National Research University
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GRADUATION THESIS

Topic:

Estimation of effectiveness of the Bank of Russia interest rate policy

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Contents

Abstract

This study examines the efficacy of the interest rate policy of the central bank of Russia in affecting the bank loans growth and interest rates charged on them for both retail and corporate portfolios. For the first time in such studies, we rely on quarterly data for over 900 different Russian banks for the 2008-2012 time period obtained directly from the place of disclosure and examine the relationship between the weighted index of CBR's refinancing facilities with the loans portfolio growth and interest income on them separately using the dynamic Generalized Method of Moments (GMM) and clustered fixed effect model respectively.

Our findings indicate the presence of a strong bank lending channel, where the monetary contraction (interest rate hike) produces significant adverse effects on loans portfolio growth for an average bank. This effect is robust to model specification and is more pronounced for retail loans than for the loans to non-financial corporations (NFCs).

Furthermore, the effect of the hike of the interest rate on refinancing facilities on the interest rates on the loans to NFCs has been found to be positive and significant.

Unlike the results for other countries, this study does not find any major impact of bank characteristics like assets size or lagged loan losses on the response to the policy stance change of an average bank (only the liquidity has shown some significance), which is consistent with the earlier studies of monetary transmission in Russia.

Introduction

According to the guidelines for monetary policy, published by the Central Bank of Russia (CBR) at the end of 2012, the development and application of the policy instruments of the Bank of Russia in the forthcoming 3-year period will be aimed at reaching the goals of the monetary policy in the framework of inflation targeting, while taking into account the goals of financial stability and continuity of the functioning of the settlement systems.

The second goal, i.e. inflation targeting, which is considered in connection with the gradual reduction of the volume of CBR's interventions in the foreign exchange market has been pronounced since the early 2007. The effective realisation of this objective of the monetary policy critically depends on the effectiveness of the policy instruments. Naturally, in connection with inflation targeting the interest rate tools are gaining the paramount importance in the view of the regulator from perspectives of both sustaining the necessary level of liquidity within the banking sector and directing the pace of credit growth.

The concentration of the attention of the impact of the monetary actions on the banking sector is not accidental: banking system in any economy is one of the key elements linking the policy making institution and the real sector of the economy. But in addition to that, like many emerging markets, Russian capital markets are underdeveloped and hence the bank-based financing is often the only option for firms considering attraction of external finance. As the mechanisms of transmission of the monetary policy stance to the rest of the economy can be divided into three groups of channels: exchange rate, asset price and credit channels (Juurikkala et. al, 2011), the credit channel in Russia is of special concern, whereas the former two are expected to have only marginal significance due to the reasons provided above.

The theoretical views on the policy transmission in connection with the banking sector may be divided into two distinct, albeit interconnected channels: the most basic is the interest rate channel of transmission – the hike in the wholesale interest rates causes the increase in the rates that the banks charge on loans to their customers, which is amplified by the absence of substitutes to the bank-based financing and information asymmetries between the borrowers and the bank. The increase in the cost of bank-

based financing raises the hurdle rates for the investments in the real sector, causing the investments to shrink, which then affects demand adversely.

This is a textbook explanation. The alternative view, formalized by Bernanke and Blinder (1988) is credit channel, which in our case can be summarized by the lending channel: when faced with a monetary contraction and the successive adverse effect on liquidity, banks, especially if they find it difficult to substitute the lost loanable funds, have to reduce their loan supply, which casts the direct effects onto the real economy

Despite the importance of the understanding of how the monetary actions are transmitted to the banking and the real sectors, the topic has been researched scarcely in Russia. To the best of our knowledge, there are no studies of the above channels of transmission for the period after 2007 for Russia, although the underlying data is publicly available[1]. Furthermore, there have been no studies of the effectiveness of the interest rate tools of the CBR: the above mentioned research employs the M2 indicator as the main independent variable under control of the policy marker. Clearly, in light of the goals of the CB and its increasing use of interest rate tools and decreasing attention to the monetary indicators, this approach is inferior.

This study is aimed at diligently filling this gap by studying the significance of the aforementioned channels of transmission. For the first time in this type of studies, we rely on the panel data for approximately 900 banks obtained directly from the place of disclosure – the regulator's website. Our research covers the period from the beginning of 2008 to the end of 2012[2] and employs the raw quarterly data on bank's balance sheets and profit and loss accounts. In addition, we use the information the main refinancing facilities of the CBR to track the effect of the different interest rate tools that the CBR employs to adjust liquidity of the banking sector.

The remainder of this paper is structured as follows: section 1 presents the recent research on the interest rate and lending channels of monetary transmission relevant to the study of Russia's case. Section 2 lists the stylized facts about the banking system in Russia. Section 3 is devoted to discussion of the CBR's interest rate tools and providing

[1] It should be noted though, that the process of collection of the micro-level bank data is cumbersome and labor-demanding. See Appendix 1 for details.

[2] The choice of sample period is dictated by the legislation and data availability reasons: from 2008 the accounting rules have been relatively 'stable' and the majority of banks have been disclosing the financial statements. Furthermore, this is relevant in connection with the transition to the inflation targeting.

the rationale for the use of the tailor-made refinancing index. We present a thorough description of the dataset in section 4.

Section 5 develops the theoretical model and states the econometric methodology. Section 6 is devoted to the estimations, and section 7 provides an overview of the main results and conclusions.

Literature review

There is surprisingly little literature presenting the research in the field of monetary transmission, especially the working of the lending channel of transmission of the monetary policy in Russia.

The only two full-fledged research papers on the topic that are existent to date, to the best of my knowledge, are by Vinhas de Souza (de Souza, 2006) and Tuuli Juurikkala, Alexei Karas, and Laura Solanko (Juurikkala et. al., 2011). I will discuss them in turn, while presenting the general literature relevant to the topic.

A good point to start with is an article by Inna Golodniuk (Golodniuk, 2006) where she presents a nice and comprehensive overview of the issues in monetary policy transmission studies. She begins with a description of the conventional view, which is referred to as the traditional interest rate channel of transmission. The basic theoretical insight behind this IR channel is quite standard explanation for monetary policy transmission in the world of non-interest bearing money and interest bearing assets summarized by the term bonds. The interest rate channel, following the author, works in the following way: monetary expansion leans to a fall in the real interest rate, i.e. the cost of capital, which causes the investment spending to increase, increasing the aggregate demand and output.

It should be noted that the aforementioned interest rate transmission channel, the evidence for significance of which can be found in e.g. Taylor (1995) is debated by many economists. Bernanke and Gertler (1995) provide an overview of such studies.

The interesting drawback of the IR channel that is pointed out by many researchers is that it is unclear how marginal changes in the short-run nominal interest rate that the central bank uses as a monetary policy instrument can induce significant changes in investment which depends on the long-term real rates.

Golodniuk (2006) goes on to refer to Mishkin (1997) who lists nine possible mechanisms which allow the changes in the short-run interest rate to induce changes in the level of investment. These can be broadly divided into the mechanisms operating through assets prices and those operating through credit markets. The latter are the subject of my study, so I will describe them in a greater detail.

In one of the milestone studies of the mechanisms operating through the credit markets, Kashyap and Stein (1994) conclude that if the central bank is able to control the supply of loans, then, for most economies, this implies the existence of the bank lending channel. In fact, there are three necessary conditions that have been stated by Bernanke and Blinder (1988) in order for a distinct bank lending channel to exist (here I present them in a slightly modified version following de Souza (2006)):

- Existence of the bank-dependent borrowers (which is not likely to be the problem in Russia as the bank lending is often the single available source of external funds in this country).
- There must be imperfections in adjustment of the aggregate price level. This condition, according to the author, is a general requirement for the monetary policy to be sensible and is usually met.
- There is an impact of a central bank's monetary policy on the supply of bank loans.

The majority of the empirical studies of transmission concentrate, of course on checking the second condition.

To review the empirical literature, it is good to start with the paper by Seija Lainela and Alexey Ponomarenko (2012) in which they present an overview of the financial markets and monetary policy instruments in Russia which is relevant to the first part of this study. The paper is descriptive in nature and presents little information relevant to formulation of hypothesis or their testing methodology, while the general information about the instruments and monetary policy conduct is very similar to that presented above. I will therefore not reproduce the contents here, but should be again highlighted that the paper has been relevant to the descriptive part of the present study.

Another paper published by the Bank of Finland is the one by Elena Deryugina and Alexey Ponomarenko (2011) in which the structural shocks behind loan supply fluctuations are identified. Noting that the expanded role of Russian banking sector as financial intermediary was rather new at the time of writing, and while the banking sector was still small for an economy of the size of Russia's, authors present evidence for the increased importance of bank lending in the recent times.
Authors model lending trends using the time series data for 1999-2010 using Bayesian vector autoregressive model, additionally imposing sign restrictions on impulse

response functions. In the methodological part of the paper authors present several approaches to modeling lending trends. The most conventional one, according to them, is to model loan demand function based on the macroeconomic indicators such as the GDP and others. With the reference to the CBR's research it is stated that the loan demand trends are generally in line with the fundamentals and do not substantially deviate from them.

This conclusion is very important to the present study as the above fundamentals will be used to proxy the loan demand function in the lending behavior model.

The model presented in the paper is an unconventional and somewhat subjective (Ponomarenko et.al., 2011) Bayesian estimation scheme with an agnostic identification scheme, which, while being interesting from the technical point of view is irrelevant to my study and thus will not be presented here. At the same time, the methodology for the choice of variables is rather comprehensive: authors list GDP, price level, interest rates (interest rates on loans to non-financial corporations with short maturity granted in rubles) and the respective volume of loans. The choice is straightforward and intuitive and I should stick to a similar list of variables in this study.

Citing the famous paper by Bernanke and Blinder (1988) authors consider the possibility of including the bank deposits as the loan supply determinant, while noting that this is somewhat usual practice. However, due to the possible spurious correlation that does not adequately reflect structural relationships, authors do not advise to include the deposits into the model unless they are exogenous. Although the authors treat the latter assumption as a plausible one, and include it into the specification as a monetary indicator, the relevance of this assumption is highly debatable as the impact of the CBR's foreign exchange interventions on the monetary aggregates has been decreasing in Russia in the recent years (CBR, 2012).

The findings of the above paper, relevant to this study, are that the monetary stance shocks cause a persistent negative impact on interest rates (recall though that authors refer only to the short-term loans to NFCs), which may be considered as an evidence for the existence of the interest channel of transmission of monetary policy in Russia.

The other empirical works relevant to this study are those by Adam B. Ashcraft. The paper titled "Firm balance sheets and monetary policy transmission" (Ashcraft et. al., 2007) is a good source of practical (and still, some theoretical) background for my

research. The paper starts with the question why the marginal changes in the short-term interest rates produce such large responses of the aggregate economy (the one that is asked by many economists). The authors structure the possible reasons into the two channels: lending channel and the balance sheet channel.

The lending channel view connects the monetary policy actions with the loan supply side of the economy, namely the bank loan supply. According to the authors, if the banks face frictions when issuing uninsured liabilities, draining of deposits from the system will result in reduced bank lending. Consequently, as other sources of funds are imperfect substitutes to the bank lending, monetary contractions will have larger effects on the liabilities of the bank-dependent firms.

The balance sheet channel in Ashcraft et. al. (2007) is described as a mechanism through which the monetary policy affects loan demand. The mechanism is as follows: higher interest rates increase servicing costs of the borrowed funds, reduce the cash flows and erode the value of collateral and hence reduce the firms' creditworthiness. The latter has an adverse impact on the cost of external finance to the firm and thus reduces the demand for loans from the firms.

The rest of the study is devoted to the study of the balance sheet effects (borrower quality) on the bank lending depending on the monetary policy stance, business cycle and so on. This study is impossible to replicate with the Russian data as we do not have a comprehensive database of borrowers' quality at our disposal, thus we have to be satisfied with using aggregate proxy, which as the studies described above show, is sufficiently good. However, the results of the study of Ashcraft et. al. (2007) are worth mentioning here: they suggest that the independent, demand-driven credit channel of transmission of monetary policy is existent, and this effect should be taken into account by the policy marker as it significantly amplifies the effects on the interest rates the monetary policy actions produce. Interestingly, Ashcraft et. al. (2007) also suggest that monetary policy actions will have different effectiveness during the boom-bust cycle: its amplification by the balance sheet effect will be stronger in times when balance sheets are weak (i.e. in times of recessions), and weaker in the periods when balance sheets are strong.

A paper by Vinhas de Souza (2006) is the first (to the best of my knowledge) attempt to fill in the above mentioned gap in the empirical studies of transmission of monetary

policy in CIS and Russia in particular. The paper is relatively important to formulation of hypothesis and model-building in the present study, so I will review it with some detail.

The description of the credit channel, which is of a particular importance for this study, is similar to one which is found in other papers including the already mentioned one by Ashcraft et. al. (2007), thus I will not reproduce it.

In what follows, author provides some theoretical postulates that may be of interest in connection with the topic. The first explicit one is that the banks that have a larger share of liquid assets or are bigger in size are better able to shield their lending relationships from the external shocks. Smaller banks, according to de Souza (2006), have to draw on their liquid assets, whereas larger banks have better access to external finance due to their size.

De Souza follows the Peek and Rosegren (1996) and Golodniuk (2006) model, which is specified by:

$$\Delta LN_{it} = \alpha_i + \gamma_i \Delta LN_{it(-1)} + \sum_{j=0}^{1} \beta_j \Delta i_{t-j} + \sum_{j=0}^{1} \delta_j \Delta i_{t-j} BS_{it-1} + \theta_j BS_{it-1} + \sum_{j=0}^{1} \varphi_j \Delta TDE_{it-j} + \sum_{j=0}^{1} \omega_j \Delta TBF_{it-j} + u_{it} \qquad (1)$$

Where:

ΔLN_{it} is growth rate of loans of bank *i* in year *t.*

Δi_{t-j} is the change in the annualized money market interest rate (here De Souza is insufficiently specific about the rate he uses).

BS_i is a vector of bank characteristics (e.g. size, liquidity)

TDE_i is the growth rate of total deposits

ΔTBF_i is the growth rate of bank's total borrowed funds.

Hence, the model is designed to test the effects of varying banks' balance sheet characteristics on the response to the monetary shock, which, according to De Souza should be different across banks of different liquidity and balance sheet strength.

The choice of short-term money market rate as the explanatory variable is arguable since the extent to which the short-term rates have on the costs of external financing for Russian banks is limited at best during the period which De Souza analyses, 1995-2003 (Juurikkala, 2011).

De Souza also argues that the changes in total loans caused by movements in loan demand should be isolated since the effects over supply of loans caused by the actions of the Central Bank of Russia are tested. However, instead of including the macro indicators like CPI or GDP index which have shown to be good proxies for the loan demand, as described above, De Souza argues that macroeconomic aggregates fail to represent the changes in loan demand that are faced by an individual bank. He uses total deposits (*TDE*) and total borrowed funds (*TBF*) to proxy movements in demand for loans of a particular bank.

The choice of these indicators is questionable for two reasons:

- It contradicts the usual underlying assumption that is made by the literature on monetary transmission that all banks face homogeneous loan demand, which is another way of saying that loan demand does not depend on bank characteristics. According to Juurikkala et. al. (2011), if for example, customers of small banks typically reduce their loan demand more than customers of large banks, when faced with an increase of an interest rate, identification of bank lending behavior becomes impossible. Furthermore, this assumption is reasonable as most of the borrowers have no alternative to short-term bank financing.
- It seems questionable that the growth in the certain items on the liabilities side (borrowed funds and deposits in De Souza) is a good choice for the proxy for the loan demand, since the degree of financial intermediation, especially in the period considered in the paper was reasonably low in Russia.

Furthermore, the study relies on the panel data for 323 Russian banks' annual balance sheets covering the period of 1995 to 2003. During the period the control of the central bank over the interest rates M2 was limited, partially due to the objective of supporting

the stable exchange rate for ruble (Vymyatnina, 2006). Thus, the choice of the explanatory variables, in addition to the low frequency of data obtained makes the

Nevertheless, despite the peculiarities of the paper, it is interesting to consider the results, obtained by De Souza. Author estimates both fixed and random effect version of the panel regression and test them against each other via a Hausman test. In all cases, the fixed effects version was the preferred one. This is not a surprise as there likely to be heterogeneities across banks that are not captured by the model's regressors.

However, De Souza also includes the lagged dependent variables in the model which may cause the estimated coefficients to be biased (Golodniuk, 2006). De Souza states that in order for the bank lending channel to be supported by the empirical data, the coefficients on Δi_t should be significantly negative and the coefficients on regressors that represent the balance sheet strength and the cross-products should be positive. This is not what the data suggest: as the coefficients on the lagged and contemporaneous monetary indicators are negative but insignificant, while the vector of balance sheet strength also shows lack of significance, same for the macro control variables.

De Souza presents several reasons associated with data and estimation technique. Firstly, he suggest that Arellano and Bond (1991) generalized method of moments (GMM) estimator which applies the entire set of lagged values of the endogenous variables as instruments should be employed. However, Hahn and Kuersteiner (2002) demonstrate that this traditionally used Arrelano and Bond procedure is subject to substantial finite sample bias.

Second reason that De Souza (2006) suggests is that large state-owned banks may be non-sensitive or less sensitive to the interest rate changes than the private banks, and so eliminates the former from the sample. This clearly contradicts to my findings on sensitivity of large banks' lending to the interest rate hike, and furthermore contradicts the conventional finding of the empirical literature that lower capitalized banks respond more to the interest rate hike. As the larger banks are more likely to have lower levels of capitalization than the smaller ones in order to maintain the return on equity, the assumption of De Souza does not seem to be reasonable.

The author also tries to use the subsamples: those for 1995 -1999 and 2000- 2003. De Souza obtains stronger results for former subsample, but these results are likely to be

arbitrary as the subsample includes the 1998 crisis when many banks defaulted while other faced substantial and prolonged liquidity shortages.

Nevertheless, De Souza (2006) finds evidence of the existence of the bank lending and interest rate channels, albeit this evidence is weak. Author expects effectiveness to increase in future (after 2003), which I show has really taken place.

The other paper important to this study has been written by Tuuli Juurikkala, Alexei Karas, and Laura Solanko (Juurikkala et. al., 2011). The empirical model they have estimated is presented as:

$$\begin{aligned}\Delta \log(L_{i,t}) = \alpha_i + \sum_{j=1}^{l} b_j \Delta \log(L_{i,t-j}) \\ + \sum_{j=0}^{l} c_i \Delta MP_{t-j} + \sum_{j=0}^{l} d_i \Delta log(GDP)_{t-j} + \sum_{j=0}^{l} e_i log(CPI)_{t-j} + f_j X_{i,t-1} \\ + \sum_{j=0}^{l} g_1 X_{i,t-1} \Delta MP_{t-j} + \sum_{j=0}^{l} g_1 X_{i,t-1} \Delta log(GDP)_{t-j} \\ + \sum_{j=0}^{l} g_1 X_{i,t-1} (CPI)_{t-j} + \varepsilon_{it}\end{aligned} \tag{2}$$

Juurikkala et. al. (2011) make a further assumption valuable to our study that monetary policy truly captures monetary policy effects and not the potential effects of the general macroeconomic variables.

In testing the empirical model authors note that the CBR uses several operations to provide liquidity to the banking sector, so there in no single interest rate that could as a monetary policy indicator. Therefore, they use M2 and M0 in regressions.

The econometric model, employed by Juurikkala et. al. (2011) is the System Generalized Method of Moments which adds the original equation in levels to the system. This method, albeit having the aforementioned deficiencies, pointed out by Hahn and Kuersteiner (2002), is specifically designed to provide consistent estimates in presence of a lagged dependent variable as it is the case in the model used by the authors.

I reproduce the results obtained by the authors below:

Table #1 *long-run coefficients obtained for loan growth by Juurikkala et. al. (2011)*

	Log(M0)	Log(M2)	Mibor rate	CBR rate
Monetary policy (MP)	0.30**	0.38**	0.03	0.08
Capitalization * MP	- 2.20**	- 3.18**	- 0.30	0.27
Liquidity * MP	- 1.04	- 1.50	0.25	1.52
Size * MP	- 0.01	- 0.02	- 0.10*	-0.10
Real GDP	- 0.19***	- 0.17***	- 0.17***	-0.19**
Prices	0.33	0.19	0.17	0.06
Observations	35,887	35,887	35,887	35,887
Number of banks	1475	1475	1475	1475
Sargan-p	0.40	0.42	0.40	0.40
AR2-p	0.33	0.33	0.38	0.36

Note: * indicates significance at 10% level, ** at 5% level, *** - at 1%

It can be seen that the changes in interest rate (both policy and interbank) fail to produce statistically significant impact on the loan growth, while the monetary growth indicators are significant. The result obtained for the CBR rate is not surprising as the indicative refinancing rate which is of limited importance is used. One interesting thing to note is that the number of banks reported for the estimation is higher than was present in Russia during the estimation period (1999-2007).

Juurikkala et. al. (2011) find that the empirical data provides evidence for existence of the bank lending channel in Russia, that is the changes in the monetary policy make banks to change their loan supply.

Stylized facts about banking system in Russia

Russian banking system has developed substantially over the last few years. From the following table we can see that the growth of the assets was tremendous over the last two years: assets of the banking sector have increased more than twofold in absolute terms and by 20 percentage points relative to GDP[3].

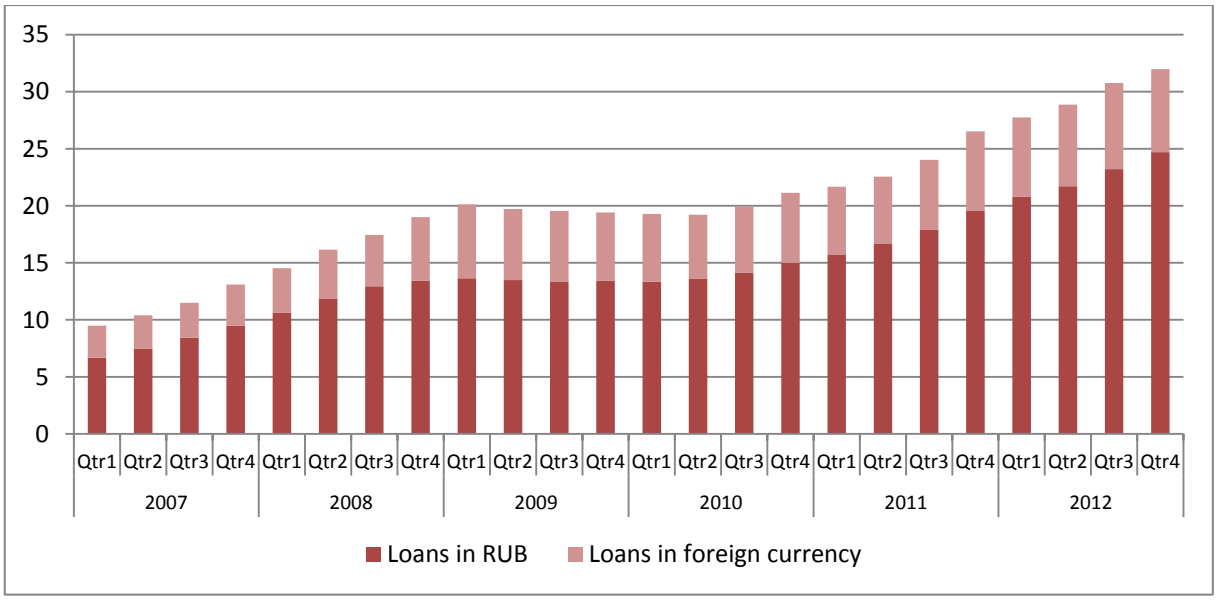
Table #1 *macroeconomic characteristics of the banking sector in Russia.*

Characteristic	2008	2009	2010	2011	2012	2013[4]
Total assets of the banking sector (bln. RUB)	20 125	28 022	29 430	33 805	41 628	49 510
% to GDP	60,5	67,9	75,8	73,0	74,6	79,1

Source: CBR

The credit to retail customers and NFCs has also been growing fast in the last 5 years: from below 10 trillion rubles in 2007 to over 30 trillion rubles by 2013. The growth of loans in national and foreign currencies is presented below.

Figure #1 *Distribution of total loans to between RUB and FCY, trillions of roubles*



Source: CBR, author's calculations

It should be noted that the share of loans in foreign currency has been relatively stable at 30%, albeit decreasing in 2011 and 2012. The majority of these loans are long-term

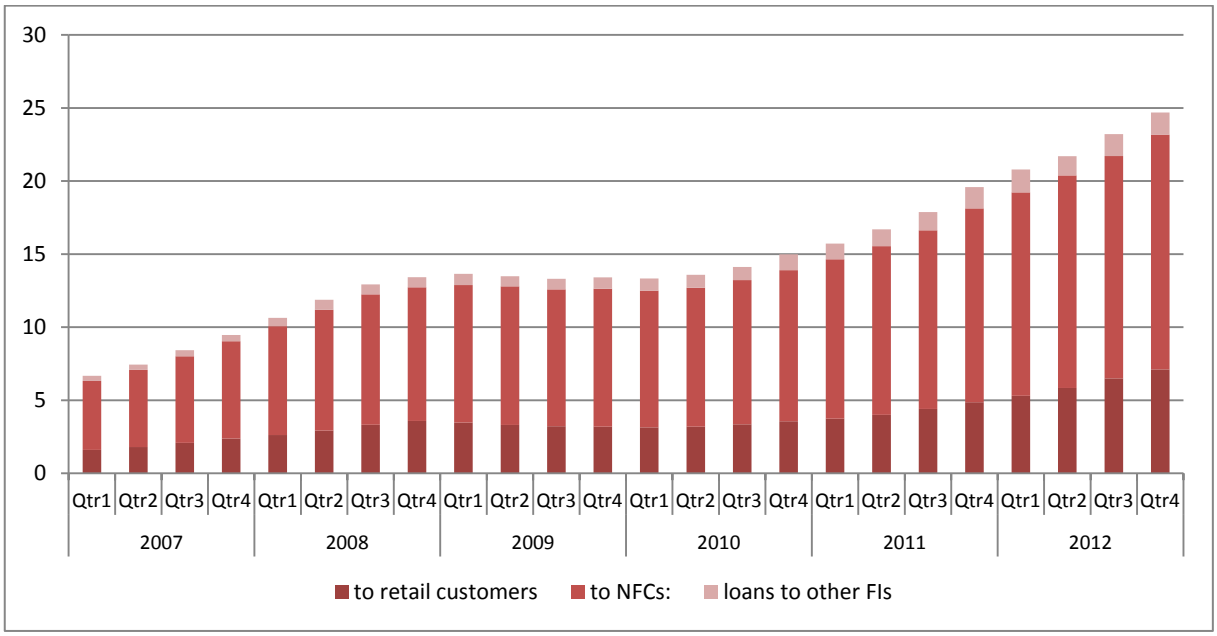
[3] The size of the banking sector is still very small if compared to the bank-based economies (e.g. Germany).
[4] First four months.

loans to NFCs which are able to secure foreign exchange proceeds from export operations.

According to the purpose of this study, we concentrate on ruble loans.

The figure below presents the distribution of loans in national currency between the customer types. It is easy to see that the share of loans granted to other financial intuitions is tiny (but increasing slightly towards the end of the period). The majority of loans are provided to the non-financial corporations, as one might expect.

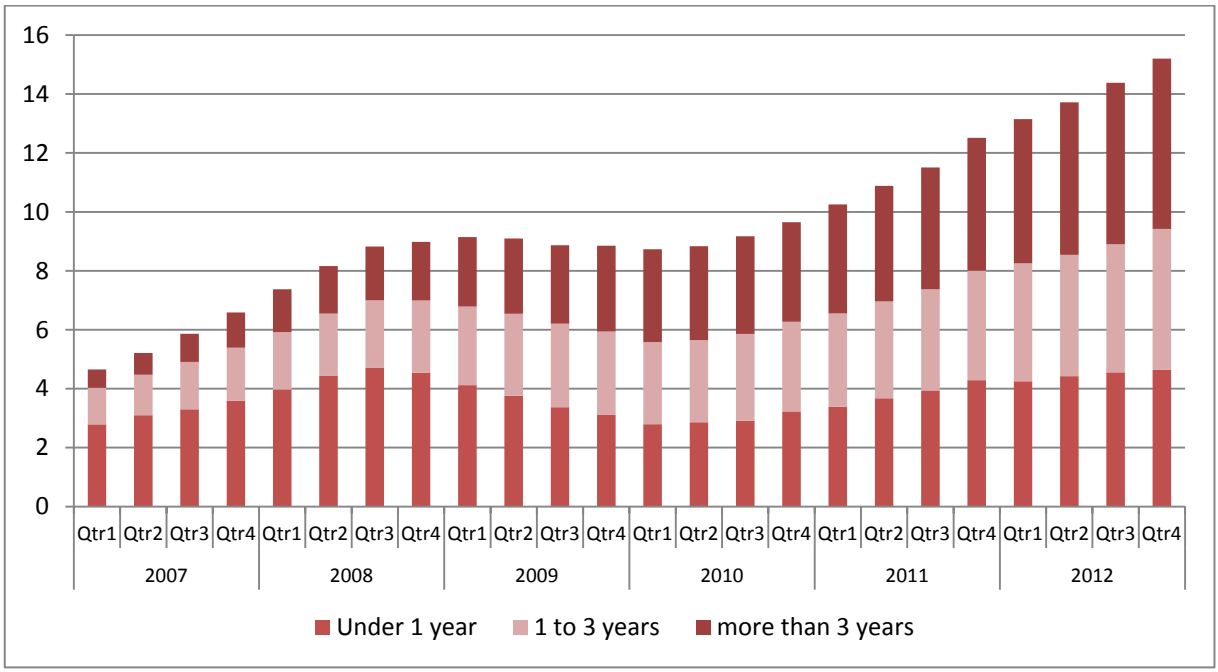
Figure #2 *distribution of loans in roubles between customer types, trillions of roubles*



Source: CBR, author's calculations

The distribution of the largest category of loans – loans to NFCs – between maturity buckets is shown on the figure 3. It can be seen that albeit increasing, the share of long-term loans is low. Note that this distribution is by volume: nevertheless, *the number* of short-term loans issued also clearly dominates within the maturity spectrum. This short-term nature of financing is likely to impose the additional positive effect on the speed of monetary transmission.

Figure #3 *distribution of loans to NFCs between maturity buckets, trillions of roubles*



Source: CBR, author's calculations

The above analysis shows that the growth of credit in Russia has been tremendous: over the last five years the volume of loans to NFCs has more than quadrupled.

At the same time, with the growth of assets of the banking system, the concentration and segmentation of the system remains and has become slightly heavier after the crisis. The share of assets held by the top 5 banks is about 51 percent – up from 45 percent in 2005.

Furthermore, the top 5 percent percentile of banks holds more than 80% of assets of the system, while the majority of banks – roughly about a half of all registered institutions holds just about 1 percent of asset. The statistics is reported in the table below:

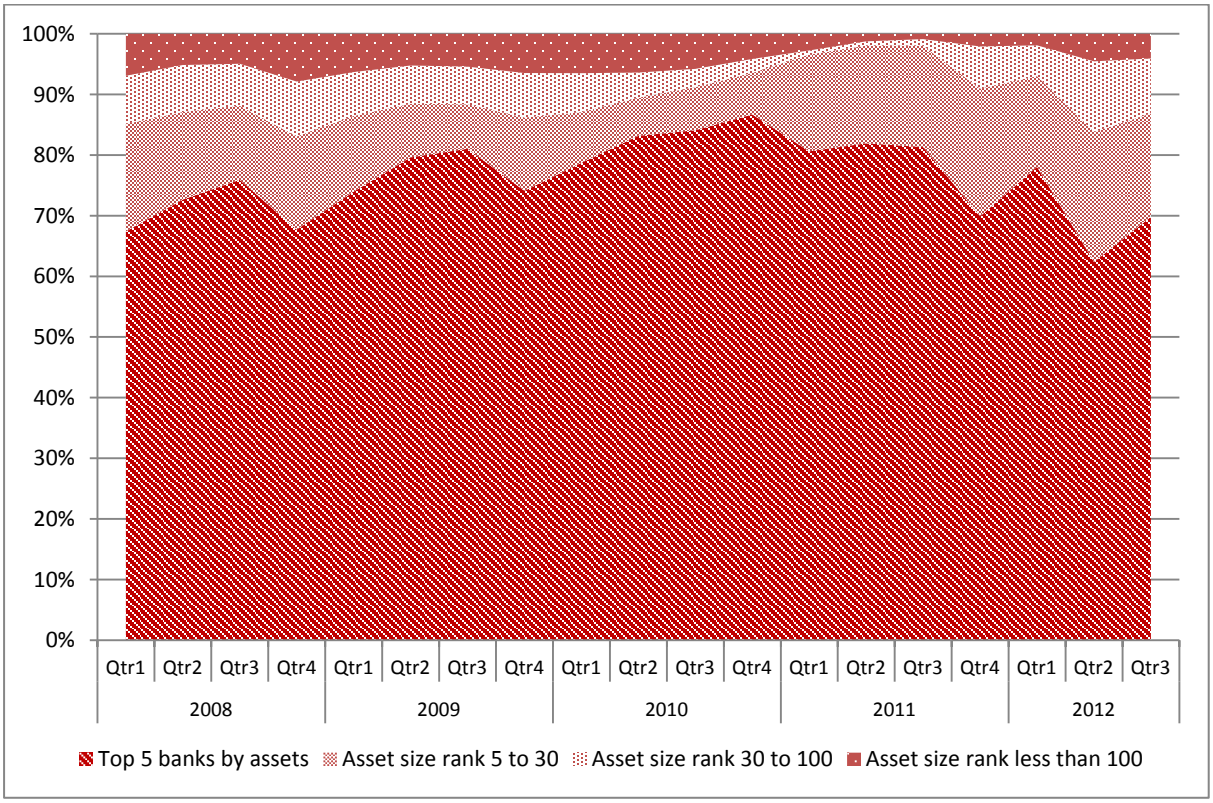
Table #2 *Concentration of assets within the largest banks as of 1 April 2013*

Distribution of banks sorted by the asset size from the highest to the lowest	RUB millions	% of total
First 5	25 361 327	50,9
From 6 to 20	9 534 479	19,1
From 21 to 50	5 716 447	11,5
From 51 to 200	6 453 620	13,0
From 201 to 500	2 226 424	4,5
From 501	546 847	1,1
Total	49 839 144	100,0

Source: CBR

The concentration of the system on the liabilities side of the balance sheets roughly resembles that on the assets size; however, in two aspects it is heavier. The majority of retail deposits are concentrated not in five banks, but just one – 'Sberbank'. The concentration of the funds provided to the system by the federal government and the CBR is even heavier: although the volume of indebtedness on the various facilities varies greatly with time as the above analysis shows, the proportion of the funds provided to the largest 30 banks is relatively constant at 80 -90% as the below figure shows:

Figure #4 *proportion of total government funds held by banks of varying asset size*



Source: data disclosed by banks, author's calculations

We may conclude here that the structure of the banking sector – namely its high concentration and the large share of state-controlled banks is likely to have a positive influence on the homogeneity of banks' reaction to the monetary tightening and the degree of the lending response.

Overview of monetary policy and calculation of the refinancing index

Unlike the many central banks of other countries, the CBR does not rely on the open market operations or the discount window to implement its monetary policy. Instead, it relies on refinancing facilities which may be divided according to the goals they serve. These goals, according to the CBR, are:

- Maintaining of stability of the banking sector;
- Rendering the 'Lender of last resort' function;
- Conduct on the monetary policy.

For our purposes we are interested only in the facilities of the third type, i.e. the instruments for provision of ruble liquidity to the banking sector whether they are standing facilities or market operations of the central bank.

There are generally two types of operations for provision of ruble liquidity that we are interested in: secured loans (the unsecured ones were introduced only during the crisis) and market operations, i.e. reverse (from the side of the CB) REPO transactions.

As for the secured loans, the following table summarizes the types of loans that vary by collateral, rates and terms:

Table #3 *the types of secured loans that the central banks grants as standing facilities*

Type of facility	Term	Possibility for advanced repayment	Annualized rate (as of 27 May 2013)	Type of collateral
Intraday loans	—	—	0	Lombard list securities Non-marketable instruments Gold in the vault of the CB
Overnight loans	1 working day	—	8.25% (refinancing rate)	Lombard list securities Non-marketable instruments[5] Gold placed in the vault of the CB
Lombard loans (fixed rate)	1 working day	—	6,5%	Lombard list securities
Lombard loans (auction determined rate)	1 week to 1 year	Yes	Auction determined	Lombard list securities
Loans secured by non-marketable instruments ('312-p')	1 day to 1 year	Yes	6.75% to 7.75% Depending on term	Non-marketable instruments
Loans secured by gold	1 day to 1 year	Yes	6,5% to 7.5% Depending on term	Gold placed in the vault of the CB

Source: Central Bank of Russia

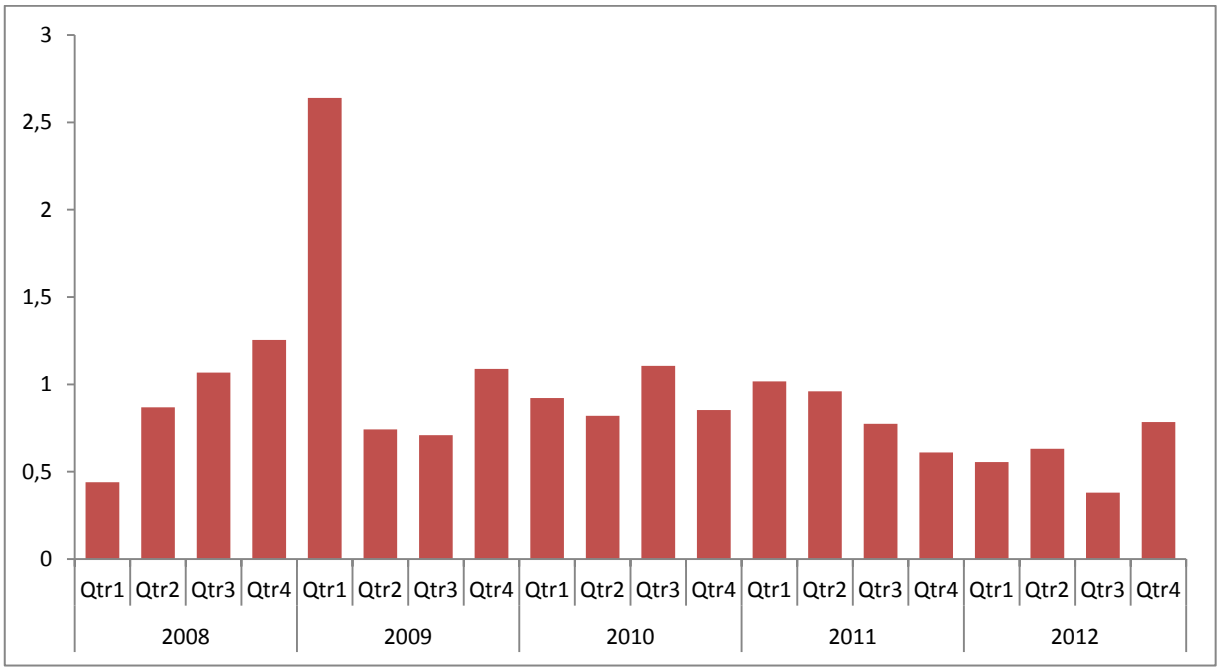
Considering the intraday secured loans, it can be seen from the table that they clearly perform the function of supporting the stability of the banking sector, and especially, the continuity of the payments made within the day. So, despite the large volumes of loans granted and the large amounts of collateral pledged, these loans cannot be considered a policy tool.

Unlike the intraday loans, the overnight standing facility is not free of charge. As the interest rates on these loans are high (in fact these are the highest in the refinancing system of the CB), and due to the perception that the continued use of this facility will

[5] Commercial papers and right of claim on loan agreements that satisfy certain conditions set by the CBR.

attract additional scrutiny from the regulator, these are very narrowly used. The graph below presents the daily borrowing using this facility averaged within quarters:

Figure #5 *Daily indebtedness of banks on overnight loans, averaged within quarters, bln RUB*



Source: Central Bank of Russia, author's calculations

It can be seen from the graph that the daily volumes of borrowing are relatively constant (the only distinct peak is observed in the first quarter of 2009) and is tiny in comparison with the volumes of indebtedness on the other refinancing facilities. Furthermore, in many instances the CBR pronounces the use of this instrument as serving the function of lending facility of last resort and not as a monetary policy tool. Therefore, we drop it from our analysis as well.

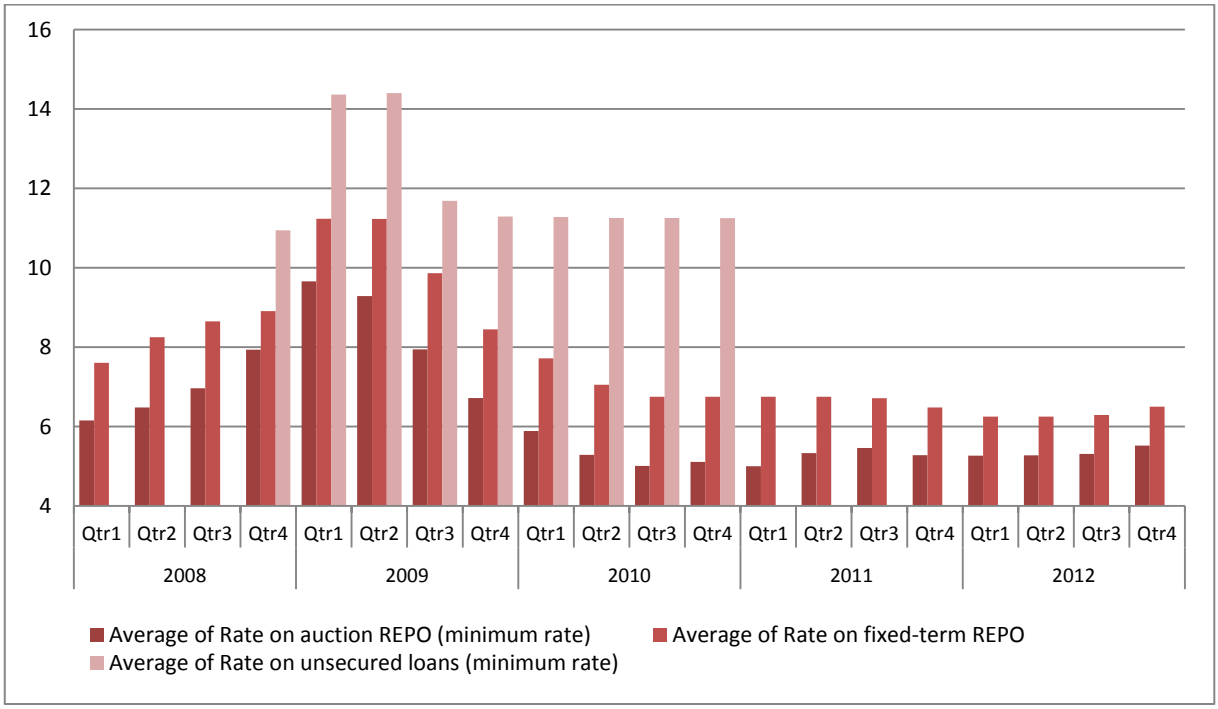
The loans secured by gold in vaults of CB are also not of the great popularity: during 2012-2013 the maximum amount of indebtedness of the system on such loans did not exceed 1.6 bln RUB which also is a tiny amount if compared to the total volumes of indebtedness on other facilities.

Therefore, we are left with the following policy instruments of the CBR in our consideration:

- Fixed REPO rate;
- Auction REPO rate;[6]
- Rate on loans collateralized by non-marketable instruments;
- Rate on Lombard loans.

The rates on these facilities vary greatly over time, and not all of them are adjusted by the CB simultaneously. Figure below presents the rates on selected facilities for the period 2008-2012 (note that unsecured loans were provided only in Q4 2008 – Q4 2010 as an anti-crisis measure):

Figure #6 *rates on selected CBR's facilities in 2008-2012, percent*

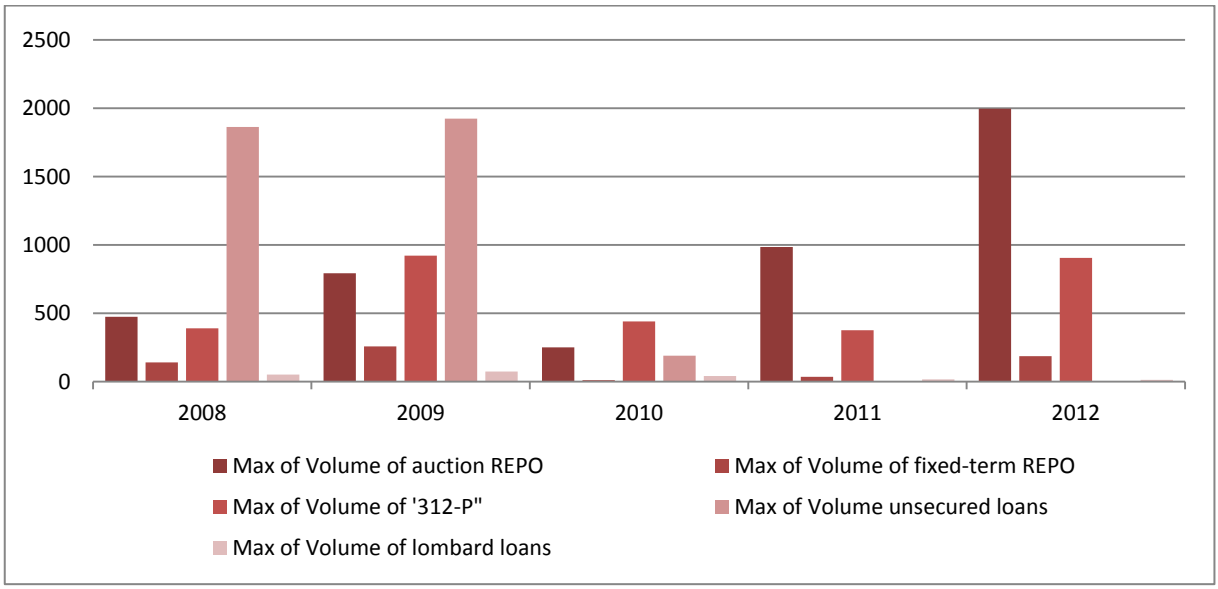


Source: Central Bank of Russia, author's calculations

Furthermore, not only the rates for each facility, but the volumes of the funds provided also vary greatly. The graph below presents the structure of daily indebtedness for the facilities of the CBR under consideration.

[6] There are two possible rates to consider in connection with rates that are determined on auctions: the minimum rate and the factual rate that is determined by the participants during this auction. While the latter represents the actual market conditions, we consider the minimum rate only as it is the rate that CB sets and uses as a policy instrument.

Figure #7 *Maximum volume of daily indebtedness for CBR facilities, for 2008-2012, bln RUB*



Source: Central Bank of Russia, author's calculations

It is easy to see that the volume of liquidity provision varies greatly with the instrument and time. Therefore, we cannot use any of the rates on the CBR facilities as a single indicator of the monetary policy stance.

We therefore need to construct an index of monetary policy that would properly weight the cost of funds provided by the CBR to the banking system. We use the most straightforward way, which is summarized by few steps:

- We collect the data on daily indebtedness on each facility from the CBR's website;
- The share of each facility in total indebtedness is calculated;
- The respective rate is multiplied by the fraction obtained one step before.

Hence, our monetary policy index may be presented by:

$$mp_t = \sum_{i=1}^{N} \frac{d_{it}}{\sum d_{it}} \times r_{it} \qquad (3)$$

Where:

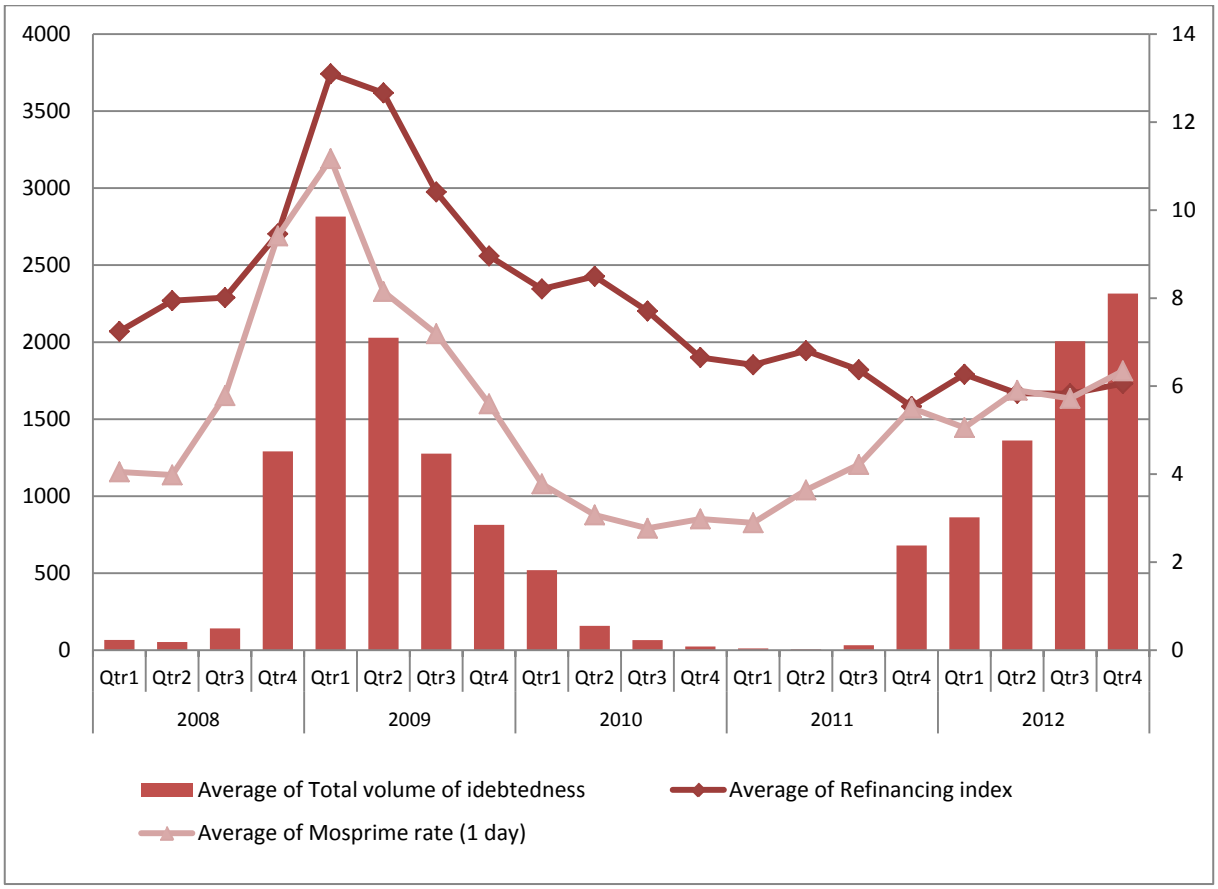
mp_t – monetary policy stance at time t

d_{it} – system's indebtedness on i's facility at time t

r_{it} – rate on i's facility at time t

We hence arrive at an index that adequately represents the actual refinancing rate. The resulting path for the index is shown on the figure below:

Figure #7 *daily indebtedness of banking system on CBR's refinancing facilities averaged within quarters, bln RUB (left scale) and monetary index and Mosprime rate averaged within quarters, per cent (right scale)*



Source: Central Bank of Russia, author's calculations

The index has the desired properties: it does not exhibit any time trend or substantial volatility; nevertheless, it shows considerable variation over the period in question. Hence, it is appropriate to use the index in regressions.

Data and description of the sample

The data for this study may be divided into two[7] distinct types:

- Micro-level individual bank data;
- Macroeconomic data.

As the two types differ in the process of collection, I will thus discuss them in turn.

Microeconomic bank data

For the purposes of this study we use the data obtained directly from the disclosed bank's balance sheet forms[8] and profit and loss account[9] forms.

For the period in question the banks' accounting policies under the Russian Accounting Standards were regulated by the regulation 302-p[10] on the "Rules of Accounting for Credit Organisations Located in the Russian Federation".

The above mentioned regulation, subject to an additional memorandum, signed by the bank, allows public disclosure of the standardized reports. Furthermore, in the beginning of 2007 the more detailed forms have been introduced, but it should be noted though, that not all banks have signed the respective memorandum and some banks (including the large ones) did not report the detailed forms up until early 2010.

The data in BS and P&L forms is structured per account, so we combine it to produce the items of interest, e.g. balance sheet volumes of retail and corporate deposits, loans and other items as well as rates charged or received on these items using the methodology presented in appendix 1.

The variables of principle interest are the rates and volumes of loans as well as the structure of liabilities of the banking sector.

[7] We have also collected the data on the conduct of monetary policy – please see the preceding section.
[8] Form 0409101 - accounts statement.
[9] Form 0409102 – profit and loss account.
[10] In 2012 the 302-p was replaced by a new statute numbered 385-p, but this has no effect on our study as the 385-p is in force only since 1 January 2013.

Rates and volumes of loans

We start the discussion of the asset side of banks' balance sheet with the investigation of the rates that banks of varying asset size have been charging for loans to non-financial corporations (NFC[11]s) and retail customers. The differences between these two groups of borrowers and between the banks of varying asset size are striking.

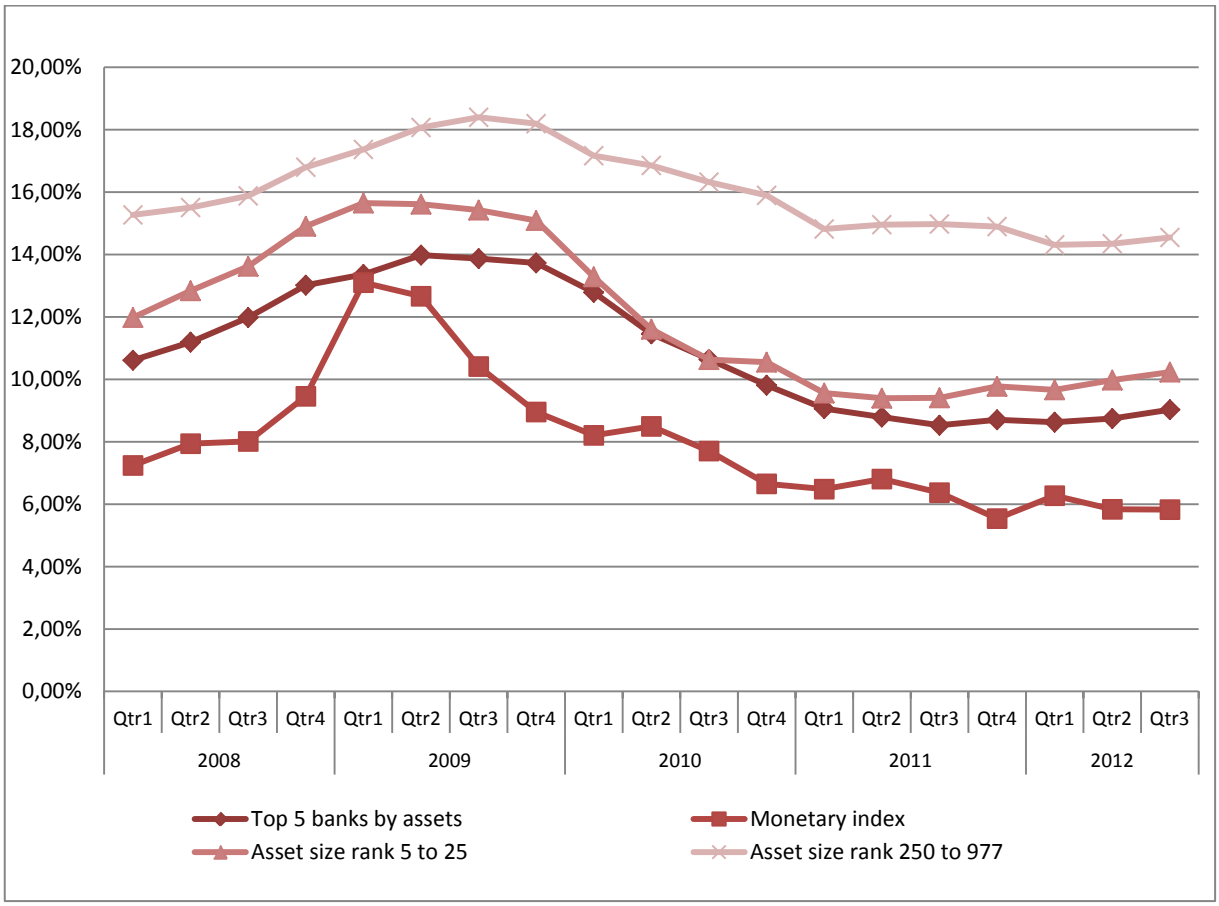
The figure below presents the calculated average rates on loans to non-financial corporations in 2008 – 2012 as well as the monetary index calculated using the methodology presented above. Not all bank groups are present on the graph (this was done to preserve the overall clarity of the depiction), but the distinctive features are clear.

First of all, it is obvious that lending rates react to the changes in the stance of monetary policy – and react considerably. The most prominent reaction is shown by the banks ranked 5 to 25 by assets or the mid-sized banks. The largest bank's reaction is also considerable, but the variability of the rates is obviously smaller than that for the largest ones. Furthermore, it seems that the mid-sized banks maintain the more or less constant spread between the rates that they are able to get on funds attracted from the central bank and the loans they underwrite. This is not completely true for the largest banks: during the crisis time the pace of interest increase on their loans is much slower for them. This is likely to be explained by the more likely overall 'sluggishness' of their portfolios and efficiency problems as portrayed by Karas et. al. (2010).

Yet another interesting result is that the rates on loans to NFCs are consistently and considerably higher for the banks that are located in the bottom of rank, which is likely to be explained by the higher costs of funding that these banks face. We shall consider this explanation later.

[11] It should be noted that we consider loans is roubles granted to the residents of the Russian Federation only.

Figure #8 *rates on RUB loans to NFCs for banks of varying asset size*



Source: data disclosed by banks, author's calculations

Next we turn to the average rates that banks charge on the loans to the retail customers. The graph below depicts the pace that the rates on these loans charged by different groups of banks followed during 2008 – 2012. It is obvious that the patterns that we found in the dynamics of the rates on the loans to NFCs are not present here. Rates are neither increased with the hike in monetary index, nor decreased with its depreciation. Furthermore, small banks do not show rates being considerably higher than that charged by banks ranked 10 to 100 by assets size. Only the largest banks are different in this respect.

Therefore, we conclude that our data suggests that the interest income on retail loans is insensitive to the monetary policy stance and business cycle. It is likely that the retail credit market is regulated not by the rates that are charged on the loans, but by credit rationing, so that banks vary the perceived credit quality (and hence the quality) of the borrowers they grant loans to.

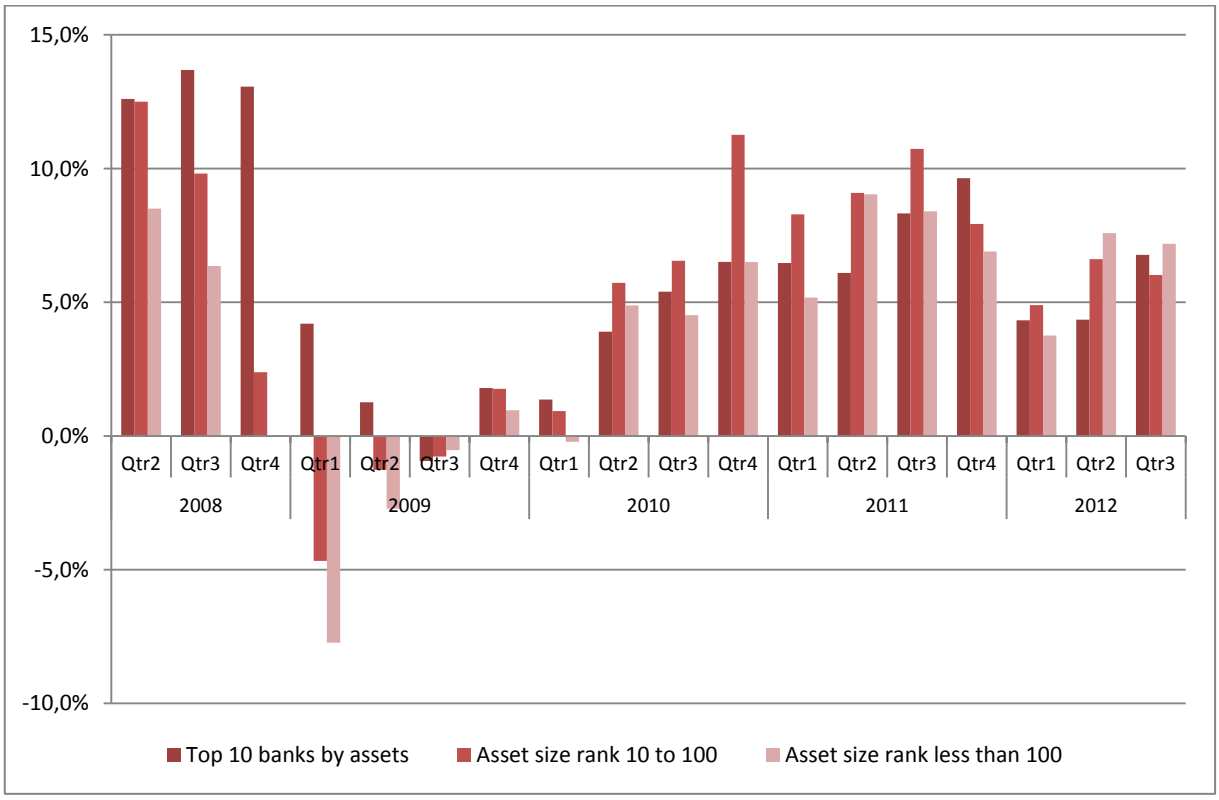
Figure #9 *rates on retail loans in RUB for banks varying by asset size*[12]

Source: data disclosed by banks, author's calculations

We next consider the balance sheet items associated with the loans. The graph below presents the data on the loan portfolio growth (in per cent to the previous period) for banks of varying asset size. It can be seen that the pace of growth varies greatly for the different types of banks: for example, the top ten banks showed on average positive rates of growth of loan portfolio in 2008 and first half of 2009, while other bank's loan portfolios were decreasing. Furthermore, the dimensions of the data vary greatly: from trillions of RUB for 'Sberbank' to millions for the smallest banks. At the same time, the standard deviation of the growth rate is also high, albeit roughly constant. Note that this may create problems for estimation of the effect of monetary index hike on the loans growth.

[12] We consider only interest income, hence any commissions are not included.

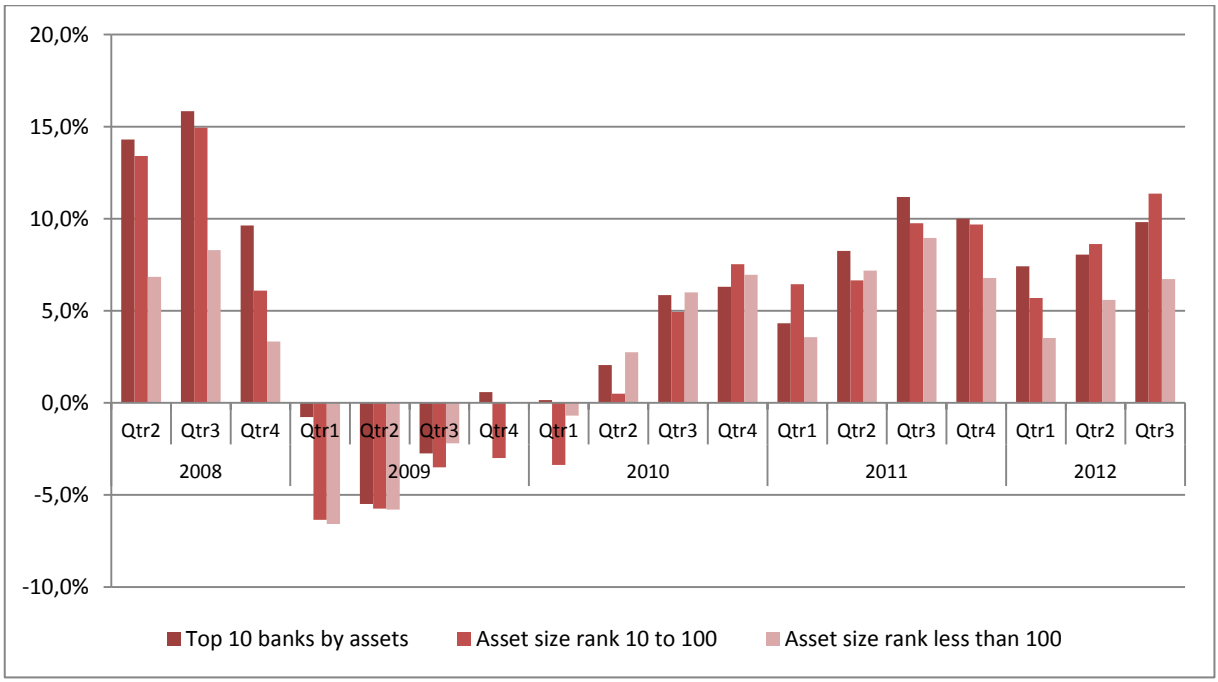
Figure #10 *total loan portfolio growth for banks of varying asset size, per cent to previous period*



Source: data disclosed by banks, author's calculations

Note that the volatility of retail loans portfolio growth is much less than that of corporate loans; furthermore the degree of homogeneity across the banks of different sizes is much higher.

Figure #11 *retail loans portfolio growth for banks of varying asset size, per cent to previous period*



Source: data disclosed by banks, author's calculations

Control variables: liquid assets and loan losses

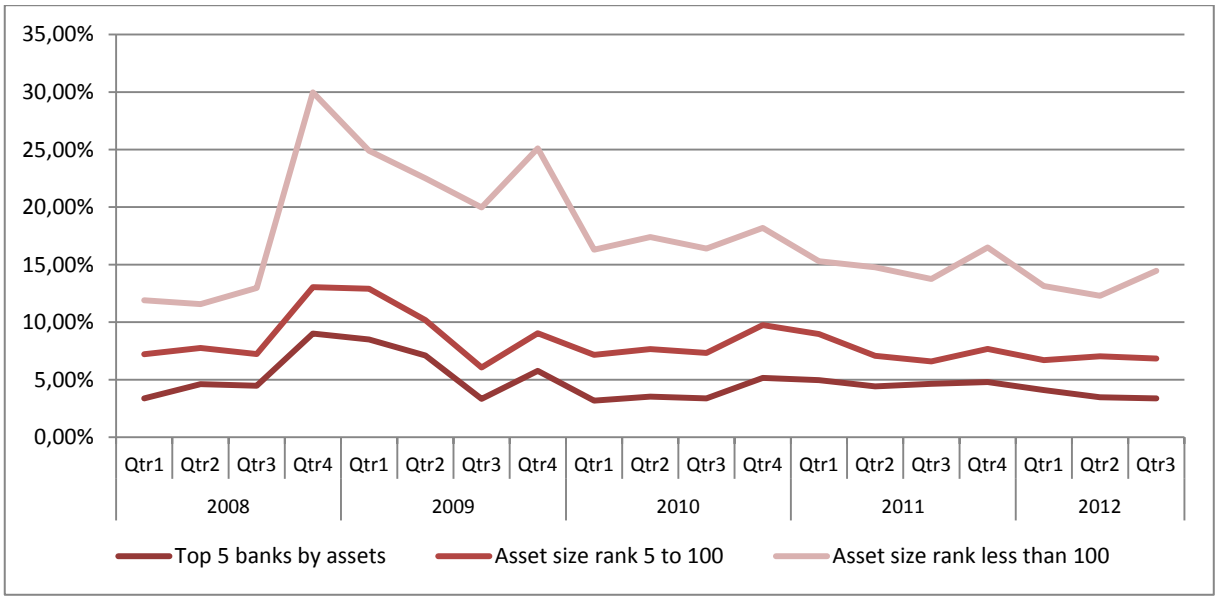
Following the literature on transmission mechanism studies, we include several variables to control for bank heterogeneity. As described in the chapter summarising the empirical model of this study, we choose asset size, liquidity and loan losses[13] as such variables. The first one measures the size of the bank's total assets share in total assets of the banking system and allows controlling for the heterogeneities that are connected with bank size, which we have depicted above.

The latter two are desired to provide useful grounds for isolation of the effects that are not captured by the asset size. The methodology of data collection is given in the appendix 1; therefore, we proceed straight to the description of data.

As for the share of liquid assets, as one might suspect, this is inversely proportional to the size of the bank. Therefore, Russian data confirms the pattern found elsewhere, e.g. in US as evidenced by Kashyap and Stein (2000). The pattern of the liquid assets during the crisis is shown on the figure below. All banks increased their buffer holdings during the last quarter of 2008 and the first two quarters of 2009, and this increase was higher for the smallest banks (for which the average proportion of liquid assets to net assets peaked to nearly 30%). At the same time, for most banks, irrelevant of the asset size, during the aforementioned period, the holding of liquid assets more than doubled:

[13] We use 101 forms (the usual methodology) to derive the first two. We use data from RBC ratings for the latter (http://rating.rbc.ru/).

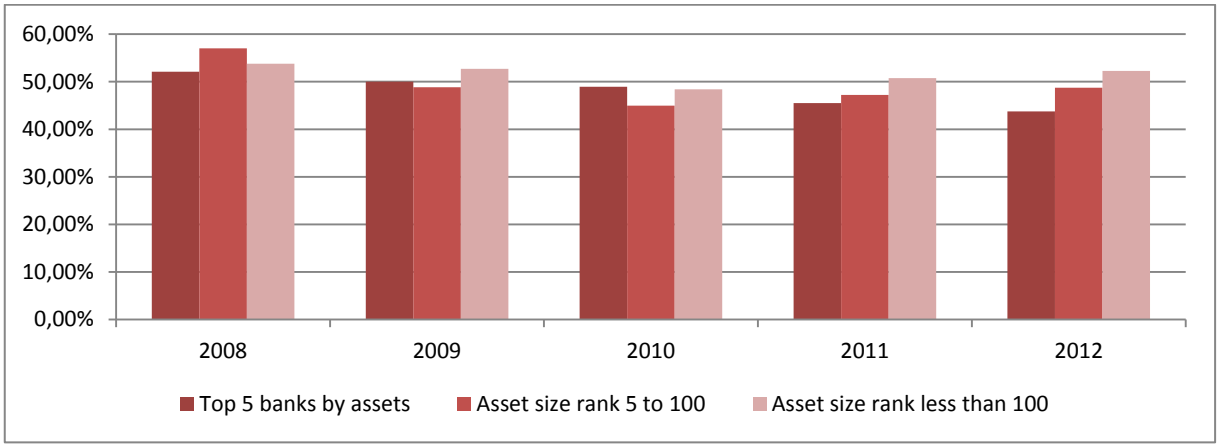
Figure #12 *share of liquid assets in total assets for banks of varying asset size, per cent*[14]



Source: data disclosed by banks, author's calculations

Therefore, our findings confirm that often stated in the literature that the small banks hold larger buffer stocks. However, the usual second part of this statement, namely that the smaller banks thus make fewer loans (found in, e.g. Juurikkala et. al. (2011)) is not confirmed by our findings. The figure below represents the percentage that loans had in net assets for banks of various sizes. It is clear that there is no evident pattern that would allow us to discriminate between small and large banks on the basis of it:

Figure #13 *share of loans in total assets for banks of varying asset size, per cent*



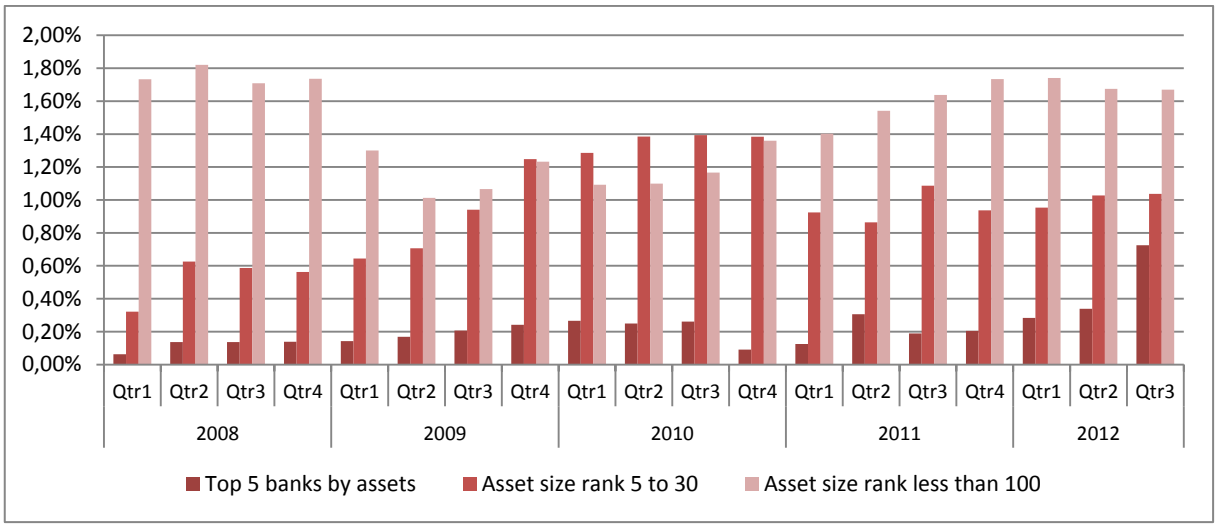
Source: data disclosed by banks, author's calculations

[14] It should be noted that we consider all assets that are deemed to be liquid by Russian Accounting Standards to be liquid (e.g. securities) as such. This may not reflect the actual liquidity profile, especially for the small banks.

We next consider the other commonly used control variable – the loan loss – which is aimed at representing the overall stability and strength of a bank. We again rank banks by asset size and calculate the percentage that the loan losses were to the total loan portfolio for each quarter. We find striking differences in the losses incurred by the top five banks, which never exceeded 1%, and losses of the smaller banks which are often several times as high as losses of the largest banks. Further interesting point is that loan losses present a high degree of 'sluggishness', i.e. the losses start to increase only in the third quarter of 2009, while the peak of the crisis (highest rates on CBR's facilities, negative loan portfolio growth rates) has been in the first two quarters of 2009. It is furthermore interesting to note that the loan losses actually *decrease* for small banks while they were increasing for the large ones (Q2 2009 – Q3 2010), the average loan loss for a bank ranked less than 100 by asset was down to approximately 1% from nearly 1.8% before the crisis. This may be explained by high rate of loan portfolio contraction for smaller banks which we have depicted above and the 'flight to quality'.

Overall, we expect to find only a limited significance for our control variables due to the patterns described above. This is especially true for the loan loss variable which adjusts relatively slowly and shows unexpected patterns for the small banks.

Figure #14 *loan loss as a proportion of loan portfolio, per cent*



Source: data disclosed by banks, author's calculations

Rates and volumes of liabilities of banks

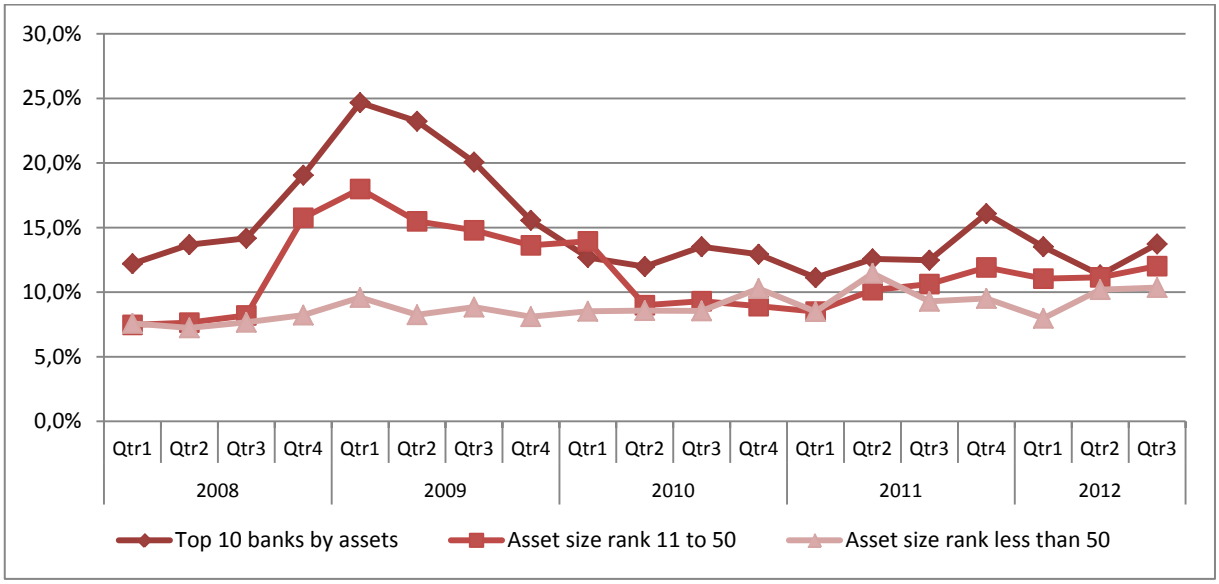
Having considered the assets side of the banks' balance sheets we now turn our attention to the liabilities side.

We first consider the proportion of the borrowed funds in the liabilities structure of the banks. We define the borrowed funds as the funds attracted from other financial corporations or the central bank. The interesting pattern that the data shows is that the proportion of borrowed funds in the liabilities of banks is consistently higher for larger banks (e.g. in the top ten banks of the sample this proportion is close to 13% in non-crisis times, while for the lower ranked banks comprising the majority of our sample, this percentage is more close to 6% during the whole period).

A further point worth noting is that the larger is the bank, the higher is the increase in the proportion of borrowed funds in the liabilities structure. For the banks ranked below 50 by assets the increase in the share of borrowed funds during the crisis in negligible, while for the largest banks it amounted, on average to 113%. This is likely to be explained mostly by the fact that the smaller banks are almost completely shut from the access to the markets for external finance, however, the fact that foreign financing and other types of financing that the large banks were using and that were rapidly shutting as the crisis evolved.

The figure below depicts these patterns:

Figure #15 *proportion of borrowed funds relative to net assets for banks varying by asset size*



Source: data disclosed by banks, author's calculations

However, the fact that the largest banks had to substitute the external financing with borrowing in rubles did not lead to higher relative costs of borrowing for these banks. Contrary to this possible prediction, larger banks (exactly that had seen the share of borrowed funds in their liabilities increase during the 2008-2009 crisis) were able to secure interbank loans at a rate considerably less than those banks that did not increase the share of the borrowed funds, despite the probable effects form the high demand.

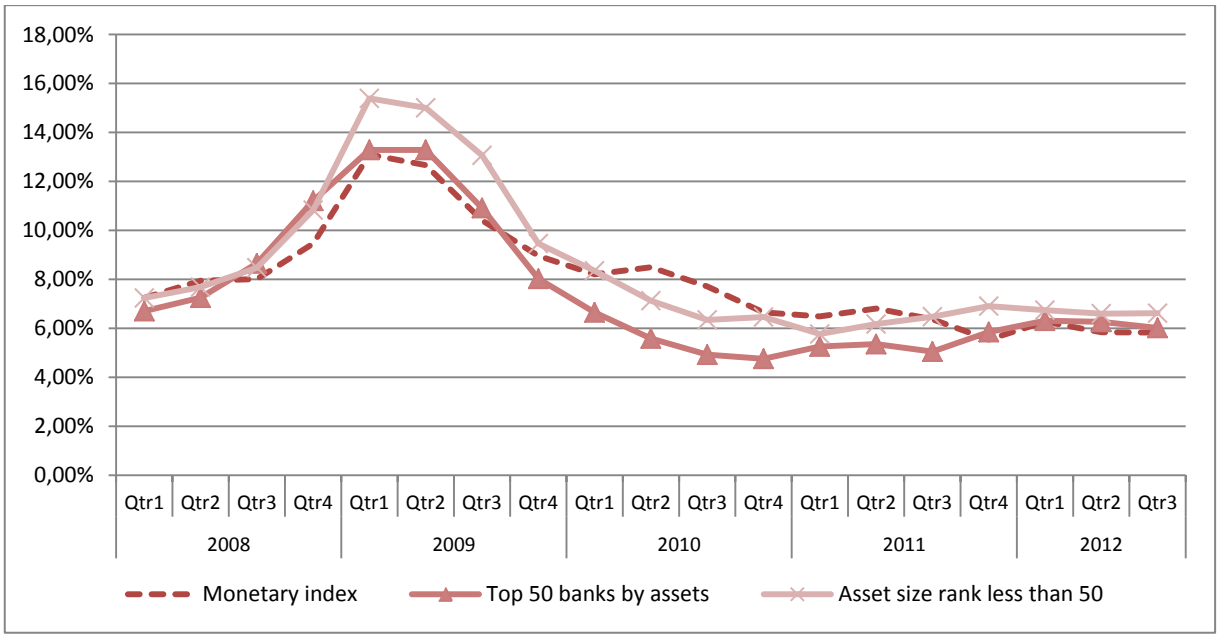
It is also interesting to note that the finance premium 'for being a small bank' is relatively constant, and remained to be high during the whole period under consideration.

The other interesting pattern is that the monetary index is generally below the average cost of funds for large banks (although, only marginally) and considerably below the average cost of funds for the banks ranked below 50 by asset size during the crisis period. This may again be considered as a direct evidence of fragmentation of the market, where not all banks can access the cheaper (in this case the CBR's) financing equally despite the fact that the central bank itself does not impose any restrictions on the credit quality of its counterparties for the majority of its refinancing operations.

As the CBR does not require any premiums for poor credit quality either, the fragmentation may only be explained by unequal possession of collateral that the CBR deems acceptable by the banks of varying asset size.

The figure below presents the findings we have just described.

Figure #16 *average interest expense on interbank loans incurred by banks of varying asset size, per cent*



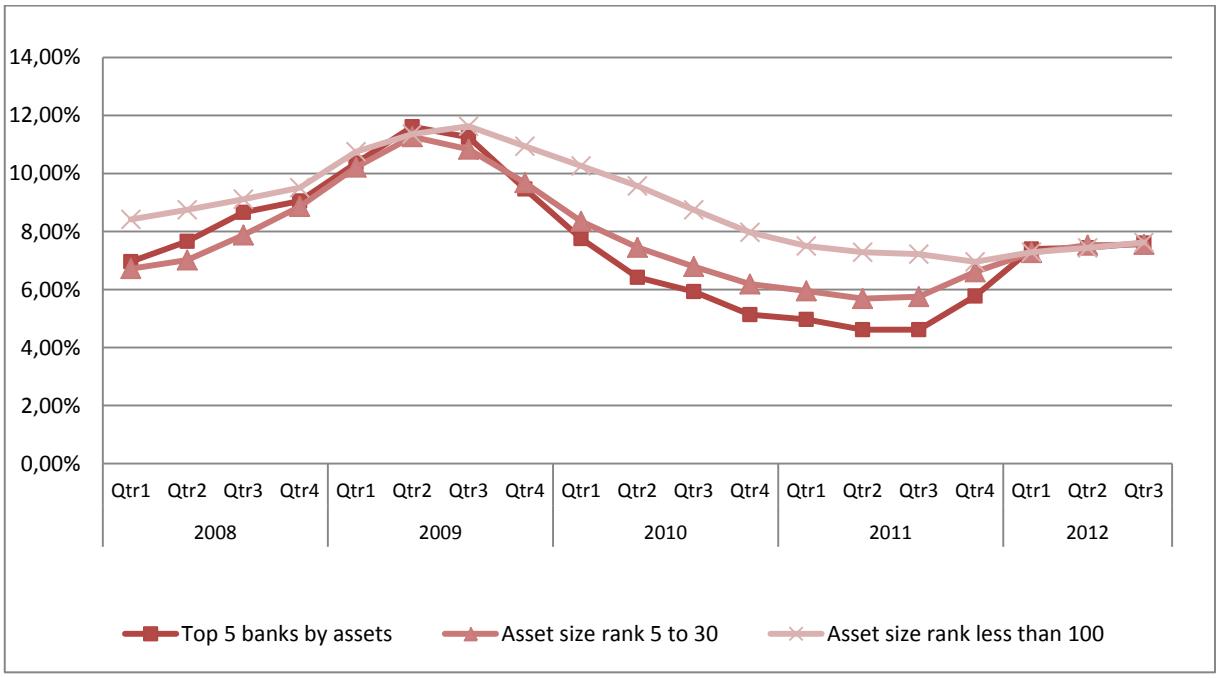
Source: data disclosed by banks, author's calculations

We next consider the other important source of funding (which, varying on the asset size of the bank contribute to 35% to 60% of the liabilities of an average bank in the group[15]) – the deposits of corporations and retail customers.

As for the deposits of NFCs, the interest expenses (i.e. the rates that the corporate depositors received on their funds) varies over time and between the banks. The time difference is large and generally corresponds to the monetary policy stance. It should be noted that the rates on NFCs' deposits are more sluggish for smaller banks, which represents the main cross-sectional finding, but there may be accounting reason for this due to the fact that both portfolios and interest rate expenses are small for the lower-ranked banks. The figure below represents the dynamics:

[15] For a detailed discussion of these patterns please refer to the chapter on stylized facts about monetary policy and banking system in Russia.

Figure #17 *interest expense on deposits of NFC incurred by banks of varying asset size, per cent*



Source: data disclosed by banks, author's calculations

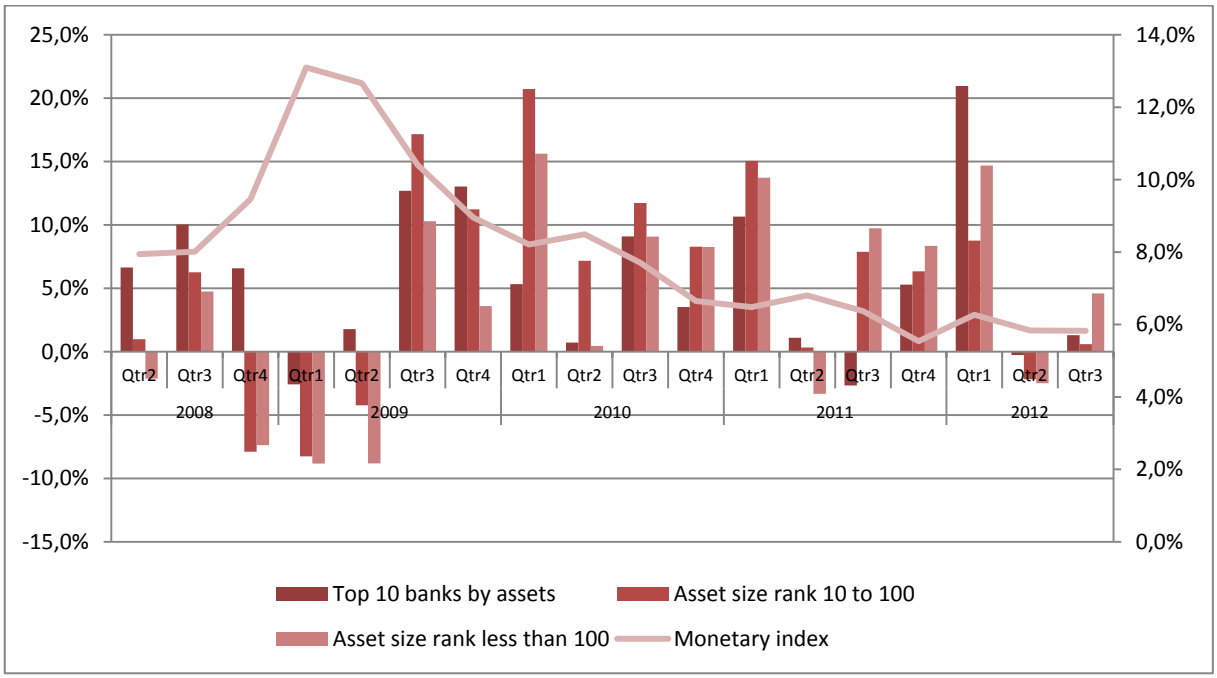
The portfolio the corporate deposits is much more volatile than the rate charged on it. The figure below represents the changes (growth rates) in portfolios of deposits of NFCs for the banks of varying assets size.

It is interesting to note how the portfolio growth rate varies for the top-tier and smaller banks: just before the decrease in total amount of funds deposited within the system, the portfolio of large banks is growing, while smaller banks see their deposits base decrease. This is clearly a flight to quality. At the same time, during the relative monetary easing, the mid-sized banks exhibit the highest growth rates, due to balanced effects of competitive rates and relatively stable performance.

It is interesting to note how volatile the sizes of portfolios are: for an average of 90 banks, for example, the quarterly growth rates range from minus 10% to 20%.

These patterns are depicted on the figure below, which also shows the monetary index calculated according to the methodology presented above.

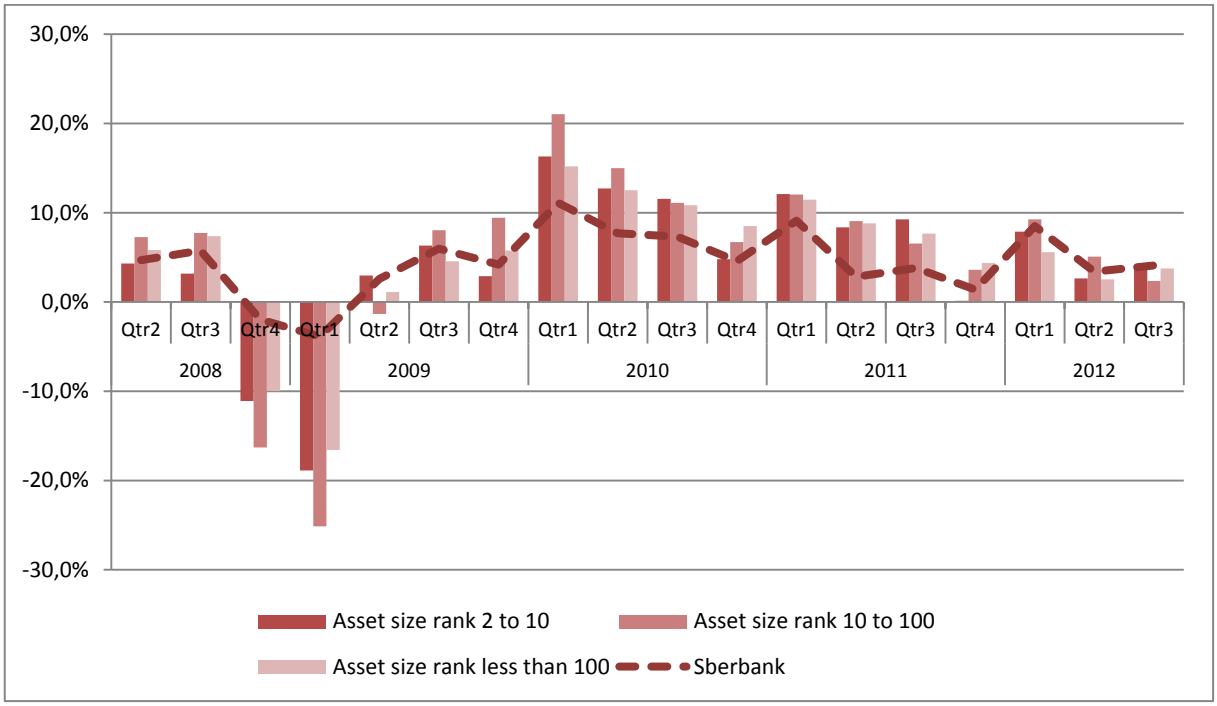
Figure #18 *deposits of NFC portfolio growth rates for banks of varying asset size, per cent*



Source: data disclosed by banks, author's calculations

Turning to the retail deposits portfolio, we can see that it is much less volatile than the corporate deposits portfolio. This is partially described by the structure of the market: a vast majority of funds of retail customers is concentrated in 'Sberbank', but also is due to the fact that retail customers are usually slower to react to interest rate changes than the corporations. The patterns are depicted on the figure below.

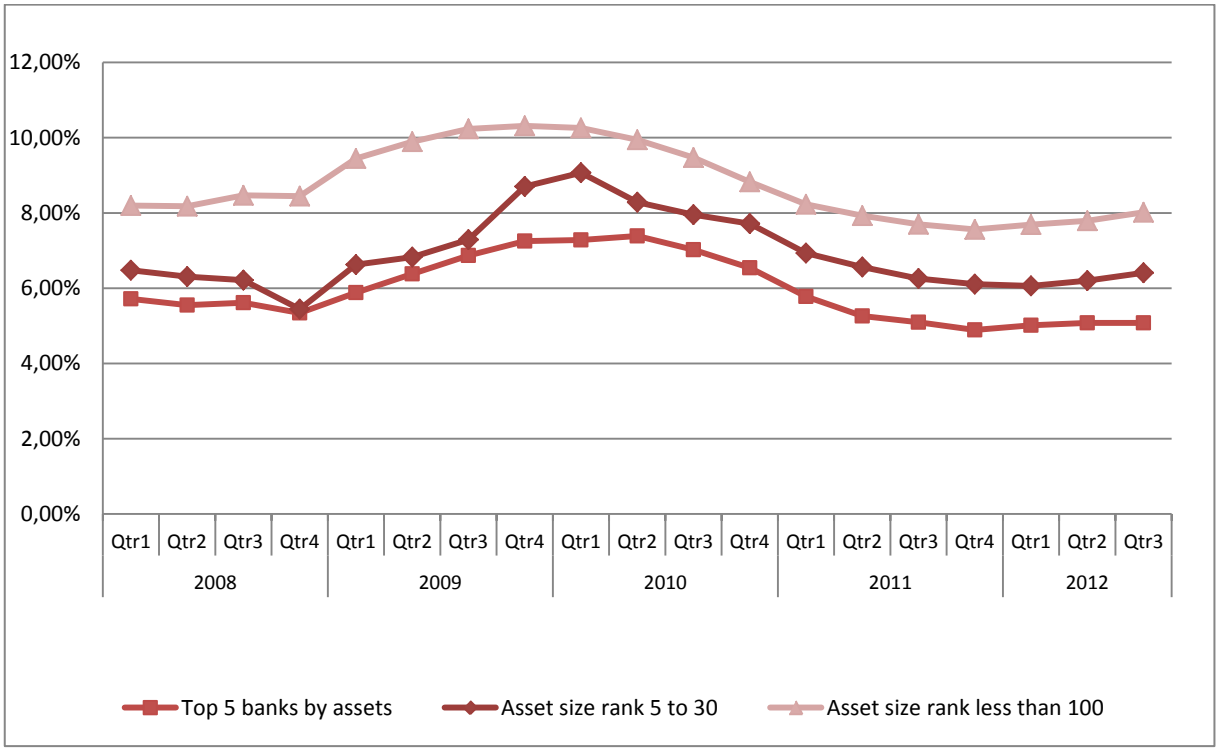
Figure #19 *average interest expense on retail deposits incurred by banks of varying asset size, per cent*



Source: data disclosed by banks, author's calculations

The interest expense on retail deposits is also much more sluggish that that on the corporate deposits: the peak of the rates is roughly in the first quarter of 2010, almost a year after the peak in the rates on the interbank market. Also, unlike the corporate deposits market, the retail rates show a clear cross-sectional pattern: smaller banks pay considerable premium over the rates that are paid by the top-tier (most of them are state-owned) banks. This is depicted on the figure below.

Figure #20 *average interest expense on retail deposits incurred by banks of varying asset size, per cent*



Source: data disclosed by banks, author's calculations

Unit-root test

Although we have seen that all series are 'well-behaved', we perform a unit-root test for the series on the loans to non-financial corporations in order to use it safely in our regressions. Below is the output from Stata. The low p-value indicates that the panels are almost certain to be stationary.

```
Levin-Lin-Chu unit-root test for loans_nfc
------------------------------------------
Ho: Panels contain unit roots               Number of panels  =    512
Ha: Panels are stationary                   Number of periods =     19

AR parameter: Common                        Asymptotics: N/T -> 0
Panel means:  Included
Time trend:   Not included

ADF regressions: 1 lag
LR variance:     Bartlett kernel, 8.00 lags average (chosen by LLC)
--------------------------------------------------------------------------------
                    Statistic      p-value
--------------------------------------------------------------------------------
 Unadjusted t       -30.9230
 Adjusted t*         -5.7271        0.0000
--------------------------------------------------------------------------------
```

Macroeconomic data

The macroeconomic data was relatively easy to collect. We took the GDP growth index and CPI inflation index from the CBR's website, and following Deryugina and Ponomarenko (2010) use them as proxies for the loan demand.

Econometric model and estimation methodology

Following De Souza (2006), we aim to test the ability of the central bank to alter the supply of the loans in the economy and the rate that is charged on the loans.

Our null hypotheses therefore are:

H_1: The Central Bank of Russia monetary policy stance has no effect on the banks' loan portfolio growth.

H_2: The CBR's monetary policy stance has no effect on loan rates.

Therefore, our results will allow us to draw conclusions on the effectiveness of both credit channel of monetary policy transmission and the more conventional interest rate channel.

We follow Juurikkala et. al. (2011) and base our empirical model on the following theoretical equations:

$$M^d = -\delta_1(mp) + \delta_2 = M^s \qquad (4)$$

Equation (#) states that deposit or money demand is a function of the monetary policy stance (an inverse relationship) and δ_2 which represents all other factors that are not captured by monetary policy stance.
As before, we define monetary policy stance as in (3):

$$mp_t = \sum_{i=1}^{N} \frac{d_{it}}{\sum d_{it}} \times r_{it}$$

Where:
mp_t – monetary policy stance at time t
d_{it} – system's indebtedness on i's facility at time t
r_{it} – rate on i's facility at time t

Further, the loan demand is assumed to be a function of output (Y), price level (P) and interest rate (r). We define it as below:

$$L^d = \alpha_0 + \alpha_1 Y + \alpha_2 P - \alpha_3 r \qquad (5)$$

Loan supply is assumed to be a function of interest rate (positive dependence), cost of funds C_i, which in turn is a function of monetary policy (negative dependence), and a vector of bank's characteristics X_i:

$$L^s = \beta_1 + \beta_2 r - \beta_3 C_i(mp) + \gamma_1 X_i \qquad \textit{(6)}$$

On the basis of the above equations we derive the following theoretical equations that we will test empirically:

$$L_i = \rho_1 y + \rho_2 p - \rho_3 mp + \rho_4 X_i + constant \qquad \textit{(7)}$$

$$r_i = \theta_1 y + \theta_2 p + \theta_3 mp + \theta_4 X_i + constant \qquad \textit{(8)}$$

Where:

L_i is a loan portfolio of bank i

r_i is a rate that is charged on the loans by bank i

Hence, we follow the usual underlying assumption in the literature that the banks face identical loan demand (Juurikkala et. al., 2011). Following this work, we further assume that monetary policy stance variable captures the monetary effects and not the potential effects of the general macroeconomic variables.

Empirical model

In estimation of the lending channel via the loan supply effects, we follow De Souza (2006), Golodniuk (2006) and Juurikkala et. al. (2011) and estimate the model (9) in first differences. This allows us to eliminate the heterogeneity effects and the huge differences in the dimensions of the data. The basic model is thus:

$$\Delta LN_{it} = \alpha_i + \gamma_i \Delta LN_{it(-1)} + \sum_{j=0}^{l} \beta_j \, \Delta mp_{t-j} + \theta_j X_{i,t-1} + \sum_{j=0}^{l} \delta_j \Delta \, Macro_{t-j} + u_{it} \qquad \textit{(model 1)}$$

Where $i = 1, \dots, N \;\; t = 1, \dots, T$. N is the number of banks and T is the total number of time periods (quarters). ΔLN_{it} is a difference of logarithm of loan portfolio at time t and

$t-1$. Δmp_{t-j} is a difference between monetary index defined by (#) at time t $t-j$. $X_{i,t-1}$is a vector of bank characteristics at time $t-1$ $Macro_t$ is a vector of macro control variables (GDP and CPI).

Presence of bank heterogeneity will generally make OLS estimates biased and inconsistent (Golodniuk, 2006). At the same time, if we eliminate the fixed effects using the within transformation, the presence of lagged dependent variables will deliver inconsistent estimates (Juurikkala et. al., 2011). Therefore, the literature, including De Souza (2006) and Golodniuk (2006) suggests the use of Generalized Method of Moments (GMM) suggested by Arrelano and Bond (1991) which applies the entire set of lagged values of endogenous variables as instruments. This basic regression output from 'Stata' is presented below:

```
Arellano-Bond dynamic panel-data estimation  Number of obs         =      2897
Group variable: regnum                       Number of groups      =       278
Time variable: quarter
                                             Obs per group:    min =         1
                                                               avg =  10.42086
                                                               max =        16

Number of instruments =    144               Wald chi2(8)          =    365.96
                                             Prob > chi2           =    0.0000
One-step results
```

D. lg_bs_loans	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lg_bs_loans						
LD.	.2753634	.0207054	13.30	0.000	.2347816	.3159451
d1_mon_index	-1.988767	.2375983	-8.37	0.000	-2.454451	-1.523083
ld1_mon_in~x	-.1397418	.2014916	-0.69	0.488	-.534658	.2551744
bs_liquid_~s						
L1.	-.3451079	.065981	-5.23	0.000	-.4744282	-.2157876
loan_loss						
L1.	-.2058717	.2558455	-0.80	0.421	-.7073197	.2955763
bs_assets						
L1.	.8364461	2.819686	0.30	0.767	-4.690037	6.36293
output_index						
D1.	-.0000359	.0007989	-0.04	0.964	-.0016018	.0015299
cpi						
D1.	.0020694	.0016067	1.29	0.198	-.0010796	.0052185
_cons	.0616522	.012069	5.11	0.000	.0379973	.0853071

```
Instruments for differenced equation
        GMM-type: L(2/.).D.lg_bs_loans
        Standard: D.d1_mon_index D.ld1_mon_index LD.bs_liquid_assts LD.loan_loss
Instruments for level equation
        Standard: _cons
```

The model looks sensible, and the diagnostic statistics are high.

Following the literature and our theoretical model we also estimate the effect of monetary policy on rates as:

$$r = \alpha_i + \sum_{j=0}^{l} \beta_j \, y_t + \sum_{j=0}^{l} \gamma_j \, p_t + \sum_{j=0}^{l} \rho_j \, mp_{t-j} + \theta_j X_{i,t-1} + u_{it}$$

(model 2)

Given that our series on rates are 'well-behaved' and there are no huge differences in the dimensions of data (all rates are within rather narrow range) we find it sufficient to eliminate the fixed effects using within transformation and not to include lagged dependent variables or estimate the model in differences. The output of 'Stata' for this regression is shown below:

```
Fixed-effects (within) regression               Number of obs      =      3746
Group variable: regnum                          Number of groups   =       390

R-sq:  within  = 0.5683                         Obs per group: min =         1
       between = 0.2366                                        avg =       9.6
       overall = 0.3279                                        max =        18

                                                F(7,3349)          =    629.79
corr(u_i, Xb)  = 0.0136                         Prob > F           =    0.0000
```

loans_nfc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
mon_index	.4567754	.0293953	15.54	0.000	.3991408	.5144101
l1_mon_index	.4667987	.0199698	23.38	0.000	.4276446	.5059529
bs_liquid_~s						
L1.	.021192	.0057223	3.70	0.000	.0099724	.0324116
loan_loss						
L1.	.0140189	.0133141	1.05	0.292	-.0120856	.0401234
bs_assets						
L1.	-.1459256	.1923109	-0.76	0.448	-.5229843	.2311332
cpi	.0002513	.0000906	2.77	0.006	.0000736	.000429
output_index	.0007543	.0000712	10.59	0.000	.0006146	.000894
_cons	-.0406742	.0115684	-3.52	0.000	-.063356	-.0179924
sigma_u	.02348509					
sigma_e	.01357456					
rho	.7495731	(fraction of variance due to u_i)				

```
F test that all u_i=0:     F(389, 3349) =    18.84           Prob > F = 0.0000
```

We justify the fixed-effects specification by using a Hausman test for specification (the 'Stata' output is available in the appendix)

Although the model looks sensible and all diagnostic statistics are high, we additionally conduct the tests for heteroskedasticity and autocorrelation.

Poi and Wiggins (2001) suggest an Likelihood-Ratio test for panel-level heteroskedasticity: as iterated GLS with heteroskedastic panels produces MLE, we can use a LR test to make inference about heteroskedasticity. The results of the test suggest that heteroskedasticity is a problem (as H0 of homoscedasticity is rejected at all reasonable significance levels).

```
Likelihood-ratio test                                 LR chi2(313)=   4684.90
(Assumption: model nested in hetero)                  Prob > chi2 =    0.0000
```

To test for autocorrelation in panel data series we use Wooldridge (2002, 282–283) test for autocorrelation. Drukker (2003) provides simulation results showing that the test has good size and power properties in reasonably sized samples. We use user-written program for 'Stata' application to test the H0 of no autocorrelation. The test results are reported below:

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
    F(  1,     254) =     46.833
           Prob > F =      0.0000
```

The test statistic shows that autocorrelation is also present in our series.

We therefore need to control for the revealed problems. One option is to use GLS correcting for both problems. However, this does not include the fixed effects that are important from the theoretical and practical point of view. There are also econometric reasons (e.g. found in Beck, 2001) that the FGLS should not be used. The thorough search on the 'Stata' support forum reveals that the fixed effect estimation will provide the desirable results if the cluster option is used on cross-section identifiers.

We use this feature of the 'Stata' package to obtain the following output (note the corrected t-statistics)

```
Fixed-effects (within) regression               Number of obs      =      3746
Group variable: regnum                          Number of groups   =       390

R-sq:  within  = 0.5683                         Obs per group: min =         1
       between = 0.2366                                        avg =       9.6
       overall = 0.3279                                        max =        18

                                                F(7,389)           =    178.92
corr(u_i, Xb)  = 0.0136                         Prob > F           =    0.0000

                                 (Std. Err. adjusted for 390 clusters in regnum)
```

loans_nfc	Coef.	Robust Std. Err.	t	P>|t|	[95% Conf.	Interval]
mon_index	.4567754	.0310226	14.72	0.000	.3957825	.5177684
l1_mon_index	.4667987	.0237207	19.68	0.000	.420162	.5134354
bs_liquid_~s						
L1.	.021192	.0077998	2.72	0.007	.005857	.036527
loan_loss						
L1.	.0140189	.0312503	0.45	0.654	-.0474218	.0754596
bs_assets						
L1.	-.1459256	.2303079	-0.63	0.527	-.5987295	.3068784
cpi	.0002513	.0001259	2.00	0.047	3.78e-06	.0004987
output_index	.0007543	.0000921	8.19	0.000	.0005732	.0009354
_cons	-.0406742	.0165195	-2.46	0.014	-.0731528	-.0081956
sigma_u	.02348509					
sigma_e	.01357456					
rho	.7495731	(fraction of variance due to u_i)				

Estimation results and robustness checks

The table below summarizes the results for the estimated regressions of the model (10) for interest rate channel of transmission:

Table #4 *Results of estimations for model 2*

Variable	Specification 1	Specification 2[16]	Specification 3
Monetary index (contemporaneous)	.506*** (.02129)	.4567754*** (.0293953)	.5049424*** (.0284099)
Monetary index (lag 1 period)	_	.4667987*** (.0199698)	.4770642*** (.0229963)
Monetary index (lag 2 periods)	_	_	.0153931 (.0329338)
Loan loss (in previous period)	.0085 (.0143)	.0140189 (.0133141)	.0105962 (.0137817)
Liquid assets (in previous period)	.0220501*** (0.061705)	.021192*** (0.0057223)	.0021786*** (.0056565)
Asset size (in previous period)	–.096607 (.2073632)	-0.1459255 (.1923109)	–.1531776 (.1937447)
GDP (contemporaneous)	.0006607*** (0.0000767)	0.0007543*** (0.0000712)	.0006787*** (.0000772)
CPI (contemporaneous)	.0009413*** (.0000818)	.0002513** (.0000906)	.0004001*** (.0000974)
Model significance	***	***	***
Number of banks in sample	390	390	390

Note: ** indicates significance at 5% level, *** - at 1%

The table above indicates that the basic econometric model as specified by (#) is significant at 1% level irrespective of the specification of independent variables' lags (inclusion up to 4 lags of monetary index has been tested; the model is robust to this).

All coefficients have the expected signs.

[16] Output from 'Stata' software for this specification is provided on the previous page. For other specifications outputs are omitted to save space.

The standard errors are stable across the specifications, while the coefficients vary only marginally. This allows us to draw conclusions on the effect of the CBR's rates on the rates on loans to NFCs: the coefficients before the monetary index are directly interpretable as the impact of the change by 1 percentage point in the monetary index. The table above shows that this average impact is equal to around 0.5% and is reflected in rates for about two periods.

The balance sheet control variables show only limited significance: the proportion of liquid assets is significant to the rates on loans, while loan losses and asset size, albeit showing the expected signs, are of no statistical significance due to large standard errors.

Furthermore, although the coefficients and standard errors look stable with the addition of regressors, we would like to conduct a robustness check and a check of our assumption that the monetary policy variable truly captures the monetary effects and not the potential effects of macroeconomic variables.

To do this, we replace the macro variables with a full set of dummy variables for each period. Although we have quarterly data, the dummies for the years have been added into specification as with quarterly dummies severe multicollinearity arises. We choose year 2012 as a reference category and do not include it into the regressions to avoid the classic 'dummy variable trap'. We further exclude the 'liquid assets' control variable as looking at the figure 12 one might suspect that the holding of liquid assets is correlated with the general macroeconomic conditions.

The output from the 'Stata' software for this specification is presented below. The coefficients before bank control variables have changed their signs to unexpected ones, but are still highly insignificant, so this is not likely to be a problem. More importantly, the coefficient before the contemporaneous monetary policy index is highly significant and is of the same magnitude with the one estimated by the full specification. However, the effect of the index vanishes with time more quickly with this time-fixed effects model, which may lead us to question the validity of the coefficient of the lagged monetary index variable in the specifications 2 and 3 above. However, as the coefficient is still positively significant this is not likely to be a serious concern.

More importantly, the time dummies have all expected signs (the rates on NFC loans are higher in earlier periods than in reference group, i.e. 2012), but are of smaller

magnitude than one might expect. At the same time, all the dummies have insignificant coefficients before them so we might consider this as indirect evidence in favor of the aforementioned assumptions.

The table below presents these findings in greater detail:

```
Fixed-effects (within) regression               Number of obs      =      4527
Group variable: regnum                          Number of groups   =       436

R-sq:  within  = 0.5659                         Obs per group: min =         1
       between = 0.2500                                        avg =      10.4
       overall = 0.2858                                        max =        18

                                                F(8,4083)          =    665.38
corr(u_i, Xb)  = 0.0031                         Prob > F           =    0.0000
```

loans_nfc	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
mon_index						
--.	.5093614	.0189103	26.94	0.000	.4722863	.5464366
L1.	.2269895	.0194034	11.70	0.000	.1889477	.2650314
loan_loss						
L1.	-.0014691	.011388	-0.13	0.897	-.0237957	.0208575
bs_assets						
L1.	.0335748	.1935925	0.17	0.862	-.345972	.4131215
d1_2008	.0010905	.0013247	0.82	0.410	-.0015066	.0036876
d2_2009	.001105	.0006781	1.63	0.103	-.0002243	.0024344
d3_2010	.0006016	.0009232	0.65	0.515	-.0012087	.0024119
d3_2011	.0004555	.0011502	0.40	0.692	-.0017996	.0027105
_cons	.1060698	.0021512	49.31	0.000	.1018523	.1102873
sigma_u	.0308253					
sigma_e	.01376388					
rho	.8337687	(fraction of variance due to u_i)				

F test that all u_i=0: F(435, 4083) = 24.13 Prob > F = 0.0000

As a further robustness check we substitute Mosprime rate fort the monetary index [17] in specification 2 (this is our preferred one). The results are similar to those provided in table 4 due to the similar patterns that both the indexes show. The coefficients before the contemporaneous and lagged Mosprime are lower than those for monetary index and the overall explanatory power of the model is inferior to that in specification 2. However, the basic results still hold and this fits our expectations very well.

[17] Mosprime is an indicative rate that is quoted by leading Russian money market players for loans and deposits to top-tier financial institutions. We use the overnight rate averaged within quarters.

To test the whether the different types of adjust the rates on loans to NFCs differently, we divide our sample into several homogeneity groups. Group 1 represents the state-owned banks which are defined as in Karas et al. (2010)[18]. Our working hypothesis is that state – owned banks adjust their lending rates in accordance with monetary policy stance quicker than other banks for the purposes of realisation of that policy. Our results seem to support this hypothesis, albeit the coefficient for contemporaneous monetary index is not significantly different from the one that we obtained using the whole sample. At the same time, the lagged explanatory variable has lower coefficient which indeed may indicate the higher speed of adjustment. Note that we drop the bank-specific control variables for two reasons: their insignificance due to high standard errors which are partially the consequence of the small sample sizes and due to the assumption that these characteristics are to some extent homogeneous within the group.

Note the high proportion of variation in the rate on loans to NFCs that is explained by the model.

The second homogeneity group is constituted by banks that comprise around 75% of assets it the system – namely the largest banks. We see that the pace of adjustment is somewhat slower, but still the coefficients are highly significant.

The third, and the most interesting group is number 3 which is comprised of banks that have seen the amount of borrowed funds scaled down by net assets increase by more than 100% during the crisis (from 4 quarter of 2008 to 2 quarter of 2009). We calculate the average amount of borrowed funds in first 3 quarters of 2008 and the following three quarters, which are the crisis one, and then divide the latter by the former. If the increase is more than twofold, the bank is included into the homogeneity group.

Our hypothesis is the banks that had to substitute the outflow of funds (i.e. foreign financing, corporate deposits and retail deposits) will cut on the rates more in response to the adverse monetary impact as the costs of financing for them is increased more rapidly. However, the hypothesis is not supported by the data: the coefficients before the lagged and contemporaneous monetary index are almost identical to those in homogeneity group 2. Largely this is because the samples have many cross-sections in

[18] The number of banks in the sample is less than the number of banks comprising each homogeneity group because not all banks disclosed the detailed version of 101 forms up until 2010.

common: as we have seen above, the largest banks were the ones to increase the proportion of borrowed funds most significantly in early 2009.

We report these findings in the table below.

Table #5 *Results of estimations for model 2 within homogeneity groups*

Variable	Homogeneity group 1	Homogeneity group 2	Homogeneity group 3
Monetary index (contemporaneous)	. 556463*** (.1405688)	. 5332566 *** (.0553242)	. .5460319 *** (..0770561)
Monetary index (lag 1 period)	.3651895*** (.095492)	. 4295681 *** (.0381151)	.4132705 (.0523462)
GDP (contemporaneous)	. 0005442* (.0001442)	.000478*** (.00013)	. 0007581*** (.0001819)
CPI (contemporaneous)	.0010407** (.000413)	.0006286 *** (.0001632)	.0011734*** (.0002264)
Model significance	***	***	***
Number of panels	10	21	21
R-sq. within groups	0.7416	0.7114	0.7251

Note: * indicates significance at 10% level, ** at 5% level, *** - at 1%

As for the 'conventional' lending channel, summarized by the model 1, we obtain the following results with dynamic panel data estimation for all loans:

Table #6 *Results of estimations for model 1*

Variable	Specification 1	Specification 2	Specification 3
Monetary index (first difference)	–1. 969832*** (.2363318)	–1.988767 *** (.2375983)	–
Monetary index (second difference)	–	–.1397418 (.2014916)	–
Log of M2 (first difference)	–	–	.2837043*** (.0329338)
Loan loss (in previous period)	–.2080325 (.2562091)	–.2058717 (.2558455)	–.2458564 (.257587)
Liquid assets (in previous period)	–.3413106 *** (.0658541)	–.3451079 *** (.065981)	–.4480946*** (.0662557)
Asset size (in previous period)	.814415 (2.823669)	.8364462 (2.819686)	1.276649 (.2.838813)
GDP (first difference)	.0001863 (.0007372)	–.0000359 (.0007989)	.0018341*** (.0007096)
CPI (first difference)	.0020451 (.0016088)	.0020694 (.0016067)	.0056643*** (.0016284)
Model significance	***	***	***
Number of banks in the sample	370	370	370

Note: * indicates significance at 10% level, ** at 5% level, *** - at 1%

The specification 1 is similar to the model estimated by Juurikkala et. al. (2011), while instead of the 'plain' refinancing index we use the monetary index calculated per our own methodology as independent variable. Specification 2 is basically the same with 1 lag of monetary index added (insignificant).

The most interesting here is the specification 3 which includes log of M2[19] instead of monetary index as policy variable. This specification almost identically replicates the one used by Juurikkala et. al. (2011) and we get almost identical results for our sample.

However, this result has primary implications for the purposes of checking our data collection procedures and estimation methodology; due to the reasons stated above, the coefficient before M2 is not of such importance as the policy variable (interest rates) because the degree of control of CBR over the interest rates is almost perfect, while the degree of its control over the M2 is questionable (Vymyatnina, 2006).

The output of 'Stata' for the dynamic panel model is presented below[20].

```
Arellano-Bond dynamic panel-data estimation  Number of obs         =      2897
Group variable: regnum                       Number of groups      =       278
Time variable: quarter
                                             Obs per group:    min =         1
                                                               avg =  10.42086
                                                               max =        16

Number of instruments =    143               Wald chi2(7)          =    306.01
                                             Prob > chi2           =    0.0000
One-step results
```

D. lg_bs_loans	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lg_bs_loans						
LD.	.2604727	.020537	12.68	0.000	.220221	.3007244
lg_m2						
D1.	.2837043	.0569702	4.98	0.000	.1720447	.3953638
bs_liquid_~s						
L1.	-.4480946	.0662557	-6.76	0.000	-.5779534	-.3182357
loan_loss						
L1.	-.2458564	.257587	-0.95	0.340	-.7507176	.2590048
bs_assets						
L1.	1.276649	2.838813	0.45	0.653	-4.287323	6.840621
output_index						
D1.	.0018341	.0007096	2.58	0.010	.0004432	.0032249
cpi						
D1.	.0056643	.0016284	3.48	0.001	.0024727	.0088559
_cons	.0661909	.0121171	5.46	0.000	.0424419	.0899399

[19] Data is collected from the CBR's website.
[20] For specification 1 the output is presented in table (#), for specification 2 it is skipped to save space.

We follow Juurikkala et. al. (2011) and conduct a robustness check replacing the macro variables with a full set of time dummies (again, 2012 is chosen as a reference category). The coefficients retain their signs and magnitude. The output from 'Stata' is presented below.

```
Arellano-Bond dynamic panel-data estimation  Number of obs         =      3452
Group variable: regnum                       Number of groups      =       370
Time variable: quarter
                                             Obs per group:    min =         1
                                                               avg =   9.32973
                                                               max =        16

Number of instruments =    145               Wald chi2(9)          =    423.06
                                             Prob > chi2           =    0.0000
One-step results
```

D. lg_bs_loans	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lg_bs_loans						
LD.	.2045852	.0194294	10.53	0.000	.1665043	.2426661
lg_m2						
D1.	.2307817	.042718	5.40	0.000	.1470559	.3145075
bs_liquid_~s						
L1.	-.4857346	.0606668	-8.01	0.000	-.6046394	-.3668298
loan_loss						
L1.	-.291005	.2432922	-1.20	0.232	-.767849	.185839
bs_assets						
L1.	3.002906	2.738183	1.10	0.273	-2.363833	8.369646
d1_2008	.0947672	.0145882	6.50	0.000	.0661749	.1233595
d2_2009	.0229454	.0116402	1.97	0.049	.0001311	.0457598
d3_2010	.0487354	.0089048	5.47	0.000	.0312824	.0661885
d3_2011	.0414635	.0064503	6.43	0.000	.0288211	.0541059
_cons	.0347006	.0130315	2.66	0.008	.0091594	.0602418

In the part describing the data set we found that the rates on the retail loans do not show any visible pattern during the observed period. We supposed that for retail loans credit rationing is an instrument of controlling the growth of loan portfolio and its quality within the banks. We test this prediction using the other dependent variable in the regressions – namely the retail loans.

With this variable we test the same model and the same specifications as above, obtaining the following results:

Table #7 *Results of estimations for model 1 with retail and NFC loans in different specifications.*

Variable	Specification 1	Specification 2	Specification 3	Specification 4
Monetary index (first difference)	–2.235259 *** (.3884178)	–2.255142 *** (.3914936)	–	–
Monetary index (second difference)	–	–.2089892 (.328552)	–	–
Log of M2 (first difference)	–	–	. 377533*** (.0929931)	. .1885956** (..0745135)
Loan loss (in previous period)	.1439662 (.42717)	.1459754 (.4271618)	.0425367 (.4284923)	. –.2485278 (.3348538)
Liquid assets (in previous period)	.0354406 (.1091682)	.0289203 (.109622)	–.1068671 (.1095273)	–.4605958*** (..0862087)
Asset size (in previous period)	2.329274 (4.668081)	2.356721 (4.668683)	3.079584 (4.682026)	–.4394307 (3.688668)
GDP (first difference)	–.0002429 (.0012196)	–.0005482 (.0013223)	.0005886 (.001173)	.0027244*** (..0009235)
CPI (first difference)	–.0002912 (.0026772)	. –.0002001 (.0026799)	. .0035933 (.0027012)	. . .0042819** (..0021458)
Model significance	***	***	***	***
Number of banks in the sample[21]	278	278	278	278

Specifications 1-3 replicate those used for total loan portfolio for the retail loans. We observe that retail loans portfolio growth has higher variability associated with a change in monetary index or M2 growth. Note that our model indicates that macro control variables are insignificant to loan portfolio growth.

Specification 4 is similar to specification 3 but uses growth of portfolio of loans to NFCs as a dependent variable. As expected, the coefficient before M2 is lower, and the variables indicating the business cycle are significant.

[21] Number of banks here is constrained by the data on bank-specific control variables – therefore the number of panels for retail loans and corporate loans is equal and is less than the total number of panels available.

Overview of results and conclusions

The hypotheses of this paper, namely:

H_1: The Central Bank's monetary policy stance has no effect on the banks' loan portfolio growth.
H_2: The CBR's monetary policy stance has no effect on loan rates.

have been tested using the quarterly panel data on more than 900 Russian banks during 2008-2012. We have applied the linear fixed- and random-effects models with clustering as well as the dynamic GMM estimators to test the above states hypotheses.

Testing the first hypothesis, we rely on DPD estimation technique to obtain the highly coefficient equal to approximately -2 for the effect of the one percentage point increase in the author-defined CBR refinancing index on the log of the total loan portfolio. This is directly interpretable as the effect of a 1 percentage point increase in the refinancing index on growth of loan portfolio of an average bank. This result is robust to the model specification (we use Mosprime and M2 indicators in regressions to test this).

Interestingly, when M2 is used as a regressor in a model analogous to that in Juurikkala et. al., 2011, we obtain results almost identical to those obtained the authors for the period of 1999-2007. This may serve as indirect evidence that the degree over which the CBR is able to control the monetary indicator has remained roughly constant over the following five years and that the response of the average bank to a change in M2 has also remained relatively stable over the course of these years.

We also use the data on loans to retail customers and NFCs in regressions separately to find the higher coefficients (very significant) before the monetary index as well as M2 in all specifications for retail loans and lower coefficients for corporate loans. For example, the coefficient before log of M2 for retail loans is found to be equal to 0.38 for retail loans, 0.19 for corporate loans and 0.28 for all loans. This is the direct evidence that banks' response to the liquidity shortage is more ample for the portfolio of retail loans than for the NFC loans portfolio.

The second hypothesis was tested in the fixed-effects regressions of the bank's interest rates of loans to NFCs against the refinancing index. We find significant coefficients in the linear models that indicate that the hike in the refinancing rates by 1 percentage

point is reflected in the average bank's interest income from these types of loans being increased by 0.5 percentage points. This result is robust to model specification. As a further robustness check we test the relationship on different sub-samples of banks varying by asset size and proportion of borrowed funds. Our results indicate that for the larger banks with a higher proportion of borrowed fund in liabilities the effect of a refinancing index hike is more pronounced than for the smaller ones. However, the difference is only marginal. At the same time, the explanatory power of the model for the larger banks is much higher.

The bank control variables like asset size, liquidity and loan losses show only limited significance in our sample. Contrary to the earlier findings on the European banking systems, only the liquidity level has shown importance for the growth of the loan portfolio and rates at the expected magnitude: accumulation of liquid assets is associated with lower pace of loans growth and higher interest rates charged on loans. This result is in line with that obtained by Juurikkala et. al. (2011).

To sum up, we find the impact of the hike in the rates on refinancing facilities of the CBR to have adverse and significant impact on the loan portfolio growth and a highly significant positive impact on rates charged on loans to NFCs. We find the evidence that banks tend to ration credit to retail customers to a higher extent than for the loans to NFCs when faced with an adverse liquidity shock. At the same time, response of interest income of banks from loans to NFCs is more pronounced than for the retail loans when faced with a liquidity shortage. This may serve as evidence that banks tend to consider the credit rationing as an instrument of regulation of portfolio quality and size regulation for retail loans, while for the loans to NFCs the interest rate regulation is more likely to be the instrument.

Therefore, we conclude that our results are consistent with the theoretical requirements for the operational interest rate and the loan supply channels of transmission of monetary policy stance to exist in Russia. This result has important implications as it allows the effective monetary policy to be conducted.

Scope for further research

The efficacy of the transmission channels is expected to increase in future with the development and unification of the refinancing facilities of the CBR. These developments are likely to be in the field of introduction of the new refinancing facilities and unification of the accepted collateral into the single pool. The continuing systemic deficit of liquidity in the system and the further innovations in the refinancing market therefore are expected to amplify the ability of the CBR to control the banks' and future work with longer time series will show whether this is indeed the outcome.

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Appendix 1

Algorithm for calculation of the aggregated indicators of bank's financial statements in accordance with CBR's 101-I instruction

N	Type of asset (in Russian)	Accounts
1	Денежные средства, драгоценные металлы и камни — всего	202+20302+20303+20305+20308+204
1.1	В том числе денежные средства	202
2	Счета в Банке России и в уполномоченных органах других стран — всего	30102+30104+30106+30125+30202+30204+30208+30210+30211+30224+30228+319+32902
3	Корреспондентские счета в кредитных организациях — всего	30110+30114+30118+30119+30213
	В том числе:	
3.1	Корреспондентские счета в кредитных организациях — корреспондентах	30110+30118+30213
3.2	Корреспондентские счета в банках-нерезидентах	30114+30119
4	Ценные бумаги, приобретенные кредитными организациями, — всего	(501—50120)—50120+(502—50219—50220)—50220+(50350319)+50505+(506—50620)—50620+ (507—50719—50720)—50720+512—51210+513—51310+514—51410+515—51510+516—51610+517— 51710+518—51810+519—51910+601—60105
	В том числе:	
4.1	Вложения в долговые обязательства	(501—50120)—50120+(502—50219—50220)—50220+(503—50319)+50505

4.2	Вложения в долевые ценные бумаги	(506—50620)—50620+(507—50719—50720)—50720
4.3	Учтенные векселя	512—51210+513—51310+514—51410+515—51510+516—51610+517—51710+518—51810+519— 51910
4.4	Портфель участия в дочерних и зависимых акционерных обществах	601—60105
5	Прочее участие в уставных капиталах	602—60206
6	Кредиты и прочие ссуды — всего	20311+20312+20315+20316+20317+20318+320—32015+321—32115+322—32211+323—32311+ 324—32403+(40109—40108>0)+(40111—40110>0)+40308+40310+441—44115+442—44215+443— 44315+444—44415+445—44515+446—44615+447—44715+448—44815+449—44915+450—45015+ 451—45115+452—45215+453—45315+454—45415+455—45515+456—45615+457—45715+458— 45818+460—46008+461—46108+462—46208+463—46308+464—46408+465—46508+466—46608+ 467—46708+468—46808+469—46908+470—47008+471—47108+472—47208+473—47308+47402+ 47410+47701+478—47804+60315
	В том числе:	

6.1	Кредиты, депозиты и прочие размещенные средства	20311+20312+20315+20316+20317+20318+320—32015+321—32115+322—32211+323—32311+ 324—32403+40308+40310+441—44115+442—44215+443—44315+444—44415+445—44515+446— 44615+447—44715+448—44815+449—44915+450—45015+451—45115+452—45215+453—45315+ 454—45415+455—45515+456—45615+457—45715+458—45818+460—46008+461—46108+462— 46208+463—46308+464—46408+465—46508+466—46608+467—46708+468—46808+469—46908 +470—47008+471—47108+472—47208+473—47308+47701+478—47804
	В том числе просроченная задолженность	20317+20318+324—32403+40310+458—45818
	Из них:	
6.1.1	Кредиты и прочие размещенные средства, предоставленные нефинансовым организациям	446—44615+447—44715+449—44915+450—45015+452—45215+453—45315+454—45415+456— 45615+45806+45807+45809+45810+45812+45813+45814+45816+465—46508+466—46608 +468—46808+469—46908+471—47108+472—47208+473—47308
	В том числе просроченная задолженность	45806+45807+45809+45810+45812+45813+45814+45816
6.1.2	Кредиты и прочие средства, предоставленные физическим лицам	455—45515+457—45715+45815+45817
	В том числе просроченная задолженность	45815+45817
6.1.3	Кредиты, депозиты и прочие размещенные средства, предоставленные кредитным организациям	20315+20316+320—32015+321—32115+322—32211+323—32311+324—32403

	В том числе просроченная задолженность	324—32403
7	Основные средства, нематериальные активы и материальные запасы	604—60405—60601+607+60804—60805+60901—60903+60905+610
8	Использование прибыли	70611+70612+70711+70712
8.1	В том числе налог на прибыль	70611+70711
9	Прочие активы — всего	20319+20320+30215+(30221—30222>0)+(30233—30232>0)+303(ДС)+304(ДС, без 30410)+30602+ 325—32505+40311+40313+40908+459—45918+47404+47406+47408+47413+47415+47417+ 47420+47423+47427+47901+50905+52503+60302+60306+60308+60310+60312+60314+60323+ 60337+60339+60341+60343+60347+614
	В том числе:	
9.1	Средства в расчетах	30215+(30221—30222>0)+(30233—30232>0)+303(ДС)+304(ДС, без 30410)+30602+40313+40908+ 47404+47406+47408+47413+47415+47417+47420+47423
9.2	Дебиторы	60302+60306+60308+60310+60312+60314+60323+60337+60339+60341+60343+60347
9.3	Расходы будущих периодов	50905+52503+614
	Всего активов	Стр. 1+2+3+4+5+6+7+8+9

N	Type of liability (in Russian)	Accounts
1	Фонды и прибыль кредитных организаций — всего	102—105+106—10605—10605+107+10801—10901+70601+70602+70603+70604+70605—70606— 70607—70608—70609—

		70610+70701+70702+70703+70704+70705—70706—70707—70708—70709— 70710+70801—70802
	В том числе:	
1.1	Фонды	102—105+106—10605—10605+107
1.2	Прибыль (убыток) с учетом финансовых результатов прошлого года	10801—10901+70601+70602+70603+70604+70605—70606—70607—70608—70609—70610+70701+ 70702+70703+70704+70705—70706—70707—70708—70709—70710+70801—70802
	В том числе:	
1.2.1	Прибыль (убыток) текущего года	70601+70602+70603+70604+70605—70606—70607—70608—70609—70610
2	Кредиты, депозиты и прочие привлеченные средства, полученные кредитными организациями от Банка России	312+31701+31704+32901
3	Счета кредитных организаций — всего	30109+30111+30116+30117+30122+30123+30230+30231
	В том числе:	
3.1	Корреспондентские счета кредитных организаций — корреспондентов	30109+30116
3.2	Корреспондентские счета банков-нерезидентов	30111+30117+30122+30123
4	Кредиты, депозиты и прочие средства, полученные от других кредитных организаций, — всего	20313+20314+313+314+315+316+31702+31703

5	Средства клиентов — всего*	20309+20310+30214+30220+30223+30227+30601+30606+40101+40105+40106+(40108—40109>0)+ (40110—40111>0)+40116+402+40301+40302+40306+40312+40314+404+405+406+407+408+ 409—40908+410+411+412+413+414+415+416+417+418+419+420+421+422+423+425+426+ 427+428+429+430+431+432+433+434+435+436+437+438+439+440+47401+47409+47418+ 476—47606—47607—47608—47609+521+522+52403+52404
	В том числе:	
5.1	Средства бюджетов на расчетных счетах	40101+40105+40106+(40108—40109>0)+(40110—40111>0)+40116+402+40301+40302+40306+ 40312+40314
5.2	Средства государственных и других внебюджетных фондов на расчетных счетах	404
5.3	Средства организаций на расчетных и прочих счетах	405+406+407+408—40803—40810—40813—40817—40820—40821
5.4	Средства клиентов в расчетах	30214+30220+30223+30601+30606+40821+409—40908+47409
5.5	Депозиты и прочие привлеченные средства юридических лиц (кроме кредитных организаций)	410+411+412+413+414+415+416+417+418+419+420+421+422+425+427+428+429+430+431+ 432+433+434+435+436+437+438+439+440+47601+47602+521+52403
5.6	Вклады физических лиц	40803+40813+40817+40820+423+426+47603+47605+522+52404
5.7	Средства клиентов по факторинговым, форфейтинговым операциям	47401
6	Облигации	520+52401
7	Векселя и банковские акцепты	523+52406

8	Прочие пассивы — всего	20321+30126+(30222—30221>0)+30226+(30232—30233>0)+303(КС)+304(КС, без 30410)+30410+ 30603+30604+30607+318+32015+32115+32211+32311+32403+32505+40307+44115+44215+ 44315+44415+44515+44615+44715+44815+44915+45015+45115+45215+45315+45415+45515+ 45615+45715+45818+45918+46008+46108+46208+46308+46408+46508+46608+46708+46808+ 46908+47008+47108+47208+47308+47403+47405+47407+47411+47412+47414+47416+47419+ 47422+47425+47426+47606+47607+47608+47609+47702+47804+47902+50219+50319+50407+ 50408+50507+50719+50908+51210+51310+51410+51510+51610+51710+51810+51910+52402+ 52405+52407+52501+60105+60206+60301+60305+60307+60309+60311+60313+60320+60322+ 60324+60338+60340+60342+60344+60348+60405+60806+613+61501
	В том числе:	
8.1	Резервы на возможные потери	20321+30126+30226+30410+30607+32015+32115+32211+32311+32403+32505+44115+44215+ 44315+44415+44515+44615+44715+44815+44915+45015+45115+45215+45315+45415+45515+ 45615+45715+45818+45918+46008+46108+46208+46308+46408+46508+46608+46708+46808+ 46908+47008+47108+47208+47308+47425+47702+47804+47902+50219+50319+50507+50719+ 50908+51210+51310+51410+51510+51610+51710+51810+51910+60105+60206+60324+60405+

		61501
8.2	Средства в расчетах	(30222—30221>0)+(30232—30233>0)+303(КС)+304(КС, без 30410)+30603+30604+47403+47405+ 47407+47412+47414+47416+47419+47422
8.3	Кредиторы	60301+60305+60307+60309+60311+60313+60320+60322+60338+60340+60342+60344+60348+ 60806
8.4	Доходы будущих периодов	613
8.5	Проценты начисленные, обязательства по процентам/купонам по выпущенным ценным бумагам	318+47411+47426+47606+47607+47608+47609+50407+50408+52402+52405+52407+52501
	В том числе:	
	Проценты просроченные	318+47606+47607+47608+47609
	Всего пассивов	Стр. 1+2+3+4+5+6+7+8