

The Impact of Asset Prices in Monetary Policy of Turkey

Abstract

The global financial crisis was the result of the contraction in economic activity that was a result of sharp decreases in asset prices in developed countries. In the aftermath of the global financial crisis, the destructive effects of financial instability on price stability began to become apparent and a discussion started on how and to what extent central banks should intervene in asset prices via monetary policies. As a result of this discussion, changes in asset prices were included in the reaction functions of central banks particularly adopting inflation-targeting regime. The aim of this study is to determine whether the Central Bank of the Republic of Turkey (CBRT) reacts to changes in stock prices apart from inflation and output gap in the period after 2002. This will help to find out whether the developments in the financial sector are taken into consideration while the monetary policies are being carried out in Turkey. The effects of the changes in asset prices on the decisions of CBRT on interest rates will be examined within the framework of forward-looking augmented Taylor rule. According to the findings of this study, CBRT shows the greatest reaction to deviations of inflation from target value. CBRT reacts the least to the deviation of stock prices from their fundamental level. The results of this study indicate that CBRT has continued to carry out monetary policies based on price stability.

Keywords: *Monetary Policies, Asset Prices, Augmented Taylor Rule.*

Türkiye’de Para Politikaları Uygulamalarında Varlık Fiyatlarının Etkisi

Öz

Global finansal kriz, gelişmiş ülkelerde varlık fiyatlarında meydana gelen şiddetli ve ani düşüşlerin reel ekonomik aktivitede yarattığı daralmadan kaynaklanmıştır. Global finansal kriz sonrasında bir yandan finansal istikrarsızlığın fiyat istikrarını bozucu etkileri ortaya çıkarken, diğer yandan para politikalarıyla varlık fiyatlarına nasıl ve ne ölçüde müdahale edilmesi gerektiği tartışılmaya başlanmıştır. Söz konusu gerekçelerden dolayı, varlık fiyatı değişimleri enflasyon hedeflemesi uygulayan ülke merkez bankalarının reaksiyon fonksiyonlarına dahil edilmiştir. Bu çalışmanın temel amacı, Türkiye Cumhuriyeti Merkez Bankası'nın (TCMB) 2002 sonrası dönemde enflasyon ve çıktı açığının yanı sıra, hisse senetleri fiyatlarındaki değişimlere reaksiyon gösterip göstermediğini tespit etmektir. Bu şekilde Türkiye’de para politikaları yürütülürken, finansal sektördeki gelişmelerin dikkate alınıp alınmadığı belirlenecektir. Varlık fiyatlarındaki değişimlerin TCMB'nin faiz kararları üzerindeki etkisi ileriye dönük genişletilmiş Taylor kuralı çerçevesinde incelenecektir. Çalışmadan elde edilen bulgulara göre, TCMB en fazla reaksiyonu öncelikle enflasyonun hedeflenen değerden sapmasına, sonra ise üretim açığına göstermektedir. En düşük reaksiyonu ise hisse senetlerinin denge değerlerinden sapmasına göstermektedir. Çalışma sonuçları TCMB'nin para politikalarını fiyat istikrarı odaklı yürütmeye devam ettiğini ortaya koymaktadır.

Anahtar Kelimeler: *Para Politikaları, Aktif Fiyatları, Genişletilmiş Taylor Kuralı.*

Nejla ADANUR AKLAN¹

Mehmet ÇINAR²

¹ Doç. Dr., Uludağ Üniversitesi,
İİBF İktisat Bölümü
adanur@uludag.edu.tr

² Doç. Dr., Uludağ Üniversitesi,
İİBF Ekonometri Bölümü
mcinar@uludag.edu.tr

INTRODUCTION

Fluctuations in asset prices affect balance sheets of financial institutions. During cyclical expansion, balance sheets of banks improve and their capacity for issuing credits expands since net wealth of households and firms increase due to the increase in asset prices. On the other hand, decreases in asset prices affect the abilities of households and firms to stay solvent, thereby leading to an increase in the share of non-performing loans. This, on the one hand, weakens the capital structure of banks and their capacity for credit supply, but on the other hand these effects get stronger because of the decrease in collateral values in case of a generalized asset price deflation. This transmission channel is stronger in countries where financial system is heavily dependent on banks.

Until the outbreak of the recent financial crisis, the main purpose of central banks was to ensure financial stability. However, the sharp changes in asset prices in the 1990s revealed that the policies implemented to ensure financial stability did not work under the effect of the new consensus approach. This study mainly explores whether the central bank in Turkey uses the monetary policy as a tool to prevent asset price bubbles. While we analyze this, we will also present the similarities and the differences between the results of our study and the studies in the literature.

The study firstly presents the relevant theory and the literature review on the traditional/non-traditional approaches. The second section focuses on the role of stock prices in the implementation of monetary policies within the framework of augmented Taylor rule.

THEORY AND LITERATURE REVIEW

The literature presenting the effects of asset prices on macroeconomic variables mainly focuses on changes in stock prices. There are also studies examining the effects of changes in stock price on consumption and capital cost as well (Tobin, 1969). The financial bubbles that occur when stock prices deviate from their fundamental value affect capital cost of firms through their balance sheets. Accordingly, investments increase when stock prices exceed their fundamental value. When stock prices stop increasing sharply, financial accelera-

tor starts to go in reverse, decreasing both the inflation and the output level. The main transmission channel works as asset prices affect the balance sheets of firms and the real economic activity. In case of credit market distortions, the balance sheets of firms affect their borrowings.

According to Borio and Lowe (2002), Bean (2003) and Bloxham (2001), the main problem is not whether central banks respond to asset prices but what effects changes in asset prices have on debt and capital accumulation. During the economic expansion, positive expectations for future cash flows increase asset prices and direct economic units to borrowing so that they can finance their capital accumulation. During this expansion, the increase in asset values balances the increase in liabilities. During the economic contraction, the decreases in asset prices reduce the net wealth, causing financial instability. This happens especially when financial intermediaries respond to the deterioration in their balance sheets by decreasing loan supplies. Sharp decreases in asset prices have important impacts as changing expectations and leading to decreases in collateral values. The decreases in collateral values in particular cause the problem of asymmetric information between the borrowers and the creditors to become more severe. By taking the effects of sudden decreases in asset prices on the financial system into consideration, there are some views arguing that it may be useful to reverse the increases in asset prices at an early stage. According to this point of view, central banks can prevent high fluctuations likely to occur in output and inflation rates by increasing interest rates at an early stage when asset prices start to increase (Kent ve Lowe, 1997).

Moreover, when analyzed within the conceptual framework, there are some fundamental studies in the literature based on the asymmetric information in financial markets and which focus on the role of asset prices as a factor affecting the deposit insurance size while transmitting the financial variables into the real economy (Bernake and Gertler, 2000; Kiyotaki and Moore 1997, Bloxham *et al.*, 2011). Looking from both perspectives, changes in asset price have some impacts on the real economy.

Ensuring financial stability requires a redesign of macroeconomic policies as well as regulatory and

supervisory policies with an eye to mitigate systemic risks. For macroeconomic policies, this means leaning against credit and asset price booms; for regulatory and supervisory policies, it means adopting a macroprudential perspective (Bank for International Settlements, Annual Report 2009: 14).

Based on all these impacts, whether asset prices should have a systematic role in the implementation of monetary policies or not, is the main discussion between the traditional (opponents) and non-traditional (proponents) approaches. In the normative literature, there are strong arguments both for and against asset price targeting.

Opponents

The dominant view that can be defined as the traditional approach in the literature, is that central banks should set the interest rates based on the current or the forecasted inflation rates and the output gap but should not directly target asset prices (Bernanke and Gertler, 2000, 2001). They argued that asset price targeting is unnecessary. The main reason is that the volatility of asset prices is high. As a result, it is not possible to systematically respond to asset prices, as it is difficult to determine the future deviations of asset prices. Bernanke and Gertler (2000, 2001) states that inflation targeting sufficiently stabilizes asset prices.

One reason why there are some views opposed to asset price targeting is that it is difficult to define asset prices. Another reason is related to the theoretical objection to explicit targeting of asset prices. The underlying reason for the theoretical objection is that asset prices are not different from other variables affecting aggregate demand. In this regard, authorities must manage the general level of aggregate demand. Asset prices are just one of the variables affecting aggregate demand. Bernanke and Gertler (2000) point in their studies that central banks should not directly respond to the changes in asset prices; in other words, they should not have explicitly target asset prices. Following these studies, the literature analyzing the relation between monetary policies and asset prices has made a remarkable progress.

Proponents

Going beyond the traditional approach, the view

that systematically including asset prices into policy making process of central banks increases economic performance has gained importance. According to this view, in the countries where the operational aim of central banks is to ensure price stability, central banks can contribute to financial stability by adopting tight monetary policies when there is an excessive credit expansion and asset prices suddenly increase. For example, Cecchetti *et al.* (2000) argued that asset price targeting could improve the efficacy of monetary policy. Similarly, Cecchetti *et al.* (2002) suggested the potential benefits of asset price targeting.

There are some studies arguing that the changes in asset prices can be included into reaction functions at the point of reaching optimal price level and growth rate since sharp increases in asset prices contain some information about the inflation and output gap for the following period (Smets, 1997; Bernanke and Gertler, 2000, 2001; Roubini, 2006; De Grauwe, 2008, Drescher *et al.*, 2010; Leduc and Natal, 2011). In such studies, it is argued that the effectiveness of inflation targeting regime will increase when asset prices are included in reaction functions. The main reason for this argument is that asset prices act like an indicator of future inflation. Within this period, asset prices are included in reaction functions in broadly defined inflation or directly¹. There is an important difference between central banks including asset prices in their reaction functions as an independent variable and regarding asset prices as a function of the inflation and/or output gap for the next period. Sharp changes in interest rates will occur in countries which include asset prices into their reaction function. Sharp correction in asset prices ne-

¹ Finding a positive correlation between asset prices and consumer prices enables the changes in asset prices to be used in the forecast of inflation (Goodhart ve Hoffman, 2001). Accordingly, it is argued that including asset prices into the measurement of inflation will increase the effectiveness of inflation targeting regime. However, the studies by Stock and Watson (2003), Filardo (2000) found that the changes in asset prices are not appropriate indicators of inflation and output growth. In the studies by Bernanke and Gertler (2000, 2001), Bullard and Schaling (2002), Gilchrist and Leahy (2002) supporting that including asset prices in reaction functions does not increase the effectiveness of inflation targeting regime, it is argued that inflation targeting regime is adequate in the reactions to the shocks.

eds sharp changes in interest rates. Real activity and especially investment will be vulnerable to the effects of interest rate changes. When asset prices rise high interest rates entail major output losses.

In the literature, there is not a clear common view about whether central banks should take into account asset prices while setting policy interest rates. In their study, Bernanke and Gertler (2000 and 2001) argued that central banks do not have an explicit asset price targeting as a component of their monetary policies. On the contrary, many other studies like the ones by Cecchetti *et al.* (2002), Drescher *et al.* (2010) and Ateşoğlu (2011) indicated that central banks explicitly or implicitly consider asset prices. The asset price bubbles and their collapse have effects that go beyond their impact on aggregate demand. Not responding to sudden and high increases in asset prices but adopting loose monetary policies in response to sharp decreases in asset prices increases risk undertakings of economic units under the effect of moral hazard (De Gregorio, 2008:5). As a result, an “activist” reaction is necessary for sharp increases in asset prices (Cecchetti *et al.* 2002; Bordo and Jeanne, 2002; Takatoshi, 2010)². According to Genberg (2000:23), “Misalignment in stock prices, housing prices or exchange rates may have undesirable effects on resource allocation, and when they unwind, they may lead to financial stress”.

In this regard, central banks aiming at achieving target inflation need to adjust interest rates in a way to include asset prices as well as inflation and output gap. Adjusting policy tools including asset prices decreases output volatility (Cecchetti *et al.*, 2002, Aydın and Volkan, 2011). Reacting to asset prices during the policy making process prevents sharp increases in asset prices on the one hand and on the other hand it increases the effectiveness of

policies in rigid and flexible inflation targeting regimes.

There are different results by country; for example, Chadra *et al.* (2003) found that asset prices in case of America and England are statistically significant while their findings for Japan are the opposite (insignificant). Cecchetti *et al.* (2000) found that central bank can improve macroeconomic stability by reacting to stock prices in addition to inflation and the output gap.

In the case of extended Taylor rules in France, Germany and Italy, Siklos *et al.* (2004) expects that the coefficient of asset prices (such as housing and stock prices) yields implausible estimates. They state that aggressive reactions to asset prices would have led to an implausible monetary policy. Bullard and Schaling (2002) constructed a macroeconomic model where a central bank targets stock prices in addition to inflation and output. They concluded that targeting stock prices leads to suboptimal levels of inflation and output gap. Results of our study are in parallel with these studies. In our study, we find no empirical evidence that supports the introduction of stock prices in the CBRT’s policy rule.

The effects of changes in asset prices on financial fragility have been put forward by Post-Keynesian approach. According to Post-Keynesian approach, changes in asset prices and financial fragility are two important variables having an impact on the decisions of central banks. From this point of view, asset prices come to the forefront via their effects on financial fragility while the main purpose of central banks is to ensure financial stability. Central banks can ensure price stability only by ensuring financial stability.

MODEL AND METHODOLOGY

The literature exploring the relation between monetary policy and financial instability within the framework of augmented Taylor rule is divided into two categories. The first one covers dynamic stochastic general equilibrium models while the other one covers the models reacting to the variables representing financial instability via monetary policy interests. In this section of the study, we mainly focus on whether CBRT responded to

² At this point, it is necessary to mention Greenspan Doctrine. According to Greenspan (2010), intervening in sharp increases in asset prices via tight monetary policies while they are going up leads to output losses. Accordingly, intervening in sharp decreases in asset prices via loose monetary policies is an appropriate strategy. See Issing, 2009; Trichet, 2009; Blanchard *et al.*, 2010 to read more on similar points of view. Some studies discussing the size of activist reaction (Kuttner, 2011; Reinhart and Reinhart, 2011) indicate that the effect of responding to sharp increases in asset prices via marginal interest adjustments is quite small.

the deviations of stock prices from the fundamental level via monetary policies when the inflation targeting regime was adopted. This means we will use a model that is within the second category.

Reduced form of Standard Forward-Looking Taylor Rule can be formulated as follows³:

$$i_t = \bar{i} + \beta\tilde{\pi}_t + \gamma\tilde{X}_t + \rho i_{t-1} + v_t \quad (1)$$

where i_t refers to the interest rate used as a monetary policy instrument; $\tilde{\pi}_t$ represents the deviation of inflation from its target value; \tilde{X}_t stands for the deviation of production from the fundamental level and when the reaction function is formulated as forward-looking, $\tilde{\pi}_t$ is calculated based on the gap between the expected inflation and target inflation. Finally, ρ stands for the interest rate smoothing and v_t is error term or residual.

Within the scope of the Taylor rule, monetary policy works via real interest rate affecting the decisions of economic units on consumption and investment. Based on this, when the inflation rate exceeds the expected level or the production is higher than the potential level, the central bank reduces the demand pressure by increasing nominal interest rates to a level that will provide an adequate rise in real interest rates. When the inflation reaction coefficient is $\beta > 1$ and production reaction coefficient is $\gamma > 0$, it shows that this policy is being implemented.

The equation (1) does not explicitly take the effect of asset prices on interest rate into consideration. Therefore, the regression model to be used within the framework of Augmented Forward-Looking Taylor Rule can be formulated as follows:

$$i_t = \bar{i} + \beta\tilde{\pi}_t + \gamma\tilde{X}_t + \theta\tilde{S}_t + \rho i_{t-1} + v_t \quad (2)$$

In this equation, \tilde{S}_t refers to the deviation of stock prices from the fundamental level. Bernanke and Gertler (2000) found that the deviation of stock prices from the fundamental level affects policy interest rates. As a matter of fact, this finding in-

dicates that when the asset prices deviate from the fundamental level, central banks intervene. Accordingly, central banks react to offset asset prices. In other words, the parameter θ showing the effect of the asset price deviation has to be $\theta > 0$ since central banks increase (decrease) policy interest rates to offset abnormal price movements when asset prices deviate from their fundamental level in the positive (negative) direction (Chadra *et al.*, 2003).

First, when we have estimated the model using the deviation of stock prices and the one excluding that deviation of stock prices, an autocorrelation problem was detected. If the autocorrelation coefficient is equal to the unit value, it means that the series are non-stationary. Hence, unit root tests were conducted for each variable and at least ten percent of these variables were found to be non-stationary. As a result, the first difference of each variable was calculated to be used in the model⁴. By using these variables, the model was estimated and the results are presented in Table 1 and Table 2. Second, while presenting the results of EVIEWS estimations, Newey-West procedure was used.

DATA AND EMPIRICAL FINDINGS

In this study, forward-looking reaction function of CBRT will be projected for 2002:01-2015:01. In the model, the interbank interest rates obtained from the IFS (International Financial Statistics) are used as a dependent variable to represent the interest rates in the money market. In the model, industrial production gap is seasonally adjusted industrial production series obtained from the IFS. The approaches of Khalaf and Kichian (2004) were used to generate production gap series. Rather than directly using Hodrick-Prescott (HP) filter for the whole sample of industrial production series to generate production gap series, an iterative approach was adopted for a specific period. The iterative approach is the one used by Khalaf and Kichian (2004). The variable of stock prices used to show asset prices was used by applying HP filter to IMKB (Istanbul Stock Exchanges) National 100 index via the approach of Khalaf and Kichian (2004).

In the analysis, we used CBRT's expectation sur-

3 More detailed information on standard and augmented forward-looking reaction function can be found in the studies by Chadra *et al.* (2003), Siklos *et al.* (2004) and Jovanovic and Zimmermann (2008).

4 The results of unit root test can be provided when asked.

vey to define expected inflation rate. The target inflation data were obtained from the website of CBRT. Yazgan and Yılmazkuday's (2007) approach was adopted while turning these data into monthly data. Expected inflation, target inflation and stock prices series were obtained from CBRT while interbank interest rates were obtained from the IFS.

Standard Taylor Rule

CBRT's forward-looking reaction function was forecasted primarily within the framework of standard Taylor rule. The GMM estimation results of the parameters $\{\beta, \gamma, \rho\}$ of equation (1) are shown

in Table 1. Analyzing the forecasted model, we found that the estimated value of equilibrium real interest rate is approximately -0.1075. When the first difference of the variable is calculated, the value is found to be around zero mean, which is an expected finding. According to the findings of Table 1, the parameter β showing the deviation of inflation from the targeted value is approximately 1.1865. The forecasted value is consistent with the literature. If the inflation exceeds the target value by 1 point when the other variables are econometrically fixed, it means that the real interest rate will increase by about 1.1865 points. The estimated parameter β is positive in terms of the expectations; it is higher than 1 ($\beta > 1$) and statistically quite significant.

Table 1: Standard Taylor Rule Estimation Results (Eq. 1)

	\bar{i}	β	γ	ρ
Parameters	-0.1075	1.1865	0.0144	0.1872
Std. Errors	(0.0271)	(0.0571)	(0.0035)	(0.0235)
Prob.	[0.0001]	[0.0000]	[0.0001]	[0.0000]
Adj. \bar{R}^2	0.3960	$\sum v_t^2$	114.4380	
Durbin-Watson	2.1670	J- statistics	0.1033	

Note: For a significance level of 5 percent, the lower limit of Durbin-Watson autocorrelation is 1.788 while the upper limit is 2.212.

If the production exceeds the potential level by 1 point when the other variables are fixed, we can see in Table 1 that CBRT increases the real interest rate by about 0.0144 points. This forecasted value is positive in terms of the expectations; it is higher than zero ($\gamma > 0$) and statistically significant at 1 percent. Accordingly, the value of this parameter is also consistent with the literature.

In the model, the smoothing parameter is 0.19, which indicates that CBRT gradually brings the interest rates closer to the target value. This value means that about two thirds of interest rates ($1 - 0.19 = 0.81$) are affected by the current value of the deviations of inflation and production. The remaining value of the variability in policy interests (0.19) is determined by its own past values.

Table 1 indicates that the model forecasted proves Taylor rule principle. Also, each parameter except for γ is significant at 1 percent while the parameter γ was found to be significant at 5 percent. In the model, the adjusted determination coefficient is high, which indicates that about 40 percent

of the changes in the real interest rate are explained by independent variables (deviation of inflation and production). Hansen (1982) J-statistics indicates that the model does not have a problem of over identification. Likewise, Durbin-Watson statistics reveals that the model does not have a problem of autocorrelation. All these findings mean that the forecasted econometric regression model is appropriate and usable. As a result, Table 1 and the forecasted econometric regression model show that CBRT, as a policy rule, strongly responds to the deviation of inflation and production while setting its policy interest rates.

Augmented Taylor Rule

In this section, CBRT's forward-looking reaction function was forecasted within the framework of augmented Taylor Rule. The GMM estimation results of the parameters $\{\beta, \gamma, \theta, \rho\}$ of equation (2) are presented in Table 2. The first remarkable point in Table 2 is that adding the stock price deviation into the model does not result in an important change in deviations of both inflation and produc-

tion when compared to Table 1⁵.

When Table 2 is analyzed, we see that adding the deviation of stock prices into the model led the estimated value of the equilibrium real interest rate to increase from -0.1075 to -0.0914. When the first difference of the variable is calculated, it is found to be around zero mean, which is an expected finding. According to the findings shown in Table 2, if the inflation exceeds the target value by 1 point when the other variables are fixed, then CBRT increases the real interest rate by about 1.0611 points. Based on Table 2, if the production exceeds the potential level by 1 point when the other variables are fixed, CBRT increases the real interest rate by about 0.0064 points. The forecasted parameters β and γ are positive in terms of the expectations and they are $\beta > 1$ and $\gamma > 0$ respectively. The parameters are statistically significant, showing that these values are consistent with the literature.

Table 2: Augmented Taylor Rule Estimation Results (Eq. 2)

	\bar{i}	β	γ	θ	ρ
Parameters	-0.0914	1.0611	0.0064	-1.24E-06	0.1482
Std. Errors	(0.0220)	(0.0399)	(0.0024)	(6.46E-06)	(0.0193)
Prob.	[0.0001]	[0.0000]	[0.0078]	[0.8483]	[0.0000]
Adj. \bar{R}^2	0.3914	$\sum v_i^2$	114.4976		
Durbin-Watson	2.0711	J- statistics	0.1246		

Note: For a significance level at 5 percent, the lower limit of Durbin-Watson autocorrelation is 1.802 while the upper limit is 2.198.

Finally, if stock prices exceed the equilibrium value by 1 point when the other variables are fixed, then CBRT decreases the real interest rate by about 1.24E-06 points. However, the parameter θ is not statistically significant. Therefore, there is not a relation between policy interest rates and deviation of stock prices. Based on this, the Central Bank does not respond to the deviation of stock prices from the fundamental level while making decisions on interest rates.

The adjusted determination coefficient was very high, showing that about 39.14 percent of the changes in real interest rates are explained by independent variables. Hansen J-statistic (1982) shows that there is not a problem of over identification in the model. Likewise, Durbin-Watson statistic shows that there is no autocorrelation problem. This value is relatively low, it supports the finding that the model does not get better but worse when the deviation of stock prices is added to the model. Nevertheless, when all these results are considered together, it is clear that the estimated econometric regression model is suitable and usable.

In line with Table 1 and Table 2, the estimated regression model indicates that within the framework of a policy rule, CBRT strongly responds to the deviation of inflation and production but not to the deviation of stock prices while setting policy interest rates.

The findings of our study are consistent those of Bernanke and Gertler (2000 ve 2001) regarded as the fundamental studies in the literature. In other words, CBRT considers the deviation of inflation and production but not asset prices while setting policy interest rates.

⁵ The studies by Smets (1997), Bernanke and Gertler (2000, 2001), Roubini (2006), Drescher et al., (2010), Leduc and Natal (2011) state that the effectiveness of inflation targeting regime will increase when asset prices are included into reaction functions.

CONCLUSION

The global financial crisis has led to renewed calls for central banks to consider potential trade-offs between macroeconomic and financial stability. After the global financial crisis the debate has focused on the extent to which monetary policy should respond to misalignments in asset prices, such as equity prices⁶. Sharp changes in asset prices are one of the features affecting the success of inflation targeting. In this regard, the changes in asset prices should be taken into consideration while implementing economic policies. This can be achieved either by including asset prices into reaction function or by taking regulatory precautions for the financial system while implementing monetary policies.

This study has investigated whether the changes in asset prices play a crucial role in shaping monetary policy in Turkey via extended Taylor Rule (1993). Our paper seeks to observe whether or not the CBRT has taken asset prices into consideration in setting interest rates. In this manner we can understand the role of asset prices in monetary policy.

According to the results of the augmented Taylor Rule CBRT bases the process of setting interest rates on inflation deviation, which is consistent with its target of ensuring price stability. In addition, production deviation is the other variable that CBRT responds to. The policies adopted by CBRT in response to the above mentioned two variables are consistent with its main target of price stability. According to the model estimated via GMM approach, CBRT did not respond to the deviation of stock prices from the fundamental level in the period analyzed. In other word, stock price movements do not play a crucial role in shaping monetary policy in Turkey. Stock prices serve as indicators of inflation and not as a variable that the CBRT directly reacts to. However, this should not mean that CBRT only aimed at ensuring price stability but not financial stability.

It must be recognized that automatic adjusting in-

terest rates will not be appropriate in all circumstances. The reason for the change in the asset prices (stock prices, housing prices, exchange rates..) should be taken account in conducting monetary policy. In Turkish economy, macroeconomic stability should be achieved by the monetary policies implemented to ensure price stability and macro precautionary measures taken to ensure the stability of the financial system. Monetary policies and macro precautionary measures are complementary.

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Appendix 1: Unit Root Test Results

	$i_t(k)$	$\tilde{\pi}_t(k)$	$\tilde{x}_t(k)$	$\tilde{s}_t(k)$
ADF	-7.0528* (1)	-9.4073* (0)	-6.3127* (10)	-11.4188* (0)
PP	-10.4202* (2)	-9.3116* (4)	-32.3548* (8)	-11.3731* (4)

Note: k is number of lags used in the models, * significant at 1%.