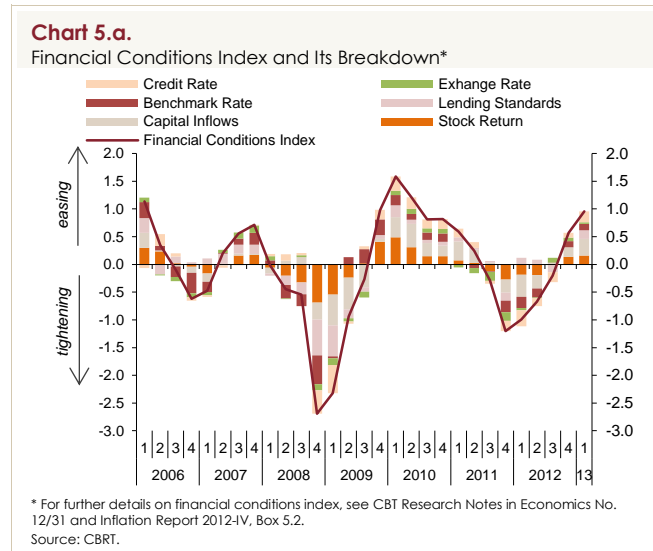


5. Financial Markets and Financial Intermediation

Overview

As capital flows followed a robust course despite setbacks in the Euro Area countries in the first quarter of 2013, financial conditions both in Turkey and around the globe remained supportive. The CBRT opted for normalization in liquidity management; raised ROC's and reserve requirement ratios, thereby feeding into restraints on the easing of domestic financial conditions in this period. The rise in ROC's and required reserves stood out as a factor to wind down the susceptibility of credit growth to capital flows.



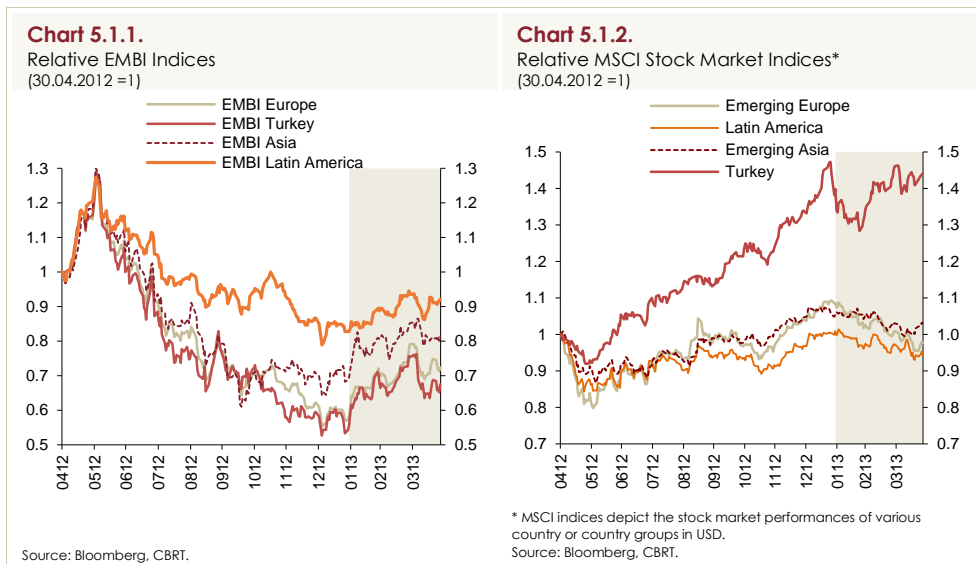
FCI for Turkey, which is calculated by taking the weighted averages of various financial indicators, continued with an uptrend in the first quarter of the year (Chart 5.a). Capital inflows have been the largest contributor to the index; while all other variables composing the index also supported financial conditions. Contributions of the increase in the stock return, the easing in lending standards, the fall in credit rates besides the decline in the benchmark rate to the index were comparable; while the contribution of the exchange rate to the FCI was relatively low. This was attributed to the limited appreciation of the exchange rate due to the CBRT's policy implementations. Under current circumstances of more favorable risk perceptions regarding Turkey as well as the expectation of ample global liquidity amid the decisions taken by the BoJ,

both domestic and external financial conditions are believed to remain supportive with regard to economic growth in the period ahead.

5.1. Financial Markets

Global Risk Perceptions

In the first quarter of the year, despite the ongoing monetary easing policies of advanced economies, political uncertainties due to the failure of establishment of a new government in Italy and fiscal issues in the Southern Cyprus mounting to a crisis weighed on the global risk appetite. Accordingly, risk premiums of emerging economies saw increases in this period (Chart 5.1.1). In late March, the settled agreement between Southern Cyprus and the EU on the solution of the crisis and the additional easing measures taken by the BoJ in early April led the risk appetite to re-settle on a recovery track. In the first quarter of the year, amid rising risk premiums in emerging economies, stock prices saw a decline (Chart 5.1.2). In the meantime, the upgrade of the stock market rating, the better-than-expected outturn of the current account deficit, expectations for a new rating upgrade and the policy rate cut have led Turkey to diverge favorably from other emerging economies since late February.

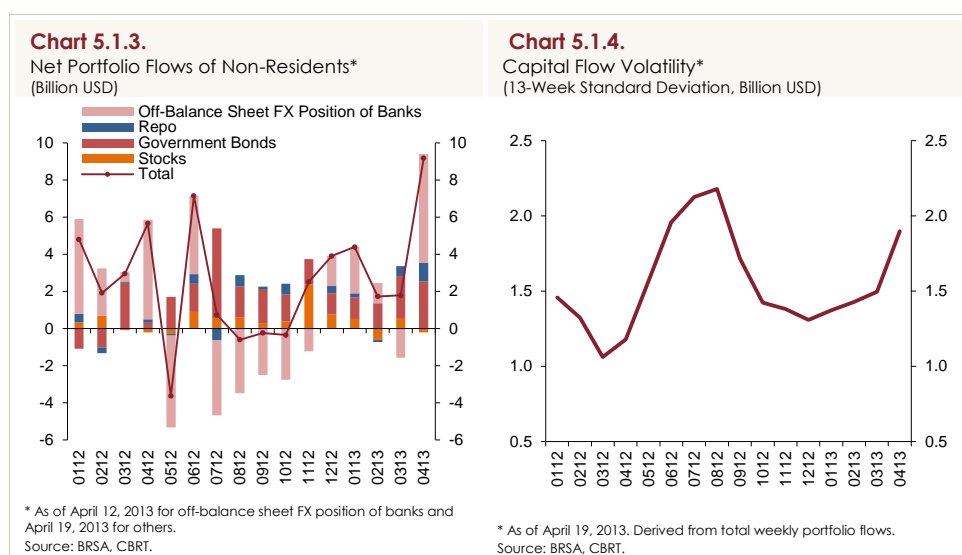


Portfolio Flows

In the first quarter of the year, emerging economies have continued to attract capital inflows. However, as a reflection of the setbacks experienced in

some European countries, the volatility of capital flows got elevated, especially in stock markets (Chart 2.5.2).

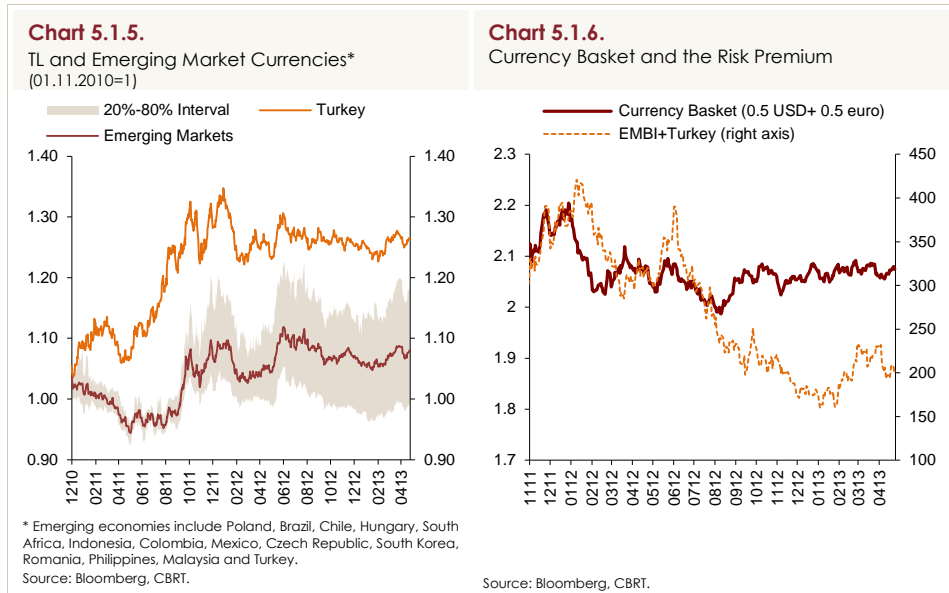
In the first quarter of 2013, investments by non-residents were maintained mainly on the back of flows to government bonds market (Chart 5.1.3). Portfolio flows by non-residents to government bonds market were heavily concentrated on longer term maturities, thus reflecting the positive expectations regarding the medium and long-term macroeconomic performance of Turkey. Meanwhile, other portfolio flows by non-residents followed a fluctuating course. Portfolio flows accelerated in April and inflows to government bonds market have continued in the first three weeks, while the first two weeks saw a surge in currency swap transactions. Amid heightened volatility in global capital flows, capital movements have also grown more volatile in Turkey in the inter-reporting period (Chart 5.1.4).



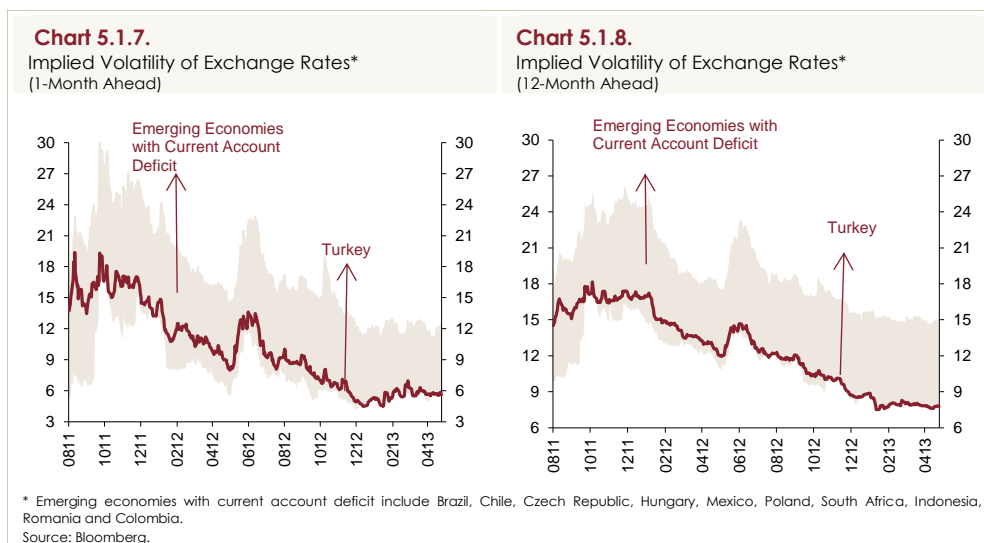
Exchange Rates

Amid elevated volatility in capital flows, currencies of emerging economies have followed a fluctuating course since the publication of the January Inflation Report. The fall in the global risk appetite in this period created a negative impact on the risk premiums of emerging economies. In line with this, currencies of many emerging economies depreciated against the USD. On the other hand, the rebound in the risk appetite as of the end-quarter led to the re-appreciation of currencies of emerging economies. In the first quarter of the year, The Turkish lira followed a similar path to the currencies of emerging

economies (Chart 5.1.5). Despite the volatile course of the risk premium, the currency basket remained broadly unchanged given the appreciation of the Turkish lira against the euro (Chart 5.1.6).

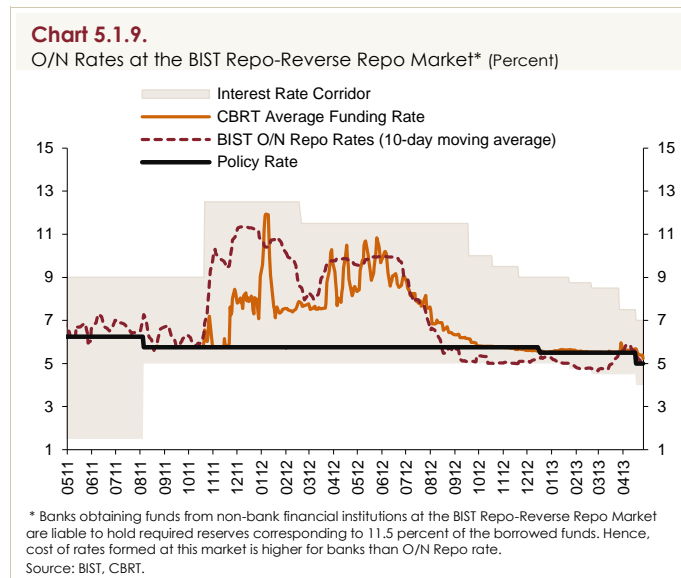


In the first quarter of the year, the fluctuations seen in the risk premiums of emerging economies and the currency markets were also reflected on the implied exchange rate volatility. Despite the recent heightening of exchange rate volatility in emerging economies, policies pursued by the CBRT provided the implied exchange rate volatility of the TL to remain relatively lower than the currencies of emerging economies running a current account deficit (Charts 5.1.7 and 5.1.8).



Monetary Policy Implementation

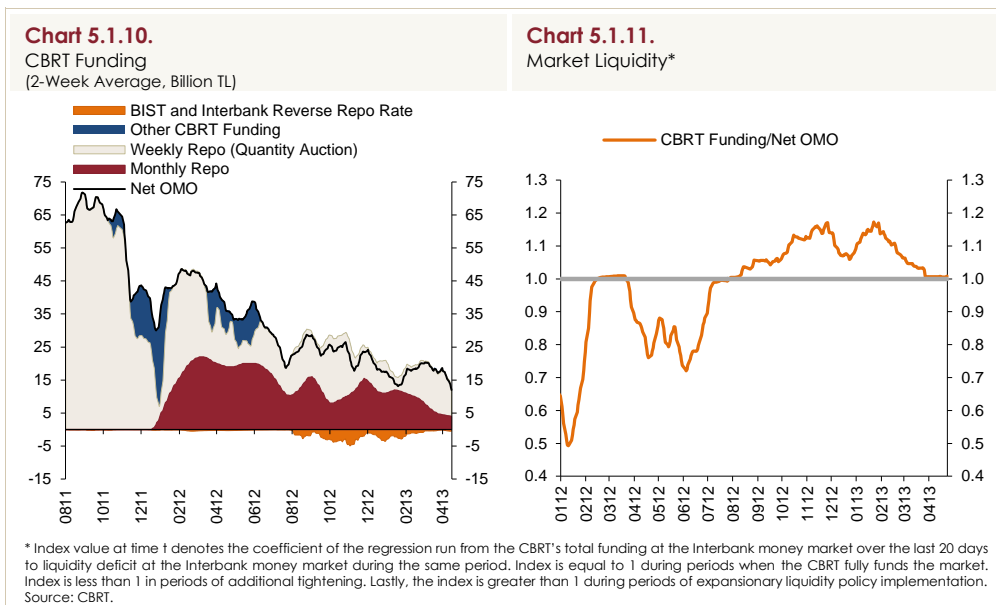
Since the publication of the January Inflation Report, the CBRT has continued with a flexible monetary policy by also observing macro financial risks caused by global uncertainties. In this environment of faster-than-expected credit growth amid robust capital flows, short-term interest rates were kept low to contain risks to financial stability on one hand, and macro prudential measures were continued in order to bolster FX reserves, on the other. Accordingly, in February, the O/N lending and borrowing rates were reduced by 25 basis points. In March, a new tranche was added and ROC's were increased to enhance the efficiency of the reserve options mechanism. Furthermore, due to reduced need for a widened interest rate corridor given the automatic stabilization property of the reserve options mechanism, the O/N lending rate was lowered by 100 basis points in March. Sustained policy rate reductions in other emerging economies, expectations for an increase in global liquidity due to the decisions taken by the BoJ and re-acceleration of the capital inflows to Turkey led to lowering of O/N lending and borrowing interest rates by 50 basis points in April; and FX reserve option coefficients were increased in order to offset risks to financial stability.



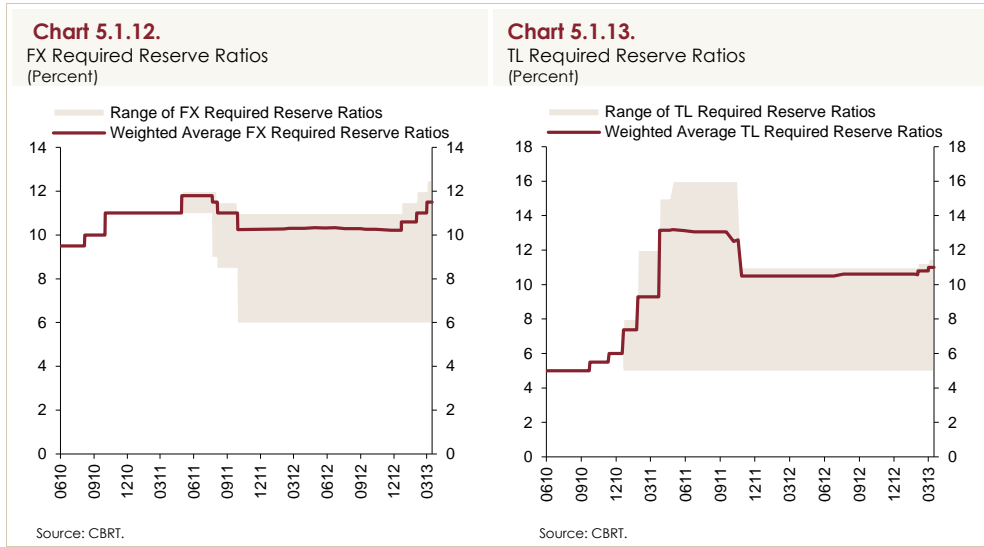
Given the CBRT's accommodative monetary policy implementations, average funding rate followed a flat course and remained close to the policy rate in the first quarter of the year (Chart 5.1.9). In this period, the CBRT funded the market mostly via one-week repo auctions held under the quantity auction

method and monthly repo auctions held under the traditional method (Chart 5.1.10).

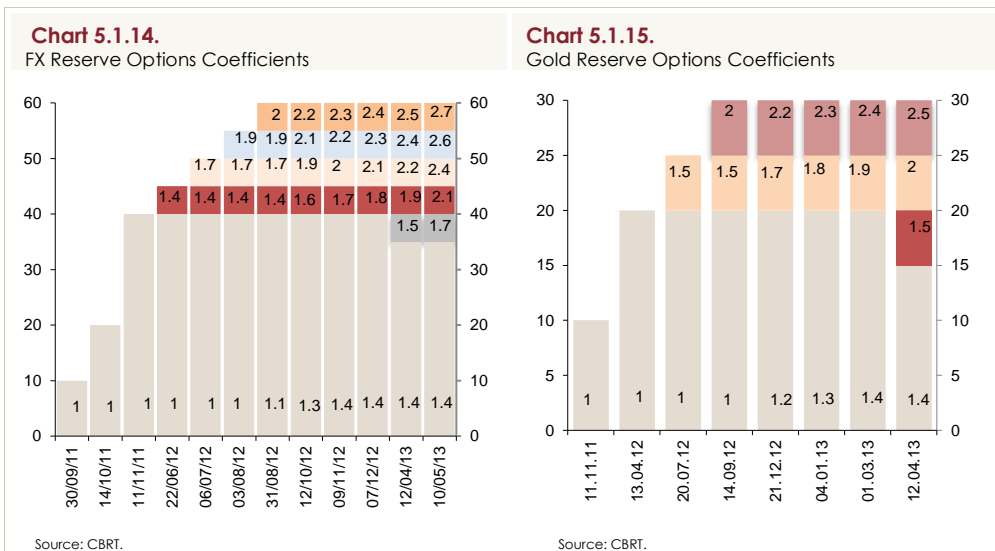
Moreover, the CBRT lowered the excess liquidity injected to the market by opting for normalization in its liquidity stance in this quarter (Chart 5.1.11). As a result of the decline in excess liquidity injected to the market by the CBRT, BIST O/N repo rates got elevated, following a similar course to the policy rate. Furthermore, the ratio of the funding amount provided by one-month repo auctions to the total amount of funding decreased in the first quarter of the year. Accordingly the maturity of the CBRT's average funding got shorter, thus providing the CBRT with flexibility in its liquidity management.



In the first quarter of the year, the strong course of capital flows led to an acceleration in credits. Accordingly, the CBRT opted for moderate increases in the TL and FX reserve requirement ratios for short-term deposits and other liabilities in January and February in order to bolster financial stability and to extend the maturities of the liabilities of the banking sector. (For the effect of the measures taken by the CBRT to support financial stability on credit growth, see Box 5.1). Thus, the average reserve requirement ratios for TL and foreign currency went up to 11 percent and 11.5 percent, respectively (Charts 5.1.12 and 5.1.13).

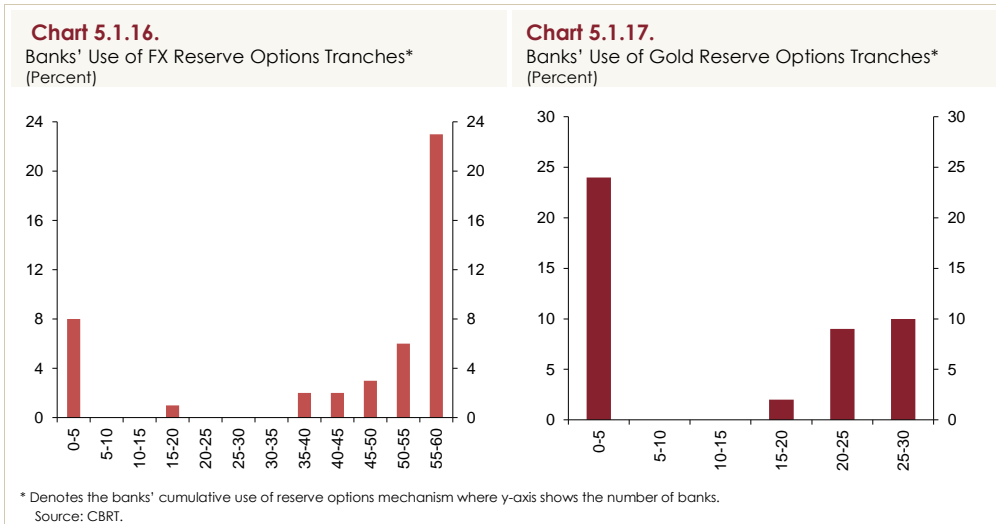


In order to complete the establishment process and thereby enhance the efficiency of the reserve options mechanism, the tranches of 35-40 percent and 15-20 percent were added to the FX reserve option ratios, and the gold reserve option ratios, respectively. Moreover, except for the first tranche, both FX and gold reserve option coefficients were increased by 0.1 and 0.2 percentage points in in March and April (Charts 5.1.14 and 5.1.15). Currently, the coefficients corresponding to the last tranche of the FX and gold reserve option stand at 2.7 and 2.5, respectively.

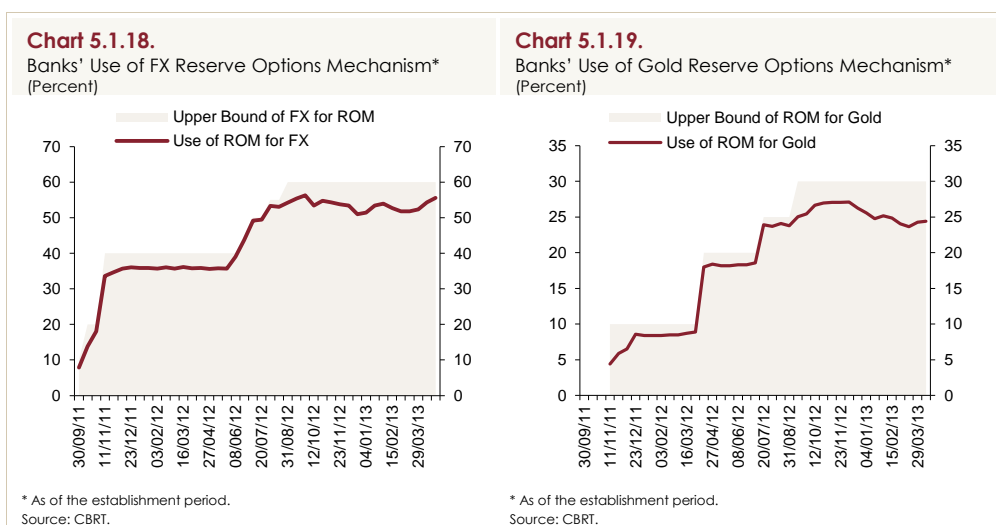


Although banks are granted with the facility to establish TL required reserves at lower costs through the reserve options mechanism, the rise in reserve option coefficients gradually increases the cost of this facility to banks.

Nevertheless, it is noteworthy that numerous banks have used both FX and gold reserve option facility as of April 26, 2013 (Charts 5.1.16 and 5.1.17). This shows that reserve options mechanism is yet to act as an automatic stabilizer.

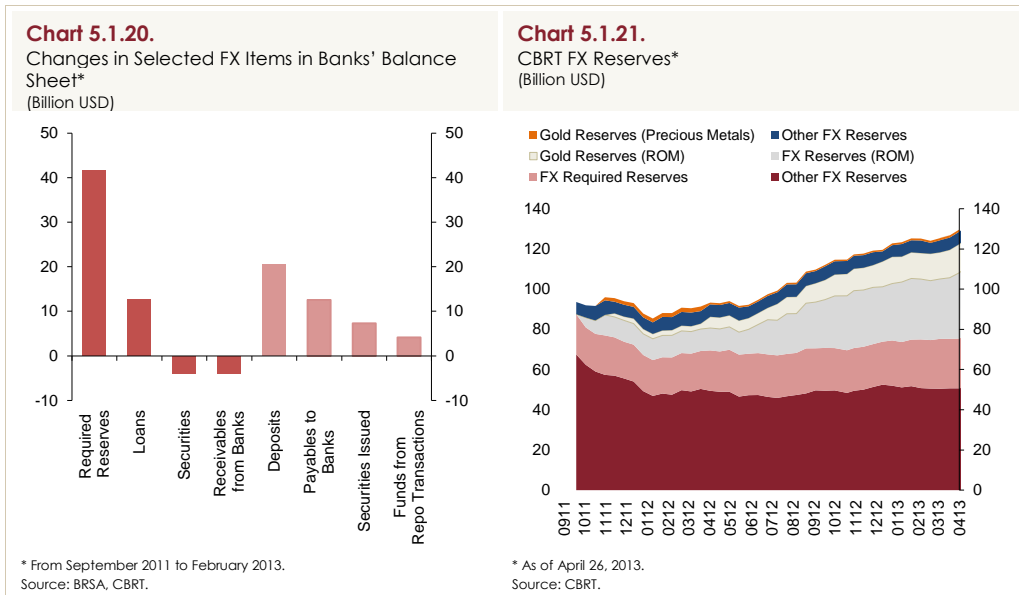


Despite the differentiation among banks regarding the utilization ratio of the reserve options, as the relatively larger banks make greater use of this facility, the utilization ratio of both gold and FX remains high in the sector. Utilization ratio of banks stood at 92.6 percent (55.5/60) and 81.8 percent (24.5/30) for FX and gold facilities, respectively as of April 26, 2013 (Charts 5.1.18 and 5.1.19). Despite hikes to ROC's, banks' use of these facilities saw higher rates in the maintenance period of April 26, mainly due to accelerated capital flows to Turkey as well as the fact that the use of the facility is still advantageous for banks.



Changes in the FX balance sheet items of banks entail valuable information on how FX required reserves are funded. An analysis of the changes in the FX balance sheet items as of September 2011, i.e. the start of the facility, suggests that banks raised deposits, payables to banks and securities issued (Chart 5.1.20). Furthermore, the increase in loans lagged behind the rise in deposits in this period.

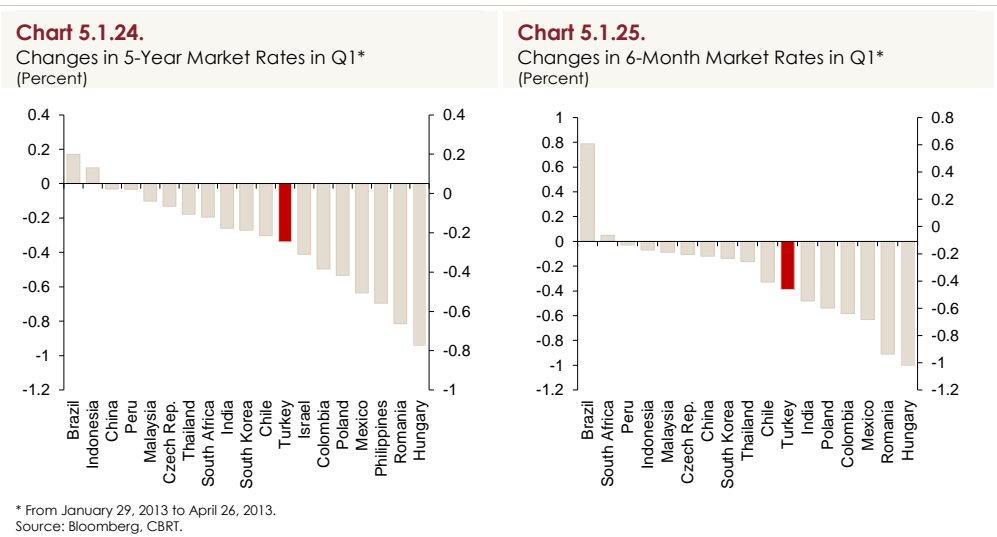
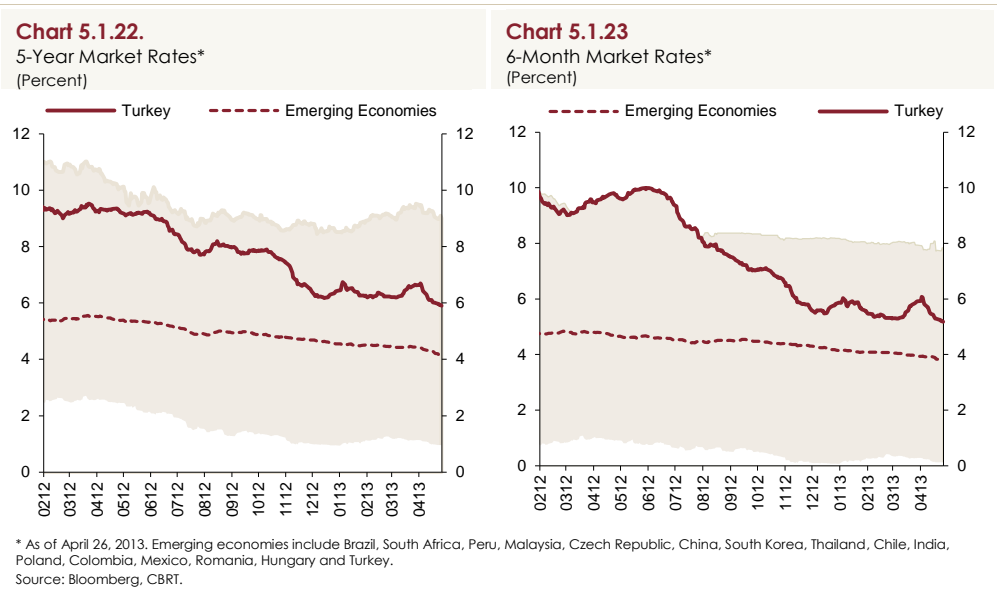
Due to the rise in TL and FX reserve requirement ratios in January and February besides the rise in reserve option coefficients for both FX and gold in March, the CBRT's gross FX and gold reserves increased further (Chart 5.1.21). Moreover, the rise in FX ROC's in April is expected to increase FX reserves by around USD 1.4 billion by May 10, 2013 maintenance period.



With a view to facilitating the liquidity management of banks and helping them project their total funding costs, the CBRT continued to announce the funding amount besides the upper limit for the one-month repo auction amount pertaining to the days of quantity auctions in the last quarter of the year. According to TL liquidity projections, the lower and upper limits of funding on the policy rate were preserved as TL 0.2 billion and TL 6.5 billion in the inter-reporting period. Meanwhile, the upper limit of the traditional one-month repo auctions was reduced to TL 2.5 billion in February and to TL 1 billion in March.

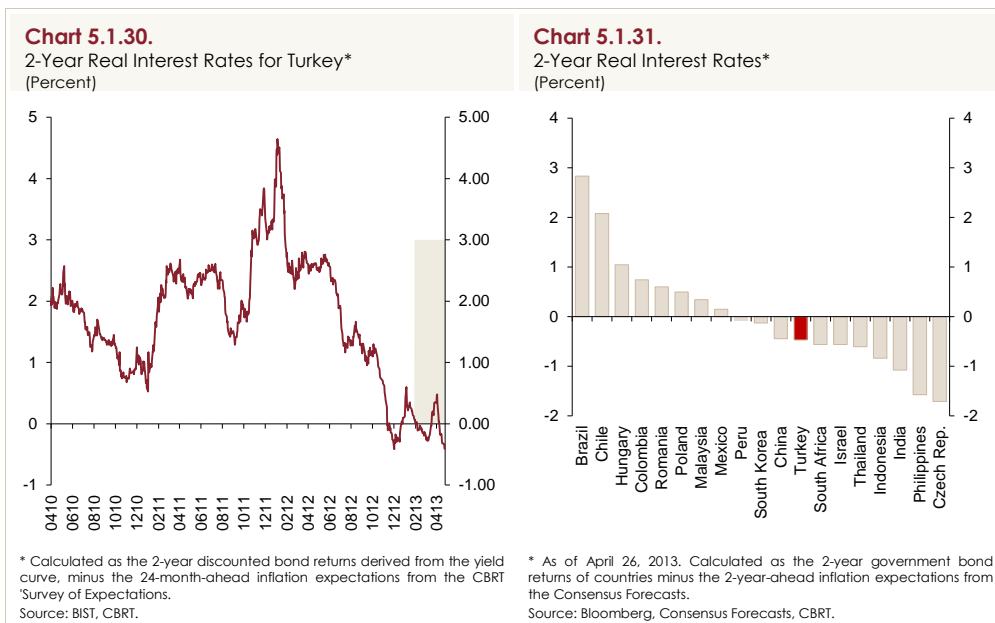
Market Rates

Amid rising risk appetite in emerging economies in the first quarter, market rates increased initially, but declined later on (Charts 5.1.22 and 5.1.23). As for Turkey, market rates in the long and short-term maturities edged down compared to end-2012 (Charts 5.1.24 and 5.1.25).



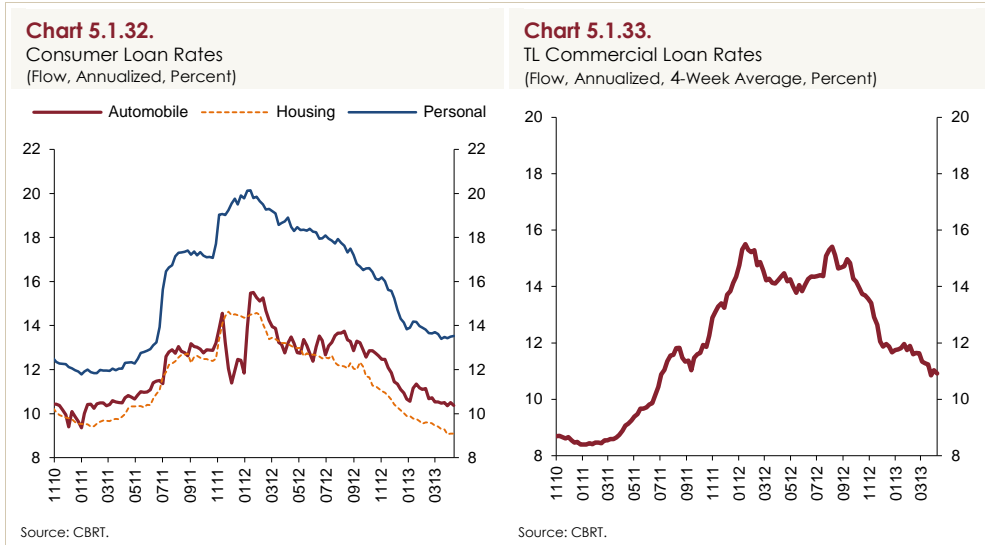
Policy rate expectations displayed a decline across all maturities in the inter-reporting period (Chart 5.1.26), thus pulling market rates down. Meanwhile, inflation expectations crept up in this period (Chart 5.1.27).

2-year real interest rates turned negative and displayed a quarter-on-quarter decline due to the fall in 2-year interest rates and the limited rise in 2-year-ahead inflation expectations (Chart 5.1.30). When compared to other emerging economies, Turkey ranked among the top countries as for the nominal interest rate; whereas it remained in the middle in the ranking of the real interest rate (Chart 5.1.31).

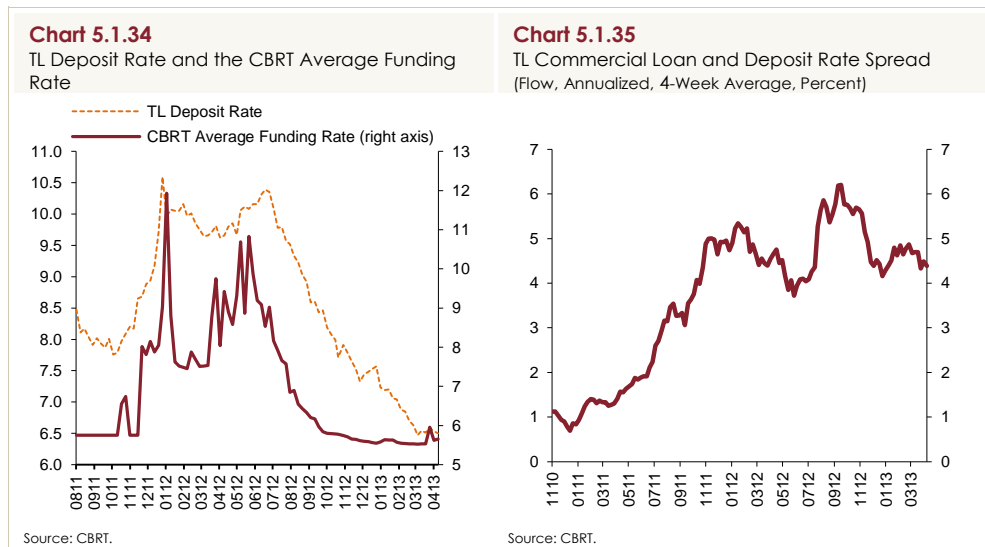


Loan Rates and the Banking Sector Funding Costs

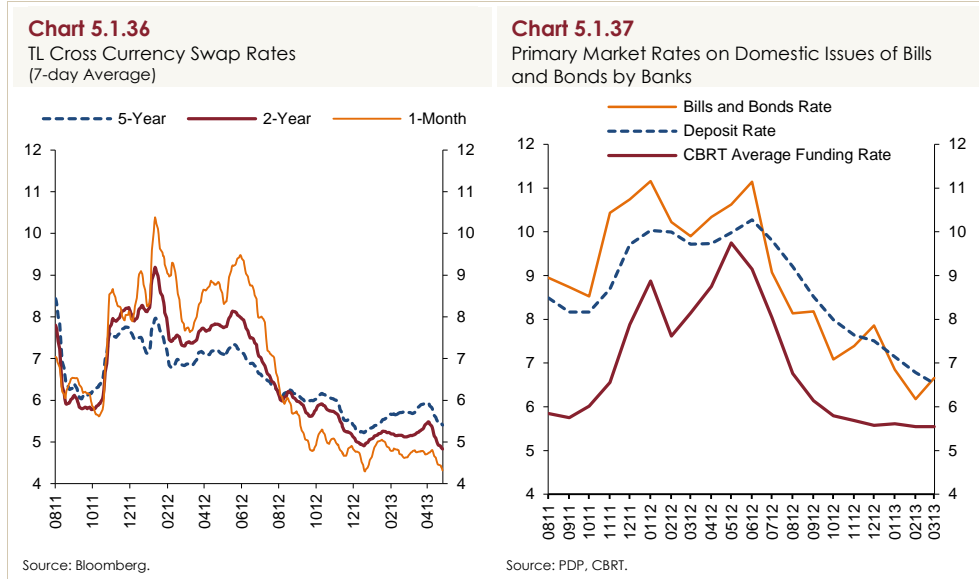
Loan rates extended to the non-financial sector declined further in the first quarter of 2013. Amid the ongoing easing policies by the CBRT and the reductions in the lower and upper bounds of the interest rate corridor, rates on both consumer and commercial loans posted a decline. As for the subcategories of consumer loans, rates on housing loans, which are highly competitive, saw a more notable decline (Chart 5.1.32). On the other hand, rates on commercial loans, which are extended on shorter maturities and more sensitive to the CBRT's O/N interest rate, went down by around 80 basis points in the first quarter of the year (Chart 5.1.33).



Amid the CBRT's policy decisions, interest rates on deposits, banks' main funding source which are highly concentrated on maturities less than 3-month, were reduced by around 100 basis points in the first quarter of the year (Chart 5.1.34). Although banks stated that their profit margins on loans extended to firms were eased, the spread between commercial loan rates and deposit rates remained relatively flat in this quarter, yet remaining high compared to the past years (Chart 5.1.35). The CBRT's moderate tightening in the reserve requirement ratios in February and adding of the 35-40 percent tranche to the reserve options mechanism and thereby raising of the reserve option coefficient by 0.3 percentage points in total for all tranches excluding the first tranche in March and April are considered to have increased the funding costs of banks.



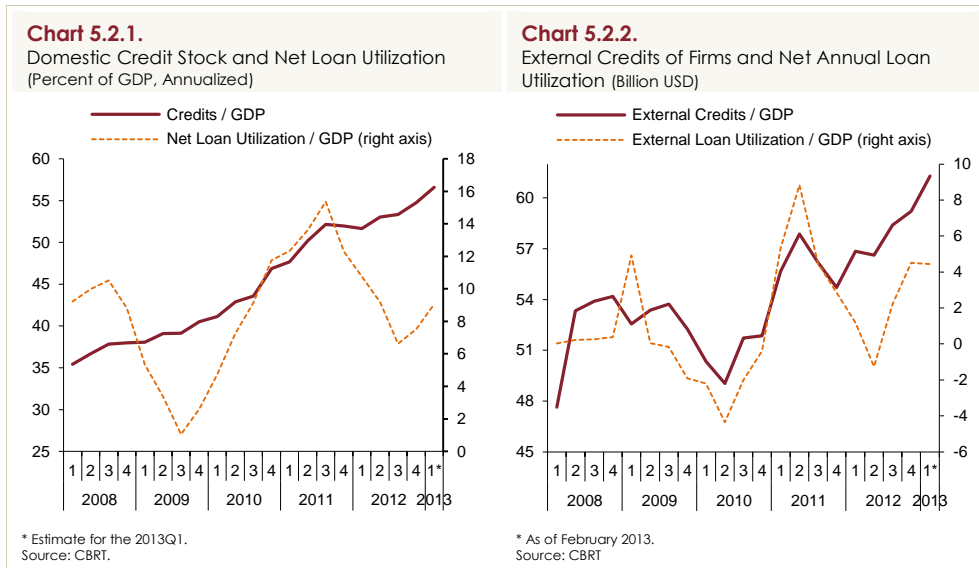
Rates on consumer loans, returns on the government bonds and interest rates on currency swap transactions with corresponding maturities increased in March, and went down in early April (Chart 5.1.36). In the first quarter of 2013, primary market rates on domestic issues of bills and bonds by banks recorded a decline and converged to the deposit rates (Chart 5.1.37).



The downtrend in FX-denominated loan and deposit rates in the last quarter of 2012, continued into the first quarter of 2013. The increase in FX financing provided by non-resident banks registered an increase in this quarter, thereby pointing that banks can still have access to foreign financing in spite of the recently elevated risk premiums in international markets.

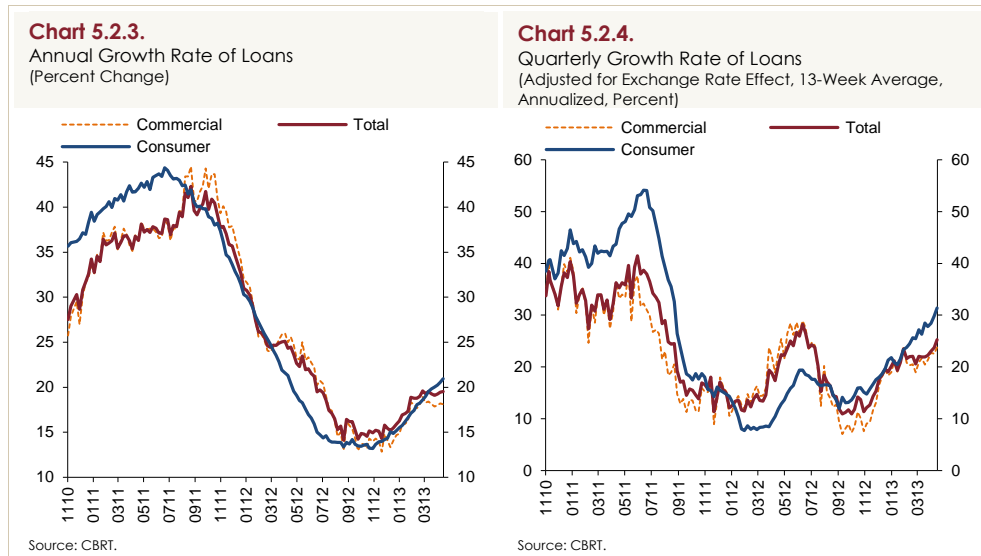
5.2. Credit Volume and Monetary Indicators

Net loan utilization, which is closely related to the developments in the economic activity and aggregate demand, and calculated as the annual change in net credit stock, peaked in the third quarter of 2011, and settled on a stable downtrend during four consecutive quarters. As of the last quarter of 2012, net loan utilization rate recorded an increase amid the recovery in the credit growth rate (Chart 5.2.1).

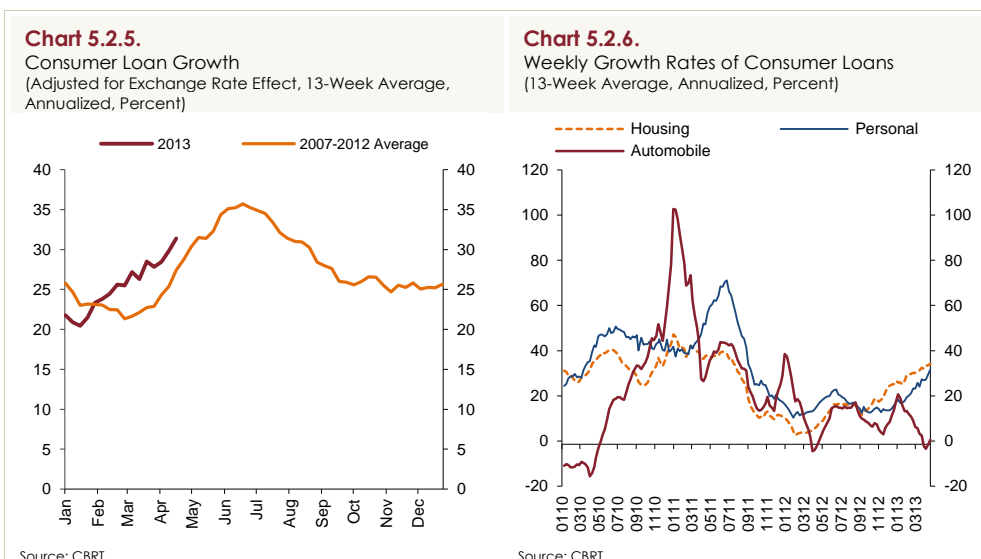


Upon the deceleration as of mid-2011, the use of net external credits of domestic firms accelerated in the second quarter of 2012 in line with the improvement in external financing opportunities (Chart 5.2.2). The net borrowing of the real sector from non-resident institutions and corporations saw an increase in the last quarter of 2012 and in February 2013.

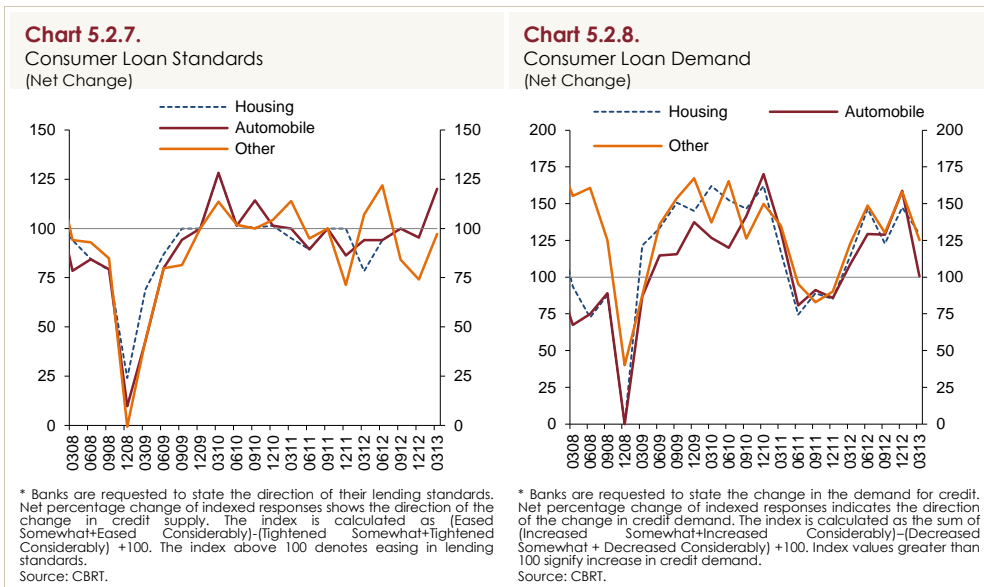
The quarterly growth of credits extended to the real sector by domestic banks gained considerable pace in November 2012 and credit growth remained above the reference value of 15 percent in the first quarter of 2013. Loans extended to the non-financial sector adjusted for the exchange rate effect recorded a year-on-year growth by 19.1 percent at the end of the first quarter of 2013 (Chart 5.2.3), and recorded a growth of 22.2 percent in annualized terms (Chart 5.2.4). Both consumer and commercial loans recorded high growth, and the growth rate of the consumer loans even went beyond 2007-2012 averages in the first quarter. The surge in capital inflows in the last quarter of 2012, followed by even more robust course in the first months of 2013 as well as the higher demand for loans amid the accommodative liquidity policies pursued by the CBRT since the second half of 2012 besides the low course of interest rates proved to be the leading underlying reasons for the acceleration in credit growth.



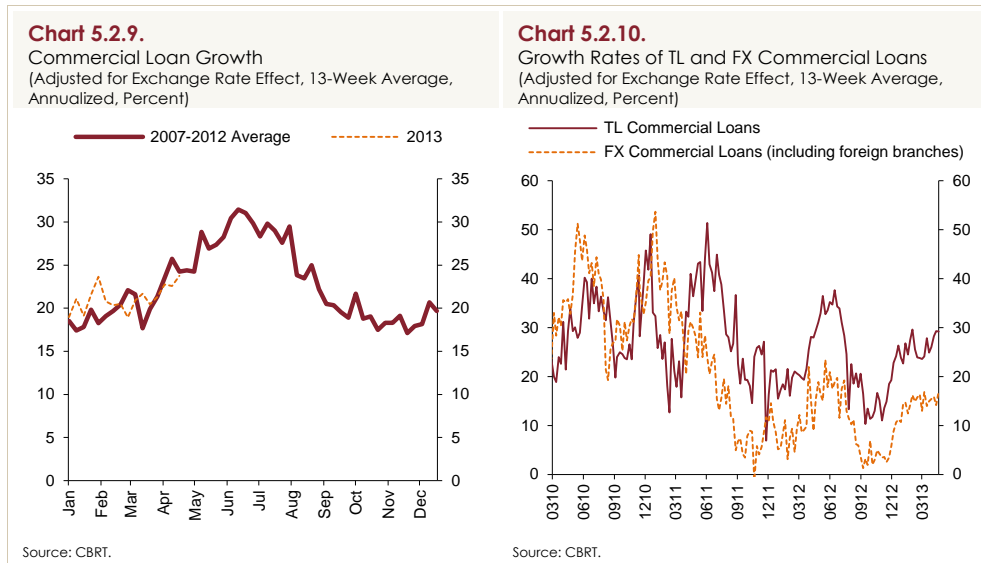
Falling rates on consumer loans accompanied by the improvement in consumer confidence as of November led to a brisk loan demand by households. Growth in consumer loans, which gained considerable pace in the last quarter of 2012 unlike previous periods, maintained this uptrend in the first quarter of 2013, standing in contrast to past averages (Chart 5.2.5). Across subcategories, the rise in consumer loans was driven mostly by housing and personal loans, while automobile loans saw a slowdown due to seasonal factors (Chart 5.2.6).



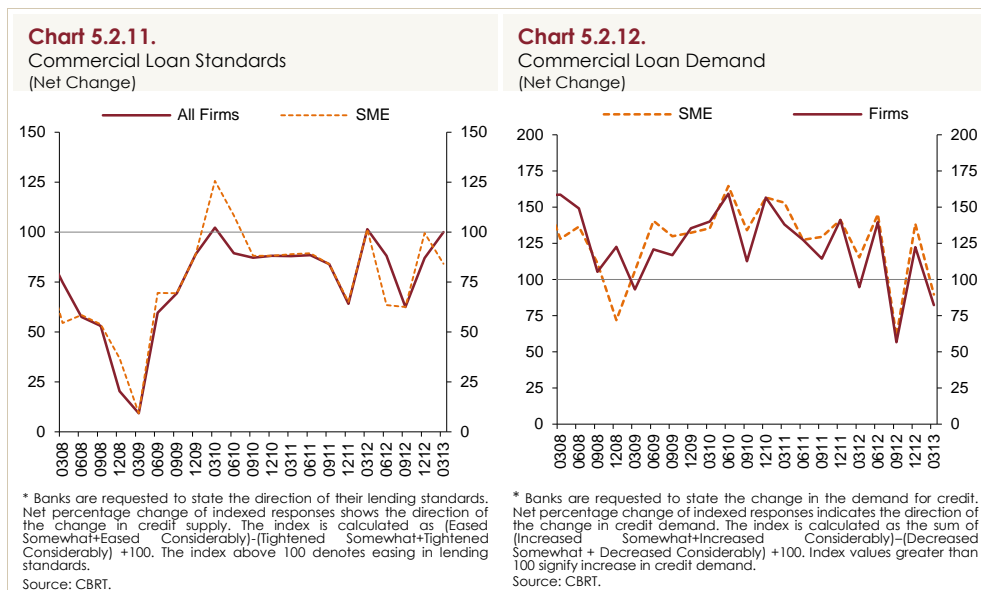
The robust course of consumer loans was fuelled by supply and demand factors. Loan Tendency Survey results pertaining to the first quarter of 2013 pointed that banks eased lending standards for housing and automobile loans, while lending standards for personal loans remained virtually unchanged. Meanwhile, increased competitiveness among banks led to eased standards across all consumer loans. As stated by banks, demand for housing and personal loans posted an increase (Charts 5.2.7 and 5.2.8), while demand for all consumer loan categories are expected to rise in the second quarter of 2013.



Growth rate of commercial loans, which has displayed an evident improvement since November 2012, remained on an uptrend in the first quarter of 2013 (Chart 5.2.9). Loan Tendency Survey results indicate that the loan demand of SMEs edged down, while loan demand of large enterprises remained broadly unchanged. The breakdown of loans by maturities reveals that demand for long-term loans continued to increase from the previous quarter; while, the demand for short-term loans displayed a decline. Refinancing of loans and financing of investments stood out as the major factors to contribute to the loan demand. The ongoing recovery in the demand for FX commercial loans, which are mostly used for financing of investment, and the higher demand for long-term loans imply a continuing demand for loans for investment purposes (Chart 5.2.10).



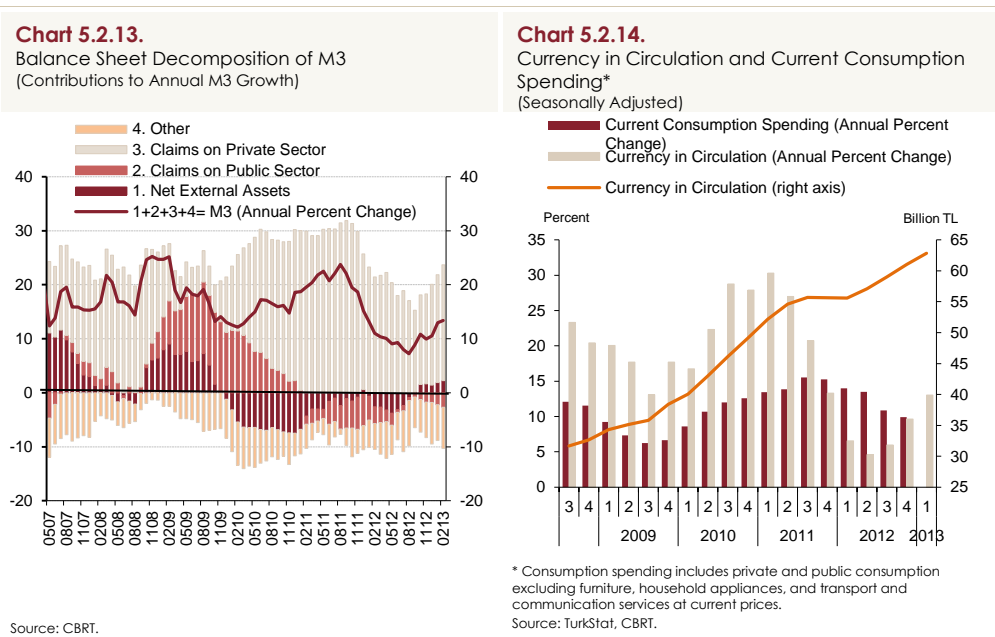
Loan Tendency Survey responses of banks point that lending standards for commercial loans remained virtually unchanged. More specifically, in the first quarter of 2013, lending standards for large enterprises were eased slightly in contrast to lending standards for SMEs, which were tightened somewhat (Chart 5.2.11). Unlike the first three quarters, in the first quarter of 2013, the risk perception for the overall economic activity was no longer the major factor to pose a tightening effect on lending standards, thus pointing to the recovery in the economic activity. In fact, banks expect a rise in demand for loans in all maturities and scales in the second quarter of 2013.



In the first quarter of 2013, consumer and commercial loan demand continued to be robust and credit growth remained higher than expected. The liquidity policy pursued by the CBRT in the second half of 2012 supported the banking system. Moreover, capital inflows, which remained strong in the last quarter of 2012 and in the first quarter of 2013, bolstered the loan supply. Meanwhile, the demand for loans increased amid the rebound in final domestic demand in terms of both consumption and investment. Capital inflows have recently grown volatile due to uncertainties regarding the global economy. Capital inflows, which have started to slow down as of mid-February, have accelerated again following the announcement of the monetary easing policy by BoJ. The CBRT shall continue to take measures to contain loan growth, which is currently hovering above the reference value, by using liquidity policy and macro prudential measures.

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 first quarter of the year. Contributions to M3 growth by sub-items show that the pronounced increase in Net External Assets of the monetary sector was offset by the fall in the Claims on the Public Sector in the same period. Lastly, 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 5.2.13).



The currency in circulation in seasonally adjusted terms lagged behind the level implied by the robust course, which was displayed in the post-2009 period. Nevertheless, the year-on-year growth of the currency in circulation remained on an upward track in the first quarter of the year (Chart 5.2.14). Recently, the previously observed correlation between 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 first quarter of the year is perceived as a signal of a rebound in the economic activity.

Box
5.1

Unconventional Monetary Policy Tools and Credit Growth

Monetary policy used to be commonly based on price stability objective prior to the global crisis; whereas in the aftermath of the crisis, it is widely acknowledged that monetary policy should also focus on financial and macroeconomic stability. The monetary policy to be centered solely at the price stability objective as well as the setting of inflation targets for relatively short-term horizon can prevent central banks from monitoring other systemic risks. Accordingly, alternative approaches in monetary policy practices come to the forefront. In this regard, the role of central banks is gaining importance in alleviating macro financial risks. In other words, the view that macroprudential policies implemented by institutions other than central banks may not suffice to control macro financial risks gained ground.¹

Rapid credit growth stands out as a significant leading indicator for financial crisis. In fact, country experiences prove that rapid credit growth is followed by major banking and balance of payments crises. Hence, close monitoring of the credit growth is of utmost importance.² As a significant component of financial stability, the CBRT attributes special importance to credit growth in its new monetary policy framework, which has been implemented since the second half of 2010, in order to alleviate macro financial risks in the aftermath of the global crisis. In order to align growth of credits with economic dynamics, the CBRT jointly uses liquidity management, required reserves and interest rate policy. Hence, understanding the effect of these alternative policy tools on credit growth is crucial. By using flow data on loans by sectors, this Box analyzes the effect of policy rates as well as unconventional monetary policy tools such as required reserves and interest rate corridor on credit growth.

According to the literature on credit channel, the main source of funding for firms and households is bank loans; and loans are mainly provided via deposits. During periods of tight monetary policy, liquidity exhibits a decline and in such an environment with limited access to non-deposit funds, banks prefer credit rationing. Hence, the substitution effect between deposits and non-deposit funds as well as loans and alternative sources of borrowing stands out as the prominent

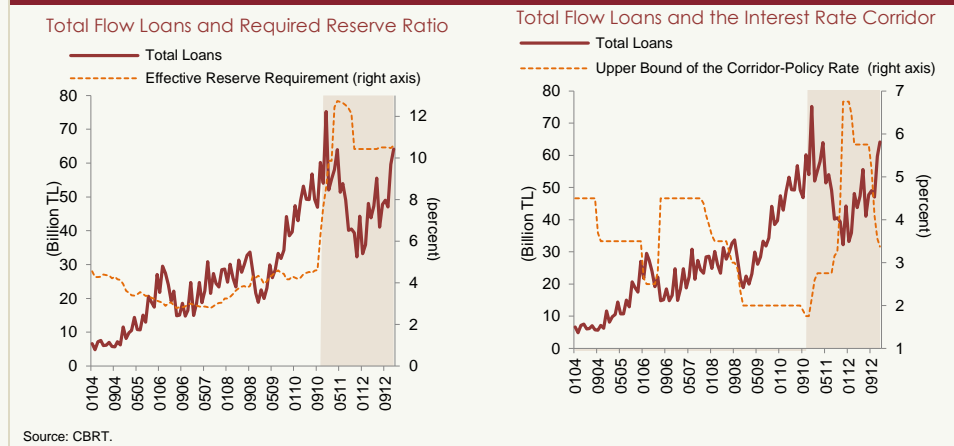
¹ For further details, see Bloxham et al. (2010).

² For further details, see Jorda et al. (2010).

factor to determine the effectiveness of the credit channel. Most studies analyzing the effectiveness of credit channel in advanced economies ignore the role of monetary policy tools other than the policy rate.^{3,4} However, unconventional tools such as required reserves are widely used in emerging economies.⁵ In fact, in the post-crisis period, most central banks adopted a flexible monetary policy approach and diversified their tools. For example, central banks of advanced economies implement monetary easing through purchases of securities, whereas those of emerging economies prefer the effective use of reserve requirement, interest rate corridor and FX interventions.⁶

For a better understanding of the effect of the adopted measures within the new policy mix on credit growth, flow data is used as the loan variable. Flow data on loans are reported weekly showing the newly-extended loans for the relevant week, thereby enabling to monitor the effect of changes in policy rate, interest rate corridor and required reserves as well as other macroeconomic developments on the price and the amount of flow loans more timely. For example, as of end-2010, hikes to effective required reserve ratios and the widening of the interest rate corridor slowed down the excessive growth of flow loans. Amid the adoption of BRSA's measures in June 2011, growth of flow loans slowed down even more remarkably (Chart 1).

Chart 1. Credit Growth and Unconventional Policy Tools



³ For further details, see Bermanke and Blinder (1988); Kashyap, Stein and Wilcox (1993).

⁴ For further details, see Gambacorta (2005).

⁵ For further details, see Tovar et al. (2012).

⁶ For further details, see Inflation Report 2012-I Box 5.2.

In accordance with the literature on credit channel, a reduced-form single equation model is estimated for testing the effects of various policy measures on credit growth. In order to take the possible lagged effects of macroeconomic and policy variables into account, a dynamic time series model is estimated. This model is illustrated in equation (1). α_{LR} , β_{LR} , θ_{LR} denote the long-run coefficients of the relevant macro and policy variables.⁷ Macroeconomic variables, which are denoted by X are GDP growth, inflation and VIX.⁸ Policy tools, which are shown by Z are one-week repo auction rate, effective required reserve ratio⁹ and the interest rate corridor. The O/N lending rate (upper bound) and the policy rate spread as well as the policy rate and the O/N borrowing rate (lower bound) spread represents the upside and downside uncertainties regarding short-term funding.

$$Y_t = \alpha_0 + \delta Y_{t-1} + X_t' \beta_0 + X_{t-1}' \beta_1 + Z_t' \theta_0 + Z_{t-1}' \theta_1 + \varepsilon_t \quad (1)$$

$$y_t = \alpha_{LR} + X_t' \beta_{LR} + Z_t' \theta_{LR} \quad (2)$$

$$\alpha_{LR} = \frac{\alpha_0 + \alpha_1}{1 - \delta} \quad (3)$$

$$\beta_{LR} = \frac{\beta_0 + \beta_1}{1 - \delta} \quad (4)$$

$$\theta_{LR} = \frac{\theta_0 + \theta_1}{1 - \delta} \quad (5)$$

The estimation results of the dynamic regression analysis as well as the long-term coefficients are presented in Table 1.¹⁰ The standard errors, which are given in the parentheses, are corrected for autocorrelation and the non-constant variance. According to estimation results, GDP growth as an indicator for aggregate demand has a positive and significant effect on credit growth. On the other hand, inflation, which represents uncertainty and price effects, as well as VIX as an indicator for external conditions and risk appetite do not have a consistent and statistically significant effect on credit growth. The effective required reserve ratio, one of the monetary policy tools, has a contractionary and statistically significant effect on all loan types. Policy rate and the interest rate corridor have

⁷ For further details on dynamic regression analysis and the estimation of long-term coefficients, see Wickens and Breusch (1988).

⁸ GDP is used to control demand for loans, inflation is included to control for uncertainty and price effects and VIX is used for controlling global risk appetite and external conditions. All variables are transformed into monthly frequency. Monthly GDP data is obtained using Fernandez (1980). The small size of the sample prevents seasonal adjustment for loans. Hence, all series, including loans are used in annual percent change.

⁹ For further details on the calculation of the effective required reserve ratios, see Binici et al. (2013).

¹⁰ The inadequacy of the sample size prevents to adopt a general-to-specific approach in setting the lag number. Instead, by adopting a specific-to-general approach, the lag number is selected by the AIC (Akaike Information Criteria) and the SBC (Schwarz Bayesian Criteria) and the model uses 1 lag.

similar effects with the policy rate being more effective on consumer loans; and the O/N lending and the policy rate spread is more effective on commercial loans. Thus, various policy tools have a narrowing effect on total loans and the effect of these tools vary depending on the loan type.

Table 1. Dynamic Regression Analysis Results

Δ (Loans) (annual percent change)	Total Loans (TL+FX)	Total Loans (TL)	Consumer Loans (TL)	Commercial Loans (TL)	Total Loans (FX)
Panel A: Macro Conditions					
GDP Growth (annual percent change)	3.95*** (0.59)	3.16*** (0.62)	6.20*** (0.73)	1.09* (0.64)	4.61*** (0.73)
CPI Inflation (annual percent change)	-0.33 (2.66)	-2.06 (2.68)	-7.48 (5.74)	-2.01 (2.81)	7.09** (3.21)
Δ (VIX) (annual percent change)	0.07 (0.07)	-0.01 (0.06)	0.33** (0.15)	-0.26*** (0.05)	0.26*** (0.09)
Panel B: Monetary Policy					
Δ (policy rate) (annual basis points change)	-5.50*** (1.94)	-5.43*** (1.90)	-11.08*** (3.30)	1.06 (1.38)	-6.44*** (2.42)
Required Reserve					
Δ (total effective required reserve) (annual basis points change)	-7.42*** (1.27)				
Δ (effective TL required reserve) (annual basis points change)		-4.98*** (0.92)	-8.08*** (2.26)	-5.52*** (1.27)	
Δ (effective FX required reserve) (annual basis points change)					-20.06*** (5.43)
Interest Rate Corridor					
Δ (policy rate-borrowing rate) (annual basis points change)	6.88*** (2.36)	5.70*** (2.35)	10.62** (4.55)	4.90* (2.71)	7.59 (4.80)
Δ (lending rate- policy rate) (annual basis points change)	-6.29*** (1.85)	-8.25*** (2.03)	-5.58 (3.83)	-7.23*** (2.46)	-6.96* (1.29)
R ²	0.82	0.85	0.75	0.88	0.79
Number of observations	77	77	77	77	77

, * and * denote significance at 10%, 5% and 1%, respectively.

In sum, unlike previous studies on the credit channel, this study provides a broader perspective on the credit channel transmission mechanism, and analyzes the effect of policy rates as well as other policy tools on credit growth. Policy rates, required reserves and the interest rate corridor are found to be effective on credit growth. In addition, the effectiveness of the policy tools varies depending on the type of loans. Our findings suggest that unconventional policy tools are effective on the loan composition, and enhance the credit channel transmission mechanism. These results entail significant information regarding why optimal monetary policy design and unconventional policy tools are crucial for financial stability within the inflation targeting regime.

REFERENCES

- Bernanke, B. S. and A. S. Blinder, 1988, Credit, Money and Aggregate Demand, *American Economic Review*, 78(2): 435-39.
- Binici, M., H. Erol, P. Özlü and D. Ünalmış, 2013, Unconventional Monetary Policy Tools and Credit Growth, mimeo.
- Bloxham, P., C. Kent and M. Robson, 2010, Asset prices, credit growth, monetary and other policies: An Australian case study, Reserve Bank of Australia Research Discussion Papers No. 6.
- Fernandez, R.B., 1980, A Methodological Note on the Estimation of Time Series, *The Review of Economics and Statistics*, 63(3): 471-76.
- Gambacorta, L., 2005, Inside the bank lending channel, *European Economic Review*, 49(7): 1737-1759.
- Jorda, O., M. Taylor and M. Schularick, 2010, Financial Crises, Credit Booms and External Imbalances: 140 Years of Lessons, NBER Working Paper No.16567.
- Kashyap, A. K., J. C. Stein and D. W. Wilcox, 1993, Monetary Policy and Credit Conditions: Evidence from the Composition of External Finance, *American Economic Review*, 83(1): 78-98.
- Tovar, C., M. Garcia-Escribano and M. Martin, 2012, Credit Growth and the Effectiveness of Reserve Requirements and Other Macroprudential Instruments in Latin America, IMF Working Paper No.142.
- Wickens, R. and T.S. Breusch, 1988, Dynamic Specification, The Long-Run and The Estimation of Transformed Regression Models, *The Economic Journal* 98: 189-205.

Box
5.2

The Relation Between O/N Swap Rates and the BIST O/N Repo Rates

Under the inflation targeting regime, policy rates are expected to affect short-term market rates. BIST Repo and Reverse Repo Market and the O/N cross currency swap market are two major money markets in Turkey where transactions are mostly overnight. This Box presents the theoretical relation between O/N swap market rate and the BIST O/N repo rates. Furthermore, this relation is tested empirically by using the co-integration relation suggested by Pesaran, Shin and Smith (2001).

The Relation Between O/N Cross Currency Swap Market Rates and the BIST O/N Repo Rates

Banks are obliged to establish required reserves for funds obtained via BIST Repo and Reverse Repo Market transactions.¹¹ Instead of borrowing from the BIST Repo and Reverse Repo Market, banks holding FX funds may acquire TL liquidity through cross currency swap transactions. However, in that case, the cost of finding FX funds should also be added to the cost of borrowing through cross currency swap. Furthermore, the liability for banks to establish FX required reserves should also be taken into account. Hence, the cost of borrowing in TL via O/N cross currency swap will include the TL interest on the borrowed fund via swap transaction and the TL equivalence determined by the forward FX purchase transaction of the difference between the interest on the borrowed FX funds and the interest on the extended funds via swap transaction. The equalization of the costs will yield the following no-arbitrage relation:

$$\text{swap}_{\text{TL}} = \frac{\frac{r_{\text{BIST}}}{1-ZK_{\text{TL}}} - \frac{1}{1+\text{Libor}\frac{t}{365}} \left(\frac{\text{Libor}+p}{1-ZK_{\text{Y}}} - \text{Libor} \right)}{1 + \frac{\frac{t}{365}}{1+\text{Libor}\frac{t}{365}} \left(\frac{\text{Libor}+p}{1-ZK_{\text{Y}}} - \text{Libor} \right)} \quad (I)$$

According to the above equation, the relation between O/N Swap Market Rates (swap_{TL}) and the BIST O/N repo rates (r_{BIST}) is mainly determined by the LIBOR rate (Libor), FX and TL required reserve ratios (ZK_{TL} and ZK_{FX}) and the additional interest (p) on the FX borrowing. In the above equation, the maturity (t) is 1-day and the LIBOR interest rate is quite low in the sampling period, thus causing some terms to be very close to zero. Ignoring these terms, the relation between O/N swap rates and the BIST O/N repo rates will be as follows:

¹¹ The analysis solely focuses on borrowing costs of banks, which have majority of the weight in this market, and ignores other borrowing institutions, which are not subject to reserve requirement.

$$\text{swap}_{\text{TL}} \cong \frac{r_{\text{BIST}}}{1-ZK_{\text{TL}}} - \frac{\text{Libor}+p}{1-ZK_y} + \text{Libor} \quad (II)$$

Data and the Methodology

The O/N rate at the BIST Repo and Reverse Repo Market is denoted by the O/N repo rate weighted by the daily transaction volume. The O/N swap rate is represented by the Reuters data on overnight swap purchase quotations. The co-integration analysis includes 1208 daily observations from December 2, 2007 to December 28, 2012.

Various methods exist in the literature for the co-integration analysis. This study is based on the co-integration methodology proposed by Pesaran, Smith and Shin (2001). The method by Pesaran, Smith and Shin (2001) does not impose any restriction on the stationarity of the series. Two alternative error correction models are estimated in this study, where dependent variables are the O/N swap and the BIST O/N rates. In addition, the error correction model is estimated with and without a constant term.

Furthermore, the relation between O/N swap rates and the BIST O/N repo rates may differ since funds acquired through repo transactions are included to reserve requirement as of the beginning of 2011. Hence, the sample is divided into two sub-periods as December 3, 2007 to January 7, 2011 and January 10, 2011 to December 28, 2012.

Empirical Findings

This section presents the empirical results for the two sub-periods. The co-integration results for the first sub-period are displayed in Table 1.

Table 1. Pesaran, Smith and Shin Test Results, December 3, 2007-January 7, 2011

Dependent Variable		Swap		BIST	
		Constant	No Constant	Constant	No Constant
Test Statistics	t-statistics	-4.286***	-3.730***	-3.763***	-3.821***
	F-statistics	9.195***	7.034***	7.079**	10.001***
	Constant	-0.072	-	0.025	-
Co-integration Vector	BIST	0.103	0.077	-0.070	-0.062
	Swap	-0.101	-0.079	0.068	0.061

*** and ** denote significance at 10%, 5% and 1%, respectively.

The analysis of the test results show that a long-run relationship exists between the BIST O/N repo rates and the O/N swap market rates. The t-statistics for the error correction coefficients are below the critical values provided by Pesaran, Smith and Shin (2001), and thus are significant in both cases where the dependent variable is the swap rate and the BIST O/N repo rate, respectively. For the first sub-period, the normalized co-integration relation is shown below where the dependent variable is the swap rate and the BIST O/N repo rate, respectively.¹²

$$r_{\text{BIST}} = 0.977\text{swap}_{\text{TL}} + 0.702 \quad (\text{III.a})$$

$$r_{\text{BIST}} = 0.970\text{swap}_{\text{TL}} + 0.357 \quad (\text{III.b})$$

The non-arbitrage relation for the first sub-period depicts that a shock to one of the markets is completely reflected to the other market.

The co-integration results for the second sub-period January 10, 2011 to December 28, 2012 are displayed in Table 2.

Table 2. Pesaran, Smith and Shin Test Results, January 10, 2011-December 28, 2012

Dependent Variable		Swap		BIST	
		Constant	No Constant	Constant	No Constant
Test Statistics	t-statistics	-6.058***	-6.016***	-1.688	-1.527
	F-statistics	18.419***	18.102***	1.764	1.251
Co-integrating Vector	Constant	0.095	-	0.163	-
	BIST	0.198	0.204	-0.092	-0.084
	Swap	-0.230	-0.224	0.075	0.088

*** and ** denote significance at 10%, 5% and 1%, respectively.

In the second period where funds obtained at the BIST Repo and Reverse Repo Market are included into reserve requirement, the co-integration relation can only be observed when the dependent variable is the cross currency swap rate. In the case when the BIST O/N repo rate is the dependent variable, the error correction coefficients are insignificant. This implies that the interaction between two markets is mostly determined by the BIST O/N repo rates. For the second sub-period, the normalized co-integration relation where the dependent variable is the swap rate is shown below:

$$\text{swap}_{\text{TL}} = 0.86r_{\text{BIST}} + 0.41 \quad (\text{IV})$$

¹² Test results are presented for both the inclusion of constant as well as no constant term. However, the model with the inclusion of the constant term is preferred as the constant term reflects other factors such as LIBOR, additional cost of FX borrowing and FX reserve requirement, which determine the spread between two rates.

In sum, the empirical relation between two interest rates is compatible with the theoretical relationship. This finding is crucial for monetary policy. In this respect, the CBRT directly affects the BIST O/N repo market rates and also influences the swap market rates. In other words, the CBRT is able to influence the O/N rates at the cross currency swap market, which comprises the majority of short-term capital inflows, and the short-term capital flows are managed to establish the robustness of the financial stability.

REFERENCES

Pesaran, M. H., Y. Shin and R.J. Smith, 2001, Bounds Testing Approaches to the Analysis of Level Relationships, *Journal of Applied Econometrics*, 16: 289-326.

