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Bank supervision Russian style: Evidence of conflicts between micro- and macro-prudential concerns*

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Supervisors sometimes have to manage both the micro- and macro- prudential dimensions of bank stability. These may either conflict or complement each other. We analyze prudential supervision by the Central Bank of Russia (CBR). We find evidence of micro-prudential concerns, measured as the rule-based enforcement of bank standards. Macro-prudential concerns are also documented: Banks in concentrated bank markets, large banks, money center banks and large deposit banks are less likely to face license withdrawal. Further, the CBR is reluctant to withdraw licenses when there are "too many banks to fail". Finally, macro-prudential concerns induce regulatory forbearance, revealing conflicts with micro-prudential objectives.

Keywords: Prudential supervision, bank stability, systemic stability
JEL Classification : G2 N2 E5

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1. Introduction

In this paper we analyze the micro- and macro-prudential dimensions of the Central Bank of Russia's (CBR) bank licensing policy. We find that both dimensions play a role in bank licensing policy. Moreover, the presence of macro-prudential goals in the CBR's objective function is found to induce regulatory forbearance with respect to its micro-prudential supervision, which suggests that the two objectives may conflict rather than complement each other. Our analysis more generally unveils the potential problems that may arise when combining the micro- and macro-prudential dimensions of bank stability in the objective function of a single supervisor.

Supervisors typically have micro- and macro-prudential objectives. The micro-prudential objective can be understood as the objective to "limit the likelihood of failure of individual institutions", while the macro-prudential objective can be seen as "limiting the likelihood of the failure, and the corresponding costs, of significant portions of the financial system" (Crockett, 2000). Micro-prudential supervision focuses on banks' idiosyncratic risk and is typically implemented by enforcing a uniform set of bank standards on each single bank. Macro-prudential supervision on the other hand is concerned with threats to systemic bank stability stemming from common shocks (for example a devaluation or a government default) or from contagion from individual bank failures to the rest of the system. Mörttinen et al. (2005) point out that:

> "Macro-prudential analysis complements the work of micro-prudential supervisors, as the risk of correlated failures, or the economic or financial market implications of problems of financial institutions are not directly covered under the micro-prudential perspective" (Mörttinen et al., 2005, p.7).

If a single agent is however responsible for both dimensions of prudential supervision, the micro- and macro-prudential objectives may conflict with each other. The fundamental challenge for any supervisor that pursues both micro-and macro-prudential objectives is to administer micro-level standards and rules in a manner that serves the macro-prudential objectives over the long run. This long term balancing act may create tensions in the short run enforcement policy and may render rule-based micro-prudential supervision time inconsistent. Indeed, actions dictated by a strict rule-based regulatory

enforcement may become undesirable if long run macro-prudential concerns are also in the supervisor's objective function, drawing the supervisor to a policy of regulatory forbearance. For example, the supervisor may want to take into account the correlation of default probabilities between institutions that are closely linked to each other, as the regulatory failure of a large deposit bank may endanger depositor trust, giving rise to contagion and inflating the risk of systemic instability. If banks are aware of this time inconsistency, they may alter their behavior in a direction undesired by the supervisor. The main question of this paper is whether such a short run conflict between micro- and macro-prudential concerns can be detected.[1]

This question fits into a larger literature that pays attention to the various roles of central banks – among others setter of monetary policy, lender of last resort, banking supervisor, and maintainer of the payments system and financial stability – and to the complementarities and conflicts arising out of these multiple functions.[2] A subset of this literature addresses the tension between bank supervision and lender-of-last-resort functions, in our terminology the micro- and macro-prudential dimensions respectively, yet there is no conclusive theory that explains how these roles should be balanced. Goodhart and Huang (1999) propose that central banks should reduce the moral hazard of individual banks by employing a policy of constructive ambiguity in the bail-out decision. Cordella and Yeyati (2003) claim that an ex ante central bank commitment to a bail-out contingent on adverse macro-shocks is welfare-superior to a policy of constructive ambiguity. Freixas et al. (2000) show if all banks are solvent it is optimal for the central bank to prevent a speculative gridlock in the payments system by guaranteeing the credit lines of all banks. They also show that it may be optimal for the central bank to show forbearance towards money-center banks, which is their interpretation of the too-big-to-fail hypothesis (see Wall and Peterson, 1990). The design and enforcement of

[1]A rational supervisor could be expected to internalize bank behavior in its choice of long term optimal de-licensing policy. Given the high level of economic and institutional uncertainty in the period under study it is not clear whether the CBR's time horizon was long enough to properly manage such a long run balancing act. This long run question is therefore beyond the scope of the paper.

[2]Peek et al. (1999) conclude for example that the implementation of monetary policy may benefit from information obtained by prudential supervision and control of the banking system. Reversely, monetary policy responsibilities may alter bank supervisory behavior as found by Ioannidou (2005). This finding has heated the debate as to whether bank supervision should be assigned to the central bank or not (Di Noia and Di Giorgio, 1999). The possible conflicts arising from the coexistence of lender-of-last-resort and deposit insurance functions have also been studied (e.g. Sleet and Smith, 2000; Repullo, 2000; Kahn and Santos, 2005).

regulatory standards involve a number of trade-offs and conflicts that may lead to excessive regulatory forbearance as shown in Kahn and Santos (2005).

Central banks may also have more obscure incentives for regulatory forbearance. Boot and Thakor (1993) show that regulatory discretion urges reputation-seeking regulators to show more-than-optimal forbearance, since they want to leave their jobs with a clean slate. This tendency to résumé polishing suggests that a rule-based prudential control might be better. Mailath and Mester (1994), on the other hand, show that if regulators cannot commit themselves, temporary forbearance may be the equilibrium outcome. In this vein, Acharya (1996) finds that regulatory forbearance may be optimal if the dead-weight losses of closure are important. Kane (2000) suggests that some banks may simply be too big to discipline adequately (TBTDA), which can lead to undesired *de facto* forbearance. Heinemann and Schüler (2004) analyze how the regulatory capture (see also Laffont and Tirole, 1991) by specific interest groups may imply that the enforcement of prudential rules is not necessarily optimal for welfare even in a situation of unthreatened systemic stability. There is a lot of evidence that government capture and political economy concerns in general are important in the Russian context. Given the intricate relationships between politicians and firms in Russia, it cannot be ruled out that the CBR may have been reluctant to withdraw some licenses for political reasons rather than macro-prudential concerns. Shleifer and Vishny (1998) analyze a variety of forms of political control of firms, including regulation, and their consequences for economic efficiency, and describe the size of the problem in Russia. Slinko et al. (2005) find evidence that the high level of regulatory capture in Russia hurts the performance of firms that have no political connections and boosts the performance of politically connected firms. The same may be true for banks. We control for regulatory capture of the CBR by treating state-owned banks separately.

There are three good reasons to employ Russian data to analyze the potential conflicts between micro- and macro-prudential dimensions of bank supervision. First, since its establishment in 1990, the CBR was entrusted with the roles of manager of the payments system, setter of monetary policy, supervisor of the banking system, and it has frequently acted as lender of last resort to secure systemic stability.[3] In our data window the CBR

[3]In the Banking Supervision Report of 2004, the CBR acknowledges that one of its key objectives is to

was also active as a commercial bank through its giant subsidiaries, Sberbank and Vneshtorgbank. This exceptionally wide set of objectives and activities generates ample room for conflict. Second, the CBR both designs the rules within the framework of the banking law and has single authority to enforce them. The actions of the CBR are therefore not affected by turf wars between competing regulatory agencies and consequent coordination problems. Third, the CBR withdrew 194 bank licenses in our data window (1999-2002). This active supervisory policy, together with detailed regulatory accounting information, provides us with a unique opportunity to measure how micro-prudential rules are enforced.

We study the period 1999–2002 for the following reasons. First, most of the casinos, exchange offices, and tiny banks had already disappeared from the system by virtue of the successive purges of bank licenses in the period 1995–1997 (see next section). Second, we consider a period with a consistent regulatory policy, since earlier CBR chairmen have shown widely different supervisory preferences. During 1999–2002, bank licensing behavior is in the hands of Viktor Gerashenko, who re-appeared at the helm of the CBR after the 1998 crisis. Third, the CBR introduced a new accounting system in 1998 that moved away from Russian accounting standards (RAS) towards international accounting standards (IAS). Fourth, a new law on bank restructuring came into effect in March 1999 that gave the CBR a central role in bank restructuring, which was expected to strongly affect the CBR's licensing behavior. Last, our data window is situated firmly before the introduction of deposit insurance in 2004. The introduction of a deposit insurance scheme, also managed by the CBR, may obfuscate the objective function of the CBR further.

We try to invalidate two hypotheses: 1) the CBR's de-licensing activity is only driven by micro-prudential objectives (i.e. the rule-based enforcement of its bank standards) and not by a set of macro-prudential objectives, and 2) the micro- and the macro-prudential objectives do not conflict. Controlling for economic failure, we find that large deposit banks (safeguarding depositor trust), banks that are active on the interbank market (safeguarding interbank market stability), and banks that operate in highly concentrated

"maintain the stability of the Russian banking system and guarantee protection of the interests of creditors and depositors" (p. 46).

regional bank markets (safeguarding minimal bank competition) are all less likely to face license withdrawal. The CBR is also less inclined to withdraw individual bank licenses when there are "too many banks to fail". We reject therefore the null that macro-prudential objectives do not affect license withdrawal. Our results also indicate that macro-prudential concerns foster regulatory forbearance, which allows us to reject the second hypothesis that there are no conflicts between the two dimensions of prudential supervision. This not only sheds light on the CBR's behavior, but more generally reveals that conflicts between micro- and macro-prudential objectives can induce regulatory forbearance. Their marriage may therefore be more precarious than previously thought. More theoretical analysis is required to understand how this could potentially affect the stability of more developed banking markets.

The next section gives an overview of the process of bank creation and destruction in Russia during the last 15 years. Section 3 explains our empirical approach, focusing consecutively on the estimation methodology, the data and the empirical hypotheses. In section 4, we estimate a panel logit model and interpret the results. In section 5, we discuss a number of robustness checks. Section 6 concludes.

2. An overview of bank creation and bank destruction in Russia

Before analyzing the bank licensing behavior of the CBR, an introductory description of the main trends in CBR bank licensing is appropriate.

[Insert Figure 1]

Figure 1 shows the detailed dynamics of monthly bank creation and destruction in Russia. It is based on data posted on the CBR website. The solid line shows new bank registrations, while the dotted line shows bank license withdrawals in a given month. There is a striking peak of bank creation at the end of 1990: 228 banks were created in October 1990, 347 in November 1990, and 269 in December 1990. This peak is to a large extent explained by the secessionist privatization of the former state banks (*spetsbanki*) that started in 1988 (i.e. well before the collapse of the Soviet Union in December 1991) and yielded over 600 often unrecognizable state bank successors (Schoors, 2003). At the same time, individuals, governments, corporations, and other organizations created a

number of new banks. Bank creation by economic agents other than former state banks took off spectacularly in 1992–1994. Many of these new private banks, so-called "pocket banks", were captured by their dominant shareholders. This made the problem of connected lending omnipresent, leaving commercial banks with only very weak monitoring incentives (Laeven, 2001). In addition, many of these new banks were more like casinos than banks and preferred speculation to lending. The vast amount of tiny banks and the lack of a transparent information system about credit histories may have further depressed lending (Pyle, 2002). The hike in bank creation partly reflected the relaxed bank supervision under Viktor Gerashenko. He was the last president of the defunct Gosbank, the former state monobank that ceased to exist, along with the Soviet Union, at the end of December 1991. He became president of the CBR in the summer of 1992 after the hard-nosed, but inexperienced, CBR president Georgi Matyukhin had been outmaneuvered by the industrial lobby. The exchange rate crisis in October 1994 cost Gerashenko his position as president; he was replaced with the more reform-minded Tatiana Paramonova. The bank creation numbers suggest that bank supervision was tightened after 1995 under her reign. She was replaced by Sergei Dubinin in early 1996. With Dubinin at the helm of the CBR, stricter minimum capital requirements were introduced in April 1996. The process of bank creation dropped sharply and remained very low from 1996 onward. Bank creation did not revive until 2001.

Figure 1 illustrates how bank destruction follows a different pattern altogether. There is a peak of license withdrawals in the first half of 1992 when the CBR was headed by Matyukhin. After his replacement in mid-1992 with Gerashenko, the number of license withdrawals dropped substantially. From mid-1992 to end-1994, the CBR had a very relaxed policy towards bank licensing and bank refinancing (Schoors, 2001). This left Russia with well above 2,000 banks at the end of 1994. Paramonova's first sweep of the banking sector in early 1995 targeted cleaning up the exchange-rate crisis mess. The second wave of license withdrawals peaked in November 1995 in the aftermath of the meltdown on the Russian interbank money market in August 1995. Apparently, the CBR reacted to crises by enforcing some of its regulations ex post, a pattern of behavior it has repeated since. Once the new chairman of the CBR, Dubinin, came into power he revoked 97 licenses in May 1996 on the heels of new minimal capital requirements, and repeated this exercise in March 1997. The majority of banks that lost their licenses under Paramonova and Dubinin were tiny banks without political clout. In several cases, the de-

licensed bank was already bankrupt or looted by its directors. In this sense the CBR followed events rather than anticipating them.

With the crisis of August 1998, Gerashenko was reinstalled at the helm of the CBR. He achieved the stabilization of the banking system and unclogged the jammed payments system by an unconditional bail-out of a number of banks. Officially, the clean-up was led by the "Agency for the Restructuring of Credit Organizations" (ARCO).[4] In fact, the ARCO was underfunded and achieved little in the way of bank restructuring. Figure 1 shows that the pace of license withdrawals did not pick up, but rather fell precipitously. This not only reflected Gerashenko's weak policy but also resulted from a striking, but well-hidden, deficiency in Russian law – the exemption of banks from the bankruptcy code, a dreary detail of which many foreign creditors were not fully aware. This ensured that creditors could not easily enforce their claims on banks. The banking sector had insisted on this exemption and thereafter was successful in blocking all draft laws on bankruptcy of banks until "The Law on the Restructuring of Credit Organizations" entered into force in March 1999. This legal loophole gave less benevolent banks the opportunity to loot creditors by stripping banks of their valuable assets and transferring them to "bridge" banks, while leaving the "inconvenient liabilities" in the defaulting or troubled institutions. As a consequence the long awaited restructuring of the Russian banking system after the August 1998 liquidity shock was further postponed (Schoors and Sonin, 2005). Foreign creditors were furious and when the March 1999 law came into force, the IMF strongly pressed the CBR to perform at least some restructuring. As a consequence, several high profile banks lost their licenses, including Promstroibank and Mosbusinessbank, two direct successors of the former specialized state banks. These bankruptcies were however more symbolic than real and convenient to everyone but the creditors. The March 1999 law stipulated that creditors could only force a bank to bankruptcy after the CBR had withdrawn its license. All too often licenses were only withdrawn after the bank was a stripped, illiquid shell. This pattern was typical of the "mired restructuring" that took place after 1998 (Schoors, 1999).

[4]See Mizobata (2002) and Tompson (2002) for more on this topic.

3. Empirical approach

We employ a panel logit model to test our hypotheses. To investigate the first null hypothesis that CBR de-licensing activity is only driven by the rule-based enforcement of its own prudential bank standards (the micro-prudential view) and not by macro-prudential objectives, we estimate regressions of the following form:

$$\begin{aligned}\text{Prob(license withdrawal)}_{i,t} = c + \alpha'_{i,t-1}\left(\text{economic variables}\right) + \\ \beta'_{i,t-1}\left(\text{macro}-\text{prudential measures}\right) + \\ \gamma'_{i,t-1}\left(\text{micro}-\text{prudential measures}\right) + \\ v_i + \varepsilon_{i,t}. \end{aligned} \quad (1)$$

The dependent variable is a dummy variable which equals one in the quarter when a bank loses its license, and zero otherwise. We relate license withdrawals to three groups of variables: 1) violations of regulatory standards (micro-prudential measures), 2) variables that capture the macro-prudential objectives of the CBR, and 3) economic (bank- and market-specific) variables. Although our focus is on regulatory failure, we introduce economic variables to control for economic failure. The micro-prudential measures assess the frequency and the severity with which banks violate the bank standards (see section 3.1). When bank regulation is properly enforced, we expect γ to be positive. If β is found to be negative and significantly different from zero, we can reject the first null hypothesis.

To investigate the second null hypothesis that the micro-prudential enforcement of bank standards and the macro-prudential concerns reinforce each other, we estimate the specification:

$$\begin{aligned}\text{Prob(license withdrawal)}_{i,t} = c + \alpha'_{i,t-1}\left(\text{economic variables}\right) + \\ \beta'_{i,t-1}\left(\text{macro}-\text{prudential measures}\right) + \\ \gamma'_{i,t-1}\left(\text{micro}-\text{prudential measures}\right) + \\ \delta'_{i,t-1}\left(\text{macro}-\text{prudential}\right)* \\ \left(\text{micro}-\text{prudential}\right) + \end{aligned}$$

$$v_i + \varepsilon_{i,t}. \tag{2}$$

Our null hypothesis that regulatory enforcement of bank standards and macro-prudential objectives reinforce each other implies that violating regulatory standards will lead to more license withdrawals ($\gamma > 0$) and that macro-prudential objectives will complement these withdrawal decisions ($\delta > 0$). If δ were to be found significantly negative instead, the null can be rejected. Indeed, $\delta < 0$ would suggest that macro-prudential objectives skew the CBR's de-licensing behavior towards regulatory forbearance, suggesting that both dimensions of prudential supervision are in conflict. In both specifications we allow for bank-specific unobserved heterogeneity, since banks may differ in ways not observed in our dataset. The logit model is therefore estimated under a random effects (RE) assumption.[5]

The bank data were supplied by two well-established Russian information agencies, Interfaks and Mobile, and by the CBR. Interfaks supplied a database with quarterly bank data on balances, profit and loss accounts and quarter-specific, bank-specific scores on a battery of regulatory standards for all Russian banks from 1999 to 2002. Mobile provided monthly bank balances and profit and loss accounts and a more limited list of quarter-specific, bank-specific scores on regulatory standards but for a longer period, from mid-1995 (although initially not for all banks) up to 2002. The two databases complement each other as they offer different classifications and a different degree of detail of the same data. The financial data employed in the analysis includes almost 1400 banks, i.e. almost all operational banks in the period under study, covering 16 quarters from 1999:Q1 to 2002:Q4. These financial data were linked to bank licensing data (freely available on the CBR's website) and allowed us to reconstruct the complete register of bank licenses. The dataset contains bank license data of all banks from 1988 up to now. For every bank that ever existed in Russia, we know when it received a license, the specific type of license it received, when it lost its license (if ever), and the official reason for losing it. Zombie banks (banks that still have a license but show no apparent bank activity) are excluded from the dataset.[6]

[5]We assume that there exists some time-invariant bank-specific factor (for example, political strings or managerial skills) that explain part of the license withdrawal probability.

[6] See Karas and Schoors (2005) for a detailed description of the different data sources available for the Russian banking sector and their compatibility.

The remainder of this section describes the explanatory variables in more detail. Table 1 summarizes the definitions and sources of all variables.

[Insert Table 1]

3.1. Measuring non-compliance with regulatory standards

The micro-prudential breach measures essentially measure the frequency and degree to which banks fail to comply with the regulatory standards. The CBR imposes a number of bank standards with which banks need to comply in each quarter (see the appendix for a detailed description). When banks do not comply with one or more of these standards, the CBR applies the same actions regardless of the standard breached. The CBR can impose financial fines for non-compliance, but these are not readily observed. We therefore consider the CBR's ultimate penalty for non-compliance, namely license withdrawal. Micro-prudential rule-based enforcement implies that the CBR is more likely to withdraw licenses of banks that violate the standards more frequently and more severely. For each bank standard, we observe bank-specific scores on a quarterly basis. We also know the regulatory thresholds for each standard on a quarterly basis. When a score does not satisfy the threshold, we say the standard has been breached. We use this information on breaches to construct several vectors of variables that measure compliance with CBR standards.

Based on the definition for each bank standard n and its regulatory minimum or maximum (the threshold) imposed by the CBR, we define standard-specific breaches and count breaches per bank and per bank standard. For each quarter, we then correct the number of past breaches for two reasons. First, we want the number of breaches to be time-varying, which implies that the total number of breaches will be higher for later quarters. Second, some banks are created after t_0^{PR}, the first quarter in which we observe standards, which means that they will have fewer bank quarters in the sample and ceteris

paribus will register fewer breaches.[7,8] Therefore, we correct the simple sum of breaches for bank i until t by dividing it by the maximal number of possible breaches at time t and multiplying it by the number of breaches that is maximally possible for banks created before t_0^{PR} and still operational at time t. More specifically, we define for each standard n and for each bank i, the number of past breaches at time t:

$$nbreach_{n,i,t} = \frac{\sum_{z=k}^{t} breach_z}{t-k}(t - t_0^{PR}), \tag{3}$$

with *breach* equal to one when a bank violates the rule and zero otherwise, k the start of observations for bank i and t the observed bank quarter for bank i. Figure 2 illustrates what this implies for banks with different dates of entry.

[Insert Figure 2]

In order to construct a first measure of regulatory (non-)compliance, we assume that the CBR is likely to attach greater importance to current breaches than past breaches. Put simply, a bank that has had two violations in the previous two quarters has the same score on *nbreach* at time t as a bank with only two breaches in the past year, although one might expect the CBR at time t to attach more value to the former than the latter. We therefore construct a vector of compliance variables that discounts past breaches. Discounting past breaches additionally captures the fact that the CBR draws from a larger action set than the observed withdrawing of licenses alone.

Define the weights:

$$\varpi_t = \alpha(1-\alpha)^t, \text{ with } \sum_{t=0}^{\infty} \varpi_t = 1. \tag{4}$$

Then the discounted number of breaches for each regulation n and a given bank i at

[7]For most bank standards, t_0^{PR} is in 1997:Q2. For N10.1 and N9.1 this is in 1997:Q3 and in 1998:Q1 respectively as these standards were introduced later. The data between 1997:Q2 and 1999:Q1 on scores of banks on prudential bank standards were collected from Mobile. For 1999:Q2 -2002:Q4, the scores on bank standards were collected from Interfaks.

[8]We evaluate the enforcement of bank standards in a period with a stable supervisory regime - 1999-2002. Our compliance variables incorporate all information available to the CBR, including information on compliance under previous regimes. This allows the CBR to incorporate the bank's full compliance record in its de-licensing decision.

time t is:

$$dnbreach_{n,i,t} = \frac{\sum_{z=k}^{t} \varpi_{t-z}(breach_z)}{t-k}(t - t_0^{PR}). \quad (5)$$

In order to interpret *dnbreach* as the discounted version of *nbreach* and make comparison of these two measures more intuitive, we make one final adjustment. The sum of the weights used to calculate *dnbreach* equals unity, while implicitly the sum of the weights used to calculate *nbreach* equals $t-k$. In order to discount the potential number of breaches too, we adjust the measure for *dnbreach* by multiplying by $t-k$, which gives:

$$dnbreach_{n,i,t} = \sum_{z=k}^{t} \varpi_{t-z}(breach_z)(t - t_0^{PR}). \quad (6)$$

To allow the CBR to be more concerned about the average severity of breaches in stead of the number of breaches, we construct a second variable for each standard n:

$$sbreach_{n,i,t} = \frac{\sum_{z=k}^{t} \left(\frac{|\text{score}_z - \text{standard}_z|}{\text{standard}_z} \right)}{t-k}. \quad (7)$$

The deviation of the score from the standard is only counted in the case of a breach; it equals zero otherwise. We take absolute values to ensure that the severity of a breach is always defined as a positive number. Again, the CBR may care more about the severity of current breaches than the severity of past breaches. The discounted severity of breach is then defined as:

$$dsbreach_{n,i,t} = \frac{\sum_{z=k}^{t} \varpi_{t-z} \left(\frac{|\text{score}_z - \text{standard}_z|}{\text{standard}_z} \right)}{t-k}. \quad (8)$$

To ensure comparability of the coefficients, we need again to multiply with $t-k$, which gives:

$$dsbreach_{n,i,t} = \sum_{z=k}^{t} \varpi_{t-z} \left(\frac{|\text{score}_z - \text{standard}_z|}{\text{standard}_z} \right). \quad (9)$$

There is a final twist in the measurement of compliance variables. For some banks in

some quarters, the scores on a number of bank standards are missing. Apparently, banks sometimes fail to report some scores to the CBR. Since non-reported bank scores may be interpreted by the CBR as compliance, non-compliance, or something in between, we introduce a dummy variable for non-reported bank scores in a given bank quarter as a separate variable in the regressions. If at least one score is missing in a given bank quarter, the non-reported scores dummy equals one and zero otherwise (see Table 1).

3.2. Macro-prudential objectives of the CBR

Regional banking coverage

In the period surveyed, the CBR was worried that banking had become too concentrated in some regions. The ARCO indicated it supported some banks with regional networks to avoid certain regions becoming underbanked (Mizobata, 2002; Tompson, 2002). We therefore expect that banks in already highly concentrated regional banking markets are less likely to lose their licenses compared to identical banks in less concentrated regions. As a concentration measure, we use the regional *Herfindahl index*. Regional banking coverage is very stable in our data window, with some very poorly banked and some very well banked regions. The low variability of this variable in our sample implies it is not suitable for explaining quarter-specific variance in the bank license withdrawal behavior of the CBR. Therefore, in the estimations we employ the average of this variable over time such that we have one observation per region.

Systemic stability

The CBR may wish to protect banks that are active on the interbank market to minimize the risk of contagion. As a proxy for banks that are active on the interbank market, we use the ratio of *interbank liabilities to total liabilities*. Activity on the interbank market may reflect general bank transparency, safety and health, but we control for this by including the non-reporting variable (see above), the compliance variables (see above) and the return-to-assets ratio and loan quality (see below) in the variables list. Therefore, if the CBR shows more forbearance for banks with high interbank liabilities, it must be

because it cares about systemic stability and contagion.

The CBR may want to protect large deposit banks to avoid deposit runs and maintain confidence in the banking sector.[9] Interestingly, this can be measured by *bank standard N11* (household deposits over capital). We expect to see forbearance of breaches of N11, since enforcement of this standard is not consistent with other CBR objectives (see the appendix for a more detailed description of this bank standard).

Bank size

Bank size may affect bank failure for various reasons. Some banks may be simply too big to fail. This can be justified on the grounds that the collapse of a large bank poses a threat to the banking system as a whole (see Wall and Peterson, 1990). There is evidence that the CBR extended credit considerably to the largest banks (Malyutina and Parilova, 2001). It is reasonable to assume that as the costs of closure increased the idea of closing down these banks became more distasteful to the CBR. In this sense, some banks may be too well connected to the CBR to fail. Kane (2000) suggests that some banks may simply be too big to be disciplined adequately (TBTDA), rather than too big to fail and generate problems of undesired *de facto* forbearance even in developed market economies such as the US. This was undoubtedly a problem in Russia, where the understaffed and relatively young department of bank supervision was not up to the task of inspecting the intricate balance sheets of huge banks engaging in complex activities. We include the variable *size* in our regressions to capture any of these effects. Both theories predict a negative relation between bank size (the log of total assets) and bank license withdrawal probability.

Too many to fail

When many banks breach the regulatory standards at the same time, the CBR may find it optimal to refrain from withdrawing individual bank licenses. When too many banks are found to be insolvent, a central bank may prefer regulatory forbearance over the costly closure of a large number of banks (Mitchell, 1998). We include the *aggregate number of*

[9]Models of bank runs include Diamond and Dybvig (1983), Postlewaite and Vives (1987), Wallace (1990), Chari (1989), Champ et al. (1996), and Alonso (1996).

breaches as an extra variable in the regressions to test this hypothesis.

3.3. Economic variables

To control for economic failure we include a set of bank- and market-specific variables. A high *return-to-assets* ratio should reduce license withdrawal probability. The *cost-to-assets* ratio is expected to correlate positively with license withdrawal probability. The ratio of *interbank liabilities to total liabilities* is an indicator of the liquidity of liabilities and should correlate positively with license withdrawal (Calomiris and Mason, 2000). Thus, either the CBR protects banks that are active on the interbank market to secure systemic stability (as argued above) or highly liquid liabilities make banks more vulnerable and therefore more likely to fail as suggested by Calomiris and Mason (2000). The *regional market share in bank assets* is a proxy for market power that is expected to affect license withdrawals negatively. Poor loan quality, measured as the ratio of *non-performing loans to total loans*, should increase the license withdrawal probability. The ratio of *total reserves to total assets*, as an indicator of absolutely safe liquidity, should reduce license withdrawal probability.

3.4. Other control variables

We include a dummy variable that identifies *state-owned banks* to measure regulatory capture. We have 27 state-owned banks in the sample, other then the large CBR-owned banks Sberbank, Vneshtorgbank and Vnesheconombank. Government bodies of several levels inherited, founded or bought banks. There are examples of villages, provinces, cities, federal bodies and state firms in this position. Government capture may also lead to forbearance in the enforcement of the bank standards related to insider lending (N9.1 and N10.1). Pocket banks typically tend not to comply with these standards. On the one hand the CBR may be less willing to withdraw the licenses from these pocket banks because of their considerable political clout. On the other, these pocket banks tend to be isolated from the rest of the banking sector and rarely accept household deposits. Therefore the CBR can do little harm from enforcing these standards from a macro-prudential point of view. We also include the ratio of *government securities to total*

assets to control for the effects of the 1998 crisis. Indeed, holding a large share of assets in government securities could be an indication of injuries suffered, because of the government's default on its GKO in August 1998. Note that the resolution of this crisis was not handled evenhandedly. Some banks were reimbursed relatively quickly at reasonable discounts. Others had to wait, and were sometimes driven into bankruptcy as a consequence. The non-transparent handling of the crisis does not allow us to calculate the precise bank-specific harm done by the GKO default, but the amount of government claims still in the books may partly reflect the remaining harm.

We control for inflation by including a deflator. We also include a dummy variable that equals one when the bank is registered in the Moscow region, and zero otherwise. Compared to other regions, Moscow-based banks face more competition which makes them more vulnerable to economic failure. To illustrate this, Figures 3 and 4 show that intermediation as well as exchange rate spreads are significantly lower in Moscow compared to the regional average. The Moscow dummy accounts for this regional effect in the license withdrawal probability.

[Insert Figures 3 and 4]

3.5. Summary statistics

Summary statistics for all variables are given in Table 2. Note that we exclude Sberbank, Vneshtorgbank, Vnesheconombank, as well as their regional branches from the sample. As they are totally dominated by the CBR, their survival is ensured in any case. This leaves us with over 19,000 bank quarters of data available for estimations. Table 2a shows summary statistics for the economic variables and the variables that measure macro-prudential objectives. The Moscow control variable reveals that 48% of bank quarters are from banks registered in the Moscow region. All other variables show reasonable average values, although in some bank quarters they reach the maximum of 100%.[10] Note however in the last column of Table 2a that the number of bank quarters

[10]In three regions (Kursk Region, Republic of Karelia and Republic of Marii El), there is only one bank active between 1999:Q3 - 2002:Q4. For these regions, our sample average of the Herfindahl index reaches maxima above 0,95.

with extreme observations is fairly limited. We choose not to exclude any of these banks, since they are all subject to the same bank standards, whose enforcement is under scrutiny in this paper. We want to investigate the enforcement of the CBR's micro-prudential bank standards for the *whole* banking sector and analyze whether macro-prudential objectives interfered with regulatory enforcement. The results are however robust to the exclusion of these extreme observations.

The summary statistics of regulatory compliance variables in Table 2b reveal that the maximum number of breaches is disconcertingly close to 23 for some bank standards, i.e. the number of bank quarters used for the calculation of the compliance variables. Apparently, some banks breached some standards in nearly all bank quarters and still managed to keep their licenses. Bank standard N11 (households' deposits-to-capital ratio) is on average breached most often (on average in 1.52 quarters out of 23) and the breaches are on average relatively severe (13% away from the standard). The capital adequacy standard is also breached quite often (on average in 0.52 quarters out of 23) and relatively severely (on average 18% away from the standard). The discounted severity of capital breaches is only 4%, which suggests that many of the severe capital breaches occurred in the past. Still, on average banks breach the standards rather infrequently and not terribly severely.

The more than 19,000 bank quarters comprise data of almost 1400 banks (194 of which lost their licenses in the sample period). Most license withdrawals were, according to the CBR, due to violations of bank regulations (over 30%) or compulsory bankruptcy (over 64%). Of course, these two reasons for license withdrawal may overlap. Economically bankrupt banks tend to violate a number of bank standards. Hence, compliance measures and economic variables should do well in picking up these license withdrawals in the empirical analysis.

[Insert Table 2]

4. Results

[Insert Table 3]

Table 3 presents the results for the logit model defined in (1). We use as measures for violation of regulatory standards the discounted number of breaches and the discounted severity of breaches, defined in equations (6) and (9). For each of these two measures, we show estimates that assume the CBR puts increasingly less weight on past breaches, as defined in equation (4), by employing increasing values of the discount parameter, α.

Our first observation is that the economic variables do reasonably well in explaining license withdrawal. Less profitable banks, banks with higher costs, banks with poorer loan quality, and banks with less liquidity are all more likely to lose their bank licenses. However, high interbank liabilities in themselves do not increase economic vulnerability as predicted by Calomiris and Mason (2000). Instead, higher interbank liabilities tend to reduce the likelihood of license withdrawal, but only significantly in the first specification with the number of breaches as compliance variable. This suggests that the CBR is more reluctant to withdraw licenses from banks that are active on the interbank market and provides a first indication that macro-prudential concerns may guide the CBR in its licensing policy. Holding a large amount of government securities relative to assets tends to increase the likelihood of license withdrawal. This is probably still the effect of lingering liquidity problems that follow from the government default on treasury bills in August 1998.

The macro-prudential objectives identified in our study do surprisingly well in explaining bank de-licensing behavior. While controlling for economic and regulatory failure, our results indicate that banks in poorly-banked regions are less likely to lose their licenses as shown by the significant coefficient on the regional Herfindahl index. The negative coefficient on size indicates that large banks are less likely to face license withdrawal, suggesting that some banks are either too big to fail or too large to be disciplined adequately. Finally, as the banking sector as a whole violates more standards, the CBR is more lenient towards withdrawing individual bank licenses. This corroborates the "too many to fail" hypothesis developed in Mitchell (1998). Clearly the null hypothesis that macro-prudential concerns play no role in bank licensing policy can be firmly rejected.

As regards the micro-prudential enforcement of bank standards, the lower part of Table 3 reveals a significant level of enforcement, though not all bank standards are strictly

enforced. We do find consistent indications of enforcement for the quick liquidity ratio (N2), the current liquidity ratio (N3) and the general liquidity ratio (N5). Indeed, if these variables show up significantly, it is always with a positive sign, indicating that a greater number of breaches and more severe breaches of these bank standards relate to a higher probability of license withdrawal. The broad enforcement of liquidity standards is not necessarily good news. It implies that the CBR may be running behind the facts, by mainly de-licensing already illiquid banks (and possibly illiquid because of asset stripping in the face of expected de-licensing), at a point where failure has become convenient to its owners. Moreover, the CBR is more likely to close banks breaching on quick liquidity, rather than those breaching on long liquidity. This indicates that if a bank fails on long-term or general liquidity the CBR allows it to "gamble for its resurrection" to avoid losses on selling illiquid assets (Kane, 1989).

Violations of the pocket-bank-related standards (N9.1 and N10.1) yield a disciplinary reaction from the CBR, which indicates that the CBR is not more lenient towards banks that have strong political clout. This is further reinforced by the fact that state-owned banks are ceteris paribus not less likely to be de-licensed.

While we find some enforcement of the capital adequacy standard (N1), the coefficient of the ratio of large credit risks to capital (N7) only shows weak indications of enforcement and the households' deposits-to-capital ratio (N11) is not enforced at all. On the contrary, the sign for N11 is consistently negative. This corroborates our hypothesis that the enforcement of this standard would affect precisely those banks that are most active on the deposit market, and runs counter to the CBR's macro-objective of securing and restoring depositor trust and systemic stability. The non-reported scores dummy variable is always significantly positively related to license withdrawal. This could mean that the CBR interprets a bank's failure to report its scores on some regulatory standards as a signal of non-compliance, or alternatively that a bank that expects to lose its license in any case, does not bother to report its scores on some bank standards any longer.[11]

[11]For most standards the number and severity of breaches is positively correlated with non-reporting (correlation tables are available upon request). Interestingly the correlation between non-reporting and non-compliance is negative for those compliance measures where enforcement was found to be weak or absent (N7 and N11). Hence, banks that do not expect enforcement report all the scores, while banks that expect some level of enforcement more often fail to report all the scores. This lends support to the interpretation that banks that anticipate withdrawal because of frequent and severe violations of the other standards do not

The results in Table 3 suggest that the CBR's licensing policy is guided not only by micro-, but also by macro-prudential objectives. To test the second hypothesis that these two dimensions of prudential supervision complement each other, we interact the two sets of variables as shown in equation (2). To ease interpretation, we first define a composite breach measure for liquidity and capital standards respectively. These are then interacted with the macro-prudential objectives. Definitions and summary statistics of these variables are included in Tables 1 and 2.

[Insert Table 4]

Table 4 shows estimation results for the model defined in (2). As the coefficient estimates of the economic variables and macro-prudential objectives remain largely unaffected when using the composite standards, we omitted these to ease the exposition of results. Since the results for alternative values of the discount factor do not differ significantly, we only show the results for a discount parameter of $\alpha = 0.5$. The results indicate that the CBR enforces both liquidity and — to some extent — capital requirements: frequent breaches of capital-related bank standards provoke a putative reaction from the CBR (columns *I* to *IV*), while the severity with which capital requirements are breached seem to be of lesser importance (columns *V* to *VIII).*[12]

We find several instances where the macro-prudential concerns skew the micro-prudential license decisions towards forbearance ($\delta < 0$): Liquidity standards are less enforced in regions with low regional competition, while capital requirements are less enforced for sizeable banks (columns *II* and *III*). Severe violations of liquidity requirements face less punishment if the bank operates in a poorly banked region (column *VII*) and when there are too many banks to fail (column *IX*). These findings suggest that macro-prudential concerns foster regulatory forbearance in several ways, which allows us to reject the null of no conflict between both dimensions of prudential regulation. Note however that a higher aggregate number of breaches for the whole

bother to report their scores any longer.

[12]When we attach more value to current breaches by imposing a higher discount factor of $\alpha = 0.7$, we observe some punishment in terms of license withdrawal of severe violations of the capital regulation. These results are available upon request.

banking sector does not systematically reduce the punishment for banks that frequently breach liquidity or capital standards (column *IV*). On the contrary, if there are many banks in dire state from a micro-prudential point of view ("too many to fail"), the CBR is more likely to withdraw the licenses from frequent offenders, which indicates that the two dimensions of prudential supervision may also, albeit only in this specific case, complement each other. Regulatory capture in the form of less enforcement of liquidity or capital standards for state-owned banks is rejected (column V end X). This does however not exclude other forms of regulatory capture that are beyond the scope of this paper.

5. Robustness

We constructed a third compliance variable that captures the total volume of breaches, rather than the number of breaches or their average severity. This measure should be interpreted as the one-sided total distance over time for a given bank between any bank standard n and the bank's actual score on the standard:

$$vbreach_{n,i,t} = nbreach_{n,i,t} * sbreach_{n,i,t}. \quad (10)$$

Again, we discount the past by imposing exponentially decreasing weights to past volumes of breaches and get:

$$dvbreach_{n,i,t} = \sum_{z=k}^{t} \varpi_t (vbreach_z). \quad (11)$$

This measure is theoretically the most appealing way of assessing compliance with prudential standards. Imposing that the CBR takes this measure into account corroborates the enforcement of liquidity standard N2 and the capital adequacy standard N1, but in general shows even less enforcement compared to the *dnbreach* and *dsbreach* variables. The results related to the presence of macro-prudential concerns in the CBR's objective function are largely sustained, with the exception of bank size. These results are available upon request.

In stead of gauging the *interbank liabilities to total liabilities* ratio, the CBR may want to protect only money-center banks to enhance the stability of the interbank market. If large

banks at the heart of the interbank system fail, the entire banking system could collapse.[13] It is therefore likely that the CBR will want to avoid this in order to preserve systemic stability.[14] To test this hypothesis, we included the bank's *market share in total interbank liabilities*. Similarly, we included the bank-specific *market share in total government securities* to investigate whether the CBR is may be captured by banks that hold a large absolute amount of government securities (mainly bonds). If this were the case, the government may be less willing to liquidate its largest financiers than closing down less influential small banks. These hypotheses could not be corroborated. These results are available upon request.

We also checked whether the results are robust to the exclusion of outliers. We stick to the definition of outliers provided in the last column of Table 2a. Specifically for variables with a theoretical maximum value of 100 we omit all bank observations between 95 and 100, i.e. 200 extreme bank observations. The results are very robust to their exclusion and available upon request.

6. Concluding remarks

We focus on the potential conflict between the micro- and macro-prudential objectives of bank supervisors. To this purpose, we conduct an empirical study of the licensing policy of the Central Bank of Russia (CBR) during the period 1999–2002, a period with consistent regulatory policy. The CBR composes an intriguing opportunity for analyzing this potential conflict, as it is a very young central bank that combines a broad swathe of authorities and functions. Equally important, the period studied involves many banks and many bank failures, allowing us to study empirically how well the CBR enforced its own micro-prudential bank standards. The finding that most capital and liquidity standards show some level of enforcement is encouraging, although the enforcement of liquidity regulations is not necessarily good news. It may indicate that the CBR mainly de-licenses banks that are already illiquid instead of anticipating future trouble. In addition we find indications that the CBR leaves the banks room to gamble for their resurrection.

[13]See, for example, Wall and Peterson (1990) on the FDIC bail-out of Continental Illinois and Kapstein (1994) and Davis (1992) on the failure of Herstatt Bank.
[14]Freixas et al. (2000) show that it may be too costly to close down money-center banks, because it might

Our analysis reveals strong indications that macro-prudential concerns related to systemic stability are present in the CBR's objective function. Controlling for economic reasons of bank failure (loan quality, profitability, liquidity, efficiency, market power), we find that banks in poorly banked regions, banks that are too big to be disciplined adequately, and banks active on the interbank market enjoy a certain degree of protection against license withdrawal. When too many banks are in a dire state, the CBR is also less likely to withdraw the license of any given bank.

It can also not be rejected that macro-prudential concerns lead to increased regulatory forbearance in the short run. Specifically, frequent breaches of liquidity standards face less punishment in regions with low regional competition, frequent breaches of capital requirements are less enforced for sizeable banks and severe breaches of liquidity standards requirements are forborne when the bank is operating in a poorly banked region. The CBR is also quite reticent about withdrawing bank licenses from banks that repeatedly and severely violated the households' deposits-to-capital ratio, supposedly because this might affect depositor trust and systemic stability. These findings suggest a conflict between the micro- and macro-prudential dimensions of bank supervision, although there is also some evidence that the two dimensions might in specific cases reinforce each other, rather than being in conflict.

The found conflict between the two dimensions of bank supervision in a supervisor's objective function is likely to be a general problem that potentially affects prudential bank supervision in many countries in ways that are not fully understood. Further theoretical work is needed to disentangle under which conditions this conflict may skew supervisory decisions and what the welfare implications are. It would be of interest to analyze whether this conflict can also be detected in more stable banking markets and in banking markets where the supervisory authority is not housed within the central bank. Specifically for the Russian case further research is needed to evaluate how the recent adoption of deposit insurance may have altered the relationship between the variables studied and bank stability.

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trigger the liquidation of all other banks. See also Rochet and Tirole (1996) on this point.

A. Prudential regulations of the CBR

The regulation that governs our period of study came into force on April 1, 1996 and draws on CBR Instruction No. 1 of January 30, 1996, "On the Procedure for Regulating the Activities of Credit Organizations". This regulation is issued in accordance with the Federal Law on the Central Bank of the Russian Federation and established a set of new prudential bank standards, taking into account international banking practices. For Russian standards, the new bank standards were rather strict and the CBR gave banks time to adjust to the new conditions. Yet the enormous peak of license withdrawals in May 1996 (see Figure 1) demonstrates that the adjustment process was rather abrupt. We concentrate on the bank standards (*normas* as the CBR refers to them) imposed by the CBR. In addition to minimal capital requirements, the CBR has instituted regulations on capital adequacy requirements (N1), liquidity requirements (N2, N3, N4, N5), credit risk requirements (N7, N9, N10, N11, N12, N13), and a host of other less important regulations and voluntary guidelines.

Capital adequacy ratio (N1)

On April 1, 1996, the bank equity capital adequacy ratio (N1) was defined as the ratio of the bank's equity capital to the overall risk-weighted assets minus the sum of the reserves created for depreciation of securities and possible losses. Since February 1998, the minimum level of N1 is set depending on the amount of the bank's equity capital:

5 million euro	*1 to 5 million euro*	*Less than 1 million euro*
July, 1996 – 5%		
February, 1997 – 6%		
February, 1998 – 7%	February, 1998 – 7%	February, 1988 – 7%
February, 1999 – 8%	February, 1999 – 9%	
January, 2000 – 10%	January, 2000 – 11%	

Quick liquidity ratio (N2)

The quick liquidity ratio (N2) is defined as the ratio of the sum of the bank's highly liquid assets to the sum of the bank's liabilities on demand accounts. The minimum value of the N2 ratio was set at 10% on July 1, 1996 and at 20% on February 1, 1997.

Current liquidity ratio (N3)

The current liquidity ratio (N3) is defined as the ratio of the sum of the bank's liquid assets to the sum of the bank's liabilities on demand accounts and accounts up to 30 days. The minimum value of the current liquidity ratio was set at no less than:

20% of total assets as of July 1, 1996;

30% of total assets as of February 1, 1997;

50% of total assets as of February 1, 1998;

70% of total assets as of February 1, 1999.

Long-term liquidity ratio (N4)

The long-term liquidity ratio (N4) is defined as the ratio of the entire long-term debt to the bank, including guarantees and sureties with a maturity of more than one year, to the bank's equity capital and liabilities on deposit accounts, credits received and other debt liabilities with maturities exceeding one year. The long-term liquidity ratio should not exceed 120%.

General liquidity ratio (N5)

The general liquidity ratio (N5) is defined as the percentage of liquid assets in the bank's aggregate assets. The minimum value of the N5 ratio has been set at:

10% of total assets as of July 1, 1996;

20% of total assets as of February 1, 1997.

Large credit risk (N7)

Large credit risk (N7) is defined as a percentage of the total amount of large credit risks in the bank's equity capital. A large credit is the total sum of the bank's risk-weighted claims to one borrower (or a group of related borrowers) on credits, taking into account 50% of the sum of off-balance claims – guarantees and sureties held by the bank with regard to one borrower (or a group of related borrowers), exceeding 5% of the bank's equity capital. Note that the decision to extend a large credit or loan must be made by the board of the bank or its credit committee, taking into account the opinion of the bank's credit department. Large credit risk was not to exceed 12 times the bank's capital in 1996, 10 times in 1997 and 8 times in 1998.

Risk per borrower-shareholder (N9.1)

The risk per borrower-shareholder (N9.1) is defined as the amount of credits, guarantees and sureties issued by the bank to one corporate or individual shareholder or to a group of related corporate or individual shareholders of the bank divided by equity capital. Related shareholders are corporate and individual shareholders connected with one another economically and legally (e.g. having common property and/or mutual guarantees and/or obligations, and/or controlling each other's property, as well as an individual concurrently holding several senior executive positions), such that the financial problems of one of the shareholders cause or may cause financial problems for the other shareholder(s). Since January 1, 1998, N9.1 should not exceed 50% of the bank's equity capital.

Credit to insiders (N10.1)

The aggregate amount of credits and loans extended to insiders (N10.1) may not exceed 3% of the bank's equity capital. Insiders comprise the following individuals: shareholders who own more than 5% of shares, directors (presidents, chairmen, and their deputies), Board members, members of the credit committee, senior executives of subsidiary and parent structures, and other persons who may influence the decision to issue credit, as

well as relatives of insiders, former insiders and other persons participating in outside structures in which insiders also participate.

Coverage of household deposits by capital (N11)

N11 is defined as the ratio of the sum of household deposits to equity capital. Since July 1996, household deposits should be 100% covered by equity capital.

Coverage of the bank's investments in shares by capital (N12)

The bank's own investments in shares of other legal entities has been limited to:

45% of equity capital as of July 1, 1996;

35% of equity capital as of October 1, 1996;

25% of equity capital as of January 1, 1997.

Bank's own promissory note liability risk ratio (N13)

N13 is defined as the percentage of the bills of exchange and bills of acceptance issued by the bank plus 50% of the bank's off-balance liabilities arising from the endorsement of bills, sureties and bill brokerage in the bank's equity capital. The maximum levels have been set at:

200% of the balance as of October 1, 1996;

100% of the balance as of March 1, 1997.

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Table 1:
Description of variables and data sources

Compliance with Regulatory Standards[1]: Micro-Prudential Objectives	
Non-reported scores	A dummy variable that equals one when information on at least one of the regulatory standards 7, 9.1, 10.1, 11, 12 or 13 is not reported, zero otherwise. The scores on all other standards are always reported.
$breach_{n,i,t}$	A dummy variable that equals one whenever bank *i* violates regulation n in quarter *t*, zero otherwise.
$nbreach_{n,i,t}$	The sum of actual breaches - relative to the maximum potential - registered by bank *i* from t_0^{PR} up till *t*, corrected for 'late entry' (see Figure 2).
$dnbreach_{n,i,t}$	An exponentially smoothed version of *nbreach* with varying weights for α.
$sbreach_{n,i,t}$	The average severity of breaches registered by bank *i* from t_0^{PR} up till *t*. Severity is defined as the relative deviation from the prudential standard whenever breach equals one.
$dsbreach_{n,i,t}$	An exponentially smoothed version of *sbreach* with varying weights for α.
Composite Liquidity $Standard_{n,i,t}$	The sum of *dnbreach* or the average of *dsbreach* for regulatory standards 2, 3, 4 and 5.
Composite Capital $Standard_{n,i,t}$	The sum of *dnbreach* or the average of *dsbreach* for regulatory standards 1, 7, 9.1, 10.1, 11, 12 and 13.
Macro-prudential Objectives	
Regional Herfindahl (assets)[2]	The regional[3] Herfindahl index, calculated as the sum of squared regional market shares for each region *j* in quarter *t* (between 0 and 10,000).
Size (log assets)[2]	The log of assets of bank *i* in quarter *t*.
Aggregate number of breaches	The banking sector's aggregate number of breaches of all standards in quarter *t*.
Economic Variables	
Return on assets[2]	The returns-to-assets ratio of bank *i* in quarter *t* (%).
Cost/assets[2]	The ratio of personnel costs to two month average of total assets of bank *i* in quarter *t* (%).
Interbank liabilities/liabilities[2]	Interbank liabilities to total liabilities of bank *i* in quarter *t* (%).
Regional market share (assets) [2]	The regional[3] market share in assets, calculated as the ratio of bank *i*'s individual assets to the sum of bank assets for region j in quarter *t* (between 0 and 100).
Non performing loans/loans[2]	The ratio of non-performing loans to total loans of bank *i* in quarter *t* (%).
Reserves/assets[2]	The ratio of total reserves (including excess reserves) to total assets of bank *i* in quarter *t* (%).
Control Variables	
Deflator[4]	Average monthly inflation (%).
Moscow Dummy	A dummy variable that equals one if the bank is located in Moscow, zero otherwise.
Government securities/assets[2]	The ratio of government securities to assets of bank *i* in quarter *t* (%).
State Dummy	A dummy variable that equals one if the bank is state owned, zero otherwise.

[1]Source: Own calculations based on regulatory standards published by the CBR (see appendix) and bank-specific scores on regulatory standards acquired from Interfaks and Mobile. [2]Source: Own calculations based on Interfaks. [3]Note: We use 80 regions for the calculation of regional market shares. [4]Source: Russian Economic Trends.

Table 2a
Summary statistics

	Obs.	Mean	Std. Dev.	Min.	Max.	Freq.
Macro-prudential Objectives						
Regional Herfindahl (assets)	20444	0.20	0.14	0.08	0.98	
Size (log assets)	20444	4.92	1.95	-1.94	11.75	
Aggregate number of breaches	20444	0.33	0.15	0.00	0.68	
Economic Variables						
Return on assets	20334	0.58	8.13	-149.61	479.61	
Cost/assets	20411	1.29	2.13	0	76.60	
Interbank liabilities/liabilities	20405	10.63	19.15	0	100	0.96%
Regional market share (assets)	20444	5.75	14.02	1.73E-05	100	0.50%
Non performing loans/loans	20000	5.06	12.98	0	100	1.42%
Reserves/assets	20444	17.64	15.49	0	100	0.23%
Control Variables						
Deflator	20444	1.96	1.74	0.46	8.02	
Moscow Dummy	20444	0.48	0.50	0	1	
Government securities/assets	20444	1.89	6.49	0	100	0.47%
State Dummy	20444	0.02	0.13	0	1	

Source: Own calculations based on Interfaks, Russian Economic Trends and CBR. A detailed description of the variables and data sources is provided in Table 1.
Note: Frequency is defined for the variables that reach a maximum of 100. It indicates the percentage of observations between 95 and 100.

Table 2b
Summary statistics of micro-prudential objectives

	Obs.	Mean	Std. Dev.	Min.	Max.
Non-reported scores	20136	0.07	0.25	0	1
Compliance with Regulatory Standards: Number of Breaches					
Capital adequacy ratio (N1)	19799	0.52	1.66	0	21
Quick liquidity ratio (N2)	19789	0.72	1.87	0	16
Current liquidity ratio (N3)	19790	1.04	2.12	0	17
Long-term liquidity ratio (N4)	19788	0.12	0.60	0	8
General liquidity ratio (N5)	19796	1.09	2.47	0	20
Large-risks-to-capital ratio (N7)	19789	0.07	0.40	0	6
Owner-related-credit-risks-to-capital ratio (N9.1)	19787	0.19	0.64	0	6
Insider-related-credit-risks-to-capital ratio (N10.1)	19788	0.16	0.61	0	9
Individuals' deposits-to-capital ratio (N11)	19787	1.52	3.37	0	22
Investment-to-shares-to-capital ratio (N12)	19787	0.16	0.60	0	8
Issued-promissory-notes-to-capital ratio (N13)	19788	0.35	1.15	0	16
Composite Liquidity Standard	19796	2.97	6.15	0	54
Composite Capital Standard	19799	2.97	5.01	0	42
Compliance with Regulatory Standards: Severity of Breaches					
Capital adequacy ratio (N1)	19784	0.18	2.02	0	59.12
Quick liquidity ratio (N2)	19769	0.15	0.81	0	13.98
Current liquidity ratio (N3)	19787	0.14	0.96	0	26.38
Long-term liquidity ratio (N4)	19735	0.01	0.09	0	1.82
General liquidity ratio (N5)	19777	0.05	0.16	0	2.70
Large-risks-to-capital ratio (N7)	19697	0.00	0.02	0	0.50
Owner-related-credit-risks-to-capital ratio (N9.1)	19738	0.03	0.18	0	4.18
Insider-related-credit-risks-to-capital ratio (N10.1)	19708	0.05	0.41	0	16.44
Individuals' deposits-to-capital ratio (N11)	19758	0.13	0.56	0	8.67
Investment-to-shares-to-capital ratio (N12)	19769	0.03	0.20	0	4.35
Issued-promissory-notes-to-capital ratio (N13)	19748	0.05	0.29	0	5.66
Composite Liquidity Standard	19796	0.09	0.43	0	9.36
Composite Capital Standard	19799	0.07	0.33	0	8.45

Source: Own calculations based on Interfaks, Mobile and CBR.
Note: The calculations of the compliance variables are based on the period 1997:Q2 - 2002:Q4. The estimation sample is restricted to the period 1999:Q1 - 2002:Q4. More detailed information on variable construction is provided in Table 1. Detailed information on regulatory standards is provided in appendix.

Table 2b continued

	Obs.	Mean	Std. Dev.	Min.	Max.
Compliance with Regulatory Standards: Discounted Number of Breaches (α=0.5)					
Capital adequacy ratio (N1)	19799	0.36	1.79	0	23.00
Quick liquidity ratio (N2)	19789	0.51	1.97	0	23.00
Current liquidity ratio (N3)	19790	0.67	2.23	0	23.00
Long-term liquidity ratio (N4)	19788	0.07	0.62	0	15.79
General liquidity ratio (N5)	19796	0.60	2.26	0	23.00
Large-risks-to-capital ratio (N7)	19789	0.08	0.76	0	20.43
Owner-related-credit-risks-to-capital ratio (N9.1)	19787	0.07	0.49	0	10.50
Insider-related-credit-risks-to-capital ratio (N10.1)	19788	0.09	0.73	0	20.67
Individuals' deposits-to-capital ratio (N11)	19787	1.98	5.09	0	23.00
Investment-to-shares-to-capital ratio (N12)	19787	0.05	0.54	0	18.93
Issued-promissory-notes-to-capital ratio (N13)	19788	0.31	1.69	0	23.00
Composite Liquidity Standard	19796	1.85	5.80	0	68.95
Composite Capital Standard	19799	2.95	6.48	0	73.50
Compliance with Regulatory Standards: Discounted Severity of Breaches (α=0.5)					
Capital adequacy ratio (N1)	19798	0.04	0.54	0	40.49
Quick liquidity ratio (N2)	19774	0.09	0.69	0	19.32
Current liquidity ratio (N3)	19790	0.04	0.25	0	11.84
Long-term liquidity ratio (N4)	19748	0.00	0.04	0	1.33
General liquidity ratio (N5)	19784	0.03	0.15	0	2.50
Large-risks-to-capital ratio (N7)	19699	0.00	0.02	0	0.41
Owner-related-credit-risks-to-capital ratio (N9.1)	19756	0.01	0.08	0	2.44
Insider-related-credit-risks-to-capital ratio (N10.1)	19753	0.03	0.40	0	13.35
Individuals' deposits-to-capital ratio (N11)	19752	0.11	0.42	0	6.32
Investment-to-shares-to-capital ratio (N12)	19770	0.01	0.07	0	2.34
Issued-promissory-notes-to-capital ratio (N13)	19747	0.03	0.22	0	4.79
Composite Liquidity Standard	19796	0.04	0.23	0	5.71
Composite Capital Standard	19799	0.03	0.13	0	5.78

Source: Own calculations based on Interfaks, Mobile and CBR.
Note: The calculations of the compliance variables are based on the period 1997:Q2 - 2002:Q4. The estimation sample is restricted to the period 1999:Q1 - 2002:Q4. More detailed information on variable construction is provided in Table 1. Detailed information on regulatory standards is provided in appendix.

Table 3
Regression results for the logit model – Coefficient estimates of equation (1)

Dependent variable:	License withdrawal					
Regulatory violations measured as:						
	(1) dnbreach			*(2) dsbreach*		
	I	*II*	*III*	*IV*	*V*	*VI*
	(α=0.3)	*(α=0.5)*	*(α=0.7)*	*(α=0.3)*	*(α=0.5)*	*(α=0.7)*
Constant	-3.87***	-3.47***	-3.34***	-2.29***	-2.12***	-2.09***
	[1.09]	[0.89]	[0.83]	[0.55]	[0.56]	[0.67]
Deflator	0.25**	0.28***	0.28***	0.32***	0.31***	0.27***
	[0.10]	[0.09]	[0.08]	[0.08]	[0.08]	[0.09]
Moscow Dummy	1.11**	1.00**	0.92**	0.74**	0.69**	0.73**
	[0.55]	[0.49]	[0.45]	[0.30]	[0.30]	[0.36]
Government securities/assets	0.01	0.00	0.00	0.04***	0.03***	0.04***
	[0.02]	[0.02]	[0.02]	[0.01]	[0.01]	[0.01]
State Dummy	-0.67	-0.26	-0.18	-0.24	-0.34	-0.78
	[1.64]	[1.42]	[1.35]	[1.02]	[1.03]	[1.29]
Economic Variables						
Return on assets	-0.01*	-0.01	-0.01	-0.01**	-0.01*	-0.01
	[0.00]	[0.00]	[0.00]	[0.01]	[0.01]	[0.01]
Cost/assets	0.15***	0.13***	0.11***	0.09***	0.09***	0.09***
	[0.05]	[0.04]	[0.04]	[0.03]	[0.03]	[0.03]
Interbank liabilities/liabilities	-0.02**	-0.02**	-0.02**	0.00	-0.01	-0.01
	[0.01]	[0.01]	[0.01]	[0.00]	[0.00]	[0.01]
Regional market share (assets)	-0.01	0.00	0.00	0.00	0.00	0.00
	[0.03]	[0.02]	[0.02]	[0.01]	[0.01]	[0.02]
Non performing loans/loans	0.03***	0.03***	0.02***	0.02***	0.01***	0.02***
	[0.01]	[0.01]	[0.01]	[0.00]	[0.00]	[0.01]
Reserves/assets	-0.13***	-0.12***	-0.11***	-0.11***	-0.11***	-0.12***
	[0.03]	[0.02]	[0.02]	[0.02]	[0.02]	[0.02]
Macro-prudential Objectives						
Regional Herfindahl (assets)	-8.42***	-6.87***	-5.95***	-3.99***	-3.67**	-4.00**
	[3.11]	[2.37]	[2.11]	[1.48]	[1.48]	[1.80]
Size (log assets)	-0.37***	-0.39***	-0.39***	-0.18***	-0.20***	-0.29***
	[0.11]	[0.11]	[0.10]	[0.06]	[0.06]	[0.08]
Aggregate number of breaches	-7.33***	-6.98***	-6.53***	-6.42***	-6.67***	-7.14***
	[1.33]	[1.22]	[1.16]	[0.92]	[0.93]	[1.08]

(Continued)

Table 3 continued

	(1) dnbreach			*(2) dsbreach*		
	I	*II*	*III*	*IV*	*V*	*VI*
	(α=0.3)	*(α=0.5)*	*(α=0.7)*	*(α=0.3)*	*(α=0.5)*	*(α=0.7)*
Compliance with Regulatory Standards						
Non-reported scores	1.49***	1.45***	1.42***	1.57***	1.57***	1.20***
	[0.32]	[0.30]	[0.29]	[0.23]	[0.24]	[0.28]
Capital adequacy ratio (N1)	0.07	0.14**	0.16***	-0.05	0.00	0.26*
	[0.07]	[0.06]	[0.05]	[0.07]	[0.06]	[0.13]
Quick liquidity ratio (N2)	0.52***	0.35***	0.27***	0.24***	0.15**	0.07
	[0.09]	[0.06]	[0.05]	[0.07]	[0.06]	[0.08]
Current liquidity ratio (N3)	0.23**	0.15**	0.11**	-0.61*	0.41	1.82**
	[0.09]	[0.06]	[0.05]	[0.37]	[0.43]	[0.71]
Long-term liquidity ratio (N4)	-0.11	-0.05	-0.02	0.57	1.24	3.78***
	[0.18]	[0.12]	[0.09]	[0.83]	[0.93]	[1.18]
General liquidity ratio (N5)	-0.06	0.00	0.03	3.09***	1.91***	1.00
	[0.09]	[0.06]	[0.05]	[0.55]	[0.45]	[0.65]
Large-risks-to-capital ratio (N7)	0.09	0.07	0.04	-1.17	4.73	8.55**
	[0.17]	[0.11]	[0.08]	[3.14]	[3.05]	[3.67]
Owner-related-credit-risks-	0.36	0.2	0.12	1.44***	1.00*	1.20*
to-capital ratio (N9.1)	[0.25]	[0.17]	[0.13]	[0.44]	[0.56]	[0.68]
Insider-related-credit-risks-	0.39***	0.24**	0.17**	0.01	0.12	0.69***
to-capital ratio (N10.1)	[0.14]	[0.11]	[0.08]	[0.07]	[0.15]	[0.25]
Individuals' deposits-	-0.05	-0.05	-0.05	-0.45	-0.45	-0.72
to-capital ratio (N11)	[0.07]	[0.06]	[0.05]	[0.28]	[0.33]	[0.45]
Investment-to-shares-	0.30*	0.16	0.09	-0.14	-0.62	0.68
to-capital ratio (N12)	[0.17]	[0.13]	[0.10]	[0.74]	[1.44]	[1.25]
Issued-promissory-notes-	0.05	0.04	0.04	0.07	-0.25	-0.42
to-capital ratio (N13)	[0.11]	[0.08]	[0.06]	[0.35]	[0.57]	[0.58]
Observations	19414	19661	19661	19384	19420	19443
Number of banks	1384	1384	1384	1373	1373	1376
Log Likelihood	-533.93	-515.32	-510.23	-517.66	-503.56	-500.46
Wald chi2	145.52	161.48	166.66	432.2	445.24	194.39

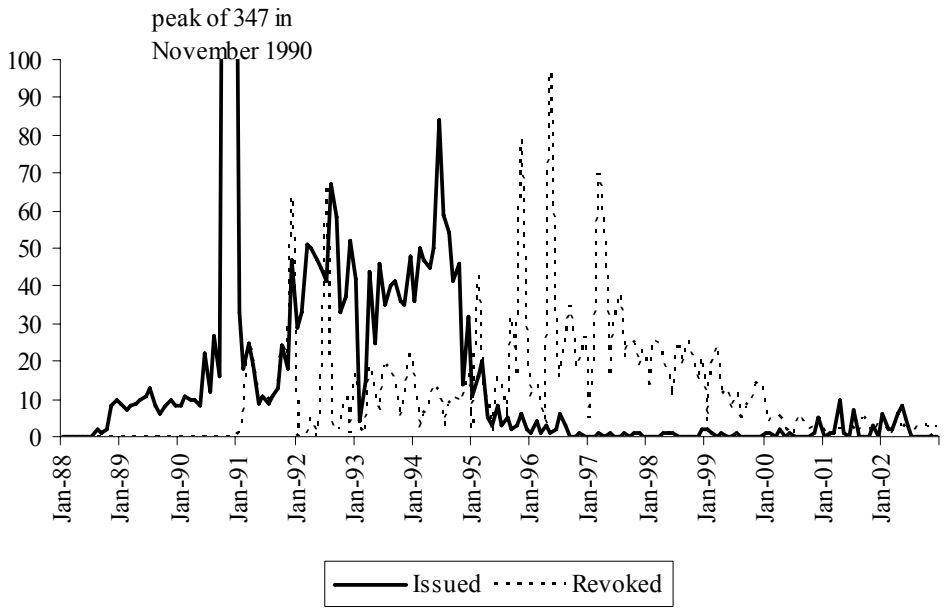
Note: The breach variables in the regression equations are: (1) discounted number of breaches assuming exponential smoothing: (I) *dnbreach (α=0.3),* (II) *dnbreach (α=0.5)*, (III) *dnbreach (α=0.7)*, (2) discounted severity of breaches assuming exponential smoothing: (IV) *dsbreach (α=0.3),* (V) *dsbreach (α=0.5)*, (VI) *dsbreach (α=0.7)*. The dependent variable is a dummy variable, license withdrawal, which equals one in the quarter when a bank's license was revoked and zero otherwise. Table 1 provides a detailed description of all variables. The logit estimations are performed under the RE assumption. Robust standard errors are given in brackets.

Table 4
Regression results for the logit model – Coefficient estimates of equation (2) (Note: part of estimation output omitted)

Dependent variable:	License withdrawal									
Regulatory violations measured as:	Clusters of dnbreach (α=0.5)*						Clusters of dsbreach (α=0.5)**			
	I	II	III	IV	V	VI	VII	VIII	IX	X
Compliance with Regulatory Standards										
Non-reported scores	1.58***	1.58***	1.64***	1.91***	1.56***	1.47***	1.47***	1.47***	1.17***	1.45***
	[0.28]	[0.28]	[0.28]	[0.27]	[0.28]	[0.23]	[0.23]	[0.23]	[0.24]	[0.23]
Composite Liquidity Standard	0.18***	0.22***	0.13***	0.05*	0.18***	1.28***	1.76***	0.85***	3.05***	1.27***
	[0.03]	[0.03]	[0.03]	[0.03]	[0.03]	[0.17]	[0.27]	[0.30]	[0.58]	[0.16]
Composite Capital Standard	0.05**	0.02	0.27***	-0.01	0.06***	0.31	0.36	0.1	2.09	0.31
	[0.02]	[0.03]	[0.06]	[0.04]	[0.02]	[0.29]	[0.66]	[0.56]	[1.38]	[0.29]
Composite Liquidity*State Dummy					0.28					4.67
					[0.27]					[3.33]
Composite Capital *State Dummy					-0.27					1.1
					[0.36]					[15.14]
Composite Liquidity*				0.35***					-3.26***	
Aggregate number of breaches				[0.07]					[0.98]	
Composite Capital *				0.16					-3.46	
Aggregate number of breaches				[0.10]					[2.57]	
Composite Liquidity*Size			0.01					0.10		
			[0.01]					[0.06]		
Composite Capital *Size			-0.04***					0.12		
			[0.01]					[0.14]		
Composite Liquidity*Herfindahl		-0.27***					-2.39**			
		[0.10]					[0.97]			
Composite Capital *Herfindahl		0.18					0.18			
		[0.14]					[1.74]			
Observations	19661	19661	19661	19661	19661	19661	19661	19661	19661	19661
Number of banks	1384	1384	1384	1384	1384	1384	1384	1384	1384	1384
Log Likelihood	-534.06	-530.63	-524.24	-510	-533.04	-591.62	-587.8	-589.43	-582.88	-589.77
Wald chi2	162.67	176.66	170.32	184.74	162.91	310.95	312.75	316.37	470.04	313.72

Note: The breach variables in the regression equations are: (1) Composite liquidity and capital standards using *dnbreach* (α=0.5), (2) Composite liquidity and capital standards using *dsbreach* (α=0.5). See Table 1 for a detailed description of the composite liquidity and capital standards. The dependent variable is a dummy variable, license withdrawal, which equals one in the quarter when a bank's license was revoked and zero otherwise. Table 1 provides a detailed description of the interacted variables. The logit estimations are performed under the RE assumption. Robust standard errors are given in brackets.

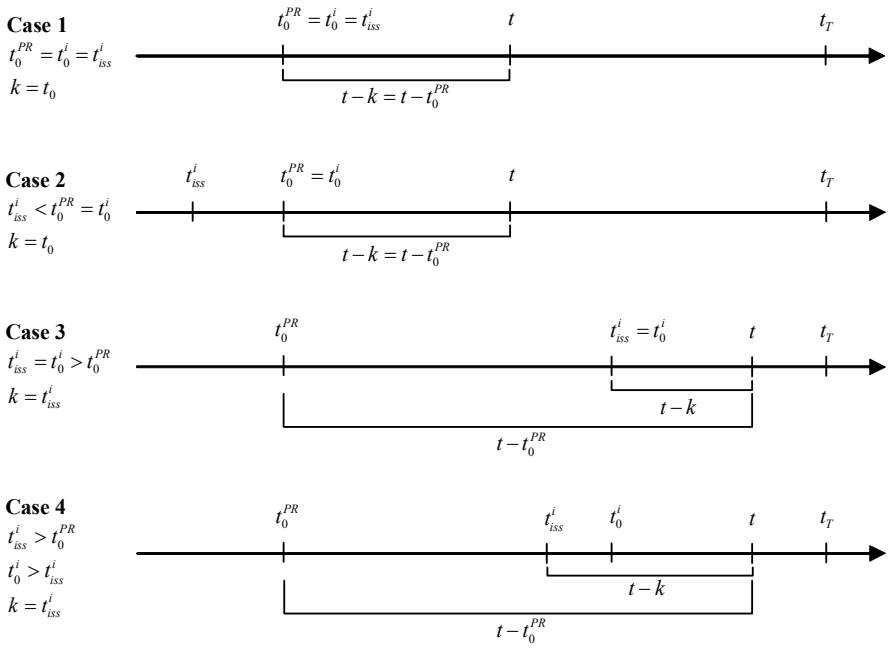
Figure 1: Bank creation and bank destruction in Russia (monthly data).



Source: CBR.

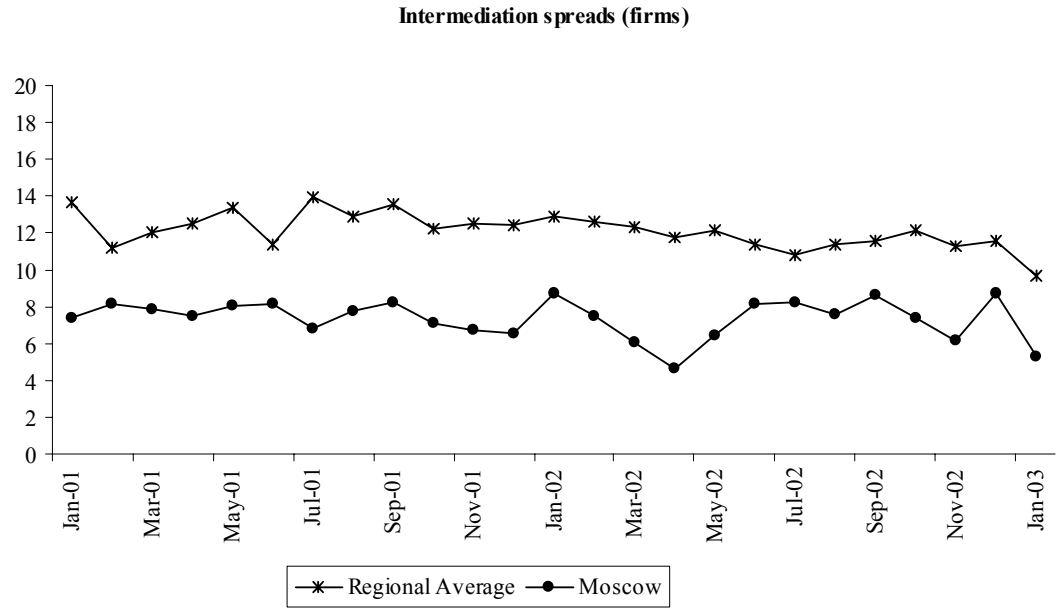
Note: Bank creation is defined as the number of licenses issued; bank destruction is defined as the number of licenses withdrawn.

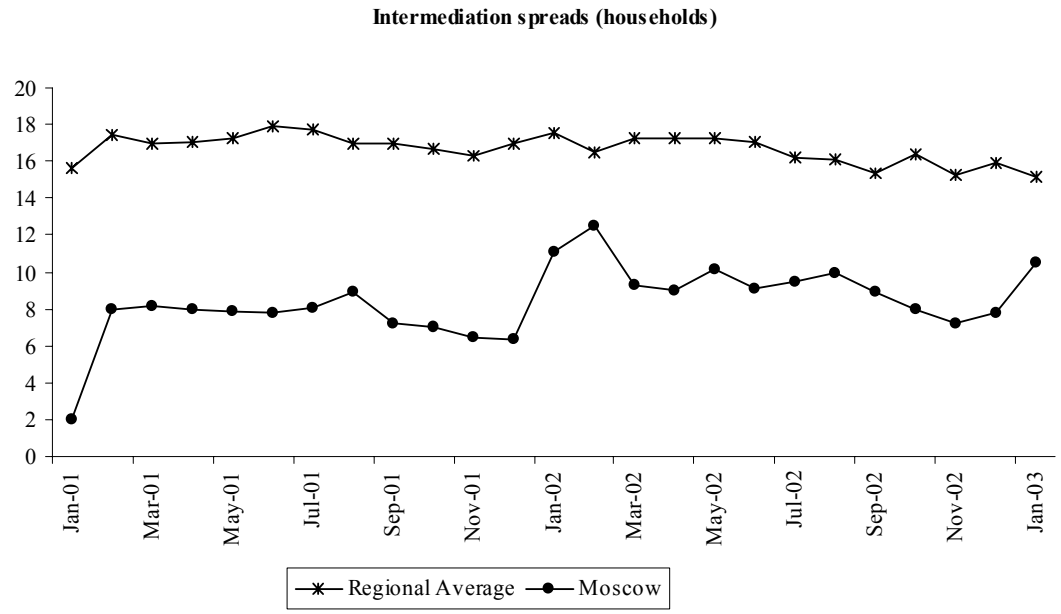
Figure 2: Measuring non-compliance with regulatory standards.



Note: t_0^{PR} marks the first quarter in which we observe bank-specific scores on different standards; t_T marks the end of our sample (2002.4); t_{iss}^i marks the quarter in which bank *i*'s license was issued; t_0^i marks the first observation of bank *i*; $t_T - t_0^{PR}$ marks the sample period for observing bank standards; *t-k* is the number of potential breaches at time *t*; $t - t_0^{PR}$ is the number of quarters used to correct for "late entry" or "late license issuance".

Figure 3: Average intermediation spreads for firms and households: regional average versus Moscow region.

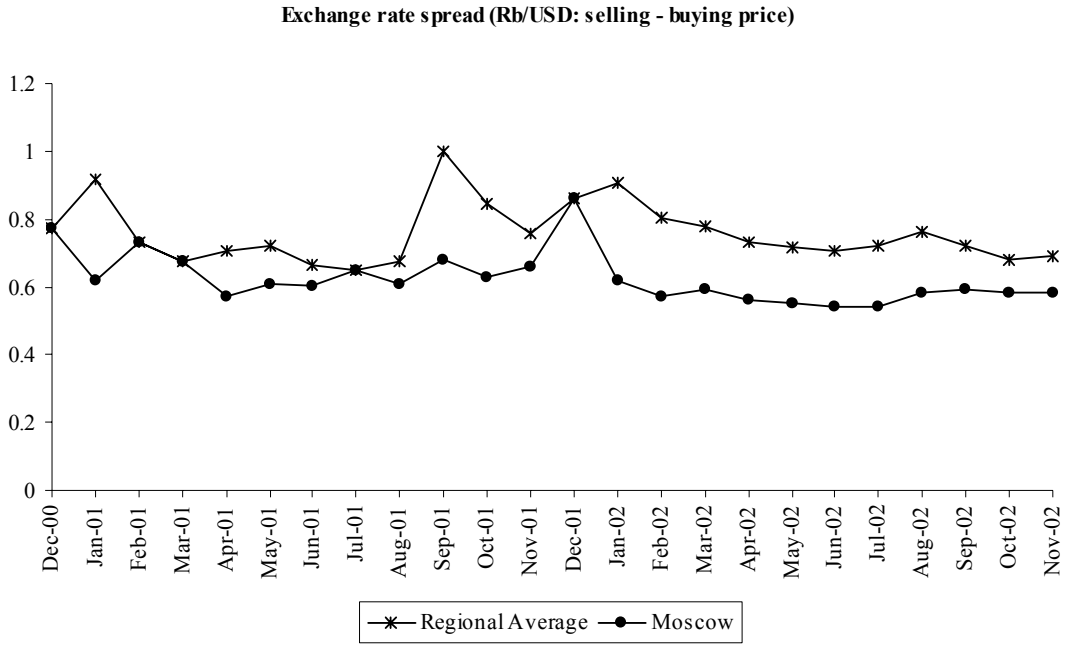




Source: own calculations based on CBR.

Note: Intermediation spreads are calculated as the difference between the region's average lending rate and the region's average deposit rate.

Figure 4: Average spreads between the selling and buying price of Rb in USD: regional average versus Moscow region.



Source: own calculations based on CBR.

Note: exchange rate spreads are calculated as the difference between the region's average selling price and the region's average buying price.

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