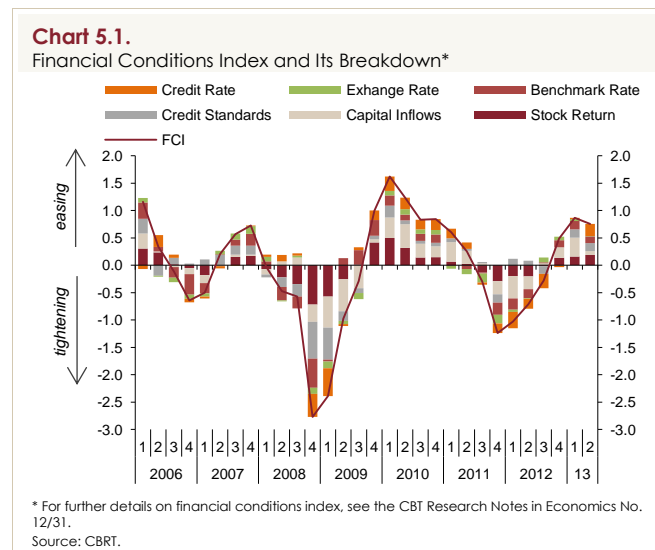


5. Financial Markets and Financial Intermediation

The second quarter of 2013 saw developments that aggravated uncertainties in financial markets. Financial conditions tightened slightly due to capital outflows. These are attributed to the signals given by the Fed regarding the reduction of asset purchases and the weaker-than-expected growth in some emerging economies, particularly China. The developments weighed on foreign investors' appetites for emerging market bonds, thus resulting in capital outflows from all emerging economies including Turkey. The slower-than-expected revival of economic activity in Turkey coupled with the profit-seeking sales of investors upon the credit rating upgrade by an international agency stood out as factors that restrained the easing in financial conditions.

The FCI for Turkey, which is calculated as the weighted average of various financial indicators, continued to support economic activity in the second quarter, yet displaying a slight decline (Chart 5.1). All variables except the exchange rate continued to offer positive contribution to the index, whereas the exchange rate provided virtually no contribution to the index in this period. The positive contribution of capital inflows to the index decreased considerably, while the plunge in credit rates proved to be the largest contributor to financial conditions.



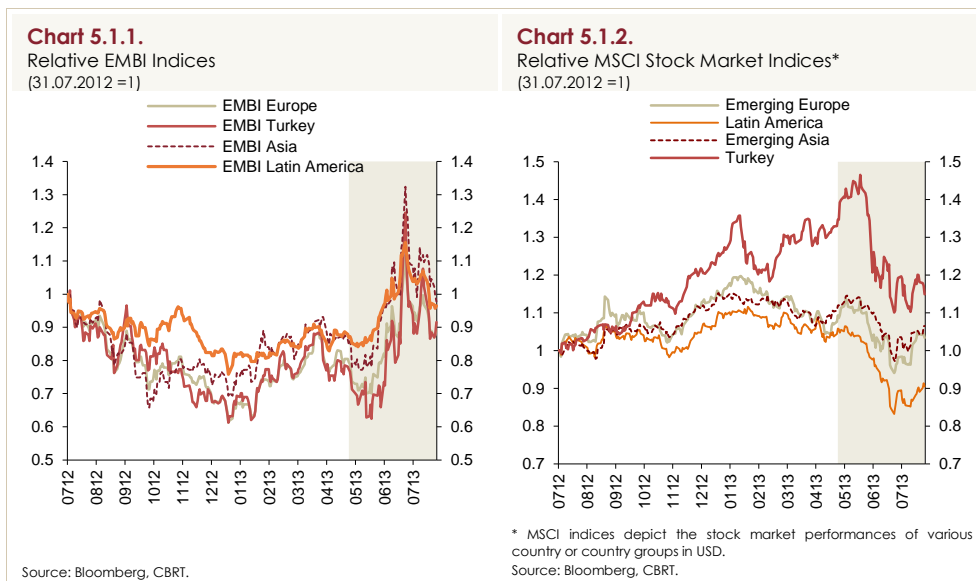
The surge in market rates amid ongoing capital outflows since early July 2013 as well as the continuing tightening in the CBRT's liquidity stance besides

the decline in the risk appetite of banks led to the expectation of tightening lending conditions, thereby indicating that financial conditions will be less supportive for the economy in the upcoming period.

5.1. Financial Markets

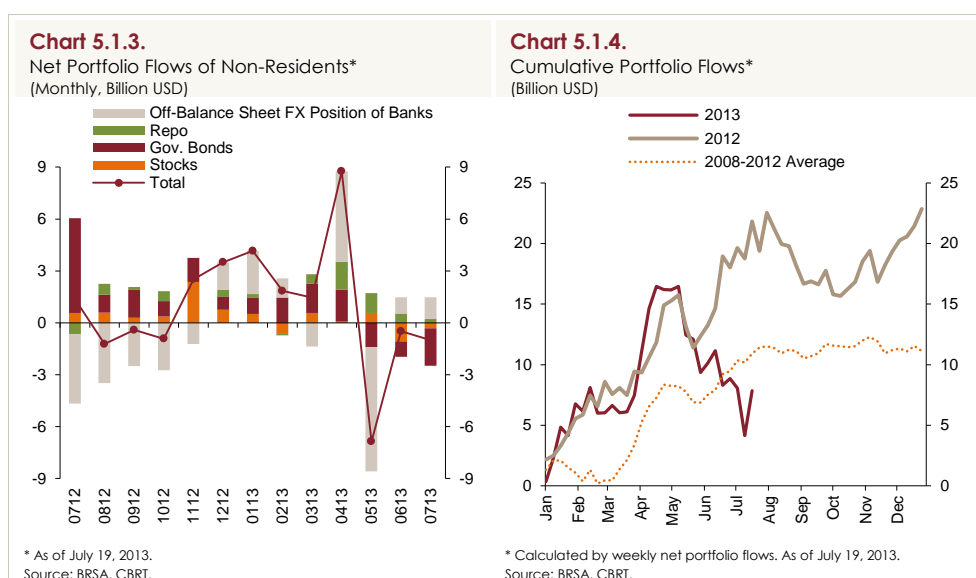
Global Risk Perceptions

Upon the developments that aggravated market uncertainties, international investors opted for a reconstruction in their portfolios, which brought about elevated levels of risk in emerging economies since the publication of the April Inflation Report (Chart 5.1.1). In line with the falling risk appetite towards emerging economies, stock prices also exhibited a decline (Chart 5.1.2). The Turkish stock market, which has been decoupling positively from other emerging economies on the back of favorable developments in macroeconomic indicators in addition to expectations for a credit upgrade in the previous reporting period, performed worse than other emerging economies in this period. One of the underlying reasons for this is the profit realizations by investors following the credit rating upgrade by an international agency in mid-May. The stock market index in Turkey, which displayed a relatively sharp fall from mid to the end of May, moved similarly to other emerging economies as of that date.



Portfolio Flows

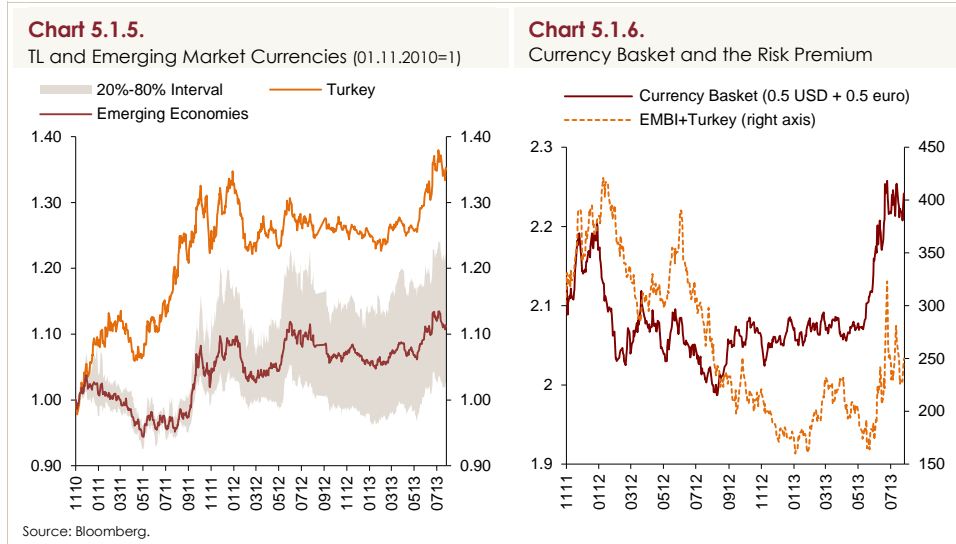
Foreign portfolio investments have declined in Turkey since the publication of the previous Inflation Report (Chart 5.1.3). In addition to the stock market, the bond market also saw profit realizations in this period following the rating upgrade. Cross currency swap transactions, which registered a surge in April, were subject to a correction in May. In cumulative terms, total capital flows moved inversely with respect to past years, and fell below the average of the last five years in June and early July (Chart 5.1.4). Between 15 and 19 July, capital inflows were seen due to the probable effect of the signal for an increase in the upper band of the corridor.



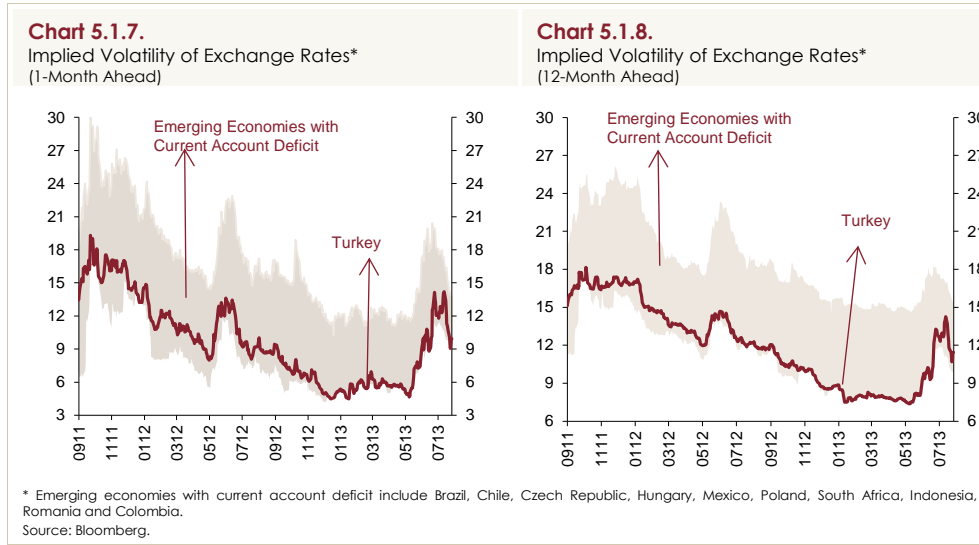
Exchange Rates

Currencies of emerging economies have followed a fluctuating course since the publication of the April Inflation Report. Federal Chairman Bernanke stated that monetary easing may be gradually reduced in the second half of May. This led to a fall in the global risk appetite, and caused currencies of many emerging economies to depreciate against the USD. The TL also followed a path similar to the currencies of emerging economies (Chart 5.1.5). The relationship between the currency basket and the risk premium, which has been weak since the last quarter of 2012, has grown brisk lately. Moreover, the currency basket exhibited an increase owing to the hike in the risk premium (Chart 5.1.6). However, towards the end of the quarter, the upper band of the

interest rate corridor was raised, which led the TL to settle on an appreciation track again.

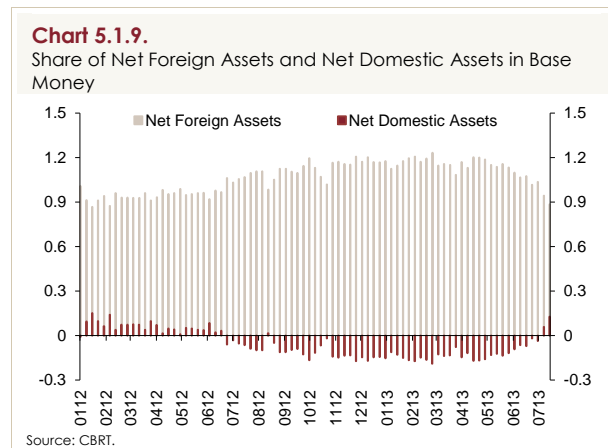


Surging risk premiums of emerging economies and fluctuations in the currency markets since May have also reflected the implied exchange rate volatility. In order to eliminate possible effects of the excessive volatility in exchange rate markets on price stability and financial stability, the CBRT implemented temporary additional monetary tightening when deemed necessary, and held accommodative intra-day unsterilized FX selling auctions. Moreover, in this period of massive capital outflows from emerging economies, the partial use of reserves, which were voluntarily built under the ROM, indicates that ROM functions as an automatic stabilizer. Additionally, the rise in the upper band of the interest rate corridor at the end of the quarter also led the implied volatility of the TL to remain relatively low. Despite the recently elevated exchange rates, thanks to measures taken by the CBRT, the implied exchange rate volatility of the TL stood low both in short and medium-term maturities compared to those currencies of emerging economies running a current account deficit (Charts 5.1.7 and 5.1.8).

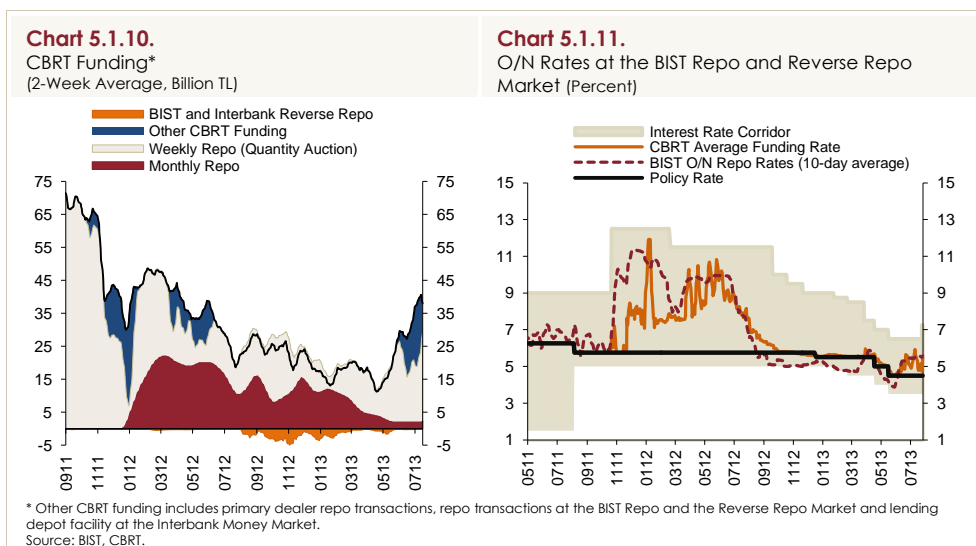


Monetary Policy

Since the publication of the April Inflation Report, the CBRT has continued with its flexible monetary policy by also observing macro financial risks caused by global uncertainties. In the beginning of the second quarter, due to maintenance of strong capital flows and growth of credit above the reference value, short-term interest rates were kept low to contain risks to financial stability and macro prudential measures were sustained in order to bolster FX reserves. Accordingly, in May, the O/N lending and borrowing rates were reduced by 50 basis points, while FX reserve requirement ratios and ROC were increased. In the meantime, due to aggravated uncertainties regarding global monetary policies as of end-May, emerging economies saw capital outflows and excessive volatility in exchange rates. Because of the excessively volatile exchange rates and the growth of credit above the reference value, the CBRT delivered temporary additional monetary tightening and launched FX selling auctions in the succeeding period to underpin the effect of monetary tightening. On the back of these developments, the composition of the liquidity provided by the CBRT was shifted from net foreign assets to net domestic assets in this period (Chart 5.1.9). Moreover, to prevent the distortion of the general pricing behavior due to global uncertainties as well as the depreciation of the TL and soaring inflation, the upper band of the interest rate corridor was increased by 75 basis points in July.

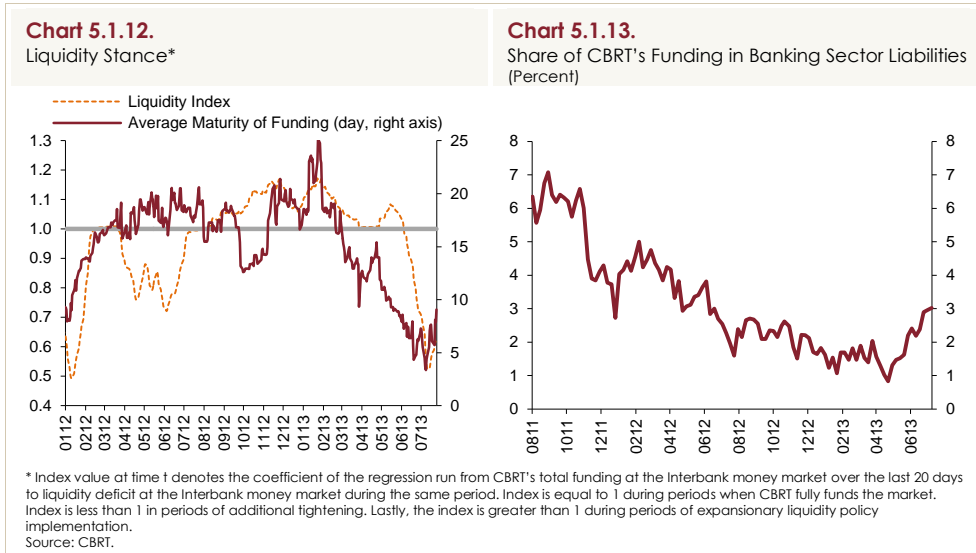


In the second quarter of the year, the liquidity gap was widened mainly by FX selling auctions and the decline in the utilization rate of the ROM by banks (Chart 5.1.10). Accordingly, the FX selling auctions and the fall in the banks' use of the ROM pushed the TL liquidity requirements of banks up by around TL 12.2 billion and TL 7 billion, respectively. Due to additional monetary tightening, the CBRT cut down on the amounts of weekly and monthly repo auctions held under the traditional method through which it provides liquidity to the market. Banks mostly resorted to the CBRT's O/N lending facilities in this period. Accordingly, the maturity of the CBRT's average funding rate and the BIST O/N repo rates rose (Chart 5.1.11) (Box 5.3 gives an analysis of the effect of the CBRT's liquidity management on the BIST O/N rate).



Due to additional monetary tightening in June and July, the liquidity index has recently gone below 1 (Chart 5.1.12), thus signifying the tight stance of the CBRT's monetary policy. Owing to the CBRT's adjustment of the balance sheet

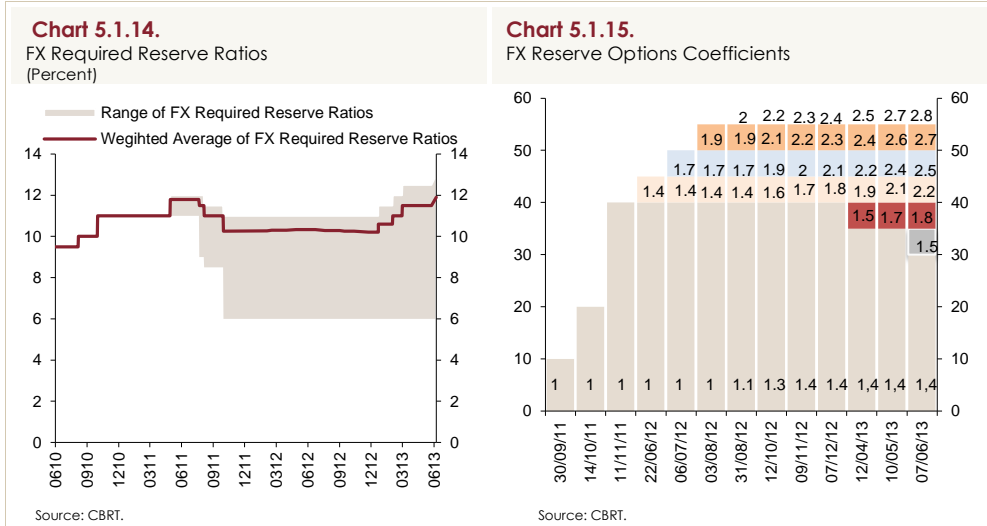
composition, the maturity of the TL liquidity provided to the banking sector shortened during this period. This shortening is expected to weigh on credit growth, which is hovering above the reference value. The rising share of the CBRT funding within the banking sector liabilities reinforces the transmission of the monetary policy in this period (Chart 5.1.13).



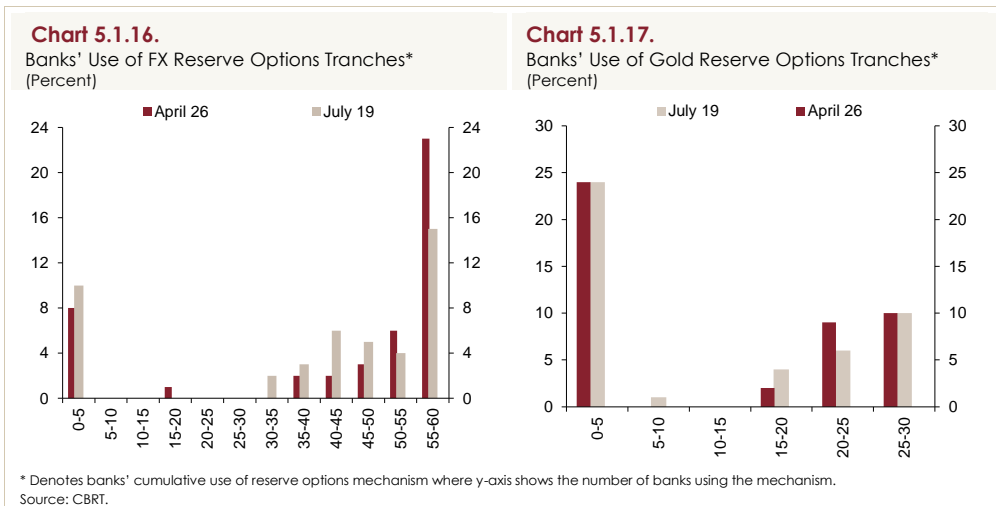
To facilitate banks' liquidity management and help them project their total funding costs, the CBRT continued to announce the funding amount besides the upper limit for the 1-month repo auction amount pertaining to the days of quantity auctions in the last quarter of the year. Nevertheless, no press releases will be issued unless the limits are changed in the upcoming period. According to the TL liquidity forecasts, the lower limit for funding on the policy rate was preserved as TL 0.2 billion in the inter-reporting period whereas the upper limit thereof was raised from TL 6.5 billion to TL 9 billion in May. Moreover, the upper limit for 1-month repo auctions held under the traditional method was lowered from 1 billion TL to TL 0.5 billion in May. In July, upper limits for both the funding via policy rate and 1-month repo auctions were removed. Moreover, it was decided that no FX selling auctions would be held on days of additional monetary tightening or no funding would be provided to banks through the primary dealer facility.

In May, FX reserve requirement ratios were raised in order to balance risks to financial stability; accordingly, the effective reserve requirement ratio was increased to 11.9 percent (Chart 5.1.14). Moreover, to complete the establishment process and thereby enhance the efficiency of the ROM, the tranche of 30-35 percent was added to the FX reserve options coefficients, and

the ROC in all tranches excluding the first one was raised by 0.1 percentage point (Chart 5.1.15). Meanwhile, ROC on gold was kept unchanged in this period. Currently, the coefficients corresponding to the last tranche of the FX and gold reserve options stand at 2.8 and 2.5, respectively.

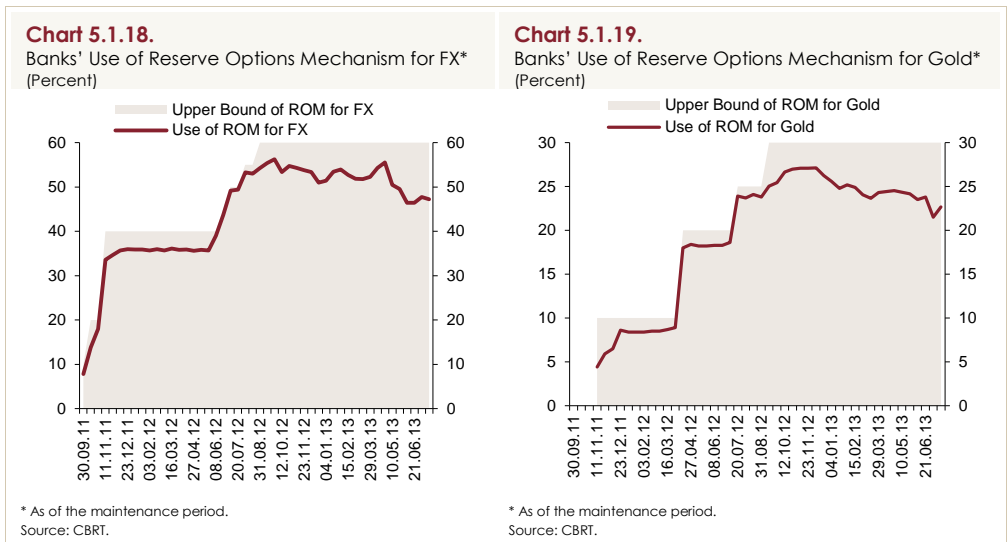


The rise of ROC gradually increases the cost of this facility to banks. More specifically, in the second quarter, fewer banks utilized the last tranches for FX and gold ROM compared to the first quarter, and the cumulative use of banks shifted towards lower tranches (Charts 5.1.16 and 5.1.17). As for the second quarter, inclusion of increases by 0.2 percentage points in ROC also took effect in April, which led to the decline in the banks' utilization rate.

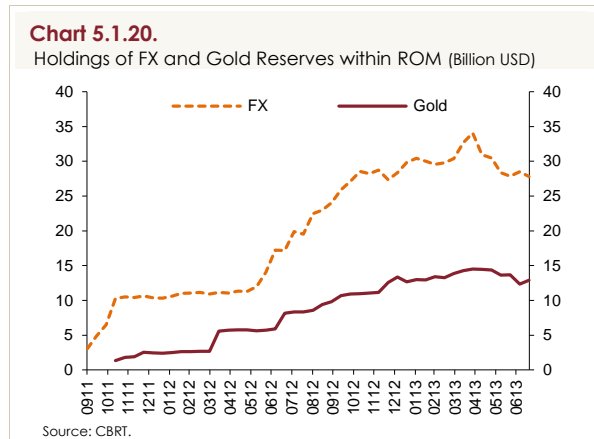


Despite the variation among banks regarding the use of reserve options, the sector-wide utilization rate exhibited a decline both for gold and FX as

many banks have recently made less use of the facility. As of the maintenance period of 19 July 2013, the utilization rate of banks stood at 78.7 percent for FX facility (47.2/60), and 75.5 percent for gold facility (22.6/30) (Charts 5.1.18 and 5.1.19). Particularly the rise in ROC, which took effect in the maintenance period of 10 May, was effective on the decline in the banks' utilization of ROC. Moreover, extension of FX loans for project financing by some banks besides the fluctuations in global markets also influenced the fall in the utilization rate. Additionally, the decline in ROM utilization rate for gold was attributed to the recent fall in gold prices.

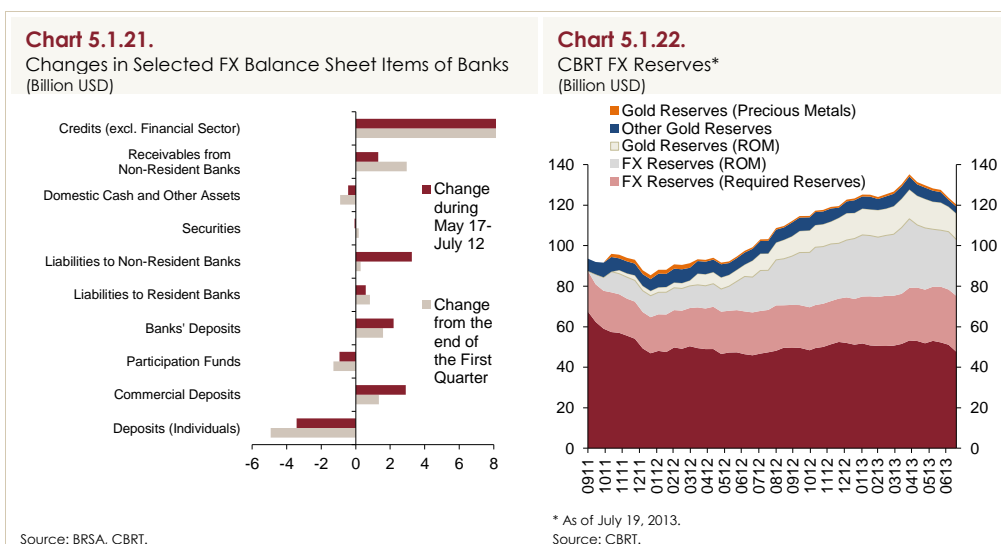


In sum, banks have recently used some part of the reserves, which were built voluntarily via the ROM facility (Chart 5.1.20). Banks used around USD 6.3 billion of the TL required reserves kept in FX in the maintenance period of 19 July compared to that of 26 April. Use of these reserves by banks in case of capital outflows shows that ROM acts as an automatic stabilizer.



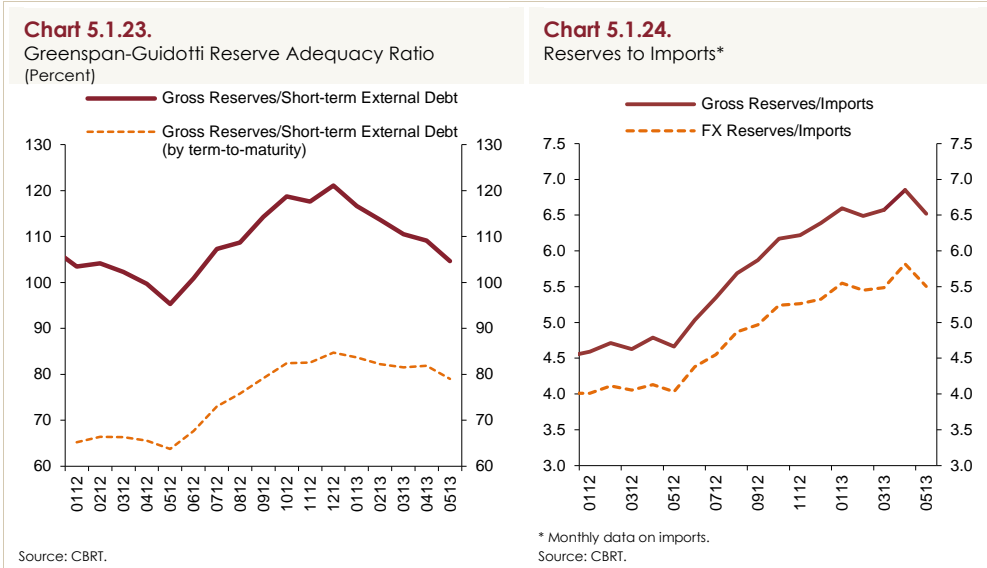
An analysis of whether banks' access to FX declines or not during periods of capital outflows is crucial. Changes in FX-denominated balance sheet items of banks entail valuable information regarding banks' use of FX resources. Examining the changes in the FX-denominated balance sheet items of banks in the second quarter suggests an increase in liabilities to non-resident banks and a decrease in the deposits by individuals (Chart 5.1.21). Despite elevated global uncertainties, the rise in funding provided by non-resident banks indicates that banks do not have trouble accessing FX resources.

Moreover, the CBRT's reserves trended downwards in the second quarter of 2013 (Chart 5.1.22). The increase introduced to FX required reserve ratios in May had a push-up effect on reserves, whereas the fall in banks' use of reserve options as well as FX selling auctions besides the fall in gold prices led to a decline in reserves. The depreciation of gold causes the CBRT's gold reserves to seem less valuable in USD terms; yet, it also leads to a decline in reserves by causing a lower use of ROM for gold by banks. Similarly, the appreciation of the USD and euro reduces the amount of FX to be maintained against TL required reserves, thus leading to a fall in the CBRT's reserves. Moreover, FX selling auctions also pulled down the CBRT's net reserves in the second quarter of the year.



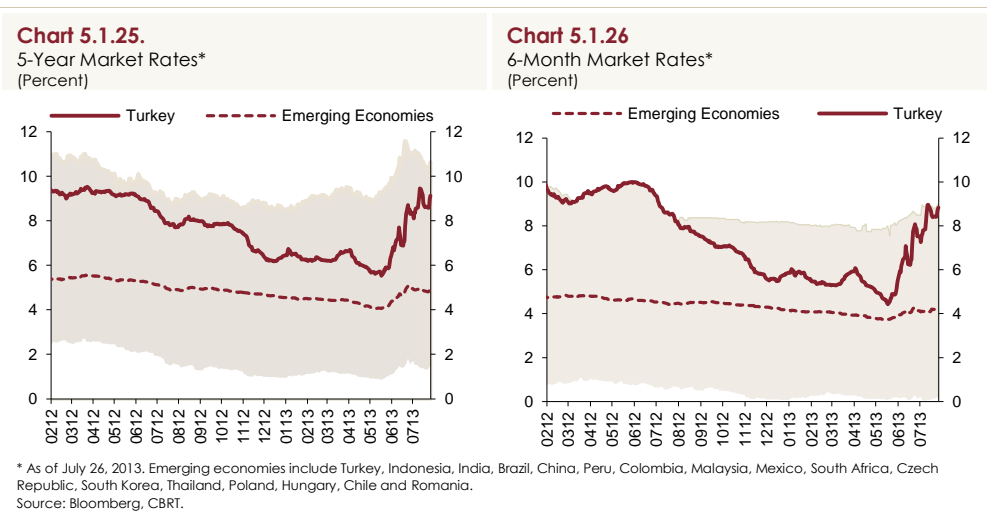
The CBRT's reserves were compatible with international standards in the second quarter. According to the Greenspan-Guidotti ratio measured as the ratio of gross reserves to short-term external debt, Turkey is above the threshold value of 100 percent (Chart 5.1.23). Moreover, the ratio of gross reserves to short-term external debt by term-to-maturity hovers around 80 percent. Another

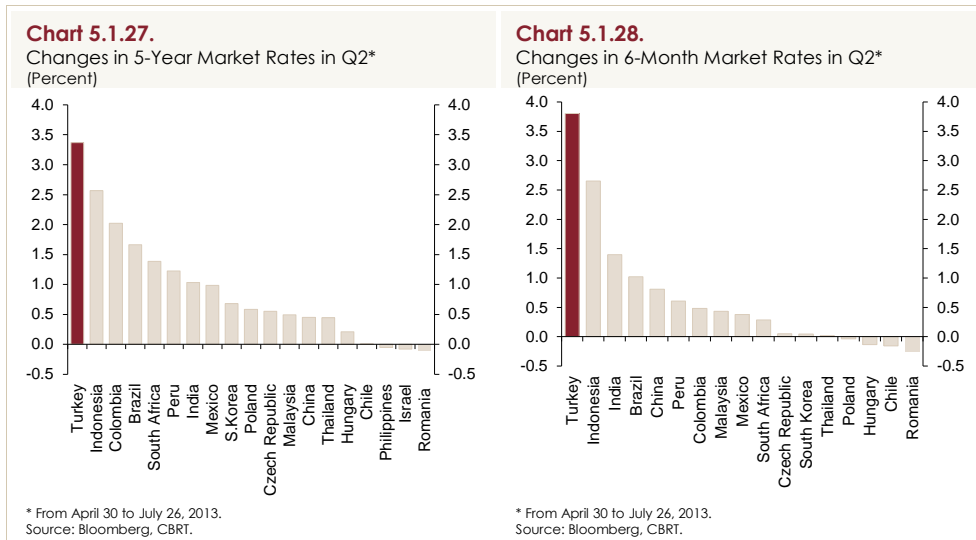
indicator regarding the reserve adequacy ratio, the import coverage ratio, stands at 6.5 months (Chart 5.1.24). These ratios point to the adequacy of the CBRT's reserves.



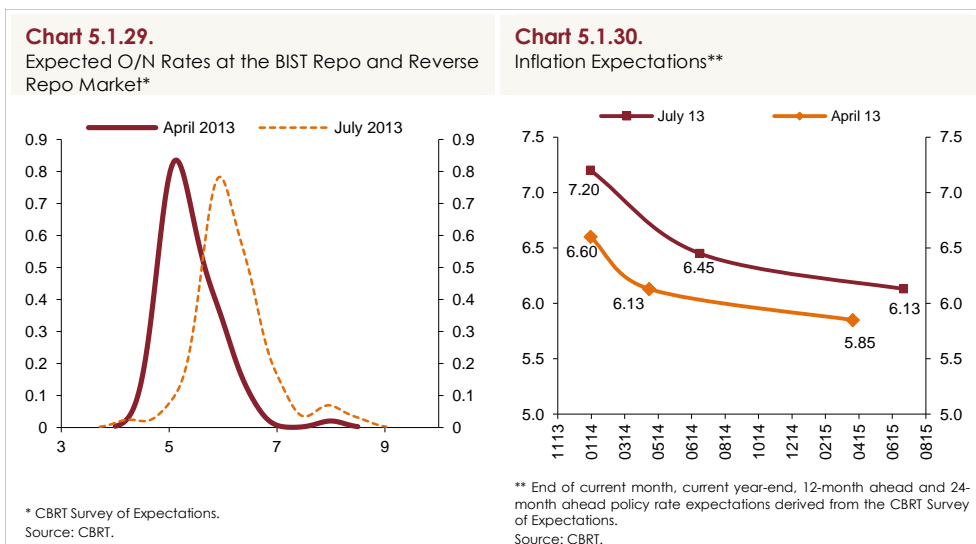
Market Rates

Amid uncertainties regarding global monetary policies, market rates in emerging economies increased both in long and short-term maturities in the second quarter of the year (Charts 5.1.25 and 5.1.26). Market rates in Turkey exhibited an increase particularly in short-term maturities compared to the first quarter of 2013 (Charts 5.1.27 and 5.1.28).



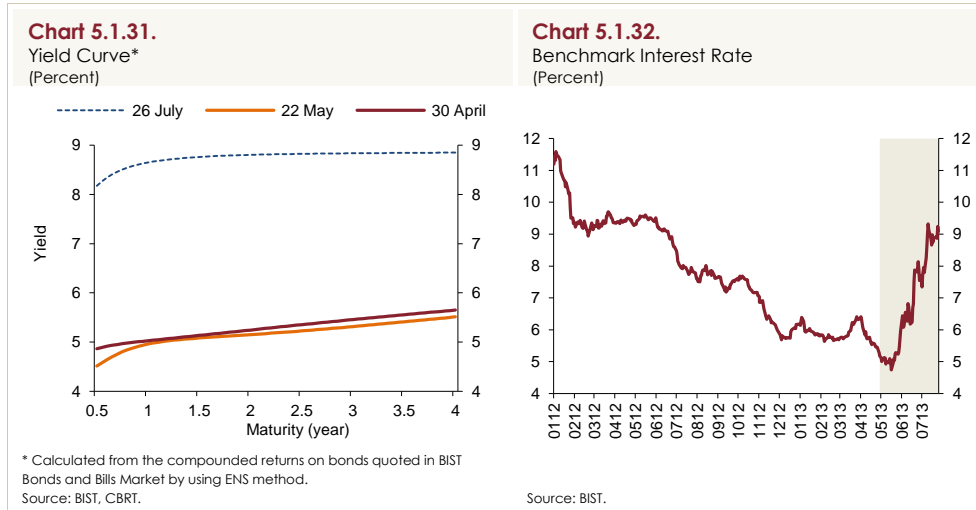


Parallel to the deterioration in global risk perceptions in this period, the BIST O/N repo rate expectations increased in the inter-reporting period (Chart 5.1.29). The 1-month repo auction rate exceeded the upper band of the interest rate corridor in this period, which shows that market players expect a rise in the upper band of the corridor, thus boosting market rates. Moreover, the higher-than-expected inflation figures in June as well as the depreciation of the TL pushed inflation expectations upwards (Chart 5.1.30), which also exerted an upward pressure on market rates.

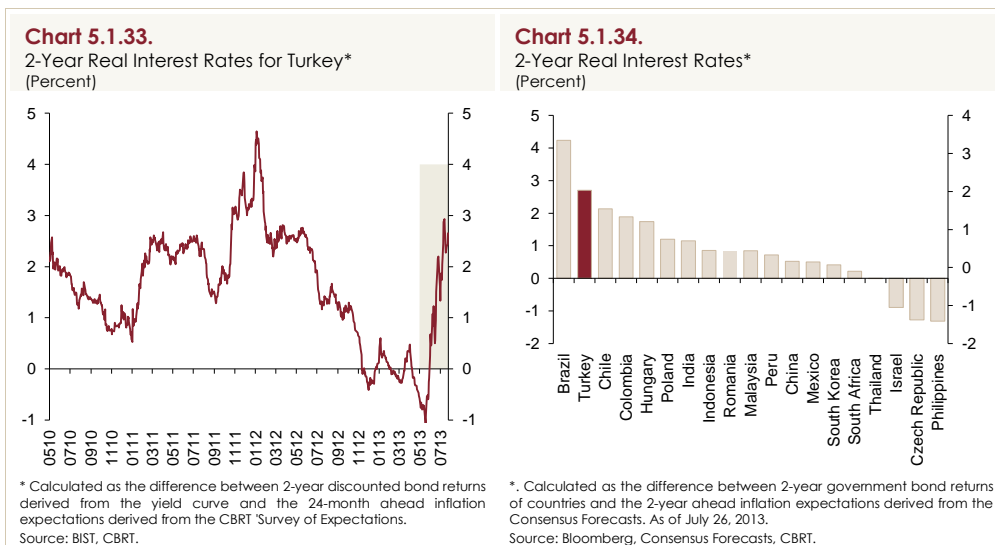


Amid the reduction in the policy rate in addition to the O/N lending and borrowing rates as well as Turkey's credit rating upgrade to investment level by another agency in May, interest rates edged down, across all maturities. The

reason for the limited fall in interest rates is the advance pricing of these developments. However, elevated uncertainties regarding global monetary policies since late May and the launching of additional monetary tightening by the CBRT raised interest rates across all maturities and shifted the yield curve upwards (Chart 5.1.31). In this period, the benchmark interest rate also displayed a similar move (Chart 5.1.32).

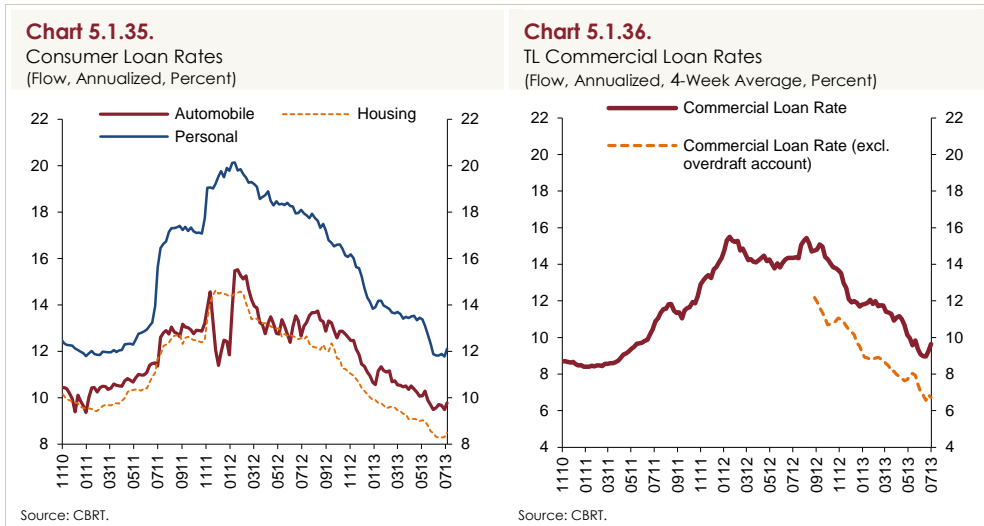


Two-year real interest rates displayed a quarter-on-quarter increase as the 2-year nominal interest rates posted higher increases than the 24-month ahead inflation expectations (Chart 5.1.33). When compared to other emerging economies, Turkey ranked among the top countries for the nominal interest rate and climbed to upper ranks for the real interest rate as well (Chart 5.1.34).

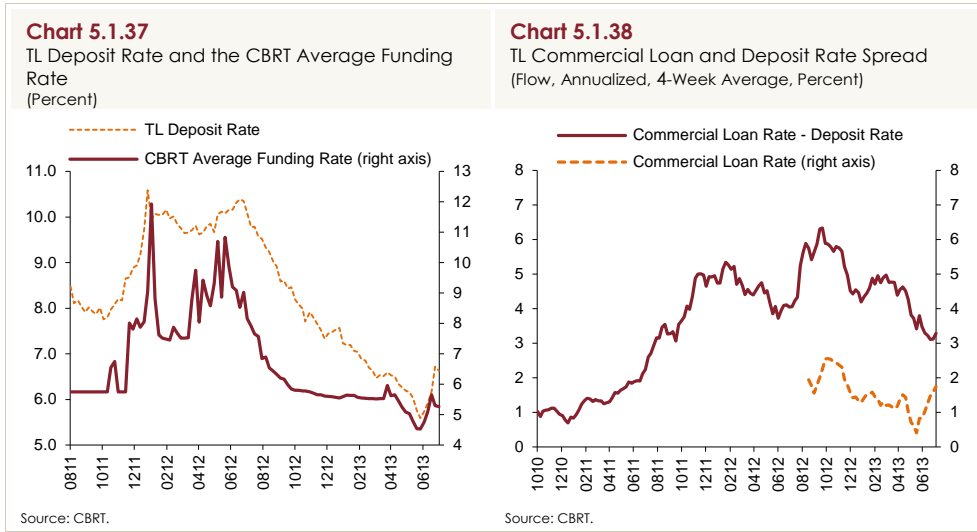


Loan Rates and the Banking Sector Funding Costs

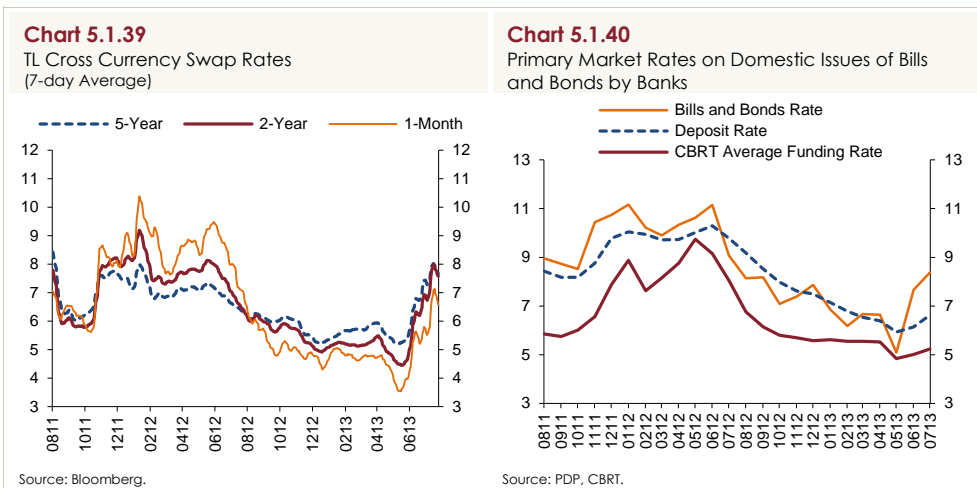
Rates on loans extended to the non-financial sector declined further in the second quarter of 2013. Amid the CBRT's reductions in the lower and upper bands of the interest rate corridor, rates on both consumer and commercial loans posted a decline. On the other hand, rates on commercial loans, which are more sensitive to the CBRT's O/N interest rate, went down by around 160 basis points in the second quarter (Chart 5.1.36). The tightening in liquidity policies in the second quarter and the average funding cost, which has increased as of late May, did not reflect on consumer and commercial loan rates in the second quarter due to intense competition among banks as well as the falling profit margins (Chart 5.1.35). Alongside rising funding costs, the CBRT's decision in July to widen the interest rate corridor is envisioned to affect loan rates.



Interest rates on deposits, which have declined since the second quarter of 2012, receded in tandem with the loan rates until the end of May, and surged upon the tightening in the liquidity policy and the rise in the average funding cost (Chart 5.1.37). As banks eased their profit margins on loans extended to firms, the spread between commercial loan rates and deposit rates declined and neared the levels before the monetary tightening in 2011 (Chart 5.1.38).



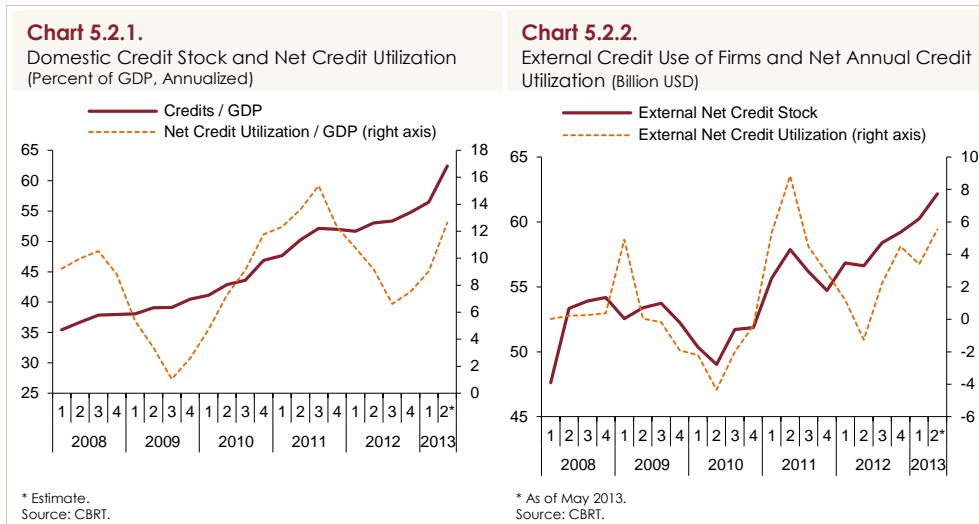
Returns on government bonds and cross currency swap rates, which have corresponding maturities with consumer loans, declined until the last week of May. However, in the succeeding period, parallel to the heightened uncertainties in global markets regarding monetary policies, these rates recorded an upsurge also due to the tighter monetary policy practices of the CBRT (Chart 5.1.39). Primary market rates on banks' domestic issues of bills and bonds recorded a decline in April and May 2013, but increased in June and went far above the interest rates on deposits (Chart 5.1.40).



5.2. Credit Volume and Monetary Indicators

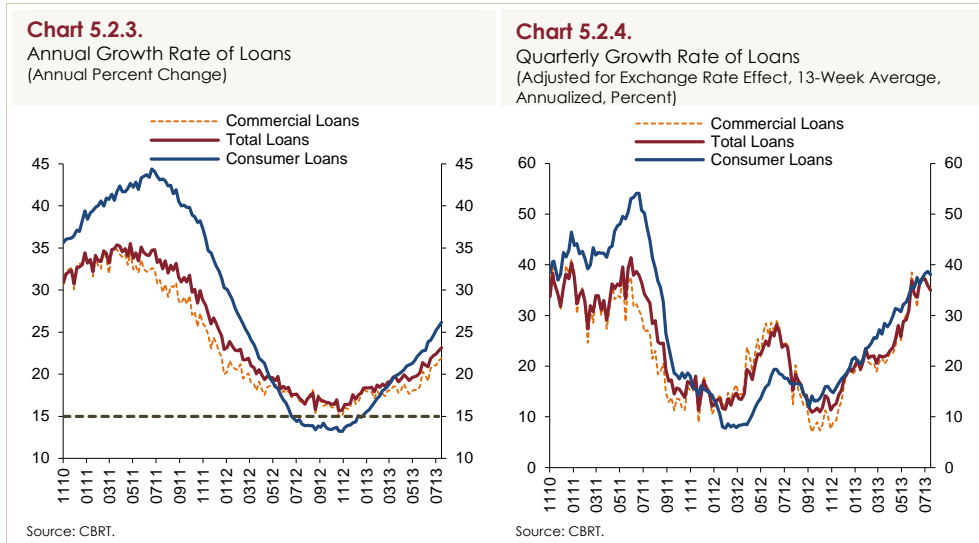
Having peaked in the third quarter of 2011, net credit utilization, which summarizes the relation of credit growth to economic activity and aggregate

demand, and calculated as the annual change in net credit stock, settled on a stable downtrend during four consecutive quarters. As of the last quarter of 2012, the net credit utilization rate recorded an increase amid the recovery in the credit growth rate (Chart 5.2.1).

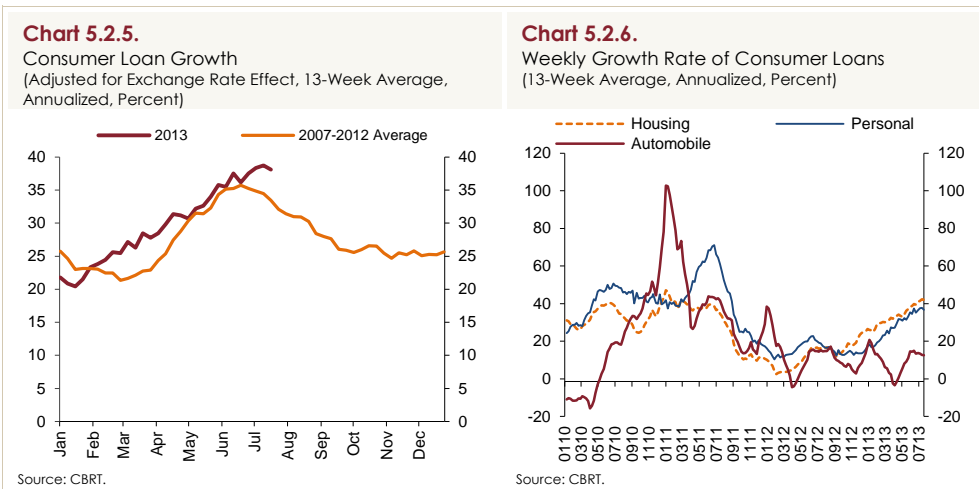


Upon the improvement in external financing opportunities, the use of external credits by domestic firms has accelerated as of end-2011. Similarly, net use of external credits has also been on the increase since the second quarter of 2012 (Chart 5.2.2). The net borrowing by the real sector from non-resident institutions and corporations went up in May.

The growth of credits extended to the non-financial sector by resident banks gained considerable pace in November 2012 and credit growth continued to remain above the reference value in the second quarter of 2013. Loans extended to the non-financial sector adjusted for the exchange rate effect recorded a year-on-year growth by 23.1 percent at the end of the second quarter of 2013 (Chart 5.2.3), and a growth of 34.9 percent in annualized terms (Chart 5.2.4) Unlike the first quarter, the growth rates of both consumer and commercial loans went far beyond 2007-2012 averages. Waning capital inflows coupled with tightened liquidity conditions did not bring about a remarkable easing on the supply side in the second quarter of 2013. On the other hand, in addition to loan demand driven by moderate economic recovery and low credit rates, the stronger perception that the policy-rate-cut-cycle has ended caused a predating of the loan demand, which caused the credit growth rate to increase in this period as well.

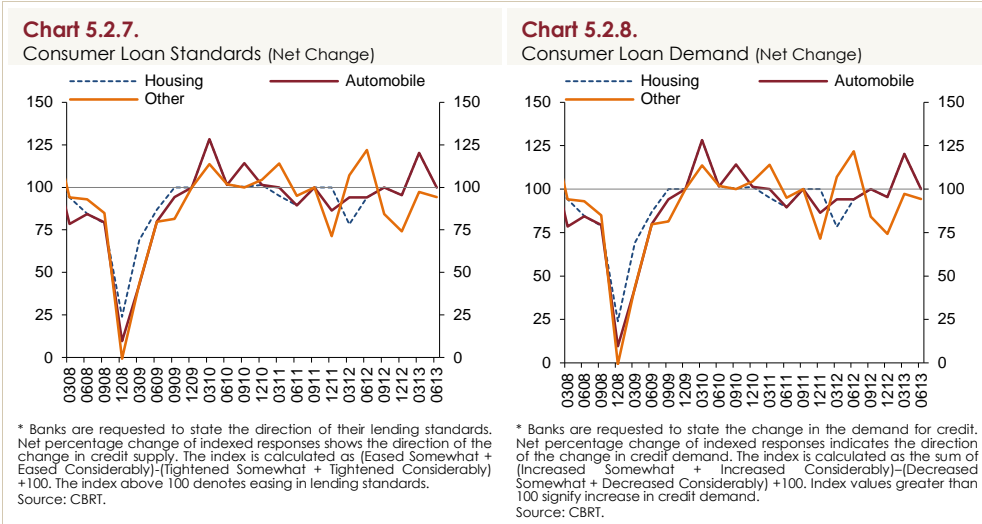


Consumer loans continued to grow in the second quarter in tandem with the previous years' average (Chart 5.2.5). An analysis of subcategories suggests that growth of consumer loans accelerated on the back of the recovery in automobile loans due to seasonal factors, while housing and personal loans in particular exhibited a robust growth (Chart 5.2.6).

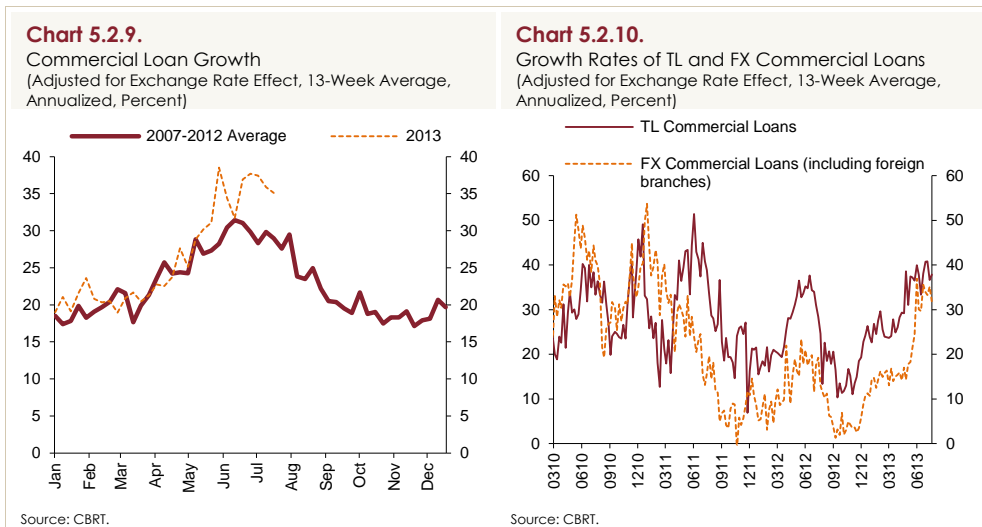


Loan Tendency Survey results pertaining to the second quarter of 2013 showed that banks introduced a limited tightening to lending standards for personal loans, while those for housing and automobile loans remained virtually unchanged. Meanwhile, alongside the improvements in funding costs and balance sheet restrictions, competition among banks led to eased standards across all consumer loans, whereas expectations regarding overall economic activity stood out as the leading factor to tighten standards. On the other hand, banks stated that demand for all consumer loans recorded an increase (Charts 5.2.7 and 5.2.8). The further acceleration of the growth of automobile

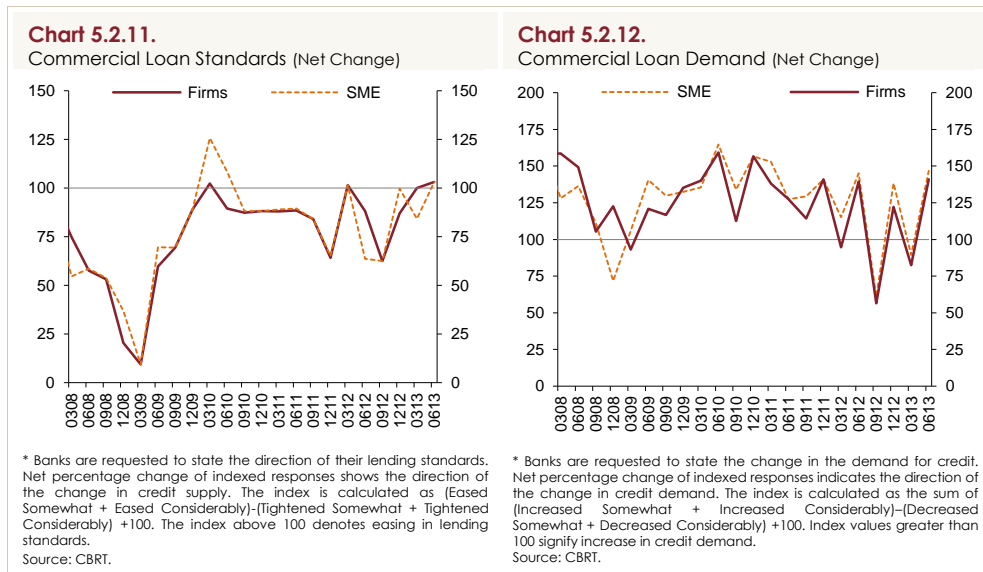
and housing loans extended by consumer financing firms in this period confirms the rise in demand for consumer loans. Banks declared that they expected an increase in all consumer loan categories, in contrast to a limited tightening of standards in the third quarter of 2013.



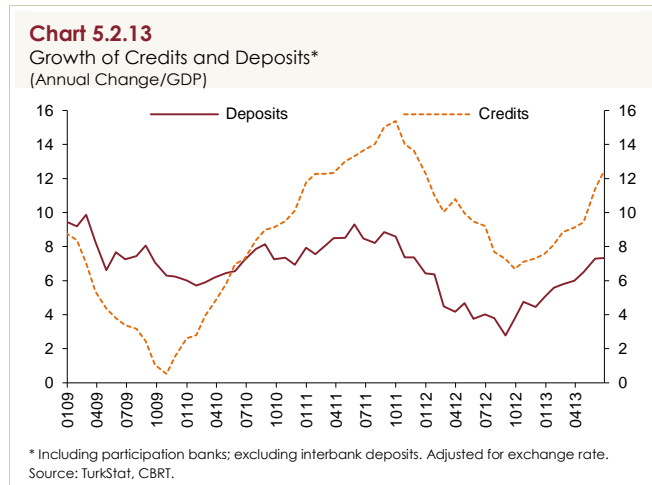
The growth rate of commercial loans, which has displayed an evident improvement since late 2012, remained on an uptrend in the second quarter of 2013 and went beyond the averages in the 2007-2012 period (Chart 5.2.9). In terms of the currency denomination, both TL and FX-denominated commercial loans registered an increase (Chart 5.2.10). Loan Tendency Survey results indicate that the loan demand from all scales of enterprises exhibited an upsurge. The breakdown of loans by maturities reveals that demand for loans increased across all maturities.



Loan Tendency Survey responses of banks reveal that banks opted for a limited easing in lending standards for commercial loans on all scales in the second quarter of 2013 (Chart 5.2.11). The easing is mainly attributed to increased competitiveness in the second quarter, which in turn reduced the profit margin applied to commercial loans. Banks expect a rise in demand for loans in all maturities and scales, and an overall tightening in lending standards for commercial loans in the third quarter of 2013.

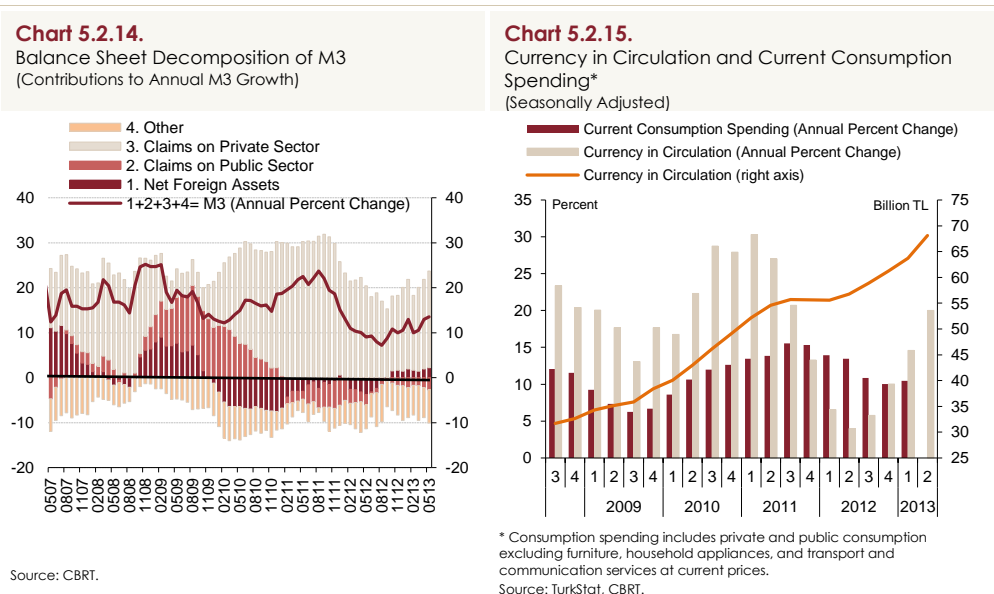


In the second quarter of the year, consumer and commercial loan demand continued to be robust and credit growth remained higher than expected. In the second quarter of the year, the subsided and volatile capital inflows accompanied by the tightened liquidity policy of the CBRT restricted easing on the supply side. On the other hand, low loan rates and restored final domestic demand led the loan demand to be brisk in this quarter. Capital inflows have recently remained subdued upon the uncertainties of monetary policies by advanced economies. Accordingly, the use of external resources by banks is estimated to slow down in the upcoming period. Along with seasonal factors, the currently excessive credit growth prompted by the CBRT's adjustments in the liquidity composition and the interest rate corridor is expected to pace down and gradually near the deposit growth rate (Chart 5.2.13).



Monetary Indicators

Amid rising credits extended to the private sector, the annual growth of M3, the broad measure of money supply, continued to trend upwards in the second quarter of the year. Contributions to M3 growth by sub-items show that the pronounced increase in Net Foreign Assets of the monetary sector was partially offset by the fall in the Claims on the Public Sector in the same period. The item 'Other' continued to create non-deposit funding resources to the banking sector in tandem with the rising profitability of the banking sector (Chart 5.2.14).



The currency in circulation in seasonally adjusted terms lagged behind the level implied by the robust course, which was exhibited in the post-2009 period. Nevertheless, the year-on-year growth of the currency in circulation

remained on an upward track in the second quarter of the year (Chart 5.2.15). Recently, the previously observed correlation between the currency in circulation and current consumption spending seems to have waned due to normalization. Yet, the stronger uptrend of the currency in circulation in the second quarter of the year is perceived as a signal of the sustained recovery in economic activity.

Box
5.1

Reserve Options Mechanism as an Automatic Stabilizing Policy Tool

Emerging economies adopted unconventional policy tools to contain financial risks emanating from large swings in short-term capital flows, which were generated by monetary easing policies conducted by advanced economies. In order to contain excessive exchange rate volatility and mitigate the adverse effects of short-term capital flows on the economy, the CBRT gradually introduced the Reserve Options Mechanism as a new macroprudential tool.¹

The ROM was introduced by the CBRT in late 2011. The mechanism is a market-friendly tool that in principle acts as an automatic stabilizer of large exchange rate fluctuations, to mitigate the distortionary effects of such large fluctuations on domestic business cycles. To give an example, during times of surge in capital flows, banks will be more willing to use the ROM facility as the relative cost of USD funding will be lower. Accordingly, some portion of capital inflows will be automatically retained as the CBRT's reserves, thereby easing the appreciation pressure on the TL. During times of capital outflow, on the other hand, the mechanism will work in reverse and the depreciation pressure on the TL will be less.

This box presents an analysis of the effect of the Reserve Options Mechanism on the USD/TL expectations. Two main questions to be addressed are: (i) to what extent the use of ROM varies the volatility, skewness and kurtosis of USD/TL expectations relative to other emerging market currencies; and (ii) whether the sensitivity of USD/TL expectations changes with respect to common external factors.

Methodologically, we first extract the risk-neutral probability distribution function (RN-PDF) of USD/TL exchange rate expectations by using option prices. Based on the estimated RN-PDF, we then calculate the standard deviation, skewness and kurtosis of USD/TL expectations. Similarly, we obtain the moments for a large set of emerging market exchange rate expectations and estimate a common factor for each moment using standard dynamic factor modeling. Finally, by controlling for common external factors and the CBRT's other policy actions, a seemingly unrelated regression (SUR) model is used to address the questions above.²

Relative Exchange Rate Expectations

In order to analyze the effect of the ROM on volatility, skewness and kurtosis expectations of USD/TL with respect to other emerging market currencies, the following SUR model is estimated in equation 1:

¹ For further details, see Alper, Kara and Yörükoğlu (2012); Oduncu et al. (2013); Küçüksaraç and Özel (2012).

² For further details, see Değerli and Fendoğlu (2013).

$$\begin{aligned}\mu_{rel,t}^{(2)} &= \alpha_1 ROM_t + \sum_{k=1}^T \rho_1^j \mu_{rel,t-k}^{(2)} + \partial_1 x_t + \epsilon_t^{(2)} \\ \mu_{rel,t}^{(3)} &= \alpha_2 ROM_t + \sum_{k=1}^T \rho_2^j \mu_{rel,t-k}^{(3)} + \partial_2 x_t + \epsilon_t^{(3)} \\ \mu_{rel,t}^{(4)} &= \alpha_3 ROM_t + \sum_{k=1}^T \rho_3^j \mu_{rel,t-k}^{(4)} + \partial_3 x_t + \epsilon_t^{(4)}\end{aligned}\quad (1)$$

$\mu_{rel,t}^{(2)}$, $\mu_{rel,t}^{(3)}$ and $\mu_{rel,t}^{(4)}$ denote the relative standard deviation, skewness and kurtosis of the USD/TL, respectively. More specifically, a higher $\mu_{rel,t}^{(2)}$ implies that the standard deviation of USD/TL is higher relative to other emerging economies. ROM_t denotes the share of reserves held by banks at the CBRT within the ROM facility to gross international reserves of the CBRT. x_t stands for CBRT's other policy tools, which are additional monetary tightening *AMT* and exchange rate interventions *FXS*.³

Table 1. Estimation Results

	Dependent Variable		
	$\mu_{rel,t}^{(2)}$	$\mu_{rel,t}^{(3)}$	$\mu_{rel,t}^{(4)}$
ROM	-0.307*** (0.099)	-0.148* (0.085)	-0.093 (0.075)
AMT	-0.013 (0.026)	0.039 (0.032)	0.014 (0.029)
FXS	0.011 (0.027)	-0.008 (0.034)	-0.039 (0.030)
$\mu_{rel,t-1}^{(2)}$	0.437*** (0.059)		
$\mu_{rel,t-2}^{(2)}$	0.446*** (0.057)		
$\mu_{rel,t-1}^{(3)}$		0.276*** (0.054)	
$\mu_{rel,t-2}^{(3)}$		0.276*** (0.054)	
$\mu_{rel,t-1}^{(4)}$			0.503*** (0.048)
$\mu_{rel,t-2}^{(4)}$			0.358*** (0.050)
Constant	0.102*** (0.026)	0.057*** (0.019)	0.046*** (0.014)
Number of Observations	235	235	235
R²	0.887	0.710	0.731
p(x²)	0.000	0.000	0.000
Q(5)	0.868	0.711	0.264

*, **, *** denotes 1 percent, 5 percent and 10 percent significance level, respectively.

Table 1 shows that the USD/TL expectations have a lower volatility and skewness than other emerging market currencies during the implementation of ROM. As for the kurtosis, which reflects the expectation for excessive swings in the exchange rate, the effect of ROM is negative, yet statistically insignificant.

³ Similar results are produced when ROM_i is treated as a dummy variable that takes the value 0 before Sept. 30, 2011, the date when ROM was put into effect, and 1 afterwards.

ROM as an Automatic Stabilizing Tool

The following SUR model in equation 2 is estimated in order to analyze the effect of the ROM on the sensitivity of the expected volatility, skewness and kurtosis of USD/TL to common external factors:

$$\begin{aligned}\mu_t^{(2)} &= \alpha_1 ROM_t + \beta_1 C_t^{(2)} + \gamma_1 ROM_t * C_t^{(2)} + \sum_{k=1}^T \rho_1^j \mu_{t-k}^{(2)} + \partial_1 x_t + \epsilon_t^{(2)} \\ \mu_t^{(3)} &= \alpha_2 ROM_t + \beta_2 C_t^{(3)} + \gamma_2 ROM_t * C_t^{(3)} + \sum_{k=1}^T \rho_2^j \mu_{t-k}^{(3)} + \partial_2 x_t + \epsilon_t^{(3)} \\ \mu_t^{(4)} &= \alpha_3 ROM_t + \beta_3 C_t^{(4)} + \gamma_3 ROM_t * C_t^{(4)} + \sum_{k=1}^T \rho_3^j \mu_{t-k}^{(4)} + \partial_3 x_t + \epsilon_t^{(4)}\end{aligned}\quad (2)$$

$\mu_t^{(2)}$, $\mu_t^{(3)}$ and $\mu_t^{(4)}$ denote standard deviation, skewness and kurtosis of the expected USD/TL, respectively. $C_t^{(2)}$ is the common factor for the implied standard deviation, $C_t^{(3)}$ is the common factor for the implied skewness, and $C_t^{(4)}$ is the common factor for the implied kurtosis. To calculate these factors, we consider a simple dynamic factor model (DFM) for each moment. By adding common external factors as well as the ROM and common external factor interaction variable to the equation, the effect of the ROM on the sensitivity of standard deviation, skewness, and kurtosis of the USD/TL exchange rate expectations to common external factors is analyzed.

Table 2. Estimation Results

	Dependent Variable		
	$\mu_t^{(2)}$	$\mu_t^{(3)}$	$\mu_t^{(4)}$
ROM	-0.209*** (0.052)	-0.078** (0.031)	-0.242** (0.101)
C²	0.004*** (0.001)		
ROM * C²	-0.004 (0.006)		
C³		0.002* (0.001)	
ROM * C³		-0.008 (0.007)	
C⁴			0.008** (0.003)
ROM * C⁴			-0.049* (0.026)
AMT	-0.003 (0.012)	0.018 (0.011)	0.037 (0.033)
FXS	0.014 (0.013)	-0.017 (0.012)	-0.040 (0.035)
$\mu_{t-1}^{(2)}$	0.867*** (0.056)		
$\mu_{t-2}^{(2)}$	0.017 (0.056)		
$\mu_{t-1}^{(3)}$		0.905*** (0.047)	
$\mu_{t-2}^{(3)}$		0.059 (0.047)	
$\mu_{t-1}^{(4)}$			0.767*** (0.049)
$\mu_{t-2}^{(4)}$			0.154*** (0.052)
Number of Observations	235	235	235
R²	0,977	0,935	0,871
p(x²)	0,000	0,000	0,000
Q(5)	0,972	0,915	0,922

*, **, *** denotes 1 percent, 5 percent and 10 percent significance level, respectively.

Results in Table 2 show that (i) after the implementation of the ROM the volatility, skewness and kurtosis expectations of USD/TL lessen considerably when common external factors and the other policy tools used by the CBRT are controlled for; (ii) common external factors have an increasing effect for all moments; (iii) the sensitivity of kurtosis to common external factors declines, thus suggesting that ROM acts like an automatic stabilizer in this regard.

To conclude, as a macro prudential policy tool to mitigate the potential effect of large swings in short-term capital flows on domestic business cycles, the Reserve Options Mechanism seems beneficial in containing large fluctuations in the exchange rate, and more importantly, in a market-friendly manner. It also appears that the USD/TL exchange rate expectations diverge positively from other emerging market currencies after the implementation of the mechanism.

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Box
5.2

External Borrowing of Banks and ROM

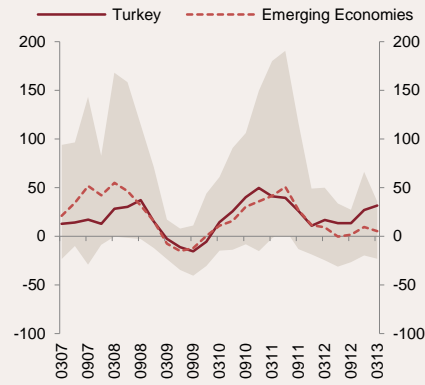
This box provides an analysis of how the external borrowing dynamics in the Turkish banking sector differ from other emerging economies. Furthermore, the analysis also comments on the recent hot debate about whether the reserve options mechanism leads to a surge in the short-term external borrowing of banks.

Banking Sector External Borrowing

Except for the decline during the global crisis period, external borrowing of banks has followed an upward course since 2005. According to 2012Q4 data, external borrowing by the Turkish banking sector stands at USD 113 billion, 60 percent of which with a less than 1-year maturity. External borrowing statistics for banks include short-term FX or TL-denominated loans borrowed by resident banks in Turkey from non-resident banks or commercial institutions abroad, FX or TL-denominated deposits of non-resident individuals, corporations and banks abroad at resident banks in Turkey as well as FX and TL-denominated securities issued abroad. As external borrowing statistics are based on residency status, funds borrowed from foreign branches of resident banks are also included in external borrowing.

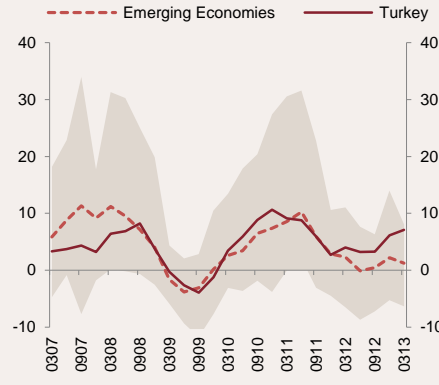
Identifying whether the increase in external borrowing of banks is specific to Turkey is of great significance. Hence, external borrowing by Turkish banks is compared to external borrowing of banks in other emerging economies. To this end, quarter-on-quarter and year-on-year growth rate of external borrowing by selected emerging economies are calculated by using the World Bank statistics on external borrowing. Accordingly, growth of external borrowing by banks in Turkey moves parallel to other emerging economies (Charts 1 and 2). However, external borrowing by banks in Turkey has recently gained pace relative to other emerging economies.

Chart 1. Year-on-Year Growth of External Borrowing by Banks (Percent)



Source: World Bank.

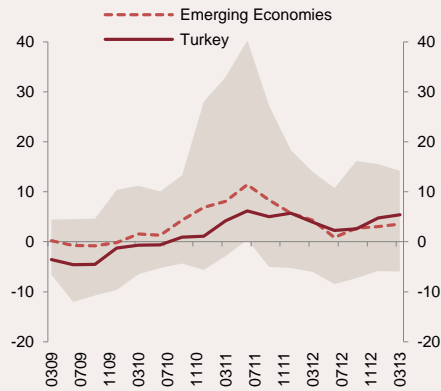
Chart 2. Quarter-on-Quarter Growth of External Borrowing by Banks (4-Quarter Moving Average, Percent)



Source: World Bank.

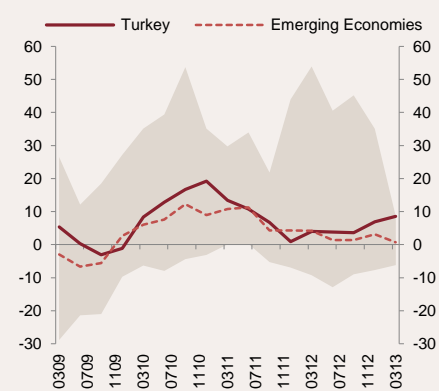
Analyzing term-to-maturity of external borrowing is as important as analyzing the growth rate of external borrowing. More specifically, banks' borrowing at long-term maturity alleviates financial stability risks. In this case, examining the maturity of banks' external borrowing reveals that especially the short-term external borrowing by banks follows a relatively more rapid course in Turkey than in other emerging economies (Charts 3 and 4).

Chart 3. Quarter-on-Quarter Growth of Long-Term External Borrowing by Banks (4-Quarter Moving Average, Percent)



Source: World Bank.

Chart 4. Quarter-on-Quarter Growth of Short-Term External Borrowing by Banks (4-Quarter Moving Average, Percent)



Source: World Bank.

Is Increasing External Borrowing by Banks Specific to Turkey?

Analyzing whether the external borrowing by banks in Turkey differs from external borrowing of banks in other emerging economies is crucial. Accordingly, the

growth of external borrowing by banks in several emerging economies is compared to Turkey using quarter-on-quarter data on external borrowing during the 2005Q1-2012Q4 period. Consequently, the year-on-year growth rate of banks' external borrowing calculated for each country is included in the analysis and the growth rate of external borrowing of banks in Turkey is compared to the average growth rate in other emerging economies. The results of this analysis, which are presented in Table 1, suggest that Turkish banks' external borrowing is not statistically different from external borrowing of banks in other emerging economies.

Table 1. Year-on-Year Growth of External Borrowing*

Countries	t-test	Satterthwaite-Welch t-test	ANOVA F-test	Welch F-test
Brazil	1.04	1.04	1.07	1.07
Chile	0.68	0.68	0.46	0.46
Colombia	1.40	1.40	1.97	1.97
Czech Republic	-0.11	-0.11	0.01	0.01
Hungary	-1.67	-1.67	2.80	2.80
India	-2.04	-2.04	4.18	4.18
Indonesia	0.89	0.89	0.79	0.79
South Korea	-1.32	-1.32	1.74	1.74
Malaysia	1.08	1.08	1.16	1.16
Mexico	-0.54	-0.54	0.30	0.30
Poland	1.07	1.07	1.14	1.14
Russia	0.33	0.33	0.11	0.11
South Africa	-1.35	-1.35	1.82	1.82
Thailand	1.32	1.32	1.75	1.75

*Table shows t values for t-test and Satterthwaite-Welch t-test; F values for ANOVA and WELCH F-tests.

In addition to analyzing borrowing by growth rates, analyzing external borrowing by maturity is also crucial. Hence, long-term external borrowing statistics are compared to other emerging economies. Results indicate that long-term external borrowing by banks in Turkey varies with respect to Colombia, South Africa and Mexico. More specifically, long-term external borrowing in South Africa and Colombia grows faster than in Turkey, while it grows relatively slower in Mexico. Meanwhile, the growth of long-term external borrowing in Turkey is statistically not different from other countries (Table 2).

In addition to the long-term external borrowing, analyzing whether short-term external borrowing in Turkey differs statistically with respect to other emerging economies is necessary. Accordingly, the analysis results show that the growth rate of short-term external borrowing by banks in Turkey is statistically different from the currencies of some emerging economies. Moreover, the short-term external borrowing by banks in Turkey grows relatively faster than other emerging economies (Table 2).

Table 2. Long-Term and Short-Term External Borrowing by Year-on-Year Growth*

Countries	Long-Term External Borrowing		Short-Term External Borrowing	
	t-test	Satterthwaite-Welch t-test	t-test	Satterthwaite-Welch t-test
Brazil	1.57	1.57	-2.86	-2.86
Chile	0.29	0.29	0.98	0.98
Colombia	2.41	2.41	0.10	0.10
Czech Republic	0.30	0.30	-3.54	-3.54
Hungary	-1.26	-1.26	-4.06	-4.06
India	-1.34	-1.34	0.47	0.47
Indonesia	-0.16	-0.16	-0.71	-0.71
South Korea	0.33	0.33	-4.79	-4.79
Malaysia	1.52	1.52	-2.37	-2.37
Mexico	-2.29	-2.29	0.85	0.85
Poland	1.33	1.33	-2.83	-2.83
Russia	0.81	0.81	-2.23	-2.23
South Africa	2.15	2.15	-3.81	-3.81
Thailand	0.84	0.84	1.20	1.20

*Table shows t values for t-test and Satterthwaite-Welch t-test.

The above analyses demonstrate that short-term external borrowing of banks in Turkey is slightly higher than other emerging economies. Analyzing whether this increase can be attributed to the implementation of the reserve options mechanism is crucial. Hence, the analysis uses the CBRT's release of the monthly short-term external borrowing series to indicate whether the implementation of the reserve options mechanism led to an increase in the short-term external borrowing or not.

Accordingly, the year-on-year growth of banks' short-term external borrowing and its sub-items is compared in the pre and post-implementation period of the ROM. TL-denominated deposits are excluded from the short-term external borrowing, since the aim of this analysis is to understand whether the short-term borrowing of banks increased in FX-denomination after the ROM. Furthermore, the sub-items of short-term external borrowing are analyzed individually. September 2011 and onwards is accepted as the post-ROM period, while pre-September 2011 is accepted as the pre-ROM period.

Table 3. Growth of Short-Term External Borrowing of Banks in the Pre-ROM and Post-ROM Period *

	STEB (excl. TL Deposits)	FX Loans	Deposits	FX Deposits
t- test	-0.80	0.26	-0.09	-2.89
Satterthwaite-Welch	-1.33	0.45	-0.14	-2.82
ANOVA F-test	0.63	0.07	0.01	8.36
Welch F-test	1.77	0.20	0.02	7.97

*Table shows t values for t-test and Satterthwaite-Welch t-test; F values for ANOVA and WELCH F tests.

Results of the analysis show that the year-on-year growth of short-term external borrowing remains unchanged before and after the implementation of the ROM. More specifically, FX loans and banks' deposits are virtually constant, while FX deposits increased only slightly. However, it should be noted that FX deposits constitute only a small portion of banks' short-term external borrowing.

Conclusion

Even though external borrowing of banks in Turkey follows a course similar to other emerging economies, banks' external borrowing has recently gained pace. The analysis, which is conducted to understand whether external borrowing of banks in Turkey differs with respect to other emerging economies, suggests that growth of banks' short-term external borrowing is statistically different from some emerging economies. A further result is that short-term external borrowing of the banking sector has a relatively rapid growth in Turkey.

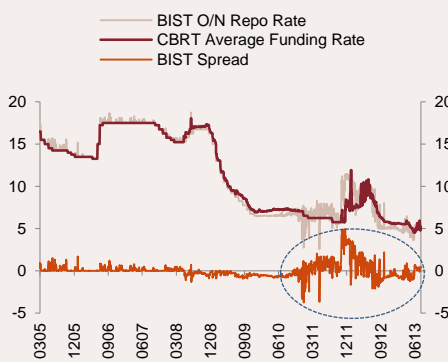
The results of the analysis on whether the reserve options mechanism increases banks' external borrowing indicate that growth of short-term external borrowing of banks remained unchanged after the implementation of ROM.

Box
5.3

The CBRT's Liquidity Management and Overnight Market Rates

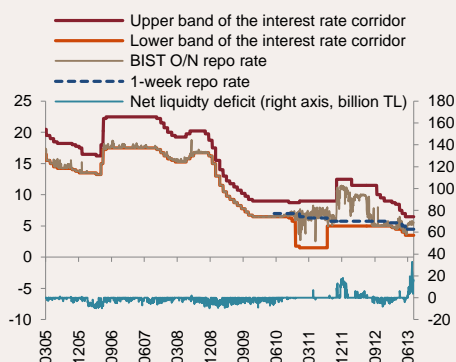
Short-term market rates played a major role during the first stage of the monetary transmission mechanism. In the conventional inflation targeting regime, overnight rates should be close to policy rates for the management of long-term rates. The overnight rates at the BIST Repo and Reverse Repo Market are critical to the transmission of the policy rate to short-term market rates. During the implementation of conventional inflation targeting regime, BIST rates moved quite close to policy rates. However, as a result of the new monetary policy implementation in the aftermath of the global crisis, the operational framework of the liquidity management underwent a change, causing non-interest policy tools to affect short-term markets' rates. Consequently, as of end-2010, the spread (BIST interest rate spread) between overnight BIST rates and the CBRT's average funding rate⁴ got wider and started to fluctuate (Chart 1). This occurrence requires a better understanding of the overnight market rate dynamics for a more accurate guiding of markets. Hence, analyzing the effect of other policy instruments, like liquidity management, on short-term rates and interest rate spread is of utmost importance. The study by Küçük et al. (2013) elaborates on this issue and demonstrates that during the new monetary policy implementation period, the CBRT's liquidity policies and the interest rate corridor are effective on the BIST spread. Accordingly, this box gives a summary of the findings of this study.

Chart 1. BIST Spread*



* Overnight BIST rate is the average overnight funding rate at the BIST Repo and Reverse Repo Market. The CBRT's average funding rate is the weighted average rate of outstanding funding at the Interbank Money Market (lending depot) and Open Market Operations (BIST repo, primary dealer repo, weekly repo via quantity auction method, weekly repo via quantity traditional auction and monthly repo).
Source: BIST, CBRT.

Chart 2. Interest Rate Corridor, O/N Rates and Net Liquidity Deficit*



* Net liquidity deficit is the sum of the CBRT's overnight net funding at the BIST Repo and Reverse Repo Market and the primary dealer repo transactions.

Source: BIST, CBRT.

⁴ By the joint use of multiple instruments within the new monetary policy framework, the policy rate fails to represent the CBRT's funding cost of the bank. Hence, the average of the different rates that apply to CBRT's funding of banks is used as the funding cost for the new monetary policy implementation period.

The Operational Framework of the Monetary Policy

As per the new monetary policy framework, the CBRT can provide daily, weekly and monthly funding to markets. The CBRT can adjust the liquidity injected to markets daily via its main policy instrument of 1-week repo auctions, thus enabling the overnight rates to settle between the overnight lending and borrowing rates, i.e. the interest rate corridor. On the days when the market's need for liquidity is not fully met by weekly and monthly funding, banks may borrow from the CBRT through overnight repo transactions at the BIST Repo and Reverse Repo Market and through the borrowing facility provided to primary dealer banks. Banks are charged the upper band of the interest rate corridor for their BIST repo transactions, while they are charged a slightly less rate than the upper band of the corridor for their primary dealer repo transactions. In this regard, the CBRT's weekly and monthly funding to remain short of the market's liquidity need results in a higher overnight liquidity deficit, thus causing market rates to soar (Chart 2). This framework offers a considerable flexibility for daily settling of market rates, and also differentiates between the overnight policy rate and the average funding rate, thereby enabling the exchange rate channel and the credit channel to be affected separately (Kara, 2012).

Determinants of the BIST Interest Rate Spread

Within the abovementioned operational framework, the interaction of the supply and demand factors determining the market liquidity conditions is expected to be effective on the interest rate spread.

Liquidity Supply and Relevant Monetary Policy Variables

The first policy variable that can explain the BIST interest rate spread is the net liquidity deficit that indicates the overnight funding need of the market. The net liquidity deficit is the sum of the CBRT's overnight net funding at the BIST Repo and Reverse Repo Market and the primary dealer repo transactions (Chart 2). The net liquidity deficit in the analysis is the ratio of this variable to total required reserve liabilities within the maintenance period. A higher net liquidity deficit implies tighter market liquidity conditions, therefore leading to an increase in the BIST spread.

Another variable in the liquidity supply is the funding provided via weekly and monthly transactions through open market operations over banks' total reserve requirement liabilities. An increase in this ratio implies easing liquidity conditions, thereby leading to a lower interest rate spread. Maturity of the CBRT's funding is also expected to be effective on the interest rate spread; hence the ratio of weekly funding to the sum of weekly funding and funding at longer

maturities is also included as an explanatory variable. An increase in ratio would imply a lower share of long-term CBRT funding, therefore causing the liquidity conditions to tighten and the interest rate spread to soar.

The operational framework of the monetary policy requires BIST rates to be within the interest rate corridor. Changes in the lower and the upper bands of the interest rate corridor determine the direction of the change in the short-term market rates, and especially the upper band of the corridor contains significant information regarding funding uncertainty. Hence, the CBRT's lending and borrowing rates are expected to affect the interest rate spread in the same direction.

Liquidity Demand and Other Relevant Variables for Liquidity Conditions

Liquidity demand is mostly composed of banks' total reserve requirement liabilities. In order to measure liquidity demand arising from required reserves, the ratio of reserves accumulated since the beginning of the maintenance period to average required reserves during the maintenance period is used. If reserves accumulated since the beginning of the maintenance period are relatively high during any day of the 14-day reserve maintenance period, the demand pressure emanating from the reserve requirement will be lower in the following day, thereby causing the interest rate spread to be lower.

Banks' expectations about the CBRT funding and short-term rates as well as variables regarding the CBRT's repo auction bids are also effective on liquidity conditions. Therefore, variables such as the bid-to-cover ratio, liquidity uncertainty, short-term interest rate expectations and interbank liquidity distribution are used to explain the interest rate spread. In addition, the first and the last day of the reserve maintenance period, tax payment days and quarterly balance sheet periods are included as dummy variables to the analysis to control for periodical factors. Furthermore, another dummy variable is added to the analysis to capture the effect of the rule change on the upper limit of auctions.⁵

Analysis Results

The study focuses on the aftermath of May 2010 when the unconventional monetary policy implementation was launched and uses relevant variables for the new monetary policy framework.⁶ Using daily data, the BIST spread s_t is estimated by least squares according to the following equation:⁷

⁵ For further details on explanatory variables, see Küçük et al. (2013).

⁶ The key policy rate of the CBRT was overnight borrowing rate until May 2010, whereas after this date, the key policy rate was set as the 1-week repo rate. This operational change paved the way for the active use of the interest rate corridor, thereby enabling the CBRT to use overnight borrowing, overnight lending and weekly repo rates for different purposes. The CBRT gradually diversified its toolkit during May 2010 and November 2010. As of November 2010, the adoption of a new policy approach has explicitly been stated in MPC meetings. The above equation, when estimated from November 2010 onwards, produces very similar results.

⁷ The selection of variables and the estimation method are based on Linzert and Schmidt (2011), which analyzes the spread between the ECB policy rate and the overnight euro rate.

$$s_t = c + \rho s_{t-1} + \alpha_1 cbrt_t^{funding} + \alpha_2 L_t + \alpha_3 maturity_t + \alpha_4 RP_{t-1} + \alpha_5 \Delta(b/c)_t + \alpha_6 H_t + \alpha_7 \Delta(ub)_t \\ + \alpha_8 \Delta(lb)_t + \alpha_9 i_t^E + \alpha_{10} uncertainty_t + \alpha_{11} D_t^{first\ day} + \alpha_{12} D_t^{last\ day} \\ + \alpha_{13} D_t^{tax} + \alpha_{14} D_t^{balance\ sheet} + \alpha_{15} D_t^{auction} + \varepsilon_t$$

Table 1 presents variable definitions and estimation results. Variables, which are directly or indirectly related to the CBRT's policies, are significant for the BIST spread. The effect of the net liquidity deficit on the BIST spread, which is positive, has a statistical significance only in periods when BIST overnight rates move within the interest rate corridor. Similarly, policy-related variables like the CBRT funding and maturity of the funding are also significant for the BIST spread.

Except for the average cumulative reserve position, other variables to explain liquidity demand and conditions have a statistically significant effect on the BIST spread, and also with the expected sign. The existence of monetary policy instruments like varying reserve requirement by maturity as well as ROM challenges the calculation of cumulative reserve position of banks for the overall sector, thus causing the relevant variable to have an insignificant effect. As expected, the bid-to-cover ratio, funding uncertainty and expected policy rate positively affect the interest rate spread (Table 1).

Table 1. Estimation Results
(May 20, 2010 – May 6, 2013)

Dependent Variable: BIST spread	Coefficient	Standard error
Dependent Variable (t-1)	0.64*	0.06
Dependent Variable (t-10)	0.05	0.03
Policy Variables		
CBRT funding (weekly and at longer maturities, $cbrt_t^{funding}$)	-0.13 *	0.05
Net liquidity deficit (L_t) (for periods when the BIST overnight rate moves within interest rate corridor)	2.11**	0.89
Maturity of the CBRT funding ($maturity_t$)	0.56*	0.18
Change in upper band of the corridor (Δub_t)	-0.31**	0.14
Change in lower band of the corridor (Δlb_t)	0.55*	0.12
Liquidity Demand and Conditions		
Change in bid-to-cover ratio ($\Delta(b/c)$)	0.13*	0.03
Funding uncertainty ($uncertainty_t$)	0.25**	0.11
Interbank liquidity distribution (H_t)	0.52*	0.21
Expected policy rates (i_t^E)	0.2*	0.04
Cumulative reserve position (RP_{t-1})	0.52	0.44
Dummy variable: First day ($D_t^{first\ day}$)	0.2*	0.07
Dummy variable: Last day ($D_t^{last\ day}$)	-0.22*	0.08
Dummy variable: Balance sheet period ($D_t^{balance\ sheet}$)	1.16*	0.31
Dummy variable: Tax payments (D_t^{tax})	0.27*	0.08
Dummy variable: Auction rule changes ($D_t^{auction}$)	-0.08***	0.05
Constant	-0.84***	0.50
R ² (adjusted R ²)	0.85 (0.85)	
*, ** and *** denote statistical significance at 1, 5 and 10 percent, respectively. Standard error values are corrected for autocorrelation and variance.		

All dummy variables used in the analysis are significant determinants of the BIST spread. Due to the stronger (weaker) liquidity demand by banks for reserve accumulation on the first (last) day of the reserve maintenance period, the dummy variable first day (last day) has a positive (negative) sign. Similarly, on the days of massive tax payments and balance sheet reporting in quarter-ends, the interest rate spread moves upward. Lastly, changes in the upper limit of the CBRT repo auctions are also effective on the interest rate spread.

Conclusion

This study indicates that liquidity management implemented within the new monetary policy framework is effective on overnight rates. More specifically, the joint use of an effective liquidity management and a wide interest rate corridor may occasionally result in the divergence of the BIST overnight market rate from the CBRT average funding rate. This divergence may cause the exchange rate and credit growth to be affected from different channels. Analysis results support the view that the rising of BIST overnight rates and the CBRT funding rate spread since the second half of 2010 is the natural outcome of the liquidity management, which is a major ingredient of the monetary policy implementation with multiple instruments. The CBRT, by jointly using the amount, timing and the maturity of funding as well as the interest rate corridor, may affect the BIST spread. In addition to these policy variables, variables such as the bid-to-cover ratio, expected policy rates and funding uncertainty, which indicate the market's need for liquidity, are also significant for the BIST spread. To sum up, effective liquidity management is considered a crucial instrument to the implementation of the new monetary policy framework that aims at contributing to financial stability in addition to price stability.

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Box
5.4

Yield Curve for Private Sector Securities

This box introduces the recently emerging market for private sector securities, and consequently, estimates a yield curve for bills and bonds traded in this market. Moreover, this estimated yield curve is compared to the yield curve for government securities, and the reaction of the private sector securities to monetary policy shocks is analyzed via a case study.

Estimation of the Yield Curve for Private Sector Securities

The market for private sector securities is still developing in Turkey. This market has grown strongly since 2011 amid higher issue of securities by the banking sector. During this period, not only banks, but also factoring firms, intermediary institutions and corporate sector firms have increased their issue of securities.

Securities traded in this market include floating-rate, fixed-coupon and zero-coupon bonds as well as asset-backed securities. In general, the maturity of floating rate bonds is longer than that of others. The yield curve can only be estimated for zero-coupon and fixed-coupon bonds. Hence, floating-rate bonds and asset-backed securities are excluded from the analysis.

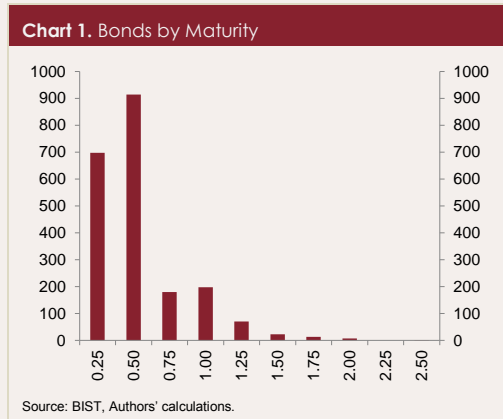
The yield curve for private sector bonds is estimated via the Nelson-Siegel method. The data used for yield curve estimation is composed of the daily average price for zero-coupon and fixed-coupon bonds. The estimation is based on minimizing the sum of the squared differences of actual and estimated bond prices. The most crucial reason for selecting the Nelson-Siegel method is that it can largely insulate yield curve from bond-specific movements, and thus, is able to smooth excessive fluctuations and produce reliable information regarding the market rate and maturity structure.

The estimation period starts from August 1, 2012 due to absence of regular trading for zero or fixed-coupon bonds prior to this date. Owing to technical reasons, bonds with less than 1-month maturity are excluded from the yield curve estimation.⁸

⁸ For further details on technical reasons, see Kanli et al. (2013).

For yield curve estimation, securities having similar risk premium and liquidity structure are preferred. On the other hand, private sector bills and bonds have differences with respect to their risk premiums. Therefore, bills and bonds issued by corporate sector firms are excluded from the analysis. Furthermore, financial firms may also differ by risk, which thus necessitates financial firms to be categorized by risk, and consequently, an individual yield curve is estimated for each category of financial firms. On the other hand, the absence of sufficient security trading under current circumstances disables the adoption of such an approach. Given that the Nelson-Siegel method is mostly insensitive to bond-specific movements, all financial firms are included in the same dataset, even though they differ with respect to risk structure. As more securities are issued in coming periods, the dataset will be enriched and produce more refined estimations.

Chart 1 shows that the distribution of bonds by maturity is right-skewed, with the longest maturity being around 2.5 years. Furthermore, the average maturity is 0.44 years, while the median maturity is 0.35 years. Also, it is interesting to note that long-term bonds are less heavily traded, while most trading occurs for bonds with maturity up to 15 months.

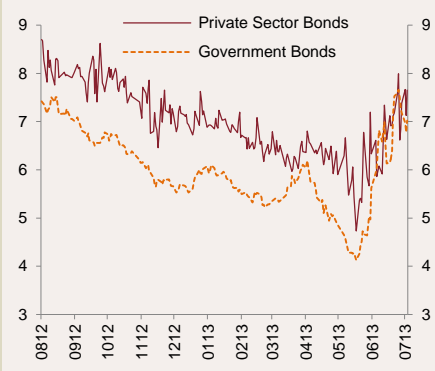


Hence, the yield curve estimated for private sector bonds produces more reliable information for shorter term maturities. As more securities are issued and the volume of trading increases for long-term zero-coupon bonds, the yield curve will provide more reliable information in the upcoming periods.

Yield Curve Estimation Results

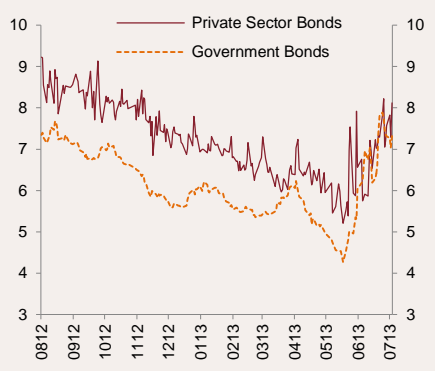
This section presents the yield curve estimation results. Accordingly, private sector bonds and government bonds with 6-month and 9-month maturities are compared (Charts 2 and 3). The analysis indicates that yields of these bonds follow a similar course. Furthermore, a risk premium differential exists between the private sector and government bonds, and recently, this differential has declined considerably. Identifying factors that are likely to determine this differential will fail to produce reliable results under current estimation conditions.

Chart 2. Yields on 6-Month Maturity Bonds
(10-day Moving Average, Percent)



Source: BIST, Authors' calculations.

Chart 3. Yields on 9-Month Maturity Bonds
(10-day Moving Average, Percent)

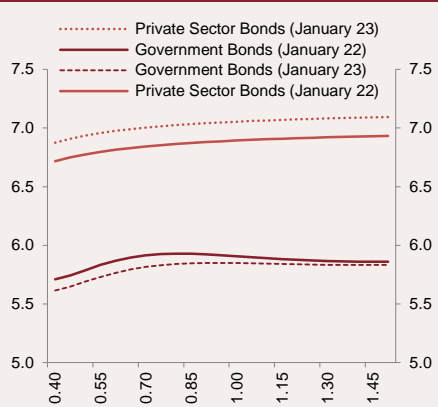


Source: BIST, Authors' calculations.

Case Study on the Reaction to Monetary Policy Shocks

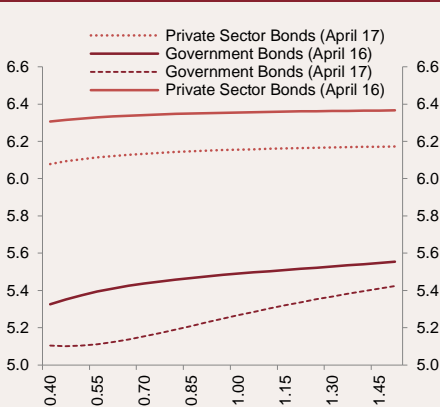
This section analyzes the effect of monetary policy shocks on private sector and government bonds. The MPC meetings on January 22 and April 16 are selected for the analysis, since the MPC decisions at these meetings were perceived as monetary policy shocks by the market. On January 22, contrary to market expectations, the MPC lowered both the upper and the lower bands of the interest rate corridor. In addition, both the required reserve ratios and the reserve options coefficients on gold were increased. Following the announcement of the decision, yields on government bonds went down, especially at short-term maturities while yields on private sector bonds edged up (Chart 4). The most crucial factor to cause such a divergence between bonds is the raising of required reserve ratios as well as reserve options coefficients since these macro prudential measures affect the profitability of financial firms.

Chart 4. Reaction to January MPC Meeting Decision(Percent)



Source: BIST, CBRT, Authors' calculations.

Chart 5. Reaction to April MPC Meeting Decision (Percent)



Source: BIST, Authors' calculations.

The other MPC decision which was perceived as a surprise by the market was delivered in the April MPC meeting in which reserve options coefficients were increased as expected; however, policy rates as well as the upper and the lower bands of the interest rate corridor were lowered more than expected. The higher-than-envisioned drop in interest rates caused government bond yields to fall. Similarly, yields on private sector bonds also declined despite increased reserve options coefficients (Chart 5). This decline is attributed to the possibility that the raising of reserve options coefficients was already priced by the market.

Conclusion

Private sector bonds offer new alternatives to borrowing for both financial and corporate sector firms. Recently, the market for private sector bonds in Turkey has developed mainly due to higher issues of securities by the banking sector.

Using the Nelson-Siegel method, this study estimates a yield curve for private sector bonds in Turkey. Results prove that the Nelson-Siegel method is quite successful. Furthermore, the study also discusses the effects of monetary policy surprises on private sector bond returns.

The relatively shorter maturity structure of private sector bonds as well as the inclusion of bonds with different risk premiums to the same dataset weighs on the efficiency of estimation. On the other hand, the yield curve will provide more reliable information on longer term maturities as maturity of bonds extends and bonds become more liquid in the forthcoming period. Furthermore, estimating the yield curve for bonds categorized by risk structure will also be possible.

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