

Further Estimations of the Bank Lending Channel in the Russian Federation (draft)

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Abstract: We use a panel of annual balance sheet data on 980 Russian banks and test for the whether lending responses to a change in monetary policy differs, depending on the balance sheet strength of a bank. We find only weak signs of that for Russian banks. This result implies that the bank lending channel has some, albeit limited, degree of effectiveness in Russia, which may increase in time, with the continued development of the Russian banking system.

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1. Introduction

For an effective monetary policy to be formulated, it is necessary to understand how monetary policy actions are transmitted into the economy and the role that the financial sector plays in this process. Studies about the transmission of monetary policy in Russia – and in other CIS countries - are extremely scarce. This paper attempts to start to fill this gap, by estimating the effectiveness of the bank lending channel in Russia.

The basic theoretical explanation of monetary policy transmission, the so called interest rate channel (IRC), suggests that monetary policy shocks propagate through the economy in the following way: a expansionary monetary policy leads to a fall in the real interest rate thus lowering the cost of capital; this reduced cost of capital causes an increase in investment spending, which increases aggregate demand, and, ultimately, output (and vice-versa, for monetary contractions). The functioning of this channel rests on the assumption that there are two assets in the economy – money and interest bearing bonds.

More recently, a substantial research on alternative monetary transmission mechanisms (MTM) has been undertaken, aiming at explaining how changes in the short-term *nominal* interest rates can induce changes in the level of investment, which should be affected only by the *real* long-term interest rate. Mishkin (1997) lists nine such mechanisms, which can be broadly divided into two categories: those operating through asset prices and those operating through credit markets. The bank lending channel is the one of the channels that operate through the credit markets.

The concept of the bank lending channel rests on the assumption that there are three assets available for businesses and households in an economy – money, bonds and bank deposits: adding deposits creates a role for banks in the transmission of monetary policy. The bank lending channel operates as follows: a contraction in the money supply by the central bank

decreases bank deposits and forces the commercial banks to cut on lending. The decrease in loans makes loan-dependent business and consumers reduce aggregate demand. As a result, output is affected.

Hence, the economic significance of the bank lending channel depends on: a) the existence of bank-dependent borrowers and b) the quantitative impact of a central bank's monetary policy on the supply of bank loans. Since the first condition usually holds for most economies, empirical studies have concentrated on testing whether a central bank can affect the supply of bank loans. They typically study individual bank data,² testing the assumption that banks with different size, liquidity or level of capitalization should respond differently to policy shocks (see Kashyap and Stein, 2000). Lending responses, if they emanate from loan supply changes, should be larger for banks with – for example - "weaker" balance sheets, which are more likely to have difficulties substituting lost deposits with external forms of finance.

We use a panel of annual balance sheet data on 980 Russian banks from 1997 to 2006 and test whether lending responses to a change in monetary policy differs, depending on the balance sheet strength of a bank. Our results indeed suggest that banks (especially *private* ones) with lower than average assets are more affected by monetary policy actions than average banks, which is consistent with bank lending channel hypothesis.

We first present a brief overview of theoretical work on the bank lending channel and describe some empirical studies that test the existence of the channel for European economies. Then we present the model to be used here. Afterwards, the Russian monetary policy and the structure of the banking sector in Russia are discussed, which is followed by the presentation

²Firm data has the added advantage of dealing with the "identification" problem in an estimation (namely, with the fact that a downturn would *endogenously* generate a reduction in the demand for loans, of the monetary policy shock).

of results of our estimations and by the conclusions.

2. A Brief Overview of the Recent Literature on the Lending Channel

According to the bank lending channel theory, monetary policy affects the supply of bank loans through an imperfect market for bank debt. A restrictive monetary policy leads to a drop in bank deposits. Only banks that have a larger share of liquid assets or that are bigger are able to shield their lending relationships from the monetary policy shock (see Mishkin, 1996). Smaller banks have to draw on their liquid assets, whereas larger banks have better access to external finance due to their size. Hence, they do not have to reduce their lending as strongly as smaller or less liquid banks (see Bernanke and Gertler, 1995). The same may be true for banks with a bigger capital-to-assets ratio, as market participants may perceive highly capitalized banks as being less risky. Consequently, it should be more expensive for less capitalized banks to access external finance. Further, if debtors do not have perfect substitutes for loans, banks' restrictive lending behaviour results in added costs to them. As a consequence, the bank lending channel would be an *additional* real economic effect to the conventional channels, which would not exist under a perfect market for debt.

Kashyap and Stein (1993) list three conditions (based on Bernanke and Blinder, 1988) for a distinct bank lending channel to exist:

1. Firms should not be able to completely compensate a reduced supply of commercial bank loans from other sources;
2. The central bank must be able to affect the supply of credit;
3. There must be imperfections in the adjustment of the aggregate price level.

The third condition is an overall requirement for the effectiveness of monetary policy, and is usually met. So, to test the existence of the lending channel, one has to verify that conditions 1 and 2 are satisfied for a given economy.

With respect to the first condition, Kashyap and Stein conclude that if a contractionary monetary policy reduces the supply of loans, loan-dependent firms will be affected adversely. The second condition requires an empirical examination in each particular economy.

There are institutional arrangements that weaken the power of the bank lending channel. Three of the most important ones are the existence of capital adequacy requirements, the existence of reserve requirements and the participation of non-banking financial institutions in the supply of loans. Capital adequacy and reserve requirements restrict the supply of loans that a bank can make, thereby leaving less room for loan responses to monetary policy actions. The central bank also cannot control loans issued by non-banking financial institutions, which implies a lower overall capacity to affect the loans' supply to the economy.³ Kashyap and Stein conclude that an *average* bank should respond by cutting back on loans, as only well-capitalised banks can raise external finance and thus their lending would be less affected by policy changes.

3. A Brief Overview of the Empirical Literature in Europe

The evidence for the European Union concerning the IRC and the banking channel is presented in Table 1 below: for most of the countries, a role for the IRC is found. Concerning the *banking* channel, only Finland (and here the fact that estimations only deal with the period after Finland's banking crisis in the mid 1990s may affect the outcome), Luxembourg (a former "tax heaven", with its small and internationally oriented banking system) and Spain do not show any role for a banking channel.⁴

³Other institutional elements are also important: the still large share of the state-owned banks in many countries, the existence of bank networks and of deposit insurance.

⁴Most of these studies were directly or indirectly linked to the European Central Bank (ECB) "Monetary Transmission Network", the first of the ECB's Research Networks. See Angeloni, Kashyap and Mojon (2003).

Table 1. The IRC in the euro area

		Financial factors important for investment and potentially important for consumption	Some evidence against IRC. Financial factors potentially important for consumption only	Financial factors important for investment but not necessarily for consumption	No evidence against IRC. No Financial factors expected
Loan supply reacts	Netherlands, Portugal	Greece, France (?)	Germany	Italy, France (?)	
Loan supply insensitive				Austria	Finland, Spain
Loan supply assessment not possible	Ireland	Belgium (?)		Belgium (?)	Luxembourg

Source: Angeloni et al. (2003).

More recently, Engler et al. (2005) also find some signs that the bank lending channel is at work in Austria via capitalization levels, while Merkl and Stolz (2006), in a similar work, find that the bank capital channel is present in Germany.

Studies for the CIS are extremely scarce. In the work that most closely relates to this paper, Golodniuk (2006) analyses the existence of the bank lending channel in Ukraine. Her results suggest that the bank lending channel operates in the Ukrainian economy.

4. The Model

We follow the Peek and Rosegren (1996) and Golodniuk (2006) model, in which “strong” and “weak” banks react differently to a change in monetary policy. In particular, we want to test the effect of bank capitalization and assets on the response of loans to changes in monetary policy. The theory predicts that better capitalized banks should be less sensitive to changes in policy, while the impact of asset size is ambiguous. The explanatory variable of primary interest is i_t , an exogenous indicator variable describing monetary policy shocks. Most of the recent studies of European economies use a short-term interest rate under control of the central bank (Engler et al., 2005, is an exception, as it uses the “unexpected” component of monetary policy). Following those, we will use the Russian short-run money market rate as the policy indicator.

The effect of monetary policy on bank loans depends, as explained above, on the balance sheet strength of a bank. We include a second set of explanatory variables that is the interaction between the change in i_t and a measure of balance sheet strength of a bank. As indicated above, the theory suggests capital and asset size as measures of bank strength. Empirical papers typically use asset size (A_{it}), liquidity (LIQ_{it}), or capitalization (CA_{it}). We include all three of them into our specification.

We also have to isolate changes in total loans caused by movements in loan demand, since we are testing if actions by the Central Bank of Russia (CBR) can affect the supply of loans. To account for loan demand movements, variables like GDP or CPI have traditionally been added to this type of model. However, macroeconomic aggregates fail to capture demand changes for an individual bank. To better control for cross-sectional differences in loan demand, measures like real certificates of deposits and bank securities holdings (Kashyap and Stein, 1995, Kishan and Opiela, 2000) were suggested. Here, we will use total deposits (TDE) and total borrowed funds (TBF) to proxy movements in demand for loans of a particular bank, as these aggregates reflect better the specific features of the Russian banking system. We also have to include lags of both dependent and explanatory variables to allow for dynamic effects. The model specification is as follows in equation (1) below:

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

where ΔLN is the growth rate of loans of bank i in year t . The data on loans and all other balance sheet items is taken directly from the balance sheet of banks.

Δi_t - change in the annualised Russian money market rate.

BS_{it} – vector of the three variables capturing the balance sheet strength of a bank – Asset size (A_{it}), Liquidity (LIQ_{it}) and capitalization (CA_{it}). Asset size is total assets (in USD), while liquidity and capitalization are calculated as ratios of bank liquid assets and equity capital to total assets, respectively. ΔTDE_{it} is the growth rate of total deposits and ΔTBF_{it} is the growth rate of a bank's total borrowed funds.

The coefficients on the Δi_{t-j} terms capture the response of an average bank to a monetary shock, while the coefficients on BS_{it} cross terms describe how the response differs for differently capitalized banks. For an operational lending channel to exist it is sufficient that all coefficients on Δi_{t-j} are negative (and significant) and the coefficients on the BS_{it} and Δi_{t-j} cross products are positive (and significant).

Before showing the results of our estimations, we will briefly describe both the monetary policy followed by the CBR and the structure of the Russian banking system.

5. The Russian Monetary and Exchange Rate Policy: 1993-2004

The dissolution of the Soviet Union at the end of 1991 did not immediately lead to the establishment of a truly *Russian* monetary authority capable of conducting an independent and effective monetary policy. It is only after 1993 that the CBR has been able to conduct its own independent monetary policy, although its scope was limited by the policy choice to finance a large budget deficit, mainly caused by a substantial initial decline in output.

This loose monetary stance continued until mid-1995, when the Russian economy started showing signs of stabilization and a new law on the CBR was passed, providing it with some degree of legal independence in conducting monetary policy. These positive developments

allowed the CBR to adopt a tighter monetary policy and to introduce a pegged exchange rate regime with a crawling band against the US dollar (USD), from July 1995 onwards, replacing the previous “dirty float”. As a result of these measures inflation slowed down from almost 200% in 1995 to 48% in 1996 and to 15% in 1997 (see Table 2). Furthermore, credit to the government fell significantly⁵ and the CBR started to conduct monetary policy via indirect instruments, such as reserve requirements.

However, the Asian crisis of 1997 decreased investment confidence in Russia and caused capital outflows, forcing the CBR to defend the band. Although during the exchange market interventions in November 1997 the CBR lost over USD 6 billion of its liquid reserves, or two thirds of total reserves at that time, the exchange band was successfully defended on that occasion.

Nevertheless, after renewed attacks on the currency in the run-up to August 1998,⁶ the government was forced to default on its domestic debt obligations. The rouble was devalued and lost 62% of its nominal value between the end of July and the end of September 1998. The exchange rate band was abandoned, leading to the adoption of a “dirty floating” regime (albeit Russia followed a *de facto* targeting of an exchange rate indicator also after 1998). One consequence of the sharp depreciation was a rapid but short-lived acceleration in inflation (it jumped to over 84% in 1998).

Table 2. Basic Monetary Indicators for Russia

	199 4	199 5	199 6	199 7	1998	199 9	200 0	200 1	200 2	200 3	200 4	2005
Inflation (CPI), 12-month % change (eoy)	307.6	197.5	47.74	14.77	84.4	36.5	20.2	18.6	15.1	12.0	11.7	10.9

⁵The financing of the fiscal deficit was mainly secured through the issuance of domestic debt, which was made possible by the initial development of the Russian securities market.

⁶The year 1998 also the low point of a downward price cycle of energy commodities, the main Russian exports: this also substantially affected Russia’s external position.

M2 growth rate	216.5	112.6	29.56	28.85	37.6	56.7	58.0	36.3	33.8	38.5	33.7	36.3
Nominal exch. rate to USD (eoy)	3.6	4.6	5.6	6.0	20.7	27.0	28.2	30.1	31.8	29.5	27.7	28.8
Nominal exch. rate to EUR (eoy)						27.2	26.1	26.5	33.1	36.8	37.8	33.9
REER, period average (2000=100)	103	112.9	137.6	145.2	128.5	90.5	100.0	118.7	122.7	135.3	155.0	168.4

Source: IMF/IFS, calculations by the author.

As a consequence of the renewed inflationary pressures in 1998, one of the main objectives of the Bank of Russia was to bring inflation down, initially to 30%, while keeping output decline in the range of 1–3% (see Table 3, for the CBR's post-1998 *stated* objectives and instruments).

Table 3. Stated Objectives and Targets of the CBR

1999	2000	2001	2002	2003	2004
M2 aggregate growth rates as an intermediate target: 18%-26% growth.	M2 aggregate growth rates as an intermediate target: 21%-25% growth.	M2 aggregate growth rates as an intermediate target: 27%-34% growth.	M2 aggregate growth rates as an intermediate target: 22%-28% growth.	M2 aggregate growth rates as an intermediate target: 20%-26% growth.	M2 aggregate growth rates as an intermediate target: 19%-25% growth.
Reduction of the inflation rate to 30%.	Reduction of the inflation rate to 18%.	Reduction of the inflation rate to 12%-14% a year.	<i>Reduction of inflation to 12%-14% a year range ("core inflation" concept introduced)</i>	Reduction of inflation to 10-12% (core inflation should be kept within the 8.0%-8.5% range).	Reduction of inflation to 8-10% (or 7%-8% core inflation), to 6.5%-8.5% in 2005 and to 5.5-7.5% in 2006.
GDP growth: -1% to -3% GDP fall.	GDP growth: 1.5%.	GDP growth: 4%-5%.	GDP growth: 3.5-4.5%.	GDP growth: 3.5%-4.5%.	GDP growth: 3.5%-4.5%.
Exchange rate: in 1999 the exchange rate was not a formal monetary policy target.	Exchange rate: in 2000 the exchange rate was not a formal monetary policy target.	Exchange rate: in 2001 the exchange rate was not a formal monetary policy target.	Exchange rate: <i>nominal</i> exchange rate targeting?	Exchange rate: "The Bank of Russia believes that the ruble's REER may safely rise by 4% to 6% in 2003".	Exchange rate: "the REER of the ruble may rise by 3%-5%. The Bank of Russia <i>will</i> try to stop it from rising by more than 7%".

Source: Esanov, Merkl and Vinhas de Souza (2005).

To achieve this objective, monetary policy was tightened by reducing net credit to the banking system. Because of this measure, inflation fell in 1999 to 37%, and the real exchange rate depreciation stopped. Furthermore, fiscal performance significantly improved, due to the approval of a new package of fiscal measures, and to improvements in revenue collection.

This improved fiscal and external performance was also linked to energy prices: 1999 signaled the beginning of a new upward price cycle for energy commodities. World energy prices increased (over 50% of Russia's exports are of energy-related products – oil and gas), resulting in very substantial trade and current account surpluses (in some years close to 10% of GDP), renewed capital inflows and a strong resumption of growth in Russia. Given the effects of these developments on the (real) exchange rate, it became again one of the main targets of monetary policy. Since 2003 the CBR has had formal real exchange rate target ranges. The CBR policy has slowed the *real* appreciation of the rouble and reduced inflation, albeit the pace of disinflation has been slower than the one formally targeted by the authorities: in 2006 the CBR for the first time fulfilled its own inflation target (and inflation for the first time fell below two digits), but at the time of writing it seems unlikely that the same will happen in 2007.

6. The Russian Banking System

Russia has a concentrated, mostly state-owned, banking system, with a still relatively limited significance in GDP terms. At early-2007, the total Russian banking sector assets amounted to roughly 53% of GDP, up from 33% at end-1999. The number of operating credit institutions in Russia continued to decline gradually, from about 1330 in 2003 to 1265 in August 2007. The concentration of the Russian banking sector has been increasing, with the five largest banks currently accounting for 47% of the total assets in 2006.

Russia has a very large share of its bank assets in the hands of state owned banks: using BankScope data, this share was above 50% in 2006.⁷ The two largest banks, Sberbank⁸ and Vneshtorgbank (VTB), together held around 35% of assets in 2006.

⁷Including banks controlled by state-controlled corporations, the largest being Gazprombank.

⁸The CBR is the major shareholder of Sberbank.

On the other hand, banks that are over 50% foreign-owned have gradually grown in number throughout this decade (from 33 to 80 banks, in August 2007). They have also been increasing significantly their still relatively small share of banking sector assets, estimated at around 12% in mid-2007.⁹ Correspondingly, the share of domestic private banks in total assets has been declining. Several small banks belong to the so-called financial-industrial groups.¹⁰ Those groups are often controlled by a few ultimate beneficial owners.

7. Data and Estimation Results

In this work we use annual data covering 1997-2006. We have bank balance sheet data for 980 Russian banks, provided by BankScope, representing over 13 trillion Roubles at end 2006, or effectively almost 100% of the total assets of the banking system.

Total assets are defined as the sum of all bank assets, while capital is bank equity. The specification is as in (1) above. We added GDP, real exchange rate (REER) and inflation as macro controls. Our aim is to test for the existence of the bank lending channel in Russia. In

terms of our specification, this implies that all coefficients on Δi_{t-j} should be negative (and significant) and the coefficients on BS_{it} and Δi_{t-j} cross products should be positive (and significant). In order to eliminate the individual effect μ_i in (1), we use the Arellano and

Bond (1991) generalized method of moments (GMM) estimator, which applies the entire set

⁹This share is indeed low if one compares with the EU's New Member States -in Bulgaria, 80% of the assets of the banking system are foreign owned, 95% in the Czech Republic, 98% in Estonia, 63% in Hungary, 68% in Latvia, 87% in Lithuania, 70% in Poland, 55% in Romania and 83% in Slovakia- but not by the standards of comparably large EU economies (7% in Germany, 11 in Spain -which has roughly the size of the Russian economy, 15% in France) and other large emerging economies (2% in China, 8% in India and 27% in Brazil).

¹⁰“Financial-industrial groups” in Russia refers to groupings of banks and non-bank companies where a non-bank company owns or controls the bank. They can be seen as a rather Russian type of “banking network”.

of lagged values of the endogenous variable as instruments.¹¹ Also, the large state-owned banks and foreign-owned banks may be non-sensitive or less sensitive to interest rate changes than private banks, so we estimate the model only for domestic private Russian banks. The estimation results are shown in Table 4 below.

Table 4. Estimation Results

Loans	LD	All Banks				Private Banks			
		Total Loans		Consumer Loans		Total Loans		Consumer Loans	
		Coef.	P> z	Coef.	P> z	Coef.	P> z	Coef.	P> z
		0.246	0.02	-0.094	0.57	0.042	0.84	-0.057	0.79
rrc	D1	-1.190	0.11	-1.498	0.07	-2.398	0.06	-2.437	0.06
	LD	-0.011	0.96	-0.362	0.04	0.772	0.24	0.963	0.24
log_assets	D1	1.744	0.11	-0.581	0.76	0.421	0.64	-1.521	0.14
capt	D1	0.055	0.35	-0.032	0.70	-0.006	0.92	-0.060	0.25
log_equi	D1	-1.053	0.38	1.146	0.54	0.776	0.44	2.354	0.01
rrc_assets	D1	0.027	0.03	0.066	0.00	0.224	0.01	0.232	0.00
	LD	0.004	0.48	0.010	0.13	-0.033	0.24	-0.034	0.30
rrc_equi	D1	-0.323	0.27	-0.070	0.85	-0.049	0.46	-0.040	0.51
	LD	0.044	0.57	-0.043	0.52	-0.045	0.36	-0.045	0.38
rrc_capt	D1	0.017	0.24	0.003	0.87	0.002	0.83	0.006	0.26
	LD	-0.003	0.48	0.001	0.70	-0.001	0.71	-0.002	0.52
g_tbf	LD	-0.548	0.00	-0.175	0.17	-0.465	0.02	0.018	0.92
g_tde	LD	0.001	0.99	-0.053	0.39	-0.133	0.03	-0.158	0.00
gdp	D1	-0.448	0.00	-0.638	0.00	-0.481	0.51	0.402	0.40
reer	D1	-0.017	0.12	-0.007	0.69	-0.075	0.33	0.008	0.78
cpi	D1	-0.616	0.00	-0.560	0.00	-0.385	0.29	0.125	0.66
Constant		-0.767	0.00	-0.409	0.00	0.447	0.69	(dropped)	

Significant variables in bold.

As one may see, interest rates do affect negatively and significantly loans. The contemporaneous effect is indeed stronger for private Russian banks, albeit not the lagged one. On the other hand, considering the interaction terms, only assets seem to be significantly counteracting monetary policy shocks.

Briefly, from this we can only conclude that we currently have only weak signs of both an IRC and of the bank lending channel in Russia - but that those become somewhat strong using

¹¹For consistent Arellano-Bond estimates, the test of overidentification cannot be rejected and therefore autocorrelation of order two or higher should not exist. In all of the following results, the tests indicated that there is no autocorrelation of higher order.

domestic privately owned banks¹² - and these are linked to the level of assets.

These results may be explained by the limited use by the monetary authority itself of interest rates as an instrument of monetary policy, by the limited – but growing - importance of the Russian banking sector as provider of loans to domestic companies and households, by the persistent excess liquidity stemming from the very large current account surpluses after 1999, and by institutional features that limit the effectiveness of the banking channel (namely, a large state presence in the banking sector, the existence of a deposit insurance system in the largest, “systemic” bank in Russia, and the existence of a very particular type of “banking networks”).

Our results may indicate that the CBR, which aims to switch to a monetary policy framework based on inflation targeting *cum* floating exchange rate in the medium-term, has to be cautious concerning the effectiveness of any interest rate based monetary policy in Russia. Changes are necessary to strengthen the transmission mechanism of interest rates decision, if such a policy switch is to work.

¹²The financial instability caused by the collapse of the sub-prime mortgage market in the US during August 2007 provides some supporting evidence of this: the only banks seemingly significantly affected by the unexpected “liquidity shock” were privately owned Russian banks.

8. Conclusions

The existence of the bank lending channel has important implications for the conduct of monetary policy by a central bank. The literature predicts that if the bank lending channel is present, banks would cut back on lending in response to monetary contraction and undercapitalized banks would be more affected than larger, better capitalized banks. This happens because for the former it is more difficult to compensate the reduction in deposits with funds from other external sources.

Tests for the existence of the bank lending channel usually classify banks according to some measure of balance sheet strength, like capitalization or asset size, and then estimating the lending responses to a monetary shock. This paper uses capitalization, bank assets and liquidity as “separating” variables.

This work, using annual data covering 1997-2006 and applying a GMM estimator, finds only limited signs that the bank lending channel is operational in Russia: the higher the assets, the less sensitive a bank is to changes in monetary policy. These results seem to be stronger for a sample without the Russian state and foreign owned and banks

These results are consistent with theoretical predictions and with the specificities of the Russian situation, and they imply that bank lending channel has some, albeit limited, degree of effectiveness in Russia. This effectiveness is expected to increase in time, with the continued development of the Russian banking system, and future work using longer time series will show if this is the truly observed outcome.

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