THE FACTORS AFFECTING CREDIT BUBBLES: THE CASE OF TURKEY

Özge KORKMAZ, PhD*
Elif ERER, PhD Candidate**
Deniz ERER, PhD Candidate***

Abstract

The Global financial crisis that started in the United Stated and which affected the whole World and especially Europe in a short time shows once again that financial crises occur as a result of bubbles in asset prices or a strong credit growth. Moreover, that bubbles in financial markets are defined as increases in asset prices. Central banks tend to control excess credit expansion and thus ensure stability in financial markets.

The purpose of this study is to analyze the existence of a bubble in the Turkish credit market and the success of the monetary policy by the Central Bank of Turkey to prevent these bubbles in light of ongoing interest debates in Turkey. Monthly real estate loans have been considered for the 1986:01 to 2014:04 period in the credit sector. In this study, Sup Augmented Dickey Fuller and Generalized Sup Augmented Dickey Fuller tests have been used to identify and define bubbles. Thereafter, the factors affecting credit bubbles have been investigated via logit model. From the results of the study, it can be inferred that both the consumer price index and interest rates have negative effects on credit bubbles, while total credit to the nonfinancial private sector and current account balances have positive effects on credit bubbles.

Keywords: Bubbles, Sup Test, Explosive Root, Logit Model

JEL Classification: G10, E51, C15, C22

* *Asis.Prof., Bayburt University, F.E.A.S, Department of Economics, ozgekorkmaz@gmail.com*
** *Ege University ,Department of Economics, elif_erer_@hotmail.com*
*** *Ege University, Department of Economics, denizerer@hotmail.com*

1. Introduction

Global financial crises generally occur as a result of bubbles in the credit market. The crisis observed in (2008 in) the United States and Europe has demonstrated once again how important the credit bubbles are. So-called bubbles in the credit markets are considered to result from excessive increases in credit.

Moore, Bynoe and Howard (2010) defined the credit expansion as a sharp and extraordinary growth in real credit, which they associated with the extraordinary growth of private consumption expenditure. These two factors cause inflationary pressure, an increase in the financial sector's fragility and, ultimately, financial crises. Cooper (2009) emphasized that the increasing asset costs gave the creditors a false sense of security, which in exchange lead to the increase in the credits. This in turn, meant that the increase in the credits caused the asset costs to go up. While Mendoza and Terrones (2008) generally defined the credit bubbles as an event in which the economic fluctuations of the credits provided for the private sector grew more than the expansion period itself.

The periods during which the marginal return of the investments made by the individual banks are greater than the marginal return of the investments as perceived by the regulator, emerge as credit bubbles. Thus, the credit bubble can be defined as the situation where the investment expectations of the banks tend to increase beyond what is reasonable (Kashyap and Stein, 2012:79). The fundamental disequilibriums in the financial sector cause the credit bubbles (Hessel and Peeters, 2011:11). At the same time, the outcome and price stability promote the formation of the credit bubbles, because this situation causes the market participants to underestimate the amount of risk in the economy.

There are different approaches to the importance of the credits in the implementation of financial policies. In the New Keynesian consensus before the 2008 global financial crisis, monetary aggragates and loans didn't play constructive roles in the monetary policy. That's why the central banks determined the interest rates in accodance with the inflation and output gaps, who were not informed of total credit and money aggragates . After the 2008 global financial crisis, the policymakers, aimining for financial and economic stability, stated that total credits and money aggragates were important information (Schularick and Taylor,2009: 13). The bubbles in the credit market were regarded as a sign of a financial crisis (Borio and Lowe,2002; Kaminsky and Reinhart,1999).

According to Minsky (1977) and Kindleberger (1978), credit bubbles start with a great shock, while the continued loan supplies initiate the bubbles (Hume and Sentance, 2009:1444). Ahrend et al. (2008) stated that a loose monetary policy causes an increase in the asset costs and leads to a strong credit growth. The contractionary monetary policy is used in order to bring the credit bubbles under control and to curve its consequences. The credit bubbles intesify the divergency between the private and social values of maturity transition operations (Kashyap and Stein, 2012:80).

The aim of this study is to research the existence of bubbles in the Turkish credit market and the success of the policies carried out by the Turkish Republic's Central Bank (TRCB) in the prevention of credit bubbles for the period 1986:01-2014:04. First of all, this study aims to unfold the present situation of the Turkish credit market. Thereafter, studies regarding the relation between monetary policies and credit bubbles are dealt with. In the third section, SADF (sup ADF) and GSADF (Generalized sup ADF), which are right-skewed unit root tests improved by Phillips, are defined in order for the bubbles to be identified (Wu and Yu 2013). Finally, the applications related to the Turkish credit market are investigated. This study aims to make a contribution to literature on the subject; inspecting how the effects of the TRCB's monetary policy on the credit bubbles are dealt with. Moreover, the study elaborates on how the SADF and GSADF tests are used.

2. Literature

Due to the enevitable failure in the market where credit bubbles develop, the risks are high. Hence, cautious regulatory measures limiting the credit bubbles should be taken. While Taylor (2007) blamed the disproportionately low policy interest rates for causing the housing bubble, Bernanke (2010), Bean et al. (2010), Turner (2010) and Posen (2009) advocated to the contrary. Theoretical and empirical studies show that the monetary policies play a role in the formation of credit bubbles. Borio and Zhu (2008) called this mechanism a means of risk-taking within monetary policies. According to the available literature, there are two reasons for the low interest rates to give way to taking unreasonably high risks. First of all, Rajan (2005,2006) pointed out that the low interest rates were promotive for the asset managers and thus increased the grounds for risk-taking behavior, since low interest rates lead to a higher payment. The second mechanism related to how the low interest rates promote a high level of risk-taking behavior are concerned with the rating effect. If financial firms get into debt in the short term and grant a long term loan, the low short-term interest rates increase the net interest margin and the value of the firms. So, the firms expand their capacity in order to raise their leverage and therefore take risks (Adrian and Shin,2009;Adrian,Moench and Shin,2010). Also, the low interest rates increase the guarantee value and in turn make it possible for the credits to multiply. This mechanism is closely-related to the financial accelerator concept of Bernanke and Gertler (1999), and of Bernanke, Gertler and Gilchridt (1999) (Mishkin, 2011:64).

Jimenez et al. (2009) studied the effects of monetary policy on the credit risk by using data from Spanish banks, and found that low interest rates reduced the risk of outstanding loans in the short run but lead to the granting of many more risky loans in the medium term. In the study that they carried out on the banks in the Euro zone, Delis and Kouretas (2010) settled the fact that there was a negative relation between the interest rates and the banks' being likely to take risks. Furthermore, their study posited that the effect of interest rates on risky structures went down for the banks which had much higher equity capital. In the study that they carried out on the banks in Bolivia, Ioannidou, Ongena and Peydro (2009) dealt with the effects of interest rates on the credit risk. They suggested that the decrease in the U.S. federal funds interest rates increased the possibility for the default of bank credits. Adrian and Shin (2008) stated that a tight monetary policy prevented credit bubbles involving the dangerous growth of intermediary balance sheets. From the study in which they dealth with the determiners of asset bubbles in equity shares and property markets, Drescher and Bernhard (2012) inferred that while monetary conditions increased the formation of bubbles, the flexibility of the exchange rate decreased the same tendency. In their study, in which they examined the toll of taking monetary policy risks, Adrian and Shin (2010) emphasized the importance of balance sheet figures in the execution of the monetary policy. The study found that the decreases in policy interest rates increased the net interest margin and the returns in turn, and that the asset growth caused a shift in the loan supply. Turner (2010), stated that the expansionary monetary policy implemented by the Federal Reserve after 2008 whetted the appetite for risk in global markets, which in itself caused the tight disequilibrium in the market, the low risk premiums and effectively; the asset cost bubbles. Using the financal accelerator DSGE model, Badaru and Popescu (2014) studied what the central bank did when faced with the bubbles. It was asserted that a more aggressive monetary policy showed little success in developing the economy's reaction to the bubbles, and that overexpansion in monetary policies created asset bubbles by increasing the risk premium and the credits themselves.

3. Methodology

We consider a time series which is$\boldsymbol{y_t}, \boldsymbol{t} = \boldsymbol{1}, \dots, \boldsymbol{T}$. Null hypothesis tests whether $\boldsymbol{y_t}$ follows Autoregressive Model AR (1) having unit root through all sample or not. Alternative hypothesis says that $\boldsymbol{y_t}$ moves as at least AR (1) process for some sub-sample. Test statistics is as follows:

$$\boldsymbol{PWY} = \sup \boldsymbol{DF_T} \quad (1)$$

Here, $\boldsymbol{DF_T}$ is standard DF test: in other words, it is $\widehat{\emptyset}$ t ratio in Ordinary Least Squared Error (OLS) regression estimation.

$$\Delta \boldsymbol{y_t} = \widehat{\boldsymbol{\alpha}} + \widehat{\emptyset}_{\boldsymbol{PWY}} \boldsymbol{y_{t-1}} + \widehat{\boldsymbol{\varepsilon}}_{\boldsymbol{t}} \quad (2)$$

Sub-sample period is $\boldsymbol{t} = \boldsymbol{1}, \dots, [\boldsymbol{\tau T}]$.

Here, $\overline{\boldsymbol{y}}_{\boldsymbol{\tau}} = ([\boldsymbol{\tau T}] - \boldsymbol{1})^{-1} \sum_{t=2}^{[\tau T]} \boldsymbol{y_{t-1}}$and $\widehat{\boldsymbol{\sigma}}^2_{\boldsymbol{PWY}} = ([\boldsymbol{\tau T}] - \boldsymbol{3})^{-1} \sum_{t=2}^{[\tau T]} \widehat{\boldsymbol{\varepsilon}}^2_{\boldsymbol{t}}$ (Harvey, Leybourne, Sollis, 2013:4).

In left-tailed unit root tests, the results are generally sensitive towards model specification. Formulating an appropriate hypothesis is especially difficult in the case of the existence of non-stationary series, because to indicate the existence of unit root and alternative hypothesis in which the stationary variable is provided - parameters take different roles under the null hypothesis. Right-tailed unit root tests are especially used in determining explosive time series or slightly explosive time series. For example, Diba and Grossman (1988) have applied right-tailed unit root tests to precisely sampled data to find financial bubbles. Phillips, Wu and Yu (2011b) and Phillps and J.Y. (2011) have suggested applying right-tailed unit root tests to recursive sub-samples. The formulation of null and alternative hypothesis and regression model specifications are of importance in both left-tailed and right-tailed unit root tests (Phillps, Shi and Yu, 2014: 316- 317).

One of the right-tailed unit root tests is the Sup Augemented Dickey Fuller (SADF) test. This test was developed by Phillips, Shi and Yu (2011). The SADF test is based on recursive estimation of the ADF model, and it is acquired as a sub-value of the corresponding ADF statistic sequence. In this case study, the window size $r_w$expands to 1 from r_0 with the result that r_0 is the smallest sample window width fraction and 1 is the largest one in the recursion. Initial point r_1 is constant at zero and that's why the end point of each sample equals to r_W and changes to 1 from r_0 (Phillps, Shi and Yu, 2013: 8).

For each $x_t$time series, ADF test is sensitive to the alternative of exploded root (right-tailed). The following autoregressive specification is estimated with least squared (OLS):

$$\boldsymbol{x_t} = \boldsymbol{\mu_x} + \boldsymbol{\delta x_{t-1}} + \sum_{\boldsymbol{j=1}}^{\boldsymbol{J}} \emptyset_j \Delta \boldsymbol{x_{t-j}} + \boldsymbol{\varepsilon_{x,t}}, \qquad \boldsymbol{\varepsilon_{x,t}} \sim \boldsymbol{NID}(\boldsymbol{0}, \boldsymbol{\sigma_x^2}) \tag{3}$$

For some given values of the lag parameter J, NID is independent and has normal distribution. In unit root tests, the null hypothesis is $\boldsymbol{H_0} = \boldsymbol{\delta} = \boldsymbol{1}$ and the right-tailed alternative hypothesis is $\boldsymbol{H_0} = \boldsymbol{\delta} > 1$. In recursive regressions, the above model is, as a rule, estimated to increase one observation at each try.

$$ADF_r \rightarrow \frac{\int_0^r \widetilde{W} dW}{\left(\int_0^r \widetilde{W}^2\right)^{1/2}} \tag{4}$$

$$sup_{r\in[r_0,1]} ADF_r \rightarrow sup_{r\in[r_0,1]} \frac{\int_0^r \widetilde{W} dW}{\left(\int_0^r \widetilde{W}^2\right)^{1/2}} \tag{5}$$

In the calculation given, W is Standard Browian motion and $\widetilde{\boldsymbol{W}}(\boldsymbol{r}) = \boldsymbol{W}(\boldsymbol{r}) - \frac{\boldsymbol{1}}{\boldsymbol{r}} \int_{\boldsymbol{0}}^{\boldsymbol{1}} \boldsymbol{W}$ is reduced Browian motion (Phillips, Wu and Yu, 2011: 206-207).

As the SADF test, the Generalized Augmented Dickey Fuller (GSADF) test is based on the idea of a recursively running ADF test on sub-samples as well. Instead, sub-samples are more extensive in comparison to the SADF. Also, the GSADF test allows the initial point r_1 to vary within a feasible sequence on account of switching the end of point of the regression r_2 from r0 to 1. The GSADF statistic is stated as the largest ADF statistic over all feasible sequences of r_1 and r_2. GSADF tests as follows (Phillps, Shi and Yu, 2013: 10).

$$GSADF(r_0) = \sup_{\substack{r_2 \in [r_0,1] \\ r_1 \in [0, r_2 - r_1]}} \{ADF_{r_1}^{r_2}\} \quad (6)$$

4. Data

In order to analyze the presence of rational bubbles in the credit market, we have looked at domestic credit volume. In addition, export, import, current account balance, credit to private non-financial sector by domestic banks, total credit to households and noncommercial institutions, interbank rate, M2 percent change, consumer price index, production price index, government final consumption expenditure, private final consumption expenditure and gross domestic product data have been examined to determine the impact of monetary policies and macroeconomic indicators on credit bubbles in Turkey. The quarterly data cover the periods between 1986:01 and 2014:04. The data are taken from the FRED database. The variables used in the study are exhibited in Table 1.

Table 1

The Variables Used in the Study

Variables	Definition
CREDIT	Total credit volüme
LNGDP	Logartihm of GDP
CPI	Consumer price index
PPI	Production price index
LEXPORT	Logarithm of export
LIMPORT	Logarithm of import
CAB	Percent change of currrent account balance
LM2	Logarithm of M2 money supply
INT	Interbank interest rate
LGOVEXP	Logarithm of goverment final consumption expenditure
LPRIEXP	Logarithm of private final consumption expenditure
LNONFIN	Logarithm of total credit to nonfinancial private sector
LNONCOM	Logarithm of total credit to household and noncommercial sector
BUBBLE	Dummy variable that indicates the dates credit bubble occured

5. Empirical Results

5.1. Bubble Estimation

In this study, the bubbles in the Turkish credit market are detected via the GSADF and SADF tests developed by Phillips et. Al. (2013) over the period from 1986:01 to 2014:04. Examining the bubbles in the credit sector is of importance to comprehend the relationship between the credit market and overall economy. The results concerning the Turkish domestic credit volume are exhibited in Table 2. It follows from Table 3 that both the SADF and the GSADF tests exceed their respective 1%, 5% and 10% right-tail critical values. That's why the null hypothesis, which erroneously fails to detect a bubble is rejected. The tests have found evidence of a bubble in the Turkish credit market.

Table 2

The Results of the SADF and GSADF Tests in Relation to CREDIT

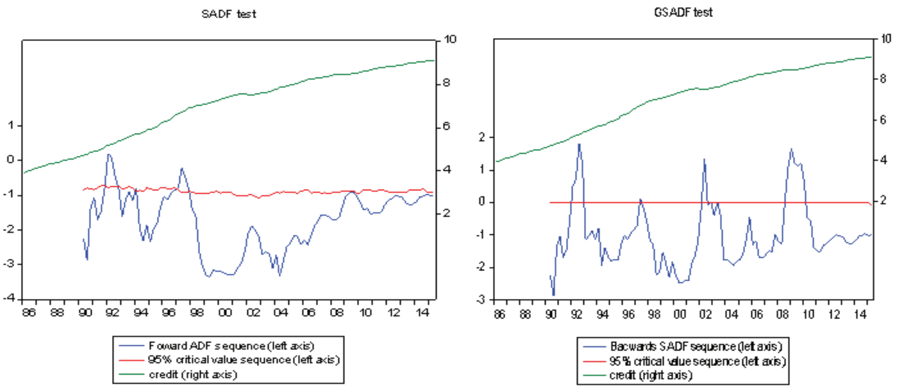
	SADF	GSADF
CREDIT	**0.203542***	**1.828244*****
90% critical value	1.094024	1.622726
95% critical value	0.476741	1.196685
99% critical value	0.237942	0.934863

Note: Critical values of both tests are obtained from Monte Carlo simulation with 1000 replications (sample size 301). The smallest window has 35 observations.

So as to detect bubble periods, we compare the data to the reverse SADF and GSADF statistics with the 95 % critical value sequence obtained from Monte Carlo simulations with 1000 replications for each observation. Figure 1 presents results for the date-stamping strategy over the period. According to Figure 1, the presence of a bubble in the Turkish credit market is evident.

Figure 1

Data-Stamping Bubble Periods in the Turkish Credit Market



5.2. Unit Root Test

After determining bubble periods with the help of the SADF and GSADF tests, the effects of monetary policies and macroeconomic variables on credit bubbles are examined using logit model estimation. It should be determined whether or not the series include unit root for logit model estimation. But, the series are adjusted seasonally via moving average before unit root analysis of the series in the study. Then, we investigated the stationary of all variables before starting the analysis. We applied ZivotAndrews structural break unit root test. The results of this test are exhibited in Table 3 (see Annex).

According to the results of the unit root test conducted with trend, constant and trend and constant, only the INT variable is stationary at level. The CPI, PPI, LEXPORT, LIMPORT, LGOVEXP and LPRIEXP variables are stationary at level in terms of unit root test with trend. However, these variables are seen to have constant and trend as the graphs of these variables are examined. Thus, so-called variables can be said not to be stationary. LNONFIN is stationary only for constant and trend at 1% significance level. Examining Table 4, one may find that all variables except for LNONFIN and INT are nonstationary at (this/their/said/listed/test?) level. Therefore, the stationary of so-called variables are first examined for differences and thus the results are exhibited in Table 4 (see Annex).

As is evident in Table 4; all variables are stationary upon examination of first differences.

5.3. Correlation Matrix Estimation

The below correlation matrix was formed in consideration to the stationary levels of the variables. In other words, the level values of LNONFIN and INT and the first differences of the other variables are taken into consideration when creating the correlation matrix. The results are as reported in Table 5 (see Annex).

We benefited from the correlation analysis results in order to determine which models to investigate in the study. For this purpose, we recoiled at the sight of high correlation rates between the variables. The high correlated variables are not to be found in the same model. The models are as follows:

Model 1: $\mathrm{BUBBLES} = \mathrm{f}(\Delta\mathrm{LNGDP}, \Delta\mathrm{CPI}, \mathrm{LNONFIN}, \mathrm{INT})$

Model 2: $\mathrm{BUBBLES} = \mathrm{f}(\Delta\mathrm{LEXPORT}, \Delta\mathrm{LNONCOM}, \Delta\mathrm{LM2}, \Delta\mathrm{LGOVEXP})$

Model 3: $\mathrm{BUBBLES} = \mathrm{f}(\Delta\mathrm{LPRIEXP}, \Delta\mathrm{CAB}, \Delta\mathrm{PPI}, \Delta\mathrm{LIMPORT})$

5.4. Logit Model Estimation

The logit model estimation results are shown in Table 6, Table 7 and Table 8.

Table 6

Model 1 Estimation Results

Variables	Coefficients	Odds Ratio
C	17.83973 (20.23907)	6.84e+07
ΔLNGDP	-1.269014 (1.101741)	0.2778546
ΔCPI	-0.025863*** (0.010935)	0.9748754
LNONFIN	0.717658** (0.717658)	2.053863
INT	-0.011078* (0.006054)	0.9894374

*, ** and *** represent respectively %10, %5 ve %1 statistical significance levels. The expressions in brackets represent standart errors. Akaike: 0.929716, Hannan-Quinn : 0.977897, LR: 5.603234

Model 1 estimation results show that the CPI and the INT variables negatively affect the probability of any bubbles. The reason is that an increase in interest rates encourages savings and also reduces overconsumption on the part of the consumers. The CPI variable is seen as a factor influencing costs and interest rates. The total credit to the nonfinancial private sector increases the probability of a bubble. However, gross domestic product doesn't have any effect on credit bubbles.

Table 7

Model 2 Estimation Results

Variables	Coefficients	Odds Ratio
C	-8.316005 (20.91345)	0.2130292
ΔLIHR	0.547628 (1.340739)	5.260196
ΔLNONCOM	-1.053848 (0.557715)	0.7310707
ΔLM2	0.705466 (0.896905)	0.0052455
ΔLKAMU	0.305293 (1.279572)	21.18248
*, ** and *** represent respectively %10, %5 ve %1 statistical significance levels. The expressions in brackets represent standart errors. Akaike: 0.9834421, Hannan-Quinn : 0.980602, LR: 5.057478		

As model 2 isexamined, exports, total credit to households and the non commercial sector, M2 money-supply and goverment final consumption expenditures are evidently not statistically significant. These variables don't affect the likelihood of credit bubbles.

Table 8

Model 3 Estimation Results

Variables	Coefficients	Odds Ratio
C	-0.9597558 (.7352295)	0.3829864
ΔLOZELHAR	-3.866884	0.0209235

Variables	Coefficients	Odds Ratio
	(6.86442)	
ΔCAB	0.2043895** (0.1080756)	1.226776
ΔPPI	18.14609 (14.45566)	7.60e+07
ΔLITH	-0.9129286 (3.501419)	0.4013471
*, ** and *** represent respectively %10, %5 ve %1 statistical significance levels. The expressions in brackets represent standart errors. Akaike: 0.958075, Hannan-Quinn : 1.006517, LR: 2.912204		

Analyzing Model 3, one finds that while private final consumption expenditures, production price index and imports don't affect credit bubbles, current account balances increase the probability of credit bubbles. This situation can be explained as follows: Deterioration of current account balances lead to an increase of exchange rate risks. Therefore, credit repayment ability can decrease and, thus, the probability of credit bubbles grows.

6. Conclusion

This paper examines whether there is a rational case for a credit bubble or not in the Turkish credit sector and analyzes the success of the authorities to prevent these bubbles. It is of importance to define the bubbles in terms of understanding movements in markets and in structures during financial crisis. Besides, the presence of rational bubbles in the credit sector reflects instabilities in the financial system.

Firstly in this study, the existence of credit bubbles in Turkey's credit market is investigated and from the analysis, it can be inferred that a credit bubble is present. Secondly, the factors affecting credit bubbles have been researched and studied. For this purpose, the study benefitted from the logit model. According to the logit model estimation, current account balance (CAB), consumer price index (CPI), total credit to the nonfinancial private sector (LNONFIN) and interest rate (INT) variables significantly affect the likelihood of any credit bubbles. These significant effects are as follows: Consumer price index and interest rates negatively affect the probability of bubbles. The total credit to the nonfinancial private sector increases the probability of any looming bubbles. Also, deterioration of current account balances lead to an increase in the probabilty of credit bubbles.

Besides, it is obvious that the LNONFIN variable overly affects the likelihood of any credit bubble and this so-called varible has a stimulating effect on existing credit bubbles. Moreover, this study finds that the CPI variable decreases the likelyhood of any credit bubble, and, yet, has little effect on existing credit bubbles. In a similar fashion, the INT variable is a factor that decreases the likelyhood of and any existing credit bubbles. Consequently, it can be said that policy makers take advantage of the INT and CPI variables in order to decrease the occurence of any looming credit bubbles. Similarly, it is believed that credit bubbles can appear or increase in correlation with the LNONFIN variable. Hereby, these findings present policy makers with valuable information to policy makers.

References

1. Adrian, T., Shin, H.S. (2010). “Financial Intermediaries and Monetary Economics”. *Federal Reserve Bank of New York Staff Report*, no: 398.
2. Adrian, T., Shin, H. S. (2008). “Financial Stability and Monetary Policy. In Maintaing Stability in a Changing Financial Sysyem”. *Federal Reserve Bank of Kansas City Economic Policy Symposium*, 287-334. Jackson Hole, Wyoming: Federal Reserve Bank of Kansas City.
3. Ahrend, R.; Cournede, B. and Price, R. (2008). “Monetary Policy, Market Excesses and Financial Turmoil”. *OECD Economics Department Working Paper*, No: 597.
4. Badarau, C., Popescu, A. (2014). “Monetary Policy and Credit Cycles: A DSGE Analysis”. *Economic Modelling*, 42, pp.301-312.
5. Borio, C., Lowe, P. (2002); “Asset Prices, Financial and Monetary Stability”. *Exploring the Nexus. BIS Working Papers 114. Bank for International Settlements*.
6. Cooper, G. (2009). “The Origin of Financial Crisis: Central Banks, Credit Bubbles and the Efficient Market Fallacy”. *Islamic Econ.,* 22(2), 271-275.
7. Delis, M. D., Kouretas, G.P. (2010). “Interest Rates and Bank Risk-Taking”. *Munich PersonelRePec Archive*. http://mpra.ub.uni-muenchen.de/id/eprint/20132

8. Drescher, C., Herz, B. (2012). “What Determines Simultaneous Asset Bubbles?”.*Universitat Bayreuth Rechts-und WirtschaftswissenschaftlicheFakultat.* Discussion paper, 08-12, pp.1-36.
9. Harvey, D., Leybournei, S., Sollis,R. (2013). “Recursive Right-Tailed Unit Root Tests for an Explosive Asset Price Bubble”. *Journal of Financial Econometrics*, vol: 0, no:0, pp.1-22.
10. Hessel, J., Peeters, J. (2011). “Housing Bubbles, The Leverage Cycle and The Role of Central Banking”. *De Nederlandsche Bank Occasional Studies*, 9(5), pp.1-35.
11. Hume, M., Sentance, A. (2009); “The Global Credit Boom: Challenges for Macroeconomics and Policy”, *Journal of International Money and Finnance 28(2009*), pp.1426-1461.
12. Ioannidou, O. S., Peydro, JL. (2009). “Monetary Policy, Risk Taking and Pricing: Evidence From a Quasi-Natural Experiment”. *European Banking Center Discussion* paper, no: 2009-045.
13. Jimenez and others (2009). “Hazardous Times for Monetary Policy: What Do Twenty-Three Million Bank Loans Say About the Effects of Monetary Policy on Credit Risk-taking”.*Banco de EspanaDocumentos de Trabajo*, no: 0833.
14. Kaminsky, G. L., Reinhart, C. M. (1999); “The Twin Crises: The Causes of Banking and Balance of Payments Problems”, *American Economic Review 89(3*), pp.473-500.
15. Kashyap, A. K., Stein, J. C. (2012). “The Optimal Conduct of Monetary Policy with Interest on Reserves”. *American Economic Journal: Macroeconomics*. 4(1), pp.266-282.
16. Mendoza, E. G., Terrones, M. E. (2008); “An Anatomy of Credit Booms: Evidence From Macro Aggregates and Micro Data”.*NBER Working Paper* No. 14049.
17. Mishkin, F. S. (2011). “How Should Central Banks Respond to Asset-Price Bubbles The Lean Versus Clean Debate After the GFC”.*Reserve Bank of Australia*, pp.59-60
18. Moore, W., Lewis-Bynoe, D., Howard, S. (2010); “Credit Booms and Busts in the Caribbean”, *MPRA* paper. No: 21472.
19. Philips, P.C.B., Shi, S., Yu, J. (2013). “Testing For Multiple Bubbles: Hıstorical Epısodes of Exuberance and Collapse In The S&P 500”, *Cowles Foundation Discussion* Paper No. 1914.
20. Philips, P.C.B., Shi, S., Yu, J. (2014). “Specification Sensitivity in Right-Tailed Unit Root Testing For Explosive Behavior”, *Oxford Bulletin of Economics and Statistics*, 76 (3).

21. Philips, P.C.B., Wu, Y., Yu, J. (2011). "Explosive Behavior In The 1990s NASDAQ: When Did Exuberance Escalate Asset Values?".*International Economic Review*, 52 (1).
22. Schularick, M., Taylor, A. M. (2009). "Credit Booms Gone Bust: Monetary Policy, Leverage Cycles and Financial Crises, 1870-2008". *NBER working paper series*. No: 15512, pp.1-38.
23. Turner, P. (2010). "Central Banks and Financial Crisis. In Perspectives on Inflation Targeting, Financial Stability and the Global Crisis". *BIS paper, Bank for International Settlements*. No: 51, pp.21-25.

ANNEX

Table 3

Zivot Andrews Unit Root Test I(0)

	Constant			Trend			Constant and Trend		
Variables	**T**	**Lags**	**Breakpoint**	**T**	**Lags**	**Breakpoint**	**T**	**Lags**	**Breakpoint**
LNGDP	-4.3066	1	1994:Q3	-4.0574	1	1997:Q4	-4.6000	1	1995:Q1
CPI	-2.5787	9	1992:Q4	-4.3035***	9	1997:Q3	-4.00031	9	1996:Q4
PPI	-3.1288	7	2001:Q2	-3.6864***	1	1996:Q2	-3.4047	1	1994:Q4
LEXPORT	-2.6126	0	1993:Q4	-4.7642***	0	2000:Q4	-4.2981	0	2001:Q1
LIMPORT	-2.1373	1	1993:Q1	-4.2016***	1	2000:Q2	-4.1733	1	1999:Q2
CAB	-3.7008	10	1998:Q3	-3.4462	10	2010:Q4	-4.1521	10	2009:Q4
LM2	-2.6117	3	1994:Q2	-3.2773	3	1999:Q4	-3.1537	3	1994:Q2
INT	-4.7030*	2	1993.Q4	-5.2999***	2	1994:Q2	-5.7118***	2	1994:Q1
LGOVEXP	-1.8435	3	1995:Q2	-4.7283**	3	1999:Q4	-4.6420	3	1997:Q2
LPRIEXP	-3.5352	7	1994:Q2	-4.6050**	7	1998:Q1	-4.7787	7	1994:Q2
LNONFIN	-2.0859	4	1994:Q4	-4.5722	4	1998:Q1	-5.0276***	4	1995:Q4
LNONCOM	-4.3755	0	1993:Q3	-3.0731	0	2000:Q2	-4.1121	0	1993:Q3
	Critical values for %1, %5 ve %10 significance levels are respectively -5.34, -4.93, -4.58			Critical values for %1, %5 ve %10 significance levels are respectively -4.80, -4.42, -4.11'dir.			Critical values for %1, %5 ve %10 significance levels are respectively -5.57,-5.08, -4.82'dir.		

Table 4

Zivot Andrews Unit Root Test I(1)

	Constant			Trend			Constant and Trend		
Variables	**T**	**Lags**	**Breakpoint**	**T**	**Lags**	**Breakpoint**	**T**	**Lags**	**Breakpoint**
ΔLNGDP	-10.3341***	0	1994:Q2	-6.3234***	4	2001:Q2	-6.6813***	4	1994:Q3
ΔCPI	-3.9428***	7	2003:Q3	-3.2274**	7	2001:Q3	-3.9278***	7	2003:Q3
ΔPPI	-8.2175***	6	1999:Q3	-7.9999***	1	2002:Q1	-8.4098*	1	2001:Q2
ΔLEXPORT	-4.8963*	4	2002:Q1	-4.3743*	4	1994:Q3	-4.8924*	4	1998:Q2
ΔLIMPORT	-9.1378***	7	1991:Q3	-9.1247***	0	1994:Q4	-9.5187***	0	1998:Q1
ΔCAB	-9.3138***	9	2001:Q3	-8.8864***	9	1993:Q3	-9.2636***	9	2001:Q3
ΔLM2	-6.0580***	2	1994:Q2	-5.4769***	2	1995:Q3	-6.3518***	2	1994.Q2
ΔLGOVEXP	-6.5349***	2	2002:Q1	-5.5642***	2	2009:Q3	-6.3575***	2	2002:Q1
ΔLPRIEXP	-5.2935***	4	2000:Q2	-3.9646	4	2009:Q4	-5.1661***	4	2000:Q2
ΔLNONCOM	-9.9751***	0	1992:Q2	-9.9544	0	1993:Q4	-10.472***	0	1994:Q1
	Critical values for %1, %5 ve %10 significance levels are respectively -5.34, -4.93, -4.58. Δ represents first difference.			Critical values for %1, %5 ve %10 significance levels are respectively -4.80, -4.42, -4.11. Δ represents first difference.			Critical values for %1, %5 ve %10 significance levels are respectively -5.57,-5.08, -4.82. Δ represents first difference.		

Table 5

Correlation Matrix

	ΔLNGDP	ΔCPI	ΔPPI	ΔLEXPORT	ΔLIMPORT	ΔCAB
ΔLNGDP	1					
ΔCPI	-0.0701	1				
ΔPPI	-0.1176	0.7478**	1			
ΔLEXPORT	-0.0508	-0.1927**	-0.0162	1		
ΔLIMPORT	0.0816	-0.2589***	-0.0301	0.5040***	1	
ΔCAB	-0.1623*	-0.0236	-0.0516	0.0185	0.1056	1
ΔLM2	0.3506***	-0.3441***	-0.2620***	0.3509***	0.3477***	-0.0346
INT	-0.1518	-0.3274***	-0.2451***	0.5348***	0.3991***	-0.0052
ΔLGOVEXP	0.0944	-0.2970***	-0.1990**	0.4338***	0.3988***	0.0280
ΔLPRIEXP	0.1373	-0.3973***	-0.2547***	0.5080***	0.6531***	0.0713
LNONFIN	-0.0857	0.6804***	0.5065***	-0.3143***	-0.4177***	0.0130
ΔLNONCOM	-0.0814	-0.1637***	-0.1086	0.0291	0.2447***	-0.0998
	ΔLM2	**INT**	**ΔLGOVEXP**	**ΔLPRIEXP**	**LNONFIN**	**ΔLNONCOM**
ΔLM2	1					
INT	0.5401***	1				
ΔLGOVEXP	0.4107***	0.4562***	1			
ΔLPRIEXP	0.5291***	0.6257***	0.5700***	1		
LNONFIN	-0.3859***	-0.4962***	-0.4715***	-0.6116***	1	
ΔLNONCOM	0.0402	0.0010	0.1091	0.2041***	-0.0962	1
*, ** and *** show respectively %10, %5 ve %1 statistical significance levels.						