International Conference «Modern Econometric Tools and Applications», Nizhny Novgorod, Russia

Bad Management, Skimping, or Both? The Relationship between Cost Efficiency and Loan Quality in Russian Banks

Mikhail Mamonov,

Institute of Economic Forecasting
Russian Academy of Science (IEF RAS)

Center for Macroeconomic Analysis and
Short-term Forecasting (CMASF)

September 20, 2014

Motivation & Contribution 1/3

Fundamental questions:

1. Does higher cost efficiency *always* imply lower credit risk exposure of banks (**the first case**)? Or whether higher cost efficiency could mean insufficient spending on borrowers screening and lead thus to higher bank credit risks (**the second case**)?

2. Does the one case necessarily exclude the other? Or could they coexist?

3. What are possible **motivations** of banks' managers in the both cases?

Why it is important:

1. Analyzing best managerial practices

2. Falsifying the financial accounts

3. Implementing a proper kind of differential prudential regulation and maintaining financial stability

Motivation & Contribution 2/3

Why we choose the Russian banking system?

– Before the "bad" debt crisis of 2008-09 Russian banks concentrated on *quick-and-easy profit extraction* rather than on *longer financial stability issues*

– Bad debts risen rapidly, but now is decreasing very slowly

– It forces banks to keep higher loan loss provisions

– Unfortunately, the pre-crisis story repeated in 2012-13

– Expected shocks from *the macroeconomic side* in 2014-16

Two practical questions:

(a) whether managing cost efficiency by Russian banks could be a viable mechanism to control their loan quality from *the microeconomic side*?

(b) and whether such a mechanism is the same for different banks?

Motivation & Contribution 3/3

Main contributions:

Skimpers vs. Bad managers: Comparative empirical analysis

✓ **New criteria for skimping behavior identification** compared to Berger & DeYoung (1997)'s explanation replicated by Altunbus et al. (2007) and Fiordelisi et al. (2011).

✓ **A two-step approach** for estimating cost efficiency influence on credit risk
   We propose to apply it separately for *bad managers* and for *skimpers*

✓ **A new evidence on skimping nature**:
   – skimping doesn't always imply lower quality of commercial loans,
   – skimping can provide more resilience to macroeconomic shocks,
   – but not all banks are able to effectively manage skimping consequences

Related studies

1. Berger & DeYoung (1997) introduced the efficiency-risk hypotheses:

   – «**Bad management**» vs. «**Skimping**»

   – «**Bad luck**»

2. The Bad management effect was revealed in banking systems of:
   – USA in Berger & DeYoung (1997), Eisenbeis (1997),
   – EU in Williams (2004), Fiordelisi et al. (2011),
   – Spain in Salas & Saurina (2002),
   – Greece in Louzis et al. (2011),
   – Russia in Mamonov (2012), Pestova & Mamonov (2013)

3. Quagliariello (2007): the Bad management effect in Italy is spurious.

4. The Skimping effect was found in
   – Berger & DeYoung (1997) for the subsample of highly efficient US banks
   – Altunbas et al. (2007) for EU banks as a whole

How the Skimping was identified previously

- ✓ It's hardly expected that all banks within a banking system are skimpers, i.e. skimp on risk-management (Berger & DeYoung, 1997)

- ✓ General framework of Berger & DeYoung (1997): skimpers are those «…*banks that willingly trade loan quality for cost reductions, but manage the resulting loan quality problems in a cost effective fashion*»

- ✓ To test that they apply **the higher-than-median efficiency filter** for a sample of US banks

We claim that higher efficiency is *necessary*, but *not sufficient* condition.

- ➢ Banks with best managerial practices vs. banks with artificially increased efficiency

- ➢ We need to distinguish between the two subgroups of efficient banks.

We propose two explanations for the skimping behavior:

1. **A practical need to preserve, or even expand, market share when competitive positions are weakening.**
   easing lending standards ⇒ extensively expanding loan supply
   ⇒ keeping existing and attracting new customers, but increasing adverse selection ⇒ result: increased cost efficiency in the short run,
   but deteriorated loan quality in a longer horizon.

2. **Insufficiency of capital needed to achieve strategic objectives** (expanding branch networks, entry into new markets, etc.).
   – How to raise funds for that? Bond issuance, more customers' deposits attraction or… just *artificially cutting expenses for screening?*
   – Shareholders will be satisfied in the short run,
     but loan quality will decline in the medium & long run.

Methodology 3/6

We suggest **two respective filters** for the whole sample of banks:

1. The annual growth rate of real loans ≥ 50th percentile level,
    at least during the 4 previous quarters.

2. The capital-to-assets ratio ≤ 50th or 25th (for robustness) percentile level,
    at least during the 4 previous quarters.

We apply these filters separately combining each of them with the Berger & DeYoung's higher-than-median efficiency condition.

In our modification, the higher-than-median efficiency condition is set
for 4, 8 or 12 quarters rather than for the whole sample period

➢ Competitive pressure may reduce cost efficiency,

➢ Skimping could be short-lived strategy rather than a permanent behavior

Different approaches to efficiency estimations: EFF={SFA, DFA, CIR}

1. *Balance-sheet approach*:

    – operating cost-to-operating income ratios (CIR)

2. *Econometric approach*:

Based on translog cost function with loans, deposits, and off-balance sheet activities as banking outputs, and non-monotonic & non-neutral technical progress (Berger & DeYoung, 1997; Maudos & Fernandez de Guevara, 2007; Solis & Maudos, 2008):

    – Stochastic Frontier Analysis (SFA-scores) $SFA_{it} = e^{-\hat{u}_{it}} \in (0,\, 1)$

    – Distribution Free Approach (DFA-scores) $DFA_{it} = \dfrac{\hat{u}_{\min,t}}{1 + \left[\hat{u}_{\min,t};\hat{u}_{it}\right]} \in (0,\, 1]$

Methodology 5/6

Estimating the effect of efficiency on credit risk: the first step

Panel Granger caus. test (Berger & DeYoung, 1997; Fiordelisi et al., 2011):

$$ODL_{t,t} = \sum_{k=1}^{4} \alpha_k^{(1)} \cdot ODL_{t,t-k} + \sum_{k=1}^{4} \beta_k^{(1)} \cdot EFF_{i,t-k} + \varepsilon_{i,t}^{(1)} \qquad EFF_{i,t} = \sum_{k=1}^{4} \alpha_k^{(2)} \cdot ODL_{t,t-k} + \sum_{k=1}^{4} \beta_k^{(2)} \cdot EFF_{i,t-k} + \varepsilon_{i,t}^{(2)}$$

Both equations are estimated for *the whole sample* and for *the subsamples*

based on the higher-than-median efficiency filter by itself and combined with

(b) the extensive growth condition **or**

(c) the insufficient capital filter.

– $\sum_{k=1}^{4} \hat{\beta}_k^{(1)} < 0$ the *Bad management* effect vs. $\sum_{k=1}^{4} \hat{\beta}_k^{(1)} > 0$ the *Skimping* effect;

– $\sum_{k=1}^{4} \alpha_k^{(2)} < 0$ the *Bad luck* effect.

Estimation technique: Two-step Difference GMM of Arellano & Bond (1991)

Estimating the effect of efficiency on credit risk: the second step

Empirical equation for loan quality:

$$ODL_{i,t} = \alpha \cdot ODL_{i,t-1} + \beta \cdot EFF_{i,t-1} + \sum_{j=1}^{N_1} \rho_j \cdot BSF_{j,it-q} + \sum_{l=1}^{N_2} \rho_l \cdot MACRO_{l,t-k} + \varepsilon_{i,t}$$

	BSF	MACRO
Salas & Saurina (2002)	Loans and branches dynamic, NIM/TA, Bank size, Equity-to-assets, Risk premium	GDP growth, Household debt to GDP ratio, Firm liabilities to firm market value ratio
Quagliariello (2007)	Loans dynamic, Loan loss provision to loans, Equity-to-assets, ROA, Interest margin to assets, Other (non-credit) income to total income, Bank size	GDP growth, Stock exchange index growth, Risk-free asset price, Spread between loan and deposit rates
Louzis et al. (2011)	ROE, Equity-to-assets, Other income to total income ratio, Bank size, Leverage, Ownership concentration	GDP growth, Unemployment, Real interest rate on commercial loans, Sovereign debt to GDP ratio

Data

1. **The Bank of Russia web-site (www.cbr.ru)**:

   Bank-specific characteristics (BSF)
   - monthly balance sheets of banks (Form 101);
   - quarterly profit and loss accounts (Form 102).

2. **The Federal State Statistics Service web-site (www.gks.ru)**:

   Macroeconomic controls (MACRO)

Time period: Q1 2005 – Q3 2012 (35 quarters)

Number of banks (depending on quarter):
 – in original sample: 705-1024;
 – in adjusted sample: 650-997 after excluding observations for which:

   ➢ the real interest rate ≥ 200% annually (0.1% of initial data);
   ➢ the loans-to-deposits ratio ≥ 1000% (2% of initial data);
   ➢ the ratio of liquid assets to deposits ≥ 305% (1% of initial data).

Estimation results 1/6

A two-step approach on estimating the effect of efficiency on risk: the first step

Panel Granger causality test : the full (adjusted) sample of banks

	M1 "ODL vs SFA" (basic)		M2 "ODL vs DFA"		M3 "ODL vs CIR"	
	ODL	SFA	ODL	DFA	ODL	CIR
Operating Cost Efficiency (SFA, DFA or CIR-scores)						
Cumulative effect of previous 4 quarters	**–0.056***** **(0.021)**		**0.010** **(0.014)**		**0.031***** **(0.012)**	
Proxy for bank credit risk exposure (Overdue loans ratio, ODL)						
Cumulative effect of previous 4 quarters		**–0.047*** **(0.026)**		**–0.260***** **(0.038)**		**0.567***** **(0.117)**
Number of observations (banks)	16338 (950)	16385 (949)	16760 (952)	15411 (931)	16760 (952)	16882 (953)
Number of instruments	902	902	919	919	933	933
P–value, Hansen test	0.392	0.364	0.448	0.400	0.487	0.394
P–values, tests AR(1) / AR(2)	0.000 0.816	0.000 0.502	0.000 0.765	0.000 0.412	0.000 0.783	0.000 0.818

The Bad management effect is supported, while the Skimping effect was not identified

The Bad luck effect was found to be significant

***, ** and * – a coefficient is significant at the 1%, 5%, and 10% level, respectively.

Robust standard errors are reported in parentheses under the coefficients.

A two-step approach on estimating the effect of efficiency on risk: the first step

Panel Granger causality test : the full (adjusted) sample filtered by higher-than-median efficiency condition

– alone (M4, M5, and M6 – 4, 8, and 12 quarters, respectively)

– combined with the insufficient capital condition (M7, M8 – capital-to-assets < 50th, 25th perc., resp.)

– combined with the extensive growth condition (M9 – annual growth of real loans > 50th perc.)

– combined with the opposite to extensive growth condition (M10 – annual growth of real loans<50th perc.)

	M4	M5	M6	M7	M8	M9	M10
Dependent variable – Overdue loans ratio (ODL)							
Operating cost efficiency (SFA-scores)							
Cumulative effect of previous 4 quarters	−0.184*** (0.038)	−0.150*** (0.045)	−0.171*** (0.055)	−0.206*** (0.041)	−0.190*** (0.053)	0.067** (0.033)	−0.155** (0.066)
Number of observations (of banks)	6344 (632)	4889 (497)	4207 (404)	3428 (400)	1308 (213)	1919 (394)	1479 (331)
Number of instruments	578	452	259	358	208	353	309
P–value, Hansen test	0.558	0.403	0.326	0.357	0.392	0.804	0.798
P–values, test AR(1) /	0.000	0.001	0.004	0.006	0.033	0.007	0.115
AR(2)	0.848	0.892	0.681	0.998	0.691	0.342	0.746

1) **Skimping does exist within Russian banking system**

2) **It was found for banks with higher cost efficiency levels AND Aggressive lending behavior**

***, ** and * – a coefficient is significant at the 1%, 5%, and 10% level, respectively.
Robust standard errors are reported in parentheses under the coefficients.

Estimation results 3/6

A two-step approach on estimating the effect of efficiency on risk: the second step

	Dependent variable – Overdue loans ratio (ODL)						
	Panel A – "Bad management"				Panel B – "Skimping"		
	M11	M12	M13	M14	M15	M16	M17
Models with BSF controls only							
Number of BSF controls	6	7	7	8	6	7	9
SFA Cost efficiency index, lag = 1 quarter	−0.060*** (0.017)	−0.075*** (0.018)	−0.111*** (0.016)	−0.068*** (0.019)	0.119** (0.056)	0.105** (0.052)	0.103** (0.050)
Models with BSF & MACRO controls							
Number of BSF controls	8	8	8	8	8	8	8
Number of MACRO controls	1	1	3	4	1	3	4
SFA Cost efficiency index, lag = 1 quarter	0.023 (0.026)	−0.016 (0.021)	−0.035* (0.021)	−0.035* (0.019)	0.116** (0.049)	0.129** (0.055)	0.130** (0.056)
Number of observations (banks)	18983 (997)	18762 (970)	12237 (796)	18759 (970)	2342 (462)	2340 (461)	2340 (461)
Number of instruments	926	926	772	926	423	423	423
P–value, Hansen test	0.278	0.405	0.394	0.387	0.912	0.931	0.827
P–values, tests AR(1)	0.000	0.000	0.000	0.000	0.001	0.001	0.000
AR(2)	0.838	0.983	0.490	0.861	0.374	0.873	0.866

Bad management is confirmed, to some extent

Skimping is robustly confirmed for the subsample of highly efficient banks with aggressive lending behavior

Additional findings: differences in senetivity to macroeconomic shocks

(*Robust OLS estimation results*)

	Dependent variable – SFA Cost efficiency index		The ratio of models coefficients of C1 to C2
	C1 "bad management"	C2 "skimping"	C1 / C2
Real GDP growth rate (annual), %	0.313***	0.162***	1.93
	(0.017)	(0.043)	
Standard deviation of the ruble-to-dollar exchange rate	1.033***	0.699***	1.14
on the Forex market	(0.133)	(0.223)	
Households real disposable income growth rate	−0.131***	−0.078***	1.67
(annual), %	(0.020)	(0.024)	
Profit-to-debt ratio for non-financial firms, %	0.223***	0.120***	1.89
	(0.031)	(0.037)	
Current-account-balance to GDP ratio, %	−0.250***	−0.130***	1.92
	(0.025)	(0.030)	
Constant	60.947***	71.355***	
	(0.187)	(0.309)	
Number of observations	19994	3466	
(banks)	(1043)	(655)	
P-value, F-test for fixed effects	0.000	0.000	
R^2 (Least squares dummy variables)	0.645	0.642	

Skimpers are less sensitive to macroeconomic shocks as compared to bad managers
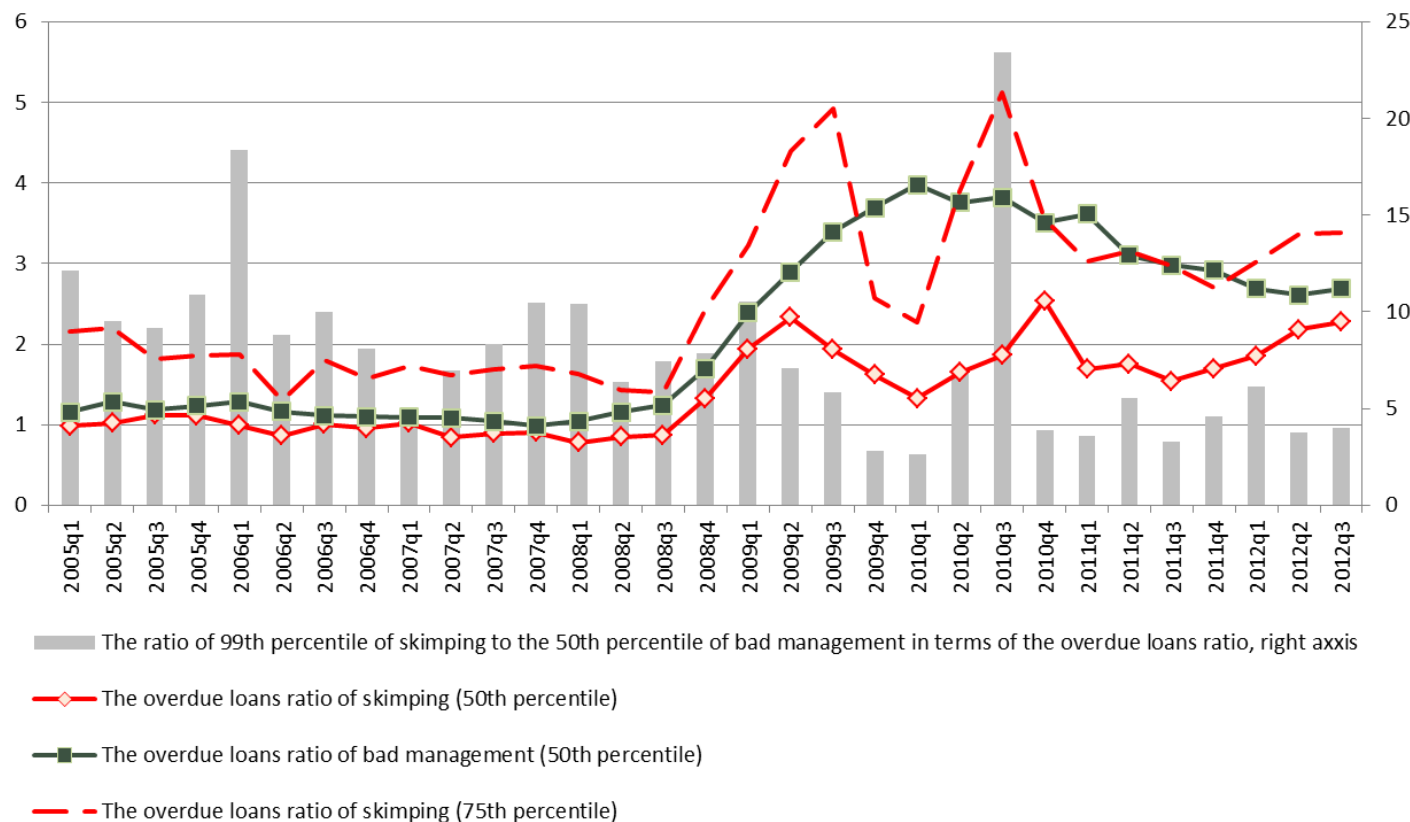
Estimation results 5/6

Additional findings: differences in profitability

	Net interest margin (NIM, group average)		Return-on-assets ratio (ROA, group average)	
	Skimping	Bad management	Skimping	Bad management
Before the crisis (2007 Q4)	5.1	4.7	2.4	2.4
At the peak of the crisis (2009 Q3)	7.6	6.1	1.9	1.2
After the crisis (2012 Q3)	5.7	4.9	2.0	1.7

Skimpers are more profitable as compared to bad managers regardless the state of business cycle

The growing scale of Skimping and their higher credit risk exposures…

The ratio of 99th percentile of skimping to the 50th percentile of bad management in terms of the overdue loans ratio, right axxis

The overdue loans ratio of skimping (50th percentile)

The overdue loans ratio of bad management (50th percentile)

The overdue loans ratio of skimping (75th percentile)

Findings:

1) About ¼ of all skimpers (approx. 100 banks) are exposed to higher credit risks compared to the median non-skimper.

3) Skimpers held 1.6% of market for loans in Q1 2010 and up to 16.4% in Q3 2012.

Conclusion & Policy implications 1/2

1. We contribute to the literature on efficiency-risk analysis by (a) describing bank managers' motivation for skimping and developing new criteria for skimping identification, and (b) first applying this methodology to Russian banks on the quarterly basis

2. The "bad management" behavior holds on average for the Russian banks. The "skimping" behavior is relevant for those Russian banks that are: (a) not just highly cost efficient, as predicted by Berger and DeYoung for US banks, but

   (b) that at the same time pursue aggressive strategies in the market for loans to households and non-financial firms

3. The "Skimping" is not the case for those Russian banks that demonstrate lower capital-to-assets ratio and that are highly cost efficient at the same time.

Conclusion & Policy implications 2/2

4. Median skimper sustainably demonstrates lower overdue loans ratio compared to the median non-skimper.

5. About ¼ of all skimpers (approx. 100 banks) are exposed to higher credit risks compared to the median non-skimper.

6. Skimpers held 1.6% of market for loans in Q1 2010 and 16.4% in Q3 2012. What is their role in providing inter-bank loans and what could be the negative chain effect to systemic liquidity risk if they go bankrupt are both opened questions.

7. Recommendations – 1) introduction of increased requirements to capital adequacy ratios of skimpers by the Bank of Russia and 2) increasing quarterly payments to the Russian Deposit Insurance Agency – both depending on subgroups of skimpers' ODL exceeding the average of the banking system.

Thank you!

Appendix: Full Estimation results 1/2

A two-step approach on estimating the effect of efficiency on risk: the second step

	Dependent variable – Overdue loans ratio						
Models	Panel A – "bad management"				Panel B – "skimping"		
Explanatory variables	M11	M12	M13	M14	M15	M16	M17
Overdue loans ratio, lag = 1 quarter	0.767*** (0.040)	0.760*** (0.041)	0.700*** (0.060)	0.727*** (0.041)	0.402*** (0.092)	0.400*** (0.092)	0.379*** (0.080)
SFA Cost efficiency index, lag = 1 quarter	−0.060*** (0.017)	−0.075*** (0.018)	−0.111*** (0.016)	−0.068*** (0.019)	0.119** (0.056)	0.105** (0.052)	0.103** (0.050)
Real interest rate charged on loans, lag = 1 quarter	0.038*** (0.014)	0.031** (0.014)	0.028* (0.017)	0.027** (0.013)	−0.013 (0.012)	−0.016 (0.012)	−0.016 (0.013)
Loan to deposit ratio, lag = 1 quarter	0.003** (0.002)	0.005*** (0.002)	0.004** (0.002)	0.006*** (0.002)	0.003 (0.003)	0.002 (0.003)	0.002 (0.003)
The bank's share in the total banking system loans, lag = 1 quarter	−0.445 (5.444)	1.329 (5.276)	4.164 (3.737)	5.002 (5.148)	0.387 (1.500)	0.651 (1.563)	−0.045 (1.330)
Equity to asset ratio, lag = 4 quarters	−0.059*** (0.018)					−0.041** (0.018)	−0.034* (0.018)
Liquid assets to accounts and deposits ratio, lag = 1 quarter		−0.017** (0.007)	0.004 (0.006)	−0.011* (0.007)	0.012* (0.006)	0.013** (0.006)	0.013** (0.006)
The share of loans to households in total bank's loans, %		0.063*** (0.018)					
The share of loans with maturities of 3 and more years in total bank's loans, %			0.065*** (0.011)				
Bank's individual concentration index (in domestic markets for bank liabilities)/ 10000, lag = 4 quarters				51.042*** (17.419)			−38.441** (16.321)
Bank's individual concentration index (in domestic markets for bank liabilities)/ 10000, squared, lag = 4 quarters				−0.018*** (0.005)			0.008** (0.004)
Number of observations (banks)	18983 (997)	18762 (970)	12237 (796)	18759 (970)	2342 (462)	2340 (461)	2340 (461)
Number of instruments	926	926	772	926	423	423	423
P–value, Hansen test	0.278	0.405	0.394	0.387	0.912	0.931	0.827
P–values, test: AR(1)	0.000	0.000	0.000	0.000	0.001	0.001	0.000
AR(2)	0.838	0.983	0.490	0.861	0.374	0.873	0.866
Maximum value for the concentration index variable (sample percentile)				1426 (50)			2285 (91)

Appendix: Full Estimation results 2/2

A two-step approach on estimating the effect of efficiency on risk: the second step

| | Dependent variable – overdue loans ratio | | | | | | |
| Models | Panel A – "bad management" | | | | Panel B – "skimping" | | |
Explanatory variables	M18	M19	M20	M21	M22	M23	M24
Bank-specific factors							
Overdue loans ratio, lag = 1 quarter	0.718*** (0.041)	0.721*** (0.041)	0.721*** (0.045)	0.707*** (0.042)	0.400*** (0.086)	0.369*** (0.079)	0.364*** (0.078)
SFA Cost efficiency index, lag = 1 quarter	0.023 (0.026)	−0.016 (0.021)	−0.035* (0.021)	−0.035* (0.019)	0.116** (0.049)	0.129** (0.055)	0.130** (0.056)
Real interest rate charged on loans, lag = 1 quarter	0.045*** (0.011)	0.029** (0.013)	0.035** (0.016)	0.038** (0.016)	−0.012 (0.013)	−0.017 (0.013)	−0.008 (0.014)
Loan to deposit ratio, lag = 1 quarter	0.003** (0.002)	0.004*** (0.002)	0.004*** (0.002)	0.005*** (0.002)	0.002 (0.002)	0.000 (0.003)	0.000 (0.003)
The bank's share in the total banking system loans, lag = 1 quarter	2.433 (5.059)	3.602 (4.863)	4.410 (4.917)	4.250 (4.917)	0.094 (1.330)	1.173 (1.644)	0.263 (1.444)
Liquid asset to accounts and deposits ratio, lag = 1 quarter	−0.008 (0.007)	−0.010 (0.007)	−0.007 (0.007)	−0.009 (0.007)	0.013** (0.006)	0.017*** (0.007)	0.018*** (0.007)
Bank's individual concentration index (in domestic markets for bank liabilities) / 10000, lag = 4 quarters	59.078*** (17.410)	53.245*** (17.298)	55.396*** (17.611)	62.465*** (16.630)	−41.193** (19.545)	−37.708* (18.783)	−35.887* (19.039)
Bank's individual concentration index (in domestic markets for bank liabilities) / 10000, squared, lag = 4 quarters	−0.018*** (0.005)	−0.019*** (0.005)	−0.017*** (0.005)	−0.018*** (0.005)	0.008* (0.005)	0.008* (0.005)	0.008* (0.005)
Macroeconomic factors							
Real GDP growth rate (annual)	−0.061*** (0.009)				−0.021 (0.030)		
Unemployment rate		0.202*** (0.042)					
Households real disposable income growth rate (annual)			−0.022** (0.010)	−0.019* (0.010)		−0.017** (0.009)	−0.019** (0.009)
The annual growth of the ratio of consumer spending to disposable income			0.023* (0.012)			0.041*** (0.016)	
Profit to debt ratio for non-financial firms			−0.063*** (0.14)	−0.039** (0.16)		−0.029* (0.015)	−0.015 (0.018)
Standard deviation of the ruble-to-dollar exchange rate on the forex market				0.218*** (0.070)			0.280*** (0.094)
Current account balance to GDP ratio				−0.035*** (0.010)			0.009 (0.011)
Number of observations	18759	18759	16537	16537	2340	2340	2340
(banks)	(970)	(970)	(960)	(960)	(461)	(461)	(461)
Number of instruments	927	927	929	930	427	427	427
P–value, Hansen test	0.340	0.334	0.332	0.400	0.914	0.882	0.848
P–values, tests AR(1)	0.000	0.000	0.000	0.000	0.001	0.000	0.000
AR(2)	0.826	0.894	0.835	0.779	0.764	0.808	0.451
Maximum value for the concentration index variable (sample percentile)	1632	1387	1592	1765	2406	2414	2392
	(63)	(47)	(60)	(71)	(94)	(94)	(94)