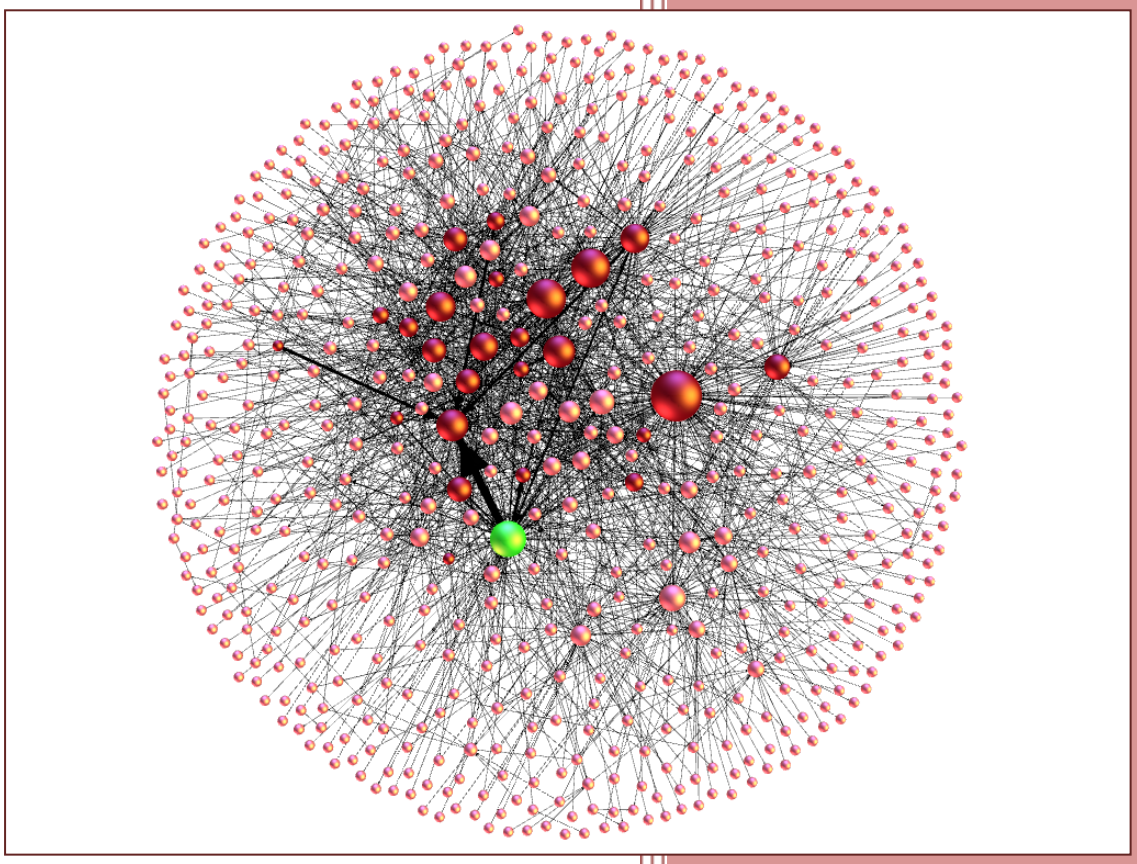
Quarter 3, 2013

Money Market Review



The Central Bank of the Russian Federation

(Bank of Russia)

This Review is prepared by the Bank of Russia Financial Stability Department in cooperation with the Monetary Policy Department

The statistics used in the Review and methodological comments are published on the Bank of Russia website under Financial Stability

http://www.cbr.ru/analytics/?Prtid=fin_stab

Comments and suggestions on the Review's structure and contents are welcome at: reports@cbr.ru.

If using information from this Review,
reference to the Bank of Russia is obligatory.

Contents

List of Charts

List of Tables

Purpose of the Money Market Review

In this Review, the money market includes the interbank lending market, the FX swap market, and the interdealer repo market. The focus is somewhat more on the repo market due to its cross-sectoral nature and the bulk of Bank of Russia liquidity provision operations concentrated in this market. The Bank of Russia is committed to promoting money market development to achieve the following:

- A stable environment for liquidity redistribution, i.e. with acceptable volatility of short-term interest rates and smoother changes in transaction values;
- Equal access to liquidity for market participants;
- Counterparty default risk minimised through sound collateral management;
- A balanced development of various market segments, specifically, a full-fledged segment beyond overnight maturity;
- A favourable environment for the development of the CCP-cleared market.

The importance of money market monitoring is underpinned by the following:

- The money market plays a key role in banking intermediation, which provides for on-going conversion of short-term borrowings into long-term loans to the economy; its uninterrupted functioning enables banks to refinance their liabilities continuously and efficiently use their capital to provide funding to the economy;
- The money market is the first to come under pressure in case of a financial turmoil, therefore, its parameters may serve as early warning indicators;
- The money market is crucial in intragroup operations of financial groups and conglomerates, which require close attention under consolidated supervision;
- The money market, in its interdealer repo and swap segments, may concentrate financial sector systemic risks, because its players include not only banks but also non-bank professional securities market participants;
- Money market trends are a good indication of liquidity conditions in the banking system;
- Potential disruption of the money market and panic sales of collateral would significantly push up the cost of market funding and make it more difficult for non-financial entities to access it;
- Money market conditions affect the central bank's capacity to manage banking sector liquidity and short-term interest rates.

In view of the money market's importance for financial stability, the Bank of Russia Financial Stability Department (FSD) issues **regular quarterly reviews** of its developments and the level of systemic risk.

The ultimate purpose of this publication is to facilitate financial stability by minimising systemic liquidity risks via enhancing money market transparency. A better awareness of the market structure and trends will allow market participants to improve their perception and assessment of their own risks. Moreover, the Bank of Russia seeks to communicate to market participants potential collective implications of their individual investment decisions in case of domino effects that are not quite fully addressed in market risk assessments.

The Review, rather than being a Bank of Russia official publication, is a research paper focused on the analysis of market developments in the period under review. The latest reported data are given as of the last business day of the quarter, while potential material events after the reporting date are excluded from the analysis. The Review is available in Russian and English on the Bank of Russia official website.

Summary

- Throughout the third quarter of 2013, banks' demand for Bank of Russia funding continued on a rising trend. In this environment, the money market's[1] outstanding volume reached its all-time high, largely on the back of FX swaps.
- Rising demand for liquidity was followed by increased marketable assets utilisation ratio, given that banks' demand for liquidity grows faster than their holdings of securities accepted by the Bank of Russia as eligible collateral. In the third quarter of 2013, the utilisation ratio for marketable assets was increasing against the backdrop of a persisting upward trend in money market interest rates.
- The Bank of Russia launched a new auction-based refinancing facility secured by non-marketable assets, which helped ease marketable collateral encumbrance and boost money market growth potential. Further measures aimed at expanding free marketable collateral on banks' balance sheets may be related to extended use of refinancing facilities secured by non-marketable assets.
- Market risks in the interdealer repo market stay at acceptable levels due to largely adequate haircuts. The share of transactions with inadequate haircuts was on a declining trend throughout the third quarter, indicating the resilience of the money market to market risk. However, the market still preserves a segment of deals with haircuts significantly exceeding market levels, which may potentially motivate lenders to default on the second leg.
- The interdealer repo market's potential vulnerability remains the presence of some non-bank financial institutions, which, on the one hand, are excessively leveraged, and, on the other hand, are not adequately transparent in their risk management practices and appropriation of losses incurred in client trade.
- In the third quarter, the money market saw intensified risk concentration on systemically important participants, as revealed by network analysis. A potential "domino effect" in the interbank lending market may result, first of all, from low capital adequacy of a number of banks.

[1] Unless otherwise specified, the money market excludes Bank of Russia operations.

1.1. Money market conditions

Money market trade volumes reached their all-time highs in the third quarter of 2013 (Chart 1). Daily repo debt of banks to the Bank of Russia also increased to an unprecedented level of 2.56 trillion roubles. These developments were caused by the banks' increasing recourse to central bank funding. In the next quarter, liquidity conditions are likely to stay largely unchanged. Banks' demand for liquidity absorbed via the FX and budget channels will be intensifying, and by the end of the year money market trade volumes and borrowings from the Bank of Russia are likely to hit their new all-time highs again.

Against the backdrop of Bank of Russia's domestic sales of FX, money market volumes increased in the third quarter, largely on the back of increased swap business (Chart 1). This segment expanded its share from 50% in early 2013 to 60% by the end of the quarter[2]. Interbank lending and repo volumes stayed roughly unchanged throughout the year, at 400–500 billion roubles and 300–400 billion roubles, respectively. In the medium term, if banks continue building up their debt under Bank of Russia refinancing operations (for more details see Section 2.3. of the Review), market participants may be expected to further increase their trade in the swap market and their borrowings against non-marketable assets.

Chart 1. Money market trade volumes, billions of roubles

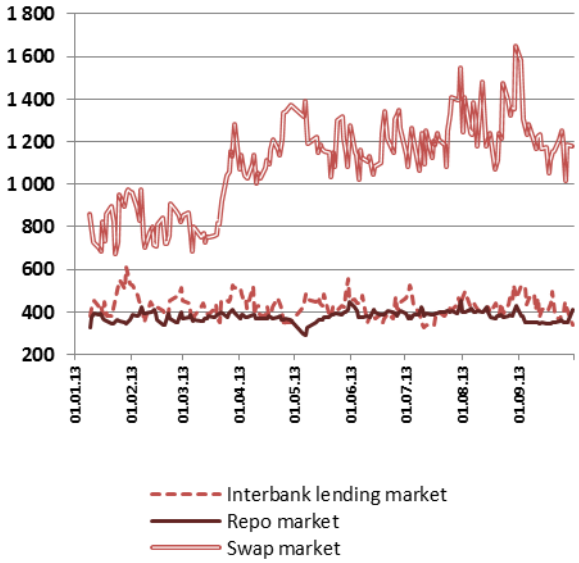
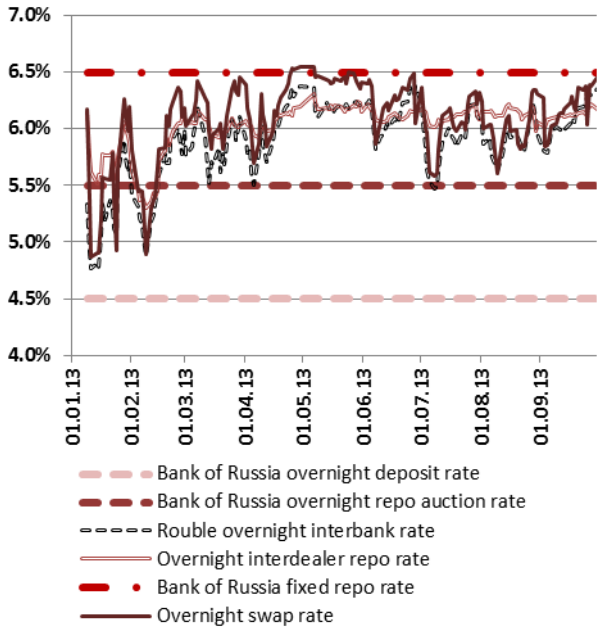


Chart 2. Money market overnight rates

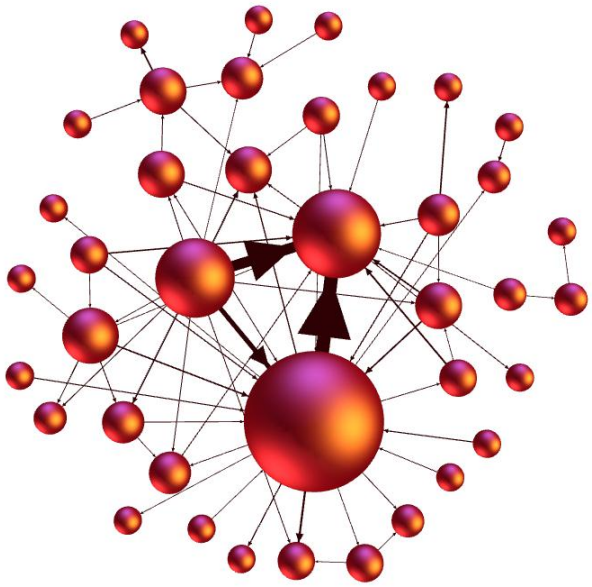


[2] This version of the Review interprets money market trade volumes as the value of open positions in the market (coverage restricted to maturities within one week), while the previous versions meant market turnovers. In this context, shares of money market segments given in this and in the previous versions will not be comparable.

Money market interest rates stayed within the Bank of Russia interest rate corridor during the period under review, coming closer to its upper bound by the end of the quarter. However, the average level of rates turned out to be lower in the third quarter than in the previous period (Chart 2).

Similarly to previous quarters, participants' trade volumes and activity in the money market varied considerably, with quite a few smaller participants alongside several large participants with high volumes of transactions (Chart 3).

Chart 3. Money market participants' positions



Note: The Chart presents a directed graph illustrating liquidity flows in the money market. The pointed arrows (graphs) show liquidity provision operations, while the nodes represent market participants. The directed graph shows cash flows above 4 billion roubles. The thickness of the arrow is proportionate to the participant's position vis-à-vis a specific counterparty.

Chart 4. Collateral breakdown for Bank of Russia repos

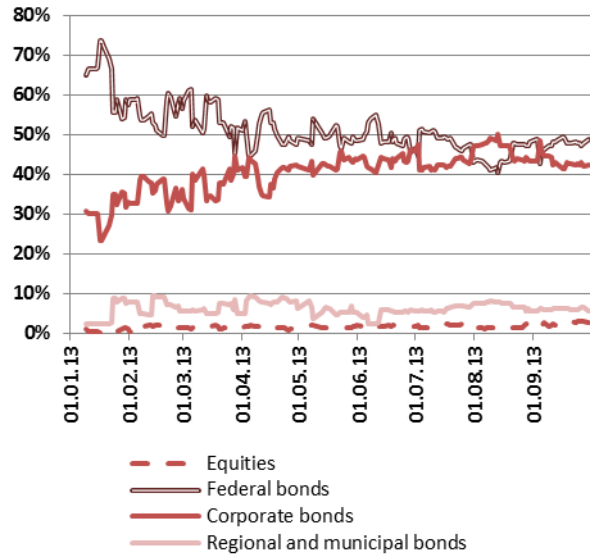
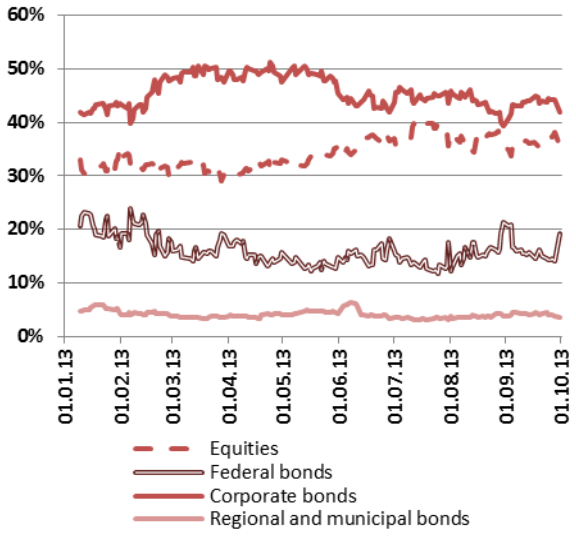


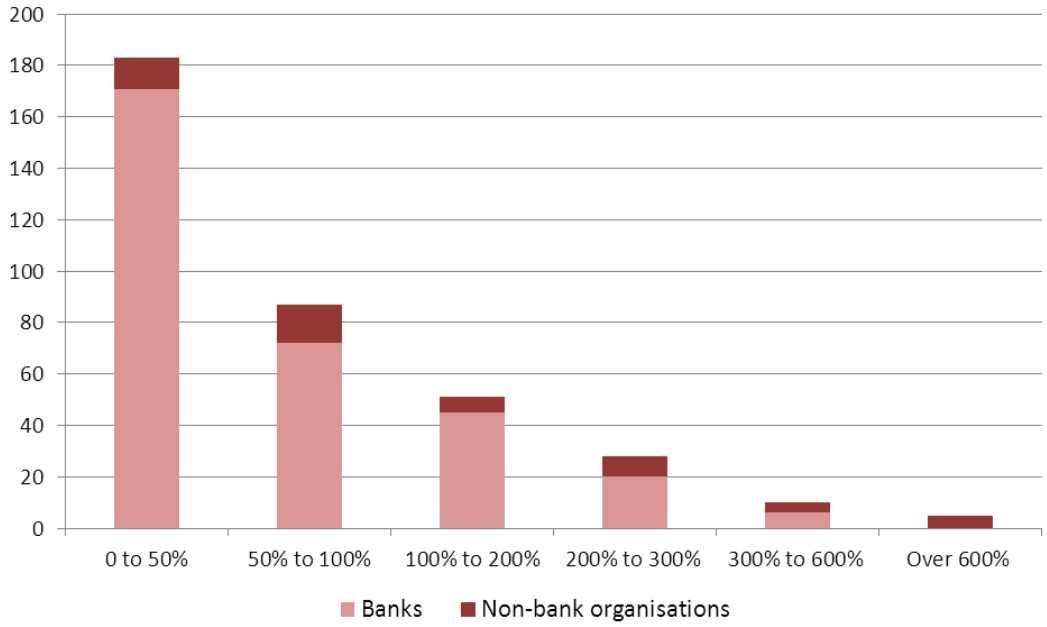
Chart 5. Collateral breakdown for interdealer repos



In the third quarter of 2013, the interdealer repo market saw no ***mass defaults***. Over the period under review, only a few client deals for a total of less than 400 million roubles were unexecuted.

At present, no factors are observable in the interdealer repo market that could lead to mass defaults. ***Margin requirements*** during periods of heightened volatility of the securities market do not pose a systemic threat (they did not exceed 250 million roubles a day in the third quarter).

Chart 6. Distribution of market participants by leverage



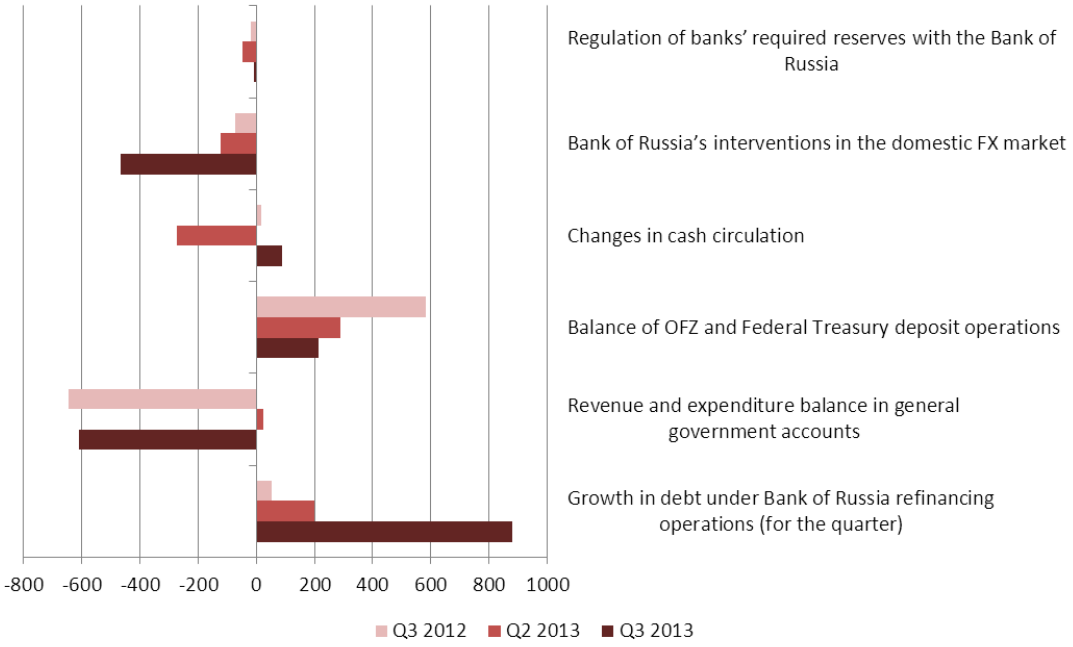
The key concern is ***high leverage in the market***. A significant group of professional securities' market participants have their interdealer repo debt exceeding their own funds 30 and more times. Meanwhile, banks' money market borrowings normally do not exceed their capital more than three times (Chart 6).

Such high leverage shown by financial companies may result in defaults if the global and domestic macroeconomic conditions deteriorate significantly. Specifically, the Bank of Russia estimates that in case of tumbling stock markets some of these participants would not be able to honour their obligations. However, the current situation does not pose systemic risks given that highly leveraged participants show modest volumes of trade. Moreover, as the supervision of non-bank organisations strengthens, the share of such participants will be shrinking.

1.2. Banking sector liquidity

In the third quarter of 2013, money market conditions were driven by significant absorption of banking sector liquidity via autonomous factors, first of all, domestic FX interventions of the Bank of Russia and government cash flows (Chart 7).

Chart 7. Liquidity drivers and debt expansion under Bank of Russia refinancing operations, billions of roubles



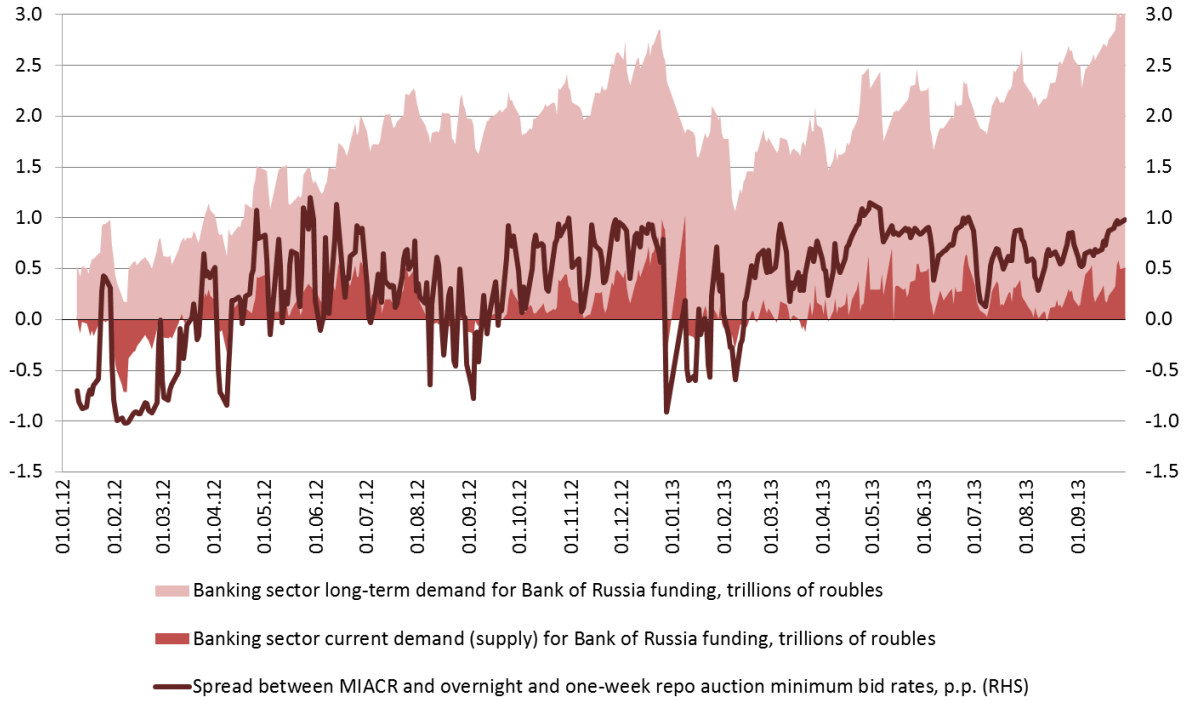
In the third quarter of 2013, the Bank of Russia was selling foreign exchange in the domestic market seeking to limit rouble exchange rate volatility, as part of its exchange rate policy. As a result, it absorbed 467.9 billion roubles (the highest reading since the first quarter of 2009).

In July–September 2013, liquidity absorption via the government channel increased substantially. The general government revenue exceeding its expenditure[3] resulted in 637.9 billion roubles absorbed compared with the largely neutral impact of budget cash flows in the previous quarter. Overall, the nine months of 2013 do not evidence smoother spending of budget funds compared with the same period last year. While the government channel had a modest effect on banking sector liquidity in January–April 2013, the key reason for that was declining budget revenues in that period.

The Federal Treasury continued depositing government cash balances with credit institutions, offsetting budget channel absorption. The average deposit liabilities stood at 657.8 billion roubles in the third quarter. Net liquidity injection to the banking sector via this channel amounted to 274.5 billion roubles compared with 353.8 billion roubles in the second quarter.

[3] Excluding OFZ transactions and changes in Federal Treasury and Russian Pension Fund deposits.

Chart 8. Liquidity demand and money market rates



In July–September 2013, banking sector liquidity was also significantly affected by the Pension Fund of Russia depositing its resources with credit institutions. These liabilities exceeded 200 billion roubles by the end of the quarter (with net cash inflows at 35 billion roubles). These operations also helped temper the squeezing impact of budget factors on banking sector liquidity.

Federal government debt operations had a modest impact on banking sector liquidity in the third quarter of 2013: OFZ issue stayed unchanged from the previous quarter at 168 billion roubles, while OFZ amortisation of 107.2 billion roubles was much higher than in April–June 2013.

In July–September 2013, changes in cash circulation did not have any material effect on banking sector liquidity due to seasonal factors and the overall medium-term slowdown of demand for cash. In the third quarter, this channel provided 87 billion roubles to the banking sector (versus absorption of 274.2 billion roubles in the second quarter).

Given minor changes in averaged required reserves, banks' demand for correspondent accounts with the Bank of Russia stayed unchanged from the previous quarter, with no effect on banking liquidity.

Bank of Russia short-term auction-based repos remained the key instrument for covering the gap between liquidity demand and supply. The outstanding debt under these transactions averaged 2.1 trillion roubles (with 1.8 trillion roubles falling on one-week repo auctions), while peaking at 2.5 trillion roubles in the third quarter. Longer-term auction-based repos stayed in little demand with credit institutions.

FX swaps with the Bank of Russia remained uneven, with the most significant liquidity injections via this instrument falling on periods of large payments to the budget. In the third quarter of 2013, the value of these transactions averaged 60.3 billion roubles on the days when the deals were made (versus 97.6 billion roubles in the second quarter).

The average outstanding debt of the banking sector under fixed-rate loans secured by non-marketable assets or guarantees contracted to 82.1 billion roubles in the third quarter (versus 169.9 billion roubles in the second quarter of 2013). The key reason behind this contraction was a new 12-month floating rate refinancing facility secured by non-marketable assets or guarantees (banks borrowed 306.8 billion roubles).

1.3. Quantitative impact of the 12-month auction on money market conditions

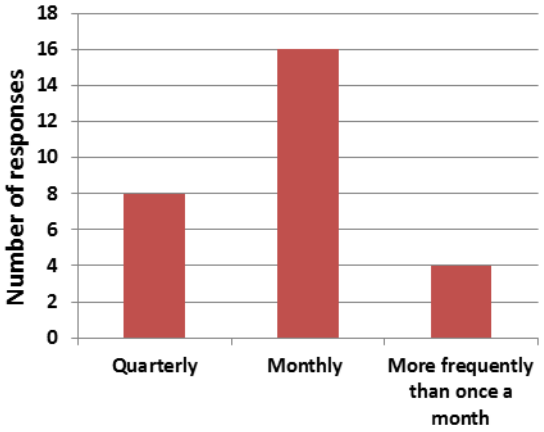
To free some marketable collateral pledged under Bank of Russia refinancing operations, and enhance the efficiency of the interbank lending market, the Bank of Russia launched an auction for longer-term funds in late July, in line with Regulation No. 312-P. The auction was secured by non-marketable collateral and guarantees, which allowed reducing the share of securities used in Bank of Russia operations. Further on, the Bank of Russia adjusted the facility's parameters and held a second auction in October 2013. Both auctions (in July and October 2013) provided over 830 billion roubles to banks (about one-third of the maximum repo exposure). Looking ahead, the Bank of Russia plans to continue using these instruments, which will help significantly reduce the share of encumbered securities in the market.

The first auction was held on 29 July 2013, with funds provided for 12 months at a minimum bid rate of 5.75% (versus 5.5% for one-week repo auctions). Credit institutions borrowed about 306 billion roubles of the total allotment of 500 billion roubles. A survey of bidders following the auction revealed the following key reasons behind this under-subscription:

- The tenor of 12 months is too long, many participants preferred to secure required funding for shorter terms, e.g. for 3 months;
- Uncertainty about the timing of the next auctions; market participants were concerned that they may be unable to roll over their loans under this facility because they were not sure that there would be further such auctions in the future;
- Low periodicity of the auctions; market participants indicated their wish to have such auctions on a monthly basis (Chart 9);
- A relatively high rate of 5.75% versus 5.5% for the one-week repo auction; however, this twenty-five-p.p. spread between the rates designates a longer repo tenor;
- Suboptimal timing of the auctions within the year given that market participants' liquidity needs peak in the fourth quarter.

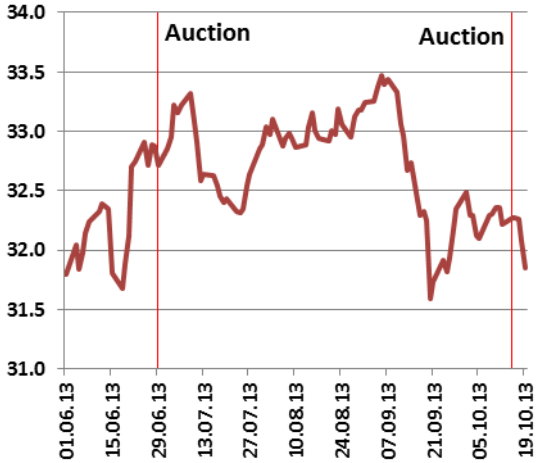
Some banks' proposals were accommodated when the second auction was launched in October 2013. Specifically, it was decided to hold three-month auctions on a quarterly basis, while the other proposals were dismissed by the Bank of Russia as impractical.

Chart 9. Optimal periodicity of auctions (based on a survey of credit institutions)*



*Respondents could choose several options at

Chart 10. Rouble exchange rate, RUB/US$



The second auction was held on 14 October 2013, with funds provided for 3 months at a minimum bid rate of 5.75%. During this auction, credit institutions took the whole allotment of 500 billion roubles. The auction eased banks' demand for refinancing against marketable assets, specifically, their repo debt to the Bank of Russia went down from 2.3 trillion roubles to 1.9 trillion roubles. It should be also noted that despite some analysis projecting the auctions to weaken the rouble, no such depreciation happened (Chart 10).

Overall, these auctions held under Regulation No. 312-P helped considerably reduce the share of encumbered securities in the banking system, lengthen central bank maturities and ensure more even liquidity allocation among market participants.

1.4. Assessment of the banking sector's "loss function" in the interbank lending market

The third quarter of 2013 saw structural changes in the Bank of Russia interest rate toolkit. The Bank of Russia Board of Directors decided to unify the maximum auction-based one-week deposit rate and the minimum auction-based one-week liquidity provision rate. The resulting single liquidity absorption and provision rate was called the key policy rate.

Strategically, this new key policy rate makes a transparent monetary policy benchmark, while operationally it acts as a benchmark for short-term borrowings by money market participants. Therefore, the key policy rate may anchor money market interest rates, and, looking

ahead, given a favourable environment, it may become an operational target for the Bank of Russia interest rate policy.

While analysing money market rates stability and assessing central bank interest rate policy, a general approach would be to compare actual money market rates with the key policy rate. The closer actual money market rates are to the key policy rate, the less volatile and the more predictable they tend to be for market participants. This would not only ensure stable interest rates in short-tenor markets (overnight, one-week), but also would reduce tenor premiums, flatten yield curves and enhance the efficiency of monetary transmission.

The effectiveness of central bank operations in the money market may be assessed by several approaches. The approach used by Norges Bank [4] seems interesting. To assess the efficiency of interest rate policy, Norges Bank uses the so-called "loss function"[5], which increases in line with the growth in money market trade at rates significantly deviating from the key policy rate. The economic meaning of the "loss function" is to measure opportunity costs incurred by the banking sector when banks have to secure funding at rates different from the key policy rate. The "loss function" may be decomposed into two components.

The first component captures deviation of money market interest rates from the aggregate market index (e.g. RUONIA), i.e. reflects the scale of market heterogeneity and interest rate risk at an individual level. The second component measures deviation of the aggregate market index from the key policy rate, reflecting, therefore, interest rate risk at a systemic level.

Therefore, the "loss function" may be dissected into an idiosyncratic (first) component and a systemic (second) component. A sum total of both components will be an aggregate measure of opportunity costs of banks incurred in their money market trade.

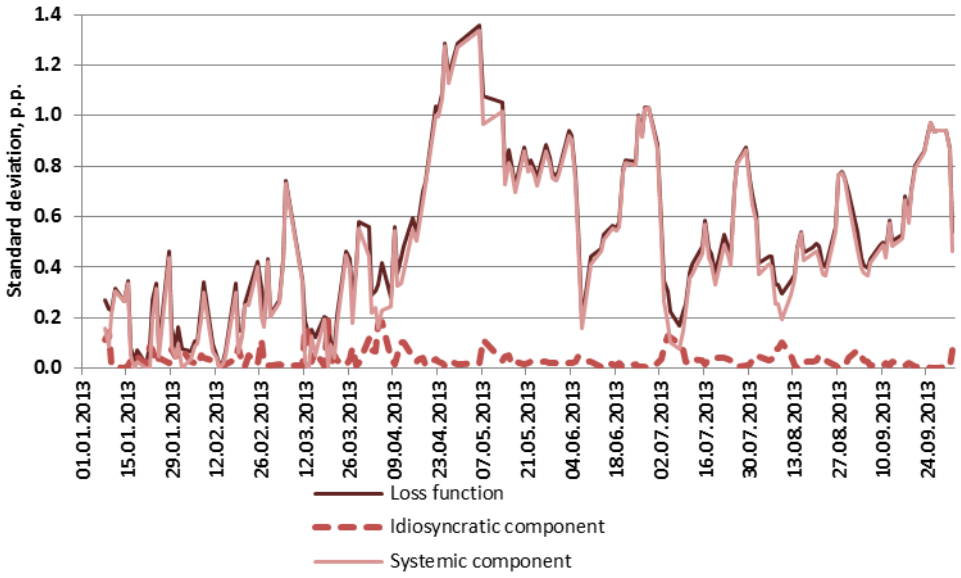
Unlike advanced money markets, the Russian market shows quite a high value of the "loss function" and its volatility over time[6] (Chart 11). While the Norwegian banking sector does not have the "loss function" exceeding 20 basis points in normal times, in the Russian banking sector, the "loss function" averages 50 basis points, sometimes shooting to 100 basis points and beyond. In 2013, the "loss function" increased substantially in early second quarter, while in the third quarter its value stayed moderate, but relatively volatile.

[4] Akram Q.F., Christophersen C. Norwegian overnight interbank rates. Staff Memo, #1, – 2011 – Norges Bank.

[5] The "loss function" is expressed as a quadratic function of a standard deviation of money market interest rates from the key policy rate, weighted by values of respective transactions.

[6] For comparative analysis purposes, the minimum rate for the Bank of Russia one-week auction-based repos was assumed as the key policy rate from 01.01.2013 to 15.09.2013.

Chart 11. The loss function and its components



At the same time, it should be noted that these two components do not contribute equally to the "loss function". The first component is extremely small compared with the second component, which practically coincides with the "loss function's" value and pattern. This suggests that money market rate risks prevail at the systemic level, and are related to across-the-board rate rises in the money market.

2. ALLOCATION OF CASH FLOWS AND MARKETABLE ASSETS

2.1. Allocation of liquidity in the money market (liquidity transmission)

This section discusses transmission[7] of domestic currency via short-term (1 to 7 days) money market transactions among groups of market participants called tiers. A money market tier represents a pool of liquidity flowing through participants of one group. The tiers, starting from tier one, are lined up sequentially depending on participants' ease of access to the funding facilities of the Bank of Russia and other primary lenders, which together make up tier zero. The analysis was based on interdealer (money market participants) trade data, and on participants' transactions with the Bank of Russia covering a period from 1 July to 30 September 2013, which included 66 trading days.

In the third quarter of 2013, the overall allocation of rouble cash flows among the tiers (Chart 12), defined by their ease of access to primary liquidity sources, showed increased prevalence of repos with the Bank of Russia. The share of Bank of Russia repos in the total money market trade grew from 37.7% to 45.1%. In this period, tier one participants accumulated 84% of total market liquidity, redistributing some of these funds to other market participants at higher rates. Tier two participants, which took up 14.6% of the money market, followed a similar pattern.

In the third quarter of 2013, the weighted average length of the transmission chain (number of consecutive liquidity provision operations with regard to their value) was shorter than the average length of the chain (number of consecutive liquidity provision operations with regard to their number), due to a high share of lower-tier trade (in this case, between tier zero and tier one). The weighted average length of the transmission chain stayed virtually unchanged through the quarter at 1.51. The difference between the weighted average and the average lengths of the transmission chain hovered around −0,08.

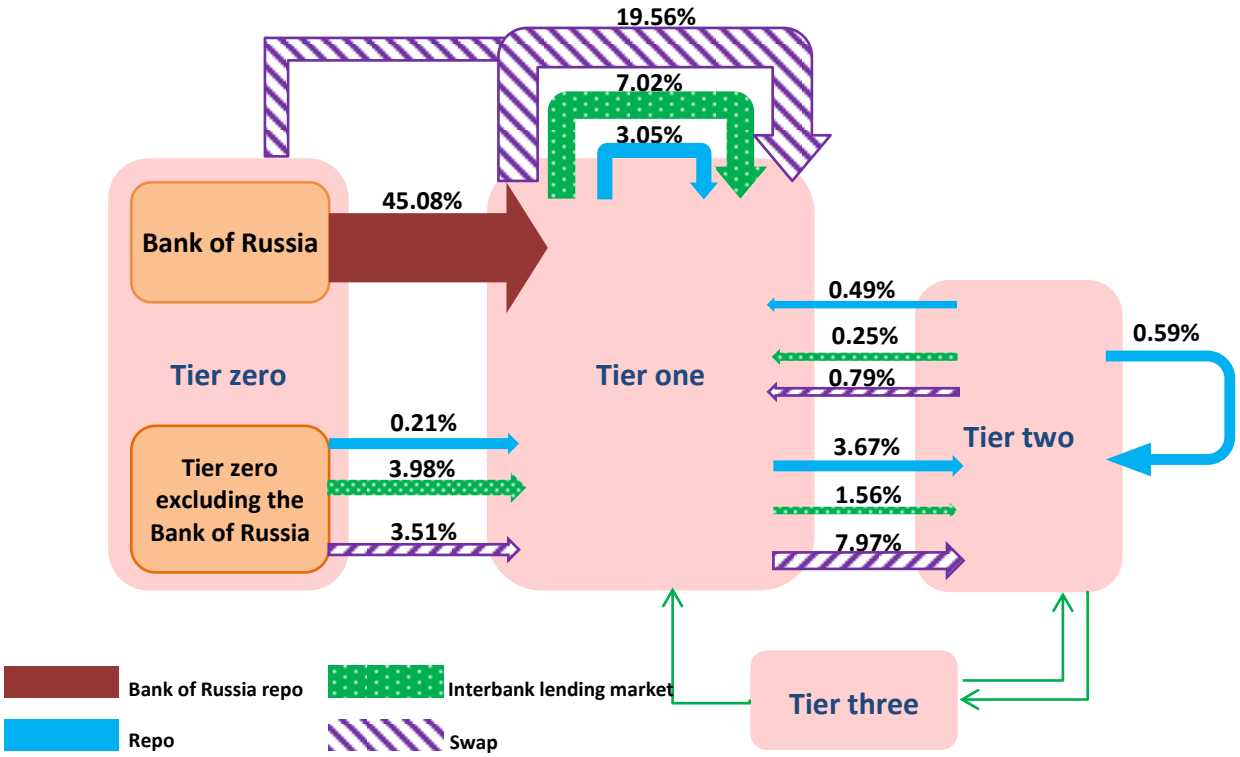
The average volume of borrowings by tier two and tier three participants was declining throughout the quarter compared with borrowings by tier one participants[8].

[7] See Conceptual Framework for Liquidity Transmission Analysis in the Interdealer Repo Market Report for the Ist Quarter of 2012, page 26. A more detailed description of the analytical framework and its measures may be found in S.R. Moiseev, I.V. Pantina and V.V. Sosyurko, Analysis of Liquidity Transmission in the Interdealer Repo Market// Dengi i Credit, 2012, №7, pp. 65-71.

[8] Average borrowings by tier one stood at 3,553.2 billion roubles in July, 4,249.0 in August, and 4,084.3 in September. Tier two borrowed 662.5 billion roubles in July, 734.6 in August and 578.1 in September. Tier three took 39.1 billion roubles in July, 62.6 in August and 36.9 in September.

Overall, the market structure looked robust in the third quarter. However, the analysis reveals a small decline in intermediation activity and a respective growth in liquidity hoarded by participants of lower tiers.

Chart 12. Liquidity allocation in the 1 to 7 days money market segment in the third quarter of 2013



Rouble liquidity flows in the one to 7 days money market segment: red arrows stand for Bank of Russia repos, blue arrows represent interdealer repos and green arrows show interbank lending market trade; violet shading refers to FX swaps.

Note: The scheme presents a directed graph illustrating cash flows in the one to 7 days money market. The pointed arrows (graphs) show rouble liquidity provision operations, while the blocks represent tiers of market participants. The percentage values reflect shares of these cash flows in the total money market outstanding value, which amounts to about 4,508.6 billion roubles per day. The directed graph captures only those cash flows that exceed 1% of this amount. The closed arrows mean that the trade is transacted between counterparties belonging to the same tier.

2.2. Issuing activity in the stock market and its impact on the size of the Bank of Russia Lombard List

A deep securities market is a necessary condition for the development of one money market segment, i.e. the repo market. New securities issues extend the range and capacity of instruments that can secure transactions. Given high banking sector demand for liquidity, an expanded securities market helps ease a potential shortage of marketable collateral to secure Bank of Russia funding. The issuing activity in the debt securities market plays the most important role for supplying adequate collateral to secure refinancing, as bonds traditionally dominate portfolios of Russian credit institutions. Moreover, they get the lowest haircuts in Bank of Russia repo transactions.

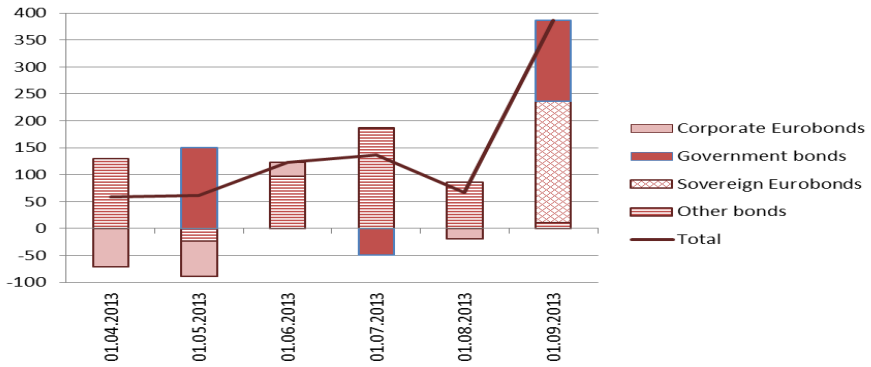
Table 1. Issuing activity in the stock market in II and III quarters of 2013, billions of roubles

Type of securities	Issue volume, billions of roubles	
	II quarter 2013	III quarter 2013
OFZs	173	168
Municipal bonds	57	50
Corporate bonds	363	359
Total, domestic market	**593**	**577**
Corporate Eurobonds	538	178
Sovereign Eurobonds	-	227
Total	**1,131**	**982**

Sources: Minfin, RUSBONDS, FSD estimates.

FSD estimates (Table 1) show that in the second and in the third quarters the total issue of OFZs, municipal and corporate bonds (excluding Eurobonds) was about 0.6 trillion roubles per quarter (1.2 trillion roubles for both quarters). Overall, domestic issuing activity stays the same as it was in the first quarter (in that period, also 0.6 trillion roubles were issued). Moreover, the second and the third quarters also saw some fairly significant issuance of international debt. In the second quarter, corporate Eurobonds' issue of 0.5 trillion roubles exceeded domestic corporate issue. Large volumes of international debt issue continued into the third quarter due to Minfin Eurobonds (0.4 trillion roubles).

Chart 13. Bank of Russia Lombard List: net inclusion of debt securities by group, II and III quarters of 2013, billions of roubles



Note: negative values signify contracting shares of respective classes of securities on the Lombard List (due to amortisation).

The continued robust supply of new issues helped expand the Lombard List in the second and third quarters of 2013 (Chart 13). In just two quarters, the net inclusion of securities in the Lombard List (i.e. inclusion net of securities excluded from the List) amounted to 0.8 trillion roubles (excluding Eurobonds, the net inclusion will be 0.7 trillion roubles). This amount is roughly consistent with the rise in credit institutions' repo debt to the Bank of Russia (it stood at 1.6 trillion roubles at the beginning of the second quarter, while increasing to 2.4 trillion roubles by the end of the third – the beginning of the fourth quarter). Given that not all the new issues are purchased by domestic credit institutions, the above correlation between the growth in repo debt to the Bank of Russia and the expansion of the Lombard List suggests increasing marketable collateral constraints

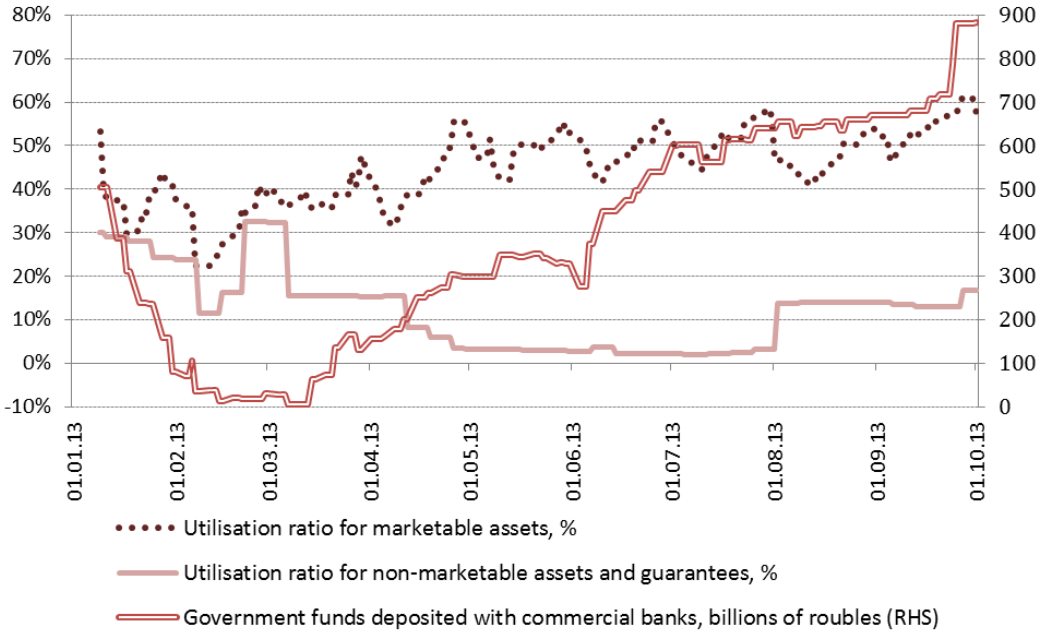
making it more difficult to secure central bank funding. This implies the need for close monitoring and regular evaluation of banking sector asset encumbrance.

2.3. Banks' collateral adequacy (assessment of asset encumbrance)

While assessing systemic liquidity risk, the Bank of Russia analyses collateral adequacy by using collateral utilisation ratios[9]. They reflect the ratio of credit institutions' debt to the Bank of Russia under a certain refinancing facility to the total collateral available to banks eligible for this refinancing facility.

In the third quarter of 2013, repos with the Bank of Russia remained the principal refinancing facility for credit institutions, with their debt incurred under these operations varying from 1.8 trillion roubles to 2.6 trillion roubles, and the utilisation ratio for marketable assets averaging 50% (Chart 14).

Chart 14. Utilisation ratios and government deposits with credit institutions in II–III quarters of 2013



Estimates based on September 2013 data suggest that the value of marketable collateral available to credit institutions (adjusted by Bank of Russia repo haircuts) increased by 0.2 trillion roubles (23% YoY) on the back of expanded eligible debt securities included in the repo list. The value outstanding of eligible debt securities added 0.4 trillion roubles over the same period

[9] The utilisation ratio for marketable assets was calculated on the basis of banking reporting data on securities holdings of banks that got repo funding from the Bank of Russia at least once. The utilisation ratio for non-marketable assets and guarantees was calculated on the basis of a regular survey of the largest credit institutions. Therefore, the value of the latter ratio is a proxy for collateral utilisation in the overall banking sector.

(24% YoY). Potential refinancing against non-marketable assets stood at 1.3 trillion roubles as of the end of the third quarter (according to a survey of the largest banks' treasury departments).

Table 2. Marketable collateral available to banks as of September 2013, trillions of roubles

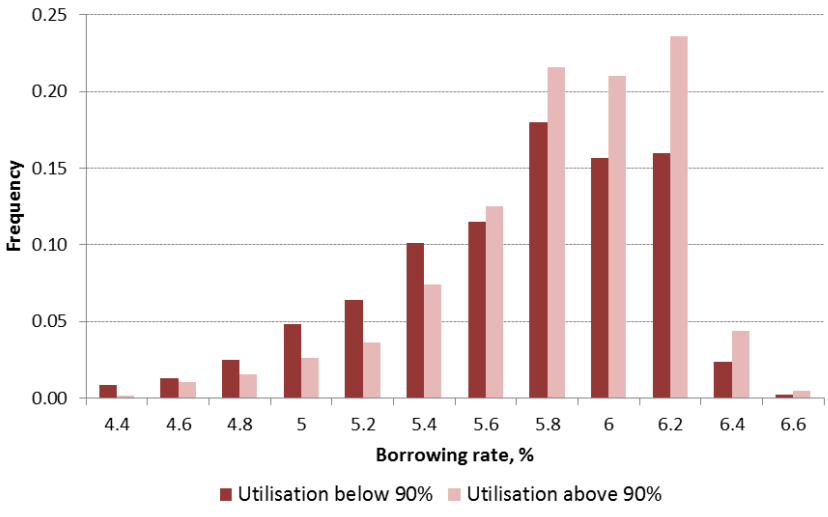
Collateral	Outstanding value	On bank balance sheets	On bank balance sheets (conservative estimate)
Debt securities	7.9	4.2	4.0
Equities	4.0	0.2	0.2
TOTAL	11.9	4.4	4.2

Note: the figures are adjusted for Bank of Russia repo haircuts; outstanding debt securities do not include domestic Eurobonds; the conservative estimate adjusts for collateral held by banks, which do not participate in repos with the Bank of Russia.

Despite increased potential refinancing against marketable assets, the marketable collateral utilisation ratio was rising in the third quarter. By the end of the period, it exceeded its reading achieved before the day of the floating rate lending auction. To contain further growth of the utilisation ratio for marketable assets, banks should continue to use this variable-rate refinancing facility secured by non-marketable assets.

In fact, the overall banking sector utilisation ratio for marketable collateral cannot actually print its theoretical maximum of 100 percent. This is caused by uneven allocation of marketable collateral across banks and their varying funding needs. Some credit institutions may face a shortage of marketable collateral when the sector-wide marketable collateral utilisation ratio is significantly less than one.

Chart 15. Distribution of unsecured rouble borrowing rates of the top 40 banks in relation to utilisation ratios, 2012 – August 2013

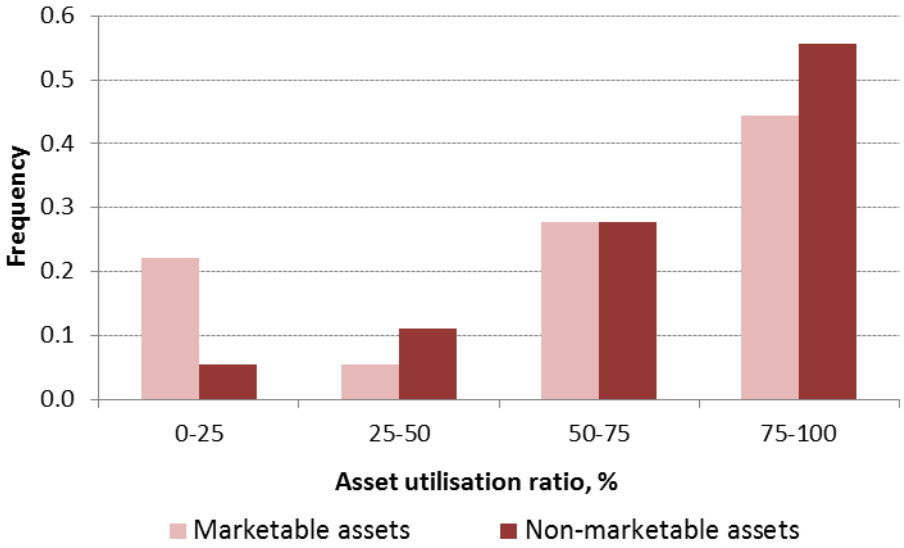


Specifically, the threat of scarce marketable collateral implies that increased utilisation ratio for marketable assets, first, undermines banks' resilience to potential liquidity risks, and, second, drives money market rates up, because in this case banks tend to resort more heavily to unsecured loans. The link between the utilisation ratio for marketable assets and money market rates is non-

linear, it becomes most apparent when the utilisation ratio is high. The chart below illustrates this relationship (Chart 15).

A survey of credit institutions finds that a "comfortable" level of marketable collateral utilisation is around 65%. However, it varies strongly across credit institutions (Chart 16) depending, inter alia, on their securities portfolio management policy. For non-marketable assets, a "comfortable" utilisation ratio will be somewhat higher on average at about 75%[10]. Therefore, at present, the sector-wide marketable asset utilisation does not exceed average "comfortable" levels. However, this "comfortable" level may be overshot if credit institutions accumulate more debt to the Bank of Russia.

Chart 16. "Comfortable" level of asset utilisation found by a survey of credit institutions in July 2013



Thus, if gross credit to banks increases as projected in the Bank of Russia Monetary Programme for 2014–2016, marketable asset utilisation may exceed 70% by the end of 2015 given the current structure of banks' debt to the Bank of Russia and the current rates of refinancing capacity growth.

To bring down the marketable collateral utilisation ratio and free up marketable collateral, the Bank of Russia may consider the following policy measures: to improve its refinancing facilities secured by non-marketable assets and guarantees; improve coordination between the Bank of Russia and the Ministry of Finance while depositing government balances with credit institutions; and revisit its exchange rate policy with a view of scaling down its exchange rate interventions.

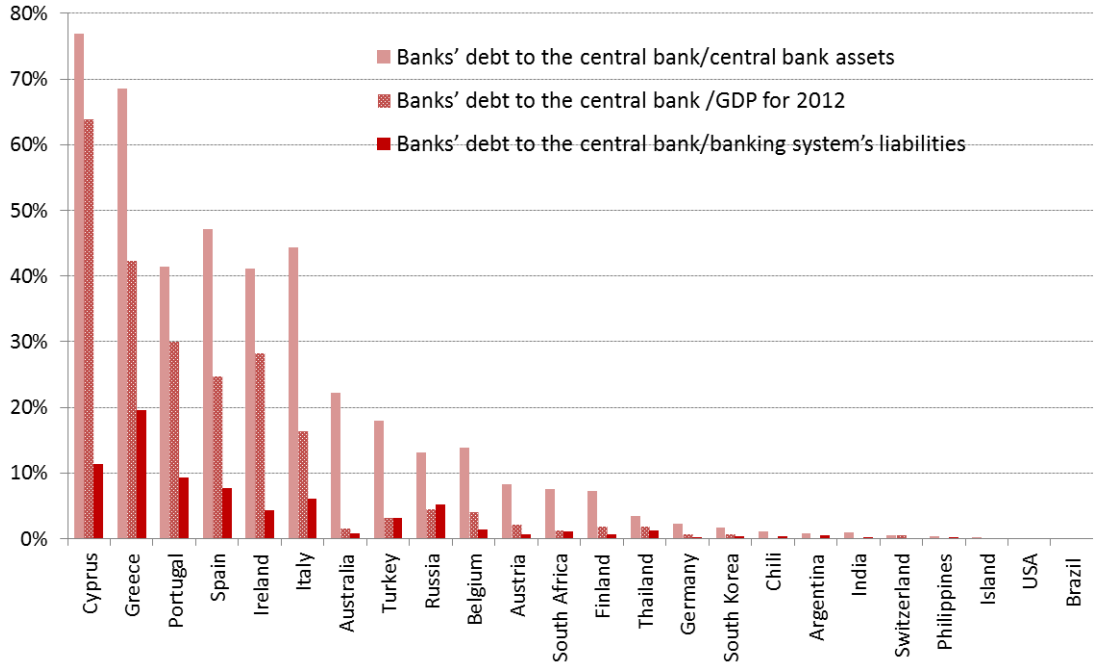
[10] This utilisation ratio for non-marketable assets is tentative given that credit institutions may have sizeable assets not recognised by the Bank of Russia as eligible collateral as of the date of the assessment, however, they may be recognised as such later. Therefore, as the Bank of Russia recognises non-marketable assets as eligible collateral, the denominator of the utilisation ratio may be adjusted upward, thus reducing the actual level of utilisation of non-marketable assets.

2.4. Banking sector debt to central bank: cross-country comparison

Russian banks' increasing debt to the Bank of Russia enlarges the share of central bank funding in the banking sector's total liabilities. In this context, it would be important to understand if there is any "normal" level of banking sector's debt to the central bank, and how high it may be.

Lending to the banking sector is one of the instruments central banks use to regulate money supply. Other key instruments include buys of foreign exchange for domestic currency (FX interventions) and buys of assets denominated in national currency in the domestic market (usually, government bonds).

Chart 17. Share of central bank funding of the banking sector in central bank assets, national GDP and banking sector liabilities: cross-country comparison, June–September 2013



Sources: IMF International Financial Statistics, IMF World Economic Outlook Database, data from national central banks and statistical offices, Bank of Russia calculations.
Note: the calculations were based on the most recent available data, primarily as of June 2013.

Until recently, Bank of Russia's policy interventions in the FX market were the key source of money supply in Russia. However, the regulator's gradual transition to a more flexible exchange rate and recent macroeconomic developments have resulted in lower interventions. In this new environment, the focus has shifted to Bank of Russia refinancing operations, which have become the new key instrument to regulate money supply. As a result, central bank funds have increased in the liabilities of the banking sector.

In countries like South Korea and Switzerland central bank interventions are a most important source of money supply. Other central banks manage money supply via their domestic asset purchases. The most prominent example of this policy is the US Federal Reserve with over

90% of assets consisting of government and quasigovernment securities (lending to banks is hardly used now, accounting for less than 0.1% of the Fed's balance sheet).

The structure of central bank and banking sector assets and liabilities depends on what instrument of money supply regulation prevails. Thus, countries where money supply is managed by FX interventions or domestic asset purchases would show a relatively modest debt of banks to the central bank (Chart 17). At present, this debt is especially large in the European economies hit by the debt crisis (Greece, Cyprus, and others), due to liquidity injections they got through the facilities put in place to support national banking systems with acute liquidity needs.

To decide what level of banking sector's debt to the central bank should be considered normal, it is necessary to take into account how this debt was incurred. Unlike some European countries where it was attributed to the financial crisis, in Russia this debt increased in a relatively stable macroeconomic environment, under conventional (not crisis-response) refinancing facilities. The Bank of Russia does not engage in outright purchases of government securities due to small fiscal deficits and a limited debt market, while providing liquidity on a repayable basis. Therefore, the debt expansion puts a pressure on refinancing instruments in terms of collateral constraints in the banking sector. However, at this point, available collateral is at an acceptable level (see Section 2.3).

3. MONEY MARKET SYSTEMIC RISKS

3.1. Analysis of interdealer repo haircuts

Assessment of systemic risks in the interdealer repo market involves an analysis of haircuts to understand if they are adequate to protect lenders against market risk. In the third quarter of 2013, haircuts in the interdealer repo market were largely adequate to secure transactions, which allowed lenders to make minimum margin calls in times of declining value of collateral. Average haircuts for various financial instruments (government, corporate, regional and municipal bonds, equities) were higher than one-day drops in these instruments' value during the crisis of 2008 (Chart 18).

During the quarter, haircuts in the interdealer repo market were relatively stable, with a slight rising trend for corporate bond haircuts (Chart 19). Arguably, this trend may reflect increasing potential risks of declining prices amid the earlier expected (in September 2013) QE tapering in the USA.

Chart 18. Haircuts and one-day drops in asset value during the crisis of 2008 by type of collateral

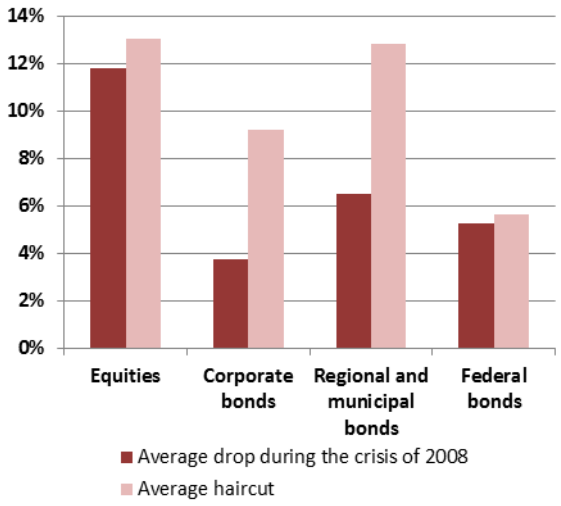
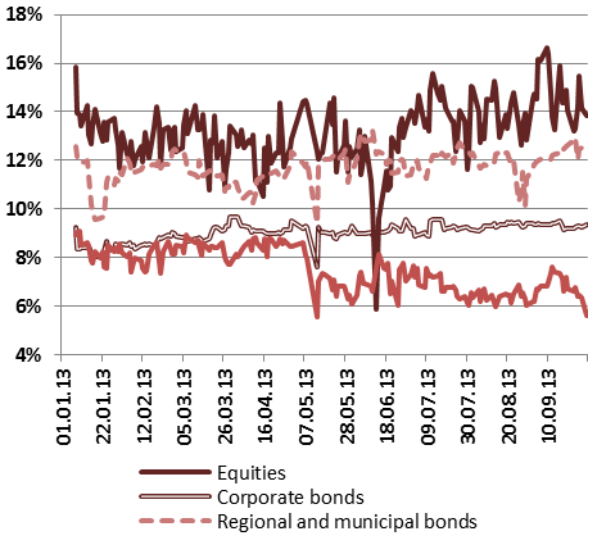


Chart 19. Haircuts by type of collateral



Despite their relative stability over time, haircuts varied notably across deals in the interdealer repo market. By the size of haircuts, transactions fall into two groups: transactions with haircuts significantly lower than average market haircuts and those with haircuts significantly higher (Chart 20). Transactions falling in the first group have more chances for default in case of a stock market shock as a result of market risk materialising. Meanwhile, parties to transactions from the second group will be motivated to default on the second leg, because the value of collateral in this case will be much higher than liabilities under the second leg.

Chart 20. Distribution of haircuts

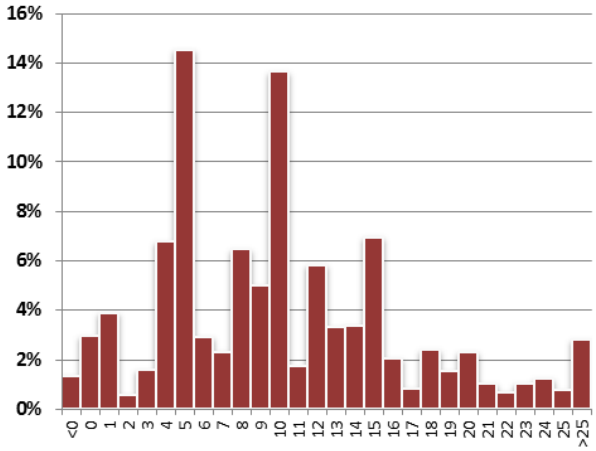
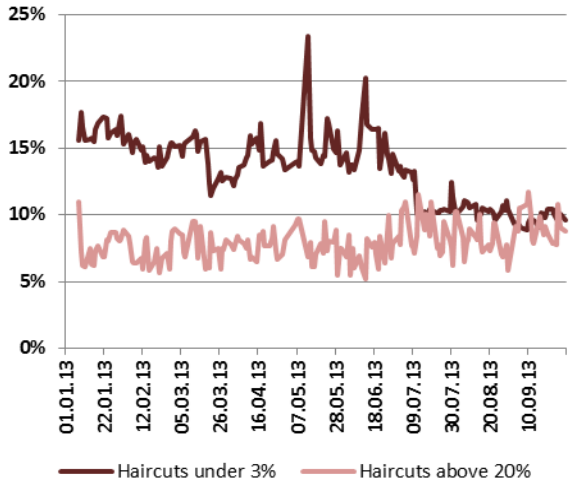


Chart 21. Shares of repos with haircuts under 3% and above 20% in the interdealer repo market



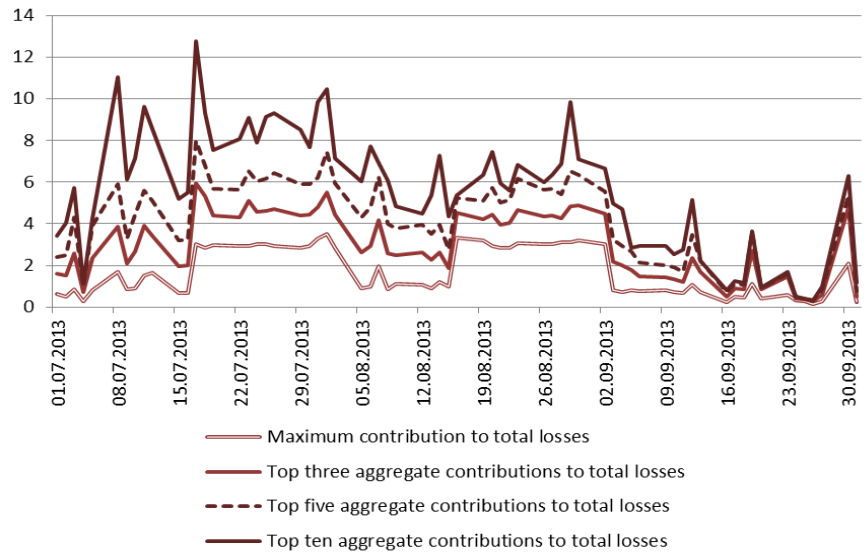
In the third quarter, the share of transactions from the second group remained virtually unchanged, while the share of deals belonging to the first group shrank noticeably, suggesting stronger resilience of the market to market risk (Chart 21).

3.2. Assessment of the "domino effect" and systemic importance in the repo market

Apart from market shocks caused by adverse developments in collateral value, an analysis of systemic risk in the interdealer repo market should focus on credit shocks and their fallout. A default of one participant may trigger defaults of some (or all) of his direct counterparties, which, in its turn, may cause defaults of further counterparties down the chain, etc. Therefore, an analysis of chain defaults or the "domino effect" may inform assessments of systemic importance of individual participants and of overall systemic risk in the market.

The first stage of the "domino effect" assessment focused on the analysis of the systemic importance of interdealer repo participants, measured by the size of the total potential loss of the financial system caused by their individual defaults[11]. Respectively, each market participant made a certain contribution to the potential loss of the financial system. Participants with the highest contribution to potential losses were recognised as systemically important.

Chart 22. Maximum contributions of one, three, five and ten systemically important participants to the total loss of the financial system, billions of roubles



The analysis of systemic importance of repo market participants suggests the following conclusions. First, the maximum contribution of one defaulting participant to the total loss of the financial sector did not exceed 3.5 billion roubles in the third quarter, contracting significantly in September to about 1 billion roubles (Chart 22). This contraction was facilitated by declining trade of counterparties of the systemically important player. Financial system potential losses from the top three, five and ten systemically important participants were also on a declining trend

[11] Potential losses of the financial system were calculated as a difference between defaulted liabilities under defaulters' transactions and the value of collateral securing these transactions (excluding losses under deals between direct counterparties and the defaulter). The assessment of potential losses was based on the Shapley Value method.

throughout the third quarter of 2013, suggesting alleviation of credit-shock-related systemic risks in the repo market.

Second, despite the declining trend, the average value of losses for all the above groups of participants turned out to be higher in the third quarter of 2013 than in the second quarter. Moreover, this increase was most observable in the top three systemically important market participants, suggesting higher risk concentration on participants with largest contributions to potential losses of the financial system.

Further on, an analysis of ten systemically important participants revealed that one-third of this group is largely permanent, i.e. three-four participants almost continuously maintain their systemic importance, while the rest of the group may be changing. Specifically, in the third quarter of 2013, the frequency of falling into this group exceeded 75% for four participants, while for nine participants it was over 20% (Chart 23). In the second quarter, the 75% frequency bracket included three participants, and the 20% bracket had 13 participants[12]. This distribution also indicates increasing importance of the 75% bracket players in the third quarter.

Chart 23. Distribution of inclusions in the group of ten systemically important participants with maximum contributions to total losses in III quarter 2013

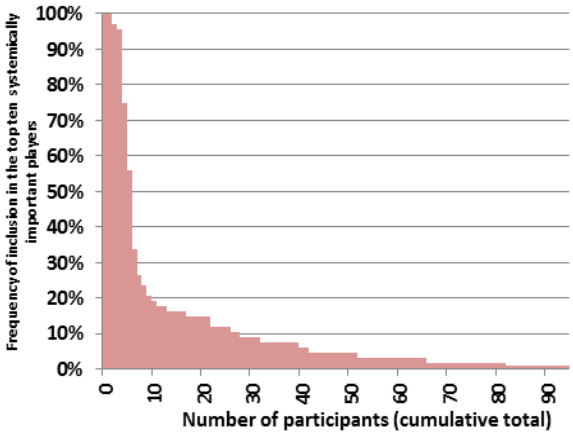
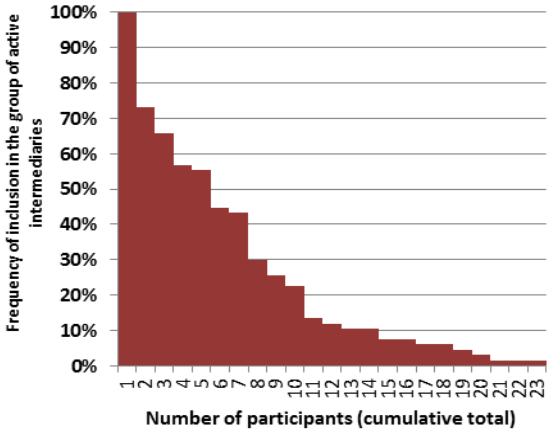


Chart 24. Frequency of inclusion in the group of active intermediaries for risk transfer in the repo market in III quarter 2013



Third, it should be noted that potential losses of the financial system are highly volatile across all the groups of systemically important participants, and are subject to sharp swings even over short spans of time (Chart 24). To explore the drivers behind this volatility, each of the systemically important participants received an "intermediation activity" indicator measuring this participant's risk transfer in the interdealer repo market[13].

[12] The top five banks ranked by frequency of inclusion in the top ten systemically important market participants are identical in the second and the third quarters of 2013.

[13] The "intermediation activity" indicator for a repo market participant is calculated as a total loss of its counterparties as a result of this participant's potential default multiplied by the number of default scenarios. Participants with a positive intermediation activity reading are classified in the group of repo market active intermediaries.

If this indicator had a positive value, the participant was classified in the group of active repo market intermediaries to be included in further analysis.

For the indicator to be in the positive area, the following two conditions need to be met:

1) The participant should have both roles – a lender and a borrower – in the repo market;

2) The capital adequacy ratio (N1) for banks and equity capital adequacy for non-bank organisations should be sufficiently small for a participant to be assessed as a potential defaulter as a result of the counterparty's default.

The analysis shows that intermediation activity is closely related to potential losses of the financial system. In the third quarter of 2013, the system included about six participants[14] (their composition varies slightly from day to day – Chart 24) with positive values of intermediation activity. Therefore, they were classified into the active intermediary group. An analysis of correlation of each of the six participants' intermediation with financial system losses revealed that over 84%[15] of losses have been caused by intermediation of only one of the identified six active intermediaries (Chart 25).

This smaller group of active participants suggests increasing risk concentration on the most active players, specifically, on Player 1, whose behavior both in the second and the third quarters has a major impact on the reading of the top ten contributions to the total loss of the market.

Chart 25. Correlation between the top ten contributions to total losses and the intermediation activity indicator of six participants classified as active intermediaries with frequencies exceeding 40%

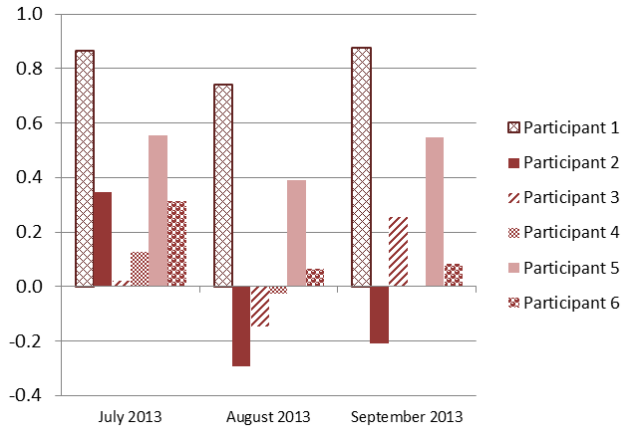
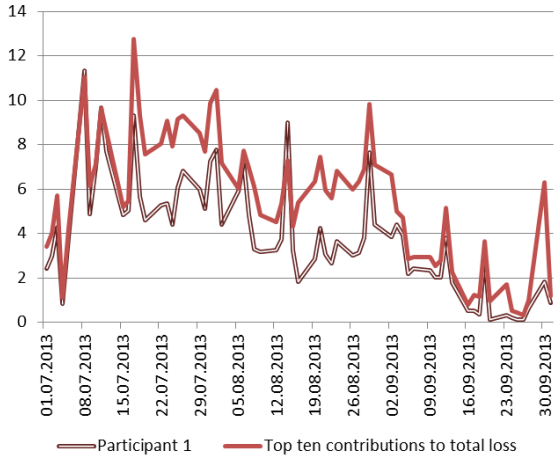


Chart 26. Intermediation activity indicators for repo market risk transfer in III quarter 2013, billions of roubles



This suggests that systemic risk in the interdealer repo market is driven not only by the size and nature of shocks, but also by structural features of the market, in particular, by participants'

[14] In the second quarter of 2013, the average number of active participants was nine.

[15] In the second quarter of 2013 – 95%.

involvement in intermediation. Chart 26 shows that as intermediation activity of the participant abates, potential losses of the financial system also come down, because the resulting smaller scale of risk transfer and the ensuing "domino effect" brings down the number of exposed market elements, thus containing systemic risk.

3.3. Assessment of the "domino effect" and systemic importance in the interbank lending market

In contrast with the interdealer repo market, the interbank market is unsecured. Therefore, systemic risk will be triggered by defaults caused by materialised credit risk rather than by market shocks. Similar to "domino effects" in the interdealer repo market, this section discusses implications of idiosyncratic defaults, simulates channels of credit shock transmission, identifies systemically important banks and market losses given their defaults[16].

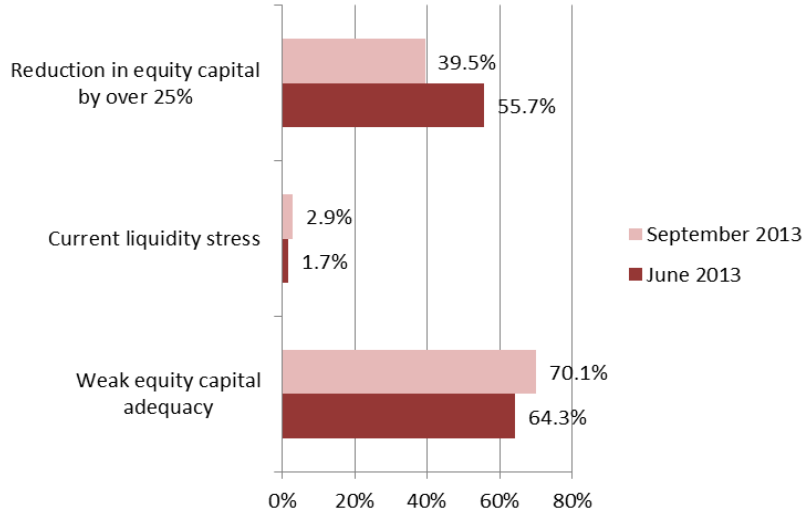
A credit shock implies that defaults on interbank loans entail recognition of losses and a respective reduction of the capital adequacy ratio of the lender bank. Moreover, the non-repayment contributes to liquidity drain adversely affecting liquidity ratios. In this context, criteria indicating defaults of counterparties of the initial defaulting bank will include reduction of the capital adequacy ratio N1, instant liquidity ratio N2, and current liquidity ratio N3 below certain thresholds[17], and also equity capital reduction by more than 25%. If at least one of these criteria is met, the bank will be perceived exposed to contagion and will be further treated as a defaulter.

An estimate of potential losses as a consequence of contagious defaults as of the end of the third quarter of 2013 indicates that the distribution of losses across interbank lending market participants had somewhat changed compared with the end of the second quarter. According to the estimates, the maximum individual contribution to the total loss of the banking sector stood at 122 billion roubles, which is 74.5% more than in June 2013. The rise in the maximum contribution is attributed to larger volumes of trade by systemically important players. Meanwhile, a reduction of the top twenty contributions by 3.5% was accompanied by a 13% increase in the top five contributions and a 27.7% increase in the top three contributions, indicating risk concentration on systemically important banks in the interbank lending market. Therefore, over the third quarter, the interbank lending market demonstrated a similar trend of systemic risk concentration and enhanced role of systemically important participants as elements of shock multiplication.

[16] Market loss given default is measured as a total volume of deals that have not been executed as a result of a participant's default.

[17] The thresholds have been calculated as 1% percentiles of the distribution of respective values across all Russian banks.

Chart 27. Drivers of potential defaults in the interbank lending market[18]



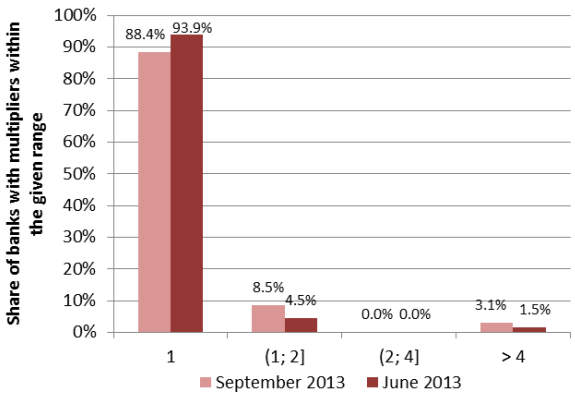
The key driver of potential defaults in the third quarter of 2013 remained weak equity capital adequacy of banks (Chart 27), whose significance increased by 5.8 percentage points. This fact may be attributed to the increase in the number of interbank market participants with relatively low capital adequacy ratios (under 11%) from 28 as of the end of June to 39 by the end of September 2013.

The ten banks that contribute most to the domino effects include eight banks ranked as the largest according to the Bank of Russia methodology, and one foreign-owned bank.

Table 3. Comparative statistics for multipliers' values[19] **in June 2013 and in September 2013**

	June 2013	September 2013
Average	1.06	1.44
30% percentile	1.00	1.00
80% percentile	1.00	1.00
90% percentile	1.00	1.01

Chart 28. Distribution of multipliers' values in June 2013 and in September 2013



Moreover, five of the top ten contributors to credit risk contagion in September 2013 were also the primary drivers of the domino effect back in June 2013. As of 1 October 2013, the capital

[18] Share of scenarios with a materialised default driver.

[19] Multipliers are defined as a ratio of total losses of the banking sector given a bank's default to its debt.

adequacy ratios of these banks were below the banking sector's average, while their activity (expressed in the number and volume of transactions) increased from the previous quarter.

This trend resulted in increased number of banks with the multiplier value above 1 and also in the rise in the multiplier average value (see Table 3 and Chart 28). Consequently, this heightened potential impact of systemically important banks on the state of the interbank lending market alongside weak capitalisation of a wide range of participating banks suggest weaker interbank lending market resilience to potential credit shocks.

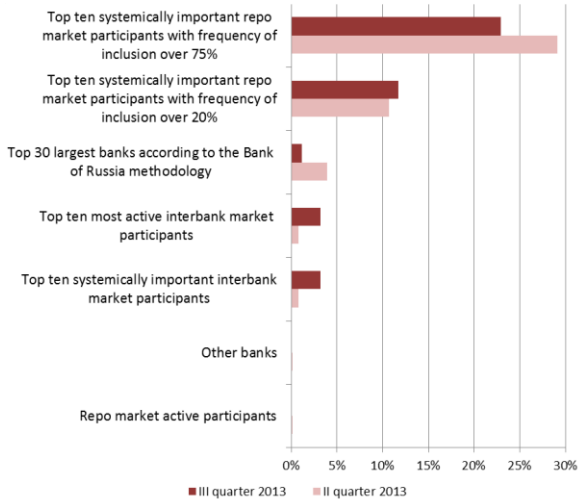
3.4. Network analysis of risk distribution in the money market

The special role of systemically important banks in risk distribution in the interbank lending market is confirmed by the findings of our network analysis. While looking at behaviour strategies of various groups of money market participants, we estimated a few network structure indicators describing the degree of each participant's involvement in market interactions and the repercussions in case of its failure.

The first indicator – *repercussions caused by a money market participant's default given a random shock* – measures the capacity of this participant to trigger a domino effect that may cause a significant damage to the money market[20]. A high value of this indicator implies that the consequences of this participant's potential default will affect many other market participants, therefore, the degree of shock transmission will be high. Estimates indicate that the highest values of this indicator are observable in systemically important participants of the interbank lending market (Chart 29).

Chart 29. Repercussions of defaults of various groups of money market participants

Chart 30. Probability of becoming a potential defaulter for various money market groups



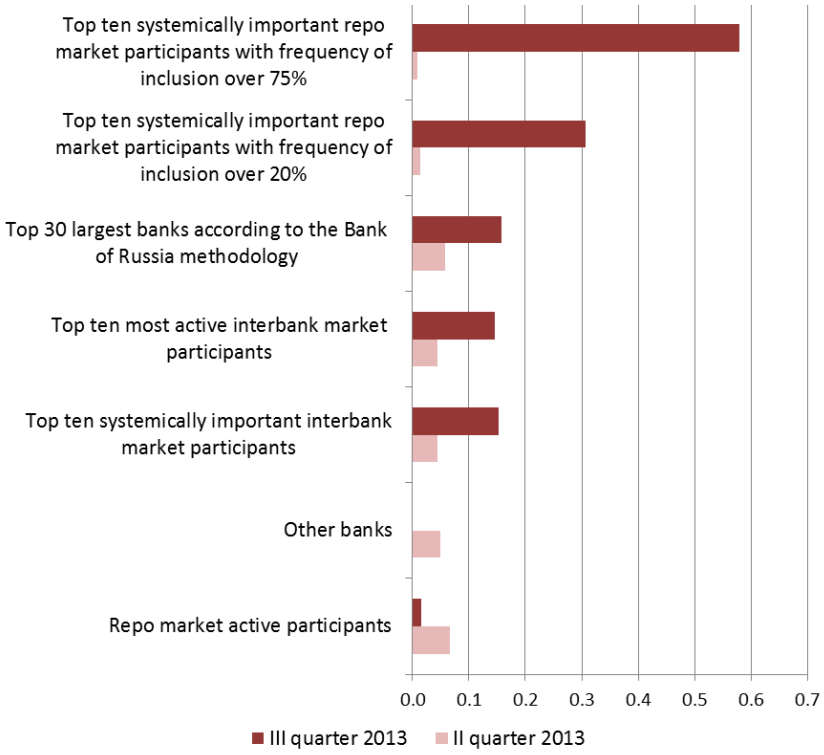
[20] The indicator is measured as decimals; the higher the value the larger the repercussions.

The second indicator – *probability of default of an individual participant given a random shock* – measures the probability for a random shock in the system to affect this market participant. Interdealer repo market participants are most susceptible to random shocks due to their weak safety buffers of liquidity and capital, and also their limited capacity to raise funds (Chart 30).

The third indicator – *intermediation activity of an individual participant given a random shock* – describes the participant's tendency to transfer shocks in the money market. A high value of this indicator implies that this participant plays a significant role in shock transmission and can amplify the domino effect in the money market. This category largely includes systemically important participants in the interdealer repo market (Chart 31).

Therefore, in the third quarter of 2013, the largest repercussions in terms of potential damage may result from a (theoretical) default of banks belonging to the group of systemically important interbank lending market participants. The domino effect triggered by this even will be transmitted via systemically important interdealer repo market participants and further. Given a high intermediation activity of the interdealer repo market, contagion will cover all the other money market participants.

Chart 31. Intermediation activity of various groups of money market participants



The above mechanism of shock transmission in the money market suggests a need for enhanced safeguards for systemically important interbank lending market participants against potential shocks, and also a need for a regular monitoring of the network structure of the interdealer repo market as the most large-scale mechanism of shock contagion in the money market.

4. APPENDIX: MONEY MARKET STABILITY INDICATOR AND RISK MEASURES

The money market stability indicator (hereinafter, the Indicator) is designed to measure the money market capacity to ensure sound and uninterrupted performance of its function of short-term liquidity redistribution among market participants. Its value ranges from 0 to 100, increasing as the risks of money market disruption decrease (Chart 32).

Chart 32. Money market stability indicator

The Indicator aggregates the eight specific indicators listed below, i.e. money market risk measures (Chart 33). It is calculated as the first primary component of these measures.

Average money market rate is a weighted average rate of the interdealer repo market, the interbank lending market and the swap market.

Marketable asset utilisation ratio is a ratio of the present value of securities posted as collateral to back transactions with the Bank of Russia to the present value of securities held by credit institutions.

Bank of Russia fixed rate swap and repo volumes mean the volumes of liquidity injections at higher rates than auction-based repo rates.

Share of securities excluded from the Lombard List is calculated as a ratio of the present value of securities pledged under interdealer repo transactions and excluded from the Lombard List, to the present value of securities pledged under interdealer repo transactions.

Money market borrower concentration is a measure of market monopolisation on the borrower side (modified Herfindahl-Hirschman Index).

Money market lender concentration is a measure of market monopolisation on the lender side (modified Herfindahl-Hirschman Index).

Money market centralisation is a measure reflecting the degree of similarity to a market where liquidity is provided via the same “central” (core) participants.

Money market intermediation reflects the share of operations by an intermediary to transfer liquidity from the donor to the recipient in the total volume of trade.

In the third quarter, the most negative dynamics were observable in marketable asset utilisation ratio, money market borrower concentration and money market intermediation. Positive developments were seen in the share of non-Lombard List securities posted for interdealer repo transactions. Collectively, these developments kept the Indicator on a declining trend, which started early this year.

Chart 33. Money market risk measures