

On Setting Limits on Bank of Russia Market Operations to Provide (Absorb) Liquidity

1. Limit on Bank of Russia market operations in the context of banking sector liquidity management

The setting of limits on Bank of Russia market operations (conducted on an auction basis) is one of the key elements of the banking sector liquidity management process, which, in addition to ensuring the normal operation of the money market and smooth settlements and payments, is aimed at maintaining a short-term money market rate at a level that meets the ultimate objective of the monetary policy considering the assessment of inflation risks and economic growth prospects.

The Bank of Russia seeks to meet the banking sector's needs in refinancing (excess liquidity placement) formed depending on the ratio of credit institutions' demand for liquidity and its supply, mainly through open market operations whose parameters are established on the basis of a consolidated forecast of the banking sector liquidity.

The objective of the banking sector liquidity management is also to limit the money market rate volatility. Excessive market rate volatility complicates the transmission of changes in the rates on the Bank of Russia operations thus lowering the effectiveness of the monetary policy interest rate channel.

2. Role of Bank of Russia operations in the formation of banking sector liquidity

For the purposes of establishing the limits on the Bank of Russia market operations, the term 'banking sector liquidity volume' shall mean the amount of balances of funds in correspondent accounts of credit institutions with the Bank of Russia being the most liquid funds of credit institutions, to which they have quick access and which they use to conduct banking activities. The banking sector liquidity volume changes both under the influence of autonomous factors (i.e. those that are outside the scope of the central bank's policy to manage banking sector liquidity) and as a result of the central bank's operations to provide and absorb liquidity, as well as regulation of credit institutions' required reserves.

The mechanism for forming banking sector liquidity can be presented as follows:

$$C_t = C_{t-1} + \Delta AF_t + \Delta RR_t + S_t + O_t,$$

where:

C_t and C_{t-1} are fund balances in correspondent accounts of credit institutions with the Bank of Russia as of the end of day 't' and previous day, respectively,

ΔAF_t is the change in the level of autonomous factors of the liquidity formation for day 't'¹,

S_t is the balance of Bank of Russia operations to provide/absorb liquidity conducted in the previous days, with the execution time falling on day 't' (without taking into account the Bank of Russia's interventions in the domestic foreign exchange market),

O_t is the volume of Bank of Russia operations to provide and absorb liquidity conducted on day 't', with the execution time falling on the current day,

ΔRR_t is the amount of regulation of credit institutions' required reserves for day 't'.

¹Including Bank of Russia interventions in the domestic foreign exchange market.

Updated information [on the contribution of these factors to the change in the banking sector liquidity volume](#) is published daily on the Bank of Russia's website. The Bank of Russia conducts daily forecasts of autonomous factors of liquidity formation and an assessment of the banking sector's demand, which are used for establishing the limit on the Bank of Russia market operations.

Below is a brief description of the methodology for forecasting supply and demand for banking sector liquidity, as well as an algorithm for setting the limits on overnight repo auctions and operations to provide or absorb liquidity by way of one-week auctions proceeding from forecast estimates.

3. Banking sector liquidity supply forecasting

Information on previously completed transactions makes it possible to calculate the balance of Bank of Russia operations with credit institutions on a particular day (S_t), for which reason the task of supply forecasting (C_t^S) actually boils down to a component-wise forecasting of the following factors of liquidity formation²:

- change in cash in circulation (outside the Bank of Russia);
- change in balances of funds in credit institutions' required reserve accounts;
- the amount of changes in balances of funds in the general government accounts with the

Bank of Russia as a result of the difference between the amount of budget revenue and expenditure, as well as the balance of operations to place government securities and deposits of the Russian Ministry of Finance with credit institutions, and other operations, including changes in float.

The volume of banking sector liquidity supply as of the end of day 't' (C_t^S) is calculated as³:

$$C_t^S = C_{t-1} + \Delta AF_t^S + \Delta RR_t^S + S_t + O_t^S$$

O_t^S includes a forecast of operations with the execution time falling on day 't', the demand for which cannot be satisfied through market operations.

Various economic and mathematical models and calculations together with general government information are used when forecasting the liquidity formation factors. The Bank of Russia continuously communicates with the Russian Ministry of Finance and the Federal Treasury on matters regarding the forecast of changes in the balances of funds in the general government accounts with the Bank of Russia.

4. Banking sector liquidity demand forecasting

The term 'banking sector liquidity demand' means the need in the balances of funds on correspondent accounts of credit institutions with the Bank of Russia maintained by them for timely fulfilment of their obligations, including the reserve requirements regarding the application of the mechanism for averaging the required reserves on the correspondent accounts.

The models used in forecasting the volume of demand for liquidity (C_t^D) take into account both a trend component of demand and various seasonal fluctuations.

²Due to the fact that Bank of Russia interventions in the domestic foreign exchange market are typically carried out with a settlement date 't+1', it is not required to provide their overnight forecasting to estimate the level of the banking sector liquidity supply.

³Here and below the "f" superscript denotes the forecasted indicators.

The purpose of forecasting is to estimate credit institutions' demand for liquidity formed under the influence of the said factors, the satisfaction of which is one of the conditions for the money market rates being close to the rate on Bank of Russia market operations.

5. Calculation of limits on overnight repo operations

Based on the comparison of the forecasted values of liquidity demand and supply, the limit on the provision of funds at an overnight repo auction is set:

$$L_t = C_t^D - C_t^S = C_t^D - C_{t-1} - \Delta AAF_t^L - \Delta ARR_t^L - S_t$$

If the calculated value of the limit on overnight operations is negative, a minimum (technical) limit is set (in accordance with the established practice – 10 bln rubles).

An example of the calculation of the limit on overnight repo operations is given in [Appendix 1](#).

The limit characterises the Bank of Russia's estimate of the banking sector's need for additional liquidity. If this estimate is correct, credit institutions will not need to seek the use of the Bank of Russia' standing facilities, since the existing gap between the demand for liquidity and its supply will be completely covered through Bank of Russia market operations, the interest rate on which, in these conditions, will have a decisive influence on the formation of the money market interest rates.

The described approach to setting limits is based on the assumption of a normal functioning of the interbank lending market, which provides for an efficient redistribution of liquidity between individual market participants — from banks with excess liquidity to those suffering from a lack thereof.

6. Calculation of limits on one-week auction-based operations

The limit on one-week auctions is defined similarly based on the average forecasted gap between demand and supply of bank liquidity on the relevant horizon.

For each of the days of the forecasted period, the demand assessment is compared with the forecasted liquidity supply. The gap arising from this characterises the banking sector's need for additional liquidity or for absorbing the excess liquidity for each day during the week. The limit on operations is set equal to the average value of the gap during the week, which is equivalent to the difference between the mean values of supply and demand: for a positive gap — based on auctions to provide liquidity, for a negative gap — based on deposit auctions.

$$\bar{L}^F = \frac{1}{T} \sum_{t=1}^T L_t^F = \bar{C}^D - \bar{C}^S,$$

where:

T is the number of business days during the period of providing (absorbing) liquidity at a one-week auction;

\bar{L}^F is the average gap between liquidity demand and supply for the period 1,...,T

L_t^F is the average gap between liquidity demand and supply as of the end of day 't' = 1,...,T ;

\bar{C}^D is the average value of demand for the period 1,...,T;

\bar{C}^S is the average value of supply for the period 1,...,T.

This approach to setting the limit is primarily based on the mechanism of averaging the required reserves on correspondent accounts, whereby the interbank market's sensitivity to liquidity

fluctuations should decrease. At the same time, conducting market operations on a weekly basis increases the requirements for the interbank market, which should ensure a smoothing of liquidity needs at the level of individual credit institutions.

An example of the calculation of limits on overnight and one-week auction-based operations is given in [Appendix 1](#) and the calculation algorithm is in [Appendix 2](#).

Appendix 1

An example of limit calculation for Bank of Russia market operations to provide (absorb) liquidity

The table provides an example of calculating the limits on overnight and one-week repo auctions of the Bank of Russia.

When calculating the limit for an overnight auction, a one-day liquidity forecast is used (in the example — for Tuesday 18.09.2012). For subsequent days, the forecast of factors affecting liquidity and demand for correspondent accounts is updated.

A one-week auction to provide (absorb) liquidity is held weekly, as a rule on Tuesdays; the calculations based on its results are performed on Wednesday. For a one-week auction, the forecast period starts on Wednesday (the day of auction settlements) and lasts until Tuesday of the following week. However, since the corresponding forecast estimation is made as of Tuesday morning, in order to calculate the limit the liquidity forecast for six business days (from Tuesday to Tuesday) is used.

[The forecast of factors affecting liquidity](#) (median values accrued for the period) offered in the example is published on the day of the auction on the Bank of Russia website.

Forecast results are rounded to tens of billion rubles when setting auction limits.

In the offered example the limit for the overnight auction was set at the level of 120 billion rubles and for the one-week auction at 1,260 billion rubles.

The example containing the calculation formulae is available for download in the [Excel](#) format.

An example of limit calculation for one-week auction-based operations for liquidity supply/withdrawal (19–25.09.2012)
(as of the opening on 18.09.2012)

Table

| billion rubles | | | | | | | | | | |
|---|---|---------------------|---------------------|---------------------|---------------------|---------------------|----------------------|-------------|--------------------------------------|--------|
| Designation | 17.09.2012 | 18.09.2012 | 19.09.2012 | 20.09.2012 | 21.09.2012 | 24.09.2012 | 25.09.2012 | Designation | Mean value for the week ³ | |
| | Mon <i>t = -1</i> | Tue <i>t = 0</i> | Wed <i>t = 1</i> | Thu <i>t = 2</i> | Fri <i>t = 3</i> | Mon <i>t = 4</i> | Tues <i>t = 5</i> | | | |
| 1. Correspondent account balances of credit institutions with the Bank of Russia (as of day end): | | | | | | | | | | |
| actual | C_1^d | 798,4 | | | | | | | | |
| demand estimate | C_1^d | - | 850,0 | 815,9 | 689,6 | 704,1 | 706,1 | \bar{C}^d | 723,4 | |
| 2. Factors affecting liquidity¹ | $\Delta AF_1^t + \Delta RR_1^t + S_1 + O_1^t$ | | -71,1 | -1113,8 | -116,7 | 8,4 | -38,4 | -217,5 | -1332,1 | |
| 2. Factors affecting liquidity - accrued¹ | | | -71,1 | -1184,9 | -1301,6 | -1293,2 | -1331,6 | -1549,1 | | |
| including: | | | | | | | | | | |
| Changes in cash in circulation (outside the Bank of Russia) | ΔAF_1^t | | 14,6 | 6,6 | -3,7 | -7,9 | 38,2 | 30,1 | 34,8 | |
| Change in general government accounts with the Bank of Russia and other operations | | | 36,1 | 1,7 | -112,0 | 25,3 | -65,5 | -241,7 | -111,2 | |
| Bank of Russia management of required reserves for credit institutions | ΔRR_1^t | | -4,0 | 0,0 | 0,0 | 0,0 | 0,0 | 0,0 | -4,0 | |
| Bank of Russia transactions balance for liquidity supply/withdrawal with the time of performance falling within the established period ² | $S_1 + O_1^t$ | | -117,8 | -1122,1 | -1,0 | -9,0 | -11,1 | -5,9 | -1251,7 | |
| 3. Liquidity supply of the banking sector | $C_1^t = C_{t+1}^t + \Delta AF_1^t + \Delta RR_1^t + S_1 + O_1^t$ | | 727,3 | -386,5 | -503,2 | -494,8 | -533,2 | -750,7 | \bar{C}^s | -533,7 |
| 4. Estimated gap between banking sector liquidity demand and supply | $L_1^t - C_1^t - C_1^t$ | | 122,7 | 1202,4 | 1192,8 | 1198,9 | 1239,3 | 1452,1 | \bar{L}^t | 1257,1 |

¹ The indicator is accompanied by the sign reflecting its impact on liquidity.

² Including the forecast for operations with day t settlement term, the demand for which cannot be satisfied within the framework of market transactions.

³ For factors affecting liquidity, mean values of indicators are given, accrued for the week.

The limit calculation algorithm for the Bank of Russia one-week market operations to provide (absorb) liquidity

I. Demand for liquidity

The demand for liquidity (C_t^D) is calculated based on models (Section 4).

The mean demand value \bar{C}^D for the period 1,...,T:

$$\bar{C}^D = \frac{1}{T} \sum_{t=1}^T C_t^D,$$

where T is the number of business days during the period for providing (absorbing) liquidity at a one-week auction.

II. Supply of liquidity C_t^S :

$$C_t^S = C_{t-1}^S + -\Delta AF_t^f + \Delta RR_t^f + S_t + O_t^f = C_{-1} + \sum_{t=0}^T (O_t^f - \Delta AF_t^f + \Delta RR_t^f + S_t + O_t^f),$$

where $C_{t-1}^S = C_{-1}$ is the actual balance of funds in correspondent accounts of credit institutions with the Bank of Russia as of the end of the day before the day of limit publication.

The mean supply value \bar{C}^S for the period 1,...,T:

$$\bar{C}^S = \frac{1}{T} \sum_{t=1}^T C_t^S = C_{-1} + \sum_{t=0}^T \left(1 - \frac{\max\{0, t-1\}}{T} \right) (\Delta AF_t^f + \Delta RR_t^f + S_t + O_t^f),$$

III. Limit on operations to provide/absorb liquidity for one week (mean liquidity gap)

$$\bar{L}^f = \frac{1}{T} \sum_{t=1}^T L_t^f = \frac{1}{T} \sum_{t=1}^T (C_t^D - C_t^S) = \bar{C}^D - \bar{C}^S,$$

where:

L_t^f is the gap between liquidity demand and supply as of the end of day 't' = 0,..., T ;

\bar{L}^f is the mean gap between liquidity demand and supply (limit estimate for a one-week auction).