

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, ΔMP_{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 (μ_{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, ζ_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.

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 Fendođlu, 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.

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

