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Fear of Floating in Turkey

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Abstract

Many emerging markets have adopted floating exchange rate regimes after currency crises. Turkey has experienced a floating regime since 2002 combined with inflation targeting. The aim of this paper is to investigate the "fear of floating" phenomenon, named by Calvo and Reinhart (2002), in the transition to a low and stable inflation environment in Turkey before and after inflation targeting. The results demonstrate that the levels of exchange rate pass-through decreased substantially, thus weakening the "fear of floating" phenomenon in Turkey after inflation targeting. Therefore, we argue whether any reactions of the central bank to foreign exchange rates imply the "fear of floating" or the "fear of inflation"

Keywords: Inflation targeting, Exchange rate, Fear of floating, Turkey

JEL Classification: E52, E58, F41

1. Introduction

Calvo and Reinhart (2002) examined 39 countries between 1970 and 1999 in their influential study. They noticed that many Emerging Market Economies (EMEs) exhibited a "fear of floating", which implies that the central banks intervene to limit exchange rate movements by utilizing the interest rate and international reserves even if their exchange rates are officially classified as flexible. Calvo and Reinhart also argued that the main reasons for the "fear of floating" are the high exchange rate pass-through to prices and monetary authority, which lacks credibility and transparency.

Although the exchange rate pass-through was lower in Turkey during the inflation-targeting

period, this paper suggests that the "fear of floating" may be still due to a "fear of inflation". It also indicates that the exchange rate pass-through effect is relatively large in Turkey, when an existence of higher probability is involved ex-ante to depreciations. This emphasizes that the inflationary risks related to depreciations still have great importance for the Central Bank of the Republic of Turkey (CBRT).

The rest of the paper is organized as follows: the subsequent part reviews some theoretical and empirical issues related with the fears of floating and inflation and the remainder of the paper is divided into four sections. First, we provide a review of some theoretical and empirical issues related with the fears of floating and inflation. Next, we review some monetary policy shifts for the Turkish economy and obtain some policy conclusions for the period under consideration. Then, we present an estimation of the exchange rate pass-through effect in Turkey and indicate the important difference in the size of the effect before and after inflation targeting. Then, we provide detailed results of our econometric analysis, based on different methodologies. Finally, we offer a brief conclusion.

2. Fear of Floating and Fear of Inflation

Specifically, after the mid-1980s, many emerging markets faced a deep and sticky inflation. To reach the objective "price stability", some of them pegged their currency to trusted ones whereas some others tried to float theirs. That situation was viewed by some economists as the end of the "middle solution". Belief for the bipolar solutions suggested that countries should choose either a hard peg or a full float to achieve a stable exchange rate regime and price stability. The problem of the "unwillingness for a floating currency" appeared strong enough in that era. Although Obstfeld and Rogoff (1995) observed widespread floating exchange rates and the abolition of capital controls on the international capital mobility in the middle of the 1990s, recent studies have mentioned a phenomenon labeled as the fear of floating, in which some officially free floater countries strongly intervene to moderate the fluctuations in the exchange rate (see Calvo and Reinhart (2002), Reinhart (2000), Fischer (2001) and Levy-Yeyati and Sturzenegger (2002)). As a depreciation may lead to inflation, this phenomenon is confusing even in economies that have low exchange rate pass-throughs. However, developing countries may witness a greater effect on inflation than developed countries due to exchange rate fluctuations. Countries that have witnessed high inflation in the past have concerns about the effects of large currency swings on domestic inflation. Goldfajn and Olivares (2001) called this the "fear of inflation". When monetary policy has low credibility, sudden exchange rate depreciation may lead to an increase in inflation through an exchange rate pass-through. The monetary authorities may raise the interest rates to overcome this inflationary pressure, and this would thus cause an increase in the volatility of interest rates in developing countries. Inflationary pressures can be controlled with an increase in interest rates, but the real and financial sector may be affected negatively. Consequently, the fear of inflation in company with the fear of floating could create additional problems in emerging countries (Goldfajn and Olivares 2001).

As carefully documented by Calvo and Reinhart (2002), economies characterized by this "fear of floating" not only exhibit mild exchange rate fluctuations but also evidence high

reserve and interest rate volatility. As an example of their findings, consider the United States and Japan as a benchmark for "true floaters". According to their results, the probability that the monthly variation of the nominal exchange rate falls within a plus/minus 2.5% band in these countries is 0.587 and 0.612, respectively. Contrary to what one would expect, for a sample of 10 emerging economies officially classified as "free floaters", this probability rises, on average, to 0.764. If we now consider nominal interest rates, the probability that their monthly variation falls within a plus/minus 25 basis points band for the benchmark floaters is 0.597 and 0.679, respectively, while this same figure for the selected EMEs falls to 0.294.

These findings provide strong evidence in favor of the existence of active interest rate shifts aimed at smoothing exchange rate fluctuations in many countries that officially hold a flexible regime. In fact, these conclusions are reinforced by the presence of a positive correlation between the exchange rate and domestic interest rates. Presented with this evidence, a natural question is why. Castro (2006) lists these reasons as follows: (1) lack of credibility, (2) pass-through considerations and (3) a contractionary depreciation.

There are a number of studies on the relationship between the fears of floating and inflation targeting issues. However, there stands no sign of full agreement; some studies have specifically concentrated on the "fear of floating versus the fear of inflation", especially for certain types of countries (countries with high or extreme inflation experience in the past). In this context, three papers by R.P. Nogueira, a well-known author, are notable. For instance, Nogueira and Leon-Ledesma's (2009) paper is about whether inflation targeting influenced the authorities' decisions on exchange rate regimes. In other words, was that the fear of floating or the fear of inflation? They chose a breakpoint in the time series to divide it into two parts that resemble before and after inflation targeting (IT). Using a dynamic inflation model, they reached three main conclusions: there was a dramatic decrease in the exchange rate pass-through after the adoption of IT; the central bank reacted to the exchange rate even after the IT; and the main reaction tool of the central bank to the exchange rate shifted almost completely from international reserves to the interest rate. The outcome was interpreted as Brazil's main concern having been not the fear of floating but the fear of inflation.

In the paper related to Brazil, Mexico and South Korea, Nogueira (2009) searched for whether there has been a change in monetary policy after the adoption of IT for the three countries. Three findings that the study implies are increased exchange rate variability after the adoption of the IT, decreased (at least for most) central bank intervention and stronger and more persistent monetary policy in response to inflationary shocks. The main conclusion is that the primary problem was the fear of inflation, not the fear of floating, for a second time.

In the third paper we mention, Nogueira (2011) demonstrates that after adoption of inflation targeting, many countries addressing high inflation rates have become able to decrease the level of exchange rate pass-throughs. However, the variation level of the exchange rate has increased dramatically, and central banks have continued intervening, which means central banks' interventions simply resemble a reaction to exchange rate movements to bring domestic inflation under control, which is affected by the exchange rate movements.

As is well known in the literature, developed countries exhibit a lower level of exchange rate

pass-through than developing ones, and the relationship between high inflation rates and high exchange rate pass-through levels is well proven. The main problem with the fear of floating, therefore, can be related to the fear of inflation. Just like many other emerging markets, Turkey went through a high inflation period during the 1980s and 1990s. Different economic programs were put in practice but until the new policy in 2002, inflation rates remained high. Implicit inflation targeting brought not only lower inflation levels but also trust in the economic policy executives. However, the Central Bank of the Republic of Turkey's (CBRT) market interventions continued. Considering that the exchange rate regime in Turkey was a freely floating regime, the ultimate question could be asserted as "Did the CBRT's market interventions specifically after 2002 aim to lower fluctuations in the market or to contain inflation?" To analytically answer this question, it is going to be fairly useful to summarize Turkish central banking and policy regime changes during the 1990s and at the beginning of the 2000s.

3. Some Facts to Understand Turkish Monetary Policy

The 1990s were transition years in the direction of establishing a modern central banking system in Turkey. In 1990, for the first time, the CBRT's monetary policy program was announced to the public, through which the CBRT aimed at providing liquidity requirements of markets without disturbing the stability of exchange rates and interest rates. However, the combined effect of the Gulf War in 1991 and existing problems such as pressure on the financial sector, political instability and the fragile structure of the banking sector caused the emergence of a financial crisis in the first quarter of 1994. As a result of the crisis, the inflation rate reached triple digits, and real GDP declined by 6.2% in 1994.

The financing of the public debt by Central Bank sources has been one of the main reasons for high inflation for many years in Turkey. In addition, this primitive method of financing limits the options of the central bank's monetary policy. Thus, financing the public debt by Central Bank sources was restricted with some changes in the Central Bank Law on April 21, 1994. Then, with a protocol between the Central Bank and the Treasury in 1997, the use of short-term credit of the Treasury's from the Central Bank was completely prohibited in 1998. During the period between 1994 and 1999, the CBRT focused on providing stability in the markets by aiming to reduce fluctuations in exchange rates and to prevent speculative movements in the exchange rate market rather than on decreasing the inflation rate. Despite all of these policies and structural arrangements, the effects of the Asian and the Russian crises in 1997 and 1998, respectively, together with the general elections and the earthquake in 1999, led to a deterioration of the fiscal balance and financial and political stability in the country. Due to these negative economic conditions, a 'monitoring agreement' was signed with the IMF in July 1998 and subsequently, also conducting a Stand By agreement, a new stabilization program, which is also known as the three-year program, was introduced at the end of 1999.

This program, which began to be implemented at the beginning of 2000, was an exchange rate based stabilization program, which adopted a crawling peg exchange rate regime. To reduce inflation, the use of the exchange rate as a nominal anchor was declared by the CBRT.

Initially, the program was successful and resulted in significant declines in the inflation rate and interest rates. The inflation rate decreased to its lowest level in the last 14 years. However because the structural changes expected by this economic program could not be performed at the desired level and due to some political problems, there emerged again a loss of confidence in the economy in the second half of the year. Increases in interest rates further triggered a loss of confidence in the financial markets and led to an increase in liquidity needs in financial markets. In particular, the banks, which had government securities, had to exchange these government securities with short-term investment instruments. This situation caused a significant deterioration in the financial positions of many banks. Therefore, these factors jointly created a more fragile banking system, and subsequently, a crisis occurred in November 2000. Structural problems that could not be resolved, political instability and speculative attacks against the Turkish lira further deepened the financial and economic crisis in Turkey. Consequently, the exchange rate-based stabilization program was abandoned by the CBRT, and the floating exchange rate regime was adopted instead on February 22, 2001.

The 2001 crisis in Turkey is consistent with the concept that is known as the ‘impossible trinity’ in the economic literature. According to the concept of the ‘impossible trinity’, a country cannot have a market with a fixed exchange rate and an independent monetary policy and also free capital movement at the same time. In the crisis of 2001, Turkey as a country with free capital movement had to make a choice between an independent monetary policy and a fixed exchange rate regime.

The 2001 crisis was a major milestone with regards to issues about the structure of the CBRT and the struggle against high inflation. After the crisis, the banking system, to ensure financial stability, was restructured, and in addition, new arrangements in the CBRT law were approved in May 2001. According to the new CBRT law, the main goal of the CBRT was clearly identified as achieving and maintaining price stability. However, the CBRT can support the growth and employment policies of the government, as long as there is not any inconsistency between the policies and the CBRT's objective of maintaining price stability. In addition, the monetary policies and policy instruments would be determined by the CBRT. Monetary policy transparency and accountability of the CBRT are other important issues in the law. To prevent credit usage by the CBRT for financing public debt, Central Bank lending to the Treasury and other public institutions and organizations, and also to purchase debt instruments issued by these organizations in the primary market were prohibited.

In the post-crisis period, an important arrangement made with the ‘Transition to Strong Economy’ program created significant changes in terms of implementation of monetary policies. In 2002, an inflation-targeting regime that employed an inflation target and monetary targets as the nominal anchor was adopted. However, as the necessary pre-conditions for the implementation of the inflation-targeting regime did not occur exactly during this period and also the banking rescue program increased significantly the public debt, transition to a full-fledged inflation-targeting regime was postponed until 2006. During the 2002-2006 period, Turkey implemented an ‘implicit inflation-targeting’ regime.

During this period, the technical and institutional infrastructure of the Central Bank was

strengthened. To achieve modern central bank implementations, a number of new units were established within the CBRT, and some of the existing units were restructured. To increase the effectiveness of monetary policy and the predictability of policy decisions, the Monetary Policy Committee began to declare their meeting dates in advance in 2005. In addition, to eliminate problems caused by high-denominated money, six zeros were dropped from the Turkish lira on January 1, 2005.

In the course of this transformation process, the transition to an inflation-targeting regime was made possible only in 2006. The short-term interest rate was determined as the main policy tool of the CBRT within the framework of this system. According to the new policy, the Monetary Policy Committee would meet once a month and determine interest rates by considering the inflation target. In addition, due to the principles of transparency and accountability, the agreed decisions during the meeting and inflation reports were to be announced to the public through the media and the internet.

After the crisis period starting with implicit inflation-targeting and followed by full-fledged inflation targeting regime, there occurred significant improvements in economic conditions. Since the 1990s, for the first time, the inflation rate dropped to the single digits from the two-digit level. Despite tight fiscal policy, realized economic growth rates were quite high, and the economic trend was positive until the 2008 global financial crisis. Although the growth rate declined sharply and inflation rate departed from target in 2008 and 2009, the Turkish economy reached high growth rates after the crisis, 9.2% and 8.5% in 2010 and 2011, respectively. Although the targeted inflation rates were not completely realized, they remained stable and decreased from the two-digit to one-digit level after inflation-targeting. As a result, it can be remarked that the CBRT could almost reach the inflation targets except for during the crisis periods.

Table 1. Inflation Targets and Actual Inflation Rates After IT

Year	Inflation Target (%)	Actual Inflation (%)
2002	35	29.7
2003	20	18.4
2004	12	9.3
2005	8	7.7
2006	5	9.7
2007	4	8.4
2008	4	10.1
2009	7.5	6.5
2010	6.5	6.4
2011	5.5	10.4
2012	5	6.2
2013	5	8.2
2014	5	7.5
2015	5	-

Source: CBRT web site

4. Analytical Framework

To distinguish the behaviors of dirty floaters from free floaters is not so easy under inflation targeting (IT) regimes. Central banks may utilize interest rates to offset the fluctuations in exchange rates under the IT regime. Because a country may respond to exchange rate fluctuations for reasons of inflation under the IT regime, these interventions should not be considered as a fear of floating at any time. As a result, a country adopting IT may appear to be fear of floater as argued by Agenor (2002), Ball and Reyes (2004 and 2008), Eichengreen (2004), Fischer (2001), Mishkin (2004) and Reyes (2007). Nevertheless, Ball and Reyes (2004 and 2008) argued that the IT regime is classified as a flexible exchange rate regime, so it requires changes occasionally in the interest rate for exchange rate reasons. According to the authors, the fear of floaters may lie behind the IT regime to mask their true intentions because of this reason. Nogueira and Leon-Ledesma (2009) suggested that the reasons to fear of floating exchange rates may be the existence of a large debt in foreign currency, high exchange rate pass-through (ERPT), and adverse effects on competitiveness and balance sheet effects for a country. According to Eichengreen (2004), another reason is that exchange rate flexibility may increase uncertainty and reduce the access of the emerging economies to the international financial markets.

The high ERPT may be seen as the most important reason for exchange rate arrangements in an IT country. However, there is not any contradiction between the exchange rate interventions and inflation aim of central banks in the presence of a high ERPT because the high ERPT causes the high inflation. In this situation, the behaviors of central banks should not be assessed as fear of floating. Otherwise, in the presence of a low ERPT, to understand whether the central banks exhibit the fear of floating is not difficult under an IT regime, and the interventions of central banks in the exchange rate may be interpreted as fear of floating.

Ball and Reyes (2008) emphasize that the basic Taylor rule for a strict IT regime must be modified for an open economy to explain the relationship between the ERPT and the central bank's reaction to exchange rate movements because pass-through from exchange rate movements to traded goods prices creates an ineluctable relationship between inflation and exchange rates. However, in order to explain relationship between the ERPT and central bank reaction to exchange rate movements, we modify the central bank's reaction function following Ball and Reyes (2004), Reyes (2007) and Nogueira and Leon-Ledesma (2009).

First, we begin by describing the general price level, which is a component of traded and non-traded goods prices in an open economy:

$$P = P_H^{\alpha} P_T^{(1-\alpha)} \tag{1}$$

where P is the price level, P_H is the home sector or non-traded good prices, P_T is the traded good prices, and α and $(1-\alpha)$ denote the proportion of traded and non-traded goods, respectively. α is bounded between zero and unit. The equation (1) can be expressed in

terms of inflation:

$$\pi = \alpha\pi_H + (1-\alpha)\pi_H \tag{2}$$

where π denotes the CPI inflation, and assuming zero foreign inflation, we can rewrite equation (2) as

$$\pi = \alpha\pi_H + (1-\alpha)\pi_H \tag{3}$$

where Δe is the change in exchange rate, and the second term of equation (3) demonstrates the effect of exchange rate depreciations on CPI inflation. We can now examine the effect of exchange rate movements on inflation.

$$i_t = i^* + \pi_t + \lambda(\pi_t - \pi^*) + \beta(y_t - y^*) \tag{4}$$

Equation (4) represents the basic Taylor rule that presents the response of the central bank to deviations of inflation and the output gap. i_t denotes the nominal interest rate, i^* is the world interest rate. π_t and y_t are current inflation and output, respectively while π^* and y^* denote inflation target and long-run equilibrium output. Substituting (3) in (4) and rearranging yields

$$i_t = i^* + \pi_t + \lambda\left[\left(\alpha\pi_{t,H} + (1-\alpha)\Delta e_t\right) - \pi^*\right] + \beta(y_t - y^*) \tag{5}$$

Equation (5) means that the exchange rate also enters directly in an IT regime in terms of the Taylor rule. Therefore, the central bank should respond to exchange rate movements by changing the nominal interest rate to struggle against possible deviations from the inflation target caused by changes to the exchange rate as it affects inflation. The terms $(1-\alpha)\Delta e_t$ can be shown as the ERPT effect. A higher ERPT will cause larger changes in the interest rate against exchange rate movements. Because our purpose is only to demonstrate whether the CBRT exhibits fear of floating under an IT regime, we can maintain our analysis to look for evidence regarding fear of floating only in the presence of a low ERPT after the IT regime. Otherwise, we cannot explain fully the reason why the Central Bank reacts to exchange rate movements in the presence of a high ERPT. We will also employ the modified Central Bank's reaction function in terms of the Taylor rule to clarify the response of the policy instrument to inflation and exchange rates in the following sections.

4.1 Methodology and Data

To compare results with the deeply discussed Brazil example in the literature, we employed the methodology suggested by Nogueria and Leon-Ladesma (2009). We utilize a dynamic inflation model in the line of those of Gagnon and Ihrig (2004) and Choudhri and Hakura (2006) to estimate ERPT before and after the regime change. We then use a structural VAR model to test for the reaction of international reserves and interest rates to changes in the exchange rate to demonstrate how the IT has affected the foreign exchange market intervention suggested in the FF literature. The structural VAR model allows us to isolate primitive shocks to the exchange rate and inflation and, thus, analyze the response of monetary policy to inflation and exchange rate shocks before and after IT. We also compare our results with those obtained from applying the methodologies developed by Calvo and Reinhart (2002) and Ball and Reyes (2004, 2008) to distinguish "true-floaters" from "dirty-floaters" (Nogueria and Leon-Ladesma 2009).

We employed monthly data that span from 1994M1 to 2012M12 for Turkey. The same data were employed for all three different estimation methods conducted in this paper. The estimation period was separated into two sub-periods, that is, before and after the IT regime in Turkey. Although a full-fledged inflation targeting regime was first implemented in 2006, the second estimation period began from 2002M1[1]. The exchange rate data are the change of the national currency per unit of exchange rate basket that includes 50% U.S. Dollar and 50% Euro. A negative variation means appreciation of the national currency, and a positive variation means depreciation of the national currency. All data were obtained from the Electronic Data Distribution System (EVDS) of the CBRT.

4.2 Estimating Long-run ERPT

Determining the degree of ERPT is highly important for emerging markets to analyze the concept of FF. The ERPT effect is expected to decrease significantly following the IT regime. To explain the ERPT effect and relationship between ERPT and the Central Bank's response to exchange rate shocks before and after the IT regime in Turkey, we follow Gagnon and Ihrig (2004), Choudhri and Hakura (2006), and Nogueira and Leon-Ledesma (2009), among others. We utilized the autoregressive distributed-lag (ARDL) model advocated by Banerjee et al. (1986) and further developed by Pesaran and Shin (1999) for a dynamic inflation model. The long-run ERPT coefficient can be easily computed employing the ARDL model. The form of the model equation is below:

$$\pi t = \beta_0 + \sum_{k=1}^{n} \beta_1 k \pi_{t-k} + \sum_{k=0}^{n} \beta_2 k \Delta y_{t-k} + \sum_{k=0}^{n} \beta_3 k \Delta e_{t-k} + \sum_{k=0}^{n} \beta_4 k \Delta imp_{t-k} + \varepsilon t \quad (6)$$

where π is the first difference of log of CPI, and Δy is the change of log of industrial

[1] The official date of adoption of the IT is 2006 M1; however, 'implicit inflation targeting' began in 2002 M1, and the floating exchange rate regime was adopted on February 22, 2001.

production index. We utilize the industrial production index as a proxy variable instead of real GDP growth rate. Δimp is the change of log of import price index, Δe is the change of log of exchange rate basket which includes 50% dollar and 50% euro and ε is a stochastic error term with the classic properties. We also have two additional variables that will be used in the later part of this paper. These variables are *R* and *i*, which represent the reserve position of the CBRT and short-run interest rate, respectively. According to ADF unit root tests, all variables are non-stationary for periods before and after the adoption of the IT. Therefore, all variables were used in first-differences[2].

The results of the OLS estimates of the long-run ERPT are presented in Table 3. Table 3 also includes some diagnostic checks, Breusch-Godfrey, ARCH and RESET tests. All coefficients are significant and diagnostic checks are consistent. The coefficients mean long-run ERPT multipliers for Turkey. It can be seen that the ERPT was at a very high level before the adoption of the IT, and it declined to 0.11 from 0.83 after the adoption of the IT in Turkey. This large decline was most likely realized thanks to the large difference in inflation rates between before and after the adoption of the IT. Furthermore, the fixed exchange rate regime (dollar-pegged) and unstable inflation rate can be seen as other reasons for the high ERPT in Turkey before the adoption of the IT.

Table 3. Long Run Exchange Rate Pass Through Estimates

	Before IT	Probability	After IT	Probability
∑Δe	0.8396	0.02	0.1113	0.01
Mean of dependent variable	0.5321		0.1214	
Log. Likelihood	234.54		421.34	
Adj R^2	0.98		0.94	
Breusch-Godfrey	0.5438 (1)*	0.4642	1.5411 (2)*	0.2188
ARCH	1.1639 (2)*	0.5588	1.8240 (2)*	0.4017
RESET	0.8026 (4)*	0.5296	0.5045 (2)*	0.6052

Note: * indicates lag length

Gagnon and Ihrig (2004), Choudhri and Hakura (2006), Reyes (2007) and Nogueira and Leon-Ledesma (2009) argued that it is possible to correlate declining ERPT effect with changes in monetary policy and the exchange rate regime after the IT regime. In this sense, the results are consistent with the existing literature. The ERPT have high correlation with inflation movements in Turkey before and after the IT regime. Therefore, the results suggest that the interventions in exchange rates should be less in the period after the adoption of the IT because there is a low ERPT in Turkey.

4.3 Fear of Floating and Inflation Targeting

Calvo and Reinhart (2002), (hereafter C&R), argued that many exchange rate regimes that

[2] The unit root tests are available upon request.

claim to float actually intervene in exchange rates to prevent fluctuations of currencies. To distinguish the free-floaters from dirty-floaters that claim to follow a floating exchange rate regime but actually utilize interest rates frequently to intervene in the currency, authors compared the variability of exchange rate, international reserves and interest rates for countries with a floating exchange rate regime by designing a test that is based on the probabilities of monthly percentage changes for these variables. According to C&R, the countries that follow the floating exchange rate regime but exhibit fear of floating will have less variability of their exchange rate while they have more variability of the interest rates and international reserves. To measure the degree of the variability, authors determined some thresholds within a certain range for exchange rates, international reserves and interest rates.

The ranges determined as arbitrary are $\pm 2.5\%$ changes in exchange rates and international reserves and ± 50 basis points change in interest rates. The proposed test can be formalized as follows:

$$P[|\Delta e| < x|Peg] > P[|\Delta e| < x|Float] \tag{7}$$

$$P[|\Delta R| < x|Peg] < P[|\Delta R| < x|Float] \tag{8}$$

$$P[|\Delta i| < y|Peg] < P[|\Delta i| < y|Float] \tag{9}$$

where x and y are the thresholds that are equal to 2.5% and 50 basis points, respectively, and Δe is the change in exchange rate, ΔR is the change in international reserves, and Δi is the change in nominal interest rates.

The logic underlying C&R's analysis is that the variability of exchange rates should be higher under the floating exchange rate regime, while it is expected to be low under the fixed exchange rate regime. The reason behind these expectations is that the central banks should intervene in the currency to prevent the exchange rate from floating. In other words, central banks do not allow the variability of exchange rates under the fixed exchange rate regime. Therefore, for a floating exchange rate regime, the variability in exchange rates should be higher than under the fixed exchange rate regime. The opposite results should hold for international reserves and interest rates, so the variability in international reserves and interest rates should be low under the floating exchange rate regime, while it should be high under the fixed exchange rate regime. Fear of floaters should be at the point between the fixed and the floating exchange rate regime. Their interest rates and international reserve variation should be higher than free floaters and less than countries that adopt the fixed exchange rate regime, while they display higher exchange rate variations than fixers, but less than floaters.

According to Ball and Reyes (2004, 2008), (hereafter B&R), the problem with C&R's analysis is that it does not distinguish between a credible IT regime, a fixed exchange rate regime and fear of floating. Their analysis assumes that credible IT is equivalent to a fixed

exchange rate regime and fear of floating. Therefore, B&R suggested some modifications to C&R's approach. First, they classified the fear of floating as a different exchange rate regime from IT and the fixed exchange rate regime. Second, they used the standard deviations of each series as a threshold, instead of ranges that were determined arbitrarily by C&R. This modification takes into account the country differences. The third modification is utilizing the real interest rate instead of the nominal interest rate. Finally, the variability of inflation was included in the analysis to analyze whether credible IT and fear of floating are different regimes. B&R's modified approach is formalized as follows:

$$P[|\Delta e| > sd|FF] < P[|\Delta e| > sd|IT] \tag{10}$$

$$P[|\pi| > sd|FF] > P[|\pi| > sd|IT] \tag{11}$$

$$P[|\Delta R| > sd|FF] > P[|\Delta R| > sd|IT] \tag{12}$$

$$P[|\Delta r| > sd|FF] > P[|\Delta r| > sd|IT] \tag{13}$$

where *sd* is the standard deviation of each series, *r* is the real interest rate, *R* is the net international reserves and *FF* denotes the Fear of Floating. The equation (10) expresses that the variability in exchange rate will be higher under the IT than FF. That is, because countries that exhibit FF will intervene to offset changes in exchange rate while IT implies less frequent intervention. Equations (11) and (12) express that we should expect to see less variability in inflation and international reserves under IT than FF. Under the IT regime, the main aim of central banks is to keep inflation stable and close to its target. Additionally, as the international reserves are not employed frequently as policy instrument, the variability in the international reserves should be less under IT, while the FF regime utilizes the international reserves to offset changes in the exchange rate. Expression (13) expresses that the variability in the interest rate should be more under FF than the IT regime. The countries that claim to adopt the IT regime should not respond to fluctuations in exchange rates, and they only focus on the inflation target in theory.

$$P[|\pi| > sd||\Delta r| < sd|IT] > P[|\Delta e| > sd||\Delta r| > sd|IT] \tag{14}$$

$$P[|\pi| > sd||\Delta R| < sd|IT] > P[|\Delta e| > sd||\Delta R| > sd|IT] \tag{15}$$

Equations (14) and (15) express that the changes in the interest rates and international reserves are more related to changes in inflation rather than to exchange rates under the IT regime. In the other words, the policy instruments respond more to the changes in inflation than to exchange rates in a country adopting the IT regime.

The probabilities that a given variable falls within a predetermined threshold band are reported in Table 4 ($\pm 2.5\%$ changes for exchange rate and international reserves and ± 50

basis points for interest rate). The lower probabilities mean that the variation in the variables is higher; opposite results hold for higher probabilities in C&R's FF analysis. Therefore, the results demonstrate that the variation or flexibility in exchange rates increased (from 84% to 31%) while the variation in interest rate decreased (from 30% to 59%) after the adoption of IT. The evidence for international reserves is not clear enough to say that the variability in international reserves changed significantly. There is a small change in probabilities of international reserves from 51% to 44% after the adoption of IT but in the opposite direction from expected results. The results of C&R's FF analysis demonstrate that the higher exchange rate flexibility and the lower variation in interest rate corresponds to the situation expected in the literature after the adoption of IT.

Table 4. C&R Analysis

Before IT		After IT	
Variable	Probability	Variable	Probability
Δe	0.84	Δe	0.31
ΔR	0.51	ΔR	0.44
Δi	0.30	Δi	0.59

Note: The numbers are the probabilities of changes confined within the bounds presented in equations (7) to (9).

The results of B&R's FF analysis are reported in Table 5. The higher probabilities mean that the variation in the variables is higher; opposite results hold for lower probabilities in B&R's FF analysis. The results are not as clear as the results of C&R's FF analysis. While the variation in exchange rates should be higher after the adoption of IT, it has a lower probability, which means a lower variation in exchange rates after the adoption of IT. Therefore, we cannot say that the interventions in exchange rates are less than in the period before the adoption of IT, as in the results of C&R's FF analysis. According to B&R's FF analysis, the variation in the international reserves, inflation and interest rate should be less after the adoption of IT. However, the evidence regarding the international reserves and inflation are different from the expected results. The probabilities increase from 21% to 23% and from 73% to 79% for the international reserves and inflation, respectively, after the adoption of IT. It is not realistic to say that the international reserves and inflation have less volatility in the period after the adoption of IT. Finally, although there is a little change in the periods before and after IT, the variation in the interest rate is lower after the adoption of IT. Consequently, the results demonstrate that the international reserves are employed more as a policy instrument while the interest rate is utilized less after the adoption of IT.

Table 5. B&R Analysis

Before IT		After IT	
Variable	Probability	Variable	Probability
Δe	0.24	Δe	0.14
ΔR	0.21	ΔR	0.23
π	0.73	π	0.79
Δi	0.18	Δi	0.17

Note: The numbers are the probabilities of changes exceed the bounds presented in equations (10) to (13).

Table 6. B&R Analysis for Policy Response

Policy Instrument:Δi		*Policy Instrument:* Δn	
Variable	Probability	Variable	Probability
π	0.35	π	0.32
Δe	0.13	Δe	0.30

Note: The numbers are the probabilities of changes exceed the bounds presented in equations (14) and (15).

Table 6 presents the results of B&R's analysis for the response of monetary policy instruments. Under the IT regime, the monetary policy instruments should respond more to inflation than to exchange rates because the main aim of central banks is price stability. The results of the analysis are consistent with the expected results. The interest rate and the international reserves respond more to inflation than to the exchange rate. The probabilities of response of the interest rate to inflation and the exchange rate are 35% and 13% while the probabilities of response of the international reserves to the inflation and the exchange rate are 32% and 30%, respectively. Although the results of B&R's first analysis are not clear, the results of the second analysis present more precise evidence to assess the behavior of FF in Turkey.

4.4 Fear of Floating or Fear of Inflation?

To further investigate whether Turkey exhibits fear of floating, we conducted a structural VAR analysis that looks how the interest rate and the international reserves respond to the changes in exchange rate and the inflation rate prior to and after IT. We follow again Nogueira and Leon-Ledesma (2009) for this section. The same data and periods were employed as in the previous sections[3]. The form of the VAR model is below:

$$Y_t = \alpha + \sum_{i=1}^{n} \beta_i Y_{t-1} + \mu_t \tag{6}$$

where Y_t is a vector of k endogenous variables, α is a vector constant, β_i are $k \times k$ matrices of coefficients, and μ_t is a $k \times 1$ vector of white noise processes. The order of variables is as follows:

$$\Delta imp \rightarrow \Delta y \rightarrow \Delta e \rightarrow \pi \rightarrow \Delta n \rightarrow i$$

In this section, we expect to see that the variance in inflation is explained more by the variance of interest rates and international reserves rather than the variance in exchange rates, and in addition, the monetary policy instruments, the interest rate and the international reserves should respond more to one-standard deviation shocks in inflation than to exchange rate shocks after adopting the IT regime. Our variance decomposition results are presented in

[3] See again Table 1 for the ADF unit root tests and the number of lags of the VAR model, which were determined utilizing the Akaike Information Criteria (AIC) and the Schwarz Information Criteria (SIC).

Table 7 for the period before IT and in Table 8 for the period after IT. The results demonstrate that the explained variance of international reserves by the variance of exchange rates decreased significantly after 12 months from 33% to 2% after IT, and from 20% to 2% after 18 months. The variance of inflation at the end of the 18 months after IT explains 2% of the variance of international reserves, while it is 9% before IT. When we look at the variance of the interest rate explained by exchange rates and inflation, it can be observed that the part of the variance of the interest rate explained by the variance of the inflation has increased substantially from 4% to 55% after IT, whereas the variance of the exchange rate decreases from 22% to 7%.

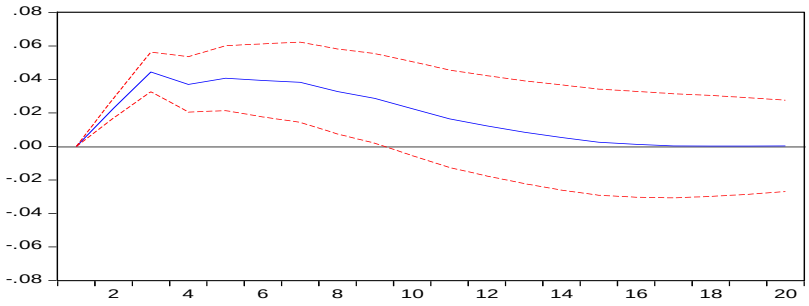
Table 7. Variance Decomposition Before Inflation Targeting

RESERVES			INTEREST RATE		
Period	Exchange Rate	Inflation	Period	Exchange Rate	Inflation
1	3.378135	1.199511	1	14.78853	1.674957
6	30.87021	4.918733	6	17.35905	4.230439
12	33.34171	3.204694	12	23.03517	4.994493
18	20.65653	9.397023	18	22.19889	4.502064

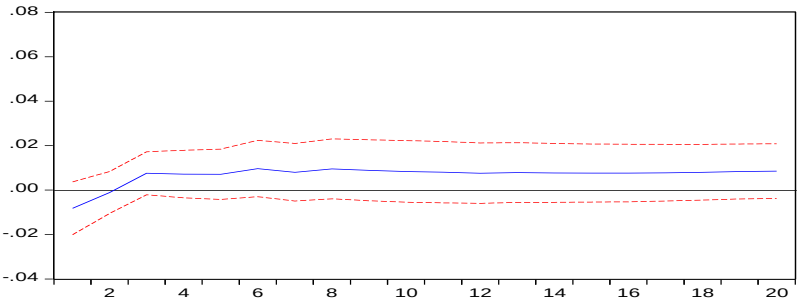
Table 8. Variance Decomposition After Inflation Targeting

RESERVES			INTEREST RATE		
Period	Exchange Rate	Inflation	Period	Exchange Rate	Inflation
1	4.296851	0.000000	1	0.865336	30.08764
6	1.576049	1.911080	6	6.574932	42.21184
12	2.001904	1.951075	12	6.825529	46.17470
18	2.086015	1.815814	18	7.088658	54.97594

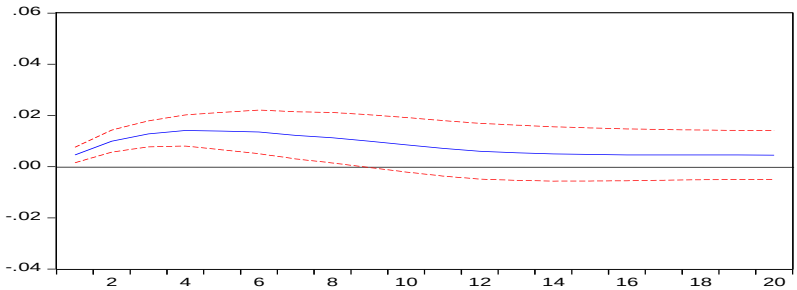
Figures 1 and 2 present the impulse response functions of the variables before and after the IT regime, respectively. The results demonstrate that the interest rate responds positively to a shock in inflation in both periods, but the response is stronger and more persistent in the period after the adoption of IT. The response of the international reserves to inflation is quite low, but it is highly persistent and remains at the same level even after 20 months before the adoption of IT, whereas the response, as expected, appears weak and insignificant in the periods after IT. Although the interest rate responds positively and persistently to exchange rate shocks before IT, after IT, the response of the interest rate is unexpectedly stronger compared to the first period. Finally, the response of the international reserves to exchange rate shocks exhibits the same patterns as does the inflation shocks.



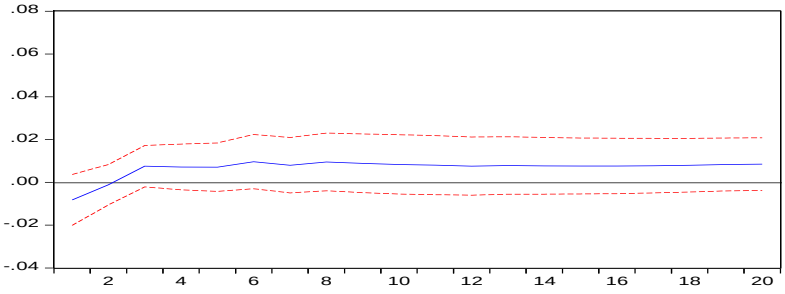
Response of reserves to inflation



Response of interest rate to exchange rate

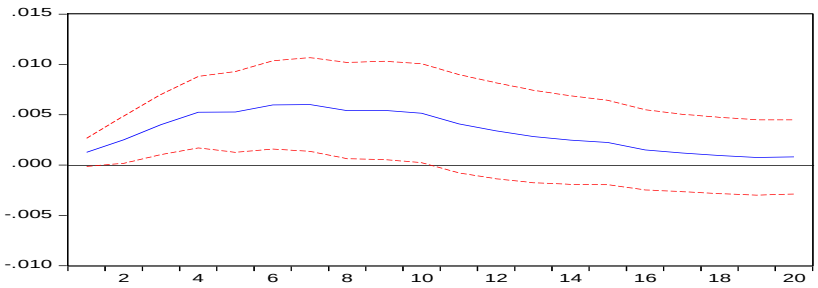


Response of reserves to exchange rate

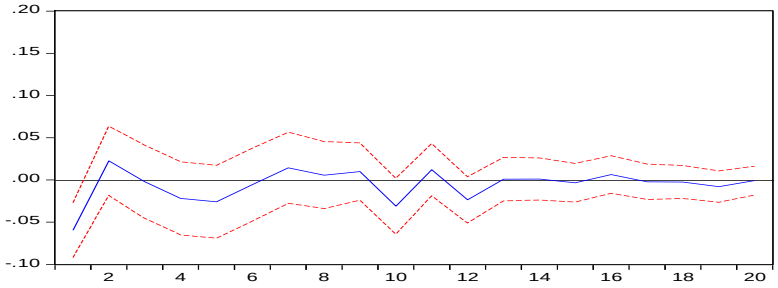


Response of interest rate to inflation

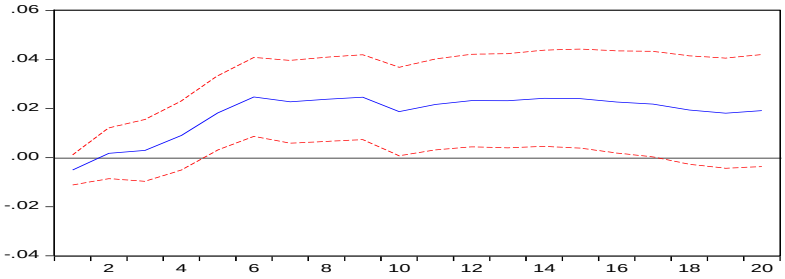
Figure 1. Impulse Responses Before Inflation Targeting Period



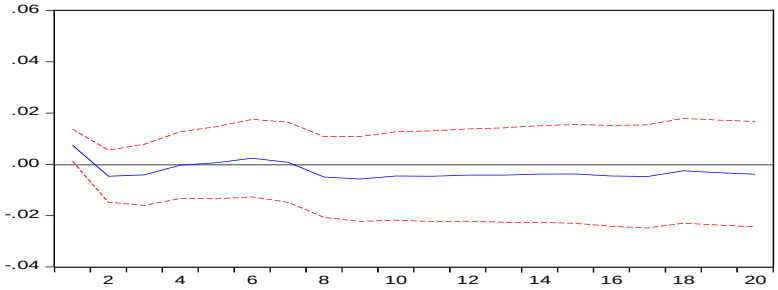
Response of reserves to inflation



Response of interest rate to exchange rate



Response of reserves to exchange rate



Response of interest rate to inflation

Figure 2. Impulse Responses For After Inflation Targeting Period

The results of the impulse response functions are consistent with the variance decomposition analysis. In this section, results support that the international reserves are not used frequently to intervene to exchange rate and inflation in period after IT in Turkey as expected in theory. Interest rates strongly react to the changes in inflation by utilizing the nominal interest rate after IT. Under the IT regime, central banks should care only about inflation, and they should use the interest rate as a policy instrument even if some minor interventions on the exchange rate may be accepted. The results are highly consistent with the literature before and after the adoption of IT in Turkey, such that we can conclude that the CBRT does not exhibit the fear

of floating and it focuses only on controlling inflation.

5. Conclusion

Many emerging markets have adopted floating exchange rate regimes after currency crises. Turkey has experienced a floating regime since 2002 combined with inflation targeting. This paper examines the exchange rate pass-through in the transition to a low and stable inflation environment in Turkey before and after inflation targeting. Together with these developments, in recent years, the term "fear of floating" has been employed to describe exchange rate regimes that while officially flexible, in practice, intervene heavily to avoid sudden or large depreciations. However, the data reveal that in most cases (and increasingly in the 2000s), intervention has been aimed at limiting appreciations rather than depreciations.

In this paper, we have examined the monetary policy reaction to exchange rate movements and inflation shocks for Turkey between 1995 and 2012. In particular, we have investigated whether the CBRT exhibits an epidemic case of 'fear of floating', as claimed by Calvo and Reinhart (2002). Our analysis has compared the impact of exchange rate and monetary policy regime shift for the period before and after the adoption of the 'Implicit Inflation Targeting' regime in 2002. We applied three methodologies to clarify the monetary policy and exchange rate movements in Turkey. First, we estimated empirically the ERPT. Second, the methodologies suggested by Calvo and Reinhart (2002) and the modified version suggested by Ball and Reyes (2004, 2008) were applied. Finally, we conducted a structural VAR analysis to investigate more explicitly how the interest rate and the international reserves have responded to the changes in exchange rate and the inflation rate before and after IT.

The results demonstrate that the ERPT decreased significantly, to 83% from 11% after the adoption of IT. The results based on both methodologies suggested by C&R and B&R indicate that exchange rate flexibility increased after the adoption of IT. Moreover, according to the results of B&R's policy response analysis, the interest rate and international reserves respond more to inflation than to exchange rates under an IT regime. In our last analysis, obtained results suggest that the CBRT reacted mostly to inflation shocks rather than to the exchange rate and the interest rate was employed as the main monetary policy instrument after the adoption of IT.

The use of international reserves to intervene in exchange rate movements has decreased considerably, and thus, we can conclude that direct interventions in exchange rate movements by utilizing international reserves have decreased noticeably. Some direct and indirect intervention in the exchange rate may still be observed in Turkey. However, these interventions are mostly because of inflationary concerns, and we can interpret that the CBRT has more 'fear of inflation' than 'fear of floating'. As a result, our entire findings demonstrate that Turkey should not be perceived as a 'dirty floater', and this finding can be interpreted as the CBRT may react to the exchange rate as long as movements in exchange rates create detrimental effects on inflation.

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