BOFIT Discussion Papers
8 • 2009

Tuuli Juurikkala, Alexei Karas,
Laura Solanko

The role of banks in monetary policy transmission: Empirical evidence from Russia

EUROJÄRJESTELMÄ
EUROSYSTEMET

Bank of Finland, BOFIT
Institute for Economies in Transition

BOFIT Discussion Papers
Editor-in-Chief Iikka Korhonen

BOFIT Discussion Papers 8/2009
30.6.2009

Tuuli Juurikkala, Alexei Karas, Laura Solanko: The role of banks in monetary policy transmission: Empirical evidence from Russia

ISBN 978-952-462-971-3
ISSN 1456-5889
(online)

This paper can be downloaded without charge from
http://www.bof.fi/bofit
or from the Social Science Research Network electronic library at
http://ssrn.com/abstract_id=1430366.

Suomen Pankki
Helsinki 2009

Contents

Abstract 3

Tiivistelmä 4

1 Introduction 5

2 The structure of the banking system and monetary policy transmission in Russia 7
2.1 Monetary policy 7
2.2 Banking sector 9

3 The model and identification of the lending channel 11

4 Data 15

5 Empirical evidence on bank lending channel in Russia 17

6 Some robustness checks 19

7 Conclusions 21

References 22

All opinions expressed are those of the authors and do not necessarily reflect the views of the Bank of Finland.

Tuuli Juurikkala, Alexei Karas, Laura Solanko

The role of banks in monetary policy transmission: Empirical evidence from Russia

Abstract

This paper focuses on the role of the banking sector in monetary policy transmission in an emerging economy with a rapidly developing financial system. Specifically, we exam whether the central bank's monetary policy stance affects banks' lending behaviour. Based on a comprehensive quarterly dataset on all Russian banks from 1Q1999 to 1Q2007, we find evidence for the existence of a bank lending channel in Russia. Contrary to several studies on developed economies, the level of a bank's capitalization matters for the transmission process. Better capitalized banks are less likely to adjust their lending practices following a change in the monetary policy stance.

JEL: C23, E44, E52, G21

Key words: monetary policy transmission, bank lending, Russia

Tuuli Juurikkala, Alexei Karas, Laura Solanko

The role of banks in monetary policy transmission: Empirical evidence from Russia

Tiivistelmä

Tässä tutkimuksessa tarkastellaan pankkisektorin roolia rahapolitiikan välittymisessä Venäjän kaltaisessa kehittyvässä taloudessa. Työ perustuu laajaan neljännesvuosittaiseen paneeliaineistoon, joka kattaa kaikki Venäjän liikepankit vuosina 1999–2007. Tulokset viittaavat siihen, että keskuspankin politiikkatoimet vaikuttavat liikepankkien lainantarjontaan. Toisin sanoen löydämme tukea sille että pankeilla on lainanantokanava Venäjällä. Toisin kuin mm. USA:ssa ja euroalueella pankkien vakavaraisuus vaikuttaa rahapolitiikan välittymiseen pankkien kautta. Hyvin pääomitetut pankit reagoivat merkittävästi vähemmän rahapolitiikan muutoksiin.

Asiasanat: rahapolitiikan välittyminen, pankkien antolainaus, Venäjä

1 Introduction

In recent decades there has been a surge of economic literature on monetary policy transmission mechanisms. The most traditional view is characterised by the interest rate channel. Expansionary (contractionary) monetary policy lowers (raises) money market interest rates, thereby reducing (increasing) borrowing costs and boosting (reducing) loan demand, investments and consumption. Moreover, theory offers several other transmission channels, including the exchange rate, asset price and credit channels. The credit channel, formalised by Bernanke and Blinder (1988), can be further decomposed into the asset price and bank lending channels. The bank lending channel, which includes an important role for banks in the transmission process, is of special interest in this study.

In the context of a bank lending channel, a tightening (loosening) of monetary policy causes a contraction (expansion) in banks' loan supply. The underlying assumption is that when faced with a decrease in liquidity, banks reduce the loan supply. There is ample evidence that aggregate bank lending decreases after a tightening of monetary policy. This, however, could as well be caused by a contraction in loan demand (via the interest rate channel) as by a contraction in loan supply (bank lending channel). To sort out the changes in loan supply from changes in loan demand, the literature has focused on cross-sectional differences between banks. It is usually assumed that, after a monetary tightening, all banks experience a decrease in liquid core deposits and a receding demand for bank loans. Some banks may find it difficult to compensate for the loss of loanable funds and hence contract the loan supply. This contraction amplifies the transmission of monetary policy into the real economy.

The increased availability of large micro-level data sets has facilitated the growth in empirical literature focusing on these issues. Largely due to data availability, the studies have mainly focused on the US and EU economies. Most studies on euro area economies do find that a bank lending channel exists, whereas the studies on the US provide a more mixed set of results. [1] The evidence from emerging countries where the banking sectors are still in the making is so far fairly

[1] See Ehrmann et al (2003) and Gambacorta (2005) and the references therein for a summary of studies on the euro area. Kishan and Opiela (2000), Kashyap and Stein (2000) for the US case.

patchy and fragmented.[2] There are, however, good reasons to assume that bank lending may indeed be an influential channel of monetary policy transmission especially in these economies.

As evidenced by the various studies on the euro area countries (Ehrmann et al, 2003), the structure of the banking sector may greatly influence the effectiveness of the bank lending channel. For the contraction in bank loan supply to be transmitted into the real economy, it is necessary that some firms be unable to substitute other forms of external finance for bank credit. Therefore, banks' lending behaviour is likely to transmit monetary policy changes into the real economy more readily in economies with bank-based financial systems. Most European (developed as well as emerging) economies rely much more heavily on bank finance than does the US. Comparing the ratio of total banking sector assets to GDP in a number of European countries and the US reveals that banks are much more important in Europe. Consequently, bank loans play a much more important in corporate finance in Europe, whereas in the US the stock and bond markets are considerably more important.

In an emerging economy like Russia, bank loans are typically short-term and hence may speed up the transmission process. Moreover, informational frictions between individual banks are likely to be more pronounced in a banking system characterised by a large number of small banks, relatively frequent bank failures, short credit histories, and slowly improving regulation. We therefore feel that examining the role of banks in monetary policy transmission in Russia should be especially fruitful.

Following the tradition of Kashyap and Stein (1995) and Ehrmann et al (2003), we rely on cross-sectional differences in micro-level data on the Russian banking sector to examine whether the bank loan supply is affected by changes in domestic monetary policy.

The rest of the paper is organised as follows. The next section describes the monetary policy framework in Russia and discusses the possible transmission channels. Further, some systemic features of the Russian banking sector are examined in the light of the previous literature. Section three describes the data and estimation methodology used in the analysis. Section four presents our empirical evidence on the existence of a bank lending channel in Russia, and the last section concludes.

[2] The great number of working papers on emerging economies include Matousek and Sarantis (2009) on Central and Eastern Europe, Golodniuk (2006) on Ukraine, Arena et al (2007) on Latin America and Asia, Benkovskis (2008) on Latvia, Juks (2004) on Estonia.

2 The structure of the banking system and monetary policy transmission in Russia

2.1 Monetary policy

The Central Bank of Russia (CBR) has for several years aimed at a dual target of stable nominal exchange rate and low inflation. Since 1998, the de facto target has been the exchange rate, most recently vis-à-vis a currency basket composed of the US dollar and the euro. In its annual Guidelines for the Single State Monetary Policy, the CBR has specified the inflation target and forecast range for growth of the rouble money stock (M2).

The CBR's set of monetary policy tools has been fairly restricted, and M2 growth has served as an information tool. The role of CBR interest rates is limited at best. With few sterilization tools, there has been an apparent tradeoff between controlling rising inflation and limiting the pace of nominal rouble appreciation.

Table 1 Inflation targets and M2 projections of the Central Bank of Russia

	Year-end inflation target	Inflation outcome	Year-end M2 growth projection	M2 growth outcome
2000	18%	20.2%	21-25%	61.5%
2001	12-14%	18.6%	27-34%	39.7%
2002	12-14%	15.1%	22-28%	32.4%
2003	10-12%	12.0%	20-26%	50.5%
2004	8-10%	11.7%	19-25%	35.8%
2005	8.5% (later revised to 11%)	10.9%	19-28% (target for base money)	30.0% (outcome for base money)
2006	8.5%	9.0%	19-28%	48.8%
2007	6.5-8%	11.9%	19-29%	47.5%

Source: Target rates as in Korhonen and Mehrotra (2009), realised outcome figures from the Central Bank of Russia.

Russia's capital flows have been liberalised. In the last couple of years, perfect capital movements have led to a sizable current account surplus requiring large unsterilized CBR interventions in the foreign-exchange market, translating into excess liquidity in the banking system. A portion of the oil dollars has been channelled into a Stabilization Fund. [3]

[3] In 2007, net capital inflows not allocated to the Stabilization Fund, about half of which went into the banking sector, caused rapid money expansion which, along with rising food and energy prices, pushed inflation above 12% in the first quarter of 2008.

Both commercial banks and large corporations have borrowed heavily from abroad through IPOs, Eurobonds and syndicated loans. Bank lending has increased rapidly in the last few years. Currently about 2/3 of loans are in roubles, and the share of the dollar is still shrinking. But the effect of dollarization on monetary policy transmission has not been studied a great deal. Keller and Richardson (2003) conclude that in the countries of the Commonwealth of Independent States (CIS), high degrees of dollarization have contributed to the exchange rate interventions as a key instrument of monetary policy.

To date, very little is generally known about the transmission channels of monetary policy in Russia. Esanov et al (2005) estimate alternative monetary policy rules and find that, in 1993-2004, the CBR used monetary aggregates as the main policy instrument. Vdovichenko and Voronina (2006) also examine monetary policy rules and suggest that the CBR's major concern in 1999-2003 was to stabilize the exchange rate and that monetary targeting was its main monetary tool.

Vinhas da Souza (2006) analyses the interest rate and bank lending channels of monetary policy transmission in Russia. Relying on an annual panel of 323 Russian banks for 1995-2003, he finds very weak signs of either one, but concludes that the effects are linked to the level of bank assets and bank capitalization.

Vymyatnina (2006a) analyses monetary policy transmission mechanisms in Russia in 1995-2004 via a structural vector error correction model (SVECM) as a special case of the structural VAR approach. She concludes that in the absence of a stable money multiplier and given the CBR's less-than-perfect control of base money, use of monetary aggregates as monetary policy instruments might not be the best choice, so that the CBR should introduce interest rate tools simultaneously with the further development of the financial system. Vymyatnina (2006b) finds indirect evidence of the interest rate channel of monetary policy operating in Russia in 1995-2004, by looking at the money supply.

Research on money demand has reached somewhat contradictory results. Korhonen and Mehrotra (2009) conclude from previous studies that widespread dollarization and the 1998 crisis have introduced a large degree of uncertainty into the empirical results. They rely on data from the post-crisis period and find a stable money demand relationship when augmented by a deterministic downward trend in velocity. Broad money shocks lead to higher inflation, and exchange rate fluctuations have had a significant influence on Russian money demand. They suggest that the existence of a stable money demand at least partially vindicates the CBR's policy of linking money growth forecasts and inflation targets, and the close attention paid to the rouble rate.

In August 2008, CBR's new monetary policy framework for 2009-2011 featured inflation fighting as the major objective of the central bank. The plan is that by 2011 monetary policy implementation will be largely based on inflation targeting and, for the first time, the monetary policy framework did not include specific limits on rouble appreciation. The CBR is supposed to gradually reduce its currency market interventions.

2.2 Banking sector

Economic growth at record high levels for several consecutive years, high export incomes, budget surpluses, structural reforms in the early 2000s, and further development of the international capital markets have contributed to the rapid growth of the Russian banking sector. For many years now, credit has grown on average by 50% per year and deposits by 40%.

Despite increasing demand for banking services due to robust economic growth, a relatively small number of Russian banks are "real" banks, whose main income source is intermediation of deposits into loans. The overall extent of financial intermediation is still low, as most investments are financed from firm's internal sources. Bank financing accounts for just 10% of corporate sector fixed investments. As of end-2007, bank assets amounted to 61% of GDP, household deposits 16% and credit to the private sector 37%. Although corporate borrowing has increased rapidly, Russian companies have been forced to borrow abroad, as the domestic banking sector has not been able to meet the demand for long-term financing driven by strong economic growth.

Table 2 Selected indicators, % of GDP

	2002	2003	2004	2005	2006	2007
Total banking sector assets	36	38	42	42	45	52
Broad money M2	18	20	24	26	28	33
Bank credit to the private sector	15	17	20	23	25	30
o/w enterprises	14	16	18	20	20	23
o/w households	1	1	2	3	5	7
Bank deposits by the public	18	20	24	24	27	32
o/w households	8	10	12	17	13	14

Note: Data as of the start of each period. Source: Central Bank of Russia, Obzor Bankovskovo Sektora.

Due to legacies from the privatization of (large) banks following the Soviet era, the financial crisis of 1998, restrictions on foreign banks' participation, and a lack of domestic competition; Russian banking is now characterized by a combination of a large number of banks (1125 at mid-2008) and

a heavy concentration of assets in a few state-controlled ones. Sberbank, VTB (Vneshtorgbank) and Gazprombank accounted for almost 40% of total assets and the next largest 200 banks for about 50% of total assets in the sector. Sberbank held 50% of deposits alone, and was the 33rd biggest bank in the world according to *The Banker*. Currently, however, most private banks are de novo banks, and most public banks were created after the collapse of the Soviet Union, by various government bodies.

Foreign bank entrance to the market has been limited, though in recent years Russian banks have diversified into retail banking while Small and Medium Enterprises have improved their governance in order to attract international funding. As a result, international institutions have acquired in particular banks with developed retail networks, as a means of entering the market. Branches of foreign banks are so far not allowed. About a quarter of the total bank assets are in foreign hands.

The capital adequacy ratios of Russian banks have been affected by the rapid credit expansion, though they are still at reasonable levels. The smaller banks have continued to experience difficulties in attracting equity investments, and even the larger ones have revised their funding plans due to global liquidity conditions. The generally low level of confidence between the banks adds to the vulnerability of the sector's liquidity, and the interbank market does not distribute liquidity efficiently. Small banks are often shut out from access to finance.

Turning to the questions specific to our analysis of the bank lending channel in Russia, and arising from the structure of the banking sector, large banks may buffer their credit supply from monetary policy shocks. In their study of the relationship between banking competition and the transmission of monetary policy through the bank lending channel, Adams and Amel (2005) find that the impact of monetary policy on loan originations is weaker in more concentrated markets.

Furthermore, according to Ehrmann et al (2003), one can argue that the existence of "house banks" in several European countries, most notably Germany, may at least mute the reaction of bank loan supply to monetary policy. Thus the Russian "pocket banks", which serve non-banks only within a particular business grouping, would presumably also reduce the effectiveness of monetary policy.

In general, one of the main problems of the Russian banking sector seems to be the lack of competition and the related lack of restructuring. Karas et al (2008) show that both foreign banks and domestic public banks are more efficient than domestic private banks, indicating that the Russian banking system may benefit more from increased levels of competition and greater access for foreign banks than from bank privatization.

Finally, due to the structural problems of the sector and mistrust in the interbank market there has thus far been a reluctance to let even small banks go bankrupt, because in the present rumour-sensitive environment this may be enough to cause problems for the entire sector or even bank runs.

3 The model and identification of the lending channel

The main argument for the lending channel of monetary policy transmission, as formalised by Bernanke and Blinder (1988), is that changes in monetary policy affect the amount of deposits (money) available to banks. The lending channel arises because some banks find it difficult to offset changes in the level of deposits except by adjusting their loan supply.

Typically, we would assume that in equilibrium money demand D equals money supply M and that money demand depends on monetary policy:

$$D = M = -\varphi(mp) + \gamma \quad (1)$$

Loan demand depends on real DGP (y), price level (p) and the loan interest rate (r):

$$Ld = \emptyset_1 Y + \emptyset_2 p - \emptyset_3 r \quad (2)$$

The supply of loans depends directly on the amount of loanable funds (deposits or money) D available, the loan interest rate r and the monetary policy stance (mp):

$$Ls = \emptyset_4 D(mp) + \emptyset_5 r + \emptyset_6 mp \quad (3)$$

Monetary policy, typically approximated by a central bank's policy interest rate, enters the loan supply function both directly and indirectly. First, the direct link is the opportunity cost for a bank that uses interbank markets to finance loans. Secondly, the amount of deposits (or money) available depends negatively on the policy interest rate. Following Ehrmann et al (2001), we further assume that banks are not equally dependent on deposit finance. The impact of deposits on loan supply depends on bank characteristics X_i (size, capitalization liquidity):

$$\emptyset_4 = \mu_0 - \mu_1 X_i \quad (4)$$

Assuming that the loan market clears and using the equations above, loan supply can be written as

$$L = ay + bp - cc_0 mp + c_1 X_i mp + dX_i + constant \quad (5)$$

The coefficient c_1 combines the loan-supply effects of monetary policy and individual-bank characteristics. In this framework a significant coefficient c_1 would imply the existence of a bank lending channel, i.e. that monetary policy affects bank loan supply.

The underlying assumption in the literature is that all banks face identical loan demand. This implies, inter alia, that loan demand does not depend on bank characteristics. If e.g. customers of small banks typically reduce their loan demand more than customers of large banks, when faced with an interest rate hike, identification of bank lending behaviour becomes impossible. The assumption of homogeneous loan demand is thus crucial. As most firms, large or small, have no short-term alternative to bank loan financing, this is usually taken as a fairly reasonable benchmark.

Our empirical model is based on (4) with slight modifications. Following Ehrmann et al (2001 and 2003) we interact bank characteristics X_i not only with the monetary policy indicator but also with GDP and the price level. Therefore we allow different types of banks to react differently to the business cycle. Moreover, in controlling for the business cycle, we assume that the monetary policy variable truly captures monetary policy effects and not the potential effects of general marcoeconomic variables. We introduce some dynamics and estimate the empirical model in first differences. The basic regression model is thus

$$\Delta \log(L_{i,t}) = a_i + \sum_{j=1}^{l} b_j \Delta \log(L_{i,t-j}) + \sum_{j=0}^{l} c_i \Delta MP_{t-j} + \sum_{j=0}^{l} d_i \Delta \log(GDP_{t-j}) + \sum_{j=0}^{l} e_i CPI_{t-j} + fX_{i,t-1} + \sum_{j=0}^{l} g_1 X_{i,t-1} \Delta MP_{t-j} + \sum_{j=0}^{l} g_1 X_{i,t-1} \Delta \log(GDP_{t-j}) + \sum_{j=0}^{l} g_1 X_{i,t-1} CPI_{t-j} + \varepsilon_{it} \quad (6)$$

where i=1, …, N and t=1, …, T. N denotes the number of banks, T the total number of time periods (quarters) and l the number of lags. L_{it} are loans by bank i at time t to private non-banking sectors, MP denotes the monetary policy indicator, GDP the real GDP and CPI the inflation rate. The bank-specific characteristics are denoted by X_i. The model further includes a bank-specific fixed effect a_i and, following Kashyap and Stein (2000), a time trend and its interactions.

In the second specification the macro-variables and trend are replaced by a compete set of time dummies. In the third specification we exclude the macro-variables also from the interaction

terms. Thus, following Gambacorta (2005), we allow the coefficients of bank-specific variables to vary with monetary policy and with time but not with macroeconomic fluctuations.

In all of these specifications, the existence of a bank lending channel should be reflected in a significant coefficient for the interaction of the bank characteristics with the particular monetary policy indicator. The three measures of bank characteristics found in the literature are bank size, capitalization and liquidity. Bank size and its capitalization and liquidity ratios are measures that may influence a bank's access to and premium on external finance. High levels of liquidity may also allow a bank to draw on own liquid funds instead of going to the market after a monetary tightening. Following the literature, we define bank characteristics as

$$
\begin{aligned}
Size_{it} &= logA_{it} - \frac{1}{N_t}\sum_i logA_{it} \\
Liquidity_{it} &= \frac{L_{it}}{A_{it}} - \frac{1}{T}\sum_t \left(\frac{1}{N_t}\sum_i \frac{L_{it}}{A_{it}}\right) \\
Capitalization_{it} &= \frac{C}{A_{it}} - \frac{1}{T}\sum_t \left(\frac{1}{N_t}\sum_i \frac{C_{it}}{A_{it}}\right)
\end{aligned}
\qquad (7)
$$

Size is measured as log of total assets in nominal roubles. Liquidity is the share of liquid assets in total assets. Liquid assets are bank reserves + loans to banks + securities. Capitalization is the bank's own-capital-to-total assets ratio. All these variables are normalised with respect to their sample means. The size variable is normalised, not over the whole period, but with respect to the sample average of each period, in order to remove the constantly increasing trends in size.

The preceding literature offers little guidance as to the choice of monetary policy variable. The studies based on US data frequently use the Fed Funds rate, usually complemented with one or two indicator variables based on Federal Reserve statements (Romer dates or Boshen-Mills indicators). The studies on European economies and emerging countries rely on central bank repo rates or short-term money market interest rates, irrespective whether the countries target inflation.

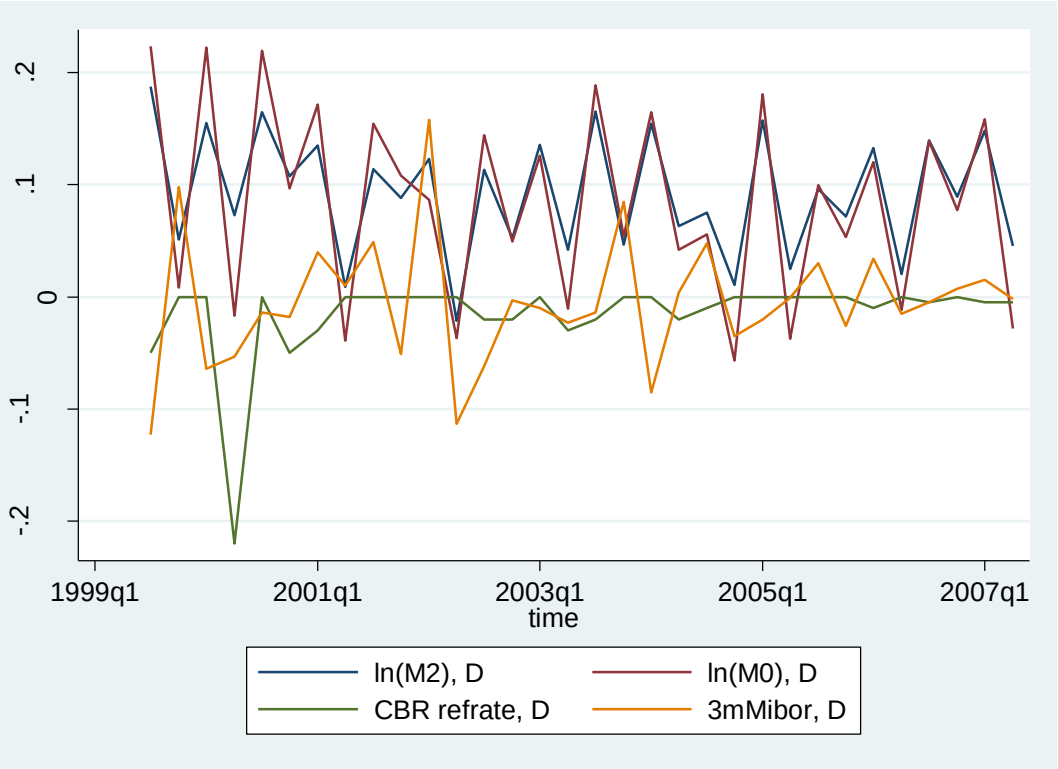
The challenge in analysing Russian monetary policy is that the Central Bank of Russia (CBR) uses several operations to adjust banking sector liquidity, and consequently there is no single interest rate that could be self-evidently used as the monetary policy target rate. During the period analysed here, the financial markets were extremely liquid, and therefore CBR operations have aimed mainly at tightening liquidity. However, as the interbank market in Russia functions poorly, the CBR has occasionally injected liquidity even in times of extreme overall liquidity. Russian fi-

nancial institutions may obtain credit through CBR overnight, repo, Lombard or currency-swap operations. To tighten liquidity, the CBR uses e.g. deposit and repo auctions. Further, CBR has sold government bonds from its balance sheet and in 2005 it started issuing Central Bank bonds (OBR). The mulitiplicity of CBR market operations is at least partly explained by the highly fragmented structure of the banking sector. Some banks are very narrowly focused, serving only a certain group of enterprises or a given region, and hence the types of collateral vary.

Therefore it should not come as a surprise that the Central Bank's interest rates have historically had very limited effects on interbank market rates and thereby on the cost of loanable funds. Another possibility to proxy CBR's monetary policy stance is to use the fluctuations in money stocks. As discussed earlier, Russian monetary policy has a dual objective of stable exchange rate and moderate inflation. As an intermediate target, the CBR officially targets growth rate of monetary aggregates, especially the broad money M2. It is highly questionable how much control the central bank has on M2 (see Vymyatnina, 2006) and therefore we also use the monetary base M0 in the regressions. The monetary base includes cash in circulation, commercial-bank deposits and required reserves at the central bank, as well as CBR bonds held by banks. The changes in this aggregate should be much more under CBR control.

As there is no consensus on the best measure of monetary policy stance in Russia, we use four different variables. In line with much of the previous literature, we use the Russian money market rate (Moscow interbank interest rate, 3mMibor). Further, we take the most widely cited CBR policy rate, the refinancing rate, which is used e.g. in overnight operations. The interbank interest rate should reflect changes in market liquidity whereas the CBR refinancing rate has generally served as the upper bound for market interest rates. Next we use the measure that CBR reportedly targets, broad money M2. And finally we take the more narrow measure of money, the monetary base M0. Figure 1 plots these four measures in first differences. As expected, the money measures move together, but the two interest rate variables are not highly correlated with each other.

Figure 1 Measures of monetary policy, first differences



Source: Central Bank of Russia

Table 3 Correlation between measures of monetary policy in Russia

	ln(M2)	ln(M0)	CBR refrate
ln(M2)	1.0000		
ln(M0)	0.9976	1.0000	
CBR refrate	-0.8816	-0.8997	1.0000
MICEX ibrate	-0.5991	-0.6065	0.6563

4 Data

The database we use is a quarterly panel of balance sheet data for all Russian banks from the first quarter of 1999 to the first quarter of 2007 (end-of-period data). For a detailed description of the dataset and the cleaning procedures, see Karas-Schoors (2005). Table 4 examines the balance sheet data for banks of different size categories in our sample. There is a marked difference between small banks (asset size below 50th percentile) and large banks. Small banks rely almost entirely on retail deposits and own capital for their financing. Larger banks (especially those above 90th percentile) have clearly more diversified liability structures with more weight given to interbank funds and

securities. The same holds true for the assets side. Small banks generate less retail loans than large banks. At the end of 1Q2007, retail loans represented 54% of small banks' total assets and 74% for large banks.

Table 4 - Balance sheets for banks of different sizes

Panel A Composition of bank balance sheets at 1Q1999 (end-period)						
	Below 50th percentile	Between 50th and 75th	Between 75th and 90th	Between 90th and 95th	Between 95th and 98th	Above 98th percentile
Number of banks						
total assets (millions of 2001 rb)	30.6	156.2	525.4	1292.6	4195	27113.8
Share in total system assets						
Share in total bank assets of:						
reserves at CBR	0.17	0.14	0.13	0.09	0.08	0.05
loans to banks	0.08	0.14	0.22	0.26	0.25	0.21
loans to government	0.01	0.01	0.01	0.02	0.03	0.01
loans to firms	0.41	0.42	0.38	0.39	0.45	0.54
loans to households	0.07	0.04	0.03	0.02	0.02	0.02
investment in securities	0.06	0.06	0.06	0.09	0.09	0.07
other assets	0.20	0.19	0.16	0.14	0.10	0.11
Total	1.01	1.00	1.00	1.00	1.02	1.00
capital	0.49	0.33	0.21	0.14	0.078	0.1
deposits of banks	0.02	0.05	0.10	0.18	0.32	0.34
deposits of government	0.02	0.02	0.02	0.02	0.05	0.03
deposits of firms	0.26	0.31	0.36	0.31	0.31	0.26
deposits of households	0.08	0.11	0.13	0.10	0.06	0.06
issued debt securities	0.04	0.08	0.06	0.08	0.05	0.07
other liabilities	0.08	0.10	0.11	0.16	0.11	0.13
Total	1.0	1.0	1.0	1.0	1.0	1.0

Panel B Composition of bank balance sheets at 1Q2007 (end-period)

	Below 50th percentile	Between 50th and 75th	Between 75th and 90th	Between 90th and 95th	Between 95th and 98th	Above 98th percentile
Number of banks						
total assets (millions of 2001 rb)	233.33	1049.34	3483.73	10494.61	25509.49	134314.60
Share in total bank assets of						
reserves at CBR	0.19	0.11	0.07	0.05	0.05	0.05
loans to banks	0.12	0.15	0.14	0.14	0.14	0.15
lonas to government	0.00	0.00	0.00	0.00	0.01	0.01
loans to firms	0.40	0.47	0.50	0.51	0.46	0.49
loans to households	0.14	0.13	0.14	0.13	0.18	0.15
investment in securities	0.04	0,08	0.10	0.13	0.13	0.14
other assets	0.11	0.07	0.06	0.04	0.04	0.03
Total assets	1.01	1.01	1.01	1.01	1.01	1.01
capital	0.29	0.19	0.16	0.14	0.12	0.10
deposits of banks	0.04	0.07	0.12	0.16	0.16	0.20
deposits of government	0.00	0.01	0.01	0.01	0.02	0.03
deposits of firms	0.39	0.38	0.34	0.35	0.37	0.38
deposits of households	0.22	0.28	0.27	0.20	0.21	0.17
issued debt securities	0.04	0.06	0.09	0.12	0.09	0.07
other liabilities	0.02	0.02	0.02	0.02	0.03	0.04
Total liabilities	1.00	1.00	1.00	1.00	1.00	1.00

The Russian data confirm the pattern found elsewhere (see Kashyap and Stein 2000 for the US): small banks hold larger buffer stocks and make fewer loans. The underlying reason is that small banks have more trouble in securing external financing due to informational frictions and e.g. very limited access to Russian interbank markets.

5 Empirical evidence on bank lending channel in Russia

To assess the role of banks in monetary transmission we estimated the model in equation (5). As the model is dynamic in the sense that the right-hand side includes lagged dependent variables, the standard OLS would produce inconsistent estimates. Therefore we use the generalised method of moments (GMM) suggested by Blundell-Bond (1988) to obtain consistent and efficient estimators. The GMM estimator first-differences the equation in order to remove individual-bank effects and produces an equation that is estimable by instrument variables. The model is estimated with one lag of the dependent variable, contemporaneous and one lag for all other variables. Loan growth is instrumented with the second to sixth lags of the endogenous variable.

The key results are reported in table 5. Each column presents the results using one of the four monetary policy indicators. We report the estimated long-run coefficients only.

Table 5 Loan growth: long-run coefficients of structural GMM estimations

	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	35887	35887	35887	35887
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: */**/*** denotes significance at 10%/5%/1% level. Time trend, bank characteristics and their interactions, as well as interactions between macroeconomic variables and bank characteristics, are included but not reported.

The columns (3) and (4) indicate that changes in the interest rates do not have statistically significant effects on bank lending. This confirms our prior expectations that in Russia neither interbank rates nor central bank policy interest rates are useful indicators of monetary policy. On the contrary, changes in the monetary aggregates do help to explain bank lending. Increases in money base as well as increases in broad money are reflected in higher bank lending. The long run effect of a change in a monetary aggregate on lending has the expected positive sign and the coefficient is significantly different from zero.

Concentrating on the first two columns, we find evidence of monetary policy affecting bank loan supply. An increase in a monetary aggregate (reflecting monetary policy expansion) increases bank lending, but less so for well capitalized banks. Contrary to most studies on the US or euro area, bank liquidity and bank size are not significant in explaining bank lending. We note, however, that capitalization and bank size are negatively correlated. As seen from the Table x, well-capitalized banks tend to be very small as measured by total assets.

Fungacova and Solanko (2008) analyse bank capitalization in Russia as a measure of bank risk. They find that smaller banks are indeed better capitalized whereas foreign banks are siginificantly less capitalized and state-controlled banks are better capitalized. They further find that higher loan growth translates into lower capitalization. Therefore, controlling for everything else, banks with rapidly growing loan portfolios have lower capitalization. Our results underline that

banks with lower capitalization react more to changes in monetary policy. It is not entirely surprising that banks with rapidly growing loan portfolios are more dependent on outside funding and are therefore more likely to react to changes in market liquidity.

The macroeconomic control variables perform surprisingly poorly in explaining bank lending. The real GDP variable has the unexpected sign and inflation is not at all significant. The negative sign of the GDP variable is mainly due to loan-growth dynamics. Loan growth has relatively rich variation, and the basic model with only one lag of the dependent variable fails to correctly capture it. The loan-growth dynamics are picked up by GDP. With 2 or 4 lags of the dependent variable included, GDP is no longer significant.

6 Some robustness checks

The approach is based on the assumption that the macroeconomic variables included in the model can capture the relevant time effects. Following Ehremann et al (2001), we check for the robustness of our results with the alternative specification reported in Table 6 below. In the alternative model, all macroeconomic variables are replaced by a full set of time dummies. The model is estimated with one lag of the dependent variable, contemporaneous and one lag for all other variables. As a robustness check, we also estimated the model with two, three and four lags. Our main results remain unchanged and therefore the estimations are not reported (available from the authors upon request).

Table 6 Long-run coefficients of structural GMM estimations for alternative model specifications

	Spec 2 Log(M2)	Spec 2 Log(MB)	Spec 3 Log(M2)	Spec 3 Log(MB)
	l=1	*l=1*	*l=1*	*l=1*
MP				
GDP				
CPI				
C*MP	-3.16**	-2.21**	-2.73**	-1.73**
C*GDP	-0.05	0.01		
C*CPI	-4.74*	-4.64*		
L*MP	-1.30	-0.92	-1.79*	-1.46**
L*GDP	-0.72	-0.69		
L*CPI	-1.61	-1.58		
S*MP	-0.02	-0.01	0.06	0.07
S*GDP	0.09**	0.09**		
S*CPI	-0.01	-0.03		
Observations	35887	35887	35887	35887
Number of bank	1475	1475	1475	1475
Sargan-p	0.39	0.39	0.34	0.35
AR2-p	0.34	0.34	0.33	0.34

Note: */**/*** denotes significance at 10%/5%/1% level. In spec 2 bank characteristics, time dummies and their interactions are included but not reported. In spec 3, time dummies are included but not reported.

In the both models the estimated coefficients of the interaction terms between monetary policy and bank characteristics are of similar magnitude. This serves as a further confirmation of our results. Well capitalized banks consistently adjust their lending behaviour less than the other banks in the face of a monetary policy change. An easing of monetary policy increases bank lending but less so for well capitalized banks. The main results remain unchanged also when each of the bank characteristics was added one at a time to the model. Only the interaction of monetary policy with capitalization was significant.

As a further robustness check, we controlled for the structure of a bank's loan portfolio as a proxy for possible differences in bank's loan demand. In the spirit of Gambacorta (2005), the basic model was estimated with the loans for enterprises as the dependent variable. The results remain qualitatively the same. On the contrary, the model failed to produce significant results when the changes in household loans was used as the dependent variable. This result is not too surprising. Household loans still constitute only a tiny share of the total bank lending in Russia.

We also checked whether bank ownership matters for bank lending. We divided banks in our sample into three ownership groups: state-controlled, foreign and domestic private banks. State controlled banks are defined as in Karas et al. (2009). The foreign ownership dummy is based on CBR data on banks with foreign ownership share exceeding 50%. One might expect that both state and foreign banks have better access to alternative funding sources via their owners. And therefore

private domestic banks would react most to changes in monetary policy. Alternatively, one could assume that in Russia state controlled banks are especially inclined to follow policy guidance from the CBR and the government. Contrary to our expectations and e.g. to results by Vinhas de Souza (2006), we did not find evidence for bank ownership being significant in any of the specifications. What matters for the bank lending channel in Russia is bank capitalization.

7 Conclusions

This paper investigates the role of banks in monetary policy transmission mechanism in Russia. As the stated long term goal of Russian Central Bank is to switch to inflation targeting, understanding how the banking sector reacts to changes in monetary policy stance is very important.

We use a large panel of all Russian banks covering 1999-2007 and dynamic panel data methods. Our empirical results support the hypothesis that the bank lending channel exists in Russia. The existence of a bank lending channel has potentially important implications for the conduct of monetary policy. In the face of monetary contraction, banks will reduce their lending, but well capitalized banks are likely to react much less than other banks. The finding suggests that well capitalized banks in effect attenuate monetary policy transmission.

On the other hand, factors like bank size and liquidity are generally not important for the way a bank reacts to monetary policy changes. We explain the absence of size and liquidity effects by the characteristics of the Russian banking sector. Size and capitalization are clearly negatively correlated whereas the poor functioning of the interbank markets drives all Russian banks to hold sizable liquidity buffers.

To sum up, the results of this paper indicate that changes in monetary policy lead banks to change their loan supply. The strength of the lending channel depends on a bank's capitalization. Our results suggest that the well capitalized banks face smaller informational frictions and have easier access to alternative financing sources at times of monetary contraction.

References

Arena, Marco, Carmen Reinhard and Francisco Vazquez (2007): The Lending Channel in Emerging Economices: Are Foreign Banks Different? IMF Working Paper 07/48.

Altunbas, Yener, Otabek Fazylov and Philip Molyneyx (2002), Journal of Banking and Finance 26, 2093-2110.

Benkovskis, Konstantins (2008): Is there a bank lending channel of monetary policy in Latvia? Evidence from bank level data. Latvijas Banka Working Paper 1/2008.

Bernanke, Ben and A. Blinder (1988): Credit, Money and Aggrerate Demand. American Economic Review 78, 435-439.

Egert, Balazs and Ronals MacDonald (2009): Monetary Transmission Mechanism in Central and Eastern Europe. Surveying the Surveyable. OECD Economics Department Working Papers, No. 654, OECD.

Ehrmann, Gambacorta, Martinez-Pages, Sevestre and Worms (2001): *Financial Systems and the role of banks in monetary policy transmission in the euro area*. European Central Bank Working Paper No. 105.

Ehrmann, Gambacorta, Martinez-Pages, Sevestre and Worms (2003): *Financial Systems and the role of banks in monetary policy transmission in the euro area*, in Angeloni, Kashyap and Mojon (eds.), Monetary Policy Transmission in the Euro Area. Cambridge University Press.

Esanov, Akram, Christian Merkl and Lucio Vinhas de Souza (2005): Monetary Policy rules for Russia. Journal of Comparative Economics 33, 484-499.

Fungacova, Zuzana and Laura Solanko (2008): Risk-taking by Russian banks. Do location, ownership or size matter? BOFIT Discussion Paper 21/2008.

Gambacorta, Leonardo (2005) Inside the bank lending channel. European Economic Review 49, 1737-1759.

Golodniuk, Inna (2006): Evidence on the bank-lending channel in Ukraine. Research in International Business and Finance 20, 180-199.

Karas, Alexei and Koen Schoors (2005): Heracles or Sisyphus? Finding, cleaning and reconstructing a database of Russian banks. Ghent University Working Paper 05/327.

Karas, Alexei, Koen Schoors and Laurent Weill (2009): Are private banks more efficient than public banks? Evidence from Russia. Economics of Transition (forthcoming)

Kashyap, Anil K. and Jeremy Stein (2000): What do a million observations in banks say about the transmission of monetary policy? American Economic review,Vol 90, no,3, 407-428.

Keller, Peter and Thomas J. Richardson (2003): Nominal Anchors in the CIS. IMF Working Paper 03/179.

Kishan, Ruby P. and Timothy P. Opiela (2000): Bank size, bank capital, and the bank lending channel. Journal of Money, Credit and Banking, vol 32, no. 1, 121-141.

Kishan, Ruby P. and Timothy P. Opiela (2006): Bank capital and loan assymmetry in the transmission of monetary policy. Journal of Banking and Finance, Vol 30, 259-285.

Korhonen, Iikka and Aaron Mehrotra (2009): Money Demand in post-crisis Russia: de-dollarization and re-monetisation. Emerging Markets Trade and Finance, forthcoming.

Matousek, Roman and Nicholas Sarantis (2009): The bank lending channel and monetary policy transmission in Central and Eastern European countries. Journal of Comparative Economics, forthcoming.

Vdovichenko, Anna and Victoria Voronina (2006): Monetary policy rules and their application in Russia. Research in International Business and Finance 20, 145-162.

Vinhas de Souza, Lucio (2006): Estimating the Existence of the Bank Lending Channel in the Russian Federation. Bank I Kredyt, wrzesien 2006, Central Bank of Poland.

Vymyatnina, Yulia (2006) How much control does Bank of Russia have over money supply? Research in International Business and Finance 20, 131-144.

Earlier BOFIT Discussion Papers

For a complete list of Discussion Papers published by BOFIT, see www.bof.fi/bofit

2008
- No 1 Tuuli Koivu: Has the Chinese economy become more sensitive to interest rates? Studying credit demand in China
- No 2 Aaron Mehrotra and José R. Sánchez-Fung: Forecasting inflation in China
- No 3 Alexei Karas, Koen Schoors and Laurent Weill: Are private banks more efficient than public banks? Evidence from Russia
- No 4 Tomasz Koźluk: Global and regional links between stock markets - the case of Russia and China
- No 5 Tomasz Koźluk and Aaron Mehrotra: The impact of Chinese monetary policy shocks on East Asia
- No 6 Rajeev K. Goel and Michael A. Nelson: Causes of Corruption: History, geography, and government
- No 7 Jarko Firdmuc, Iikka Korhonen and Ivana Bátorová: China in the world economy: Dynamic correlation analysis of business cycles
- No 8 Kashif Saleem: International linkage of the Russian market and the Russian financial crisis: A multivariate GARCH analysis
- No 9 K.C. Fung, Iikka Korhonen, Ke Li and Francis Ng: China and Central and Eastern European Countries: Regional networks, global supply chain or international competitors?
- No 10 Rajeev K. Goel: Regulatory bottlenecks, transaction costs and corruption: A cross-country investigation
- No 11 Alicia García-Herrero and Daniel Santabárbara: Does the Chinese banking system benefit from foreign investors?
- No 12 John Bonin, Iftekar Hasan and Paul Wachtel: Banking in transition countries
- No 13 Maria Ritola: Price convergence and geographic dimension of market integration: Evidence from China
- No 14 Anatoly Peresetsky: Market discipline and deposit insurance in Russia
- No 15 Tuuli Koivu, Aaron Mehrotra and Riikka Nuutilainen: McCallum rule and Chinese monetary policy
- No 16 Iikka Korhonen and Svetlana Ledyaeva: Trade linkages and macroeconomic effects of the price of oil
- No 17 Anatoly Peresetsky and Alexander Karminsky: Models for Moody's bank ratings
- No 18 Laurent Weill: How corruption affects bank lending in Russia
- No 19 Alexei Karas, Koen Schoors and Gleb Lanine: Liquidity matters: Evidence from the Russian interbank market
- No 20 Pierre-Guillaume Méon and Laurent Weill: Is corruption an efficient grease?
- No 21 Zuzana Fungáčová and Laura Solanko: Risk-taking by Russian Banks:Do Location, Ownership and Size Matter?
- No 22 Juuso Kaaresvirta and Aaron Mehrotra: Business surveys and inflation forecasting in China
- No 23 Olga Garanina: What Beyond Oil and Gas? Russian Trade Specialisation in Manufactures
- No 24 Andrei Shumilov: Performance of Business Groups: Evidence from Post-Crisis Russia
- No 25 Matthieu Bussière and Tuomas Peltonen: Exchange rate pass-through in the global economy - The role of emerging market economies
- No 26 Andrei Yakolev: State-business relations and improvement of corporate governance in Russia
- No 27 Elena Fedorova and Mika Vaihekoski: Global and local sources of risk in Eastern European emerging stock markets
- No 28 Iftekhar Hasan, Haizhi Wang and Mingming Zhou: Do better institutions improve bank efficiency? Evidence from a transitional economy
- No 29 Yu-Fu Chen and Michael Funke: China's new labour contract law: No harm to employment?
- No 30 Jenni Pääkkönen: Optimal law enforcement and welfare in the presence of organized crime
- No 31 Judith Dean, K.C. Fung and Zhi Wang: How vertically specialized is Chinese trade?

2009
- No 1 Jenni Pääkkönen: Economic freedom as a driver for growth in transition
- No 2 Jin Feng, Lixin He and Hiroshi Sato: Public pension and household saving: Evidence from China
- No 3 Laurent Weill: Does corruption hamper bank lending? Macro and micro evidence
- No 4 Balázs Égert: Dutch disease in former Soviet Union: Witch-hunting?
- No 5 Rajeev K. Goel and Iikka Korhonen: Composition of exports and cross-country corruption
- No 6 Iikka Korhonen and Aaron Mehrotra: Real exchange rate, output and oil: Case of four large energy producers
- No 7 Zuzana Fungáčová, Christophe J. Godlewski and Laurent Weill: Asymmetric information and loan spreads in Russia: Evidence from syndicated loans
- No 8 Tuuli Juurikkala, Alexei Karas, Laura Solanko: The role of banks in monetary policy transmission: Empirical evidence from Russia

Bank of Finland
BOFIT – Institute for Economies in Transition
PO Box 160
FIN-00101 Helsinki

☎ + 358 10 831 2268
bofit@bof.fi
http://www.bof.fi/bofit