



RESEARCH NOTES IN ECONOMICS

Interest Rate Corridor and the Monetary Policy Stance¹

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Abstract:

Central Bank of Turkey (CBT) has been implementing a multi-instrument monetary policy strategy within a wide interest rate corridor since 2010. In this approach, composition of the central bank liquidity provision is an important component of the policy stance. Therefore, interpreting the changes in the monetary policy decisions necessitates an understanding of the practical implementation of monetary policy. By presenting a simplified exposition of the CBT's operational framework, this note aims to answer questions such as (i) How are the short term interest rates determined? (ii) What is the implication of a change in the funding composition? (iii) Which interest rate is more relevant for the monetary transmission mechanism? We attempt to address these questions to provide some insight into the assessment of the monetary policy stance.

¹ The views attributed in this study are those of the author's and cannot necessarily be attributed to the Central Bank of Turkey. I am grateful to Erdem Başçı, Koray Alper, Mahir Binici, Gürsu Keleş, Pınar Özlü and Deren Ünalmış as well the referee and the editors for useful contributions.

The Wide Interest Rate Corridor and the Policy Rates: Introduction

Interest rate corridor is a tool developed by the CBT to ease the trade-off between financial stability and price stability posed by the volatility in global markets. Emerging markets have become excessively sensitive to the global monetary policy developments since the global crisis. Sudden movements in capital flows and global risk appetite reduce the predictability in emerging economies, which may be a source of macroeconomic instability in itself. This environment has highlighted the need to develop new tools that will enable timely reaction to the shifts in the global liquidity and risk perceptions. Reflecting these concerns, the CBT has developed and adopted a strategy by end-2010 in which a wide interest rate corridor is used along with an active liquidity management strategy.²

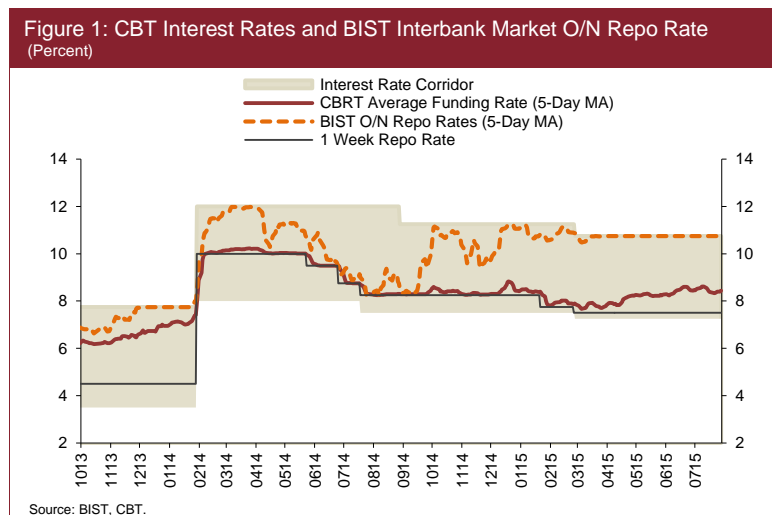


Figure 1 shows the CBT's short term interest rates within the interest rate corridor as well as the interbank overnight money market rate. Observed movements of these rates reveal a stark difference of the CBT's policy framework compared to the conventional ones. Under a conventional interest rate corridor system, all short term interest rates typically move in the same direction and at similar (if not the same) size, whereas in the CBT setting the extent of movements and directions of various rates may occasionally depart from each other. Admittedly, under the CBT's framework, implications of these movements for the monetary policy stance is less clear compared to a conventional system, especially during when the central bank average funding rate (dark red line) and the short term market interest rate

² A full discussion on the benefits and challenges of the wide interest rate corridor are beyond the scope of this note. See Başçı and Kara (2011); Kara (2012); Aysan, Fendoğlu, and Kılınc (2014); Akçelik, Başçı, Ermişoğlu, and Oduncu (2015) for more detailed assessments of the motivation for adopting such a policy as a well as its contribution to easing the trade-off between financial stability and price stability.

(orange dotted line) diverge from each other.³ Assessing the implications of the movements in various interest rates for the monetary policy stance requires an understanding of the role of each interest rate in the transmission of monetary policy. This study aims to contribute to the understanding of the monetary transmission mechanism by presenting a simplified setup for the operational framework of monetary policy.

In the first part of the note, we explain how short term interest rates are determined within the wide interest rate corridor in conjunction with the central bank liquidity (funding) policy. Next, we discuss the relative importance of each relevant interest rate for the transmission mechanism and thus for the policy stance. In the final section, we provide simple examples to further clarify the implications of the interaction between interest rate policy and the funding policy.

Interest Rate Corridor: Operational Framework

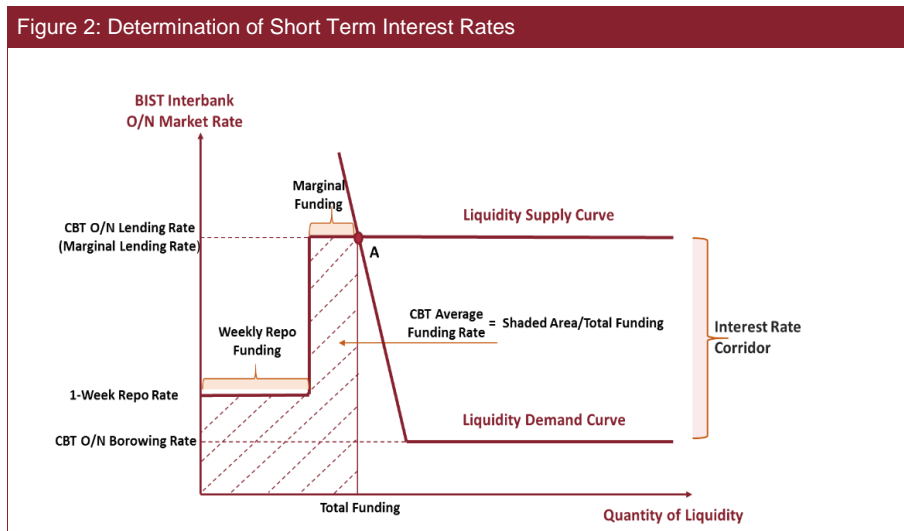
In order to interpret the changes in the CBT interest rates adequately, it is essential to understand the practical implementation of the monetary policy. Doing so would help to better assess the implications of the changes in the interest rates and the funding composition, which would in turn facilitate the understanding of the transmission of monetary policy.

In countries operating under inflation targeting with floating exchange rate regimes, main instrument of the monetary policy is the short term interest rate. Although there are technical discrepancies in the exact implementation process, central banks set the short term interest rates by controlling the size and the structure of their own balance sheets. This may be achieved directly through sales or purchases of government securities, as well as through short-term lending (liquidity provision) to the financial institutions as in the case of the CBT. Currently, main liquidity provision of the CBT takes place via one week and overnight repo operations.

It should be noted that net liquidity position of the market matters for the representation of the monetary policy operational framework. In the Turkish case, banking system restructuring process after the 2001 crisis led to a net surplus of liquidity in the system for several years. As a consequence, the reference rate for the short term interest rates was the CBT borrowing rate during this period. Since 2010, CBT funding rates have gained a central role in the monetary transmission process as the banking system became a net borrower from the central bank. The operational framework we present throughout this study reflects the recent situation where

³ Küçük et al. (2014) investigate the factors driving the spread between the BIST overnight market rate and the CBT average funding rate.

the central bank is a net lender to the system. Against this backdrop, Figure 2 illustrates the determination of the short term interest in the money market in a simplified setting.



The vertical axis in the Figure shows the interest rates, while the horizontal axis depicts the quantity of short term funds (liquidity). The supply and demand curves represent the net liquidity supply and demand. Although the liquidity is heterogeneously distributed across banks, the net position of the system is in deficit. The liquidity supply is provided by the CBT via one-week and overnight (marginal) repo operations.⁴ Since these two liquidity facilities have different interest rates and the quantity of the one week repo provision is directly set by the CBT, the supply curve takes a stepwise form. Note that in this setup the CBT decides on both the interest rate (price) and the quantity of the one-week repo. Given these parameters, the financial institutions resort to overnight lending (marginal funding) facility should there be any additional liquidity need.

The demand curve shows the relationship between the short term liquidity demand and the market interest rate. An increase in market rates, *ceteris paribus*, would lead to a fall in the demand for liquid funds. Hence the demand curve is downward sloped. Since the market interest rates would never fall below the central bank borrowing rate, the demand curve becomes flat after reaching this level. In other words, the discontinuity of the negative slope reflects the fact that all the funds will be lent to the central bank if the market interest rate is lower or equal to the central bank borrowing rate.

⁴ It is worth to mention that there is an additional liquidity facility of the CBT which is the funding to the market-makers, with an interest rate slightly below the marginal funding rate. Including this facility in our analysis would add a second step to the shape of the supply curve without changing the main analytical setup. Therefore, we do not include the CBT's market makers funding facility in our graphical illustration for the sake of brevity and clarity.

The market illustrated in Figure 2 largely corresponds to the Borsa İstanbul Interbank Repo Market. The equilibrium interest rate at the market materializes at the intersection of the supply and demand curves (point A). Note that, at point A the CBT provides only a fraction of the total liquidity through one week repo. The rest of the central bank funding takes place at the (more expensive) marginal funding facility, which has two important implications: (i) average funding rate of the CBT is higher than the one week repo rate (ii) equilibrium market interest rate materializes at the level of the upper bound of the interest rate corridor. In graphical language, the supply and demand curves intersect at the upper-flat section of the supply curve. These two curves would have intersected at the level of the one-week repo rate, had the CBT provided all the liquidity through weekly repo. In such a case, both the CBT average funding rate and the market rate would be equal to the one-week repo rate; and thus, it would be possible to name the one week repo rate as the “policy rate”.

The Transmission Mechanism

Under inflation targeting regimes with floating exchange rates, the main tool of the monetary policy is the short term interest rate. Therefore, the level of the central bank interest rate is largely a sufficient statistic to gauge the short term policy stance. However, in the Turkish case where multiple rates are used jointly as policy instruments, the question of “which interest rate?” arises as a natural response.

The interest rates shown at the vertical axis of Figure 2 are the main interest rates set by the CBRT, which are revised during the monthly Monetary Policy Committee meetings and announced at the official website of the CBT. The CBT may also change the funding composition (the share of one week repo in total funding) within the month. In the conventional interest rate corridor systems, once the short term policy rate is set, the open market operations are conducted to ensure that money market rates materialize at levels close the policy rate. In other words, funding composition assumes a largely passive role. However, under the policy strategy implemented by the CBT since 2011, there are multiple policy rates, where the funding composition plays an active and instrumental role regarding the policy stance. As shown in Figure 2, the composition of the central bank liquidity determines the location of the supply curve, and thus the intersection point of the two curves. The equilibrium interest rate can jump from the one-week repo rate to the marginal funding rate with a tightening in liquidity provision such as a shift in the composition of liquidity towards more expensive funding. This means, monetary policy stance can be tightened without changing the officially announced short term interest rates (see also the example below).

To sum up, although the short term interest rates officially announced by the CBT constitute the main basis for the medium term monetary policy stance, central bank funding composition and the liquidity policy also turn out to be important parameters for the actual policy stance. Overall policy tightness implied by the interaction of the short term interest rates and the liquidity policy can be summarized by the following two variables:

1. *CBT average funding rate*: This is the weighted average of the cost of funds provided by the CBT through several channels. Typically, central bank funding constitutes a sizeable portion of the banks' short-term Turkish lira funding at any time;⁵ therefore the CBT average funding rate plays a significant role in the pricing of deposits, loans and other financial instruments.
2. *Interbank market O/N rate*: This is the interest rate banks charge to each other in the Borsa Istanbul (BIST) money market transactions at an overnight maturity. Although the O/N market rate is not directly set by the CBT, it can be influenced through liquidity policy in conjunction with the parameters of the interest rate corridor. The interbank O/N rate serves as a benchmark for the banks' short term funding costs from other money market sources such as cross-currency swaps,⁶ and therefore plays a central role for the monetary transmission mechanism.

Overall, all the short term interest rates that are relevant for the monetary policy transmission mechanism are in one way or another linked to the two variables described above. Hence, it is fair to argue that the monetary policy stance will not change as long as the CBT funding rate and the BIST overnight rate stay constant.⁷

Besides these direct implications from the operational framework, empirical research by the CBT also suggests that the average funding rate and the BIST overnight interest rate play a central role for the transmission of monetary policy. For example, a recent study published in the May 2015 Financial Stability Report presents the results of panel regressions with 19 banks for June 2010 – December 2014 period to investigate the interaction of bank loan and deposit rates with various CBT short term interest rates.⁸ The results of the study confirm the conjecture laid out in the previous section, in the sense that the CBT funding rate and the BIST overnight rate turn out to be the most significant variables in the determination of bank loan

⁵ For example, according to our calculations, almost half of the banks' short term funding in July 2015 was supplied through CBT funding (Source: Banking Regulation and Supervision Agency).

⁶ See Küçükşaraç and Özel (2013).

⁷ It should be noted that this argument ignores the expected volatility channel that may be induced by the changes in the width and the asymmetry of interest rate corridor. Unfortunately, it is not possible to quantify this effect. Attempting to incorporate the signaling impact of the interest rate corridor would have complicated the analysis without improving the strength of the main messages we seek to convey. As such, we have opted to exclude such effects for the sake of simplicity and pedagogical purposes.

⁸ See Special Topic IV.6: "The New Monetary Policy Framework and the Interest Rate Transmission Mechanism", which based on the ongoing work by Binici, Kara and Özlü (2015).

and deposit rates with highest coefficients. Two important implications can be inferred from the findings of this study:

1. The CBT average funding and the BIST market overnight rate are almost sufficient statistics for the stance of monetary policy.
2. Although the BIST interbank rate seems to be more important for the pricing of financial assets, CBT funding rate also plays a significant role in the determination of bank rates, especially in the deposit rates.

Overall, the effective CBT monetary policy stance can be gauged by a linear combination of the CBT average funding rate and the BIST interbank market overnight rate. The weight of each component would vary depending on the share of CBT funding in the total short-term TL funding of the banking system.⁹

The Corridor, Liquidity Policy and the Monetary Policy Stance: Case Studies

This section presents some hypothetical cases to further clarify the concepts introduced throughout the study. We study two different examples to understand how the monetary policy stance depends on the interaction between the liquidity policy and the interest rate corridor. Our first example shows that it is possible to tighten the monetary policy without changing CBT's officially announced rates. In the second example, we present a case where CBT raises one-week repo rate but keeps the policy stance intact by adjusting the composition of the liquidity provision.

Case 1: Changing the Monetary Policy Stance with Liquidity Policy

In order to demonstrate the role of liquidity policy for the monetary stance, we first provide an example where the monetary policy is tightened by solely changing the funding composition. Table 1 presents a numerical example to illustrate this case. The first three columns reveal the main funding rates of the CBT and the composition of the liquidity provision. The resulting indicators relevant for the policy stance—the CBT average funding rate and the market rate—are shown in the last two columns. These two variables summarize the interaction of the funding rates with the liquidity policy.

⁹ Note that the banking system can obtain short term TL funds from sources other than the CBT. (For example, in the Turkish case, a typical channel for banks to access TL liquidity is through engaging in cross currency swap with foreign parties.) Hence, not only the CBT funding cost but also the non-CBT funding rates will be important for the monetary transmission mechanism. Interest rates for the non-CBT funding is close to the BIST interbank overnight rate, while the BIST interbank rate under tight liquidity policy materializes at the level of the marginal funding rate as illustrated in Figure 2. Therefore, in the case of tight liquidity policy, the broad average funding costs of the banking system will be a linear combination of the CBT average funding rate and the marginal funding rate. For example, if half of the short term funding of the banking system is provided by the CBT (which was the case in July 2015), broad effective funding rate for banks would be a simple average of the marginal funding rate and the CBT average funding rate.

	Marginal Funding Rate	1-Week Repo Rate	Share of Weekly Repo in Total Funding	Average Funding Rate	BIST Market O/N Rate
I	10,75	7,5	80%	8,2	10,75
II	10,75	7,5	70%	8,5	10,75
III	10,75	7,5	60%	8,8	10,75

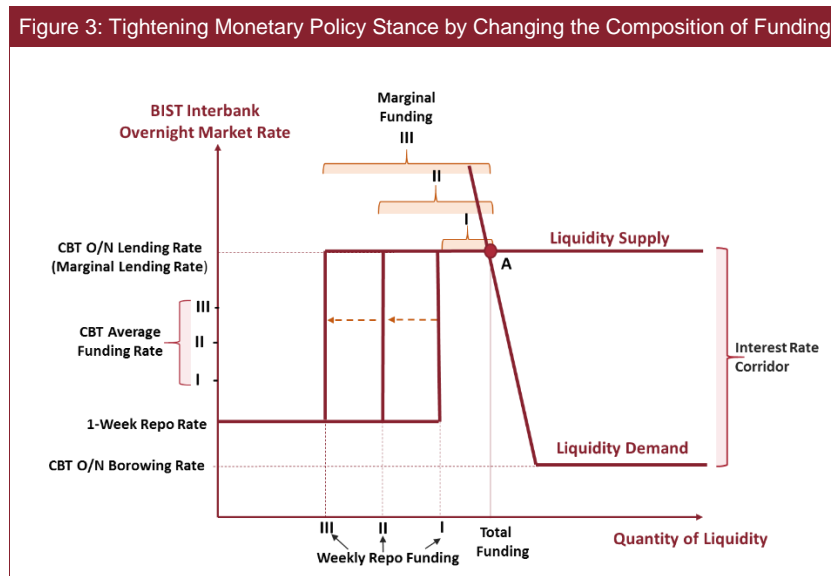
Each row in the Table corresponds to a different funding composition. Funding rates (one week repo and marginal funding rates) stay the same in all three cases, but the share of one-week repo funding declines gradually towards the bottom of the Table. In the first case, 80 percent of the central bank liquidity is provided through one week repo at an interest rate of 7,5 percent. The banks have to tap the marginal lending facility (with an interest rate of 10.75 percent) for the remaining 20 percent of their liquidity needs. Under such a composition, the weighted average funding rate of the CBT becomes 8.2 percent ($0.8 \cdot 7.5 + 0.2 \cdot 10.75$). In the second and third rows, the share of one week repo falls gradually from 80 percent to 70 and 60 percent. The higher share of more expensive liquidity provided at the marginal funding rate leads to an increase in the average funding rate of the CBT. Notwithstanding the change in the composition of liquidity, the interbank rate remains at the same level. As the CBT does not provide the liquidity need of the banking system *fully* through one week repo, the interbank rate materializes at the marginal funding rate in all three cases.

In sum, the change in the funding composition leads to an increase in the average funding rate of the CBT, while the overnight money market rate stays at the same level. Although money market rates does not change, the broad funding costs of the banks will increase due to higher CBT funding rate. (Recall that the broad funding costs of the banks can be expressed as a linear combination of these two rates). The higher broad funding costs will drive up the interest rates of financial instruments such as deposits, bonds, and bank loans, leading to tighter monetary conditions. Overall, this example shows that it is possible to tighten monetary policy stance without changing officially announced short term interest rates.

Figure 3 provides a graphical illustration of the example presented in Table 1. The demand curve stays intact in all three cases because interest rate elasticity of the liquidity demand and other autonomous factors driving system's liquidity deficit are independent of the changes in the funding composition.¹⁰ Meanwhile, the vertical part of the supply curve shifts to the left as we move from (I) to (II) and (III), reflecting the lower share of the one-week repo in total CBT

¹⁰ See Koçyiğit, Polat and Böcüoğlu (2014) as well as Güler, Keleş ve Kilimci (2014) for technical details on the determinants of the net liquidity deficit of the system.

funding. Higher share of more expensive marginal funding leads to an increase in the average funding cost of the CBT. Note that in all three cases the supply and demand curves intersect at the higher-flat section of the supply curve. In other words, the equilibrium interest rate at point A, which corresponds to the BIST interbank overnight rate, materializes at the level of the CBT marginal funding rate (upper-end of the interest rate corridor). Eventually, although the official rates of the CBT stays constant, monetary policy tightens due to higher average funding cost induced by the change in the composition of the liquidity provision.

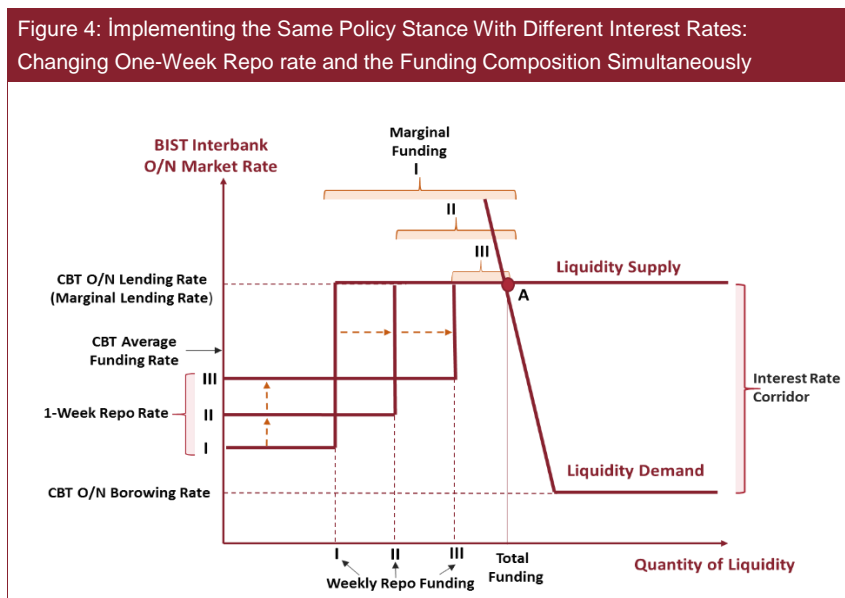


Case 2: Changing Monetary Policy without Changing Monetary Policy Stance

The previous example have demonstrated that it is possible to tighten monetary policy stance without changing the CBT’s short-term interest rates. Now we ask the other way around: Can the CBT implement the same monetary policy stance with different official interest rates? The numerical example presented in Table 2 shows that the answer is affirmative.

	Marginal Funding Rate	1-Week Repo Rate	Share of Weekly Repo in Total Funding	Average Funding Rate	BIST Market O/N Rate
I	10,75	7,5	70%	8,5	10,75
II	10,75	7,75	75%	8,5	10,75
III	10,75	8,0	82%	8,5	10,75

The Table considers three different cases. In the first one, the CBT provides 70 percent of the liquidity through one week repo funding (at an interest rate of 7.5 percent) and the remaining 30 percent through marginal lending facility at a cost of 10.75 percent. This funding composition implies a weighted average CBT funding rate of 8.5 percent ($0.7 \cdot 7.5 + 0.3 \cdot 10.75$). As we move down the Table, in each step, one week repo rate increases by 25 basis points. Average funding rate does not change because the CBT gradually increases the share of one-week repo funding (less costly liquidity) to offset the impact of the higher one-week repo rate on the average funding costs. For example, as we move from row (I) to row (III), one week repo rate increases from 7.5 percent to 8 percent while the share of the one week repo funding increases from 70 percent to 82 percent. Thus the average funding rate once again becomes 8.5 percent ($0.82 \cdot 8.0 + 0.18 \cdot 10.75$). Moreover, in all three cases, the interbank money market rate also stays constant at the upper bound of the interest rate corridor, because the CBT does not fully meet the liquidity deficit of the banking system through one week repo funding, requiring the banks to tap the marginal repo facility to fulfil the rest of their liquidity needs. To sum up, although the one-week repo rate increases, the main indicators for the policy stance—CBT funding rate and the BIST money market rate—stays constant. Overall, this example shows that it is possible to implement the same monetary policy stance with different combinations of official interest rates and funding compositions.



The example shown in Table 2 is illustrated with a supply-demand framework in Figure 4. The location of the demand curve does not change because interest rate elasticity of the liquidity demand and other autonomous factors driving system's liquidity deficit are

independent of the changes in the funding composition.¹¹ Sequential increases in the one-week repo rate are represented by the shifts in the lower flat portion of the supply curve. The rightward shifts in the vertical section of the supply curve reflect the increases in the share of one-week repo funding. Despite the increase in the one-week repo rate, the average CBT funding rate stays intact as the share of the liquidity provided through (more expensive) marginal lending facility declines in each step. Once again, the supply and demand curves intersect at the upper end of the corridor in all three cases, meaning that the interbank money market rates materialize at the level of the CBT marginal funding rate. The monetary policy stance remains unchanged, as both the interbank rate and the CBT funding rate stays intact.

Conclusion and Final Remarks

This note discusses the interaction between the liquidity policy and the short term interest rates within the wide interest rate corridor system implemented by the CBT. Using a simplified graphical setup and hypothetical case studies, we explain the determination of short term interest rates and its implications for the monetary policy stance. Our aim is to contribute economic agents' understanding of the operational framework of the monetary policy and hence to facilitate a more accurate interpretation of the changes in the monetary policy stance.

The analysis carried out in this study shows that, besides the official short term interest rates set by the CBT, the composition of liquidity provision may also be instrumental for the actual stance of the monetary policy. The monetary policy stance implied by the interaction of short term interest rates with the liquidity composition can be represented by two indicators: (i) Borsa Istanbul Overnight Interbank Rate (ii) CBT average funding rate. Both indicators have direct impact on the broad funding costs of the banking system, therefore playing significant role in the pricing of bank deposit and loan rates, and thus, in the monetary transmission mechanism. The relative importance of each component in representing the monetary policy stance would vary depending on various factors such as the share of CBT funding in the total short-term TL funding of the banking system.

¹¹ In line with the main focus of this study, the examples laid out in this note are constructed so as to reflect shifts in the supply curve (changes in the interest rate and liquidity composition). However, it should be noted that the CBT is also able to affect the location of the liquidity demand curve through other policy tools such as reserve requirements or FX operations. For example, if the CBT lowers reserve requirement ratios for Turkish lira liabilities, liquidity needs (and hence the liquidity demand) of the system would fall permanently at any level of interest rate, which would result in a leftward shift in the demand curve.

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