# 5. Financial Conditions and Monetary Policy

In the third quarter of 2018, volatilities in global financial markets continued to increase due to the normalization process in monetary policies of advanced economies and the rising protectionism in international trade while the risk premiums of emerging economies climbed and their currencies depreciated. Consequently, portfolio outflows from emerging economies accelerated. In the current reporting period, Turkey's financial indicators negatively diverged from other emerging economies due to geopolitical developments, deterioration in the inflation outlook, and uncertainties. However, financial indicators slightly improved in September and October due to the measures taken and statements regarding the economic policies to be implemented.

The deceleration in credit growth rates continued in the third quarter of 2018. According to the Bank Loans Tendency Survey, banks tightened their commercial credit standards in this quarter, and they expect this tightening to persist through the final quarter of the year. Meanwhile, demand for commercial loans continued to decline in the third quarter. However, this demand is projected to increase moderately in the last quarter.

The Financial Conditions Index (FCI) suggests a deeper tightening in the third quarter of 2018. Moreover, the decline in the ratio of net credit use to GDP continued due to the contraction in loan supply and the base effect (Chart 5.1). All financial components had a further contracting effect on the FCI but the tightening in credit standards, real depreciation in the Turkish lira, the rise in loan rates, and the downside increase in the slope of the yield curve had a stronger contractionary impact on the index compared to the previous reporting period (Chart 5.2).

Chart 5.1: Financial Conditions and Credit Growth*



Source: CBRT.

* For further details on measuring the FCI, see the CBRT Working Paper No. 15/13.

Net Credit Use is defined as the annual change in the credit stock and it is adjusted for exchange rate. GDP data for 2018Q3 is forecast.

Chart 5.2: Contributions to the FCI



Source: CBRT.

## 5.1 Relative Performance in Financial Markets

### Risk Perceptions and Portfolio Flows

In the current reporting period, the normalization process in monetary policies of advanced economies continued, its effects became visible on long-term interest rates, and US bond rates increased over the previous reporting period. In addition to increased yields in advanced economies, protectionist discourse

in foreign trade also caused the global risk appetite to weaken and regional risk premiums of emerging economies rose. Meanwhile, Turkey's risk premium negatively diverged from other emerging economies to a considerable extent due to geopolitical developments (Chart 5.1.1). Increased volatility in global markets led to outflows from emerging economies in February 2018 which continued through the third quarter of the year, albeit at a slightly decelerated pace. In this period, portfolio flows in Turkey also followed a similar trend (Chart 5.1.2). An analysis of portfolio flows by types of markets reveals that outflows mainly occurred in the Government Domestic Debt Securities (GDDS) market.

**Chart 5.1.1: Regional Risk Premiums\*** (Basis Points)
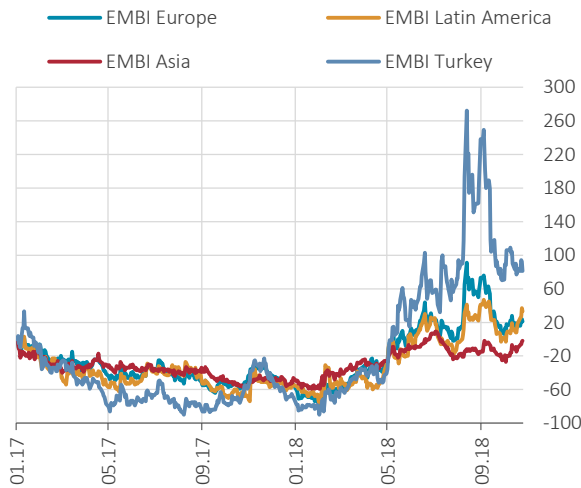


Source: Bloomberg.

\* Shows cumulative changes since 2 January 2017.

**Chart 5.1.2: Cumulative Portfolio Flows in Turkey\*** (From the onset of the year, Billion USD)
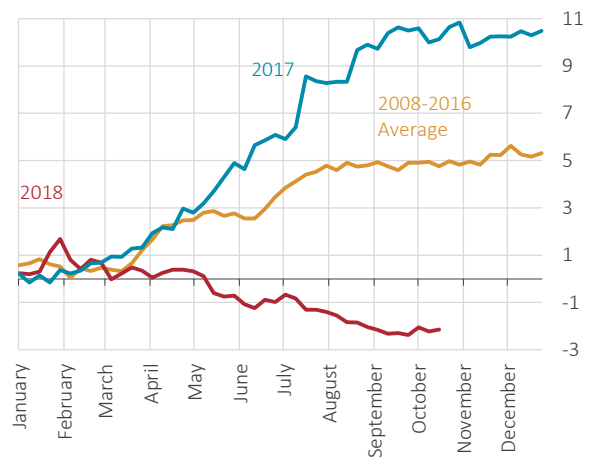


Source: CBRT.

\* Includes portfolio inflows to stocks and GDDS market. Repo is included in the GDDS data.

## Exchange Rates and Market Rates

In the current reporting period, the deterioration in risk perception for emerging economies due to the ongoing appreciation in the US dollar and tightened global financial conditions ignited portfolio outflows from these countries and cause depreciation in their currencies. Geopolitical developments, deterioration in the inflation outlook and uncertainties caused the depreciation in the Turkish lira to be higher and Turkey to diverge negatively from other emerging economies. In this period, the Turkish lira significantly depreciated on the back of a rising risk premium and weakening portfolio flows, and followed a more volatile trend compared to currencies of peer emerging economies (Chart 5.1.3). Following the measures taken and the strong monetary tightening delivered at the MPC meeting in September, both long-term TL and FX interest rates and the implied volatility of the Turkish lira, which had climbed significantly in August, decreased in September and October, mainly due to the fall in risk premium and inflation compensation (Chart 5.1.4).

**Chart 5.1.3: TL and Emerging Market Currencies against US Dollar** (02.01.2017=1)
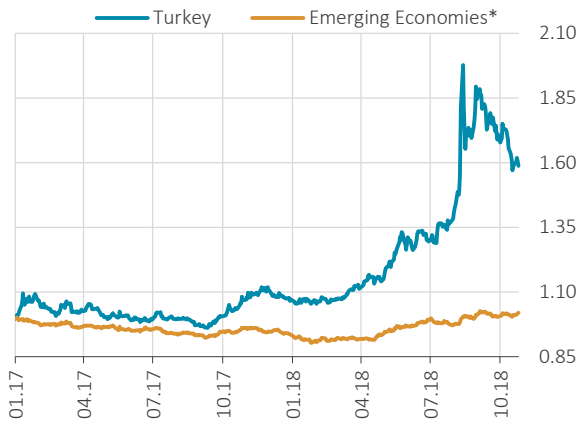


Source: Bloomberg.
* Emerging market currencies include those of Brazil, Indonesia, the Philippines, South Africa, India, Colombia, Hungary, Malaysia, Mexico, Poland, Romania and Chile.

**Chart 5.1.4: Implied FX Volatility** (1 Month-Ahead, %)
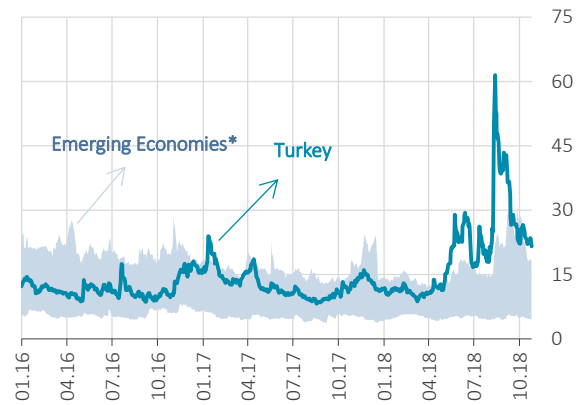


Source: Bloomberg.
* Emerging market currencies include those of Brazil, Indonesia, the Philippines, South Africa, India, Colombia, Hungary, Malaysia, Mexico, Poland, Romania and Chile.

In the current reporting period, short and long-term interest rates in emerging economies were largely flat. Meanwhile, short and medium-term market rates in Turkey drastically increased in August due to the rise in inflation expectations and risk premium, remaining at this elevated level in September and October as well (Chart 5.1.5 and Chart 5.1.6).

**Chart 5.1.5: Six-Month Market Rates** (%)
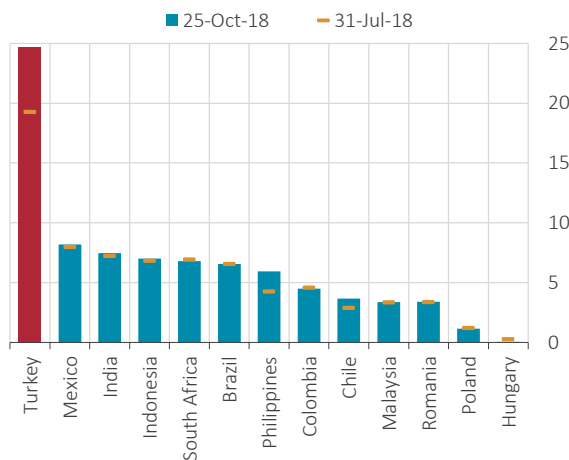


Source: Bloomberg.

**Chart 5.1.6: Five-Year Market Rates** (%)
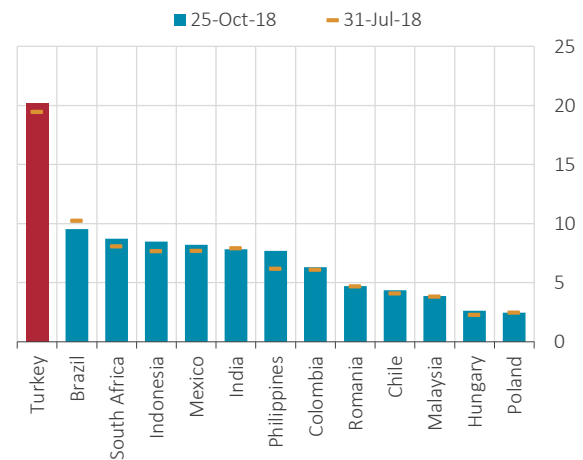


Source: Bloomberg.

# 5.2 Credit Conditions

## Loan Rates, Funding Costs and Interest Rate Spreads

In the third quarter of 2018, banks' funding costs continued to increase. This was mainly due to the increasing currency swap rates fueled by risk premium and exchange rate developments as well as to deposit rates that increased as a result of upward movements in loan rates (Chart 5.2.1).

The Bank Loans Tendency Survey reveals that the increase in the riskiness of the sector and firms and the deterioration in the overall economic outlook as well as banks' access to the money market and their liquidity constraints were the leading factors affecting credit standards in the current reporting period. Likewise, the rise in the credit risk perception of the corporate sector, the deterioration in the overall

economic outlook, and the tightening in funding conditions caused the increase in loan rates to continue. All these led to a decline in credit volume, which triggered a relatively modest increase in deposit interest rates. Thus, the increase in the loan-deposit rate spread significantly exceeded the historical averages (Chart 5.2.2).

Chart 5.2.1: Indicators of Banks' Funding Costs (4-Week Moving Average, %)
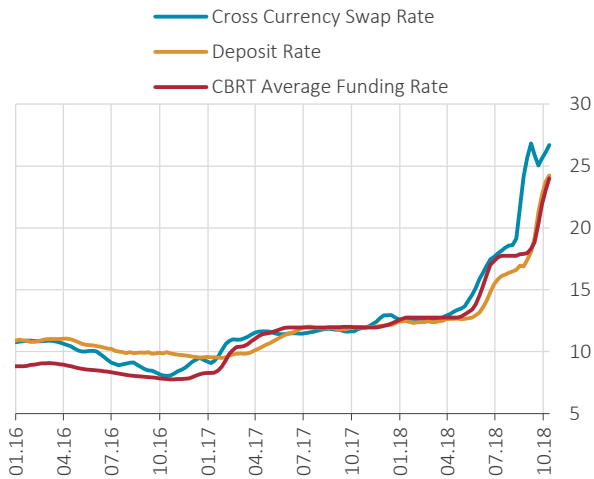


Source: Bloomberg, CBRT.

Chart 5.2.2: TL Commercial Loan Rates and TL Deposit Rates* (Flow Data, Annualized, 4-Week Moving Average, %)
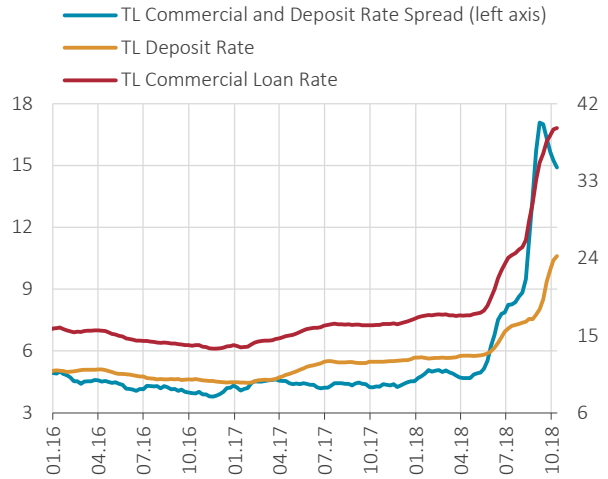


Source: CBRT.

* TL commercial loan rate series excludes overdraft accounts, credit cards and zero-rate loans.

An analysis of commercial loan rates by a breakdown of firm size demonstrates that rates increased strongly across all sub-categories, with a more moderate rise in micro-size SME loan rates (Chart 5.2.3). The moderate increase in micro-size SME loan rates is attributed to the incentives offered. Meanwhile, as suggested by the Bank Loans Tendency Survey, consumer loan rates strongly rose mainly on the back of expectations regarding overall economic activity (Chart 5.2.4).

Chart 5.2.3: TL Commercial Loan Rates* (Flow Data, Annualized, 4-Week Moving Average, %)
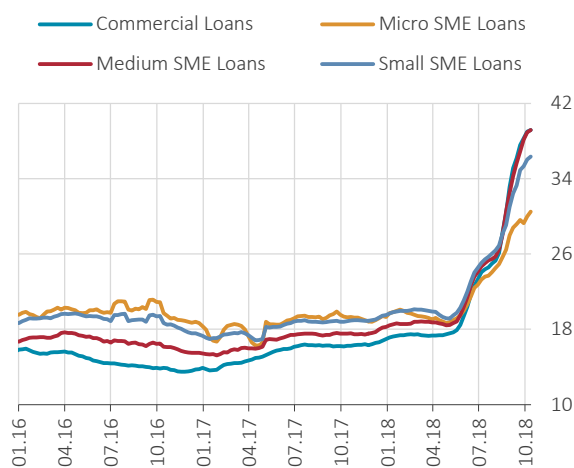


Source: CBRT.
* Excluding overdraft accounts, credit cards and zero- rate loans.

Chart 5.2.4: Consumer Loan Rates (Flow Data, Annualized, 4-Week Moving Average, %)
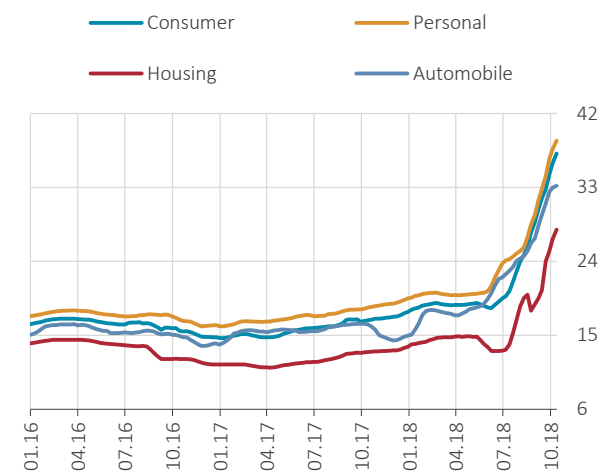
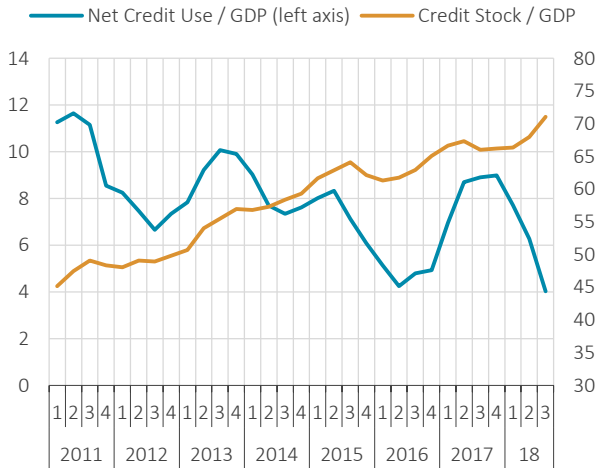

Source: CBRT.

## Credit Volume

In the third quarter of 2018, the ratio of FX-adjusted net credit use to GDP continued to decrease due to the tightening in commercial loan supply and the base effect observed since the first quarter. However, the ratio of total loans to GDP increased as a result of the surge in exchange rates (Chart 5.2.5). In this quarter, the total loan growth rate continued to decelerate due to the decline in both commercial and consumer loan growth rates (Chart 5.2.6). As suggested by the Bank Loans Tendency Survey, the decline in loan growth is believed to have been driven by the decrease in both loan supply and loan demand.

**Chart 5.2.5: Domestic Credit Stock and Net Annual Credit Use\*** (%)



Source: CBRT.
\* GDP data for the third quarter of 2018 is forecast.
Net Credit Use is defined as the annual change in the credit stock and it is adjusted for exchange rate

**Chart 5.2.6: Y-o-Y Loan Growth** (Adjusted for Exchange Rates, % Change)
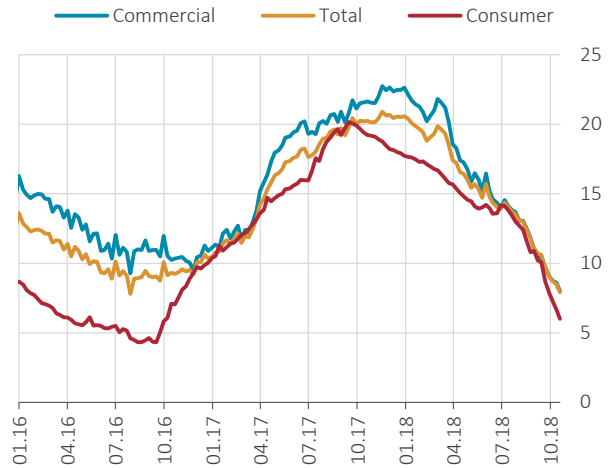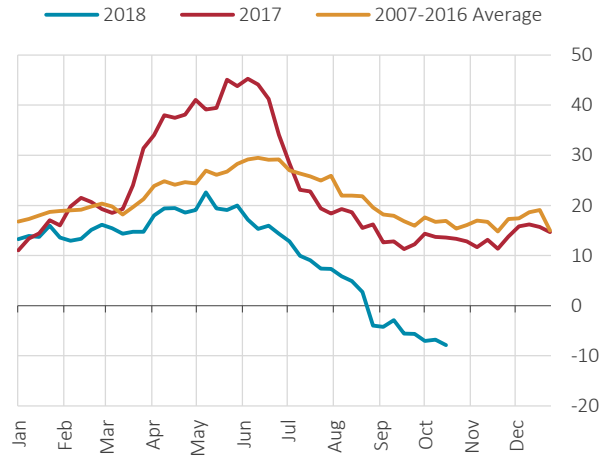


Source: CBRT.

Commercial and total loan growth rates, which had been below historical averages since early 2018, further moved into negative territory in the third quarter. (Chart 5.2.7 and Chart 5.2.8).

**Chart 5.2.7: Annualized Total Loan Growth** (13-Week Moving Average, Adjusted for Exchange Rates, %)
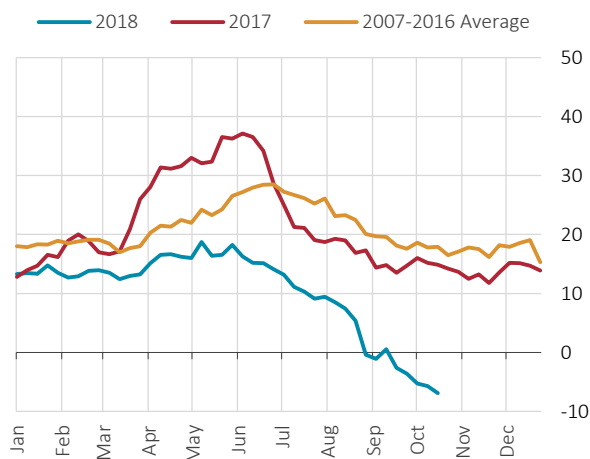


Source: CBRT.

**Chart 5.2.8: Annualized Commercial Loan Growth** (13-Week Moving Average, Adjusted for Exchange Rates, %)
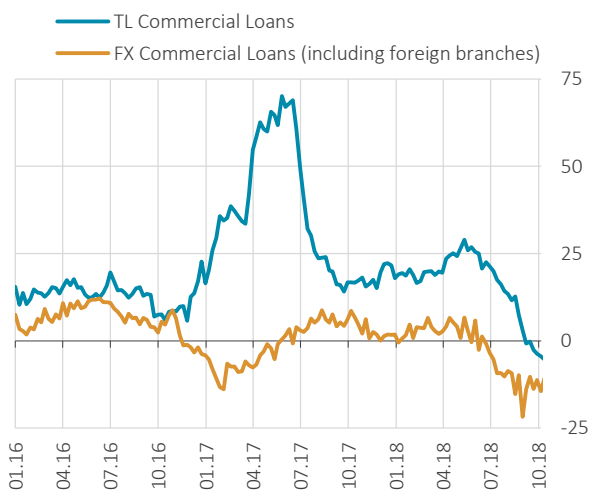


Source: CBRT.

Banks' foreign currency borrowing costs increased due to the depreciation in the Turkish lira and concerns over firms' FX debt. In addition, demand for FX loans decreased as a result of the regulations in FX risk management. Accordingly, the decline in FX loans also continued in the third quarter (Chart 5.2.9). The Bank Loans Tendency Survey suggests that the tightening in FX effects credit standards was sustained and the demand for these loans decreased as well.

In the third quarter of 2018, the downward trend in consumer loans accelerated. Towards the end of the quarter, all consumer loan subcategories registered declines (Chart 5.2.10). This is also  revealed in the Bank Loans Tendency Survey that the tightening in consumer credit standards deepened and the decline in the demand for loans further strengthened in that period.

Chart 5.2.9: Annualized TL and FX Commercial Loan Growth (13-Week Moving Average, Adjusted for Exchange Rates, %)



Source: CBRT.

Chart 5.2.10: Annualized Consumer Loan Growth (13-Week Moving Average, %)
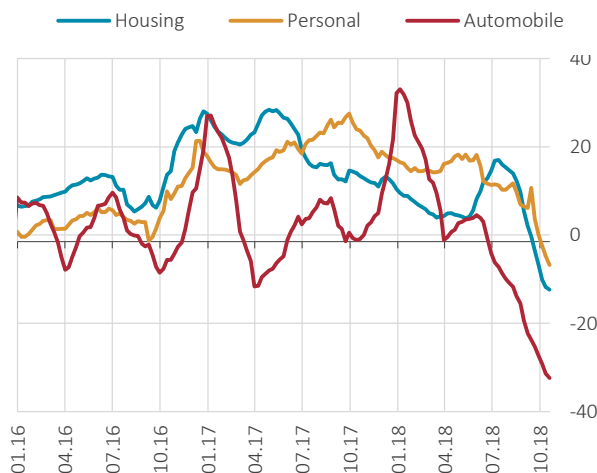


Source: CBRT.

## Credit Standards

According to the Bank Loans Tendency Survey, in the third quarter of 2018, banks continued to tighten their commercial credit standards beyond historical averages. Expectations for the final quarter of the year suggest a further tightening in commercial credit standards (Chart 5.2.11). A breakdown of credit standards by scale, maturity and currency unit reveals that there was a tightening across all sub-categories in the third quarter, which is also expected to continue in the upcoming period.

All subfactors related to commercial credit standards had a tightening effect. Prospects for overall economic activity, outlook for the sector or firms, access to money and bond markets, and banks' liquidity positions stood out as the leading factors fueling the tightening in standards. As for conditions and terms for approving commercial loans, all factors led to a tightening in loan conditions, with the tightening in profit margins having the most salient impact.

Answers of banks participating in the survey suggest that firms' demand for commercial loans continued to decrease in the third quarter of 2018. However, the demand for these loans is expected to increase somewhat in the upcoming period (Chart 5.2.11). An analysis of firms' demand for commercial loans by scale, maturity and currency unit reveals a decline across all sub-categories in the third quarter of the year. While FX-denominated loans are expected to decline in the final quarter of the year, other subcategories are projected to post a modest increase.

The decrease in demand for commercial loans was essentially driven by financing needs, resulting largely from the decline in loan demand for fixed investments, mergers/acquisitions and corporate restructuring, inventories and working capital. On the other hand, the debt restructuring, internal financing, loans

obtained from other banks and the non-bank financial sector, and discounts and facilities for cash payments had an upward impact on loan demand.

**Chart 5.2.11: Commercial Credit Standards and Commercial Loan Demand\*\***
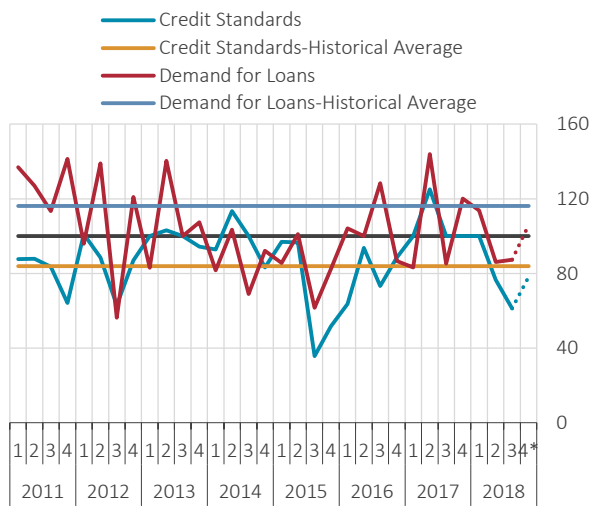
- Credit Standards
- Credit Standards-Historical Average
- Demand for Loans
- Demand for Loans-Historical Average



Source: CBRT.

*Data for the final quarter of 2018 are expectations.

**Index values above 100 indicate an easing in credit standards and an increase in loan demand.

**Chart 5.2.12: Consumer Credit Standards and Consumer Loan Demand\*\***
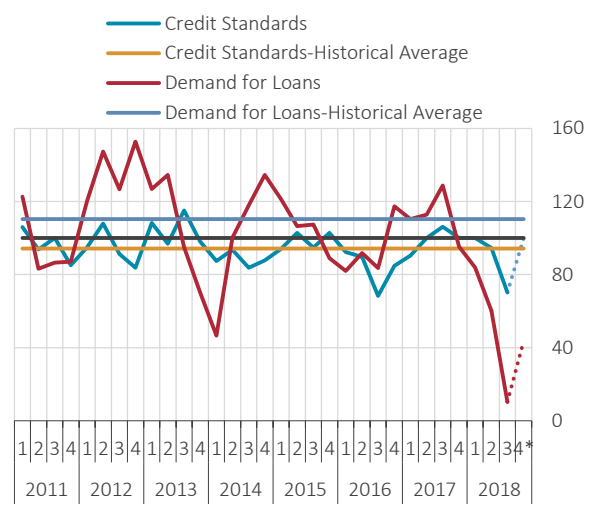
- Credit Standards
- Credit Standards-Historical Average
- Demand for Loans
- Demand for Loans-Historical Average



Source: CBRT.

*Data for the final quarter of 2018 are expectations.

**Index values above 100 indicate an easing in credit standards and an increase in loan demand.

Respondents' answers to survey questions about consumer loans suggest that the tightening in credit standards deepened in the third quarter while credit standards are expected to remain unchanged in the final quarter. The decline in the demand for consumer loans, which further accelerated in the third quarter, is expected to continue through the final quarter of the year (Chart 5.2.12).

An analysis of the factors affecting consumer credit standards reveals that expectations regarding general economic activity had a visible impact on the tightening in credit standards across all consumer loan types while the tightening effect resulted from housing market prospects in housing loans and from creditworthiness of consumers in vehicle and personal loans. Housing market prospects, consumer confidence, non-housing related consumption expenditures, household savings, and loans from other banks stand out as the leading factors reducing the demand for housing loans. As for vehicle and personal loans, all factors had a downward effect on demand but prospects regarding each one of these markets constituted the strongest factor in this respect.
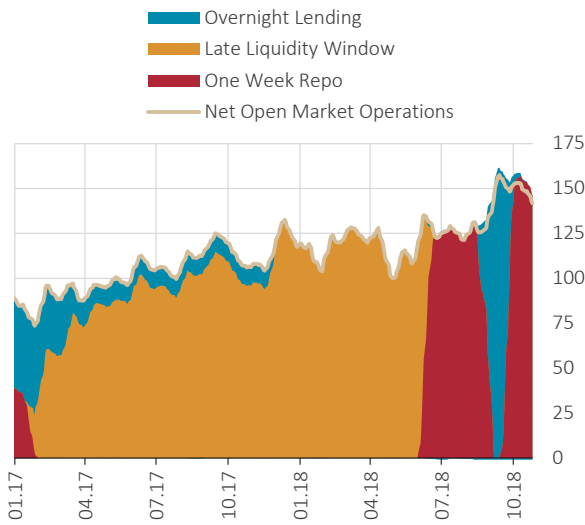
# 5.3 Monetary Policy

## Market Developments

Following the completion of the simplification process, the CBRT started providing all its funding via one-week repo auctions as of 8 June 2018. However, in the face of unhealthy price formations and increased volatility in foreign exchange markets witnessed on 10 August 2018, it introduced FX and TL liquidity measures as well as a change in its funding strategy. Accordingly, the CBRT did not hold any one-week repo auctions between 13 August and 14 September 2018 but instead the CBRT funding was carried out by overnight lending at the CBRT lending rate (Chart 5.3.1). At its MPC meeting in September, the CBRT raised the policy rate to 24 percent from 17.75 percent, and decided to resume one-week repo auctions to provide all its funding through this channel. BIST Interbank Repo rates, which hovered around the CBRT policy rate following the completion of the simplification process in early June, materialized at the CBRT overnight lending rate level (the upper band of the interest rate corridor) after all funding was provisionally shifted to overnight funding. Following the re-introduction of one-week repo auctions after
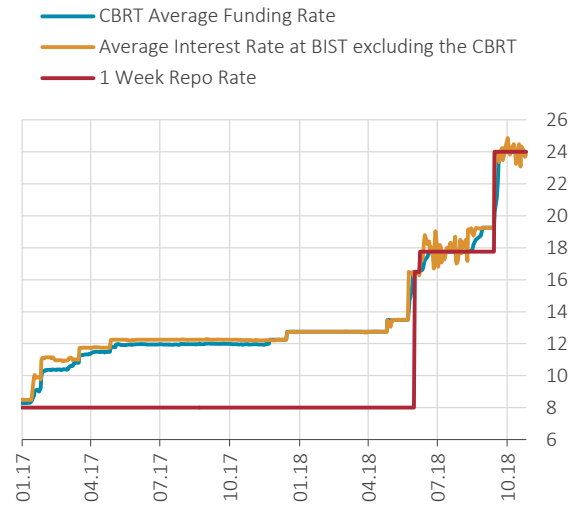
the September MPC meeting, the average interest rate at the BIST Repo-Reverse Repo Market calculated excluding the CBRT's transactions started to hover around the one-week repo rate (Chart 5.3.2).

**Chart 5.3.1: CBRT Funding** (2-Week Moving Average, Billion TL)



Source: CBRT.

**Chart 5.3.2: Short-Term Interest Rates** (%)



Source: BIST, CBRT.

Due to the policy rate hike of 625 basis points that the CBRT delivered through a strong monetary tightening in September, currency swap rates increased across all maturities compared to the previous reporting period. Although Turkey's risk premium decreased after the MPC decision in September, it moderately increased throughout the current reporting period, shifting the yield curve upwards. Short-term currency swap rates continued to hover above long-term currency swap rates due to the tighter monetary policy stance while the decline in long-term swap rates became more evident (Chart 5.3.3). As was the case in the previous reporting period, Turkey continued to have the lowest yield curve slope among other emerging economies due to the strong monetary policy tightening (Chart 5.3.4).

**Chart 5.3.3: Swap Yield Curve** (%)
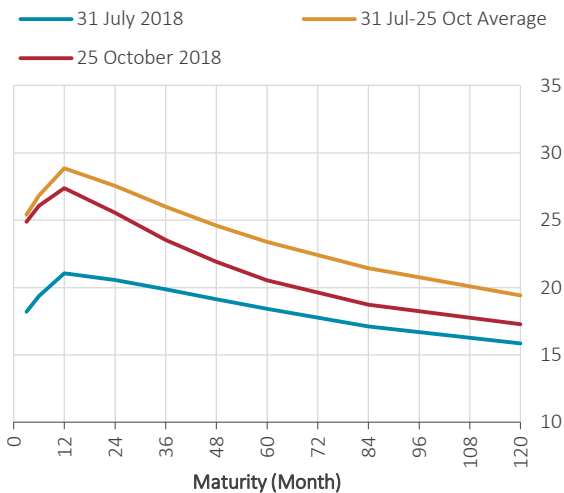


Source: Bloomberg.

**Chart 5.3.4: Yield Curve Slopes in Emerging Economies\*** (% Points)
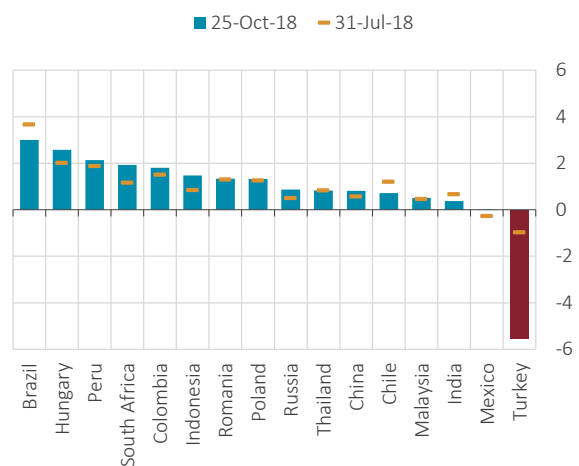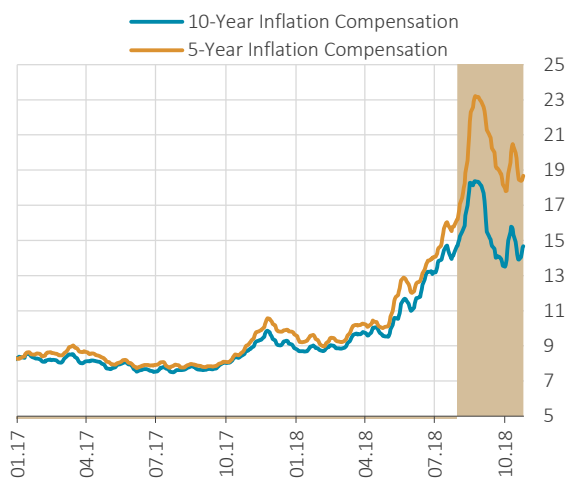


Source: Bloomberg.

\* Yield curve slope is calculated by taking the difference between 5-year bond yields and 6-month bond yields. For Turkey, swap rates have been used instead of bond yields to calculate the yield curve slope.

The sharp depreciation in exchange rates in August caused long-term inflation expectations and the inflation uncertainty to increase, and provoked a rapid rise in inflation compensation in the current reporting period (Chart 5.3.5). The uptrend observed in inflation compensation since end-July reversed as of September following the increase in the weighted average funding cost triggered by provisional changes in the CBRT's funding strategy as of the second half of August and the decline in FX volatility due to a number of measures introduced. The downtrend in inflation compensation became more pronounced following the CBRT's strong policy response at the MPC meeting in September but there was a temporary rise in inflation compensation after the September CPI inflation significantly exceeded market expectations. Two-year real interest rates, calculated using inflation expectations data obtained from the CBRT Survey of Expectations, slightly decreased over the previous reporting period as the rise in inflation expectations outpaced the rise in nominal interest rates (Chart 5.3.6).

**Chart 5.3.5: Inflation Compensation** (5-Day Moving Average, %)



Source: Bloomberg.

**Chart 5.3.6: 2-Year Bond Yields and the Real Interest Rate in Turkey*** (%)
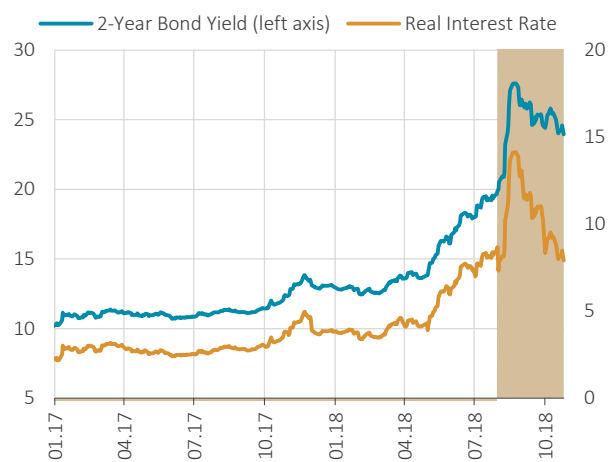


Source: Bloomberg, CBRT.

*Real interest rate is calculated as the difference between 2-year bond yields and the 24 month-ahead inflation expectations data obtained from the CBRT Survey of Expectations.

## Monetary Policy Response

Maintaining its tight monetary policy stance in January and March 2018, at its MPC meeting in April the CBRT underlined the elevated levels of inflation and inflation expectations as well as the risks to pricing behavior and introduced a measured hike of 75 basis points in the LLW lending rate. Following the press release on 16 May 2018, which stated that the impacts of unhealthy price formations and excessive volatilities in the markets were closely monitored, the CBRT decided to hold an interim meeting on 23 May 2018. At this meeting, the CBRT delivered a strong monetary tightening by raising the LLW lending rate by 300 basis points. It announced the completion of the simplification process via a press release on 28 May 2018, and as of 1 June 2018, it started holding one-week repo auctions at the policy rate that was the mid-point of a symmetrical corridor of +/- 150 basis points.

Measures introduced in response to unhealthy price formations in the markets after the April MPC meeting to ensure effective functioning of the FX market in particular, as well as the monetary tightening in May and the completion of the simplification process were instrumental in the decrease in financial market volatility. At its June MPC meeting, the CBRT decided to further strengthen the monetary tightening, and raised the policy rate to 17.75 percent from 16.5 percent. At the July MPC meeting, the CBRT kept the policy rate unchanged in view of the need to closely monitor the deceleration in domestic demand and the lagged effects of monetary policy decisions. A number of measures were introduced in

early August to ensure effective functioning of markets in the face of rapid depreciation of the Turkish lira against other currencies due to excessive volatility in financial markets (Table 5.3.1).

Accordingly, on 6 August 2018, the CBRT lowered the upper limit for the FX maintenance facility within the reserve options mechanism (ROM) to provide the banking system with FX liquidity. Then, on 13 August 2018, it provided liquidity to banks by reducing Turkish lira and FX reserve requirement ratios, and also announced a range of financial stability-oriented measures to support banks' TL and FX liquidity management. The CBRT suspended its one-week repo auctions as of 13 August 2018, and increased the weighted average funding cost gradually from 17.75 percent to the overnight lending rate of 19.25 percent. On the same date, the Banking Regulation and Supervision Agency (BRSA) introduced limits to the currency swap transactions of domestic banks with foreign counterparties, which reined in speculative positions taken against the TL and caused short-term currency swap rates to increase. Measures taken before the September MPC meeting proved effective in easing the air of panic in the financial markets while price formations in the markets improved.

The Monetary Policy Committee emphasized at its September meeting that price increases had shown a generalized pattern across subsectors, reflecting the movements in exchange rates, and decided to implement a strong monetary tightening to support price stability. Following this meeting, the CBRT resumed its one-week repo auctions at the policy rate that it raised by 625 basis points to 24 percent, and started providing all its funding at the one-week maturity instead of overnight.

As of October, developments regarding the inflation outlook point to significant risks to price stability. Price increases have shown a generalized pattern across subsectors, reflecting the movements in exchange rates. At its October meeting, the Committee emphasized that the rebalancing trend in the economy became more noticeable while the slowdown in economic activity continued, partly due to tighter financial conditions. Although weaker domestic demand conditions are expected to partially mitigate the deterioration in the inflation outlook, upside risks to the pricing behavior prevail. Accordingly, the Committee decided to maintain the tight monetary policy stance and keep the policy rate (one-week repo auction rate) constant.

Table 5.3.1: Policy Actions Taken in the Current Reporting Period

| Date | Policy Decision |
|---|---|
| 6 August 2018 | CBRT:<br>• The upper limit for the FX maintenance facility within the reserve options mechanism was lowered to 40 percent from 45 percent. |
| 13 August 2018 | CBRT:<br>• Measures were introduced for TL and FX liquidity management.<br>• TL and FX reserve requirement ratios were reduced.<br>• One-week repo auctions were suspended as of 13 August 2018, and the weighted average funding cost was increased gradually to 19.25 percent from 17.75 percent.<br>BRSA:<br>• The total notional principle amount of banks' currency swaps and other similar products (spot + forward FX transactions) with foreign counterparties, where at the initial date local banks pay TL and receive FX, was limited to 50 percent of banks' regulatory capital. |
| 14 August 2018 | CBRT:<br>• The TL interest rate applicable in Foreign Exchange Deposits against Turkish Lira Deposits auctions was raised to 19.25 percent from 17.75 percent. |
| 15 August 2018 | BRSA:<br>• The 50-percent limit announced on 13 August 2018 was reduced to 25 percent. |
| 17 August 2018 | BRSA:<br>• Forward, option and similar derivatives transactions other than swaps, where banks receive TL at maturity, were also included in the scope of the above-cited limitation. |
| 20 August 2018 | CBRT:<br>• A swap agreement was signed with the Qatar Central Bank over Turkish lira and Qatari riyal with an overall limit of USD 3 billion. |
| 29 August 2018 | CBRT:<br>• CBRT Interbank Money Market borrowing limits, which were lifted with an announcement on 13 August 2018, were re-introduced. |
| 31 August 2018 | CBRT:<br>• In addition to the Turkish lira-settled forward foreign exchange sale auctions held at the Central Bank, transactions were launched at the Derivatives Market (VIOP) operating under Borsa Istanbul (BIST).<br>• The Turkish lira currency swap market was opened at the Central Bank. |
| 3 September 2018 | CBRT:<br>• In a press release on monetary policy, the CBRT announced that the monetary stance would be adjusted at the September MPC meeting. |
| 8 September 2018 | BRSA:<br>• Banks' consolidated transactions with foreign counterparties qualified as credit agencies and financial institutions were excluded from the scope of limitations on swap transactions. |
| 13 September 2018 | CBRT:<br>• It was announced that one-week repo auctions, which were suspended as of 13 August 2018, would resume as of 14 September 2018. |
| 17 September 2018 | BRSA:<br>• The calculation of transactions subject to the 25-percent limitation in swaps was differentiated based on maturity. |
| 29 September 2018 | CBRT:<br>• The calendar for Turkish lira-settled forward foreign exchange sale auctions to be held in the fourth quarter of 2018 was released. |

## Box 5.1

## Monetary Policy Transmission and Banks' Cross-Border Borrowing

The bank credit supply channel is one of the key channels through which monetary policy is transmitted to the economy. Changes in the monetary policy rates affect banks' funding costs, and consequently banks' credit supply and loan rates. Eventually, one may observe an indirect effect on aggregate demand, economic activity or inflation.

Studies conducted at the CBRT have shown that banks respond differently to changes in monetary policy rates.[1] Banks with a higher degree of reliance on global liquidity or banks that are well-capitalized reflect a monetary policy tightening more moderately on their loan rates. In this box, we shed light on the underlying mechanism behind this finding by elaborating on the following question: "How does a monetary policy tightening affect domestic banks' cross-border borrowing?".

Theoretically, borrowing from abroad may become more favorable compared to domestic borrowing following a domestic monetary policy tightening (in other words, the interest rate differential between the costs of external and domestic borrowing may decline). Provided that the domestic currency also gains value, banks may increase their borrowing from abroad. Indeed, Avdjiev et al. (2018) use Bank for International Settlements' cross-border borrowing data, and argue that such a mechanism may indeed be in place. Nonetheless, so far, there is no empirical study that documents this mechanism in a well-identified way. In this regard, this box employs transaction-level data on cross-border borrowing of domestic banks in Turkey from global bank subsidiaries, and aims to identify this mechanism.

The cross-border borrowing database provides information on the volume, interest rate, maturity, and opening date of each transaction as well as on unique identifiers for the borrower and lender banks. Moreover, it shows the country of the lender bank, and also the country where its headquarters is situated in if the lender bank is a subsidiary. In the sample period analyzed (January 2006-December 2016), domestic banks borrowed from 914 different global banks and subsidiaries in 80 countries (with the majority headquartered in the euro area (53%) or the US (23%)) and in 17 different foreign currencies (with 67% denominated in US dollars, and 31% in euros).

The main empirical specification is as follows:

$$Y_{bgc,t} = \sum_{s=1}^{3} \beta_{1,s}\Delta MP_{t-s} * X_{b,t-s} + Controls + \mu_{bg} + \vartheta_{h,t} + \zeta_c + \varepsilon_{bgc,t}$$

$Y_{bgc,t}$ denotes the quarterly change in (log) cross-border borrowing of domestic bank b from global bank subsidiary g headquartered in country h, in currency c (from t to t+3). The first focus variable on the right-hand side is the monthly change in the CBRT Weighted Average Funding Rate, $\Delta MP_{t-s}$, over the last three months (s=3). One-to-three-month lags of changes in the monetary policy rate are used to account for the fact that the effect of changes in the domestic monetary policy on local banks' cross-border borrowing may take time. The remaining focus variables, as included in $X_{b,t-s}$, denote the size (log of assets), capital adequacy ratio (total equity capital over total assets), liquidity ratio (liquid assets over total assets), and reliance on global liquidity (ratio of non-core foreign currency liabilities to-total assets) of bank b. Besides the levels

[1] Financial Stability Report, May 2017, Special Topic IV.5.

of the variables in $X_{b,t-s}$, we include in the model these variables' interaction with the changes in the monetary policy rate as well, since banks with different degrees of reliance on global liquidity, capital adequacy ratios, liquidity ratios, or sizes may react differently to a change in the domestic monetary policy rate (by opting for different levels of borrowing from abroad).

Other factors that might affect domestic banks' demand for funds from global banks are controlled for:

(i)     *Controls* include variables such as the capital adequacy ratio, size and liquidity ratio of domestic banks, domestic macroeconomic indicators and the interactions of these variables.[2] Thus, the impacts of domestic economic activity, inflation and real effective exchange rate on domestic banks' cross-border borrowing are controlled for.

(ii)    To capture the strength of the borrowing-lending relationship between a domestic bank and a global bank, (domestic bank x global bank) fixed effects ($\mu_{bg}$) are included.

(iii)   Another important factor to be controlled for is supply conditions. The value of cross-border borrowing is an equilibrium value determined by demand and supply conditions.[3] So, we include headquarters country x month fixed effects $\vartheta_{h,t}$. Additionally, in the most saturated specification, we employ global bank subsidiary x year fixed effects to more strongly control for the supply side. Hence, while studying the impact of domestic monetary policy tightening on the cross-border borrowing of domestic banks, factors that may affect the supply of global banks such as the macroeconomic conditions of the headquarters country or these banks' willingness to supply funds are controlled for.

(iv)    Lastly, $\zeta_c$ denotes currency type fixed effects.

Table 1 and Table 2 present the results. Table 1 shows that domestic banks with higher foreign funding borrow more from abroad after a tightening in the domestic monetary policy. In Column (2), we control for supply side conditions. Following a 100-basis-point tightening in the monetary policy, a domestic bank with a higher foreign funding ratio (i.e. a bank with its non-core FX liability to total assets ratio at the 75th percentile) demands 0.83% more funds from abroad compared to a domestic bank with a lower foreign funding ratio (i.e. a bank with a non-core FX liability to total assets ratio at the 25th percentile).[4] On the other hand, well-capitalized banks are in less need of foreign funds after a tighter domestic monetary policy stance.

If supply conditions are adequately controlled for, a rise in demand should lead to a rise in prices. In line with this intuition, we find that higher demand by globally funded domestic banks increases the cross-border interest rate while lower demand by well-capitalized domestic banks decreases the cost of cross-border borrowing (Table 2). These estimated effects are not statistically significant, though. Weak results on the price margin point to a nearly perfectly elastic international supply schedule for globally funded domestic banks following a domestic policy tightening.

To summarize, the results show that after a domestic monetary policy tightening, banks with higher non-core FX liabilities demand more funds from abroad. This finding sheds light on how these banks reflect a domestic monetary policy tightening more moderately on their credit conditions. Moreover, it is found that well-capitalized banks demand less funding from global banks. In periods when the international supply schedule is not perfectly elastic, it is expected that well-capitalized banks' lower demand for cross-border funding will have a positive effect on their borrowing costs.

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[2] Annual percentage changes in the industrial production index (IPI) and the consumer price index (CPI), and the monthly percentage change in the real effective exchange rate are included as domestic macroeconomic indicators. In line with the lag specification for the monetary policy rate, one-to-three-month lags of macroeconomic variables are included in the estimation.

[3] For instance, the post-tightening increase in domestic banks' cross-border borrowing might be due to an increase in global banks' supply of funding rather than an increase in domestic banks' demand for funding.

[4] For the details on the calculation of economic impacts, see Fendoğlu, Gülşen, and Peydro (2018).

Table 1: Estimation Results
Dependent Variable: Quarterly Change in the Cross-Border Borrowing Amount

| | (1) | (2) |
|---|---|---|
| $\sum \Delta MP_{t-s} * Non-Core\ FX\ Liab.\ Ratio$ | 0.399** (0.161) | 0.429** (0.208) |
| $\sum \Delta MP_{t-s} * Capital\ Adequacy\ Ratio$ | -0.174 (0.507) | -1.036* (0.622) |
| $\sum \Delta MP_{t-s} * Liquidity\ Ratio$ | -0.079 (0.14) | 0.029 (0.195) |
| $\sum \Delta MP_{t-s} * Size$ | -1.439 (1.002) | -0.316 (1.203) |
| Domestic Bank Variables | Yes | Yes |
| Macro Controls x Domestic Bank Variables | No | Yes |
| Domestic Bank Fixed Effect | Yes | -- |
| Domestic Bank x Global Bank Fixed Effect | No | Yes |
| Global Bank's Headquarters Country x Month Fixed Effect | Yes | Yes |
| Global Bank x Year Fixed Effect | No | Yes |
| Number of Observations | 107,854 | 107,854 |
| $R^2$ | 0.083 | 0.146 |

Notes: The results are obtained using ordinary least squares. The sample period is 2006:1-2016:12. Regarding the fixed effects, "Yes" indicates that corresponding fixed effects (or the variable) are included, "No" indicates that corresponding fixed effects (or the variable) are not included, and "--" indicates that the respective fixed effect is inapplicable or already included in the wider set of fixed effects or variables. Standard errors are clustered at domestic bank x global bank and month level, and are given in parentheses. ** Significant at 5 percent level, and * significant at 10 percent level.

Table 2: Estimation Results
Dependent Variable: Quarterly Change in the Cross-Border Borrowing Interest Rate

| | (1) | (2) |
|---|---|---|
| $\sum \Delta MP_{t-s} * Non-Core\ FX\ Liab.\ Ratio$ | 0.004 (0.003) | 0.002 (0.003) |
| $\sum \Delta MP_{t-s} * Capital\ Adequacy\ Ratio$ | -0.008 (0.008) | -0.012 (0.013) |
| $\sum \Delta MP_{t-s} * Liquidity\ Ratio$ | -0.005 (0.003) | 0.001 (0.005) |
| $\sum \Delta MP_{t-s} * Size$ | -0.001 (0.017) | -0.027 (0.024) |
| Domestic Bank Variables | Yes | Yes |
| Macro Controls x Domestic Bank Variables | No | Yes |
| Domestic Bank Fixed Effect | Yes | -- |
| Domestic Bank x Global Bank Fixed Effect | No | Yes |
| Global Bank's Headquarters Country x Month Fixed Effect | Yes | Yes |
| Global Bank x Year Fixed Effect | No | Yes |
| Number of Observations | 107,854 | 107,854 |
| $R^2$ | 0.125 | 0.171 |

Notes: The results are obtained using ordinary least squares. The sample period is 2006:1-2016:12. Regarding the fixed effects, "Yes" indicates that corresponding fixed effects (or the variable) are included, "No" indicates that corresponding fixed effects (or the variable) are not included, and "--" indicates that the respective fixed effect is inapplicable or already included in the wider set of fixed effects or variables. Standard errors are clustered at domestic bank x global bank and month level, and are given in parentheses.

## References

Avdjiev, S., C. Koch, M. P., and G. von Peter (2018). Transmission of monetary policy through global banks: whose policy matters? BIS Working Paper No.737.

Fendoğlu, S., Gülşen, E., Peydro, J.L. (2018). Global Liquidity and the Impairment of Local Monetary Policy Transmission. CBRT Working Paper Series, under review.