this aim, makes autoregressive AR predictions in first level.

According to this model, if the rest in the first order autoregressive model is still related with each other, the test can be extended for higher level autoregressive process with ΔPt-1.

In contrast, SADF test which is proposed by Phillips et. al. is a right sided test. When it is assessed in the context of DF test, the test is based on the regression below:

$$\Delta p_t = \alpha + (\beta - 1) p_{t-1} + \epsilon_t + \epsilon_t \sim iid\left(0, \sigma^2\right)$$

While the hypothesis represents unit root, the alternative hypothesis H1 represents explosive behavior. Hı=β>1 (right sided).

SADF test carries out a hypothesis which is based on the subvalue of ADF statistic serial, by anticipating ADF model repetitively on a forward expanding sample series.

Window size (rw) expands from r0 to 1. Here, while r0 is the smallest sample window; 1 is the biggest sample window, in other words it is the total sample size. r1, which is the start point of sample series, is fixed to “0”. Hence; r2 which is the final point of each sample is equal to rw. r1 changes from r0 to 1. The ADF statistic of a sample which goes 0 from r2 is shown as $ADF_0^{r_2}$.

Phillips et. al. (2011, 2012) applies right tailed ADF test on a forward expanding sample repetitively and makes conclusions according to critical value of corresponding ADF statistic sequence. Thus, Phillips et. al. shows that it enhances its power dramatically when compared to conventional cointegration test of SADF. This test also provides a dating strategy about defining the start and the end points of bubbles.

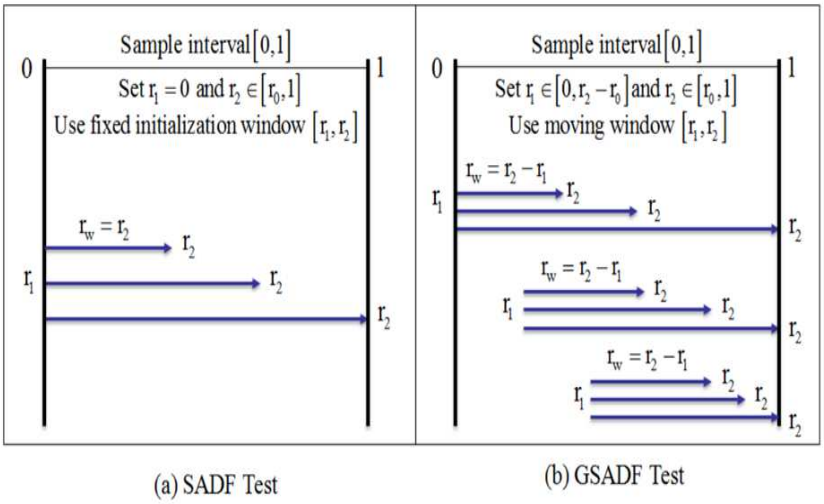
SADF test can be unsuccessful and incoherent at revealing the existence of bubbles in long term time series and analyzing the

fast changing market data. Generalized Sub ADF (GSADF) test, which is a new approach by Phillips et. al., is put forward to reduce these weak points of SADF test.

GSADF test is based on a right-tailed ADF test which is applied repetitively like SADF test. But, the sample sequence of GSADF test extends to more extensive and flexible range. Namely, on the first observation of the sample extends; GSADF test extends the beginning and the end points of the samples over a feasible range of flexible windows.

It is designed to catch explosive behavior seen in sample sequences of SADF and GSADF tests&overall sample, and provide the adequate observation which is required for starting the self-renewal. For this reason; GSADF covers more subsamples of test data and has much more window flexibility. So, it is a more effective method for revealing the explosive behaviors in multiple episodes. The main idea of GSADF test is based on applying the ADF test regression to a sample sequence repetitively just like SADF test. However, the sample sequence of GSADF test is more extensive than of the SDAF test. Along with changing the final point of regression r2 from r0 to 1; GSADF test also makes it possible for the beginning points of test (r1) to change from 0 to r2-r0 in a feasible range. Figure 1 shows the sample intervals of SADF and GSADF tests.

Figure 1: Intervals of SADF and GSADF Unit Root Test



(a) SADF Test (b) GSADF Test

According to Phillips et. al. GSADF is defined as;

$$GSADF\ (r_0) = \sup_{\substack{r_2 \in [r_0, 1] \\ r_1 \in [0, r_2 - r_0]}} \left\{ ADF_{r_1}^{r_2} \right\}$$

Similar to SADF statistic, the smallest windows size in asymptotic GSADF distribution depends on r_0. The decision should be made according to "T1" which is the total observation number of r_0 in practice. If "T" is low, the value of r_0 should be chosen appropriately enough to provide a right initial estimation and adequate observation. If "T" is high, r_0 can be set as a small number in order not to miss an early explosive episode.

GSADF test is a rolling window right sided ADF unit root test with double-sup window selection criteria. Different from Phillips et. al.'s SADF tests, windows size is chosen by using the double-sap criteria and ADF test is applied to sample sequences, which have the moving windows frame feature, gradually until the last sample. SADF test is incapable of detecting the location of bubbles in such cases like there is a collapse in sample range and multiple episodes of exurbance. GSADF test is successful at detecting the location of bubbles and it also provide advantages in long historical data series.

4. Empirical Findings

In this study, SADF and GSADF tests developed by Phillips et. al. (2011, 2012) were used to determine real estate bubbles in Turkish housing market. Monte Carlo simulation was carried out with 10000 iteration while test statistics were being acquired during analysis. The initial window size was set as 0.10. Additionally, the result of analysis were obtained through trend and intercept models due to the structure having trend of prices.

According to results of the study, bubbles came onto being only in Ankara. The fact that SADF test statistic related to house prices in Ankara was higher than critical values verifies this outcome. However, according to GSADF test it was not possible to mention the existence of bubbles in these 3 cities because the test statistics for each three cities are below the critical values. These results show that Turkey has been more cautious approach about house pricing since the 2008 Mortgage crisis, and prices above average have not emerged for long term in this market. This proves that efficient market

hypothesis is valid in Turkish housing market. These results are shown in Table 1.

Table 1

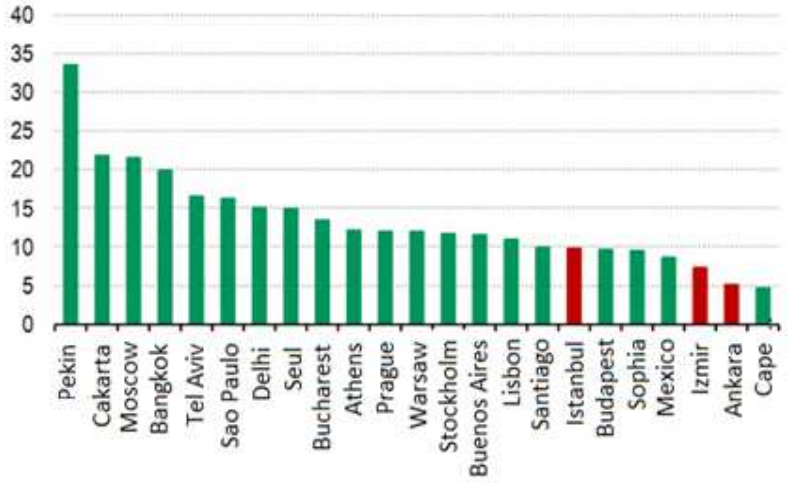
Results of SADF and GSADF Test for Housing Price Index (n=0.10)

	Test Statistic		
Cities	**SADF**	**GSADF**	
İstanbul	-0.25	2.81	
İzmir	-0.31	1.70	
Ankara	0.62*	1.53	
	Critical Values		
	% 1	**% 5**	**% 10**
SADF	3.83	1.04	0.59
GSADF	9.95	4.31	2.96

On the other hand, figure 2 shows the income/price rate of housing market in the big cities of developing countries in May, 2014.

The columns standing for income show the rent income the house owners get. It can be concluded from the relatively low price/income rate compared to other big cities that bubbles do not exist in the Turkish housing market.

Figure 2: Price / Income Ratio Comparison in Developing Countries



Reference: Karakaya, Kerim, (2014)

The detailed version of findings in table 1 is shown in Figure 3 and 4 (in the Annex) about results of SADF and GSADF unit root test. No matter how much does the general test statistics show that bubbles do not exist in these three cities, price increases above the average can be seen from time to time. However, these increases do not cause real estate bubbles as they disappear in a short time. The similar progress of market in İstanbul and İzmir stands out when these graphics are examined in depth. According to GSADF test results; both in the housing market in İzmir and İstanbul there is a price increase for short term in the second half of 2011 and the beginning of 2013 but this increase disappears soon after. The house prices in Ankara have slightly different structure when compared to those two cities. On the other hand, according to SADF tests, each of these three cities has different tendencies. Although the test statistic related to Ankara is seen significant at 10%, it is not that high value for a test statistic. Thus, the tendencies that bubbles do not exist in Ankara is at underestimated level. The results of GSADF test, which is more developed compared to SADF, verify these finding.

5. Concluding Remarks

In general; such factors like people's expectations about the future and purchasing preferences shaped by these expectations, low interest rate and simplified credit requirements cause the increase in demand for houses. The change in people's anticipation for house prices or reversal of interest and credit applications brings about the financial term "bubble" which results from the reversal of the price increase observed in housing market. For example, as a result of Turkish Republic Central Bank's decision of reducing the interest rates in July 17, 2014; the question whether the quick demand in housing market and price increases are bubble or a revival in the market has become a current issue.

In this study; the accuracy of the facts that quick increase of prices cannot be an indicator of bubbles and the house pricing is appropriate for efficient market hypothesis are verified with SADF and GSADF unit root tests developed by Phillips et. al. (2011, 2012). The data from housing market in Turkey's three biggest cities İstanbul, İzmir and Ankara are used in this study. Monte Carlo simulation is carried out with 10000 iteration while test statistics are being acquired during analysis. According to results of the SADF unit root test, bubbles exist only in Ankara. Additionally, according to GSADF test it is not possible to mention the existence of bubbles in these 3 cities.

The results of this study, which is the first research testing the housing market bubbles with SADF and GSADF tests, are compatible with the Turkey's outcomes of the house price/house income which are seen as basic indicators for explaining the price increases in housing market by Case and Shiller (2004). They also advises to examine real price changes in the market to gain a wholistic perspective. The real price changes in last four years in Turkey (March 2010-March 2014), adjusted for inflation, show that house prices have increased by 14.2%. This increase rate is not an indicator of an abnormal increase and supports the result of the study by showing that bubbles in housing market do not exist in Turkey. If the house prices keep increasing at the same rate for 7-8 years in a long run, there may be a risk of bubbles in housing market in Turkey.

References

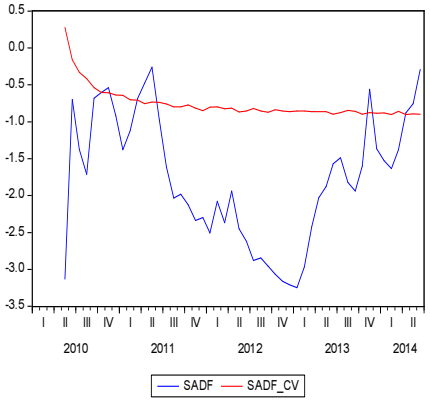
1. Case K.E., Shiller R.J, (2004). "Is there a Bubble in the HousingMarket?, Cowles Foundation for Research in Economics", Yale University, Paper No:1089.
2. Chang, T. Gupta, R., (2014). "Testing for Multiple Bubbles in the BRICS Stock Markets", University of Pretoria Department of Economics Working Paper Series.
3. Chen, X. Funke, M., (2013). "Renewed Momentum in theGerman Housing Market: Boom or Bubble?", CESifo Working Paper, No. 4287.
4. Chen, X. Funke, M., (2013). "Real-Time Warning Signs of Emerging and Collapsing Chinese House Price Bubbles", National Institute Economic Review, 39-48.
5. Engsted, T., Hviid, S. J., Pedersen, T. Q., (2014). "Explosive Bubbles in House Prices? Evidence from the OECD Countries", Working Paper.
6. Eraslan, C. Bayraktar, Y., (2012). "Konut Balonlarının Oluşumunda FED'in Rolü ve Küresel Krizden Çıkartılacak Bazı Dersler", İktisat Fakültesi Mecmuası, 62, 2.
7. Erol, I., (2013). "Türkiye'de Konut Balonu Var mı? Konut Sektörü Kapitalizasyon Oranları Analizi", Türkiye Ekonomisi Çalıştayı – ODTÜ Kuzey Kıbrıs Kampüsü / 25-26 Nisan, "Türkiye Ekonomisinin Dünü, Bugünü, Yarını – Yakup Kepenek'e ve Oktar Türel'e Armağan".
8. Gallager, E., Bond D., Ramsey, (2015). "Northern Ireland's Property Market Bubble: a Preliminary Analysis", Applied Economics Letters, 1, 61-65.

9. Gonzalez, J. E. G., Joya, J. N. O., Guerra, C. R. Sicard, N., (2013). “Testing for Bubbles in Housing Markets: New Results Using a New Method”, Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute Working Paper No. 164.
10. Karakaya, K., (2014). “Türkiye'de Konut Balonu Var mı Dediniz? O Kadar Acele Etmeyin!”, The Wall Street Journal (Turkey).
11. Kargı, B., (2013). “Housing Market and Economic Growth Relation: Time Series Analysis over Turkey (2000-2012)”, International Journal of Human Sciences, 10, 1, 898-924.
12. Mikhed V. Zemcik P., (2009). “Testing for Bubbles in Housing Markets: A Panel Data Approach”, Journal of Real Estate Finance & Economics, 38, 366-386.
13. Oliveira, M. M., Alexandra, C. Almeida, L. (2014). “Testing for Rational Speculative Bubbles in the Brazilian Residential Real-estate Market”, Contemporary Studies in Economic and Financial Analysis, 96.
14. Pavlidis, E., Paya, I., Garcia, E. M., Yusupova, A., Peel, D., Mack, A., Grossman, V., (2013). “Monitoring Housing Markets for Episodes of Exuberance: An Application of the Phillips et al. (2012, 2013) GSADF Test on the Dallas Fed International House Price Database”, Federal Reserve Bank of Dallas Globalization and Monetary Policy Institute Working Paper No. 165.
15. Phillips, P.C.B., Wu, Y., Yu, J., (2011). “Explosive Behavior in the 1990s Nasdaq: When did Exuberance Escalate Asset Values?” International Economic Review, 52, 201-226.
16. Phillips P.C.B, Shi S-P Yu. J., (2012). “Testing for Multiple Bubbles, Cowles Foundation for Research in Economics”, Yale University, Paper No: 1843.
17. Roubini, N. (2014), “Türkiye’de Konut Balonu Olabilir”, 10 July 2014, www.ntvmsnbc.com.
18. Shiller R. J, (2000). “Irrational Exuberance”, Princeton University Press, Princeton.
19. Shiller R. J, (2007). “Understanding Recent Trends in House Prices and Home Ownership”, National Bureau of Economic Research.
20. Yiu, M. S., Yu, J. Jin, L. (2013). “Detecting Bubbles in Hong Kong Residential Property Market”, Journal of Asian Economics 28, 115–124.

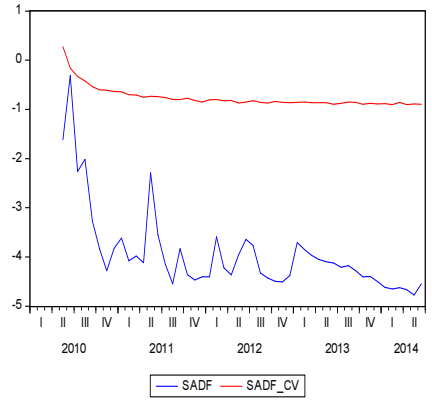
Annex

Figure 3: Graphs of Test Results for Housing Markets in Turkey (SADF)

İstanbul



İzmir



Ankara

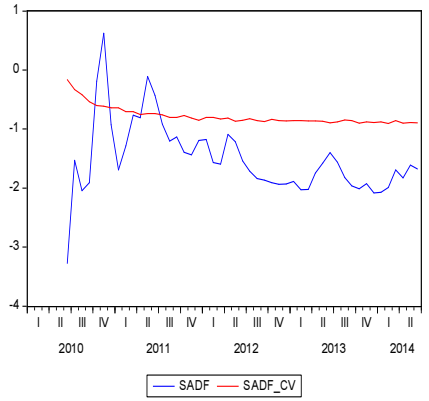


Figure 4: Graphs of Test Results for Housing Markets in Turkey (GSADF)