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Alternative Tools to Manage Capital Flow Volatility

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Koray ALPER
Hakan KARA
Mehmet YÖRÜKOĞLU

Address:
Central Bank of the Republic of Turkey
Head Office
Research and Monetary Policy Department
İstiklal Caddesi No: 10
Ulus, 06100 Ankara, Turkey

Phone:
+90 312 507 54 02

Facsimile:
+90 312 507 57 33

Alternative tools to manage capital flow volatility[1]

Koray Alper, Hakan Kara and Mehmet Yörükoğlu[2]

Abstract

Heightened volatility in cross-border capital flows has increased exchange rate volatility across emerging markets as well as in advanced economies, setting the stage for more active management of currencies. Traditionally, foreign exchange rate intervention has been the primary tool to address these types of challenges. However, given the limitations of foreign exchange rate intervention, it may be well worthwhile to explore alternative mechanisms for dealing with capital flow volatility. This paper explains how the new policy framework adopted by the Central Bank of the Republic of Turkey (CBRT) in the past two years has eased the need to conduct FX interventions. We first describe the rationale for the new policy framework, which is an augmented version of inflation targeting, with more emphasis on macro financial risks. Next, we explain the new instruments developed by the CBRT and their contribution to coping with capital flow volatility. In particular, we focus on the Reserve Option Mechanism, which is designed as a shock absorber for volatile capital flows, and thus reduces the need for FX intervention. We demonstrate that, since the adoption of new policy tools, the volatility of the Turkish lira has been remarkably low in comparison with the currencies of peer economies.

Keywords: Monetary policy, Capital flows, Exchange rate interventions, Financial stability

JEL classification: E52, E58, F31, F32

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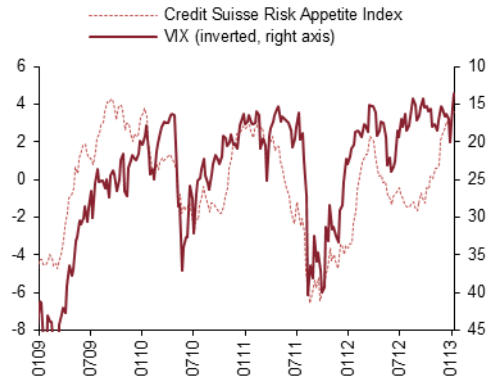
[2] Contact address: Central Bank of the Republic of Turkey, İstiklal Cad. No: 10 Ulus, Ankara, Turkey. Emails: koray.alper@tcmb.gov.tr; hakan.kara@tcmb.gov.tr; mehmet.yorukoglu@tcmb.gov.tr.

Introduction

During the past few years, heightened volatility in cross-border capital flows and sharp swings in risk appetite (Figures 1 and 2) has increased the focus on macro financial risks across emerging markets. Increased volatility in short-term capital flows has led the central banks of these countries to seek alternative policies. One particular variable of interest during this period has been the exchange rate. Excessive volatility in exchange rates has prompted central banks – even those that have traditionally operated under pure-float regimes – to take explicit policy measures.

Risk appetite

Figure 1

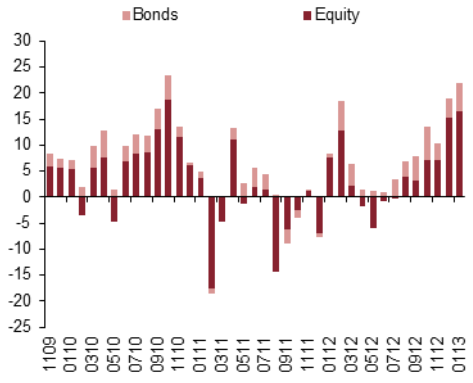


Source: Credit Suisse, Bloomberg.

Equity and bond flows to emerging markets

(USD Billions)

Figure 2



Source: EPFR.

Many central banks under inflation targeting (IT) regimes responded to capital flow volatility through direct interventions in the form of outright sales and purchases of FX. However, empirical evidence has been unable to provide robust support for the effectiveness of intervention and the issue is still open to debate. Moreover, there are non-negligible costs associated with FX interventions. Against this backdrop, Turkey has opted for an alternative strategy. Since year-end 2010, the Central Bank of the Republic of Turkey (CBRT) has implemented a new policy strategy to address the challenges posed by volatile capital flows. To this end, the conventional inflation targeting regime was modified by incorporating financial stability as a supplementary objective. The use of alternative monetary policy instruments in this new regime has reduced the need for direct FX intervention. This note explains the motivation and implementation of the new set of tools, and provides some evidence on the effectiveness of these tools in containing exchange rate volatility. We start by describing the main ingredients of the new framework.

A new policy framework

The new strategy adopted by the CBRT reflects the need to respond to the post-crisis dynamics governing the global financial environment. Table 1 compares the new and former policies. The current framework differs from the standard IT

framework in terms of both objectives and instruments. The new regime preserves the main objective of price stability, while risks to financial stability are also taken into consideration in the conduct of monetary policy. Financial stability as an objective calls for the use of multiple instruments in monetary policy. Consequently, the CBRT has developed a rich set of tools in order to be capable of addressing macro financial risks without jeopardizing the price stability objective.

Monetary policy framework — Table 1

	Former approach	New approach
Objectives	**Price Stability**	**Price Stability** **Financial Stability**
Instruments	Policy rate	Structural Instruments Cyclical Instruments (Policy Rate, Liquidity Management, Interest Rate Corridor)

The CBRT's approach to financial stability reflects a macro perspective. While aiming to achieve price stability, this approach does not ignore macroeconomic instabilities and risks accumulating in the financial system. Although macro financial risks can arise from many different factors, it is fair to say that the main source of vulnerability in the post-crisis period has been the global economic outlook and related policy uncertainty. Ongoing accommodative monetary policies due to the fragile global economic outlook, abrupt changes in risk perceptions and excessively volatile capital flows have been the main factors driving macro financial risks. In this context, the CBRT's approach to macroeconomic and financial stability in the last two years can be characterized as minimizing the effects of capital flow volatility on domestic markets.

Key variables: credit and exchange rates

The new policy framework attaches special importance to the credit and exchange rate channels as operating targets. Global liquidity cycles typically lead to excessive fluctuations in domestic credit and exchange rates in small, open, emerging economies. These two variables interact in a way that creates financial accelerator mechanisms that amplify business cycles. For example, capital inflows lead to currency appreciation and easy access to credit. A rapid appreciation of the local currency improves the balance sheets of firms, which are typically net borrowers of foreign currency. This, in turn, may lead to excessive lending appetite by banks and thus feed into rapid credit growth and systemic risk (see Bruno and Shin 2012). Rapid credit growth may lead to a relative rise in non-tradable prices, further increasing the appreciation pressures on the domestic currency. The feedback between exchange rates and credit growth may become a spiral, which can be a source of vulnerability and eventually end in a sudden reversal of capital flows. Needless to say, the possibility of an abrupt contraction in credit or an excessive depreciation of the local currency is undesirable from a macroeconomic and financial stability perspective.

In sum, capital flows create excess volatility in output and may threaten macroeconomic stability through the interaction of the exchange rate and credit. Rapid credit growth and excessive appreciation of the exchange rate lead to imbalances through over-borrowing and excess spending by domestic agents,

which in turn distort the economy's resource allocation. The policy framework developed by the CBRT in the last couple of years reflects the need to avoid the build-up of macro financial risks resulting from these cycles. To this end, the policy has focused on smoothing out the adverse effects of capital flow volatility. In order to implement this goal, the CBRT has stated that credit should grow at reasonable rates and that developments in the foreign exchange rate should be consistent with economic fundamentals. Of course, this is easier said than implemented. It is almost impossible to pin down the "equilibrium" or "fair value" of the exchange rate. Likewise, finding the appropriate pace of credit growth is far from being a trivial challenge, as there is no clear guidance provided by either theory or practice.

Exchange rates, intervention and monetary policy

Under conventional IT framework, which was in place between 2006 and 2010, the CBRT was almost completely silent about exchange rate movements. Occasional intervention was conducted through direct FX purchases/sales or regular auctions, yet the interventions were motivated by the usual "volatility" argument. Regular purchase auctions were also conducted with the classic motive of reserve build-up. There were no explicit references to exchange rate misalignments and/or macro financial risks.

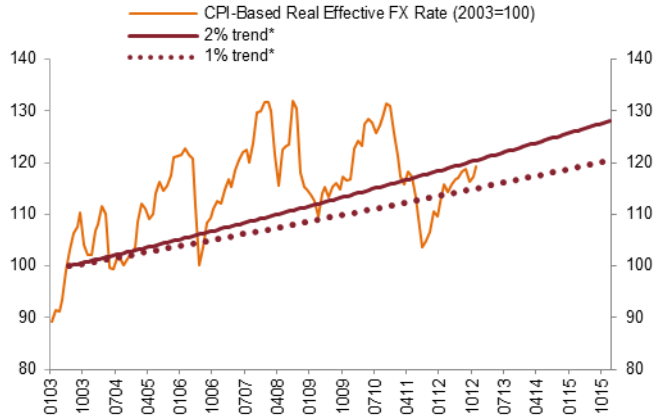
The new policy setup has changed both the motivation and implementation of the foreign exchange management policy. In the new framework, exchange rate movements are explicitly linked to the newly established financial stability objective. Monetary policy explicitly aims to avoid excessive misalignment of the exchange rate. Although it is impossible to be precise about the equilibrium exchange rate, it is often possible to use judgment or model-based analysis to detect an excessively misaligned exchange rate. For example, when economic fundamentals do not justify the level of the real exchange rate, indicators such as current account balance and relative prices provide important signals. When we have a strong feeling that the exchange rate is misaligned, we go public with our opinion and/or respond actively by using alternative policy tools.

In sum, compared to the previous framework, the new policy setup brings two major differences to exchange rate policy: (i) the CBRT is now more vocal and reactive regarding exchange rate misalignments, and (ii) direct FX intervention is no longer the main policy tool to smooth exchange rate fluctuations. As described below, the introduction of new instruments such as an asymmetric interest rate corridor and the Reserve Option Mechanism have reduced the need for FX intervention in the form of outright selling and purchasing of foreign currency.

Against this backdrop, the CBRT conducts exchange rate policy in a more rule-based fashion, aiming to prevent significant and persistent deviations of the exchange rate from what the economic fundamentals justify. In implementing the new policy, one needs some guidance on what a reasonable (or tolerable) path of the exchange rate is. Recently the Governor of the CBRT has announced that an annual 1.5–2% appreciation in the (CPI-based) real effective exchange rate is consistent with Balassa-Samuelson effects and measurement bias due to quality improvements. Excessive deviation from this trend will not be disregarded by the CBRT (Figure 3). Accordingly, the monetary authority will use its policy instruments to contain excessive appreciation or depreciation pressures. This approach implies an automatic mechanism to react against capital flow volatility.

Real effective exchange rate index

(2003 average=100) Figure 3



*Red trend lines show the real exchange rate appreciation that may attributed to Balassa-Samuelson effects and quality improvement.

Source: CBRT.

Credit growth rule

Many empirical studies show that excessive credit growth is highly detrimental to macroeconomic and financial stability. Mendoza and Terrones (2008), for instance, find that rapid credit growth is associated with booms in output, rising asset prices, widening external deficits, and sharp real appreciation. When booms phase out, recessions and financial crisis are likely to follow. Accordingly, excessive credit growth calls for corrective policy action. Using 140 years of data for advanced economies, Schularick and Taylor (2012) find that rapid credit growth is historically a leading indicator for financial crises. On the other hand, Jorda et al. (2011), using the same database, show that the relationship between credit growth and external imbalances has strengthened in recent years. They also emphasize the importance of the interaction between these two variables for financial stability.

As a reflection of the recent empirical evidence and lessons from the global crisis, the second pillar of the new policy strategy of the CBRT is to preserve a healthy and sustainable level for the path of credit that will ensure the stability of the financial system. The literature usually focuses on credit growth rates or credit-to-GDP (credit deepening) ratios in assessing credit paths. The CBRT instead highlights *the change in credit stock/GDP* (ΔCredit/GDP). This variable, which also can be called the "net borrowing-to-income ratio", incorporates the information embedded in the credit growth and credit deepening variables. It is a measure of the change in the net indebtedness of domestic agents in a given year relative to their income. Given that an economy's savings ratio does not tend to display major changes in the short-to-medium term, a higher ΔCredit/GDP ratio would imply an increasing share of external resources in total borrowing, rendering the economy vulnerable to sudden reversal. In addition to macro financial risks, above-normal

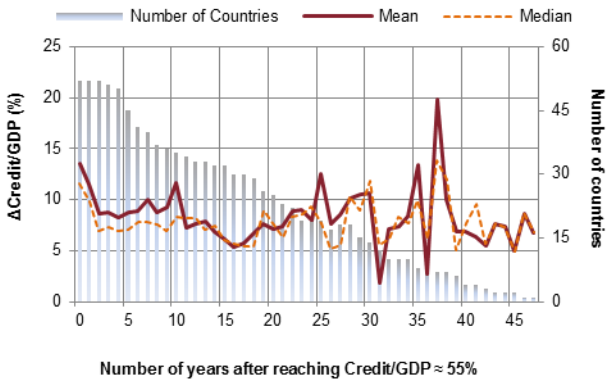
credit growth would be very likely to imply significant deterioration in credit quality, which would only become apparent in downturns, with a formidable cost.[3]

Thus, wishing to reflect financial stability concerns in the new policy framework, the CBRT decided to focus on the net borrowing-to-income ratio and become more responsive to excessive deviations of credit from "normal" levels. For practical implementation of a credit rule, one needs to have a benchmark for the reasonable (or normal) path for credit. Kara, Küçük, Tiryaki and Yüksel (2013) analyze historical data in order to provide some reference values for Turkey's credit path. In particular, they take Turkey's current credit-to-GDP ratio (55 percent) as a starting point, and aggregate the information embedded in the credit paths of other countries following similar credit deepening phases. Interestingly, the authors find that countries exhibit roughly stable net borrowing-to-income ratios after this point (Figure 4).

Evolution of net borrowing-to-income ratio (ΔCredit/GDP) after countries reach credit/GDP ratio of 55%*

Net Borrowing / GDP

Figure 4



*Horizontal axis indicates the number of years since a country reached a Credit/GDP ratio of 55%. Left vertical axis shows the evolution of ΔCredit/GDP, while the right vertical axis shows the number of countries.

Source: World Bank.

When averaged across time for each country, the 25 and 75 percent quartiles for ΔCredit/GDP correspond to a range of 6.7–10.6 percent. Considering the lessons learned from the global crisis, and considering Turkey's high current account deficit, the CBRT has judged that a ratio in the neighborhood of 7.5 percent would constitute a reasonable and prudent benchmark for Turkey. This ratio corresponds to annual credit growth of 15 percent in the short term, assuming nominal income growth of around 10 percent. As credit deepening increases through time, each percentage unit of credit growth means more borrowing relative to income. This means that in order to stabilize the ΔCredit/GDP ratio, the benchmark credit growth must follow a gradual downward path.

Accordingly, the CBRT announced a "credit targeting rule" for monetary and macro prudential policy. For the year 2013, significant deviations from 15 percent annual credit growth would prompt tightening through macro prudential tools such

[3] See, for example, Dell'Ariccia et al. (2012), and Jiménez and Saurina (2006).

as reserve requirements. Liquidity policy would also support this goal, provided that it does not conflict with exchange rate smoothing and inflation targeting goals.

The idea behind establishing some sort of a credit rule is twofold: First, the CBRT wishes to consolidate the lessons from the crisis in order to ensure the stability of the financial system. Second, the CBRT aims to break the vicious circle of exchange rate appreciation and rapid credit growth driven by capital flows and global liquidity cycles. By inhibiting banks' demand for external resources, the adoption of a credit rule dampens the amplitude of capital flow cycles, which implicitly help to smooth out exchange rate fluctuations. In that sense, dampening credit fluctuations also reduces the need for FX interventions.

New policy instruments

As explained above, besides the conventional price stability objective, the new policy strategy aims to reduce the credit and foreign exchange volatility associated with cross-border capital flows. This multiple-objective approach necessitates the use of a variety of policy instruments. Accordingly, the CBRT developed new instruments like the "asymmetric interest rate corridor" and the "Reserve Option Mechanism" in recent years.[4] In the next sections we describe these instruments and provide some evidence on how these new mechanisms have alleviated the need to conduct direct FX interventions.

Asymmetric interest rate corridor

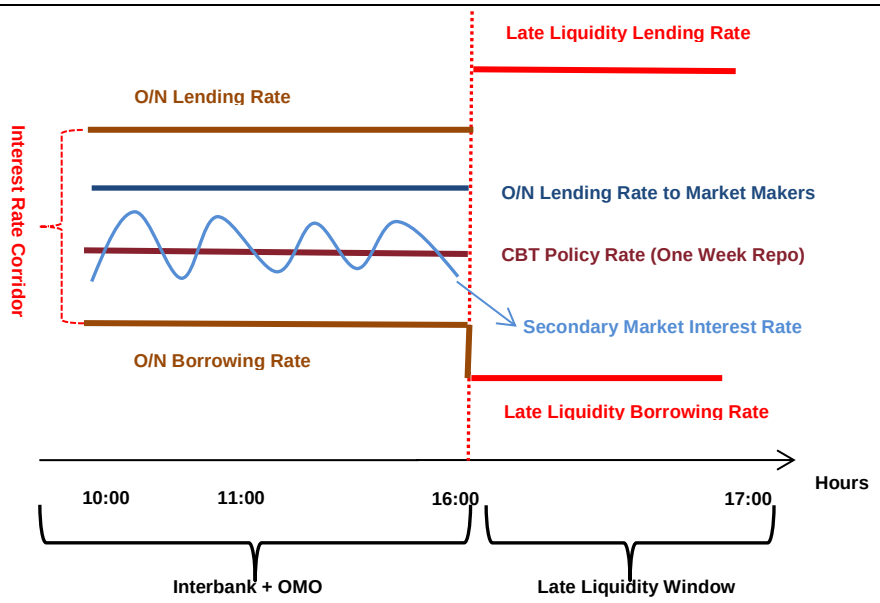
The asymmetric interest rate corridor is a new tool developed by the CBRT to increase the flexibility of monetary policy. It provides the ability to make timely responses to external finance or risk sentiment shocks through active management of daily open market operations. In order to understand how the mechanism works, it will be useful to briefly review the operational framework of monetary policy.

The CBRT, like many other central banks, has various instruments at its disposal to affect the amount of liquidity and interest rates in the interbank money market. Since funding is provided mainly through weekly repo transactions, the one-week repo funding rate is called the "policy rate". However, in principle, the CBRT can also provide daily, weekly, or monthly funding to banks that are short of liquidity, and borrow at the O/N borrowing rate from those that have an excess of it. The area between the O/N borrowing and lending rates is called the "interest rate corridor" (Figure 5). As a requirement of the operational structure, market rates are formed within the interest rate corridor.

[4] For details of the design and implementation of the new policy framework, see Başçı and Kara (2011) and Kara (2012).

Operational framework of CBRT's monetary policy

Figure 5



Up to here, there is nothing special in the operational framework. In fact, having an interest corridor for operational purposes is fairly common among central banks. What makes the Turkish case unique is the use of the width of the corridor as a policy instrument. In the conventional structure, the interest rate corridor is used as a two-sided buffer to prevent market rates from deviating significantly from the policy rate. The interest rate corridor is defined as a symmetrical (generally unchanged) narrow band around the policy rate. In other words, the interest rate corridor assumes a passive role. On the other hand, the CBRT's current system uses the interest rate corridor as an active instrument: The CBRT can adjust the width of the interest rate corridor (possibly in an asymmetric way) when necessary. In this structure, the interest rate corridor not only facilitates a faster and more flexible reaction to volatility in short-term capital movements, but also can be used as an effective instrument against credit growth.

The main contribution of the asymmetric interest rate corridor system is the flexibility it provides for reacting to capital flows. In the traditional inflation targeting framework, interest rates are fixed for a predetermined period (typically for one month). In other words, the central bank short-term interest rates depicted in Figure 5 stay unchanged between the periodic monetary policy meetings. Once the rates are announced, short-term money market rates stay close to the policy rate, reflecting the central bank's implicit commitment to keep the money market rates constant until the next meeting. However, under the new system implemented by the CBRT, there is no rigid commitment to keep the level of market rates constant at a predetermined rate. Market interest rates can be changed, if needed, on a daily basis, by adjusting the quantity of funds provided through one-week repo auctions. Accordingly, the overnight rate can be targeted anywhere inside the corridor.

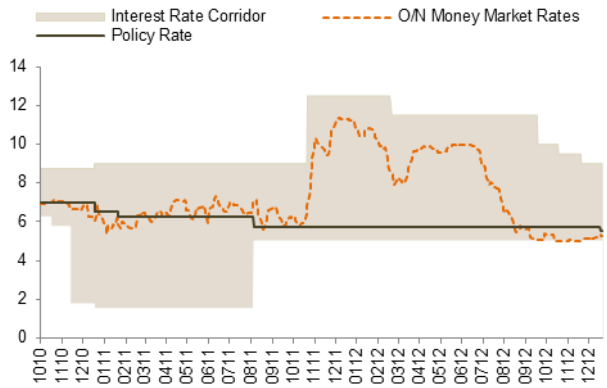
In this setup, the width of the interest rate corridor represents the range within which interest rates can fluctuate. In other words, it signals the maximum possible change that can be engineered in short-term market rates via daily liquidity operations. As a consequence, both the width of the corridor and upper/lower bounds matter for expectations and monetary policy. When the inflows are strong

(weak), the interest rate corridor may be widened downwards (upwards). The CBRT can "fine tune" the amount of liquidity in the money market via daily liquidity operations, letting the market O/N rate fluctuate within the corridor, depending on the intensity and direction of capital flows. The monetary stance can be adjusted, as needed, in response to rapid changes in the global risk appetite. This framework allows the liquidity policy to smooth out the impact of sharp changes in capital flows on exchange rates, thereby reducing the need for direct FX intervention.

The interest rate corridor may be also used to change the composition of inflows during "capital flood" episodes. This can be achieved by creating short-term interest rate uncertainty in money markets via liquidity management facilities. The short-term interest volatility created using the interest rate corridor should discourage short-term capital flows, yet remain less relevant for long-term investors.

Asymmetric corridor system and O/N money market rates

(percent) Figure 6



Source: ISE, CBRT.

Figure 6 shows the implementation of the corridor policy. Since year-end 2010, the CBRT has been using the interest rate corridor as an active policy tool. There have been three main phases during this period:

i) *QE2 and surging capital inflows at the end of 2010.* During this period, the lower bound of the interest rate corridor (O/N borrowing rate) was cut significantly, and interest rate volatility was increased, to discourage short-term capital inflows.

ii) *Intensification of the Euro Area debt crisis.* Global markets witnessed a sudden reversal in risk sentiment during the last quarter of 2011. In order to avoid a sudden stop, and to contain the depreciation of the exchange rate, the interest rate corridor was widened by increasing the upper bound (O/N lending rate).

iii) *Removal of tail risks associated with a break-up in the Euro Area.* There has been a resurgence of capital inflows to emerging markets since mid-2012. The CBRT responded by increasing the liquidity injected to the money market and thus lowering short-term market rates. The upper bound of the interest rate was cut gradually in response to persisting capital inflows.

In sum, the interest rate corridor was actively used to counterbalance the impact of capital flows in the past two years.[5] Although direct interventions (outright sales of FX) were used to complement the corridor system in the last quarter of 2011, more active use of the asymmetric corridor, coupled with the adoption of the Reserve Option Mechanism (described below), has gradually eased the need to intervene in FX markets. As a consequence, the CBRT has not resorted to direct interventions since January 2012.

Reserve option mechanism

Another recent instrument introduced by the CBRT to smooth exchange rate volatility is the Reserve Option Mechanism (ROM). This is a novel tool designed to act as a sort of an automatic FX intervention mechanism (but a more market-friendly one), reducing the adverse impact of excessively volatile capital flows on macroeconomic and financial stability. Below, we describe the main features of the ROM and evaluate its main transmission channels.[6]

The ROM is a mechanism that allows banks to voluntarily hold a certain proportion of their Turkish lira (TL) reserve requirements in foreign exchange (FX) and/or gold. The amount of FX or gold that can be held per unit of Turkish lira is called the reserve option coefficient (ROC). For example, if the ROC is 2, banks must hold 2 liras worth of FX or gold per 1 TL reserve requirement if they wish to utilize the ROM facility.

A simple example may help to understand the mechanism. Suppose that banks have to hold 100 TL reserve requirements in total for their TL liabilities. Let us assume that the ROM allows the banks to hold up to 90 percent of their TL reserve requirements in FX and that the ROC is equal to 1. Let us further assume that the USD/TL exchange rate is 1.8. In this case, if the bank prefers to use the facility fully in USD, it has to hold the 90-TL equivalent of USD, which is 90/1.8 = 50 USD. If this is the case, banks will hold 50 USD (90 TL) plus 10 TL, to fulfill their 100 TL of total reserve requirements. If the ROC is set at 2 instead of 1, the banks will have to hold the 2-TL equivalent of FX per 1 TL. In this case, if the banks wish to utilize the facility fully, they will hold the 90*2, i.e. 180-TL, equivalent of FX for their 90 TL reserve requirements, which will be 180/1.8=100 USD.

In the example above, for purposes of simplicity, the ROC is assumed to be uniformly distributed across the whole reserve option facility (up to 90 percent in our example). However, the ROC does not have to be constant across all tranches. For example, in the above example, it is possible to set the ROC, say, at 1 through the first-40-percent tranche, and at 2 for the remaining 50 percent. In fact, as we will explain below, increasing the ROC across tranches may lead to a more efficient system under certain conditions.

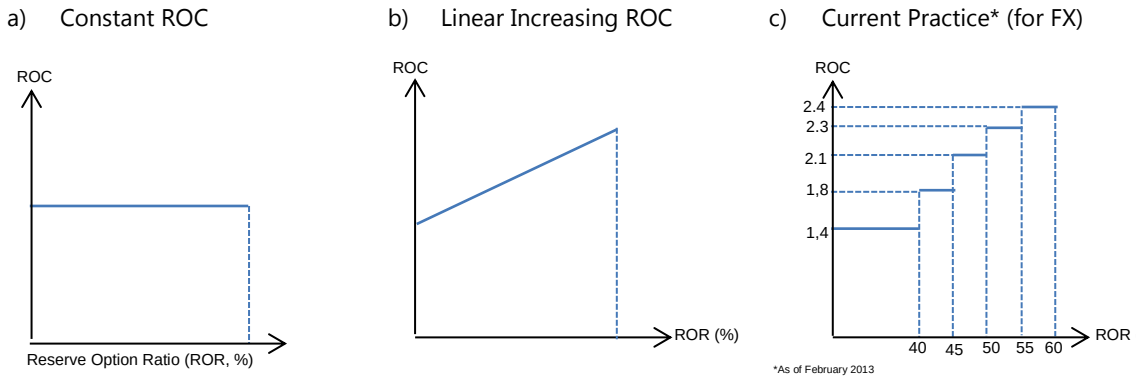
Figure 7 presents some examples of the alternative ways of setting the ROC. The first panel depicts the case of a constant ROC. In the second panel, the ROC increases linearly across reserve option ratios. In this case, banks have to hold higher amounts of FX per unit of TL if they wish to use the facility more intensively. The last panel corresponds to the current practice of the CBRT: The ROC is an

[5] See Kara (2012) for details.

[6] This section is partly based on Alper, Kara and Yörükoğlu (2012).

increasing function of reserves; however, for practical implementation purposes, the use of the whole facility is discretized by 5 percent tranches.

Some examples for the setting of the ROC — Figure 7



As explained above, banks may not always opt to utilize the ROM facility in full. Up to what fraction banks will use the ROM depends on the relative cost of FX funding to TL funding. For example, in the case of a ROC equal to 1, the banks will use the ROM facility fully if FX borrowing is less costly than TL borrowing, provided that there is no quantity constraint for FX-denominated borrowing. On the other hand, in the case of an increasing ROC across reserve option ratios, the banks will prefer not to use the facility fully if the ROC is "sufficiently high" at the highest tranches. The "threshold ROC", the level of ROC that makes banks indifferent about using or not using the facility, will depend on the relative cost of FX and TL funding. For example, if the cost of Turkish lira funding is 6 percent and the cost of FX funding is 3 percent (including the expected depreciation), the threshold ROC will be 2. In other words, banks will be expected to use the ROM up to a point where the ROC is equal to 2. Technically, the threshold ROC can be expressed as follows:

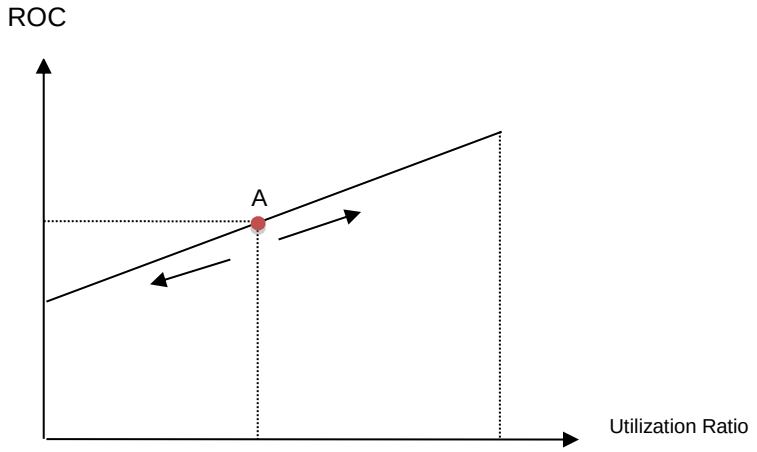
$$ROC^{tr} = \frac{r_t^{TL}}{r_t^{FX} * \frac{E(e_{t+1})}{e_t}} \qquad (1)$$

In the equation, ROC^{tr} denotes threshold ROC, r_t^{TL} denotes the cost of TL funding, r_t^{FX} is the cost of FX funding, e_t is the spot exchange rate at the beginning of the maintenance period, and $E(e_{t+1})$ is the expected exchange rate for the end of the maintenance period. In this formula, r_t^{TL} is the cost the bank incurs if it prefers to maintain the Turkish lira reserve requirements by borrowing in TL. The denominator $(r_t^{FX} * E(e_{t+1})/e_t)$ denotes the bank's expected cost at the end of the maintenance period (denominated in TL), should it choose to use the ROM and fulfill the Turkish lira reserve requirement through FX borrowing.

Each bank's threshold ROC will depend on the relative funding cost shown in equation (1). The fact that each bank can solve its own maximization problem (depending on the relative costs and availability of credit) is critical, as it facilitates the system's working as an automatic stabilizer in the face of external funding shocks.

Impact of the change in relative funding costs on the threshold ROC

Figure 8



Now, in order to understand the automatic intervention mechanism, let us use a simple figure to analyze the interaction of cross-border capital flows with ROM. Assume that the ROC is linearly increasing in reserve option ratios as in Figure 8, and that the point "A" represents the threshold ROC at a certain period. The automatic stabilizer mechanism in the face of capital flows is expected to work as follows.

During an acceleration of capital inflows: These periods are typically characterized by a decline in FX funding costs relative to TL funding costs and/or a relaxation of quantity constraints. In the case of a relative decline in FX borrowing costs, the threshold ROC will increase, inducing banks to hold a higher ratio of their TL reserve requirement liabilities in FX. In other words, profit maximization behavior will lead the banks to use the ROM facility more intensively, increasing the "ROM utilization ratio". Accordingly, point A will shift to the right along the line, increasing both the threshold ROC and, consequently, the utilization ratio. In this case, a fraction of the foreign exchange inflows will be withdrawn, since they will be placed at the CBRT accounts of the banks as reserve requirements. This will not only contain the appreciation pressure on the TL but also limit the conversion of the FX inflows into bank lending, weakening the linkage of capital flows, credit, and exchange rate. On the other hand, if there are quantity constraints on bank borrowing, accelerating capital inflows will lead to a relaxation of these constraints, and once again shift point "A" to the right. This means that the utilization ratio will increase again and thus some of the inflows will voluntarily park at the CBRT. In both cases, some TL liquidity will be injected into the system. Yet the amount will be less – and thus sterilization costs will be lower – than in the case of direct FX purchasing by the CBRT, as long as the ROC is greater than 1 (see the balance sheet example below).

During a deceleration of capital inflows: These periods are typically characterized by an increase in FX funding costs relative to TL funding costs, and/or a tightening of external borrowing constraints, which will shift point "A" in Figure 2 to the left. This will lead to a fall in the utilization of the ROM and release some of the FX liquidity held by the banks at the CBRT, limiting depreciation pressures and reducing the possibility of a credit squeeze. Once again, the ROM will act as an automatic stabilizer.

Thus, by providing the banks with the flexibility to adjust their foreign exchange reserves depending on changes in external financing conditions, the ROM alleviates the impact of volatile capital flows on the exchange rate and credit volumes. As a by-product, there is less need for direct FX intervention.

Is the ROM more efficient than direct FX interventions?

In order to contrast the ROM with conventional sterilized intervention in the face of capital inflows, Table 2 conducts a simple balance sheet analysis of the aggregate balance sheet of the banking system. For all cases in the table, banks borrow 100 units of foreign currency from abroad (for the sake of simplicity, we assume that the exchange rate is 1 and there are no reserve requirements for FX liabilities).[7]

Effects of capital flows on the balance sheet of the banking system

Table 2

a) Base Scenario		b) Sterilized Intervention	
Assets	Liabilities	Assets	Liabilities
Loans +100	Due to foreign banks +100	Loans +50	Due to foreign banks +100 Due to CB (Repo) -50
c) ROC=1		**d) ROC=2**	
Assets	Liabilities	Assets	Liabilities
Loans +50 TL RR (ROM) +50 Due from CB -50	Due to Foreign Banks +100 Due to CB (Repo) –50	Loans +0 TL RR (ROM) +100 Due from CB –50	Due to Foreign Banks +100 Due to CB (Repo) –50

The first panel of the table describes the case of no policy response. Under this scenario, 100 units of capital inflows are fully converted into FX-denominated credit by banks. Moreover, the rise in the domestic supply of foreign currency would exert appreciation pressure on the domestic currency. This means that, *ceteris paribus*, both the exchange rate and credit would deviate from the desirable path. The typical response of central banks to such a situation has traditionally been to conduct sterilized FX intervention, which is shown in the second panel of the table. Here the central bank purchases 50 units of FX and simultaneously sterilizes the liquidity injected to the market. With this policy, the central bank contains some of the appreciation pressure on the domestic currency. Moreover, domestic interest rates stay intact because of the sterilization. However, this does not necessarily mean that the impact of capital inflows on credit growth is fully sterilized in practice. Since the banks' need for domestic currency liquidity decreases as their liquidity

[7] It should be noted that the results would remain the same if one considered the portfolio flows. In that case capital flows would end up as FX deposits on the banks' balance sheets.

positions improve, the situation may encourage them to expand their loan portfolio.[8]

The ROM, if calibrated properly, may be more effective than sterilized intervention in containing the impact of capital inflows on credit and exchange rates. To demonstrate this, the last two panels of the table analyze the scenarios where capital inflows are absorbed by using the ROM facility. In panel (c), ROC=1, whereas in the final panel ROC=2. To compare the results with the sterilized FX example, we assume that under both scenarios the central bank withdraws the amount of FX needed to fulfill 50 TL of reserve requirements. As shown in the aggregate balance sheet of the banks, the consequences of sterilized intervention and the consequences of the ROM are quite similar when the ROC is set at 1.

The merits of using the ROM become clearer when the ROC is greater than 1, i.e. when banks have to hold more FX for each unit of TL reserve requirements. When ROC>1, the central bank can withdraw more FX from the market (than in the previous case) for each unit of TL reserve requirements. The balance sheet in panel (d) shows the case ROC=2. In this case, banks deposit 100 units of FX to the central bank in exchange for 50 units of TL reserve requirements. Therefore, all 100 units of FX inflows are absorbed by the ROM facility and there is no additional credit expansion by the banks. This is absolute sterilization.

In sum, the ROM has the potential to be more effective than sterilized intervention in neutralizing the effects of fluctuations in the supply of foreign currency on domestic markets.

Another advantage of the ROM over sterilized FX intervention is its potential to be a more efficient tool economically. Direct intervention decisions are mostly discretionary by nature and impose the same restrictions on all relevant agents. The results of the ROM, on the other hand, derive from the optimization policies of the individual banks, which may lead to a more efficient outcome in terms of resource utilization.

The ROM is also easier to communicate and implement than discretionary tools such as FX intervention. Thus, unlike direct intervention procedures, the ROM runs less risk of provoking speculative FX demand. An FX intervention aiming to smooth exchange rate volatility may be (mis)perceived as an attempt to defend some exchange rate level or as a change in monetary policy stance, leaving the currency prone to speculative attacks. Indeed, the likelihood of interventions' attracting speculative attacks is one of the reasons that central banks opt for covert intervention (see, for example, Archer, 2005). In contrast, withdrawal or injection of FX liquidity through the ROM (assuming that it operates as an automatic stabilizer) does not pose such a problem, since it is largely an outcome of optimization decisions by the banks.

In addition to the possible negative side effects of intervention, its effectiveness in influencing the exchange rate is debatable. Disyatat and Galati (2004) argue that existing empirical evidence indicates that intervention may be a useful tool only to

[8] Garcia (2011), with a simple IS-LM type model, shows that contrary to conventional wisdom, sterilization may be expansionary. He argues that when capital flows take the form of foreign borrowing by domestic banks, the central bank's sterilization should induce an increase in banks' bond holdings. However, with increased liabilities, banks are drawn to diversify their assets, leading them to enlarge their loan portfolio. In other words, in his model a portfolio balance effect is generated inside the bank.

cope with short-run exchange rate fluctuations arising from temporary shocks. Turkish experience does also yield mixed results so far. Domaç and Mendoza (2002), studying the experiences of Mexico and Turkey, conclude that while sale operations are effective in reducing volatility, purchase operations are not. Another empirical study on experience in Turkey, by Akıncı et al. (2004), concludes that only large and isolated purchase interventions were effective in curbing exchange rate volatility, while appreciation/depreciation trends seem to remain impervious to intervention. Özlü (2006), investigating the effects of intervention on the risk premium under two different exchange rate regimes for Turkey, concludes that neither sale nor purchases of US dollars had any effect on the size of the risk premium for the TL/USD exchange rate under either managed or free-float regimes.

It is important to note that the ROM is not intended as a full replacement for FX intervention. The adoption of the ROM reduces, but does not completely remove, the need for discretionary intervention. Although it has the potential to be a more efficient tool than just selling and purchasing FX in a discretionary fashion, its power as a signaling and coordination device at times of extreme stress may not be as strong as that of discretionary interventions. Moreover, the liquidity-managing capacity of the ROM may not adjust quickly enough. Abrupt swings in capital flows and/or unhealthy price formation in the FX market may still necessitate the use of intervention as a supplementary instrument. Therefore, there may be circumstances where discretionary intervention tools[9] are needed.

Finally, it is worth mentioning that the corridor and the ROM can also work as complementary tools on certain occasions. For example, the presence of the corridor provides flexibility for sterilizing the liquidity effects of the ROM. In the standard inflation targeting framework, the TL liquidity injected into the system through FX withdrawals has to be almost fully sterilized, since the central bank commits to keep short-term interest rates close to a pre-announced policy rate. On the other hand, the existing corridor system allows short-term interest to fluctuate freely within the corridor, providing ample flexibility in terms of sterilization. For example, during a surge of capital inflows, the central bank will have the option of not fully sterilizing the domestic currency liquidity injected through the ROM, by letting short-term interest rates decline. A fall in short-term rates may further discourage short-term capital inflows in such a case, strengthening the ROM's role in smoothing the exchange rate and credit fluctuations.

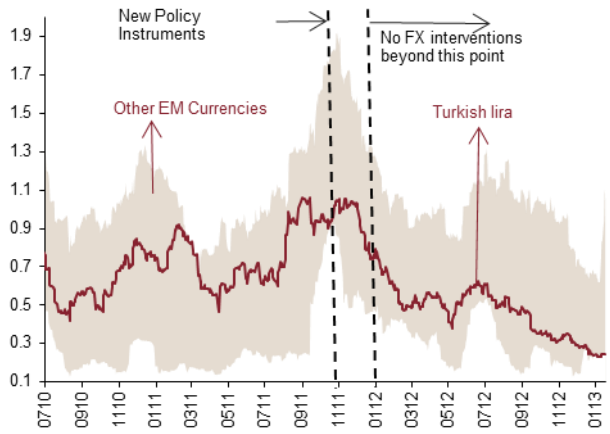
New Instruments and Exchange Rate Volatility: Empirical Evidence

Throughout this paper, we have argued that the adoption of policy instruments such as the ROM and the interest rate corridor have reduced the need for direct intervention. In fact, several recent studies conducted by the CBRT staff provide evidence on the role of the new instruments in reducing FX volatility. Using a GARCH framework, Akçelik et al. (2012) find that the active interest rate corridor and liquidity policy (adjusting liquidity conditions frequently to counterbalance exchange rate movements) have been associated with lower FX volatility. In a companion paper, Oduncu et al. (2013) show that the ROM has had a significant role in reducing the excess volatility of nominal exchange rates.

[9] Spot foreign exchange transactions, swaps, options and verbal operations are examples of such discretionary intervention instruments.

Volatility of the Turkish lira and other EM currencies* against USD

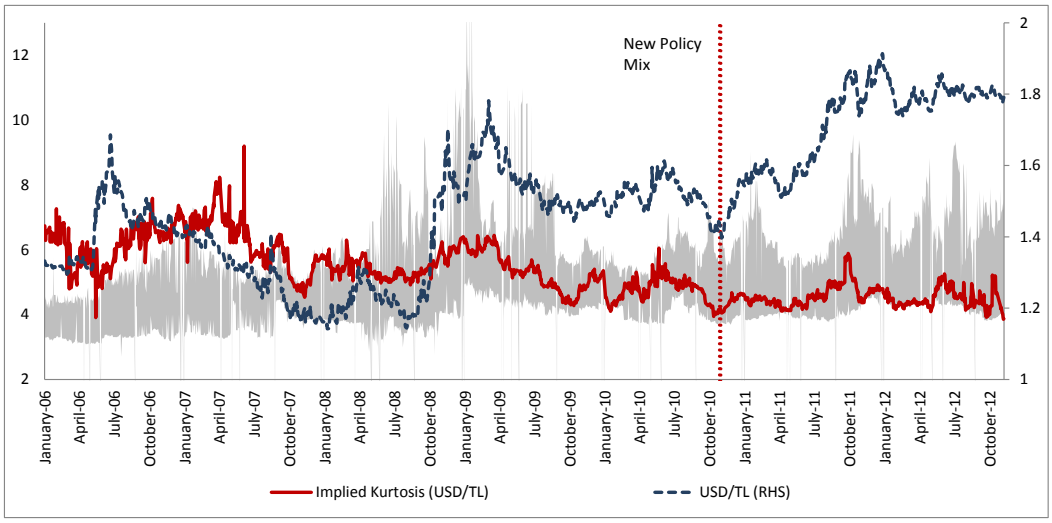
(30-day moving average) Figure 9



* The sample contains countries with current account deficits: Brazil, Chile, Columbia, Czech Republic, Hungary, Indonesia, Mexico, Poland, Romania, South Africa, and Turkey.

Another way to test the effectiveness of the new instruments is to compare the Turkish lira with peer currencies, and see whether relative volatility of the TL has declined after the introduction of new instruments. Figure 9 shows that the answer is affirmative. The first broken line marks the beginning of the adoption of the ROM mechanism and the active use of the upper bound of the interest rate corridor (November 2011). The second shows the date of the last FX intervention. It is evident at first sight that the relative volatility of the Turkish lira has declined considerably compared to peer emerging-market currencies, despite the fact that the CBRT did not resort direct FX interventions in 2012.

Implied kurtosis of the USD/TL exchange rate expectations* Figure 10



* The shaded area denotes the maximum and minimum kurtosis of FX expectations for 10 emerging economies with current account deficits.

Source: Değerli and Fendoğlu (2013)

Using distributions extracted from options prices, Değerli and Fendoğlu (2013) find that the implied volatility of the Turkish lira vis-à-vis the US dollar has declined considerably since the introduction of new policy instruments, compared to peer emerging-market currencies. More importantly, the relative kurtosis of the distribution has declined markedly since the implementation of the new policy mix in late 2010 (Figure 10). This result is important because the kurtosis of the distribution is somewhat related to the probability of a sudden stop. These observations suggests that the adoption of the new policy mix and the introduction of new instruments such as the asymmetric interest rate corridor and the ROM have considerably reduced the tail risks associated with sharp movements in exchange rates.

Summary and conclusions

Persisting volatility in cross-border financial flows and the increased emphasis on financial stability have once again shifted the focus to exchange rate movements across the globe. Historically, in this environment, direct FX interventions emerge as a natural policy tool. However, the evidence on the effectiveness of intervention is, at best, mixed. Interventions are costly and may entail undesired signaling effects. In this study, we have argued that new alternatives to FX interventions are worth exploring, as demonstrated by the Turkish experience. Recent evidence suggests that the new toolkit developed by the CBRT has so far been effective in reducing exchange rate volatility and tail risks without using FX interventions. As a consequence, the Turkish lira has been one of the least volatile currencies among emerging markets. These observations lend support to the view that new instruments such as an asymmetric interest rate corridor and the Reserve Option Mechanism have largely eased the need for direct intervention. Moreover, these instruments, by nature, have the potential to be more efficient and market-friendly than conventional interventions. All in all, we conclude that Turkish approach may offer an alternative way to deal with the post-crisis exchange rate volatility.

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