

CBT RESEARCH NOTES IN ECONOMICS

Reserve Options Mechanism and Computation of Reserve Options Coefficients¹

Doruk Küçüksaraç

Özgür Özel

Özet: Bu notta son dönemde TCMB tarafından aktif bir politika aracı olarak kullanılan rezerv opsiyonu mekanizması (ROM) kapsamında TCMB'nin Türk lirası zorunlu karşılıklar için döviz ve altın bulundurma imkânı değerlendirilmiştir. Daha sonra imkânı diğer fonlama maliyetleriyle kayıtsız bırakan rezerv opsiyonu katsayı değerlerinin hesaplanma yöntemi ele alınmış ve bu hususta bir örnek sunulmuştur. Kritik katsayı değerlerinin temel olarak; yabancı para ve Türk lirası fon bulma maliyetlerine, Libor faiz oranına, Türk lirası swap faiz oranına ve yabancı para zorunlu karşılık oranına bağlı olduğu gözlenmektedir. Katsayı değerinin özellikle yabancı para cinsi borçlanma maliyetlerine hassas olduğu dikkat çekmektedir.

This note evaluates the option to hold Turkish lira reserves in foreign **Abstract:** currency and gold within the context of reserve options mechanism (ROM). We exemplify calculation of reserve options coefficient(s) leaving banks indifferent between the reserve option and other main funding sources that can be used for holding reserve requirements. The breakeven reserve options coefficient(s) mainly depends on interest rates on foreign currency and Turkish lira funds, Libor, Turkish lira swap rates and reserve requirement ratio on foreign funds. The breakeven reserve options coefficient(s) are highly sensitive to changes in interest rates on funds denominated in foreign currency.

¹ The authors would like to thank to Erdem Başçı, Mehmet Yörükoğlu, Hakan Kara and Mustafa Kılınç for their valuable comments.

1.Introduction

The reserve options mechanism (ROM) is a new monetary policy tool deployed by the Central Bank of the Republic of Turkey (CBRT). As a first step, on 12 September 2011, the CBRT granted commercial banks (banks) the option to hold a fraction of their mandatory required reserves for Turkish lira (TL) liabilities in foreign currency, specifically in US dollars (USD) and euro. In the meanwhile, the size of the option has been increased and its scope has been widened to encompass gold as a means of meeting TL reserve requirements, as well. At the initial stage banks were allowed to replace 1 TL reserve requirement with FX equivalent of 1 TL. Later, the CBRT increased the amount of FX to be held per unit of TL required reserve is called reserve options coefficient(s) (ROC).

Typically, ROC is an increasing function of different tranches of the TL required reserves. In other words, the more banks want to use the option, the higher foreign currency/gold they have to deposit to the CBRT to fulfill one unit of TL reserve requirement. The tranches of the mechanism and the corresponding levels of ROC are determined by the CBRT. Specifically, as of 26 November 2012, the ROC levels for foreign currency and gold are presented in the following graphs (Graph 1 and Graph 2).



As seen in the graph, ROC in both foreign currency and gold are increasing in specific tranches of TL required reserves. Currently, banks are able to exploit the first tranches of foreign currency and gold with ROC of 1.4 and 1.2, respectively. On the other hand, the highest ROC are 2.4 and 2.2 for foreign currency and gold, respectively. In case banks use both facilities fully, they

may hold up to 60 percent of their TL required reserves in foreign currency and 30 percent in gold.

The level of the ROC is an important parameter for the utilization ratio of the ROM facility. At a certain ROC level, banks are expected to be indifferent between using and not using the facility, which we call "breakeven" ROC. For policy makers and banks, it is important to calculate the breakeven ROC leaving banks indifferent between the reserve options facility and other funding sources for holding Turkish lira reserve requirements. Accordingly, this note aims to contribute to the understanding of the ROM by detecting the variables determining the breakeven ROC.

2. ROM as a Monetary Policy Tool

The reserve options mechanism grants banks substantial flexibility in their liquidity management. Furthermore, since the Turkish banks' current cost of borrowing in foreign currency and gold is lower compared to that in TL, banks are able to hold their TL required reserves at a lower cost. However the CBRT may adjust reserve holding costs by changing ROC.

Another advantage of ROM is the incentive it provides to banks to voluntarily accumulate foreign currency and gold reserves to be used in rainy days. During periods of strong capital inflows, banks typically acquire foreign currency funds easily and at a lower cost, and therefore have a tendency to use the option heavily. This eases excessive appreciation pressure on TL and at the same time curbs rapid credit growth especially in foreign currency denominated credits. On the contrary, during capital outflow periods, accumulated reserves will mitigate banks' vulnerability arising from foreign currency squeeze, which otherwise would result in a rapid and excessive depreciation of the local currency. In this respect, the mechanism acts as a volatility-dampener of the TL. Furthermore, it decreases the sensitivity of credit growth to volatile capital flows. By lowering the responsiveness of the TL and credit growth to capital flows, ROM acts as an automatic stabilizer.²

The CBRT can use the new tool in both foreign currency/gold and TL liquidity management. In order to mop up more foreign currency/ gold liquidity from the market, the CBRT might increase current coefficients, and/or add another tranche to the ROM. In the latter case, the banks will have access to fresh TL funding, whereas the former case does not result in a change in TL liquidity.

Another potential contribution of ROM may work through a reduction especially in short-term currency swaps. As banks use ROM facility more heavily, there may be less need for currency

² See Alper, Kara, and Yörükoğlu (2012) for a demonstration of this mechanism through bank balance sheet representation.

swaps, which may ease the potential volatility resulting from the need for short-term borrowing. The facility is expected to limit banks' short-term currency swap transactions.

Lastly, ROM boosts the CBRT gross foreign currency and gold reserves at times of capital inflows and reduces them in case of capital outflows. Yet, since the CBRT does not acquire the foreign currency/gold used by the banks in the ROM framework, the net foreign currency/gold reserves of the CBRT are unaffected by the utilization of the new mechanism.

3. Calculation of Breakeven Reserve Options Coefficient(s)

The extent to which banks utilize the reserve options facility depends on the availability of foreign funds and the level of reserve options coefficient(s). Therefore it is important to calculate the breakeven ROC leaving banks indifferent between the reserve options facility and other funding sources for holding Turkish lira reserve requirements. Below, we provide an example of how to calculate the breakeven ROC for reserve option enabling banks to hold TL required reserves in FX, when the alternative funding source for fulfilling reserve requirements is currency swaps.³

One of the sources that banks use for holding Turkish lira reserve requirements is currency swaps that enable banks to convert their foreign currency funds into Turkish lira. A bank that has to hold S_0 ⁴units of TL reserve requirement by using currency swaps needs to adhere to the following steps:

- Borrow $\frac{1}{(1-RR_{\nu})}$ \$ at the cost of LIBOR + spread.
- Hold foreign currency reserve requirement for these funds.
- After fulfilling reserve requirement for foreign currency borrowing, the bank has 1\$.
- The bank engages in a currency swap transaction to exchange 1 \$ for S_0 TL in the spot.
- The bank also makes a forward agreement in order to hedge the exchange rate risk. The amount of forward agreement is the difference between the interest payments of borrowed $\frac{1}{(1-RR_y)}$ \$ and interest revenues that will be received from 1\$ which has been lent in currency swap transaction.
- The bank holds its Turkish lira reserve requirement at the amount of S_0 TL.

We also construct a table indicating the flow of funds in each currency at the outset and the maturity for illustration (Table 1).

³ Another example of breakeven ROC can be found in Inflation Report IV, 2012 Box 5.1.

⁴ For the purposes of this note, S_0 denotes the current spot USD/TL exchange rate.

Table 1: Holding TL Reserve Requirements By Converting Foreign Currency Funds to Turkish Lira Through Currency Swaps					
	Currency	At the Spot	At the Maturity		
Borrow foreign currency funds at the cost of Libor + spread	TL				
	\$	$\frac{1}{(1 - RR_y)}$	- $[1 + (Libor + p)\frac{t}{365}]\frac{1}{(1-RR_y)}$		
Hold foreign currency reserve requirement against foreign currency funds borrowed	TL				
	\$	$-\frac{\mathrm{RR}_{\mathrm{y}}}{(1-\mathrm{RR}_{\mathrm{y}})}$	$+\frac{\mathrm{RR}_{\mathrm{y}}}{(1-\mathrm{RR}_{\mathrm{y}})}$		
Enter into a currency swap transaction	TL	+S ₀	$-S_0 \left(1 + swap_{TL} \frac{t}{365}\right)$		
	\$	-1	$(1 + Libor \frac{t}{365})$		
Hold Turkish lira reserve requirement	TL	-S ₀	+S ₀		
	\$				
NET CASH FLOW	TL	0	$-S_0 swap_{TL} \frac{t}{365}$		
	\$	0	$-\frac{1}{(1-RR_y)}(Libor+p)\frac{t}{365}+Libor\frac{t}{365}$		

The net cash flow in USD will be converted to Turkish lira at the exchange rate which has been fixed through the forward agreement. In addition to that, we also need to take into account the interest payment in TL for the borrowed funds in currency swap. The total cost in TL for holding S_0 units of TL reserve requirement will be as follows:

$$Total \ Cost = \left[\frac{1}{\left(1 - RR_{y}\right)} \left(Libor + p\right)\frac{t}{365} - Libor \ \frac{t}{365}\right]F_{0} + \left(S_{0}swap_{TL}\frac{t}{365}\right)$$

RR_v: Reserve requirement ratio for foreign currency funds

 F_0 : Forward exchange rate which is determined at time t = 0

swap_{TL}: TL interest rate in currency swap transaction

p: Spread which banks pay over Libor in their foreign currency borrowing.

On the other hand, the necessary steps for holding S_0 units of Turkish lira using the reserve options facility of the CBRT can be demonstrated as follows:

- Borrows $\frac{x}{(1-RR_y)^5}$ \$ at the cost of LIBOR+ spread.
- Holds foreign currency reserve requirement for these funds.
- After holding foreign currency reserve requirement, the bank has x units of \$.
- The bank enters into a forward agreement in order to hedge exchange rate risk. The amount of forward agreement is equal to the interest payments of borrowed $\frac{x}{(1-RR_y)}$ \$.
- The bank holds its Turkish lira reserve requirement at the amount of S_0 TL.

⁵ x denotes the ROC level the banks need to meet in order to utilize the facility.

Table 2: Holding Turkish Lira Reserve Requirement Through Reserve Options Facility					
	Currency	At the Spot	At the Maturity		
Borrow foreign currency funds at the cost of Libor+spread	TL				
	\$	$\frac{x}{(1 - RR_y)}$	- $[1 + (Libor + p)\frac{t}{365}]\frac{x}{(1-RR_y)}$		
Hold foreign currency reserve requirement against foreign currency funds borrowed	TL				
	\$	$-\frac{\mathbf{x} * \mathbf{RR}_{\mathbf{y}}}{(1 - \mathbf{RR}_{\mathbf{y}})}$	$+\frac{\mathbf{x} \ast \mathbf{RR}_{\mathbf{y}}}{(1-\mathbf{RR}_{\mathbf{y}})}$		
Hold Turkish lira reserve requirement	TL				
	\$	-x	+x		
NET CASH FLOW	TL	0			
	\$	0	$-\frac{x}{(1-RR_y)} (Libor + p)\frac{t}{365}$		

The total TL cost for holding S₀ units of reserve requirement will be as follows:

$$Total Cost = \frac{x}{(1 - RR_y)} \left[(Libor + p)\frac{t}{365} \right] F_0$$

To calculate the reserve options coefficient(s) leaving banks indifferent between two possible alternatives for holding Turkish lira reserve requirement, we equate the total costs of both strategies, in order to find the breakeven ROC.

$$x = 1 + \frac{1 - RR_y}{(Libor + p)} \frac{swap_{TL} - Libor}{\left(1 + swap_{TL}\frac{t}{365}\right)}$$

The breakeven ROC depends on the cost of foreign currency funds, Turkish lira swap rates, Libor and reserve requirement ratio for foreign currency. However, the main determinant of breakeven ROC is the foreign currency interest rate. The graphs below show the sensitivity of breakeven ROC to several parameters based on the current levels of parameters determining the breakeven ROC.⁶ We observe that the breakeven ROC displays the highest sensitivity to the changes in spread (Table 3).

⁶ The analysis is conducted using the current values of the respective variables.



4. Factors Affecting ROM Usage of Banks

Obviously, the level of ROC is an important factor for banks' usage of the current mechanism. Other factors playing a role in the utilization of the mechanism are the required reserve ratios, and borrowing costs in TL, foreign currency and gold. Intuitively, banks will try to minimize total required reserve holding costs for TL liabilities by borrowing the minimum amount of funds (induced by the ROC level and the required reserves ratios) at a lower cost (induced by the level of borrowing costs).7

Although the ROC level and the required reserve ratios are the same for all banks, their ability to acquire lower cost foreign currency/gold funds, or the ability to be funded in foreign currency/gold at all, depends on bank specific factors. Therefore, the utilization pattern of the mechanism differs among banks. Currently some banks use the reserve options mechanism fully, some utilize it only partially, yet there are banks that do not use the facility, at all. Despite this

⁷ The required reserves in TL, foreign currency and gold are <u>not</u> remunerated by the CBRT.



heterogeneity, the aggregate utilization rates of the ROM as of 12 October 2012 are quite high in the Turkish banking sector (Graph 3 and Graph 4).

5. Conclusion

Lately, the ROM has been used by the CBRT as an active policy tool. This mechanism enables commercial banks to hold up to 60 percent and 30 percent of their TL required reserves in foreign currency and gold, respectively. However, the possible range has been divided to tranches, and the scheme is designed so that it is more costly to use the upper tranches. The idea is that after a certain ROC level banks should be indifferent between using and not using the facility. This note contributes to the understanding of ROM by calculating the breakeven ROC leaving banks indifferent between the reserve options facility and other funding sources for holding Turkish lira reserve requirements. Our analysis shows that (besides the level of the ROC) the required reserve ratios, as well as borrowing costs in TL, foreign currency and gold are key parameters banks have to consider in their evaluation of the ROM utilization. We observe that the breakeven ROC displays the highest sensitivity to the changes in external borrowing spreads. Assuming that spreads are sensitive to external funding conditions and risk appetite, the ROM has the potential to act as an automatic stabilizer against capital flow volatility.

References

- Alper, K., H. Kara, and M. Yörükoğlu, 2012, "Reserve Options Mechanism", The CBT Research Notes in Economics No.12/28.
- Küçüksaraç, D., and Özel, Ö. (2012), "Rezerv Opsiyonu Mekanizması ve Optimal Rezerv Opsiyonu Katsayılarının Hesaplanması", Central Bank of Republic of the Turkey Working Paper No:12/32.
- Inflation Report (2012), IV, Box 5.1, Central Bank of the Republic of Turkey.
- Inflation Report (2012), IV, Chapter V: Financial Markets and Financial Intermediation, Central Bank of the Republic of Turkey.

The CBT Research Notes in Economics is a refereed publication prepared by Central Bank of Turkey with the purpose of disseminating results from research on the Turkish economy with a particular emphasis on macroeconomic developments and issues relevant for monetary policy, and thereby contributing to discussions on economic issues in a timely fashion. The views and opinions expressed in the CBT Research Notes in Economics do not necessarily represent the official views of the Central Bank of Turkey and its staff. This publication is edited by Yusuf Soner Baskaya. A written permission must be obtained to reprint the entire text of notes published in CBT Research Notes in Economics series. For questions and comments:

Editör, Ekonomi Notları, TCMB İdare Merkezi, İstiklal Cad, No: 10, Kat:15, 06100, Ulus/Ankara/Türkiye. E-mail: ekonomi.notlari@tcmb.gov.tr