



Munich Personal RePEc Archive

# **The Conduct of Monetary Policy in Turkey in the Pre- and Post-crisis Period of 2001 in Comparative Perspective: a Case for Central Bank Independence**

Alper, Emre and Hatipoglu, Ozan

Bogazici University, Center for Economics and Econometrics

January 2009

Online at <https://mpra.ub.uni-muenchen.de/18426/>

MPRA Paper No. 18426, posted 13 Dec 2009 12:56 UTC

# **The Conduct of Monetary Policy in Turkey in the pre-and post-crisis Period of 2001 in Comparative Perspective: A Case for Central Bank Independence<sup>\*</sup>**

**C. Emre Alper<sup>†</sup> and Ozan Hatipoglu<sup>††</sup>**

Department of Economics, Bogazici University

---

<sup>\*</sup> We are grateful to Oya Pinar Ardic, Burcay Erus, Refik Erzan, Ziya Onis and Fikret Senses for many helpful comments. We are also grateful for the financial support by TUBITAK project number 10K297. We thank Ayse Kabukcuoglu for able research assistance. Alper also acknowledges financial support from TUBA-GEBIP (Turkish Academy of Sciences -Young Scientists Scholarship Program). The usual disclaimer applies.

<sup>†</sup> Corresponding Author. Department of Economics. Natuk Birkan Hall. Bogazici University, Bebek, Istanbul, 34342, Turkey. Email: emre.alper@boun.edu.tr.

<sup>††</sup> Department of Economics. Natuk Birkan Hall. Bogazici University, Bebek, Istanbul, 34342, Turkey. Email: ozan.hatipoglu@boun.edu.tr.

## **Abstract**

We document the role of independence for Central Bank of Republic of Turkey (CBRT) as it matters to successful implementation of monetary policy. We compare the implementation of monetary policy pre- and post-crisis periods within an empirical framework which allows us to measure the role of independence quantitatively. We estimate a Taylor rule with time varying coefficients by employing a dual extended Kalman filter. We find that the coefficient of inflation gap has increased substantially since CBRT gained de-juro independence.

## 1. Introduction

Conducting monetary policy in an unstable macroeconomic environment characterized by a fairly dollarized economy, large and volatile capital flows due to weak macroeconomic fundamentals and rapidly changing global liquidity conditions has been a task faced by the Central Bank of the Republic of Turkey (CBRT) during the 1990s. This period featured chronic high inflation coupled with huge macroeconomic imbalances, and it ended with the twin financial crises of 2000 and 2001 and several legal reforms one of which lead to the instrumental independence of CBRT. In the post-crisis period CBRT has redefined its role and reverted to inflation targeting under stronger macroeconomic fundamentals and more favorable global liquidity conditions. The chronic high inflation fell to single digits. While the role of central bank and inflation-targeting regime in the post-crisis period in reducing inflation has been well researched, how much of this success owes to central bank independence remains largely unexplained. In this article, we will attempt to document the role of central bank independence as it matters to successful implementation of monetary policy by comparing the implementation of monetary policy pre- and post-crisis period and by providing an empirical framework which allows us to measure the role of independence quantitatively.

Based on the previous empirical works on Turkey, in terms of the challenges faced by the CBRT and the differences in the choice of monetary policy targets, one may actually divide the post-financial account liberalization period (1989-2008) into three sub-periods.

The pre-1999 macroeconomic instability period was characterized by high and chronic inflation, volatile real output growth performance due to dependence on short-term financial flows as a major source of external financing, weakly regulated banking sector, soft budget constraints and fragmented party system as well as populist cycles.<sup>1</sup> During this period CBRT was not an independent institution and monetary policy was subordinate to fiscal policy in an environment with high public sector borrowing requirement of the governments.

---

<sup>1</sup> For a detailed documentation of major developments in the Turkish economy in the post-financial account liberalization and pre-2000 period, see, among others, Alper and Onis (2003a, 2003b, 2004), Alper and Saglam (2001), Cizre-Sakallioğlu and Yeldan (2000), Ersel (1996) Ertugrul and Selcuk (2001), Kibritcioglu (2004), Onis (1998), and Onis and Rubin (2003).

The second sub-period is the 2000-2001 period in which the launching of the three-year stabilization program backed by the International Monetary Fund took place. During this period, the sole purpose of the monetary policy was to facilitate the three-year exchange rate based stabilization program that was launched at the beginning of 2000. The program ended abruptly as a result of the twin financial crises on November 2000 and February 2001.<sup>2</sup> In the immediate aftermath of the February 2001 crisis, the “Transition to Strong Economy Program” was launched which involved several reforms focusing on reducing uncertainties in the financial markets and restructuring the banking sector as well as switching to a flexible exchange regime. With the amendment of the Central Bank Law in April 2001, the CBRT was given the *de jure* (legal) instrument independence which enabled the central bank to set the monetary policy autonomously. The Monetary Policy Committee was also established in order to set the inflation target in cooperation with the government. The main goal of the CBRT was defined as maintaining price stability.

The post-crisis period has been characterized by stronger macro fundamentals, institutional reforms and a relatively conducive international global liquidity conditions following the monetary easing in the U.S. in the immediate aftermath of the September 11, 2001 attacks.

(Insert Table 1 here)

Table 1 depicts the evolution and the decomposition of the Turkish Public Sector Debt in the post-2001 period. Some key reflections on this table can be stated as follows: Following the financial crisis in February of 2001, the banking sector was restructured and troubled banks were taken over by the Savings Deposit Insurance Fund and since these were recapitalized through issuance of non-cash debt by the Treasury, the total public sector debt to GDP ratio climbed to the unprecedentedly high level of 74.13% by the end of 2001<sup>3</sup>. If one adds the foreign exchange indexed domestic debt to GDP to the external debt to GDP ratio, the figure would stand at

---

<sup>2</sup> See Alper (2001) for a brief account of the major developments during the first year of the stabilization program.

<sup>3</sup> The calculations are made using the new definition of the GDP which was released in 2008 by the Turkish Statistical Institute. When the previous definition of the Turkish GDP was used, the 2001 total public debt to GDP ratio figure stood well in excess of 90%.

41.37% of GDP in 2001 reflecting the exchange rate sensitive portion of the total public debt. While nominal yield bonds stood at 7.39% of the GDP, the inflation indexed real yield bonds stood at 25.37% of GDP in 2001 reflecting the inflation-averse attitude of the investors following two decades of chronic inflation. The public debt picture is much improved when we consider the final column of Table 1. The total public sector debt to GDP ratio has declined drastically and stood at 37.58% while the exchange rate sensitive portion of the debt was 11.73% by end-June 2008. While the total public sector debt to GDP ratio and the real yield bonds almost halved, the ratio of the nominal yield bonds to GDP almost doubled and now stands at 13.42% by 2008.

(Insert Figure 1 here)

Following the financial liberalization when the Turkish Lira was made fully convertible in August 1989, Turkey experienced mostly short-term inflows and real appreciation of domestic currency. The financial account openness period coincided with the high public sector borrowing requirement financed in part through seigniorage resulting in high and chronic inflation, and in part through debt issuance resulting in high *ex-ante* real interest rates. Seigniorage financing coupled with financial openness led the household sector to substitute domestic currency holdings with foreign ones, referred in the literature as dollarization. Public debt issuance form of financing coupled with financial openness led the banking sector to have open positions (borrowing in foreign currency and lending in domestic currency) in an environment of a real appreciated currency and high real interest rates. As can be observed from Figure 1 however, a reverse currency substitution took place and the ratio of foreign exchange deposits to the broad definition of money supply declined monotonically from an average of 88% for the 1995-2001 period to 45% as of end-September 2008.

(Insert Figure 2 here)

Arguably, the improvements in macro fundamentals such as the significant reduction in the public debt to GDP ratio and inflation rates as well as the reverse currency substitution could have been a statistical artifact due to the favorable environment in global liquidity conditions in the post-September 2001 financial easing period, or in other words, a result of good luck rather

than good policy.<sup>4</sup> As can be observed from Figure 2, excluding the subprime crisis episode of the late 2008, the average emerging market sovereign bond spread as well as the Turkish sovereign bond spreads declined almost monotonically in the post-2001 period. The average emerging market bond spread which gives information on cost of borrowing i.e., how much of a risk premium an average emerging market treasury needs to pay over and above the U.S. Treasury while issuing a Eurobond denominated in USD with comparable maturity, stood at 820 basis points (8.20%) during the 1998-2001 period while the same spread was 380 basis points (3.80%) during the January 2002-October 2008 period. Some part of this reduction in cost of borrowing may be due to institutional reforms and better policies in the emerging market economies, however, an increase in the risk-appetite of the global financial investors in an environment of financial easing and hence reduced yields in developed economies could have been the driving force. Figure 2 also underlines that the Turkish experience of a nearly sustained increase in financial inflows and reduction in the cost of borrowing is not a unique experience during the 2002-2008 period. Moreover it is possible to see the relative Turkish performance by analyzing the plot of the average emerging market economy bond spread less the Turkish spread.

(Insert Figure 3 here)

Figure 3 depicts that surprisingly Turkish Treasury was actually able to borrow cheaper than the average emerging market economy during the 1998-2001 period (exactly 272 basis points or 2.72% cheaper) while during the 2002-2008 period Turkish cost of borrowing is almost identical to the emerging market average.<sup>5</sup> This surprising result can be explained in two different ways. Either the sovereign bond market participants did not price the Turkish risk premium during the 1998-2000 period correctly, or an average emerging market economy fared better than Turkey in

---

<sup>4</sup> Observed increase in capital inflows in the post-2002 period led to appreciation of the domestic currency both in nominal and in real terms in a floating exchange rate regime. Nominal appreciation contributed to the improvement of Turkish macroeconomic fundamentals on a number of fronts: the value of foreign exchange linked domestic debt and external debt declined in terms of domestic currency (debt sustainability); the value of foreign deposits expressed in domestic currency declined in value relative to domestic deposits (de-dollarization); the price of imported goods in the basket of consumer goods comprising the consumer price index (lower inflation).

<sup>5</sup> There are 2 spikes of importance that caused higher spreads on Turkish Eurobonds during the 2002-2008 period: the first is the deterioration in health condition of PM Ecevit in 2002 and the resulting uncertainty in the political arena. The second spike is the rejection by the Turkish Parliament to allow U.S. troops to use Turkish bases for a military attack on Iraq in March 2003. Excluding those two episodes will actually reduce the spreads of the Turkish Eurobonds.

the 2002-2008 period. In any case, the above results suggest that the improvement in macroeconomic imbalances occurred in the face of deteriorating borrowing conditions for Turkey, suggesting that the role of monetary policy has been rather instrumental. Therefore, rather than scrutinizing the Turkish case in a comparative way to other emerging market economies, we will focus on causes of improving economic fundamentals in Turkey other than improving global liquidity conditions in the 2002-2008 period.

Specifically, this paper is an endeavor to determine the importance of good policy in the Turkish case for the 2002-2008 period. In particular, we will focus on the importance of the monetary policy, its relation to the institutional reforms taken in the immediate aftermath of the 2001 financial crisis in February in reducing the high and chronic inflation to single digit levels. During the analysis we will attempt to tackle the issue of how the *de facto* (actual) independence of the CBRT fared following the *de jure* independence granted in 2001. In other words, we will attempt to focus on “deeds rather than words”, within an empirical framework.

After the soft peg was abandoned and the flexible exchange regime was adopted and the *de jure* independence of the CBRT was granted in 2001, the CBRT adopted an implicit inflation targeting (IT) regime during the 2002-2005 period followed by an explicit IT regime since 2006.<sup>6</sup>

Section 2 will outline the literature on central bank independence. Section 3 of the paper will briefly summarize the developments that took place during the initial and later phases of the IT regime implementation while section 4 will introduce the notion of the Central Bank reaction function. The previous literature on the conduct of monetary policy suggests the possible inconsistency of two or more targets for a central bank. For an independent central bank following an IT regime, a relatively high weight should be placed to inflation credibility gap. The technical part of this study will focus on the relative importance of the weights of output gap, inflation credibility gap and the real exchange rate and how these weights evolve across the three aforementioned periods within the context of Turkey. In particular, *a priori*, one would expect the relative weight of inflation deviation from its target to be smaller for the periods when the central

---

<sup>6</sup> Among others see Kara and Ogunc (2005), Kara (2006) and Ersel and Ozatay (2008) on issues pertaining to inflation targeting in the post-2002 period.

bank is relatively less independent and the monetary policy is subordinate to fiscal policy so that output gap and perhaps real exchange rate receives higher priority. Based on this empirical analysis, we plan to provide evidence to the evolution of the degree of independence of CBRT since 1995. Section 5 presents the data used, the estimation results. Section 6 includes the concluding remarks.

## **2. Brief Review of Literature on Central Bank Independence**

Central bank independence, which is used interchangeably with “policy independence”, can be defined as the flexibility given to the central bank in the formulation and execution of monetary policy and freedom from being dictated by political considerations. However, this definition should not be taken to mean that the government cannot comment on the stance of the monetary policies or the central bank cannot consult with the government on these issues. Broadly speaking, given the definition above, an independent central bank is more likely to implement a restrictive monetary policy and to signal the future course of policy with greater credibility resulting in lower uncertainty.

DeBelle and Fischer (1994) classifies central bank independence into instrument independence and goal independence. Instrument independence refers to the independence of the central bank in using the monetary policy tools and is generally viewed as “desirable” in the literature. Goal independence on the other hand, such as aiming price stability and/or output stability, is generally deemed as “undesirable”. Based on accountability grounds, it is argued that since governments are elected from a democratic process, the goals of a central bank should be assigned by the government. The central bank should be free in its choice of means to achieve these goals, whereas the governments are responsible for monitoring the performance of the central bank in fulfilling these goals (successfully). It is also argued that the higher the degree of delegation of decision-making in monetary policy, the more explicit monetary devices should be, to provide accountability to the public.

A successful implementation of IT requires being able to set a credible target in advance and to do so in successive years without government influence.. Additionally, it also requires the ability

to change instruments to achieve the preset target whenever necessary. The first of these requirements calls for goal independence, and the second, instrument independence. Therefore, one can say that a successful IT requires full independence of the central bank. The public announcement of an inflation target by a central bank necessitates the central bank to act, at least in principle, in conformity to some rules. In an IT regime, for example, these rules are frequent announcements concerning how and why the central bank adjusts its policy rate, or revises inflation targets and inflationary expectations. Such announcements are binding for the central bank and can be made credibly only if the central bank is perceived as independent by the private and public agents.

Previous empirical literature reports a negative relation between average inflation and central bank independence.<sup>7</sup> One may presume that since there may be a trade-off between output stabilization and inflation stabilization, higher central bank independence may bring about real costs. However, a higher degree of central bank autonomy is found to be unrelated with higher variation in output growth for developed economies by Alesina and Summers (1993), and for OECD economies by Grilli *et al.* (1991).

The issue of central bank independence has been approached from other directions as well. Some studies have focused on the proper measurement of central bank independence. Posen (1995), for instance, suggests that the measurement of central bank independence in such studies based on legal codings may not be capturing central bank independence accurately and/or the assumptions on central bank independence are in fact inappropriate. Measuring central bank independence is difficult when different countries with heterogeneous market structures are subject to the analysis. In order to measure central bank independence, several indexes have been employed in the literature. The most common and comprehensive belongs to Cukierman *et al.* (1992). Bade and Parkin (1984); Alesina (1988); Grilli *et al.* (1991) provide alternative measures. Cukierman, Miller, and Neyapti (2002) updated the central bank independence index of 1992 for the 26 former socialist economies in order to study these economies during the period of transition to liberalization in the 1990s. Similar studies for Latin American and Caribbean countries during the

---

<sup>7</sup> See, for example, Cukierman (1992), Eijffinger and de Haan (1996), and Cukierman (2006), among others for a survey of the empirical literature, the definition of, the theory on, and the measurement of central bank independence.

1990s were conducted by Gutierrez (2003) and Jacome and Vazquez (2005). Finally, among the most recent studies, Arnone, Laurens and Segalotto (2005) employ the current versions of the OECD data that were previously studied by Grilli *et al.* (1991).

Hayo and Hefeker (2001) stress the endogeneity issue for studies focusing on the degree of central bank independence and disinflation. Although a strong correlation between independence and low inflation exists in most cases, they argue that this finding does not imply causality since societies with “inflation culture” are more inflation averse and give priority to price stability as a policy objective and then central bank independence takes place as a result. They also propose other solutions to the time-inconsistency problem, such as inflation targeting or exchange rate based monetary policies. Another direction in the central bank independence literature is the issue of legal (*de jure*) and actual (*de facto*) independence of central banks. Cukierman (1993) shows that inflation and legal independence are in fact negatively related in developed countries and there exists no such relation in developing countries due to this dual aspect of central bank independence.

### **3. Implementation of Inflation Targeting Regime in Turkey**

Transition of the monetary policy aimed at facilitating a stabilization set up within a quasi-currency board exchange rate regime to an IT framework coupled with an independent float is not an easy process. This section is a brief survey of issues pertaining to the implementation of the IT regime in Turkey. At the onset of a switch to an IT regime certain series of prerequisites are expected to be fulfilled. Masson *et al.* (1997) argue that a central bank needs to be granted instrument independence; the central bank should announce a single target for monetary policy (any other target that might create conflicts must be avoided) and be able to implement a clear monetary policy with predictable effects on inflation.

Granting central bank the instrument independence was the first condition that Turkey was able to satisfy among the prerequisites of inflation targeting. With the amendment of Central Bank Law in April 2001, the CBRT gained instrument independence. The primary objective of the central bank was stated in its charter as establishing and maintaining price stability. The law also

required central bank to be transparent in the conduct of the monetary policy; and inform the public on the conduct and performance of policies such as the departures from the inflation target, if there is any. The central bank was also prohibited from granting and borrowing any debt instrument to and from the Treasury and other public institutions. Hence, *de jure* central bank instrument independence was achieved. We shall take a look at the implementation of the IT regime and empirically analyze the importance of inflation as an objective empirically and discuss *de facto* independence of the CBRT in the next section.

The second prerequisite of adopting inflation targeting is having a unique target. In the presence of other target variables such as monetary aggregates, nominal exchange rate and unemployment rate, certain conflicts may arise. The floating exchange rate regime which Turkey adopted in the post February crisis in 2001 however, allowed room for both an inflation and exchange rate target as long as the inflation target is given priority under conflicting cases and as long as the public is convinced that the priority is given to the inflation target. However, management of expectations posed a challenge. The safest and most convenient way was accepted to be the adoption of inflation as a single target under a floating exchange rate regime. Turkey was able to fulfill this prerequisite as well by choosing inflation as a credible nominal anchor.

The third precondition of inflation targeting, implementing an effective and clearly-defined monetary policy, it can be argued, was not satisfied, due to a variety of reasons. Kara (2006) enumerates the challenges during the initial phase of the implementation of IT. First, because many stylized facts that were valid for the fixed exchange rate regime became invalid in the floating exchange rate regime and relationships between certain variables were uncertain, the economy could not be modeled easily. Second, the new regime required new types of data to be collected and released, such as inflation expectations. Starting 2001, the central bank started conducting inflation expectations surveys for the first time. Another challenge on the data side arose when the methodology and content of the basket comprising the consumer price index (CPI) was changed in 2004. This change increased the uncertainty in making inflation forecasts. Another issue was the change in seasonal factors and hence the challenge of identification of permanent and temporary factors. The third challenge is establishing credibility in the beginning of the new regime. The third precondition of implementing an effective and clearly defined

monetary policy is particularly important in order to make credible forecasts. Prior to 2002, inflation forecasting in Turkey was extremely difficult due to the high levels of exchange rate volatility, risk premium, exchange rate pass-through and dollarization (which reached historically high levels during the 2001 crisis) during the pre-implementation stage of inflation targeting. Hence, any method for inflation forecasting would clearly be unreliable under this macroeconomic context.

In summary, during the rather short preparation phase for inflation targeting, Turkey fulfilled the requirement of *de jure* central bank independence to a great extent, while the overall macroeconomic conditions showed that an immediate adoption of the regime would be too early. Therefore, implicit inflation targeting regime was introduced for transition.

Next we review briefly the developments in the initial phase of the IT regime. During the implicit inflation targeting period of 2002-2005, the CBRT announced its inflation and monetary targets one year in advance. Inflation was the main target during 2002-2005, and monetary aggregates were the “complementary anchors”. Monetary aggregates were revised if any conflict occurred with the target inflation.

It can be argued that the practice of monetary policy during the implicit IT period lacked transparency and the monetary policy was rather discretionary, but as the conditions improved, these problems were overcome gradually. Implementation of fiscal discipline played a crucial role in this new disinflation program. In this sense, the central bank and the government worked hand in hand in order to build up credibility. This became particularly helpful in managing expectations. The IT regime with flexible exchange rate regime and lower fiscal dominance (see Table 1) seem to diminish the effectiveness of exchange rate pass-through.<sup>8</sup> Other than lower debt burden and exchange rate pass through, nominal appreciation led slowly to reverse currency substitution (Figure 1). The banking restructuring and institutional reforms led to the disappearance of open position practice of the private and public sector commercial banks. With

---

<sup>8</sup> Sometimes as a result of an outside shock that reduces the value the domestic currency, such as an increase in import prices, or a sudden stop in capital flows, inflation is imported to the economy. This effect is called the pass-through effect. Kara and Ögünç (2005) provide results indicating that exchange rate pass-through was high and fast during the pre-2001 period and lower and slower after 2001.

the adoption of IT regime, the CBRT abandoned backward-looking price stability methods and incorporated the role of inflation expectations in the conduct of monetary policy. The former method had an obvious drawback: If contracts are made according to past inflation, then inflation tends to move with inertia. Therefore, changing the indexation method removed an obstacle in combating inflation. As can be observed from Figure 4, the CBRT also seemed to have established credibility in terms of inflation expectations during the 2002-2005 period.

(insert Figure 4 here)

The CBRT released periodic reports and other statements in order to enhance transparency and share the information and experience gained with the public.

An inflation target requires certain steps to be implemented. First, a time horizon over which the targeted inflation rate is to be achieved needs to be specified. Then, the choice of the appropriate price index should be made. Next, it should be specified whether the target is a point or a band. Furthermore, a list of exemptions or excuses should be defined for the cases in which the target gets far from being achieved.

The target inflation rate (measured in terms of CPI) set out in 2002 was 35% by the end of the year 2002. For years 2003 to 2005, the upper bound for the inflation targets were set as 20%, 12% and 8%, respectively. The inflation rate gradually fell to 7.7% in end-2005 from 68% in end-2001.

The good news on the inflation front was accompanied by reduced volatility in growth. During the 2002-2005 period, growth kept an increasing pace. Exchange rate and financial volatility also declined.<sup>9</sup> These also contributed to the fall of Turkey's risk premium. Both the nominal and real interest rates went down in the meantime, declining by about 60 percentage points from 2001 to 2005.

---

<sup>9</sup> Using daily Turkish data for the period between March 2001 - October 2003, Ardic and Selcuk (2006) report that the policies of the CBRT were aimed at containing the volatility of the exchange rate rather than affecting its level while acknowledging the role of favorable external factors.

The improvements in the macroeconomic indicators established that Turkey was ready for a full-fledged IT regime. Indeed, at the end of 2004, the CBRT announced that the full-fledged IT regime will be adopted by 2006 which gave the central bank time to get prepared for the final requirements of inflation targeting and therefore implement the regime smoothly. At the end of 2005, the CBRT disclosed its policy framework to the public.

With the new regime the CBRT set three-year target horizons and the “uncertainty bands”. The CBRT presented medium term inflation forecasts with the “Inflation Reports” and took responsibility for explaining any deviation from the target level of inflation to the predetermined intervals and providing the appropriate policy responses.

The new regime differed from the implicit inflation targeting regime in its being more flexible in terms of attaining the inflation targets. The CBRT was more tolerant to shocks in the short run and rather aimed to approach the target in the medium run. This flexibility would naturally be inappropriate to apply in the preparation phase of the regime since it would pose certain risks to credibility.

(insert Figure 5 here)

Through the period 2001-2006, the central bank continuously decreased short term interest rates in order to maintain debt sustainability and reduce the default risk implied by higher interest rates. One measure of credibility is to see how the longer term interest rates respond to the central bank changes in the short-run interest rates. As can be observed from Figure 5, the initial divergence between the benchmark government security interest rates later on diminished and converged on the CBRT policy rates. We should note that what actually brought down inflation to low levels was not the interest rate policy but the continuous capital inflows which provided sustainability of the debt and which resulted in the appreciation of Turkish lira and alleviated the cost-push inflationary pressures stemming from the production side of the economy.

As will be discussed in more detail in the fourth section, IT regime increased the role of short-term interest rates in the formation of expectations and demand. The CBRT kept interest rates at low levels until 2006. The May-June 2006 emerging market sell-off (see Figure 2) following the announcement by the FED that the monetary easing cycle came to an end in the U.S. in April 2006, led to long-term interest hikes (see Figure 5) as well as an episode of new Turkish Lira depreciation. This resulted in questioning the appropriateness of the IT regime, but the CBRT responded by policy rate increases and signaled its firm stance in adhering to the IT regime. By the end of 2007, the global liquidity conditions turned ?and the ensuing subprime crisis in the U.S. will be yet another test of the CBRT's resolve on the IT regime.

How important was the independence of the CBRT in reducing the inflation rate? Even though the CBRT attained de jure independence in 2001, did the CBRT act as an independent institution? How important was the deviation in the public's expectations of the inflation rate from the CBRT's announced target in determining the policy rates in the post-2002 period? In the next section, we will attempt to answer these questions by providing a structural empirical framework.

#### **4. Definition and Estimation Issues of the Reaction Function of a Central Bank**

We first review the literature on how central banks adopt targeting regimes, which can be described as a set of rules that are optimal for maximizing a certain objective function. To provide the relevant framework for the empirical analysis, we briefly introduce central bank preferences and define a loss function for an emerging market central bank. We further suggest an augmented Taylor rule that can be derived from this loss function, which, we believe, is an ideal candidate to explain CBRT reactions.

We begin by assuming that once a central bank becomes independent it starts implementing its own "targeting regime." In general, a targeting regime can be defined by a multi-variable

objective function (also called the loss function) and the weights assigned to these objectives. While the specific set of objectives chosen by a central bank depends on its preferences, it can range from exchange rate specialization to output specialization.

Incidentally, the first strand of literature assumes that a central bank's objective function involves output (or employment) and inflation where more output is preferred to less output and inflation brings disutility. The central bank aims to maximize the expected value of a utility function by choosing inflation and output levels. A standard example of the central bank's utility function is the following

$$U = \alpha (y - y^n) - \frac{1}{2} \pi^2 \quad (1)$$

where  $y$  is the real output and  $y^n$  is the natural rate of the real output, and  $\pi$  is the inflation rate. In this specification, more output is always preferred with a constant marginal utility, and the inflation term, has an increasing marginal disutility as it enters the function in a quadratic form. The relative importance of output expansions is given by the parameter,  $\alpha$ . A higher  $\alpha$  indicates that the central bank is more concerned with output expansions when compared to the objective of inflation stabilization.

The second strand of literature assumes that the central bank dislikes uncertainty (and hence volatility) and desires to minimize the value of a loss function that is quadratic in output and inflation fluctuations. In other words, instead of maximizing output at the expense of higher inflation, the central bank rather aims stabilization in both output and inflation. In this case, the loss function can be expressed as

$$L = \frac{1}{2}(y - (y^n + b))^2 + \frac{1}{2}\pi^2, \quad b > 0 \quad (2)$$

Since both of the arguments in equation (2) are quadratic, the central bank attempts to minimize both the deviations of the inflation rate from zero and the deviations of output from its natural rate simultaneously. Specifically, it aims at a zero inflation rate and tries to stabilize output,  $y$ , around  $y^n + b$ , which is higher than the equilibrium output, given that  $b > 0$ . At this point, the major concern is the existence of the parameter  $b$  in this loss function. A few potential explanations have been offered in the literature. For example, the presence of labor-market distortions or monopolistically competitive sectors might cause the equilibrium output to be lower than its efficient level (Walsh, 2003). Hence,  $b$  acts as a correction parameter. Or, the politicians might prefer expansionary policies in order to increase the probability of getting re-elected, thus increasing  $y$  above its natural rate is the desire.

To investigate the behavior of a central bank empirically, one needs to assume that the central bank attempts to minimize the expected discounted value of a loss function similar to the one given above. The targeting regime relevant for our purposes is the IT regime. Similar to other targeting practices such as price level or income growth targeting, IT can be viewed as a task of minimizing a loss function which is increasing in (i) squared deviations of the actual inflation from target inflation and (ii) squared deviations of the actual output from the potential output. Since the emphasis in an IT regime is on inflation, the level of output matters to the extent that it affects inflation. In this respect, potential output is the relevant measure as a benchmark for inflationary pressures. In an IT framework, the central bank is concerned with output being above the potential output because this may create inflationary pressures through two channels: potential output might be falling, which indicates a supply side pressure, or actual output might

be rising which indicates a demand side pressure.

Under these assumptions the loss function takes the form:

$$L = E\left[\sum_{t=0}^{\infty} \left(\frac{1}{1+\rho}\right)^t (\alpha_y (\pi_{t+i} - \pi^*)^2 + \alpha_y (y_t - y_t^*)^2) \mid I(0)\right] \quad (3)$$

where  $E$  is the expectation operator,  $\rho$  is the discount rate,  $\pi_{t+i}$  is the  $i$ -period ahead inflation,  $\pi^*$  is the target inflation (announced by the central bank),  $y_t$  is the actual output level at period  $t$  and  $y_t^*$  is the (unobservable) potential output.  $I(0)$  captures the information set available to the central bank at period 0. The loss function in (3) is forward-looking because policy decisions taken in period  $t$  may affect future inflation and output, and therefore the central bank must make its decisions based on the forecasts of future inflation. In this policy setup, both measuring inflationary expectations and correctly forecasting the end-of-period inflation are crucial.

Once the objective function is defined as in equation (3), the next step is to translate it into optimal decision rules about the instruments. There have been several successful attempts in the literature to derive optimal instrument rules using the above objective function in a general equilibrium context (Walsh, 2003). The most commonly known of the optimal decision rules was put forward by Taylor (1993). Taylor suggested that the central bank responds to output gap, defined as the difference between actual and potential output, and the inflation gap, defined as the difference between expected inflation and its target. The Taylor rule and its variants have been shown to be a fair description of the behavior of the central banks targeting inflation.

Taylor suggested that for each percent deviation of the expected inflation from the inflation target

the central bank should increase the interest rate by more than one percent. This has also become known as the Taylor principle. The idea underlying the principle is that since nominal rates increase naturally one-for-one with expected inflation, the central bank should increase the nominal rates more than one-for-one to have an increase in the real rate. In policy terms, this amounts to increasing the overnight interbank rate by more than one percent as a response to a one percent increase in expected inflation. This rule can be expressed as:

$$i_t = \varphi + \beta E((\pi_{t+i} - \pi^*) | I(t)) + \gamma(y_t - y_t^*) + \varepsilon_t \quad (4)$$

where  $\beta$  is expected to be greater than one. Here, the central bank sets its policy rate,  $i_t$ , in order to reach its annual inflation target,  $\pi_t^*$  given the information set  $I(t)$  at period  $t$  and  $\varepsilon_t$  is a zero mean independently and identically distributed shock.

Although the above rule has been accepted to be a fairly successful description of the central bank behavior (Clarida *et al.*, 2000), the practice shows that the central banks adjust the interest rates more smoothly than the above rule suggests. In other words, although overnight rates move in the same direction as suggested by the rule, the magnitudes of the movements are smaller and occur in a series of hikes or falls. This type of a rule can be described as an inertial Taylor rule where today's rate depends on yesterday's rate besides output gap and expected inflation gap. The inertial rule can also be explained using the idea that today's overnight rate movements signal the future rate movements.<sup>10</sup> These rules can be estimated empirically in the following form:

$$i_t = \varphi + \alpha i_{t-1} + \beta E((\pi_{t+i} - \pi^*) | I(t)) + \gamma(y_t - y_t^*) + \varepsilon_t \quad (5)$$

---

<sup>10</sup> Carlstrom and Fuerst (2008) find that with both sticky wages and sticky prices, the inertial Taylor rule performs better than the standard rule in reducing inflation.

While equation (5) explains the central bank behavior in developed economies fairly well, it ignores several important features that are specific to emerging markets. We briefly explore those features below and suggest a rule for the CBRT that may explain its behavior in the post-2001 period.

## **5. Reaction Function and Independence of the CBRT**

One of the explanations put forward as to why the CBRT has been successful in bringing down inflation to single digits in the post-2001 period following two decades of high inflation is the *de jure* independence it gained after the 2001 crisis. While there may be other explanations of how inflation was reduced, one can easily argue that the flexible exchange rate regime coupled with the successful implementation of the IT regime adopted by the CBRT in the post-2001 period was the main reason.

In this section, we explore how the CBRT's reaction function has changed in the post-2001 period in order to understand the effect of independence on the actual implementation of the monetary policy. We test this rule using pre- and post-crisis Turkish data and present the results.

As mentioned in the previous section, while equation (5) explains the central bank behavior in developed economies fairly well, it ignores several important features that are specific to emerging markets. First, equation (5) ignores the role of exchange rate volatility, which affects the behavior of the CBRT (or any other emerging market economy's central bank). There are four dimensions of the effect of exchange rate volatility on the central bank behavior. The first dimension regards the effect of exchange rate movements on inflationary expectations because of

the pass-through to domestic price indices via imported consumption and manufactured goods. In this respect, these movements may also have an effect on the second policy input, the output gap, by changing the marginal rate of substitution between labor and capital when capital consists of at least partially of imported machinery. Therefore, the CBRT might intervene to prevent the pass-through of exchange rate movements to prices to achieve its preset inflation target.<sup>11</sup> The second dimension is the relatively high degree of dollarization and open positions of commercial banks, which may cause the CBRT to be more sensitive to a possible sudden capital flight. The third dimension is the relative importance of the export sector. There has been a considerable amount of lobbying by the pressure groups, including some members of the government, to devalue the Turkish currency on the grounds to achieve higher competitiveness and to improve the current account balance.<sup>12</sup> The fourth and final dimension is the fiscal sustainability dimension. Having some portion of the public debt linked to foreign exchange may also cause a not-so-independent central bank to care about exchange rate movements.

Second, the CBRT might be more prone to regime shifts or structural breaks in its policy function. For example, even the process of appointing of a new governor, such as the process experienced in 2006, might lead to a structural break in the reaction function. Such shifts cannot be represented by the class of linear Taylor rules, as suggested above in equations (4) and (5). Estimating a Taylor rule for the purpose of describing policymaker behavior in this case would

---

<sup>11</sup> Taylor (2001) suggests that rules that do not include exchange rates are essentially closed economy rules, which embed movements of the exchange rates in the fluctuations of the interest rates. Therefore, one can expect that including the exchange rates as separate inputs in Taylor rules might improve the fit of the model. Taylor (2001) finds no support for a role in exchange rates in the estimation of Taylor rules.

<sup>12</sup> As explained previously, central bank independence is a prerequisite for a successful IT regime as it allows the central bank to act on a well-defined set of pre-announced rules. However, adjusting exchange rates under political pressures might create the impression that the central bank is not acting independently. In this context, the behaviour and actions of the CBRT after the adoption of the IT regime provides a laboratory in which we can study whether and how these pressures were handled without losing credibility that is essential for the success of the IT regime.

require appropriate modeling of such policy shifts. Below, we suggest a model for explaining the behavior of the CBRT that takes into account the role of exchange rates and regime shifts.

$$i_t = \varphi_t + \alpha_t i_{t-1} + \beta_t E((\pi_{t+i} - \pi^*) | I(t)) + \gamma_t (y_t - y_t^*) + \delta_t q_t + \varepsilon_t \quad (6)$$

where  $q$  represents a function of the nominal exchange rate that can either be specified as the nominal exchange rate itself or gap of exchange rate defined as the deviation from its trend. We let the coefficient  $\varphi$  vary with respect to time to reflect regime shifts. Since our aim is to compare the CBRT behavior before and after independence, we also let other coefficients  $\alpha$ ,  $\beta$ ,  $\gamma$  and  $\delta$  vary with respect to time.<sup>13</sup>

(insert Figure 6 here)

The third term in expectations is what we call the “credibility gap”. That is to say how the expectations of future inflation rate deviates from the target inflation rate. Figure 6 plots the inflation credibility gap in the post-2002 period and the CBRT policy rate. The inflation credibility gap is obtained as follows. We obtain 12-month-ahead inflation expectations and we subtracted the moving average level of year-end target of the CBRT announcements from these. For a *de facto* independent central bank one would expect to see a higher weight,  $\beta$ , on this term. Hence in equation (6), one would like to see that the coefficient of inflation is significantly higher after 2001 than that for the period before 2001 since the CBRT started inflation targeting after the 2001 crisis. Moreover, this coefficient is expected to be positive and greater than one. This

---

<sup>13</sup> Note that variable coefficients imply that the model we estimate is nonlinear. Moreover, estimating the unobserved variables, such as potential output requires a different approach than ordinary least squares. We handle both problems using a dual extended Kalman filter technique. For the details of the estimation methodology and a thorough explanation of the theoretical considerations in implementing the above rule see Hatipoglu and Alper (2009).

simply reflects the fact that the CBRT should increase the interest rate more than the increase in the actual inflation to achieve a net increase in the real rate as a response to increase in inflationary expectations.

(insert Figure 7 here)

Figure 7 shows the results of our estimations. In the pre- and post-crisis period, there is a significant difference in the mean levels of inflation coefficient, which indicates that the CBRT attached different weights on inflation gap in these two periods. While there has been an increase in the inflation coefficient in the pre-crisis period, the coefficient hovers around one implying that the CBRT was not fighting inflation in an aggressive manner.<sup>14</sup> In the post-crisis period there has been a steady increase in the inflation coefficient reflecting the fact that the CBRT was more concerned with fiscal dominance in the initial phases of the IT period. Moreover, the increasing coefficient of the inflation gap in the second sub-period indicates that the CBRT has adopted a more independent position compared to the pre-crisis period. This is especially evident if we also consider the developments in terms of the coefficient of the exchange rate in the reaction function. The coefficient of the exchange rate turns out to be negative and insignificant across the whole sample.<sup>15</sup> We find no trend in the coefficient of the exchange rate indicating that the CBRT has adopted a consistent independent stance in the post-2001 period against the political pressures that are mentioned above.

---

<sup>14</sup> We assume that the inflation target for the pre-crisis period is zero. Although this is not a realistic scenario, even a central bank that fights inflation aggressively and has a less ambitious inflation target should have a coefficient of inflation greater than one in its loss function. See Clarida, Gali and Gertler (1998) for a detailed explanation of the magnitude of the inflation coefficient.

<sup>15</sup> The coefficient of the exchange rate at the last observation is  $-0.65$  with a standard deviation of  $1.47$ .

## 6. Conclusion

Misconducted macroeconomic policies in the past resulting in huge public debt prevented a healthy conduct of monetary policy in Turkey. It is a lesson that removing fiscal dominance and switching to the right regime that provides the central bank with independence are crucial to combat inflation.

The pre-crisis period was characterized by a fragile financial system, high dependency on short term capital inflows, and high levels of public debt. Nevertheless, the aim was to reduce inflation, which could only be reached in the post-crisis period after performing fundamental reforms. The 2000 and 2001 crises demonstrated what was wrong (the financial sector), and the necessary steps to cure the problems were taken. Among these steps, the benefits of an independent central bank has been discussed. It is an obvious fact that a well-coordinated fiscal and monetary policy lead the economy to the more desirable macroeconomic outcomes.

Finally, in order to estimate the reaction function of the CBRT we proposed an augmented Taylor rule is suitable for a highly dollarized economy operating in a floating exchange rate regime. We provide evidence that after gaining *de jure* independence in 2001, the CBRT has fought inflation more aggressively and hence was *de facto* independent, more so in the later periods.

## References

- Alesina, Alberto. 1998. "Macroeconomics and Politics." In NBER Macroeconomics Annual, edited by Stanley Fischer, pp. 17-52. Cambridge, MA: MIT Press.
- Alesina, Alberto. 1998. "Macroeconomics and Politics." In NBER Macroeconomics Annual, edited by Stanley Fischer, pp. 17-52. Cambridge, MA: MIT Press.
- Alesina, A. and L. Summers. 1993. "Central Bank Independence and Macroeconomic Performance," *Journal of Money, Credit, and Banking*. 25, pp. 157-162.
- Alper, C. E. 2001. "The Liquidity Crisis of 2000: What Went Wrong," *Russian and East European Finance and Trade*, Vol. 37, No. 6, pp. 54-75.
- Alper, C. E. and I. Saglam. 2001. "The Transmission of a Sudden Capital Outflow: Evidence from Turkey," *Eastern European Economics*, Vol. 39, No. 2, pp. 29-48.
- Alper, C. E. and Z. Onis. 2003a. "Financial Globalization, the Democratic Deficit and Recurrent Crises in Emerging Markets: The Turkish Experience in the Aftermath of Capital Account Liberalization", *Emerging Markets Finance and Trade*, Vol. 39, No.3, pp. 5-27.
- Alper, C. E. and Z. Onis. 2003b. "Emerging Market Crises and the IMF: Rethinking the Role of the IMF in the Light of Turkey's 2000-2001 Financial Crises," *Canadian Journal of Development Studies*, Vol. 23, No. 3, pp. 267-284.
- Alper, C. E. and Z. Onis. 2004. "The Turkish Banking System and the IMF in the Age of Capital Account Liberalization," *New Perspectives on Turkey*, Vol. 30, Spring 2004, pp. 25-55.
- Arnove, M., B. J. Laurens, and J. F. Segalotto. 2005. "Measures of Central Bank Autonomy: Empirical Evidence for OECD and Developing Countries and Emerging Market Economies." Working paper. Washington: International Monetary Fund.
- Ardic, O. P. and F. Selcuk (2006). "The dynamics of a newly floating exchange rate: the Turkish case," *Applied Economics*, 38, pp. 931-941.
- Bade, R. and M. Parkin. 1984. "Central Bank Laws and Monetary Policy". Department of Economics, University of Western Ontario, Canada.
- Blanchard, Olivier J. 2004. "Fiscal Dominance and Inflation Targeting: Lessons from Brazil". MIT Department of Economics Working Paper No. 04-13.
- Carlstrom, T.C. and Fuerst T.S. 2008. "Inertial Taylor Rules: The Benefits of Signaling Future Policy" *Federal Reserve Bank of St. Louis Review* 90(3)193-204.
- Central Bank of Turkey "Monetary Policy Reports (2001-2005) and Inflation Reports (2006-2008) Ankara, Turkey, [www.tcmb.gov.tr](http://www.tcmb.gov.tr).

- Cizre-Sakallioğlu, U. and E. Yeldan. 2000. "Politics, Society and Financial Liberalization: Turkey in the 1990s" in *Development and Change*, Vol. 31, No. 1, pp. 481-508.
- Clarida, R., J. Gali and M. Gertler (1998). Monetary policy rules in practice: *Some International Evidence*, *European Economic Review* 42(6), 1033-1067.
- Clarida, R., J. Gali and M. Gertler (2000) Monetary Policy Rules and Macroeconomic Stability: Evidence and Some Theory, *Quarterly Journal of Economics*, 115(1), 147-180
- Cukierman, A. 1992. "Central Bank Strategy, Credibility, and Independence". Cambridge, MA: MIT Press.
- Cukierman, A. 1993. "Central Bank Independence, Political Influence and Macroeconomic Performance: a Survey of Recent Development," *Cuadernos de Economía (Latin American Journal of Economics)*, Instituto de Economía. Pontificia Universidad Católica de Chile., vol. 30(91), pp. 271-292.
- Cukierman, A. 2006. "Central Bank Independence and Monetary Policymaking Institutions: Past, Present, and Future," Working Papers Central Bank of Chile 360, Central Bank of Chile.
- Cukierman, A., G. P. Miller, and B. Neyapti. 2002. "Central Bank Reform, Liberalization, and Inflation in Transition Economies: An International Perspective." *Journal of Monetary Economics* 49(2), pp.237–64.
- Cukierman, A., S.B. Webb and B. Neyapti. 1992. "Measuring the Independence of Central Banks and Its Effects on Policy Outcomes," *World Bank Economic Review*, 6, 353-398.
- Debelle, G. and S. Fischer. 1994. "How Independent Should a Central Bank Be?" in *Goals, Guidelines, and Constraints Facing Monetary Policymakers*, Jeffrey C. Fuhrer, ed., Federal Reserve Bank of Boston. pp. 195-221.
- Eijffinger, S. and J. de Haan, 1996. *The Political Economy of Central-Bank Independence*, Special Papers in International Economics, No. 19, Princeton University.
- Ersel, H. 1996. "The Timing of Capital Account Liberalization: The Turkish Experience." *New Perspectives on Turkey* 15, 15, 45–64.
- Ersel, H. and F. Ozatay (2008) "Fiscal Dominance and Inflation Targeting: Lessons from Turkey" *Emerging Markets Finance and Trade*, November-December.
- Ertugrul, A. and F. Selcuk (2001) "A Brief Account of the Turkish Economy: 1980-2000", *Russian & East European Finance & Trade*, v37, pp. 6-28.
- Grilli, V., Masciandaro, D. and G. Tabellini. 1991. "Political and Monetary Institutions and Public Finance Policies in the Industrial Countries." *Economic Policy* 13 pp.341-92.

- Gutierrez, E. 2003. "Inflation Performance and Constitutional Central Bank Independence: Evidence from Latin America and the Caribbean." Working paper. Washington: International Monetary Fund.
- Hatipoglu, O. and C. E. Alper. 2009. "Estimating Central Bank Behavior in Emerging Markets: The Case of Turkey," Cobham, D. and G. Dibeh (eds.) *Monetary Policy and Central Banking in the Middle East and North Africa*, Routledge, forthcoming.
- Hayo, B. and C. Hefeker. 2001. "Do We Really Need Central Bank Independence? A Critical Re-examination" University of Basel WWZ Working Paper No. 01/03
- Jacome, L. I., and F. Vazquez. 2005. "Any Link between Legal Central Bank Independence and Inflation? Evidence from Latin America and the Caribbean." Working paper 05/75. Washington: International Monetary Fund.
- Kara, H. and F. Ogunc. 2005. "Exchange rate pass through in Turkey: It is slow, but is it really low?" Working Paper No. 05/10, Central Bank of Turkey, Ankara.
- Kara, A. H. 2006. "Turkish Experience With Implicit Inflation Targeting" Working Papers0603, Research and Monetary Policy Department, Central Bank of the Republic of Turkey, revised.
- Kibritcioglu, A. 2004. "A Short Review of the Long History of High Inflation in Turkey" In: Shilpa M. Rao (ed.), *Inflation: Concepts and Experiences*, Hyderabad: The ICFAI University Press, Ch. 9, pp. 84-109.
- Masson, P.R., M. A. Savastano and S. Sharma. 1997. "The Scope for Inflation Targeting in Developing Countries". IMF Working Paper No. 97/130.
- Onis, Z. 1998. *State and Market: The Political Economy of Turkey in Comparative Perspective*, Istanbul: Boğaziçi University Press.
- Onis, Z. and B. Rubin. (eds.) 2003. *Turkey's Economy in Crisis*, London: Frank Cass.
- Posen, A. 1995. "Central bank independence and disinflationary credibility: A missing link?" *Brookings Papers on Economic Activity*.
- Taylor, J.B. 1993. "Discretion versus Policy Rules in Practice," *Carnegie-Rochester Conference Series on Public Policy*, 39(1),195-214.
- Taylor, J.B. 2001. The Role of the Exchange Rate in Monetary-Policy Rules, *American Economic Review*, 91(2), 263-267.
- Walsh, C. E. 2003. *Monetary Theory and Policy*. Cambridge, Massachusetts, The MIT Press.

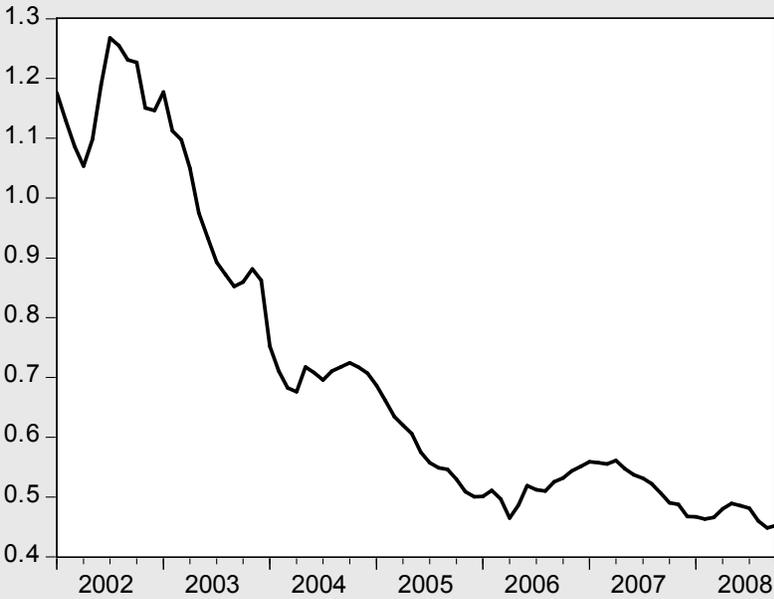
**Table 1: Structure of Turkish Public Sector Debt (%)**

	2001	2002	2003	2004	2005	2006	2007	2008*
<b>Total Public Sector Debt/GDP</b>	74.13	69.31	62.24	56.67	51.14	45.60	39.09	37.58
<b>Domestic Debt/GDP</b>	50.85	42.76	42.74	40.16	37.72	33.16	29.91	28.15
Cash Debt/GDP	24.29	25.47	28.69	29.62	29.92	27.48	25.84	24.56
Non-cash Debt/GDP	26.56	17.29	14.05	10.54	7.80	5.68	4.07	3.58
Floating Rate Notes/GDP	25.37	18.29	18.29	16.12	16.24	13.89	13.14	12.43
FX and FX-indexed Debt/GDP	18.10	13.75	9.37	7.06	5.84	4.57	3.06	2.30
Fixed Rate Notes/GDP	7.39	10.72	15.09	16.98	15.63	14.70	13.71	13.42
<b>Total External Debt /GDP</b>	23.27	26.55	19.50	16.51	13.42	12.44	9.18	9.43
IMF Debt/GDP	0.27	6.52	5.15	4.44	3.04	2.01	0.98	1.33
Other Multilateral Loans/GDP	3.89	9.69	7.27	6.35	4.61	3.63	2.36	2.71
Eurobonds/GDP	12.08	10.79	8.24	7.16	6.55	6.79	5.30	5.19
Commercial loans/GDP	3.54	2.94	1.87	1.43	1.17	1.07	0.84	0.85
Bilateral Loans/GDP	3.76	3.13	2.12	1.58	1.09	0.95	0.67	0.68

\* End-June value for 2008

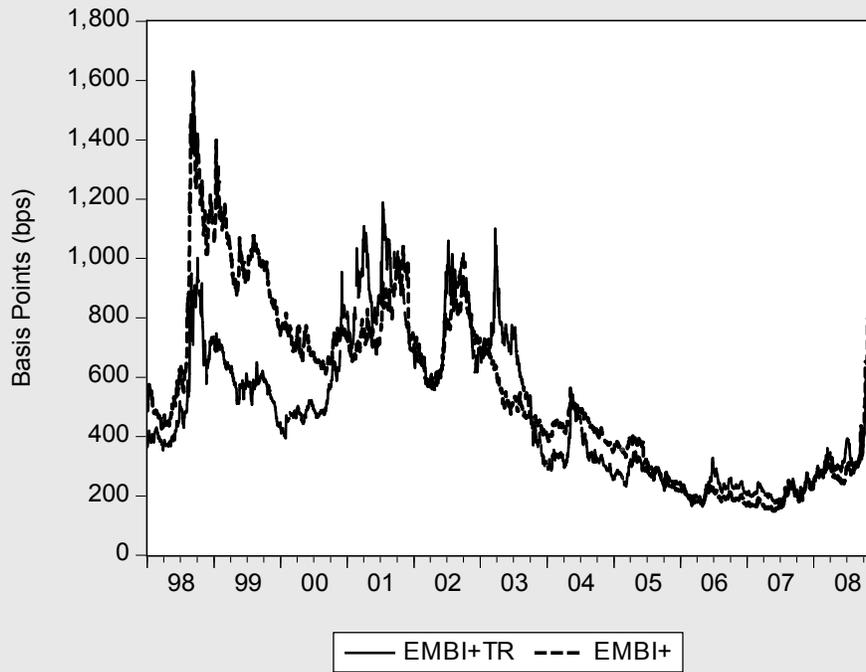
Source: Turkish Treasury and authors' own calculations

Figure 1: De-Dollarization in the post-2002 period in Turkey (FX deposits/M2)



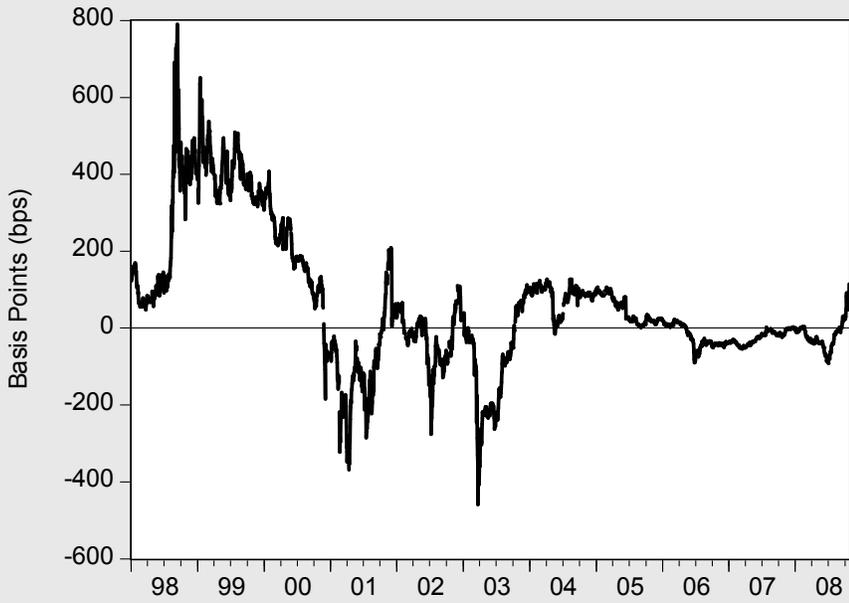
Source: CBRT

Figure 2: Average EMBI Spread and Turkish Spread



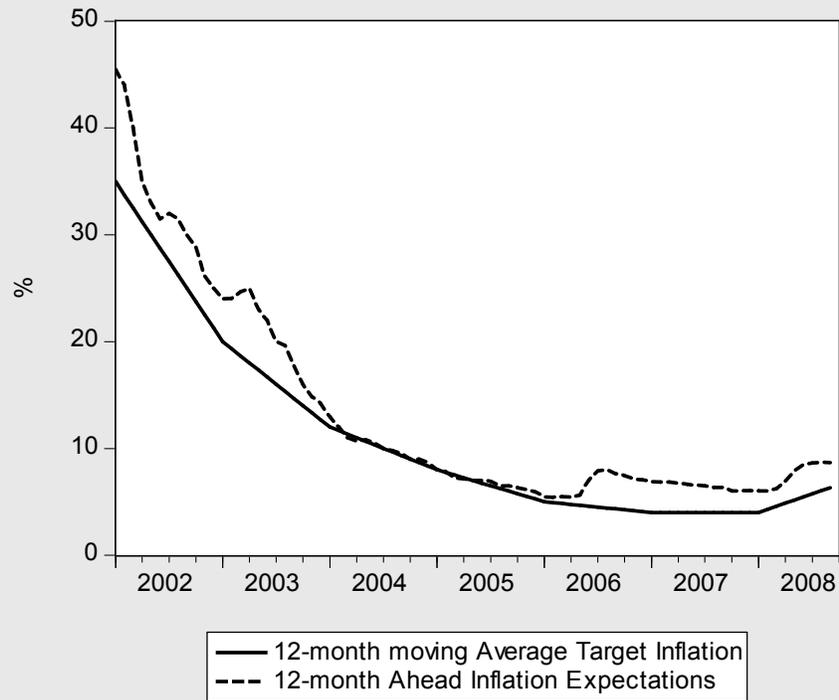
Source: cbonds.info

Figure 3: EMBI Spread Difference (Average EM Spread Less Turkey's Spread)



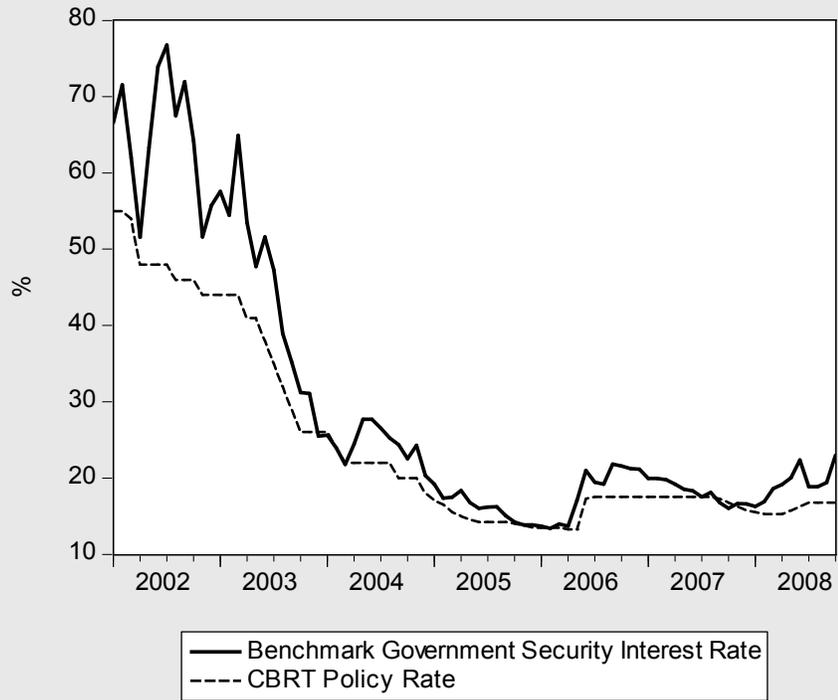
Source: cbonds.info and authors' own calculations

Figure 4: 12-Month-Ahead Inflation Target and Expectations



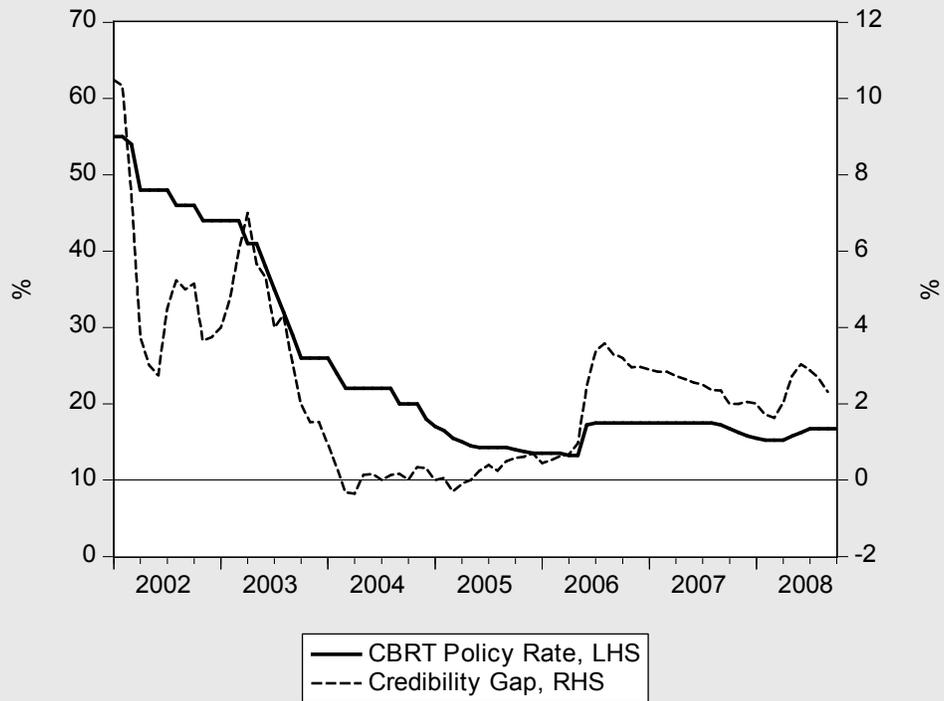
Source: CBRT and authors' own calculations

Figure 5: Secondary Market Benchmark Interest rate and CBRT Policy Rate



Source: CBRT and Turkish Data Monitor

Figure 6: Policy Rate and Credibility Gap:  
2002:01-2008:10



Source: CBRT and authors' own calculations

Figure 7: CBRT's Reaction to Inflation

