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ABSTRACT

The Credit Squeeze During Russia's Early Transition: A Bank-Based View*

Russia's early transition is characterised by one of the most dramatic credit expansions and inflation experiences in recent history. As a consequence, Russia has been involved in a protracted inflation stabilisation effort. This paper addresses the question whether the inflation stabilisation might have caused a credit squeeze and hence might have contributed to the output collapse in the first three years of transition. Russian monetary policy was certainly not restrictive as a whole, but still the occurrence of a credit crunch is not excluded. Indeed, the lending channel of monetary policy transmission might have caused a credit crunch in Russia. To analyse Russia's monetary stance from the point of view of the lending channel, we perform an empirical analysis of Russian bank liquidity in 1994 on the basis of bank data. The paper concludes that the huge excess reserves of Russian banks in 1994 were at least partially due to excess liquidity in the banking system. This means that banks preferred to hold liquidity rather than to grant loans. The hypothesis that the credit crunch is due to the lending channel of monetary policy transmission is therefore rejected. The question why banks preferred to hold excess liquidity deserves further attention. This question is still relevant, because Russian commercial banks have again accumulated excess reserves in 1999 and decreased their lending to the economy, in the aftermath of the banking crisis, triggered by the August-1998 crisis.

JEL Classification: E51, G21, P50
Keywords: Russia, early transition, bank liquidity, lending channel

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NON-TECHNICAL SUMMARY

Russia has been faced with a very soft monetary policy between 1992 and 1994, with high inflation as a consequence. On the other hand commercial banks' credit to enterprises shrunk strongly. This apparent paradox might be due to monetary policy transmission. The transmission of monetary policy to the economy is still something of a puzzle. This is certainly the case in a country like Russia. The literature has made a difference between the money channel of monetary policy (interest rates increase, loan demand decreases) and the lending channel of monetary policy transmission (restrictive monetary policy affects bank liquidity and hence bank lending to the economy). It is clear that with respect to interest rates and money creation, Russian monetary policy was very accommodating indeed between 1992 and 1994. However, with respect to commercial banks, the stance of monetary policy is not so clear. Russian commercial banks were obliged to hold high required reserves at the central bank at zero interest rates, with monthly inflation still running at 8% in 1994. This constitutes high implicit inflation tax to banks and must have restricted bank liquidity, which in turn might have caused a credit crunch through the lending channel of monetary policy. If anything, theory predicts that the lending channel of monetary policy will be particularly strong in Russia, because of the important capital market imperfections in that country.

We explore the idea that the credit crunch is explained by the lending channel. Since the lending channel runs through bank liquidity, it is a necessary condition for the lending channel to work, that bank liquidity be constrained. Therefore our main research question is whether or not banks were liquidity constrained in 1994. Using aggregate data we observe that Russian commercial banks in 1994, next to their already high required reserves, also held even higher excess reserves (reserves deliberately deposited in the CBR at zero interest rates). It seems as if Russian banks were not liquidity constrained at all by required reservation, which would mean that attributing the credit crunch to the lending channel makes no sense. We, however, argue that one cannot simply interpret excess reserves as excess liquidity. There are a number of other reasons that might explain why excess reserves are so high. These reasons vary from payment system inefficiencies to loan demand effects and the lack of investment alternatives.

To analyse this question in detail we use Russian bank data and try to explain the excess reserves of Russian banks. Indeed, we find that the huge scale of excess reserves is to a large extent explained by payment system inefficiencies and lack of investment alternatives. However the hypothesis of excess liquidity cannot be rejected either. This finally settles the issue: the Russian banking sector as a whole was not liquidity constrained in 1994. On the contrary, banks were holding excess liquidity, but preferred to hold

reserves rather than to grant credit to the economy. The credit crunch was therefore due to other factors, such as the shock of transition from plan to market or bank decentralization and privatization. Transition is the heart of the problem. Hence, decreasing required reserves would not have been a solution to the credit crunch problem. This analysis is still relevant today because excess reserves have again grown and bank credits have shrunk in the aftermath of the banking crisis that was triggered by the August 1998 crisis. Our bank-based approach may offer some inspiration to interpret current events in the right way.

1. Introduction

Russia experienced high inflation during early transition. This was mainly due to the soft monetary policy of the central bank of Russia (CBR). The softness of the CBR is easily observed in table 1 and figure 1. It is clear from table 1 that the growth of CBR-credit was very high in 1992-1994. Figure 1 shows that the main beneficiary of central bank credits was the government, which covered its budget deficit with the money press. Other main beneficiaries were the CIS-countries[1], and the commercial banks. However the evidence on commercial banks is dubious. They received huge amounts of credits at low nominal interest rates (before 1994 negative real interest rates), but the banks held also large sums of reserves with the central bank at zero nominal interest rates. In column 5 of table 1, we subtracted these reserves of commercial banks at the central bank from the stock of CBR - credit to the commercial banks and calculate the growth rate of the resultant stock of net credit to commercial banks. We observe that the growth of net CBR-credit to commercial banks has been as much negative as it has been positive during 1992-1995. So the stance of monetary policy with respect to commercial banks is not so clear in that period.

<insert table 1 around here>

<insert figure 1 around here>

On the other hand we observe that bank lending to the economy decreased substantially during early transition. Table 2 clearly shows the gradual decrease of banks' credits to the economy, relative to gross investment. The question is whether this credit squeeze can be attributed to monetary policy or is rather due to other factors.

<insert table 2 around here>

Monetary policy transmission is still much of a puzzle. It is widely accepted that restrictive monetary policy raises interest rates and decreases **loan demand** and investment. This is referred to as the money channel. There exist a number of other transmission channels that affect **loan supply** rather than loan demand. This is clearly the case in Russia (see table 2). The **lending channel** has received broad academic interest lately. All models of the lending channel of monetary transmission lean on a particular capital market imperfection as necessary condition, namely the imperfect substitutability of loans and publicly issued bonds for both banks and firms (see for example Bernanke and Blinder, 1988; Kashyap and Stein, 1993). These imperfections imply that restrictive monetary policy affects bank liquidity and hence the loan supply. Since enterprises do not have perfect substitutes for bank lending, they are adversely affected by this lower loan supply. Another channel runs over moral hazard. More restrictive monetary policy and higher interest rates might affect the behaviour and creditworthiness of enterprises (moral hazard) and banks might react by constraining loan supply. This is commonly referred to as the financial accelerator or the **balance sheet channel** (Mishkin, 1996).

Next to monetary policy, other factors may have a direct effect on the loan supply.

We give three examples. First, risk-based capital regulations can play a role (see Bernanke and Lown, 1991; Brinkman and Horvitz, 1995; Peek and Rosengren, 1995). Second, autonomous shifts in enterprises' creditworthiness due to shocks in the economic environment might affect loan supply. The only difference with the balance sheet channel is that the creditworthiness is not affected by higher interest rates but by autonomous factors. Transition from a centrally planned economy to a market economy and the protracted inflation stabilisation are obvious examples. Third, bank decentralisation or privatization might affect loan supply (see for example Dewatripont and Maskin, 1995; Berglöf and Roland, 1998). This is a typical feature of transition economies.

The purpose of this paper is to verify whether the Russian credit squeeze was triggered by overly repressive monetary policy with respect to banks, or was rather due to other factors. This is an important question since the credit squeeze in early transition might have contributed to the excessive output collapse in Russia, as it did in other transition countries (see Calvo and Coricelli, 1993). If the credit squeeze can be explained as a monetary policy phenomenon, some of the output loss could have been avoided by a more appropriate monetary policy.

There has been some literature on the stance of Russian monetary policy in early transition. Granville (1995) evaluates Russia's monetary policy in 1992-1994 and finds that at no time in that period there was a tight monetary stance. This point of view is confirmed by a number of authors such as Åslund (1993), Sachs (1994), or Baliño, Hoelscher and Horder (1997). The literature has however implicitly concentrated on the money channel of monetary policy transmission. The lending channel was largely neglected, while it is bound to play an important role in Russia, because of severe capital market imperfections. Indeed in Russia there was hardly any substitution at all. There was (and is) no liquid market of corporate bonds for banks nor enterprises. Russian banks could not substitute bonds for deposits and Russian enterprises could only finance with either retained earnings or bank credit. In a suchlike environment repression of commercial banks can affect bank liquidity, and hence bank lending and corporate investment. This is the lending channel at work. Since the lending channel runs through bank liquidity, it is a necessary condition for the lending channel to work that bank liquidity be constrained. Therefore our main research question is whether Russian banks were liquidity constrained in 1994. If banks were still liquid, the hypothesis of a too restrictive monetary policy is rejected also from a lending channel point of view. We analyse bank liquidity with the use of individual bank data. Section 2 provides a theoretical discussion on liquidity of Russian banks and formulates research hypotheses. Section 3 describes the data. In section 4 we present results. Section 5 concludes.

2. The paradox of bank liquidity

2.1. The repressive character of required reserves

Required reserves are funds which banks have to deposit with the central bank. Usually they are defined as a proportion of certain classes of liabilities, mostly deposits. Central banks claim to apply reserve requirements as an instrument to secure the bank sector against systemic risk and as an instrument of monetary policy. There exist however better instruments to achieve these goals. Systemic risk

is better contained by good prudential control and supervision and properly priced deposit insurance. Kanatas and Greenbaum (1982) have shown that monetary policy is better off with deliberate and interest earning reserves at the central bank than with obligatory reserves that earn no or low interest. Galbraith and Rymes (1993) have shown that the central bank can better conduct its monetary policy by properly setting overdraft rates in its function as clearing centre in the payments system. In practice, required reserves often pay interest rates below the market rate (sometimes even zero). This cannot be motivated from the point of view of systemic risk or the conduct of monetary policy and therefore reveals the true nature of these requirements: required reserves are primarily an instrument of financial repression (see McKinnon and Mathieson, 1981) and offer a cheap source of financing to the state budget. For these reasons repressive reserve requirements have gradually been replaced by market-based instruments in OECD-countries. However, since in most transition countries financial markets are weakly developed, alternative instruments are not readily available. Therefore reserve requirements play an important role in the monetary policy of transition countries[2].

It is not surprising therefore that Russia, with its huge budget deficits and its underdeveloped financial markets, applied reserve requirements. The Russian regime of required reserves changed frequently during 1991-1995[3]. Before 1992, required reserves were 2% of deposits. At the beginning of reforms in early 1992, the requirement was strengthened to 15% on short term deposits and 10% on long term deposits. Since March 1994 until the end of the period under study the required reserves amounted to 20 % on short term ruble deposits and 15 % on long time ruble deposits. Deposits have to be interpreted broadly as sources of funds. Some sources of funds are excluded. Interestingly, bonds, interbank credits and currency deposits were for example exempted from required reservation. Banks have to deposit required reserves at a special account with the CBR[4], where the funds are frozen. Last but not least, **required reserves bear no interest**[5].

Until now we described how the system of required reserves should have looked like, according to regulations. Unfortunately, in Russia there tends to be a substantial difference between regulations and reality. Under the weak assumption that less than 10% of deposits was long term, the average reserve requirement was about 14.5% of total ruble deposits from early 1992 until the end of February 1994 and about 19.5% of total deposits since. However, the data in table 3 tell a different story. Table 3 shows total ruble deposits, required reserves and their ratio. The legally imposed 14.5% was first reached in October 1993 (14.6%), about two years after its implementation in early 1992. The 19.5% imposed in March 1994 was still not reached in practice by end 1994, though the difference was getting small in the last quarter of 1994. The difference between the legal requirement and actual required reserves may be due to fraud and miscalculation in the calculation of required reserves. The IMF (1995) explains how the concrete calculation methods[6] created room for abuse. By shifting deposits among each other in a timely manner banks could easily abuse the calculation method to get a lower reserve requirement. Only in 1995 these calculation methods were altered. Laurila (1996) indicates that the CBR may have been physically unable to control the weekly reports of the more than 2500 banks that existed in 1994[7]. Therefore the theoretical heavy burden of required reserves may in practice be a lot less heavy, but still it remains at least substantial. It must certainly have reduced bank liquidity.

<insert table 3 around here>

2.2. The paradox of excess reserves

Excess reserves are reserves voluntarily held by commercial banks on their correspondent accounts at the CBR. These reserves bear also zero interest rates but are at the banks' free disposal. They should be a good indicator of the liquidity of banks. Table 4 shows data on required, voluntary and total reserves. Notwithstanding the apparent repression of banks by high required reserves, banks voluntarily held substantial excess reserves with the central bank. Excess reserves reached extremely high levels. They were four to five times higher than required reserves in 1992 and two to four times higher in 1993. Only at the end of 1994, excess reserves reached levels that are comparable with those of required reserves At that time 18% of ruble deposits were deliberately held as excess reserves. This is still remarkably high if we take account of the fact that average monthly inflation was 8% in 1994. The excess reserves must have constituted a serious drain on real bank revenue. It seems as if commercial banks were not liquidity constrained at all by required reserves. This leaves us with a paradox.

<Insert table 4 around here>

Some authors have interpreted these high excess reserves as support for their thesis that bank liquidity was not constrained in early transition. This is however far too simple. In the literature we find a number of contributions that explain the high level of excess reserves, without implying that bank liquidity was high. Several arguments have been put forward, namely data problems, credit risk, payment system problems, absence of alternatives and excess liquidity.

Sunderarajan and Sensenbrenner (1994) find that centralised credit resources were channelled to enterprises via the banks' correspondent accounts at the CBR. Due to the slow settlement system this artificially inflates the banks' correspondent accounts which are used to measure their reserves at the CBR. Sensenbrenner and Sunderarajan (1994) offer data series to correct this distortion. However, after their corrections there still remains an impressive amount of excess reserves.

The credit risk argument is less straightforward. Why would banks prefer to voluntarily hold excess reserves and pay the price in the form of inflation tax? Berglöf and Roland (1995) give a theoretical answer. They study the behaviour of banks in a financial transition environment characterized by undercapitalised banks and poor loan portfolios. They show that "banks themselves can reduce their incentives to gamble for bail-out, and thus credibly commit to hard budget constraints, by **setting aside capital for liquidity reserves, or equity, rather than investing in projects**" (Berglöf and Roland, 1995, p. 355). The empirical prediction is that banks with poorer loan portfolios would hold more liquidity reserves as a device to commit to hard budgets. There exists an alternative interpretation to this empirical prediction: If banks are not aware of the adverse incentive effects of high loan rates, they may set loan rates too high. This would imply poorer loan quality, lower loan demand and higher excess reserves.

Payment system inefficiencies are another factor, as explained by Baliño, Dhawan

and Sunderarajan (1994). A typical consequence of an inefficient payment system, is the large size and variability of payment float. Large and unpredictable flows of payment float impede effective liquidity management by commercial banks and force them to hold large levels of excess reserves as a buffer against the variability of float. If payment float is large and unpredictable, so will be bank reserves, because of the inability of banks to manage their liquidity more efficiently in such a situation. This argument certainly applies to the Russian payment system in 1992-1994. Hoggarth (1996) therefore rightly mentions that excess reserves are likely to fall as the Russian payment system becomes more efficient.

As pointed out by Granville (1995), banks had no alternative in the form of domestic interest-bearing reserves. Treasury bills, the famous 'GKO[8]' were introduced only in May 1993, and they became broadly accepted only in 1994. Moreover the auctions were initially held only in Moscow, and thus available only to Moscow-based banks. Gradually the CBR also started to hold regional auctions. If one makes the sum of the stock of treasury bills and the stock of excess reserves, one observes that the relation between this sum and required reserves stays roughly constant in 1994. This supports the idea that banks have been substituting GKO for excess reserves. Before their existence, the unavailability of riskless interest-bearing reserves lead banks to hold zero interest excess reserves at the central bank as a form of safe liquidity. The access to GKO will therefore decrease excess reserves, because it offers an alternative liquid investment. Another alternative investment for excess liquidity might be interbank loans, since interbank loans are short term and, contrary to excess reserves, do pay an interest rate. Therefore we also include a variable on interbank lending.

Another straightforward explanation, that however has not been put forward in the literature, is the interest elasticity of loan demand. Too high loan rates will logically decrease loans granted and hence will increase the level of excess reserves, given the lack of investment alternatives. This would mean that excess reserves are concentrated in banks with the highest loan rates.

Last, it is possible that in 1992-1994 banks were not liquidity constrained by required reserves and hence that excess reserves were a genuine sign of excess liquidity.

Khoo and Tsepliaeva (1994) tested these various explanations statistically, with aggregate data, and found no significance. They attributed high excess reserves to the slowness of the money creation process. We will test several explanations with the use of bank data.

2.3. Hypotheses

We adopt a bank-based empirical approach to explore the various determinants of excess reserves on the level of a single bank. We know from Sensenbrenner and Sunderarajan(1994) that excess reserve data were distorted by the settlement of centralised credit resources. However, we cannot use their general corrections for our bank-based approach. Therefore we concentrate on 1994-data. This largely solves the measurement problem because at that time centralised credit resources

were reduced to fairly small flows.

The dependent variable **ERTA** is defined as excess reserves, divided by total assets.

The independent variables follow from the theoretical arguments in section 2.2. To approximate the **flow of payments** we divide the current accounts of enterprises by total assets (**CATA**). We suspect that the amount of money on current accounts of enterprises is a good indicator for the flow of payments handled by the bank. We expect a positive sign for CATA: banks with high payment volumes should have high floats.

For **credit risk** we use the proportion of overdue loans to total assets (**BLTA**). Banks with large bad loan portfolios already have a large credit risk exposure and may be tempted to accumulate reserves rather than grant any further credits. We therefore hypothesize a positive sign for BLTA.

For **cash liquidity** we need an indirect measure. Any direct measure (acid ratio, current ratio, etc.) would involve excess reserves, since these are by far the main constituent of bank liquidity. But this would produce endogeneity problems since excess reserves are the independent variable. Therefore we use an indirect indicator of liquidity, namely dividend policy. Since we measure the balance at the end of the year, banks that have distributed all their profits to their owners, will have depleted their liquidity and will be less liquid at that point of time than banks that reserve all their profits. We include therefore a dividend variable (**DIV**), defined as dividends divided by total profit. The coefficient is expected to be negative. Another indirect indicator of liquidity is given by bank reserves as a proportion of total assets (**RESTA**). Bank reserves are accumulated retained bank profits. One can interpret RESTA as a variable that captures DIV over time. If DIV is always 0, which is the case for some banks, than all profits were retained and RESTA will be high. If DIV is always 1, which is also the case for some banks, then all profits have been distributed and RESTA will be 0. The coefficient on RESTA is expected to be positive. If these variables are not significant, it means that banks have invested their retained profits proportionally into new loans, GKO, interbank loans, fixed assets and excess reserves. If we find significance, this means that banks with high profit retention rates have higher excess reserves, or in other words that banks have chosen to put retained profits in excess reserves rather than in other investments, such as credits. This would support the idea that high excess reserves are an indicator of excess liquidity.

To measure the effect of interest rates on loan demand, we introduce the loan rate **IL**, calculated as total interest revenue divided by total interest-earning assets. With a standard loan demand function, high loan rates should affect loan demand adversely and, given the lack of alternatives, induce higher excess reserves. The coefficient is expected to be positive.

The lack of alternative investment opportunities can be captured by data on GKO. We have data for all banks on the ruble amount invested in state bonds, mainly GKO. Bonds can be held by anyone, but primary purchases of GKO were held only in Moscow during 1993-1994. Also on secondary markets they were distributed mainly in and around Moscow[9]. Therefore we assume that GKO were mainly held

by Moscow banks and that in Moscow the data on state bonds mainly contained GKO. We approximate the amount of GKO as follows:
GKO = MOSCOW * (state bonds/total assets), with MOSCOW equalling 1 for Moscow-based banks and 0 in all other cases. Since we hypothesize a substitution of GKO for reserves, we expect a negative coefficient for GKO.

As an alternative investment we also include interbank lending. We measure interbank lending (**IBLTA**) as total interbank loans / total assets.

The capability of efficient **liquidity management** is measured by two variables. We use the log of total assets (**LOGTA**) and the log of the age of the bank (**LOGAGE**). The explanation for LOGTA is obvious. Larger banks have higher but less variable payment flows and have the resources to invest in efficient liquidity management. Therefore the coefficient on LOGTA is expected to be negative. LOGAGE is less straightforward. We assume that there exist considerable learning effects in liquidity management. We assume that this learning process is exponential with time. Therefore we use the log of the age of Russian commercial banks. In our sample all banks are between one and seven years old. The older banks are expected to have learned over time to manage liquidity more efficiently. Therefore LOGAGE is expected to have a negative coefficient. LOGTA and LOGAGE can be interpreted as **control variables**, that control for scale and age.

Last we introduced a number of **dummy control variables**, namely **NATREG**, a dummy for banks operating on a national or regional scale and **STATE**, a dummy for the origin of the bank. The separate introduction of the dummy **MOSCOW,** next to the variable GKO, avoids the possibility that we wrongly conclude that GKO is significant, while in reality this would only be due to the inclusion of MOSCOW in its calculation. Indeed, if that would be the case, GKO would be rejected as insignificant and MOSCOW would be accepted by the data. The precise definition of these three dummy variables is given in the next section.

3. The data

3.1. Data collection

We collected a considerable number of accounts of Russian banks in 1994 from three sources, namely ABC Consulting, one of the small and private information businesses that arose during transition (source A), Intelbridge[10], a specialised financial information firm (source B) and our own field research (source C). The sourcing is described in a separate paper (Schoors, 1999).

After checking the completeness of the data, in the sense that we required their balance, profit and loss account and type, after testing the data (see Annex A), and after checking whether the time period of the data complied with our criterion to only accept annual accounts of 31/12/94, we kept 154 banks from source A, 115 banks from source B and 25 banks from source C.

3.2. Construction of samples

The accounts must be in the same format or complementary formats that can be

translated to a common format. Unfortunately our different sources supplied accounts in different formats. Source A delivered very detailed information. The information was not really in a format but simply reported all the accounts and sub-accounts of bookkeeping. I aggregated the information to an interpretable balance and profit and loss account according to the rules established by the August 1993 CBR instruction on the establishment of a common financial accounting system for commercial banks[11].

In December 1994, the CBR issued a letter laying out a common format for commercial banks to fulfil their publication obligations[12]. This format for obligatory publication provides a balance and a profit and loss account that are far more concise than the internal accounting format of source A. Unfortunately sources B and C were in this more condensed format. I could translate source A in the format of sources B and C, but the opposite transformation was not feasible, because of the lack of detail in sources B and C. The transformation of source A to the condensed format of B and C implied a severe loss of information. Therefore I thought it useful to construct two samples. Sample D is in the most detailed format and only contains data from source A. Sample G contains accounts from sources A, B and C and is in the more condensed format, instructed as the official publication format by the CBR in December 1994. The sample has therefore a lower information value but its size is larger and it representativeness is superior. Table 5 gives an overview. The transformation from source A-data to the sample G-format was accomplished according to the method proposed by Androsov (1995).

<insert table 5 around here>

It is generally accepted that, out of the more than 2500 banks that were officially registered by end-1994, only around 1000 were genuinely operating as banks. Since I selected only banks that can be considered as genuine banks, sample D(1994) represents about 12.6% of number of active banks, while sample G(1994) represents about 23% of the active bank population. If I compare total assets in our sample with total assets in the population (with the exclusion of Sberbank) I observe that sample D(1994) represents 10.9% of total bank assets and sample G(1994) represents 29.4% of total bank assets. Again, these are strong under-estimations of the underlying representativeness, since I only selected genuine banks for our samples, while the population contains the assets of all registered banks. Table 6 gives an overview of these checks on the representativeness of the samples.

<insert table 6 around here>

To check the representativeness of the samples in more detail, we classified according to three criteria: Is the bank Moscow-based or not, is the bank local, or rather a regional or even national player, and is the bank a successor of a (part of) a former state bank or not? The operational definitions of these criteria are :

Moscow-based banks : These are banks with the official address of headquarters in Moscow according to the register of the CBR. This category is important because Moscow developed into the financial capital of the country and has therefore special characteristics.

National banks : These are banks with branches in at least three Russian regions, other then the Central Moscow region. Their scope of operation is deemed to be national.

Regional banks : These are banks with at least five branches in a particular region. They are large in their region, but often not important outside it.

State banks : In Russia these banks are commonly referred to as banks founded on the basis of one of the former specialised banks. These banks are not genuine state banks but rather the successors of a branch, a local department, a regional department or a sectoral department of one of the formerly state-owned specialised banks. They were in a large part founded in the process of decentralised spontaneous privatisation of 1990-1992[13]. These banks are private banks, founded on the basis of one of the specialised state banks and often retaining good connections with the state. The predicate 'state' refers to their history (and possibly to certain common characteristics that follow from it) and not to property relations.

The directory of Intelbridge was the main data source for the classification of banks. In practice we use three dummy control variables for the bank's type, namely MOSCOW, STATE, and NATREG. NATREG is the union of NAT and REG.

The combination of three dummy variables allows 8 different combinations, ranging from private, small, local banks (all dummies are 0) to Moscow-based large state banks (all dummies are 1). Figure 2 gives an overview of the 8 different classes of banks and table 7 gives the structure of our sample according to these 8 classes. Comparing the sample distribution to the population distribution is difficult, because there is no detailed information on the population distribution. The CBR (1994) notes that at the beginning of 1994, 609 of the 2041 registered banks are actually successors of the former SB, which amounts to 29.8%[14]. This is the last time the CBR disclosed data on the history of banks. Since many of the 2041 banks were not operational, the actual presence of state banks may even be larger. This shows that the strong presence of former state banks in our sample is not necessarily an over-representation. Both big banks and small banks are present in our study. Small local banks may seem to be under-represented if their number is considered, but considering their small impact on the banking system as a whole, this is justified. Last, the share of Moscow banks in our sample is similar to the population characteristics (about 30%).

4. Results and interpretation

<insert table 8 around here>

We tested the hypothesises of section 2 with an OLS on the bank data described in section 3. We were forced to use sample D, because sample G turned out to be too condensed for our purpose. More specifically sample G provided no separate numbers for required reserves and excess reserves, but only the volume of total reserves held at the central bank. Separating the two proved to be impossible.

Results are presented in table 8 (see above). All four equations are OLS regressions on the same sample. In equation 1, we show the basic regression that

tests our main hypotheses. It follows from table 8 that all control variables are insignificant. The control variables are consequently dropped in equation 2. In equation 3 we drop the interest rate (CREDIR), because it becomes insignificant in equation 2. In equation 4 we additionally drop bad loans (BLTA) and the dividend variable (DIV).

None of the equations in table 8 rejects the hypothesis that the inefficiency of the payment system has contributed to high excess reserves. This is shown by the high significance of CATA in all equations. Therefore we can expect that excess reserves will decrease if the increasing efficiency of the payment system.

The role of loan demand is not so clear. The sign is positive, as hypothesised, in equation 1 and 2 but the coefficient is insignificant. The variable is therefore dropped in equation 3 and 4.

There is strong support for the idea that banks invest liquidity in excess reserves because of lack of alternatives. This is shown both by the negative sign and the strong significance in all equations of GKO, our variable on treasury bills, and by the negative sign and significance in the last three equations of IBTA, the interbank lending variable. Banks that are active in the GKO-market appear to hold less excess reserves than other banks. The introduction of the dummy MOSCOW in equation 1 is not altering these conclusions. The coefficient of GKO remains significant and stable, and MOSCOW is rejected. The substitution between GKO and excess reserves shows that at least part of the excess reserves are explained by the lack of investment alternatives. The fact that there is a substitution between GKO (an instrument of liquidity management) and excess reserves also indicates that at least part of the excess reserves constitute excess liquidity. The same holds for IBTA. Interbank lending and excess reserves seem to be substitutes to some extent, which again supports the idea that excess reserves are at least partially excess resources looking for an investment.

Credit risk (BLTA) is significant in all equations, but it does not exhibit the expected sign. Apparently banks with poor loan portfolio's have been depleting reserves in order to keep afloat, rather than accumulating reserves as a reaction to bad loans. Because of the unexpected sign of the variable, we drop it in equation 4 to see to what extent it affects the other variables. One explanation for the negative sign might be that banks that hold bad loans are rationed on the interbank market and therefore have lower liquidity. We verified this by introducing interbank borrowing, without much effect. The unexpected sign might also be due to a specification error. Indeed, one could imagine a quadratic relation between ER and BLTA, where banks with relatively poorer bad loan portfolios accumulate excess reserves to enhance hard budget credibility up until a certain optimum. Beyond this point bad loans are so dramatically high that banks are depleting excess reserves to survive and the relation between ER and BLTA is reversed. However, after the introduction of a quadratic term $BLTA^2$, both BLTA and $BLTA^2$ became insignificant. This specification is therefore also rejected by the data. This means that the Berglöf and Roland conjecture is rejected on the individual bank level. They may be still right on a systemic level however: bank systems with inherent bad loan quality may hold more excess reserves than bank systems with high loan quality. However our hypothesis that the differences

among banks within the Russian bank system might be explained by loan quality differences, is rejected.

This is supported also by the strong significance and the positive sign of RESTA in all equations of table 8, and the negative sign of DIV in all equations: Precisely the banks that retain most earnings (and ceteris paribus are most liquid) seem to accumulate excess reserves, rather than the banks with bad loan problems[15]. This does not allow us to reject the hypothesis of excess liquidity in the Russian banking system. Indeed, banks that retain earnings seem to accumulate excess reserves, rather then to lend more money.

The hypothesis on the efficiency of liquidity management on the other hand is rejected, by the insignificance of LOGTA and LOGAGE. Also the other control variables are insignificant.

5. Sensitivity analysis

We tested the data excluded a number of banks because they were not operational or not trustworthy (see Annex A). It is possible that we have not been selective enough and that our sample still contains some observations that should have been omitted from the sample. To verify whether our results are sensitive to some extreme observations we bootstrap our results.

< insert table 9 around here >

In table 9 we show bootstrapped results for equations 2, 3 and 4. The bootstrapped mean is shown first. The OLS mean of table 8 is shown between brackets. The difference between the two is the bias. On the second row between brackets we show the bootstrapped standard error. We observe that the main results uphold very well. Apparently there is an upward bias in the estimation of the coefficient for RESTA of between 0.06 (equation 3) and 0.016 (equation 1). The variable however stays strongly significant and positive, so the interpretation of results is not affected. There is however a serious problem with DIV. The coefficient of DIV exchanges its negative sign for a positive one and becomes insignificant. This does not alter the general conclusions, since omitting DIV from the estimation does not affect the other results (see equation 4 in tables 8 and 9). We identified the observations that cause the bias, but they could not be eliminated from the sample by stronger selection criteria (see Annex A), because we would lose to many observations in that case. Therefore we chose not to change our selection criteria, as the main conclusions would change by eliminating some observations.

6. Concluding remarks

The analysis shows that the massive excess reserves held by Russian commercial banks in 1994 should not be interpreted unambiguously as an indication of excess liquidity. Theory indicates that the enormous scale of excess reserves is to a large extent explained by payment system inefficiencies, loan demand effects and the lack of investment alternatives. The empirical verification rejected the loan demand hypothesis but the other hypotheses could not be rejected. In addition

excess reserves had already reached moderate levels in 1994, when compared to 1992 or 1993. On the other hand, the hypothesis that high excess reserves were at least partially a sign of excess liquidity can not be rejected either. It is possible that a number of individual banks faced liquidity problems by the end of 1994. Our analysis however indicates that the commercial banking sector as a whole was not liquidity constrained, but rather holding excess liquidity.

This means that the decline in production in 1992-1994 can not be blamed on monetary policy, since the credit crunch was not a consequence of too restrictive monetary policy transmitted through the lending channel. On the contrary, our analysis of bank liquidity shows that the banking system as a whole was holding excess liquidity in 1994, but preferred to hold reserves rather than grant credit to the real economy. There must be structural reasons why banks were not granting credits to the economy even if they had the liquidity to do so. These reasons may lie in a number of inherent deficiencies of the emerging commercial banking system. I think at least part of these deficiencies are to be found in the economic shocks following transition from plan to market and the shocks to credit markets following bank decentralisation and privatisation. There remains the possibility that the balance sheet channel, which was not analysed in this paper, played a role in the transmission of monetary policy. Still we think that the creditworthiness of enterprises was more affected by transition problems than by interest shocks, following monetary policy. Transition is the heart of the problem, not monetary policy. The analysis is still relevant today because the excess reserves of the banks have again grown and bank credits have shrunk in the aftermath of the banking crisis that was triggered by the August 1998-crisis. Our approach may give some inspiration to interpret current events correctly.

Endnotes

1. Until the end of 1994, when all CIS-countries had established their own currencies, war-ridden Tajikistan excluded.

2.Konopielko (1997) estimates the implicit tax revenue for the government from reserve requirements in Hungary, Poland and the Czech Republic. Using the opportunity cost definition, he finds that the implicit tax revenue was on average 0.62% of GDP for Poland in the period 1992-1994, 0.59% of GDP for Hungary in 1990-1994 and around 0.4% for the Czech Republic in 1992-1993. Given the low development of the financial markets in these countries these estimates are comparable with those for Italy (Molho, 1992) and Spain and Portugal (Repullo, 1991), before the convergence process to EMU.

3. According to article 27 of the banking law of the Russian Federation and article 23 of the statutes of the CBR, the CBR can oblige commercial banks to deposit required reserves on accounts with the CBR. A short list of regulations issued by the CBR to implement the system of required reserves in the period 1992-1994 looks as follows:
- Instructions from the CBR, 30 April 1991, No. 1
- Telegram from the CBR, 29 December 1991, No. 218-91
- Letter from the CBR, 11 March 1992, No. 13-3-1/122
- Telegram from the CBR, 4 August 1992, No. 171-92
- Letter from the CBR, 15 February, 1994, No. 13-1/190
- Annex 1, 31 December 1994, No. 135

4.Required reserves are booked on the banks' balance accounts Nos. 816 and 681, which is mirrored on the balance of the CBR by accounts Nos. 815 and 680.

5.The most important document for the 1994 regulatory framework is the letter from the CBR of 15 February 1994 (No. 13-1/190) and its adaptations of 31 December 1994 (No. 135) and of 29 March 1995 (No. 158). Androsov (1995) gives an overview of the procedures that are in effect since March 1994 and the various adaptations.

6. In February 1994 the CBR introduced four methods to calculate the base for required reservation, between which banks were allowed to chose. These alternative bases were: 1) deposit balances as of the first day of the month, 2) deposit balances as of the 16th of the month, 3) daily averaged deposit balances and 4) the average of deposits held at the end of each six five-day periods in the month (Baliño, Hoelscher and Horder; 1997).

7. Only in early 1993 was the banking supervision department of the CBR founded. The department was responsible for regulation, monitoring and research of the banking sector. It initially comprised three divisions, namely the division for bank licensing, lending institutions and bank audit, the division banking regulation and supervision and the division for economic analysis of banking. The department was founded with only about 70 relatively inexperienced employees for more than 2000 banks.

8.GKO are zero-coupon bonds that are issued by the Ministry of Finance by American tender. In conformity with resolution no. 107 of the Ministry of Finance, the CBR acts as an agent for the Ministry of Finance and organises the auctions of GKO. GKO were in 1993-1994 only issued in Moscow. Moscow-based banks alone could reap the full benefit on the primary market, since the CBR started regional primary auctions of GKO only in 1995. At the time, non residents were largely excluded from the GKO-market. As a rule foreign investors have been limited to a maximum of 10% of every auction (Korhonen, 1997). The main holders of GKO are the CBR, Sberbank and the commercial banks (see table).

	01/05/95	01/01/96	01/07/96
CBR	25.2 %	36.6 %	37.3 %
Sberbank	24.8 %	30.5 %	40.7 %
Commercial banks	48.1 %	32.5 %	21.2 %
Source : CBR, 1996, Tekushie Tendentsii v Denezhno-Kreditnoi Sfere, No. 9, 1996			

9. The secondary trade in GKO was conducted by licensed dealers at MICEX. In 1996, 6 regional dealers were linked to the MICEX-trading system, but the trading volume was small. Regional banks were de facto excluded. Also foreigners were initially excluded from the secondary market (Malievsky, 1996). We conclude that secondary trading was de facto reserved for Russian Moscow-based banks.

10.**Intelbridge** is a medium-sized firm specialised in financial information. One of its basic activities is to collect and sell information about commercial banks. Intelbridge publishes a **directory** of commercial banks, containing detailed information on more than 1500 banks, which was very useful to determine the bank's type.

11. Instruction of the CBR, No. 17, 24 August 1993, with addenda No. 1 and No. 2.

12. Letter of the CBR, No. 132, 22 December 1994.

13. One of the main sources of bank creation between 1990 and 1992 was the process of splitting, corporatisation and spontaneous privatisation of the former specialised state banks. For convenience we will in this work refer to banks that were founded on the basis of a former state bank (a SB) as 'state banks'. Spontaneous privatisation means that individual branches, local departments or regional departments of former state banks declared themselves independent and registered as independent banks. The founding shareholders were typically the largest clients of the departments concerned.

14. The CBR (1994) notes that in early 1994, 609 of the 2041 registered banks were actually successors of the former SB, which amounts to 29.8%. Of these 609 banks, 42.7% were successors of Agroprombank, 28.2% were successors of Promstroibank and 20.2% were successors of Zhilsotsbank.

15. But they may be doing so because of systemic bad loan quality, so Berglöf and Roland may still be right on a systemic level. Credit risk may not influence the variation of excess reserves within Russia but rather the average level of Russian excess reserves when compared to other countries.

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ANNEX A

We submitted the bank accounts to a battery of tests to assure internal consistency, operativeness and trustworthiness and accuracy of our data base. We describe the tests below.

1. Internal consistency

We performed several tests on the correctness and consistency of each account. First we tested a number of accounting identities :

- $\sum$ items of a category = subtotal
- $\sum$ subtotals = total
- $\sum$ liabilities = $\sum$ assets
- $\sum$ revenues - $\sum$ costs = profit

Then we tested whether some accounting entries were different from zero :

- statutory capital > 0
- reserves at the CBR > 0

If an account does fail one of these tests, something is badly wrong with the account concerned. Such accounts were left out of the sample.

2. Operativeness

The banks should be functioning. We tested this by checking some structural ratios :

- equity/total assets $\leq$ 0.6
- reserves at the CBR/total assets $\leq$ 0.6
- fixed assets/total assets $\leq$ 0.6
- total deposits/total assets > 0
- total credits/total assets > 0

Banks that do not comply with these criteria are not operational or are at least not operating as banks. These banks are excluded from the samples. In this way we avoid empty shell banks and facade banks that hide operations other than banking.

1.5. Trustworthiness and accuracy

Some accounts look so strange, one can doubt their trustworthiness and accuracy :

- other assets/total assets $\leq$ 0.6
- other revenues/total revenues $\leq$ 0.6
- other costs/total costs $\leq$ 0.6

Banks that do not comply with these criteria can be expected to cheat on their reporting obligations or are not functioning as genuine banks and are excluded.

Table 1 : Credit expansion of the CBR during early transition

quarter	growth of nominal credit of the CBR				
	credit to commercial banks (1)	credit to the government (2)	credit to CIS-countries (3)	total credit of the CBR (4)	net credit to commercial banks (5)
Q1 92	113%	0%	NA	80%	-56%
Q2 92	99%	242%	489%	182%	588%
Q3 92	127%	155%	251%	164%	150%
Q4 92	103%	107%	33%	85%	-130%
Q1 93	48%	48%	51%	53%	290%
Q2 93	39%	39%	39%	35%	249%
Q3 93	49%	51%	25%	42%	36%
Q4 93	9%	52%	1%	26%	-74%
Q1 94	20%	47%	1%	34%	-232%
Q2 94	25%	71%	8%	43%	60%
Q3 94	24%	54%	13%	42%	254%
Q4 94	62%	42%	-57%	38%	-140%
Q1 95	31%	1%	0%	9%	393%
Q2 95	-12%	18%	0%	7%	-192%
Q3 95	4%	27%	0%	20%	-50%
Q4 95	-1%	11%	-5%	8%	-3%

Source : own calculations based on data from Russian Economic Trends

Table 2 : Russia's credit crunch illustrated

	1992	1993	1994	1995	1996
Bank credit to economy/GDP	33.6%	20.4%	19.6%	12.0%	10.0%
Total bank assets/GDP	88.0%	54.0%	56.0%	36.0%	36.0%
Bank credit/total bank assets	38.2%	37.8%	35.0%	33.3%	27.8%
Gross fixed capital formation /GDP	24.7%	21.0%	22.0%	21.2%	21.0%

Source : OCDE, 1997, p 87

Table 3. Are required reserves really required ?

	Required reserves (1)	Ruble deposits (2)	Ratio (1)/(2)
Mar92	86	1075	8.0%
Jun92	114	1488	7.6%
Sep92	254	35.16	7.2%
Dec92	472	4372	10.8%
Mar93	731	6354	11.5%
Jun93	1227	10652	11.5%
Sep93	1895	13362	14.2%
Dec93	2710	18496	14.6%
Mar94	3603	22883	15.7%
Jun94	5431	34685	15.7%
Sep94	8119	44804	18.1%
Dec94	9863	56208	17.5%

Source: Granville (1995)

Table 4. Excess reserves and required reserves compared

	Excess Reserves (1)	Ruble deposits (2)	Ratio ER/RD (3) =(1)/(2)	Ratio RR/RD (4) see table 2.	Ratio (ER+RR)/RD (3+4)
Q1/92	306	1075	20.5%	8.0%	28.5%
Q2/92	705.5	1488	39.8%	7.6%	47.4%
Q3/92	1634	3561	39.2%	7.2%	46.5%
Q4/92	2521.9	4372	46.9%	10.8%	57.7%
Q1/93	2790.4	6354	43.9%	11.5%	55.4%
Q2/93	2716.9	10652	25.5%	11.5%	37.0%
Q3/93	4114.3	13362	30.8%	14.2%	45.0%
Q4/93	5751	18496	31.1%	14.6%	45.7%
Q1/94	6626	22883	29%	15.7%	44.7%
Q2/94	7748	34685	22.3%	15.7%	38.0%
Q3/94	10139	44804	22.6%	18.1%	40.8%
Q4/94	10100	56208	18.0%	17.5%	35.5%

Source: Granville (1995)

Table 5. Size of the samples according to data sources

Sample	Source A	Source B	Source C	Total
D(1994)	126	-	-	126
G(1994)	126	84	20	230

Table 6. Representativeness of the samples

As of 1 January 1995	Number of banks		Total assets (bn rubles)	
	Genuinely operating banks	Samples as % of the population	All registered banks	Samples as % of the population
Bank population	± 1000		322445	
Sample G(94)	230	23 %	94695	29.4 % 29.4 %
Sample D(94)	126	12.6 %	35102	10.9 %

Table 7. Sample structure according to bank type

	Sample D	Sample G
A	3	7
B	6	20
C	21	27
D	3	4
E	26	93
F	9	11
G	23	25
H	35	43
former state banks	50	63
Moscow-based banks	38	124
national or regional banks	39	65
private small local banks	35	43
Total	126	230

former state banks = A + C + D + G
Moscow-based banks = A + B + D + E
national or regional banks = A + B + C + F
private, small, local banks = H

Table 8. Excess reserves analysed

No. equation	expected sign	1	2	3	4
Constant		0.0388	0.017 *	0.0297 ***	0.0234 ***
		(0.623)	(1.816)	(3.474)	(3.185)
Payment system					
-CATA	+	0.1554 ***	0.1573 ***	0.160 ***	0.1516 ***
		(4.399)	(4.426)	(4.633)	(4.653)
Credit risk					
-BLTA	+	-0.1772 **	-0.1713 **	-0.1378 *	
		(-2.218)	(-2.199)	(-1.970)	
Indirect Liquidity					
-RESTA	+	1.4634 **	1.4496 **	1.647 ***	1.5461 ***
		(2.285)	(2.293)	(2.975)	(2.635)
- DIV	-	-0.0003	-0.0003 *	-0.0002	
		(-1.468)	(-1.969)	(-1.444)	
Alternative investment					
-GKO	-	-0.3383 **	-0.3453 ***	-0.3629 ***	-0.3039 **
		(-2.100)	(-2.769)	(-3.022)	(-2.573)
-IBTA	-	-0.0511	-0.0565 *	-0.0868 **	-0.0631 **
		(-1.406)	(-1.758)	(-2.615)	(-2.199)
Interest rates					
-IL	+	0.0193	0.0223		
		(1.225)	(1.518)		
Control variables I : Liquidity management					
-LOGTA	-	-0.0013			
		(-0.162)			
-LOGAGE	-	-0.0162			
		(-0.811)			
Control variables II : dummies					
-NATREG		-0.0014			
		(-0.155)			
-MOSCOW		-0.0034			
		(-0.320)			
-STATE		0.0017			
		(0.179)			
Adjusted R^2		0.2655	0.289	0.276	0.262
F-statistic		4.6754	8.2703	8.957	12.099
Jarcques Bera		3.1862	4.5157	8.1068	13.686

White heteroskedasticity-consistent standard errors & covariance.
For all results *** is 1%-significance, ** is 5%-significance and * is 10%-significance.
T-statistics are in brackets.

Table 9. Bootstrapped results

No. equation	expected sign	2	3	4
Constant		0.0169 (0.017) (1.768)	0.0295 (0.0297) *** (3.502)	0.0233 (0.0234) *** (3.053)
Payment system				
-CATA	+	0.1604 (0.1573) *** (4.476)	0.1635 (0.160) *** (4.731)	0.153 (0.1516) *** (4.501)
Credit risk				
-BLTA	+	-0.1774 (-0.1713) ** (-2.171)	-0.1386 (-0.138) * (-1.937)	
Indirect Liquidity				
-RESTA	+	1.4009 (1.4496) ** (2.084)	1.587 (1.647) *** (2.651)	1.530 (1.5461) ** (2.322)
- DIV	-	0.0008* (-0.0003) (0.145)	0.0001 (-0.0002) (0.0352)	
Alternative investment				
-GKO	-	-0.3400 (-0.3453) ** (-2.5099)	-0.358 (-0.363) *** (-2.756)	-0.3026 (-0.3039) ** (-2.229)
-IBTA	-	-0.0567 (-0.0565) (-1.614)	-0.0861 (-0.087) ** (-2.558)	-0.0632 (0.0631) ** (-2.128)
Interest rates				
-IL	+	0.0223 (1.518)		

First we observe the bootstrapped mean. The observed mean from table 8 is in brackets.
For all results *** is 1%-significance, ** is 5%-significance and * is 10%-significance.
T-statistics calculated with the bootstrapped mean and the bootstrapped standard error are in brackets.

Figure 1. Credit of the CBR (as % of monthly GDP)

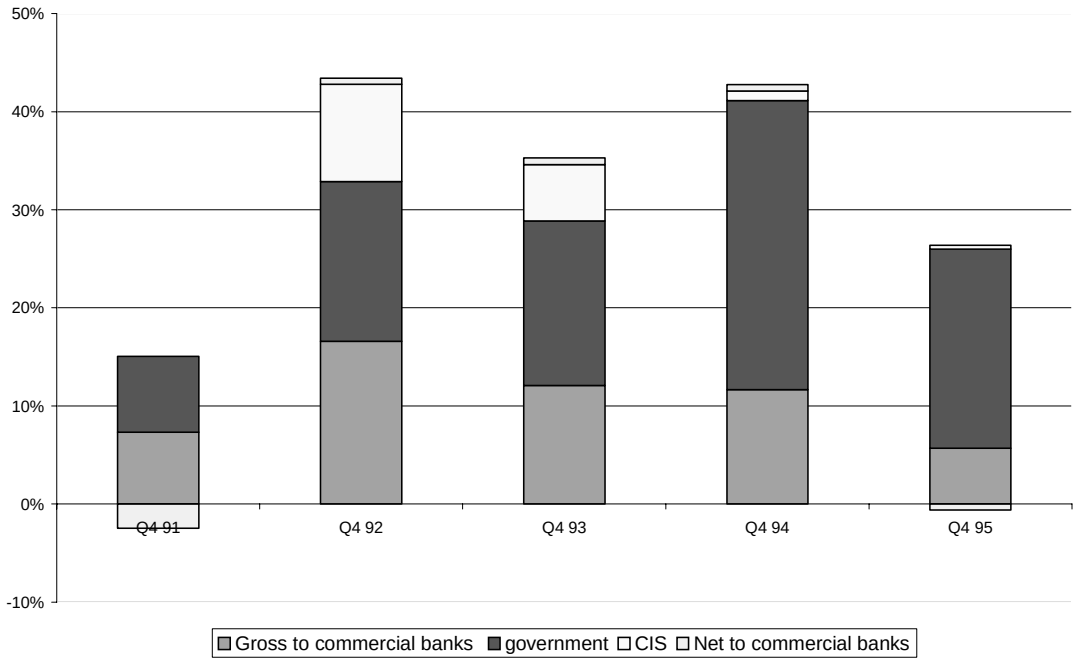

Figure 2. The classification of banks according to three criteria