Bank of Russia Financial Stability Department

INTER-DEALER REPO MARKET REPORT, III QUARTER 2012

Moscow 2012

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PURPOSE OF THE BANK OF RUSSIA INTER-DEALER REPO MARKET REPORT

Article 3 of the Federal Law on the Central Bank of the Russian Federation (Bank of Russia) prescribes the following **purposes for the Bank of Russia**: to protect the rouble and ensure its stability; to develop and strengthen the banking system of the Russian Federation; and to ensure efficient and uninterrupted functioning of the payment system. **The money market is a proper venue to achieve all these three purposes**. The money market serves to support liquidity in the banking sector and rouble interest rates (stability of the banking system), to meet transaction money demand (efficient and uninterrupted functioning of the payment system), and to smooth rouble exchange rate fluctuations, facilitating effective monetary transmission. This may explain the Bank of Russia's focus on the money market, which is a mechanism for short-term liquidity redistribution in the financial system.

Sustainable development of the money market involves the following tasks:

- Stable conditions for liquidity reallocation, i.e. acceptable volatility of short-term interest rates and smoothed fluctuations in trading volumes;
- Minimised counterparty default risk by means of sound collateral management;
- Well-balanced development of various market segments, specifically, fostering a robust segment beyond overnight maturities;
- Putting in place conditions for the use of CCP for repo transactions.

Within the money market, which includes the interbank lending market, the currency swap market, and **the inter-dealer repo market** the latter commands most attention. **There are several factors contributing to its importance**:

- As evidenced in the autumn of 2008, the repo market can create instability resulting in a liquidity squeeze in the banking sector;
- The short-term segment of the inter-dealer repo market (overnight) is comparable in size to the short-term segment of the interbank lending market adjusted for intra-group trade;
- Repo interest rates and haircuts emerge as macroprudential indicators, as they reflect links between the corporate and government bond market, the equity market and the interbank lending market;
- The repo market concentrates systemic risks of the financial sector, as it has not only large banks but also non-bank professional securities market players among its participants.

With regard to the rising importance of the inter-dealer repo market for the interest rate policy of the monetary authorities, the Bank of Russia releases **regular quarterly reports** to reflect its developments. **Inter-dealer repo** trade means transactions between market participants (primarily, banks and non-bank professional securities market participants) to sell (buy) securities with an agreement to repurchase (resell) the same securities at a specified price on a specified date. Inter-dealer repo operations exclude **Bank of Russia repo operations**. The latter are central bank operations to provide liquidity to credit institutions via buying securities from credit institutions with their obligation to buy them back on a specified date and on pre-agreed conditions.

The ultimate goal of this publication is to promote financial stability by enhancing transparency in the money market on the whole and in its repo segment in particular. If participants are more aware of the repo market structure and trends they would better understand and more appropriately assess their own risks. The Bank of Russia also seeks to communicate potential collective implications of their individual investment decisions in case of systemic effects that participants may fail to fully recognise while assessing market risks.

The Report is not an official Bank of Russia document. It is more of an analytical and information paper focusing on the inter-dealer repo market in the third quarter of 2012. The latest reporting data are provided as of the last business day of the quarter, with any possible material events following the reporting date excluded from the analysis.

A data source for this study was the Moscow Exchange repo trade data and reporting form No. 0409701 "Report on FX and money market transactions".

The Report is published **in electronic form in Russian and in English** and is available at the official website of the Bank of Russia.

The Bank of Russia Financial Stability Department (hereinafter FSD) invites interested parties' comments and suggestions regarding the Report's structure and contents at reports@cbr.ru.

SUMMARY

- The third quarter of 2012 saw continued strong demand of the banking system for liquidity. Bank of Russia' exchange-traded repos remained the key source of liquidity for banks. In late July, the debt incurred by banks under these transactions reached an all-time high of 1.77 trillion roubles. During the period under review, 75% of the total debt fell on one-week trade on average – a rise from 53% in the second quarter.
- The key contributor to increased liquidity demand at the beginning of the quarter was the net withdrawal of liquidity from the system into government accounts. By the end of the quarter, money market conditions eased due to over 500 billion roubles deposited by the Federal Treasury with commercial banks in August-September.
- The value of open positions[1] and the structure of the inter-dealer repo market stayed largely unchanged during the period under review (the market size varied from 405 to 430 billion roubles). Transaction maturities, concentration of participants, collateral composition and sizes of haircuts in the inter-dealer repo market did not change much either. Irrespective of some contraction in the overnight trade share, this maturity still prevailed (accounting for over 70 percent of outstanding values).
- For the most part of the period under review, inter-dealer repo rates were on a declining trend. Following the Bank of Russia Board of Directors' decision to raise interest rates on Bank of Russia operations since 14 September 2012, they edged up by 0.25 percentage points.
- Non-resident clients played a nontrivial role in the inter-dealer repo market. The outstanding value of their transactions accounted for 16 percent of total lending and 41 percent of total borrowing in the market.
- The maximum liquidity transmission chain in the repo market did not shorten any further in the third quarter, keeping its length of three consecutive liquidity transmission links. In August-September 2012, tier 1 banks[2] accumulated half of the overnight market liquidity, distributing the remaining part to other market participants. Non-banking financial institutions were mostly at the receiving end.
- Market multipliers' values in the third quarter reflected improved liquidity situation in the overnight segment.
- In the third quarter, the banking sector retained basically adequate collateral for Bank of Russia repo refinancing against marketable assets (estimated at 3.3 – 3.6 trillion roubles as of 1 September 2012). It should be noted that not much room is left for any further extension of the repo eligible collateral list, which currently covers almost three quarters of the securities portfolio of Russian banks. The most important securities not yet included on the list are non-resident bonds and resident equities.
- The results of the inter-dealer repo market stress testing suggest the market's resilience to moderate stock market shocks: in the third quarter, potential defaults could have been at 96 billion roubles (slightly under a quarter of the market size in value terms, and about 45% in terms of number of transactions) with potential collateral shortage of 6.1 billion roubles. Under current conditions, any large-scale non-payment crisis (domino effect) in the market seems unlikely.
- The FSD estimates that securities transactions leveraged via Bank of Russia repo operations are not on a mass scale.

[1] Hereinafter all the measures are calculated for open positions as of a date, i.e. in terms of "stocks" (rather than for closed transactions as of a date, i.e. in terms of "flows"), unless otherwise specified.

[2] See Section 4: Liquidity Transmission in the Repo Market (Including Bank of Russia Operations).

1. INTER-DEALER REPO MARKET STRUCTURE

The Report has been prepared using exchange-traded repo data, provided by the Moscow Exchange[3] (the data provided covered over 99 percent of transactions).

According to the IV Survey of the Russian Repo Market prepared by the National Securities Market Association (NSMA), a self-regulatory organisation[4], exchange traded repos accounted for over 90 percent of total trade[5].

Inter-dealer repo reports for the first and for the second quarter of 2012 are available at the official website of the Bank of Russia[6].

In the third quarter of 2012, open positions in the inter-dealer repo market varied in the range of 400 – 470 billion roubles, showing a rising trend (Chart 1).

Chart 1. Open positions in the inter-dealer repo market, billion roubles

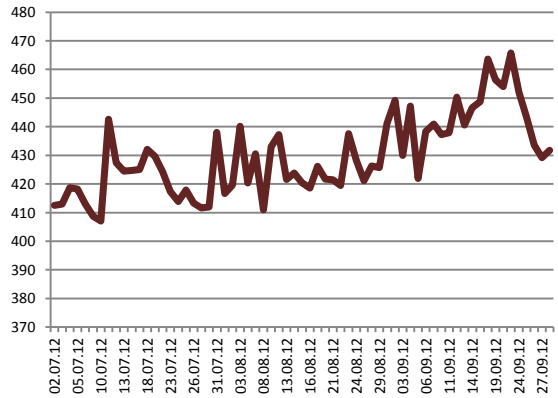
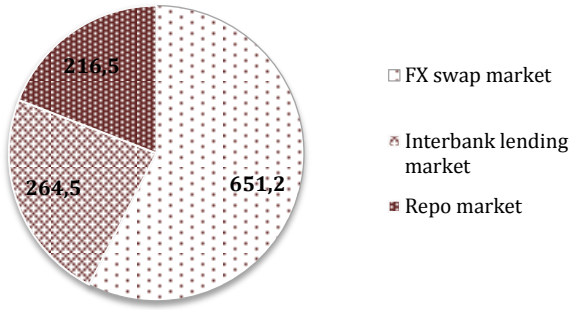


Chart 2. Volume and composition of the overnight money market, billion roubles (1 October 2012)



The inter-dealer repo market accounts for a significant share of the overall money market, with almost a quarter of outstanding overnight money market trade falling on inter-dealer repo transactions[7] (Chart 2).

The volume and composition of the inter-dealer repo market have remained largely unchanged since May 2012. Trade volumes stayed stable varying in the range of 405 billion roubles to 430 billion roubles during the quarter.

The key lenders in the inter-dealer repo market were banks (about 70% of total lending), especially banks with high credit ratings awarded by international rating agencies, and subsidiaries of foreign banking groups (over 60%[8]).

[3] The Bank of Russia receives information on repo transactions made in the Main Market section of the stock market. Standard section transactions are not covered in the Report.
[4] www.repo-rus.ru/?page=reports
[5] These figures do not include repo trade with the Bank of Russia, therefore, if the inter-dealer exchange-traded repos take 82.9%, the Bank of Russia repos – 12.1%, and the OTC repos – 5.1%, the share of exchange-traded repos excluding Bank of Russia operations would make 82.9 / (82.9 + 5.1) = 94.2%.
[6] www.cbr.ru/analytics/fin_stab/
[7] Values of inter-bank lending market and currency SWAP market are taken from reporting form 0409701 "Report on FX and money market operations", while repo market values are provided according to the Moscow Exchange data. The data received were adjusted for intra-group trading. The dataset is restricted to rouble repo and inter-bank lending transactions, inter-bank lending deals between residents, and FX swaps RUB/US$ and RUB/EUR (over 90% of the market).
[8] This figure reflects the share of banks with the highest of S&P, Moody's, and Fitch ratings greater than or equal to BBB- (S&P scale), and subsidiaries of international banking groups.

Key borrowers included clients of both banks and non-banks (over 70% of total borrowings). Non-residents among borrower clients accounted for about 60 percent.

The inter-bank repo segment[9] contracted from 26.1% in the first quarter of 2012 to 10.5% in the third quarter, largely due to banks' substitution of their inter-dealer repo market borrowings with borrowings from the Bank of Russia. Borrowers in the inter-bank repo segment included mainly unrated or low-rated small and medium-sized banks[10] (over 60% of the total inter-bank market).

Chart 3. Open positions in the inter-dealer repo market by counterparty (quarterly average), %

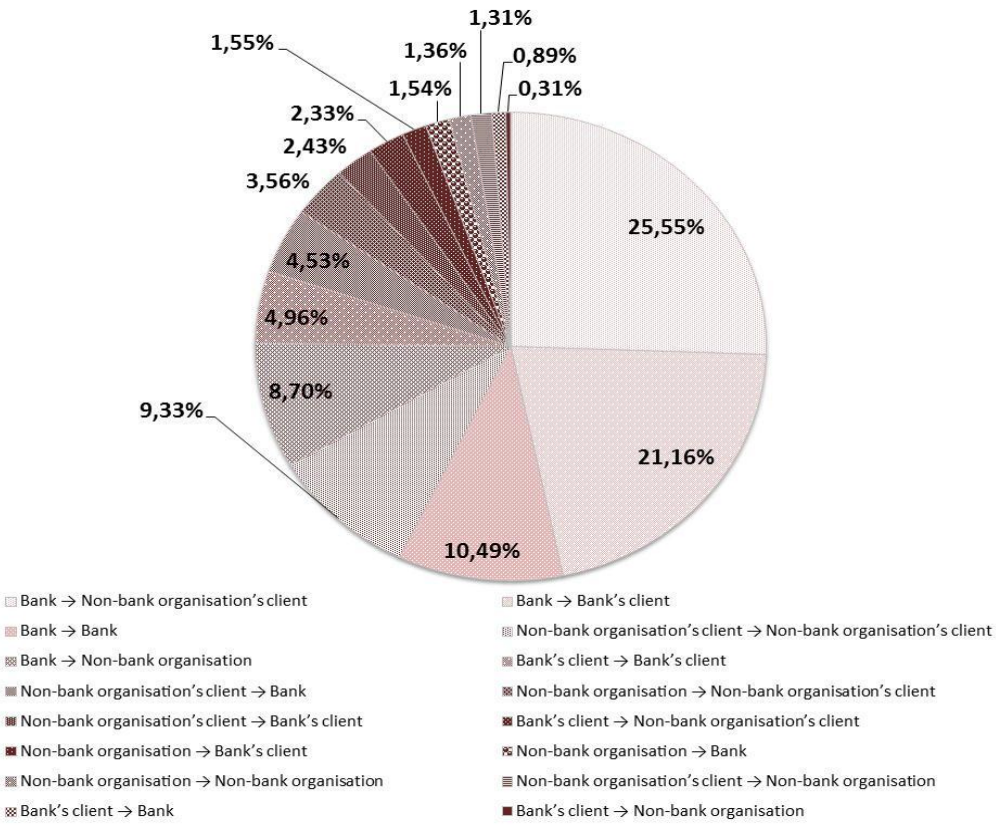
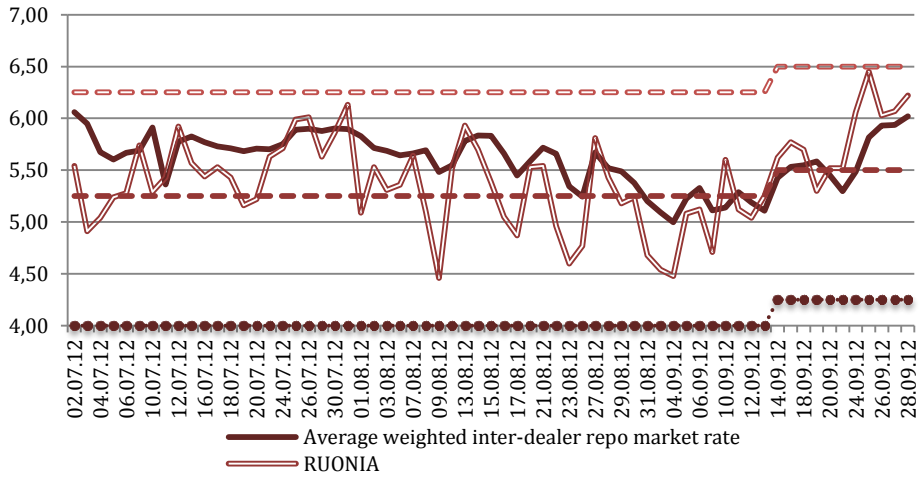


Chart 4. Money market and Bank of Russia rates, %



[9] Inter-bank repo segment is a segment of the inter-dealer repo market.

[10] This figure reflects the share of banks with the highest of S&P, Moody's, and Fitch ratings smaller than or equal to B+ (S&P scale) or unrated.

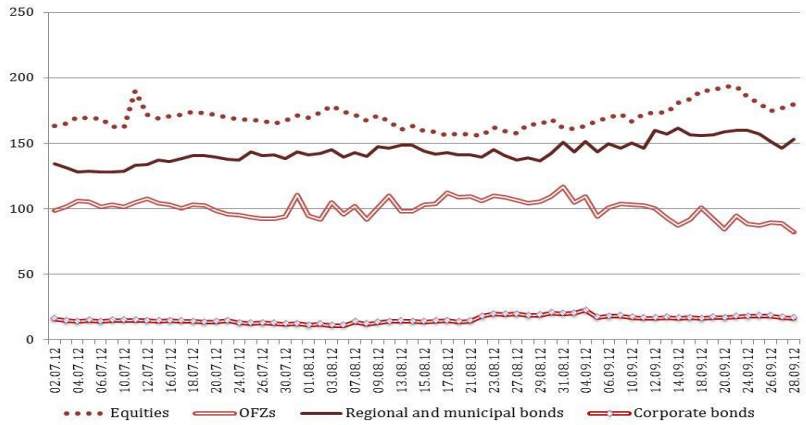
Inter-dealer repo market ***interest rates*** followed a declining trend during most of the period under review. As a result of the Bank of Russia Board of Directors' decision to raise its policy rates on 14 September 2012, market rates edged up by 25 basis points. Overall, during the third quarter of 2012, daily inter-dealer repo rate volatility was lower than the inter-bank lending rate volatility (RUONIA). Inter-dealer repo rates were more stable both due to negative interest rate transactions in the market (which have a stabilising effect on the overall level of rates) and due to a larger client trade (when liquidity was in surplus, banks would provide smaller rate reductions for clients than market rate reductions, as clients have fewer opportunities to switch counterparties).

Inter-dealer repo ***maturities*** and ***concentration*** changed insignificantly during the first three quarters of 2012, with overnight trade contracting to 69.8% in the third quarter from 74.9% in the first quarter; and one-week repos expanding from 18.8% to 21% during the same period (largely due to Bank of Russia focused measures to shift to one-week refinancing facilities). Concentration of lenders and borrowers rose moderately (Table 1).

Table 1. Inter-dealer repo market features

Parameter	I quarter	II quarter	III quarter
Overnight repos, %	74.9	72.6	69.8
One-week repos, %	18.8	18.6	21.0
Top 10 lenders, %	42.9	45.6	45.8
Top 10 borrowers, %	28.3	32.0	35.1

Chart 5. Open positions in the inter-dealer repo market by collateral, billion roubles



The composition of collateral in the inter-dealer repo market remained stable during the first three quarters of 2012 (Chart 5), with the share of OFZs and corporate securities of companies with government stakeholdings still high (over 50%). Some diversification observable in the collateral portfolio (the share of the 20 top issuers edged down from 66.6% to 64.0%) may be attributed to increased repos with the Bank of Russia. The quality of collateral is also evidenced by a high share (80-85%) of securities from the Bank of Russia repo list of eligible collateral.

Haircuts for equity-secured inter-dealer repos were as high as 14% for the most part of the third quarter, which is higher than in the first and in the second quarters of 2012 (12-14%). Potential equity value drops in times of financial turbulence varies considerably depending on the issuer's credibility. Almost all the trades were secured by more or less liquid equities[11] (99.89% of trades). Overall, the FSD estimates that the haircuts for equity-secured inter-dealer repos were adequate in

[11] Our analysis was limited to equities overwhelmingly used in repo transactions (these equities were used in 99.89% of transactions in value terms). These equities were more or less liquid: transactions backed by most of these equities were made on over 90% of trading days, with the average number of transactions exceeding 100 and the value of trade considerably more than 1 million roubles. The above equities included inter alia "blue chips" and second grade equities.

the third quarter[12] (Chart 6). Haircuts for bond-secured inter-dealer repos remained close to their values in the first and in the second quarters (Chart 7).

Chart 6. Haircuts and potential devaluation of equity groups during a crisis, %

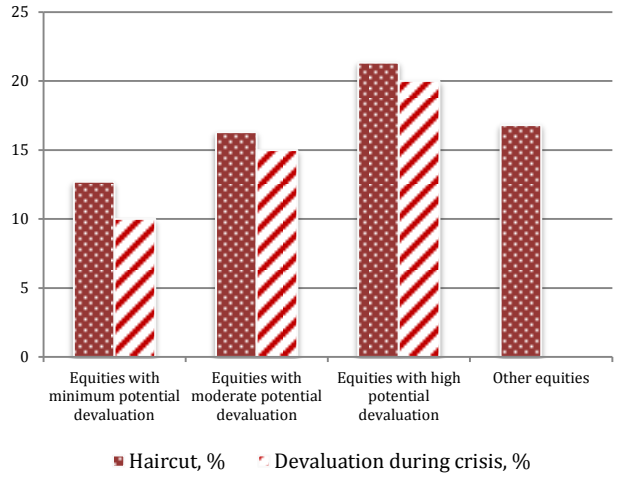
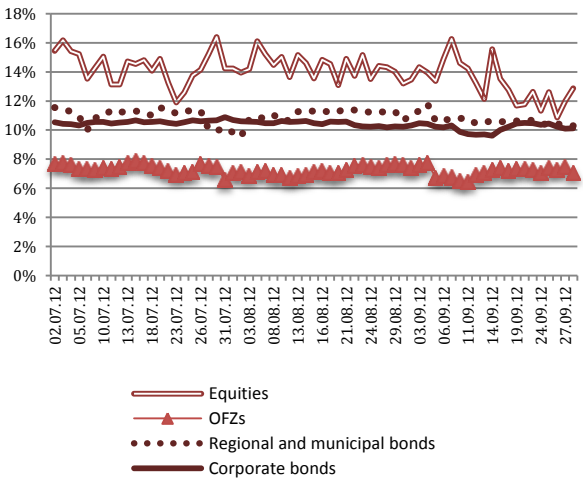


Chart 7. Haircuts in inter-dealer repo market, by collateral, billion roubles



The above structural features of the inter-dealer repo market give rise to potential vulnerability factors that should be recognised while analysing systemic risks in this market[13]. Such factors will include a high share of client trades and also trades secured by collateral with elevated market risk characteristics. Moreover, non-residents prevail among borrowers in the client trade segment of the inter-dealer repo market (for more detail please see Inter-Dealer Repo Transactions with Non-Residents). However, the above potential vulnerability is offset by risk mitigation factors that allow minimisation of potential losses (Table 2).

Table 2. Potential Systemic Risk Factors and Risk Mitigation Tools

Risk factors	Risk mitigation factors
Borrowings in the market feature a large share of client transactions (about 70%) – in case of crisis, clients cannot recourse to the creditor of last resort to obtain refinancing.	**Overall, the market features quality collateral, with a high share of government paper (OFZs taking over 25%) and securities issued by major parastatals (about 70% of total collateral), which are unlikely to fall in value dramatically.**
Client borrowers show a high proportion of non-residents (about 60%): it may be difficult to collect funds from defaulting non-resident clients due to legal risks involved.	**The key lenders in the market are represented by banks (about 70% of total lending), which are more resilient compared to non-banks and clients, because they have access to Bank of Russia refinancing. Moreover, the market features a high share of collateral included on the Bank of Russia repo list of eligible collateral (about 80-85%).**
A significant proportion of collateral is taken by equities (39.6 %). Potential crisis drop of value for equities may be quite deep (during the 2008 crisis Gazprom shares collapsed four times[14]). In case of a defaulted transaction, the lender holding the above collateral may incur massive losses from its sale (revaluation), increasing the probability of a domino effect.	**The Bank of Russia has access to information on exchange-traded repos, allowing the regulator to enhance market transparency and facilitate debottlenecking of payments in case of market collapse (domino effect).**
Over 99% of repo trade is non-CCP.	**Haircuts are adequate to cover on the safe side a one-day stock market shock.**

[12] Equities were graded with regard to their devaluation during the crisis of 2008. If a share was not traded during the crisis, it was graded on the basis of its liquidity (determined with regard to the number and value of transactions in these equities).

[13] An analysis by the Bank of Canada provides interesting insights in repo market financial stability issues (see Appendix 1. Bank of Canada: Financial Stability of the Repo Market and Central Bank Capacity).

[14] The average weighted Gazprom share price was 344.5 roubles as of 16 May 2008, while being at 71.2 roubles on 27 October 2008 (source: Bloomberg).

2. INTER-DEALER REPO TRANSACTIONS WITH NON-RESIDENTS

In the third quarter of 2012, non-resident clients (hereinafter – non-residents[15]) were playing an important role in the inter-dealer repo market, taking up 16 percent of the total lending value in the market and 41% of total borrowings (Chart 8). Non-resident borrowing deals were largely brokered by non-bank organisations (about 70% of total borrowings), while lenders to non-residents were mostly banks (about 73% of total borrowings). Therefore, non-resident transaction risks of potential inter-dealer repo defaults were largely carried by lending banks.

The non-resident borrowing market was quite concentrated during the period under review, with over 60 percent of borrowings falling on the top 10 largest companies (Chart 9). Overall, there were 144 non-resident borrowers, with 32 making large borrowings (over 1 billion roubles). Thus, about a quarter of total borrowings in the inter-dealer repo market was taken by 10 companies registered outside the Russian jurisdiction.

Overall, the non-resident borrowing deals had parameters close to average market parameters. Other features to be noted include a high share of securities lending trade and shorter maturities for this category of inter-dealer repos (Table 3).

Chart 8. Inter-dealer repo borrowings by type of borrower, billion roubles

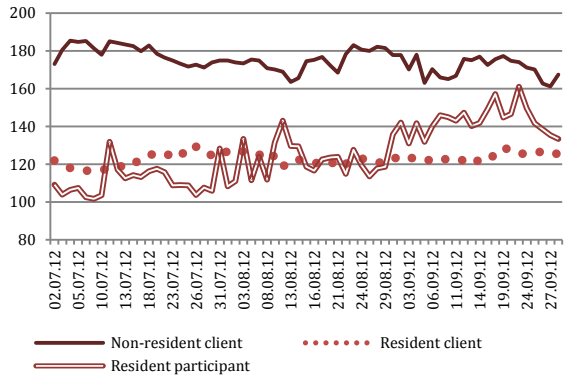


Chart 9. Inter-dealer repo borrowings by largest non-resident clients, billion roubles

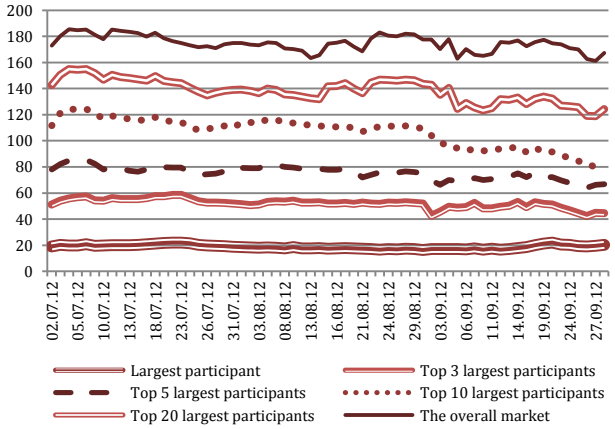


Table 3. Average market trade parameters versus parameters of trade with non-resident borrowers

Parameter	Total trade	Borrowers in client trade	Non-resident borrowers in client trade
Average borrowing rate, %	5.95	6.13	5.72
Average haircut (central government bonds; regional government and municipal bonds; corporate bonds; equities), %	7.3; 10.4; 10.9; 14.0	7.6; 9.9; 10.5; 13.5	7.5; 8.8; 8.3; 14.7
Overnight repos, %	63.1	63.1	72.9
1-week repos, %	22.7	23.7	20.2
Equities in total collateral,%	39.6	42.8	49.4
Top 20 largest collateral issuers, %	72.8	74.2	79.6
Top 10 largest borrowers, %	28.3	32.0	35.1

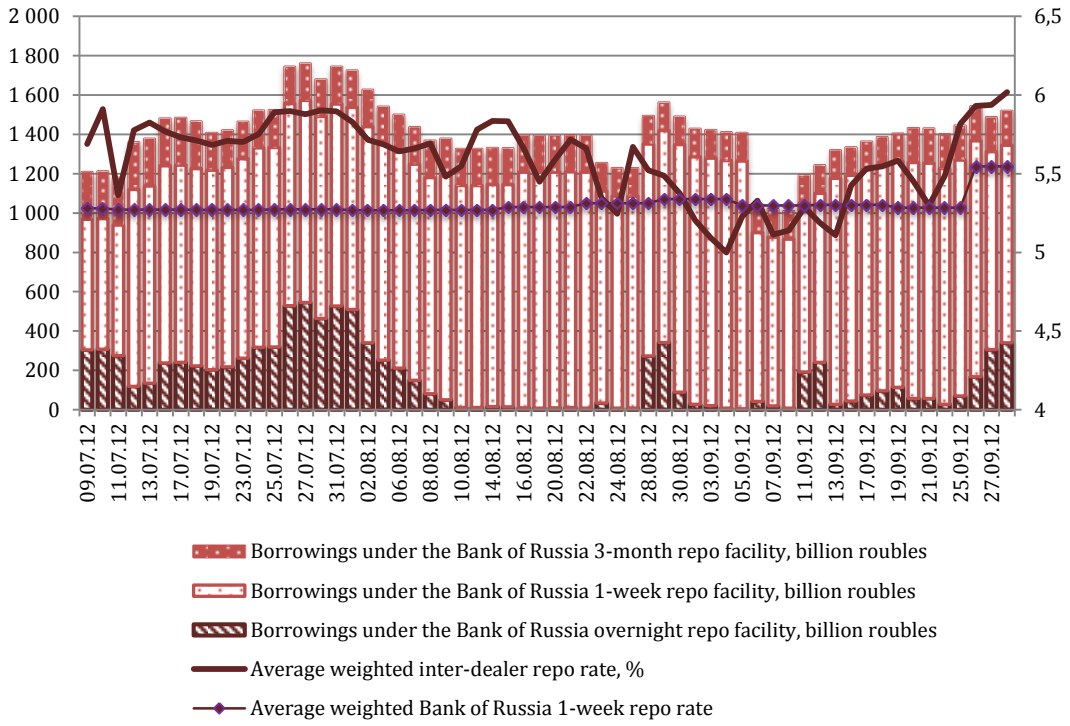
[15] Non-residents are not authorised to directly participate in Russian exchange-traded repos, therefore, they participate in repo trade as clients of resident brokers.

3. BANK OF RUSSIA REPO OPERATIONS

The third quarter of 2012 saw continued lending activity of the Bank of Russia in the repo market. During this period, the banking sector's repo debt to the Bank of Russia hit its all-time high. Liquidity provision by the Bank of Russia supported money market rates at acceptable levels, as RUONIA and the overnight inter-dealer repo rate did not exceed 6 percent in late July – early August of 2012 (except for two days, when RUONIA climbed slightly above this level).

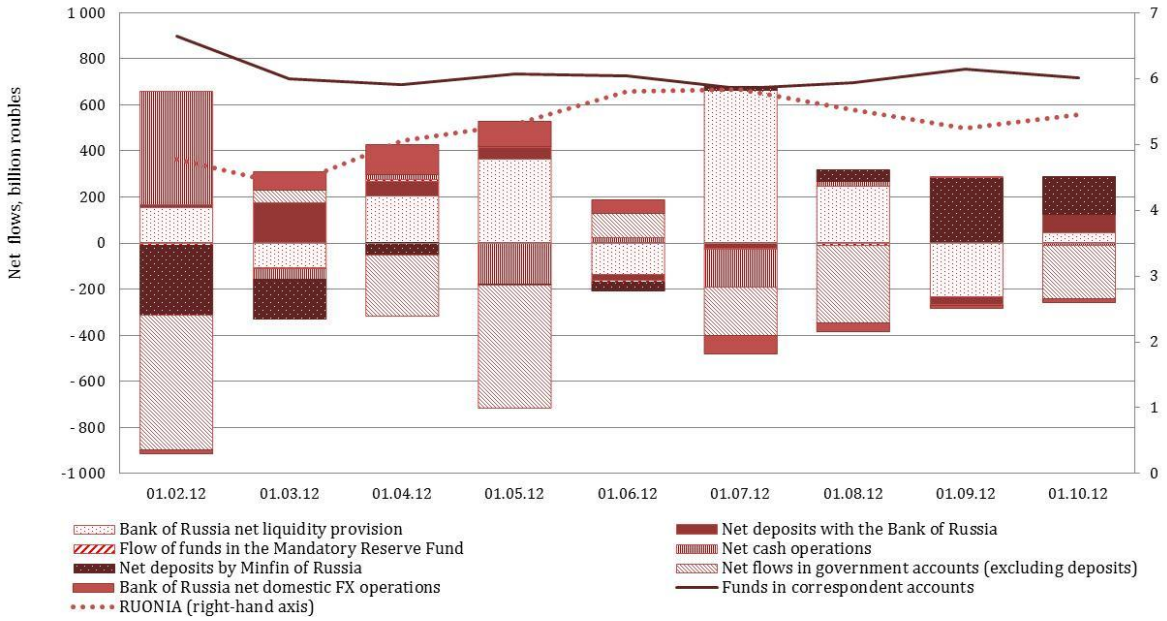
The Bank of Russia concentrated its regular repo activity in the three key segments of the inter-dealer repo market, providing overnight, 1-week and 3-month liquidity. Given that the Bank of Russia is gradually shifting to the use of 1-week repos as its primary refinancing instrument of the banking sector, the debt of credit institutions incurred under this maturity exceeded their debt under other maturities (Chart 10). Moreover, in July 2012, the Bank of Russia held a repo auction for 364 days, but the demand was relatively weak, resulting in no more than 1 billion roubles of borrowings.

Chart 10. Debt maturities under Bank of Russia repos, and average weighted rates in inter-dealer repo market versus Bank of Russia 1-week repo auction rates



The Bank of Russia's active involvement in the repo market was primarily driven by banks' dire need for refinancing, largely due to the budget accounts mopping up funds from the system (Chart 11). More detailed information about liquidity drivers and sources of liquidity shortfalls is provided in the Guidelines for the Single State Monetary Policy in 2013 and for 2014-2015 available at the Bank of Russia's official website. Looking ahead, liquidity drivers will be covered in quarterly monetary policy reports that are to replace the current Quarterly Inflation Reviews.

Chart 11. Banking liquidity drivers in 2012



In September 2012, the Bank of Russia's Board of Directors decided to raise its key policy rates, including the Bank of Russia repo rates across all the maturities currently offered. This increase was tracked by money market rates. By the end of September 2012, in the inter-dealer repo market both the overnight repo rate and RUONIA exceeded 6%. However, despite the increase in the cost of borrowing from the Bank of Russia, the banking sector continued to build up its debt to the Bank of Russia in the last ten days of September 2012, amid the earlier described banking liquidity conditions and drivers at work.

According to the Guidelines for the Single State Monetary Policy in 2013 and for 2014-2015, the banking sector refinancing in 2013-2015 will depend on which macroeconomic development scenario materialises and, therefore, which corresponding monetary programme is enacted. According to the first (pessimistic) variant of the monetary programme, the net credit to the banking sector may grow to 4.1 trillion roubles by 1 January 2014, with a further increase to 5.34 trillion roubles (as of 1 January 2015), and 5.66 trillion roubles (as of 1 January 2016). Therefore, in case of unfavourable macroeconomic development in the next three years, the Bank of Russia's involvement in repo trade may rise considerably, implying increased demand for financial instruments used to collateralise Bank of Russia operations.

4. LIQUIDITY TRANSMISSION IN THE REPO MARKET (INCLUDING BANK OF RUSSIA OPERATIONS)

This section presents the results of the liquidity transmission analysis[16] in the repo market from 2 July through 28 September 2012 (65 trading days). During the period under review, daily outstanding repo values, excluding repo futures (executed in T+N mode) and reverse repos, averaged 1,827.1 billion roubles (including Bank of Russia operations), which is 33.2 percent more than in the second quarter of 2012. The total repo value includes repos secured by all types of collateral (bonds, equity and depositary receipts).

Similar to the previous reports, the focus was on bond-secured transactions, with their share expanding to 89.4% (+2.2 percentage points, quarter on quarter) and the value rising to 1,632.6 billion roubles. The number of open positions under such transactions (number of linkages between various dealers across different maturities) averaged 831 a day (-2.3% quarter on quarter) for 243 dealers (+3.8% quarter on quarter), including both banks and non-bank financial institutions.

The third quarter of 2012 saw a change in the maturity distribution due to the Bank of Russia's active use of its 7-day repo facility. In July-September 2012, the bond-secured trade was dominated by 1-week repos, with a daily average of outstanding transactions at 1,090.3 billion roubles (+153.4% quarter on quarter). Meanwhile, the overnight segment contracted to 308.5 billion roubles (-27.3% quarter on quarter). Outstanding transactions with more than a month to maturity stayed virtually unchanged averaging 195.7 billion roubles. Overall, the share of the 1-week segment in total trade rose to 66.8%, the share of the overnight trade was 18.9%, and transactions with more than a month to maturity took 12.0% of the bond repo market.

Table 4 presents a monthly distribution of interest rates by maturity. Against the backdrop of changing macroeconomic and financial conditions, money market rates rose in the third quarter of 2012. Overall, the rates of 7-day repos (which are currently the primary refinancing tool of the Bank of Russia), were lower on average than rates for other maturities.

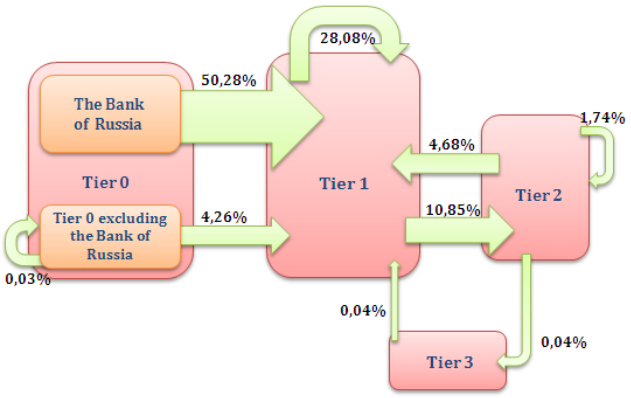
Table 4. Average weighted rates by maturity, **%**

Period	Overnight	2-6 days	7 days	8-29 days	30 days	Over 30 days
April 2012	5.57%	5.86%	5.40%	6.27%	5.85%	6.98%
May 2012	5.76%	6.09%	5.80%	6.22%	6.12%	6.97%
June 2012	5.58%	6.44%	5.34%	6.59%	10.72%	6.95%
July 2012	5.55%	6.30%	5.31%	6.52%	12.40%	6.95%
August 2012	5.64%	6.03%	5.34%	6.48%	10.40%	7.00%
September 2012	5.61%	5.99%	5.42%	6.35%	7.28%	7.11%

The third quarter of 2012 saw some changes in the market distribution among the tiers identified by their distance from the key financing sources. Over a half of overnight trade (54.5% in value terms) were conducted between tier zero (includes the Bank of Russia and primary lenders) and tier one, incorporating the largest banks, which actively leverage Bank of Russia refinancing facilities. An overall distribution of liquidity flows among the tiers is presented in Chart 12, showing shares of tier-to-tier deals in the total overnight market. The share of transactions with tier 0 declined noticeably from the second quarter of 2012, while the cash liquidity transmission flow from tier 1 to tier 2 more than doubled.

[16] See Conceptual Framework for Liquidity Transmission Analysis in the Inter-Dealer Repo Market Report for the First Quarter of 2012, p.27. For a detailed description of the analytical system and its indicators please see Моисеев С.Р., Пантина И.В., Сосюрко В.В. Анализ трансмиссии ликвидности на рынке междилерского РЕПО // Деньги и кредит, 2012. - №7. – с. 65-71.

Chart 12. Liquidity distribution in the overnight repo market, third quarter of 2012



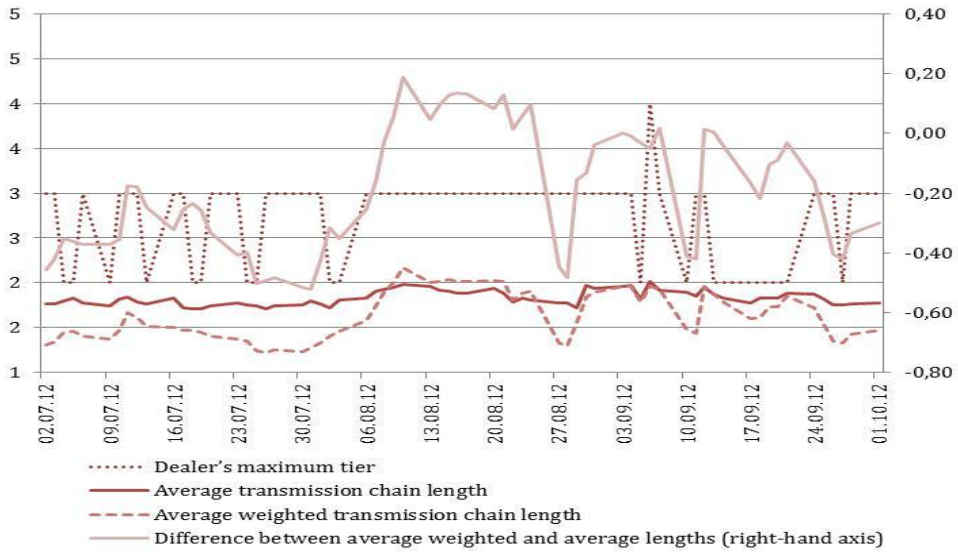
Note: The chart presents a directed graph illustrating cash flows in the repo market. The pointed arrows (graphs) show liquidity-providing operations (i.e. Bank of Russia repo transactions), while the blocks represent tiers of market participants. The directed graph shows shares of cash flows in the overnight bond segment, totalling about 309 billion roubles daily. The percentage values reflect shares of these cash flows in the total bond segment of the overnight market. The closed graph means that the trade is transacted between dealers (clients) from the same tier.

The average number of tier 0 participants fell back to 22 (including 12 banks), of tier 1 participants – to 100 (including 88 banks), and of tier 2 – to 21 (including 7 banks). The average daily number of repo market dealers declined from 188 to 144 quarter on quarter.

The average maximum length of the transmission chain marginally declined to 2.71 in the third quarter of 2012 (-1.2% quarter on quarter). In July and in September, the maximum transmission chain was as short as two liquidity transmissions in some cases, when liquidity was transferred from tier 0 to tier 2 at maximum. In most cases, liquidity was transferred sequentially from tier 0 to tier 4, indicating that the market was functioning normally. Indeed, during financial stress episodes, for example, on certain days in October-November 2011, the market shrank to three tiers (from tier 0 to tier 2), while in good times the market operates across five tiers (February 2012).

In July and in September of 2012, the average weighted length of the transmission chain was below the average length of the chain, driven by high trading volumes in lower tiers (in this case, between tier 0 and tier 1). However, its average value increased by 13.2 percent quarter on quarter, which positively affects the transmission mechanism and indicates improved liquidity in the money market. The largest improvement happened in August 2012, when the difference between the average weighted and the median lengths of the transmission chain was in the positive area suggesting an increased share of transaction numbers in the upper tiers.

Chart 13. Transmission chain length in the overnight bond segment



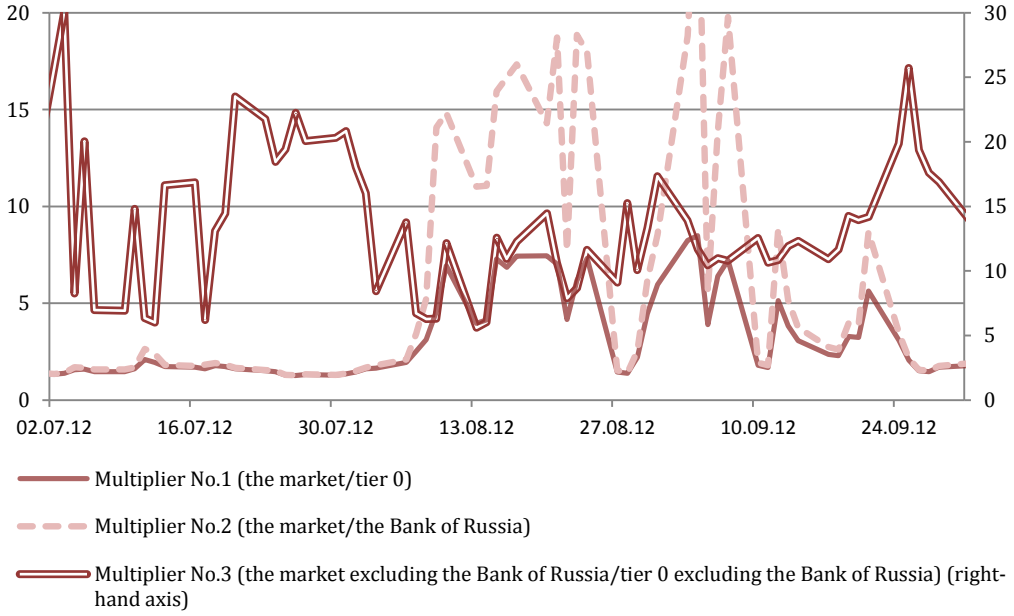
Average weighted overnight rates at each tier of liquidity distribution show the average rate, weighted by the trade value, of liquidity borrowing for this tier. In July and in August 2012, repo rates rose, while declining in September. Quarter on quarter, the average weighted overnight rates edged up from 5.55 % to 5.61%[17]. Rate fluctuations in tier 3 may be related to few trades in this tier, especially in July and in September. Reduced rates in tier 2 suggest adequate liquidity supply. Earlier, to support liquidity, banks had to borrow at high rates, exceeding the Bank of Russia fixed repo rate (6.25%).

Table 5. Average weighted overnight interest rates by tier, **%**

Period	**Tier 1**		**Tier 2**	**Tier 3**	**Total**
	Bank of Russia operations, separately	excluding Bank of Russia operations		and above	**for the overnight segment**
April 2012	5.55%	5.74%	5.72%	5.55%	**5.57%**
May 2012	5.48%	6.10%	6.35%	6.40%	**5.76%**
June 2012	5.34%	6.04%	6.25%	5.28%	**5.55%**
July 2012	5.34%	5.88%	6.00%	4.80%	**5.57%**
August 2012	5.71%	5.70%	5.73%	5.52%	**5.64%**
September 2012	5.61%	5.68%	5.73%	5.79%	**5.61%**

In August-September 2012, as the Bank of Russia was scaling down its overnight repo liquidity provision, the values of multiplier No.1 (ratio of the total market size to liquidity provided by the Bank of Russia) and No.2 (ratio of the total market size to tier 0 total trade) increased manyfold. The gap between these two multipliers suggests that the Bank of Russia contracted its share in tier 0 and was no longer the primary lender during the period under review. However, in the last week of September these multipliers declined to the values of May-July 2012. Multiplier No.3 (ratio of the total market size excluding the Bank of Russia to tier 0 size excluding the Bank of Russia), as the number of tier 0 banks and their trade declined in early and late July, exceeded 20 in early August and in late September 2012, indicating high market activity excluding Bank of Russia actions.

Chart 14. Multipliers for the overnight segment



[17] These figures show a discrepancy with the inter-dealer repo rate trend due to material influence from Bank of Russia repo operations.

In the second half of the third quarter of 2012, tier 1 banks show a sharp reduction in the intermediation ratio (net liquidity borrowings by a tier to its total trade). This suggests that the bulk of funds borrowed by tier 1 banks is transmitted to other inter-dealer repo market participants. Sberbank of Russia reduced its share in borrowings. It is a net lender with the intermediation ratio at -0.76 in August and -0.56 in September 2012. Tier 2 banks were borrowing more than lending in the overnight market in September 2012, while in August they posted a net outflow of funds with the intermediation ratio at -0.43.

Table 6. Average weighted intermediation ratios for tiers 1 and 2

Period	Tier 1			Tier 2	
	banks	Sberbank	non-banks	banks	non-banks
April 2012	0.51	-0.44	0.82	-0.83	0.54
May 2012	0.57	-0.44	0.85	0.26	0.60
June 2012	0.69	-0.12	0.78	-0.38	0.55
July 2012	0.61	0.02	0.73	0.09	0.58
August 2012	0.08	-0.74	0.75	-0.43	0.67
September 2012	0.06	-0.56	0.76	0.15	0.70

An analysis of the inter-dealer repo market transmission and a re-count of tier trade excluding Bank of Russia repos[18] indicate that the inter-dealer repo market structure remained largely unchanged compared to the previous quarter. The bulk of funds was concentrated in tier 1 (48.98% of total cash flows come from other tiers, while 38.71% falls on trade between tier 1 participants).

In the third quarter of 2012, the value of open positions in the bond overnight segment of the inter-dealer repo market averaged 153.3 billion roubles. The average number of tiers was four (with market participants belonging to tiers 0-3). The most junior tier was five. The average and the average weighted length of the transmission chain increased similarly to the Bank of Russia transmission mechanism values in the second half of August and in early September of 2012. The multiplier (ratio of total market value to tier 0 trade) similar to multiplier No.2 presented in Chart 15, increased from 2.76 in the second quarter to 3.67 in the third quarter of 2012, suggesting increased activity in the inter-dealer repo market.

[18] See Modified Liquidity Transmission Analysis in the Inter-Dealer Repo Market Report for the Second Quarter of 2012, page 19.

5. ISSUING ACTIVITY IN THE STOCK MARKET

A thick securities market is a necessary condition for repo market development. New securities issues extend the range and capacity of instruments that can secure repo transactions. Given increasing demand of credit institutions for refinancing, a larger securities market may help resolve the problem of potential shortage of marketable collateral to secure Bank of Russia refinancing. The issuing activity in the debt market is most important for supplying adequate collateral for refinancing, as debt securities traditionally dominate portfolios of Russian credit institutions, and at present they feature the lowest haircuts in Bank of Russia repo transactions.

Issuing activity data for the Russian stock market are presented in Table 7. According to FSD estimates, in the third quarter of 2012, the total issue of OFZs, municipal and corporate bonds (excluding Eurobonds) was at about 0.6 trillion roubles, with a total of 67 new debt issues registered.

The new OFZ issue is included in the Bank of Russia repo list. As regards municipal and corporate bonds, only 5 new issues were included in the repo list by the end of the third quarter[19].

Table 7. Issuing activity in the stock market in the third quarter of 2012, billion roubles

Type of security	Par value of the issue	Number of issues (auctions)
OFZ	332	1 new issue (19 auctions under 5 issues)
Municipal bonds	28	8 issues
Corporate bonds	251	58 issues
TOTAL	611	67 issues

Sources: RUSBONDS, the Bank of Russia, FSD estimates.

Note: excluding Russian Eurobond issues.

The new securities issues are already actively used in the inter-dealer repo market. Of the 67 securities issues, 37 issues were utilised to collateralise inter-dealer repos in the last two weeks of the third quarter of 2012[20]. According to FSD estimates, in the estimation period, securities of the new issues participated in 4% of all the inter-dealer repo transactions, while the value of trade secured by them accounted for 5% of the total trade in this period. The majority of transactions used the new issues of corporate bonds. Overall, about 700 securities of various issues participated in repo trade during the estimation period, with 37 new issues constituting 5% of this value.

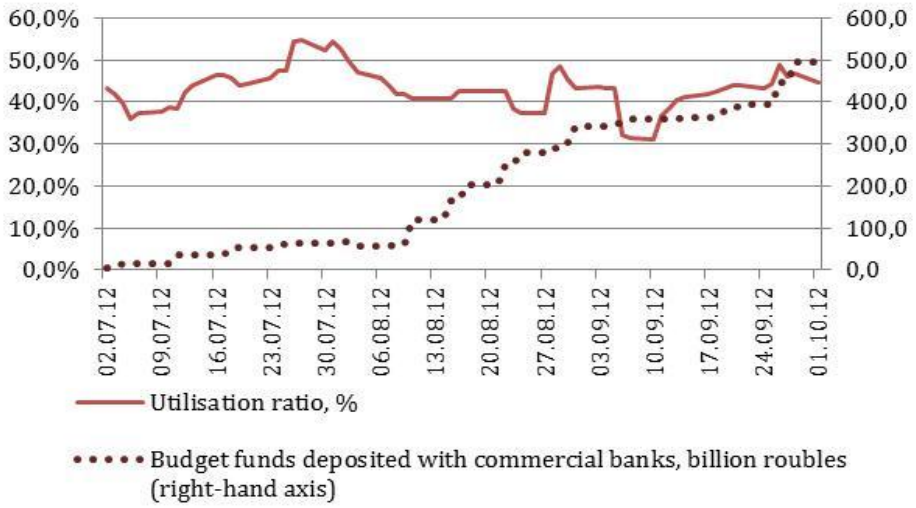
[19] A certain period of time lapses between a new issue and its inclusion in the Bank of Russia repo list. To be included, the security should be on the Bank of Russia Lombard List. Decisions to include or not are taken with regard to the security's liquidity, which can be evaluated only some time after its issue. Moreover, even if the security meets all the requirements, some time is needed for decision-making on the security's inclusion in the Lombard List and for approval of the new Lombard List.

[20] For the estimation period, the FSD selected the last two weeks of the third quarter of 2012 (from 17 through 30 September 2012). The idea was, on the one hand, to make estimates for a period when most securities under review were already issued, and, on the other hand, to have a long enough period. This approach allows the most representative estimates.

6. POTENTIAL BANK OF RUSSIA REFINANCING AGAINST MARKETABLE ASSETS

As the debt of the banking sector to the Bank of Russia remains high, the FSD keeps its focus on regular evaluations of refinancing capacity using marketable assets as collateral. For this purpose, we use the so-called "marketable collateral utilisation ratio" for repo transactions (hereinafter utilisation ratio). This measure reflects a ratio of the credit institutions' total repo debt to the Bank of Russia across all maturities to the total collateral available to credit institutions[21]. A rise in the utilisation ratio indicates that the share of securities not utilised in Bank of Russia repo operations is declining in the pool of available collateral. A high value of the utilisation ratio suggests a shortage of collateral in the banking sector, potentially leading to higher money market interest rates and bank liquidity management problems. In fact, some participants may face liquidity problems even when the utilisation ratio is significantly lower than one, due to uneven allocation of collateral.

Chart 15. Utilisation ratio (%) versus budget funds deposited with commercial banks (billion roubles) in the third quarter of 2012



Throughout the third quarter, the repo debt of credit institutions to the Bank of Russia varied from 1.0 to 1.7 trillion roubles, while the utilisation ratio was in the range of 40% to 50% (Chart 15). A growth in budget funds, deposited with commercial banks starting from mid third quarter of 2012, reduced banks' outstanding repo debt to the Bank of Russia, and, consequently, reduced the utilisation ratio. Its further decline is expected at the end of the fourth quarter of 2012 amid increased fiscal spending by the end of the year. In case of further increasing demand for refinancing and collateral becoming short, credit institutions will be able to tap other source of rouble liquidity, i.e. refinancing against non-marketable assets and warranties, and currency swaps with the Bank of Russia.

In response to increased demand for refinancing, the Bank of Russia extended its repo list of eligible collateral in the second quarter of 2012 to include equities issued by residents. However, at present, there is hardly any room left for further extending the repo list. It already includes about three fourths of securities held by Russian banks. Excluded securities largely represent non-resident bonds and resident equities (Table 8).

[21] The utilisation ratio has been derived on the basis of the value of securities held by the banks, which have at least once borrowed from the Bank of Russia via repo transactions during the first – third quarters of 2012.

Table 8. Securities held by Russian banks: portfolio composition, %

Portfolio			Share in total portfolio	
			01.07.2012	01.09.2012
Included on the repo list	Bonds	issued by Minfin of Russia	34.3%	34.0%
		by banks	8.7%	9.1%
		by regional and municipal governments	3.9%	3.4%
		by other residents	18.2%	17.2%
		by non-residents	3.3%	3.8%
	Equities	by residents	6.7%	6.4%
		by non-residents	0.0%	0.0%
	TOTAL included on the repo list		75.1%	73.9%
Excluded from the repo list	Bonds	by banks	1.2%	1.4%
		by regional and municipal governments	0.3%	0.3%
		by other residents	4.8%	3.3%
		by non-residents	10.1%	11.9%
	Equities	by residents	7.0%	7.9%
		by non-residents	1.5%	1.3%
	TOTAL excluded from the repo list		24.9%	26.1%
	Total		100.0%	100.0%

Note: calculated using custodian accounting data from reporting form 0409711 "Report on securities".

Preliminary estimates on September 2012 data suggest that the value of marketable collateral held by credit institutions (adjusted by Bank of Russia repo haircuts) expanded from the second quarter of 2012 due to increased value of debt securities included on the repo list (in June 2012, their value was estimated at 3.1 trillion roubles).

Table 9. Value of collateral held by banks as of September 2012, trillion roubles

Collateral	Free float	On banks' balance sheets	On banks' balance sheets (conservative estimate)
Debt securities	6.7	3.4	3.1
Equity securities	3.8	0.2	0.2
TOTAL	10.5	3.6	3.3

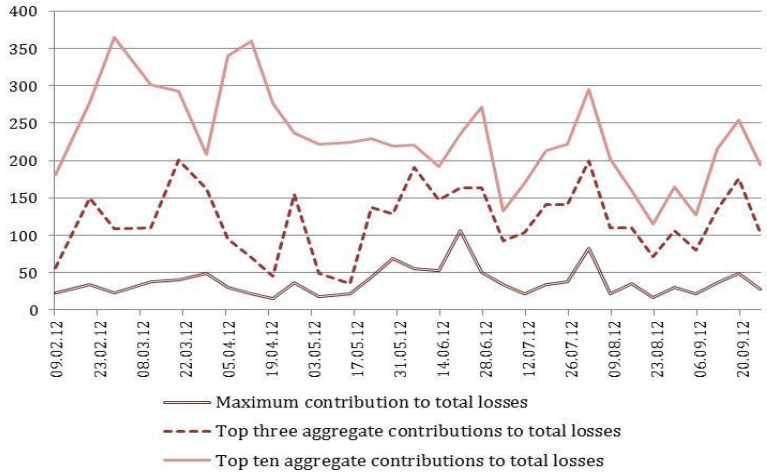
Note: the data have been calculated with regard to the Bank of Russia repo haircuts; outstanding debt securities do not include Russian Eurobonds; the conservative estimate recognises that some collateral is held by banks not engaged in repo transactions with the Bank of Russia (the observation period covers the second and the third quarter of 2012)

7. SYSTEMIC RISK AND SYSTEMIC IMPORTANCE OF THE INTER-DEALER REPO MARKET PARTICIPANTS

The FSD presents the results of its analysis using the modified Shapley Value approach[22]. This approach allows measuring systemic importance of each market participant for the financial sector and for groups of financial institutions holding similar portfolios of securities pledged in repo transactions. The Shapley Value directly assesses systemic liquidity risk and market risk via counterparty intra-market linkages as an amount in roubles that market players excluding direct counterparties are set to lose in case of each financial institution's default (see Appendix 3. Modified Shapley Value).

In the third quarter of 2012, the maximum contribution to total losses of the financial system (including both banks and non-banks, excluding losses of direct counterparties) from the leading systemically important market participant is estimated in the range of 16.5–82.3 billion roubles. As of the end of the third quarter of 2012, it stood at 27.9 billion roubles. Therefore, the total losses of the financial system caused by a default of its leading systemically important participant may amount to about 28 billion roubles within one month. The value of the "top three contributions to the total losses of the financial system" indicator was in the range between 71.2–200.1 billion roubles, reaching 103.8 billion roubles at the end of the third quarter. The value of the "top ten contributions to the total losses of the financial system" was in the range of 114.4–295 billion roubles, reaching 194.8 billion roubles by the end of the third quarter. The "top ten contributions" indicator peaked in mid-April of 2012. Following that, this systemic risk indicator tends to be on a declining trend, largely on the back of the shrinking inter-dealer repo market (since the beginning of the year), and, consequently, of weaker cross dependence of dealers on the financial position of their counterparties.

Chart 16. Shapley Value weekly dynamics in the first three quarters of 2012 (potential contributions of market participants to the total losses of the financial system if counterparties holding homogeneous securities portfolios default), billion roubles



The "top three aggregate contributions to total losses of the financial system" peaked at 201 billion roubles in the second half of March and in early April. The rise of this indicator in the third quarter suggests increased risk concentration among key repo market players. The correlation between the concentration ratio and the "top aggregate contributions to system losses" may be seen in Chart 17. It shows that the system risk decline in the third quarter of 2012 is accompanied by risk concentration of the top three contributors to system risks.

The systemically important groups of financial institutions identified show that co-existence of repo players with similar portfolios increases systemic risk. The analysis suggests that losses of systemically important coalitions average about 10 billion roubles (Chart 18).

[22] In 2012, a Nobel Prize was awarded to L. Shapley and A. Roth "for the theory of stable allocations and the practice of market design" (See Appendix 2. L. Shapley: 2012 Nobel Prize in Economics).

Chart 17. Correlation between the concentration ratio (ratio of the top three aggregate contributions to the top ten aggregate contributions to the total losses of the financial system) and the top ten aggregate contributions to the system's total losses as observed in the third quarter of 2012.

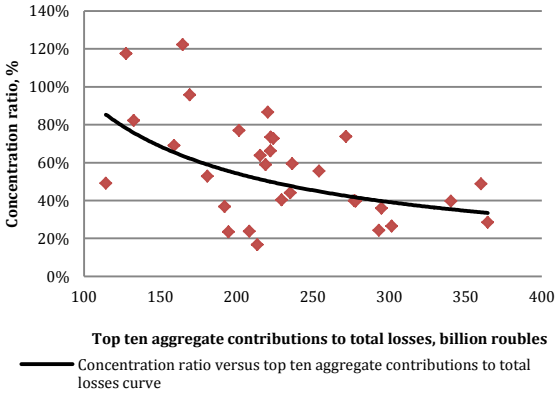
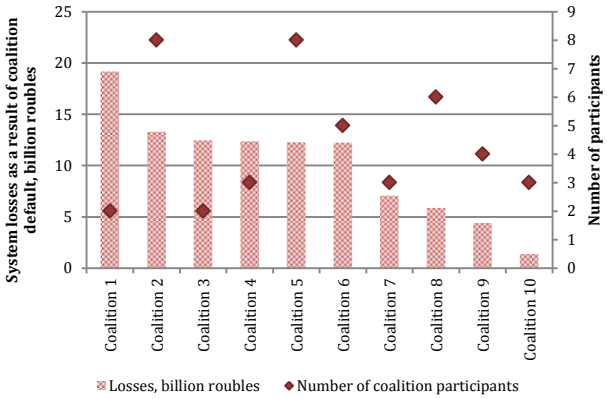


Chart 18. Distribution of losses across systemically important coalitions as of 1 October 2012



8. STRESS TESTING OF THE INTER-DEALER REPO MARKET

Stress testing of the inter-dealer repo market seeks to estimate the impact of potential stock market shocks (collapsing prices, loss of market liquidity) on the inter-dealer repo market. Stress tests address the following questions:

- Will a stock market shock trigger mass defaults in the inter-dealer repo market (a domino effect)?
- What participants or groups of participants are most vulnerable to shocks?
- What market segments (repos secured by equities, government bonds, corporate bonds, etc.) are most vulnerable to shocks?
- Are the current inter-dealer repo haircuts adequate?

Stress tests consider two stock market shock scenarios:

1) Moderate shock. This scenario simulates a stock market shock under the current (non-crisis) conditions. The size of the shock is assumed with regard to a potential drop in the securities value early in the crisis. The key purpose of running this scenario is to assess the inter-dealer repo market resilience to a stock market shock as of the last date of the period under review (i.e. with regard to the actual market situation).
2) Severe shock. This scenario simulates a stock market shock during a potential crisis. The size of the shock is assumed with regard to a potential drop in the securities value at the height of the crisis. The key purpose of running this scenario is to determine if there would be a need to change repo operations' parameters in case of a crisis.

This Report presents the results of stress testing the inter-dealer repo market as of 1 October 2012, following the previous methodology and the new upgraded methodology (see Appendix 4: Changes in the Repo Market Stress Testing Methodology).

The results of stress testing (according to the earlier methodology) show some heightening of risks in the inter-dealer repo market. Specifically, the value of defaulted transactions increased from 102.9 billion roubles to 114.3 billion roubles, with the shortage of collateral deteriorating from 6.9 billion roubles to 10.2 billion roubles (Table 10). However, the absolute values suggest that the inter-dealer repo market is broadly resilient to a one-day stock market shock.

Table 10. Comparative results of the inter-dealer repo market stress tests in the first, second and third quarters of 2012

Parameter	I quarter	II quarter	III quarter	III quarter
	Previous methodology			Revised methodology[23]
Market size, billion roubles	519.1	418.7	427.5	427.5
Number of transactions, units	8,106	7,367	7,510	7,510
Captured value of transactions, billion roubles	361.5	314.8	295.1	426.2
Captured number of transactions, units	6,561	6,214	6,050	7,479
Value of defaulted transactions, billion roubles	114	102.9	114.3	96.1
Number of defaulted transactions, units	3,898	3,928	3,788	3,436
Collateral shortage, billion roubles	8.2	6.9	10.2	6.1

[23] The results under the new methodology are provided for the moderate shock scenario.

Moderate shock scenario

An improved methodology allowed increased capturing of the value of transactions (while in the second quarter we captured 75% of trade value, and about 70% in the third quarter, the new methodology extends the capturing to over 99%).

Collateral was 6.1 billion roubles short. This moderate amount suggests that in case of a stock market shock, assuming the stock market parameters are unchanged, participants' losses would be marginal and would hardly result in a systemic crisis.

Potentially defaulting transactions (transactions where the "crisis" collateral value is lower than the liabilities under the second leg) amounted to 96 billion roubles (just under a quarter of the market in value terms, and about 45% of transactions in terms of numbers). Therefore, the cluster of potentially unexecuted transactions is quite big. Even if we assume a 9% smaller potential drop in value for each security (i.e., for example, while the previous version of the scenario assumes a 15 % drop in the value of a common share of a company, in this scenario it would be losing only 6% in its value), the volume of unexecuted transactions would still be significant at 37.6 billion roubles or 2,820 transactions. Thus, the inter-dealer repo market features a large number of transactions, mostly small-value, with inadequate haircuts.

Most vulnerable to stock market shocks are equity-secured transactions (Table 11). Over 40% of such transactions fall into the group of potential defaults. One explanation for this large figure is the high share of securities lending transactions in total equity repos. These transactions run a heightened risk of default in case of a stock market shock.

Table 11. Results of inter-dealer repo market stress testing by collateral

Collateral	Market size, billion roubles	Defaulted transactions, billion roubles	Share of defaulted transactions, %	Collateral shortage, billion roubles
Federal bonds	84.1	12.8	15.2%	0.29
Corporate, sub-federal and municipal bonds	165.4	11.3	6.8%	0.29
Equities	176.7	72.0	40.8%	5.55

The least risky were client repo transactions with non-residents as borrowers (Table 12). These repos showed a minimum share of unexecuted transactions at 17%, because participants have a high risk perception for equity repos with non-residents, and thus set higher haircuts. Transactions with non-banking financial institutions as borrowers were the most risky, in no small measure because supervision over non-banks is less rigorous, and thus these participants tend to opt for riskier strategies in the market.

Table 12. Results of inter-dealer repo market stress testing by borrower

Borrower	Market size, billion roubles	Defaulted transactions, billion roubles	Share of defaulted transactions, %	Collateral shortage, billion roubles
Banks	74.1	18.2	24.6%	1.23
Non-bank institutions	55.9	18.4	32.9%	1.02
Resident clients	123.7	31.1	25.1%	2.19
Non-resident clients	166.5	28.4	17.0%	1.70

For the overwhelming majority of banks and non-banks, the ratio of collateral shortage to own capital was under 1%. The highest reading of this ratio was 10%. Therefore, an inter-dealer repo market shock *per se* can hardly result in insolvency of market participants. The share of potential defaulters among clients is not so big either, with their borrowings totalling 4.5 billion roubles (about 1% of total borrowings in the market). Consequently, a full-scale non-payment crisis (domino effect) seems unlikely in the current conditions.

Under the severe shock scenario, the value of defaulted transactions is estimated at 246.6 billion roubles (over half of total trade), and the collateral shortage – at 26.6 billion roubles. Therefore, in case of crisis, the current haircuts in the inter-dealer repo market would be inadequate. Accordingly, if financial markets weaken, market participants should revise their haircuts upwards and scale down their market risks.

9. LEVERAGE IN REPO TRADE

The Bank of Russia gives special attention to the business models of those banks in the repo market, which increase their leverage by collateralising available financial assets. To assess their resilience to stock market risk, the FSD made estimates for a group of credit institutions that have a considerable share of securities in their assets. Moreover, to build up their securities portfolios, they mostly use repo cash loans.

During the second and the third quarter of 2012, the debt of credit institutions to the Bank of Russia expanded considerably. Normally, banks resort to the Bank of Russia's refinancing to manage their market liquidity. However, some banks borrow from the Bank of Russia to fund their securities portfolio, deriving their profit from the interest rate spread. If the stock market collapses, the assets of these banks may plummet in value, increasing risks of their default on their debt to the Bank of Russia and to other creditors.

This analysis is restricted to banks complying with two criteria:

- the value of their securities portfolio exceeded 30% of total asset value as of 1 September 2012;
- at least 30% of their securities portfolio were pledged under Bank of Russia repos (see Chart 19 and Chart 20).

Chart 19. Distribution of securities portfolio in total assets of a bank, %

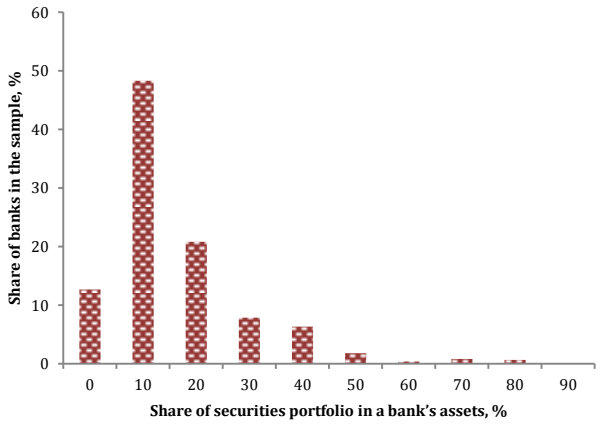
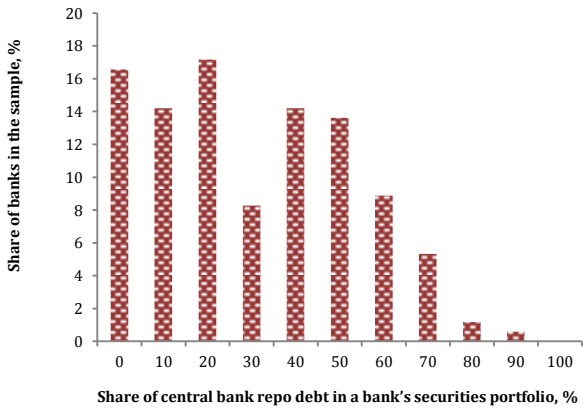


Chart 20. Distribution of central bank repo debt in securities portfolio of a bank, %



The initial sample for analysis covered 23 banks. The sampled banks account for just 1.7 percent of the total banking sector assets. For 18 banks, the share of the securities portfolio in total assets does not exceed 60%. Still another 6 banks have this share between 60 to 80%. Our sample is specific because the asset allocation between the credit portfolio and the securities portfolio is significantly different from the overall sector. While the sector on average has 70% of assets falling on loans and up to 15% on the securities portfolio, our sample has equal shares for both at 44% (Table 13).

Liabilities of the sampled banks show two specific features. Their key funding sources include corporate deposits (26.5% of the sample liabilities, and 19.6% of the total banking sector liabilities), and Bank of Russia funding (21.9% of the sample liabilities and 5.3% of the total banking sector liabilities) (Table 14).

Table 13. Asset composition of sampled banks and total banking sector, %

ASSETS	Sample	Banking sector
Highly liquid assets	4.0	2.5
Credit and other loans	44.2	70.8
Investments in securities	43.9	14.4
Accounts with the Bank of Russia	2.7	2.9
Other assets	5.1	9.4
Total assets	100.0	100.0

Table 14. Liabilities composition of sampled banks and total banking sector, %

LIABILITIES	Sample	Banking sector
Own funds	13.3	12.0
Corporate deposits	26.5	19.6
Retail deposits	18.9	28.6
Bank of Russia funds	21.9	5.3
Interbank loans	10.1	9.8
Bonds and bills	3.3	4.3
Other sources	6.0	20.4
Total liabilities	100.0	100.0

To estimate banks' susceptibility to a stock market shock, we simulated revaluation of the securities portfolio on the basis of its actual composition. The size of shocks was measured by the MICEX composite index, and by MICEX indices of corporate, municipal, and government bonds since January 2006 for the municipal bond index and since January 2003 for the other indices. We opted for stock indices of equity, federal and municipal bonds, and corporate bonds rather than for individual quotations due to the following reasons:

- low liquidity of some paper and relative difficulty of reconstructing missing values;
- a considerable stock of securities issued after 2009, when the 2008-2009 period of heightened volatility was over.

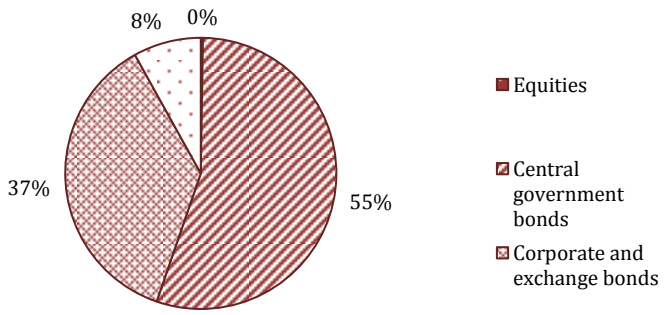
We used VaR as stock market risk factors – readings of stock market indices for a one-week, one-month and one-quarter period of time at 1% of significance. The shock parameters by groups of instruments are presented in Table 15.

Table 15. Negative revaluation of securities portfolios
(post-shock readings of portfolio value indices, in percentiles)

Shock duration	Shock parameters			
	Equities	Government bonds	Municipal bonds	Corporate bonds
week	0.86	0.97	0.97	0.99
month	0.74	0.93	0.94	0.97
quarter	0.59	0.88	0.90	0.96

The overall portfolio value is mostly affected by OFZ price fluctuations. OFZs showed the highest negative revaluation across this type of paper, while this instrument prevails in the portfolios of sampled banks (Chart 21).

Chart 21. Aggregate repo portfolio of sampled banks



Our estimates suggest that a week-long shock may weaken the financial health of three banks, a month-long shock – of five banks, and a quarter-long shock – of seven banks. A stock market shock may bring down the capital adequacy ratio (N1) of these banks under 10%. However, the simulated losses are just estimates, because when exposed to these shocks banks can muster a timely response by cutting their stock investments and revising their asset structure.

If the turbulence (declining bond prices, first of all) persists for two and more consecutive days, i.e. the negative securities revaluation amounts to 7% for equities, 2% for government and municipal bonds, and 0.6% for corporate bonds, then defaults of two banks under the second part of the central bank repos may result in 25.6 billion roubles in losses, or 1.8% of the total banking sector indebtedness to the Bank of Russia.

However, each of the tested banks meet liquidity adequacy tests in case of an adverse scenario described in Table 16. The values of the N2 and N3 instant and current liquidity ratios, estimated with regard to potentially increased haircuts, never drop below the regulatory requirements of 15% and 50%, respectively. In other words, margin calls are no significant threat to the surveyed banks.

Moreover, banks with a sizeable amount of leverage supported by Bank of Russia repo operations, specifically, subsidiaries of foreign banks, show strong resilience to stock market shocks and margin calls.

To sum up, we may conclude that:

- the analysed business model (securities transactions financed via borrowings under repo operations with the Bank of Russia) is not used on a wide scale;
- default contagion in the inter-dealer repo market will be limited, given that the Bank of Russia is the primary lender of the surveyed banks.

10. NEW REGULATORY AND INFRASTRUCTURAL MECHANISMS FOR THE REPO MARKET[24]

At present, the National Settlement Depository in cooperation with the Bank of Russia is launching OTC tri-party basket repos. The project envisages that banks would be able to make repos with the Bank of Russia not against individual securities issues, but against a basket of securities, making it easier for the front office. These operations are expected to start in the first quarter of 2013[25].

The National Settlement Depository will provide collateral management services for tri-party basket repos: automatic collateral selection, collateral replacement and revaluation of liabilities.

Tri-party repos, essentially, assume that collateral management functions are delegated to a third party – a collateral management agent. Therefore, a tri-party repo allows considerable increases in repo volumes without increasing the workload for the back office. It also allows efficient use of security replacement possibilities for portfolio management purposes, as well as modern risk management techniques without extra labour and IT costs.

Further on, the National Securities Market Association (NSMA) is currently revising and upgrading the Indicative Terms for Repo Contracts in the Russian Financial Market (hereinafter – Indicative Terms). This document was developed by the NSMA in line with the Federal Law on the Securities Market and coordinated with the Federal Financial Markets Service in October 2011. The legislation prescribes that the use of close-out netting[26] requires that the general repo agreement made by the parties should be consistent with the Indicative Terms. If requested by a financial market participant, the NSMA may provide its opinion on a General Repo Agreement's compliance with the requirements set forth in the Indicative Terms. It is also noteworthy that the NSMA has developed a standard General Repo Agreement in line with the Indicative Terms.

The revised version of the Indicative Terms will take into account lessons learned during the practical application of this document. Further amendments are proposed with regard to the development of repo instruments and the use of new mechanisms, including basket repos, replacement of repo collateral and collateral management services provided by agents.

[24] With regard to the growing importance of the repo market, the third quarter was positively highlighted by the establishment of a Council of Treasurers with the National Securities Market Association (see Appendix 6. Establishment of the NSMA Council of Treasurers).

[25] Repo market risks and respective regulatory measures get a lot of international attention (see Appendix 5. Financial Stability Board efforts to analyse securities lending and repos).

[26] The close-out netting is described in the Inter-Dealer Repo Market Report for the second quarter of 2012.

Appendix 1

Bank of Canada: Financial Stability of the Repo Market and Central Bank Capacity

In June 2012, the Bank of Canada published a paper by Hajime Tomura assessing financial fragility in the repo market[27]. The paper presents a model of an over-the-counter bond repo market. The model looks at the behaviour of two types of players: cash investors (suppliers of cash) who get their margin as the difference between the buying and the subsequent selling price of the bond, and dealers (suppliers of securities), who are market makers in the repo market.

The model simulates non-stationary equilibrium when cash investors stop transacting with dealers all at once, causing aggregate liquidity shortage in the inter-dealer repo market. Dealers run short of cash to repurchase bonds from cash investors who entered in repos with them before. These cash investors sell their bonds to other cash investors in search of market liquidity. As a result, the repo market collapses despite the quality of the collateral, i.e. even a repo market with safe long-term bonds as collateral can collapse[28].

Discussing policy options to stabilise the repo market, the author investigates the use of central bank loan facilities. The model shows that a central bank facility for lending cash to dealers like the Primary Dealer Credit Facility, launched by the Federal Reserve in March 2008, can support repo market stability. Alternatively, the central bank can prevent a repo market collapse by committing to a bond purchase within a certain range of prices in the inter-dealer market.

Given the existence of multiple equilibria in the repo market, the Bank of Canada leaves open the question regarding the optimal bond market design, such as whether to introduce a centralised bond dealer market or a decentralised set-up with investors trading bilaterally[29]. The empirical implications of the model are yet to be tested, according to the author. One of the implications of the study is that increasing sales of securities in a brokered bond market may signal problems in the inter-dealer repo market.

[27] Tomura H. On the Existence and Fragility of Repo Markets / Bank of Canada working paper 2012-17, June 2012.
[28] A similar situation was observable in the US repo market in the run up to the Bear Stearn bankruptcy in March 2008. Its important feature was that most pledged bonds in the market were long-term and safe, e.g. US treasuries.
[29] In this respect, this study is related to the work by Miao (Miao J. A Search Model of Centralised and Decentralised Trade // Review of Economic Dynamics, 2006. – No.9. – pp. 68-92), where the author describes how liquidity suppliers make their choice between the de-centralised bond market with investors trading directly with each other, and the centralised bond market with trade intermediated by dealers.

Appendix 2

L. Shapley: Nobel Prize in Economics for 2012

15 October 2012, the Royal Swedish Academy of Sciences awarded the 2012 Nobel Prize in Economic Sciences to Lloyd Shapley and Alvin Roth "for the theory of stable allocations and the practice of market design".

Lloyd Stowell Shapley, an American economist, was born on 2 June 1923, in Cambridge, Massachusetts. During the war he served in the US Air Force. After the war, he earned a bachelor's degree from Harvard, and a PhD from Princeton. Since 1981 he has been a professor at the University of California.

The theory of stable allocations looks into how best to allocate scarce resources among users. Mathematical algorithms were applied to real life situations, e.g., matching doctors to hospitals, students to schools and kidney donors to patients. L. Shapley used the co-operative game theory principle of finding stable matches between players where no one would have a more suitable partner other than their current partners. Apart from that, L. Shapley is the author of the Shapley Value – a solution concept for optimal distribution where the benefits reaped by each participant in a game equal their mean contribution to the well-being of the total coalition.

L.Shapley's works in co-operative game theory:

- Lloyd S. Shapley. Solutions of Compound Simple Games// Advances in Game Theory, Princeton University Press, 1964. – pp. 267-305.
- Lloyd S. Shapley. Some Topics in Two-Person Games// Advances in Game Theory, Princeton University Press, 1964. – pp. 1-28.
- Guillermo Owen and Lloyd S. Shapley. Optimal Location of Candidates in Ideological Space// International Journal of Game Theory 18, 1989. - pp. 339-356.
- Dov Monderer, Dov Samet and Lloyd S. Shapley. Weighted Values and the Core// International Journal of Game Theory 21, 1992. – pp. 27-39.

Appendix 3

Modified Shapley Value

Starting from the third quarter of 2012, the FSD has switched to a modified Shapley Value approach. The new approach will allow assessment of systemic significance of financial institutions assuming two types of scenarios, i.e., individual defaults and collective defaults of financial institutions with homogeneous portfolios of securities pledged as collateral for repos. This new method to identify systemically important players will give a full picture of potential risks in the inter-dealer repo market. From now on, the upgraded Shapley Value estimation will involve three frameworks.

The first framework will help estimate potential losses of the financial sector for each financial institution if the individual default scenario materialises. The individual default scenario means a default of an individual institution and the subsequent domino effect, caused by the counterparties' inability to meet their obligations. The FSD estimates that the domino effect may take from one to five rounds.

The second framework will serve to estimate potential losses of the financial sector for each financial institution if the individual default scenario materialises, less losses incurred by direct counterparties of the initial defaulter. In other words, the sought-for losses will be calculated as sector losses caused by the domino effect excluding losses incurred during the first round. An aggregate value for all the financial institutions will be the modified Shapley Value. This approach allows measuring the domino effect systemic risk caused by an individual financial institution's default (excluding its total liabilities) as aggregate losses of market participants with no relations to the original defaulter.

The third framework will allow estimation of potential losses of the sector caused by a default of a coalition of financial institutions. A coalition here means a group of market participants with similar portfolio compositions. This approach will classify each repo market participant into a group of financial institutions with similar portfolio structures. It should be noted that players may belong to several coalitions simultaneously. Portfolio value correlations are used as a measure of portfolio similarity.

Ultimately, the Shapley Value, estimated by any of the three methods, describes the degree of a financial institution's systemic importance for the overall sector. Under each of the three frameworks, the value is calculated for each institution, to be further used as a basis for ranking market participants. Systemic importance of a financial institution is a function of not only the number of its interconnections in the market (number of counterparties), and of the total value of its market position, but also of the overall structure of linkages in the market. Moreover, under the third framework, the financial institution will be considerably affected by the structure and volatility of its portfolio value, and by the number of players in its coalition.

Appendix 4

Changes in Stress Testing Methodology for the Inter-Dealer Repo Market

To improve the quality of inter-dealer repo market stress testing, the methodology was somewhat modified compared to the methodology used in the Reports for the first and for the second quarters.

The methodology changes were driven by the following key motives:

1. Increased share of Minfin bonds issued after the crisis of 2008 used as collateral in repo transactions. As the previous calculation of CVAR estimates for these securities (these estimates were used in simulations of the "crisis" fall in bonds' prices) did not cover the crisis period, therefore, the resulting CVARs for this group of securities were underestimated.
2. The stress-testing methodology used in the Reports for the first and for the second quarters assumed a one-time stock market shock, i.e. without an ex-ante deterioration in the financial system. However, at present we do not observe any crisis in stock markets, therefore, it would not be quite appropriate to assume a full-scale stock market crisis in the near future (not preceded by declining financial markets).
3. Extended list of issues analysed following stress tests (allocation of losses across market segments, across categories of participants, etc.).

To take care of the above, the stress testing methodology was revised as follows:

1. A "crisis" shock was redefined:
- for corporate, regional and municipal bonds, CVAR-based estimates were used, as previously;
- for central government bonds, aggregate estimates derived on the basis of the crisis drop of 2008 were used, with estimates varying depending on bond duration;
- for equities, aggregate estimates derived on the basis of the crisis drop of 2008 were used depending on their liquidity; four groups of equities are identified, with each of the groups having its own potential price drop threshold.

2. A supplementary scenario was added.
   The revised stress testing methodology simulated two scenarios: a moderate stock market shock scenario that can potentially materialise in the present situation, and a severe shock scenario, which is more consistent with the height of the market crisis.
3. Credit risk parameters were added.
   While in the previous version of stress testing, the final point of analysis was the value and number of potentially defaulted transactions, the new version introduced bankruptcy criteria for individual participants; this allowed explicit inclusion of credit risk parameters in the stress testing methodology.
4. The range of issues under consideration was extended.

Financial insolvency criteria for various types of participants:

1. probability of default for clients and non-resident clients depends on the share of potentially defaulted transactions in total trade, and on the ratio of aggregate shortage of collateral to total borrowings;
2. probability of default for banks and non-banks depends on the ratio of potentially defaulted transactions to own capital, and on the ratio of aggregate shortage of collateral to own capital.

Appendix 5

Financial Stability Board efforts to analyse securities lending and repo risks

In line with the G20 Cannes Summit in November 2011 decision, to strengthen regulation and oversight of shadow banking, the Financial Stability Board set up a Task Force (TF) to address issues pertaining to securities lending and repos. The TF was tasked with developing respective recommendations by the end of 2012. A review of market and regulatory practices conducted by the TF revealed specific features of securities lending and repos, financial stability risks, and informed preliminary recommendations by the TF[30].

Key drivers behind the growth of securities lending and repo markets:

1. Demand for inter-dealer repos as an alternative to central bank funding and other market instruments to manage short-term liquidity;
2. Secured financing of lending (the repo market as an important source of one-day to 12-month (and beyond) borrowings by banks);
3. Leveraged funding of investments and short sales;
4. Collateral mining by banks and brokers-dealers (borrowing and swaps of securities to use as collateral for own transactions);
5. Increased rates of return achieved by investors lending securities, and by credit agents.

Uses of securities in the shadow banking system:

1. Borrowings in repo markets to create leverage and to transform maturities and liquidity;
2. Impact of the use of funds borrowed by a hedge fund on maturity transformation and creation of leverage;
3. Creation of a chain of transactions when cash generated in short sales is used to secure securities borrowings (normally money market funds) and to be further reinvested by creditors in longer-term assets (these transactions may be highly risky);
4. Collateral exchange (collateral swap, collateral downgrades/upgrades), i.e. high-grade securities lending collateralised by low-grade securities.

Regulation of the securities lending and repo markets includes requirements for:

1. financial intermediaries (banks and brokers-dealers);
2. investors (investment funds and insurance companies): counterparty credit risk (restrictions, limits on counterparty transactions); liquidity risk (limits on maturities); collateral requirements (minimum haircuts, eligible collateral, restrictions on the re-use of collateral, reinvestment of cash collateral);
3. disclosure requirements.

Financial stability risks: inadequate transparency; procyclicality of system leverage; re-use of collateral; intermediary risks; reinvestment of cash collateral; ineffective collateral revaluation and management.

Tentative policy recommendations:

1. to enhance transparency (collection of macro- and micro-level market data; disclosure by companies and financial reporting by financial institutions; disclosure by agent lenders to clients);
2. structural measures (augmented supply of money-like instruments; restrictions on activities; centralised clearing);
3. regulatory measures (minimum haircuts; regulation of securities lending and/or agent lenders, including cash collateral reinvestment; requirements for re-hypothecation of securities; minimum standards for collateral revaluation and management).

[30] Appendix 5 sets forth the key points of the Financial Stability Board Report on Policy Measures for Addressing Shadow Banking Risks arising from Securities Lending and Repos// Financial Stability Board – 3 October 2012.

Appendix 6

Establishment of the NSMA Council of Treasurers

Last quarter, an important event in the Russian repo market was the establishment of a Council of Treasurers with the National Securities Market Association, a self-regulatory organisation (NSMA; http://www.nfa.ru). The Association includes about 250 professional participants in the Russian stock market – mostly credit institutions. The most high-profile NSMA projects include the Russian Repo Council, accreditation of nationally recognised rating agencies, development of a standard general repo agreement, etc.

The Council of Treasurers was established to monitor corporate treasury issues that may arise in the course of financial institutions' operations, and to address these issues in cooperation with regulatory authorities. On an on-going basis, the Council will discuss current operational and development issues of treasury departments in banks, financial companies, and groups; will facilitate problem solving; will shape expert opinion of the professional community about money market issues, etc. The Council will include heads of treasury departments of Russian banks and financial institutions, who will be nominated by the Council's chairman and co-opted by the Council's decision. Organisational and technical support to the Council will be provided by the NSMA's Executive Directorate.

The recent meetings of the Council of Treasurers were chaired by the Council chairman A.S. Khavin (National Clearing Centre – NCC) and K.A. Volkov (NSMA). The meetings were joined by officials from the leading repo market participants, including Gazprombank, VEB, Troika Dialog, VTB24, Deutsche Bank, Metallinvestbank, Citibank, Ellips Bank and others. The Bank of Russia was represented by Deputy Chairman S.A. Shvetsov, and by the heads of the Market Operations Department and the Financial Stability Department.

The first meeting of banks and investment companies focused on organisational issues, including the Council's tasks, statute, candidates, etc. The meeting also discussed prospective areas of the Council's activity aimed at solving pressing corporate treasury issues, including liquidity, money market, refinancing issues, and the development of the repo market, its instruments and technologies.

The Bank of Russia sees the Council as a public forum for exchanging views, informing market participants about Bank of Russia novations and policies, and for coordinating efforts to improve the effectiveness of money market operations. The Council's work program till mid-2013 focuses the efforts of treasury heads on the following: infrastructure projects (NSD's Price Centre, CCP, repository), technical support to liquidity management, refinancing issues, development of interest rate money market indicators, measures to stimulate the long-term repo market, open repos, development of instruments to hedge against rouble interest rates, close-out netting issues and other important money market aspects.

GENERAL CONCEPTS

Basic terms – framework conditions to conclude and execute repo transactions.

Intraday repo – repo transactions with both legs executed within one trading day. Repo maturity is assumed as one day.

Volatility – a quantitative measure of variation in economic variables.

Outstanding repo transaction – a repo transaction with the start leg of the transaction executed and the close leg unexecuted because the term for the close leg has not expired yet.

Dealer – a party (counterparty) to a repo transaction acting either on its own behalf and account or on behalf and for account of clients.

Haircut – a percentage variable reflecting correlation between the value of the collateral and the value of liabilities discounted by the repo rate.

Duration – the average weighted time until the redemption of a financial asset (asset portfolio); calculated as a weighted sum total of the asset (asset portfolio) maturities, where the weights are the present values of the shares of respective payments in the total present value of the asset (asset portfolio).

Margin call – a payment required by the buyer from its repo counterparty (the seller) as a partial prepayment under the close leg of the repo transaction if the market value of the collateral drops below the required level.

Credit rating – an expert assessment by a rating agency of the borrower's (issuer's) ability and willingness to meet their financial obligations fully and in time.

Yield curve – a graphic interpretation of the relationship between the yield and the term to maturity of a debt obligation.

Accumulated income under a repo transaction – an estimated value in roubles used to calculate liabilities under a repo transaction.

Collateral (for the purposes of this Report) – securities traded under a repo transaction. Undelying repo collateral shall not include bonds to be redeemed through the execution date of the close leg of the repo transaction, as well as bonds of different issues.

Residual liabilities – liabilities of repo counterparties incurred as a result of a non-executed or unduly executed close leg of a repo transaction. Residual liabilities shall be settled with regard to the basic terms.

Lender (for the purposes of this Report) – a party (counterparty), who is buying a financial asset under the start leg of a repo transaction and is selling the financial asset under its close leg.

Borrower (for the purposes of this Report) – a party (counterparty), who is selling a financial asset under the start leg of a repo transaction and is buying the financial asset under its close leg.

Bank of Russia interest rate band – a framework of short-term borrowing and lending interest rates of the central bank aimed at limiting the volatility in money market rates.

Repo – a two-way transaction to sell (buy) a financial asset (the start leg of a repo) with a commitment to buy (sell) back the same issue and the same amount of the asset (the close leg of the repo) on a date and for a price specified in the terms and conditions of the repo contract.

Repo maturity – a time period in calendar days between the dates of execution of the start and of the close legs of the repo transaction. The repo maturity is calculated starting from the date following the date of execution of the start leg through the date of execution of the close leg.

Repurchase price – an amount the seller has to pay to the buyer under the close leg of the repo transaction.

Refund under a repo transaction – an amount payable by the seller to the buyer as of the date of the reverse purchase (sale) of the financial asset under the close leg of the repo transaction.

GENERAL MARKET CHARACTERISTICS

Number of participants – number of counterparties (dealers and brokers) in the repo market; includes all the counterparties with open repo positions as of the reporting date. All counterparties engaged in repos and reverse repos, secured by any type of collateral, are included.

Number of open positions – number of open positions between counterparties as of the reporting date. All the one-way transactions of the same maturity made by two participants are aggregated into one position. Then, the number of such positions in the system is derived.

Funds provided by the Bank of Russia – an amount of accumulated positions of market participants under their repo transactions with the Bank of Russia as of the reporting date.

REPO TRADE STRUCTURE BY COLLATERAL

Repo market size, total – total accumulated positions of the repo market participants (repo value outstanding) as of the reporting date. The amount is calculated as a sum total of all the open positions as of the reporting date across all the instruments and all the maturities. The calculation includes short-sale transactions (securities lending).

Debt repo market size – total accumulated positions of the repo market participants (repo value outstanding) as of the reporting date. The amount is calculated as a sum total of all the open positions as of the reporting date under bond repo transactions of any maturity. The calculation excludes short-sale transactions (securities lending).

*Sizes of repo markets secured by equities (*shares*)* and *by other securities (*depository receipts*)* are calculated in a similar way.

Debt repo market share – a percentage ratio of the bond repo market size to the total market.

*Shares of the equity (*shares*) repo market* and *of the other securities (*depository receipts*) repo market* are calculated in a similar way.

Overnight segment size – total accumulated positions of the repo market participants (repo value outstanding) as of the reporting date. The amount is calculated as a sum total of all the open overnight (1 day) positions as of the reporting date. The calculation excludes securities lending (reverse repo) and repos secured by equities and depository receipts.

Values of *2-to-6-day, one-week, 8-to-29-day, one-month and over 30 days* repo segments are calculated in a similar way.

Overnight repo segment share in total market size, % – ratio of the overnight bond repo market size to the total market size, in %.

Shares of *2-to-6-day, one-week, 8-to-29-day, one-month and over 30 days* repo segments are calculated in a similar way.

TRANSMISSION MECHANISM CHARACTERISTICS

These indicators shall be derived for bond-secured transactions. The calculation excludes short-selling trade (securities lending). The overnight segment is estimated separately.

Maximum length of transmission chain – the maximum number of consecutive liquidity provision transactions from the zero to the last tier of liquidity distribution. It is identified as the highest number of liquidity distribution tiers.

Average length of transmission chain – an average number of consecutive liquidity provision transactions (liquidity transmission), including client transactions of one single broker. It is determined as an average value of the tier number weighted by the number of open positions of this tier's participants.

Average weighted length of transmission chain – an average number of consecutive liquidity provision transactions (liquidity transmission) with regard to trade values. It is determined as an average value of the tier's number weighted by the outstanding value of open positions of this tier's participants.

Repo market multiplier No.1 (the market/tier zero) – a ratio of overnight positions to the total cash provided by tier zero of liquidity distribution; calculated for the "repo amount outstanding" field.

Repo market multiplier No.2 (the market/the Bank of Russia) – a ratio of overnight positions to total cash borrowed from the Bank of Russia; calculated for the "repo amount outstanding" field.

Repo market multiplier No.3 (the market excluding the Bank of Russia/tier zero excluding the Bank of Russia) – a ratio of overnight positions, excluding borrowings from the Bank of Russia, to total cash provided by tier zero, excluding borrowings from the Bank of Russia; calculated for the "repo amount outstanding" field.

Number of tier i participants (banks) – number of credit institutions (dealers and brokers) in the repo market, attributed to tier i.

Number of tier i participants (non-banks) – number of counterparties (dealers and brokers) attributed to tier i of the repo market, which are not credit institutions.

AVERAGE WEIGHTED INTEREST RATES

Average weighted interest rate for tier i – a ratio of the product of the repo amount outstanding and the interest rate to the repo amount outstanding, for lending transactions of tier i of liquidity distribution.

Average weighted interest rate for tier zero (Bank of Russia operations separately) – a ratio of the product of the repo amount outstanding and the interest rate to the repo amount outstanding, for Bank of Russia lending operations.

Average weighted interest rate for tier zero (excluding Bank of Russia operations) – a ratio of the product of the repo amount outstanding and the interest rate to the repo amount outstanding, for lending transactions by other than the Bank of Russia participants.

Average weighted interest rate, total for the market – a ratio of the product of the repo amount outstanding and the interest rate to the repo amount outstanding, for all overnight transactions.

BORROWING AND LENDING VOLUMES ACROSS ALL THE LIQUIDITY DISTRIBUTION TIERS

Tier i borrowings (banks) – amount of funds borrowed in repo transactions by tier i credit institutions; determined for the "repo value outstanding" field.

Tier i borrowings (non-banks) – amount of funds borrowed in repo transactions by tier i financial institutions, which are not credit institutions (banks); determined for the "repo value outstanding" field.

Lending by tier i (banks) – amount of funds provided in repo transactions by tier i credit institutions; determined for the "repo value outstanding" field.

Lending by tier i (non-banks) – amount of funds provided in repo transactions by tier i financial institutions, which are not credit institutions; determined for the "repo value outstanding" field.

Share of funds lingering at tier i (banks) – a ratio of the difference between borrowed and provided funds to total borrowings by tier i credit institutions.

Share of funds lingering at tier i (non-banks) – a ratio of the difference between borrowed and provided funds to total borrowings by tier i non-bank financial institutions.

Intermediation ratio (banks) – an absolute value of the ratio of the net position (difference between borrowings and loans) of the participants (credit institutions) to the total trade of credit institutions.

Intermediation ratio (non-banks) – an absolute value of the ratio of the net position (difference between borrowings and loans) of the participants (non-credit institutions) to the total trade of non-bank participants.

FORWARD TRANSACTIONS

Number of forward transactions – number of "future" transactions with the open leg to be settled after the reporting date.

Forward market size, billion roubles – a sum total of accumulated forward positions of repo market participants.

Average weighted maturity of forward transactions, billion roubles – average maturity weighted by initial values for all forward transactions.