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Zuzana Fungáčová[#] and Tigran Poghosyan[°]

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Abstract

This paper analyzes interest margin determinants in the Russian banking sector with a particular emphasis on the bank ownership structure. Using a unique bank-level data covering Russia's entire banking sector for the 1999−2007 period, we find that the impact of a number of commonly used determinants such as market structure, credit risk, liquidity risk and size of operations differs across state-controlled, domestic-private and foreign-owned banks. At the same time, the influence of operational costs and bank risk aversion is homogeneous across ownership groups. The results overall suggest the form of bank ownership needs to be considered when analyzing interest margin determinants.

JEL classification: G21, P34
Keywords: bank interest margins, financial intermediation, Russia

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Zuzana Fungáčová and Tigran Poghosyan

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Tiivistelmä

Tässä tutkimuksessa käsitellään korkomarginaaleihin vaikuttavia tekijöitä Venäjän pankkisektorilla ottaen erityisesti huomioon pankkien omistusrakenne. Analyysissä käytettään vuosien 1999 ja 2007 välistä laajaa tilastoaineistoa Venäjän pankkisektorilta. Tulokseksi saadaan, että tavallisten tekijöiden, kuten markkinarakenteen, luottoriskin, likviditeettiriskin ja pankin koon, vaikutus vaihtelee valtiopankkien, kotimaisten yksityispankkien ja ulkomaisten pankkien välillä. Operatiivisten kustannuksien vaikutus on homogeeninen kaikissa omistusryhmissä. Tulokset osoittavat, että pankkien omistus on otettava huomioon korkomarginaalien määräytymisen tutkimuksessa.

Asiasanat: korkomarginaalit, rahoituksen välittyminen, Venäjä

1 Introduction

In modern finance, banks play a crucial role in the process of financial intermediation. This holds especially true for transition countries, where financial systems tend to be bank-based (Berglof and Bolton, 2002). Not surprisingly, banks play a dominant, and increasingly important role in financial intermediation in Russia. The ratio of banking-sector assets to GDP nearly doubled between 2000 and 2007, exceeded 60% as of end-2007 (Central Bank of Russia, 2008). The growth in bank credit extended to the private sector as a share of GDP exhibited a similar pattern during this period.

Given this expansionary trend of bank participation in the reallocation of financial resources, it seems reasonable to consider the costs and efficiencies of banks in providing intermediation services. As state-controlled banks dominate Russian banking and foreign-owned banks play relatively minor roles, we might also ask how bank ownership structures affect costs of financial intermediation. To address these questions, we analyze bank net interest margin (a commonly used measure of efficiency of financial intermediation) and its determinants in Russia. We investigate the determinants of bank interest margins to see if they differ when bank ownership is taken into account.

In general, the analysis of interest margins and interpretation of their level contains a trade-off. On the one hand, high margins create impediments for the deepening of financial intermediation as lower deposit rates discourage savings flow into bank deposits and high lending rates reduce investment opportunities of banks. In emerging economies with poorly developed capital markets, both firms and individuals often have nowhere else to turn besides bank loans to raise money, which, in turn, may even hinder growth (Martinez Peria and Mody, 2004). Moreover, high margins may indicate problems in the regulatory banking environment and information asymmetry. On the other hand, higher margins can improve profitability of the banking system, strengthen bank capitalization and solidify its financial position by creating additional buffers against negative shocks (Barajas et al., 2000).

In this paper, we test the importance of bank interest margin determinants suggested by the dealership model of Ho and Saunders (1981) and its extensions modified for the Russian case. We follow the empirical literature on determinants of bank interest margins that investigates European banks (Saunders and Schumacher, 2000; Maudos and Fernandez de Guevara, 2004), Latin American countries (Martinez Peria and Mody, 2004) as well as emerging markets in Europe (Claeys and Vander Vennet, 2008; Schwaiger and Liebeg, 2008; Horváth, 2009). We extend previous studies by

paying special attention to the role of bank ownership in determining interest rate margins. Russian banking sector, where state control is still significant and the role of foreign banks modest[1], provides an interesting case to investigate this issue.

Our sample is subdivided into three parts according to the bank ownership structure. To this end, we differentiate among three types of banks: state-controlled, domestic private and foreign. We subdivide the sample according to bank ownership structure to examine variations in the impact of interest margin determinants across ownership structures. While Russia has been included in several cross-country bank interest margin studies, it has not been investigated separately in a way that takes specific ownership structures of banks into account. Moreover, the previous studies used fairly restricted samples of Russian banks available in international databases. Here, we utilize a rich dataset containing quarterly data covering the whole banking sector in Russia. Our findings lend support to the hypothesis that the impact of certain interest margin determinants differs by bank ownership.

The paper is structured as follows. The next section reviews selected literature. Section 3 describes data, specification of the empirical model and methodology. Section 4 provides estimation results and robustness checks. The last section concludes.

2 Review of select literature on interest margin determinants

Contemporary models employed in the literature for the analysis of interest margin determinants are based on the dealership model proposed by Ho and Saunders (1981). Under this model, banks are assumed to be risk-averse intermediators in the financial market, collecting deposits and granting loans. An important factor influencing the size of the bank margin in this model is transaction uncertainty due to asymmetric arrival time of the supply of deposits and demand for loans. Another factor driving the margin is market structure; due to the relatively inelastic demand for loans and supply of deposits, banks choose to exercise their market power and set higher margins.

The main criticism of the initial model proposed by Ho and Saunders is its failure to recognize the bank as a firm having a certain production function associated with provision of the intermediation services (Lerner, 1981). The presence of cost inefficiencies associated with the pro-

[1] The state controls about half of the banking sector's total assets in Russia. The number of foreign-owned banks increased from 174 in 2000 to 221 at the end of 2008, at which time they accounted for about 28% of banking sector capital.

duction process across banks can have a distortionary effect on the margin. The extension of the basic dealership model by Maudos and Fernandez de Guevara (2004) responds to this criticism by explicitly incorporating the role of operating costs and providing a detailed description of the link between riskiness and the margin. This model specifically differentiates between market risk and credit risk, as well as their interaction as separate factors affecting the margin.

Although the theoretical evolution of the model has been straightforward, empirical verification remains a challenge. To begin with, the data available to the researchers usually covers banks located in different countries with different institutional and environmental characteristics. This complicates comparison of the effects of various determinants across countries. For instance, there is great variation in factors such as financial taxation (level of reserve requirements), opportunity costs for reserves, bank capitalization and fragmentation of the market. This is true even for EU member countries, which have undertaken considerable measures to harmonize their regulatory, legal and institutional systems (Ruthenberg and Elias, 1996). To deal with this variation, some empirical studies apply a two-stage approach that isolates impacts of various imperfections not taken into account in the theoretical model before modelling the remaining "pure spread" as a function of the theoretically motivated factors (Saunders and Schumacher, 2000).

Empirical studies of interest margin determinants applied to the developed countries generally support the theoretical predictions of the model (see Appendix). Margins have been found to be positively related to the degree of market concentration in European banking sectors (Saunders and Schumacher, 2000; Maudos and Fernandez de Guevara, 2004), the US (Angbanzo, 1997) and Australia (McShane and Sharpe, 1995; Williams, 2007). There is also consensus among these studies as to the positive impact of operational costs confronting banks, suggesting that the technological regime of the bank plays important role in its pricing strategy. However, there are also some notable contradictory results. For example, Williams (2007), who finds a negative relationship between credit risk and interest margin in Australia, interprets this finding as evidence that banks are unable to accurately price credit risk.

The empirical outcomes for developing countries are more controversial. Brock and Rojas-Suarez (2000) point out a need for caution in directly applying methods developed to study interest margins in industrialized countries to developing countries. More specifically, results can be misleading when applied to the countries, where financial markets have yet to be deregulated. For this reason, worldwide studies of determinants of bank interest margins (Demirguc-Kunt and Huizinga, 2000; Claessens et al., 2001) go beyond the framework of the dealership model. Using data on

banks from 80 countries for 1988-1995, the researchers consider a wide range of potential factors driving international differences in bank interest margins, including macroeconomic conditions, explicit and implicit bank taxation, deposit insurance regulation, overall financial structure, legal and institutional indicators.

In general, the empirical evidence suggests that the level of interest margins in developing economies is persistently higher than in developed economies. Using data on Central and Eastern European (CEE) banks that included Russia, Claeys and Vander Vennet (2008) attribute these differences to low efficiency and low degree of market competition in these developing countries. Barajas et al. (2000) also note the role of financial liberalization in improving market competition and enhancing banking sector efficiencies in the case of Colombia that led to lower interest margins and better financial intermediation.

One variable that could influence margins substantially, yet is not captured by the dealership model, is the ownership structure of the bank. Micco et al. (2007) show that the form of bank ownership has strong influence on bank performance in developing economies, while its impact is weaker in industrial countries. The dealership model assumes that, regardless of their ownership, banks apply similar business strategies and are exposed to a similar set of interest margin determinants. This assumption appears inappropriate for transition countries, which experienced a surge of foreign bank entry during the transition process.[2] To overcome this, some studies augment the empirical specification obtained from the dealership model by introducing dummy variables to capture the impact of bank ownership on the margin.

Demirguc-Kunt and Huizinga (2000) find that foreign banks realize higher margins than domestic banks in developing countries. The opposite conclusion holds for the developed countries, in which domestic banks realize higher interest margin. In a follow-up study, Claessens et al. (2001) investigate the impact of foreign bank entry (change in foreign bank presence) on the performance of domestic banks using a similar worldwide sample. They find that foreign bank entry improves domestic bank profitability, which they attribute to improved banking efficiency following the entry of foreign players. Martinez Peria and Mody (2004) show that foreign banks in Latin American countries exhibit lower interest margins than domestic banks. The negative impact of foreign bank presence on the margin is also shown to work indirectly through its impact on administrative costs. Similar evidence is reported in Drakos (2003) for CEE countries (although Russia is not included in this study). In contrast, Dabla-Norris and Floerkemeier (2007) find no direct relationship between

[2] In a recent theoretical study, Lehner and Schnitzer (2008) show that foreign bank entry may affect domestic banking markets via two channels: spillovers and competition. In their model, foreign bank entry has implications for banking efficiency, which is an important determinant driving the interest margin.

the presence of foreign banks and interest margin in Armenia. Schwaiger and Liebeg (2008), using a sample of eleven CEE countries, show that foreign banks charge higher interest margins than domestic banks. They attribute this to the relatively low refinancing costs of foreign banks in CEE countries as these banks have access to cheaper funds from parent banks based in developed countries.

The above discussion suggests that determinants and impacts of bank interest margins vary considerably in emerging markets and bank ownership plays an important role. Previous studies account for the impact of bank ownership by including ownership dummy variables. This assumes that the impact of interest margin determinants is the same across banks with different ownership structures and that the differences arise from varying intercepts. In this study, we relax this assumption and assume that both intercepts and slope coefficients may vary across banks with different ownership structures.

3 Methodology and data

3.1 Methodology

We use a fixed effects estimator to evaluate the impact of various determinants on bank interest margins in Russian banks characterized by different ownership structures.[3] Our empirical specification takes the form:

$$NIM_{it} = \alpha_i + \beta_1 \cdot HERF_{it} + \beta_2 \cdot PER_{it} + \beta_3 \cdot CAP_{it} + \beta_4 \cdot CR_{it} + \beta_5 \cdot LA_{it} + \beta_6 \cdot LIQ_{it} + \\ + \gamma_1 \cdot D_{seas} + \gamma_2 \cdot D_{time} + \varepsilon_{it},$$

where indices i and t stand for bank and quarter, respectively, NIM_{it} is the net interest margin for bank i in period t, α_i is the fixed effects intercept and ε_{it} is the i.i.d. error term. The seasonal and time-specific variation in the interest margin is captured by the dummy variables D_{SEAS} and D_{TIME}, respectively.

[3] The Hausman test gives preference to the fixed effect estimator when compared to a different panel estimator, the random effect model.

Following earlier studies, we define net interest margin (NIM) as interest income minus interest expenses divided by total assets. We consider six main determinants of bank interest margins that are motivated by the dealership model (Ho and Saunders, 1981) and are in line with previous empirical studies on determinants of bank interest margins. *HERF* (Herfindahl index) captures the market structure in the Russian banking sector. The index is calculated for 81 regions in Russia, with bank regional affiliations based on the location of their headquarters. The Herfindahl index is defined as the sum of squares of individual bank asset shares in the total banking sector assets for a given region. As higher market concentration is likely to contribute to higher margins, the estimated coefficient in our model is expected to have a positive sign.

PER is the ratio of personnel expenses to total assets. This measure captures the impact of operational costs on the margin. Banks that incur high operational costs tend to transfer these costs to their customers by increasing interest margins, so the estimated coefficient is expected to be positive. Following Maudos and Fernandez de Guevara (2004), the ratio of equity to total assets *(CAP)* is used as a proxy for bank risk aversion. As equity is more costly than deposits, a higher proportion of equity in total assets indicates greater risk aversion and is expected to be reflected as higher margins. As a result, the estimated coefficient for *CAP* is expected to be positive. *CR* measures the credit risk faced by individual banks, and is proxied by the ratio of nonperforming loans to total loans. Banks with higher ratio of nonperforming loans face higher credit risk, which is likely to be reflected in the charging of higher margins.[4]

LA is the logarithm of total assets, included as a proxy for the size of operations. The theoretical model predicts a positive relationship between the size of operations and margins, since for a given value of credit and market risk larger operations are expected to be connected to a higher potential loss. On the other hand, economies of scale suggest that banks that provide more loans should benefit from their size and have lower margins. Therefore, we do not have a particular prior regarding the expected sign of this coefficient. Finally, *LIQ* is the ratio of liquid assets to demand liabilities, proxying the liquidity risk faced by banks. The more the demand liabilities of the bank are backed up by liquid assets, the lower the liquidity risk of the bank and its margins. Table 1 provides description summaries of the individual variables, as well as the anticipated sign of their impact based on the theoretical argumentation.

[4] Note that causality can also run in the other direction. To control for a possible endogeneity problem, we use lagged explanatory variables as a robustness check.

Table 1 Variable description and expected impact on the bank interest margin

Variable	Notation	Description	Mean	Standard deviation	Expected impact
Net interest margin	NIM	interest income minus interest expenses divided by total assets	0.019	0.013	
Herfindahl index	HERF	regional Herfindahl index for assets	0.208	0.145	+
Personnel costs	PER	personnel expenses to total assets	0.010	0.008	+
Capitalization	CAP	ratio of equity to total assets	0.278	0.178	+
Nonperf. loans	CR	ratio of nonperforming loans to total loans	0.020	0.039	+
Size	LA	logarithm of total assets	5.971	1.923	?
Liquidity ratio	LIQ	ratio of liquid assets to demand liabilities	1.067	1.184	-

3.2 Data

Our dataset covers all banks operating in Russia during the period 1999 − 2007. It consists of the quarterly balance sheets and profit and loss accounts of banks. The sources of the data are the financial information agency Interfax and the Central Bank of Russia (CBR).5 To avoid the direct effects of the 1998 financial crisis, we start our sample period in 1999. The data constitute an unbalanced panel, because there were banks entering and leaving the market due to mergers or failures. We clean the data first by excluding the observations for which the loans to assets ratio is lower than 5%. Moreover, for each of the explanatory variables, we account for potential outliers by dropping 1 percentile from both tails.

Our dataset has three major advantages over the panels used in previous studies. First, it covers the whole banking sector and, thus, unlike the Bankscope dataset widely employed in previous studies, is not subject to a selection bias.[6] Second, the data have quarterly, not yearly, frequency. Finally, the dataset contains detailed information on bank ownership structure coming from the CBR, which allows us to divide the total sample into three subsamples composed of state-controlled, private domestic and foreign-owned banks.

[5] For more detailed description of the data, see Karas and Schoors (2005).
[6] A commonly used source of data in these studies is the Bankscope database of Bureau van Dijk, which covers only a selected number of banks in each country. For the period our dataset covers, there are about 2,600 bank-year observations in the Bankscope database. Our sample has more than double that number of bank-year observations.

Table 2 Descriptive statistics of the net interest margins

	Mean	Median	Std. deviation	NOB
1999	0.023	0.020	0.021	2915
2000	0.020	0.017	0.018	4162
2001	0.020	0.019	0.014	4410
2002	0.020	0.018	0.013	4295
2003	0.018	0.016	0.012	4635
2004	0.017	0.016	0.010	4605
2005	0.017	0.016	0.009	4525
2006	0.016	0.015	0.008	3004
2007	0.015	0.014	0.007	901

Note: Data for 2007 concern only the first quarter.

The first insight is that margins overall decreased during the observation period from 2.3% in 1999 to 1.5% in 2007 (see Table 2). Moreover, volatility declined. Taken together, this indicates that the process of financial intermediation became less costly to society as a whole.

The trends for the most common interest margin determinants during the observation period suggest they had an important impact on margins. Specifically, risk aversion measured by the capitalization ratio exhibits a downward trend, which suggests falling risk aversion may have contributed to the declining pattern of the interest margins in Russia. At the same time, the size of banks and liquidity risk rise during the period under consideration, and operational expenses fluctuate around the same level. Credit risk measured by the ratio of non-performing loans to total loans declines in the aftermath of the Russian crisis, but then remains constant during 2002−2007. Market concentration of the banking sector does not change much in the 1999−2005 period, although it does increase slightly towards the end of the period.

Net interest margins further differ by ownership groups (see Table 3). On average, margins are the lowest for foreign-owned banks. The average margins for private and state-controlled domestic banks do not significantly differ. If we consider interest margin a proxy for efficiency of financial intermediation, this ordering of banks is broadly in line with the finding concerning bank efficiency in Russia. Karas, Schoors and Weill (2009) find that in Russia foreign banks are most efficient, followed by domestic public and domestic private banks.

Table 3 Average interest margins by ownership groups

	1999	2000	2001	2002	2003	2004	2005	2006	2007	Average
State-controlled	0.026	0.023	0.024	0.021	0.016	0.016	0.015	0.013	0.013	**0.0187**
Foreign-owned	0.017	0.012	0.012	0.011	0.012	0.013	0.013	0.014	0.013	**0.0128**
Domestic private	0.023	0.020	0.020	0.020	0.018	0.017	0.017	0.016	0.015	**0.0185**

Note: Data for 2007 only cover the first quarter.

Decomposition of bank interest income and expenditures by sources of origin provides further insights into the importance of bank ownership for the business models employed by banks (see Table 4). The table shows that foreign clients are still very important for foreign-owned banks, accounting for almost half of the interest expenditures. On the asset side, the share of involvement of foreign banks in operations with foreign clients has decreased over time.

Similarly, state-controlled banks were heavily involved in operations with public clients in the late 1990s, but thereafter this source of income declined significantly. State-controlled banks also redirected their activities to funding domestic clients as former public enterprises were privatized. Of course, this client base continues to retain close ties with state-controlled banks.

Domestic private banks work mostly with domestic clients. The shares of income and expenditure coming from government clients were larger at the beginning of 1990s than at the end of the observation period.

Table 4 Decomposition of bank interest income and expenditures by counterparties

	Share in interest income			Share in interest expenditures		
	Foreign clients	**Public clients**	**Domestic clients**	**Foreign clients**	**Public clients**	**Domestic clients**
Foreign-owned banks						
1999	37.72	2.60	58.40	49.32	0.05	50.63
2000	39.35	1.44	58.47	44.05	0.67	53.87
2001	35.65	2.36	59.00	49.58	1.09	49.33
2002	24.43	2.18	70.10	36.63	0.35	62.73
2003	22.72	1.71	72.94	49.34	0.18	50.49
2004	16.50	2.48	78.82	54.58	0.08	44.35
2005	15.89	2.15	79.61	57.26	0.19	41.77
2006	13.31	1.12	83.25	48.36	0.44	51.18
State-controlled banks						
1999	7.51	19.86	63.57	8.62	8.00	80.35
2000	8.50	15.52	71.14	5.35	11.02	81.18
2001	7.03	14.40	72.79	7.99	16.16	75.03
2002	2.18	13.69	75.58	6.14	16.02	76.51
2003	2.75	11.38	81.68	7.57	13.97	78.45
2004	2.19	8.96	82.85	5.53	11.53	82.94
2005	1.83	7.21	88.06	5.95	9.47	84.45
2006	3.07	4.53	89.34	11.17	9.07	79.55
Domestic private banks						
1999	2.47	8.38	78.16	1.94	4.09	89.59
2000	3.17	7.24	82.18	2.05	4.17	89.68
2001	3.05	6.10	84.26	3.25	5.31	88.57
2002	1.21	5.71	82.01	3.60	4.35	88.66
2003	1.09	4.63	83.90	3.61	3.51	90.52
2004	0.97	3.67	86.38	3.59	2.79	91.35
2005	1.19	2.69	90.76	4.08	2.12	91.99
2006	1.56	2.09	92.18	4.05	1.76	93.97

Note: foreign clients = foreign banks and foreign non-banking firms; public clients = federal government, bank of Russia, and firms owned by federal and local governments; domestic clients = domestic banks, domestic non-bank firms, and individuals.

This descriptive analysis overall suggests that the development of interest margins, their determinants, as well as the sources of bank interest income and expenditures, exhibited different tendencies for different subgroups of banks. The following section analyzes the quantitative impact of these variables on the interest margin by the means of regression analysis. We evaluate how the impact differs across banks with different ownership structures.

4 Results

This section presents results of our estimations. First, we provide the results for the whole sample. We then do separate estimations by ownership groups and show our robustness checks.

4.1 Baseline results

In line with the previous literature, we first estimate the model using a sample of all Russian banks, regardless of ownership. The results of our estimations presented in Table 5 enable us to check whether determinants of the bank interest margins in Russia differ from the ones observed in developed countries as well as other emerging markets.

Table 5 Estimation results for all banks

	Total sample		**Excluding Moscow banks**	
	Estimated coefficient	Economic significance	Estimated coefficient	Economic Significance
Herfindahl index	-0.001		-0.0002	
Personnel expenses	0.620 ***	0.0051	0.625 ***	0.0053
Capitalization	0.007 ***	0.0012	0.010 ***	0.0015
Nonperforming loans	-0.007 ***	-0.0003	-0.015 ***	-0.0006
Total assets (log)	-0.001 ***	-0.0011	-0.0002	-0.0004
Liquid assets to demand liabilities	-0.001 ***	-0.0006	-0.001 ***	-0.0006
Obs.	33452		18159	
R^2 (overall)	0.2373		0.2579	
R^2 (within)	0.1478		0.2299	

Note: We report estimated coefficients and their significance (*** significant at 1% level, ** significant at 5% level, * significant at 10% level). Seasonal and yearly dummy variables, as well as constant term, are included but not reported. Economic significance is measured by the impact of one standard deviation change.

The first column reports estimation results for the baseline specification and the entire sample of Russian banks. All estimated coefficients, with the exception of the one concerning the Herfindahl index, are significant. This finding suggests that the dealership model rather well describes interest margin determinants for the Russian banking sector as a whole. On the other hand, our finding that interest margins in Russia are not affected by changes in the market structure contradicts earlier studies for developed economies (see summary table in the Appendix) and the pre-

dictions of the theoretical model (which predicts a coefficient with a positive sign). Looking at the larger picture, we see results for emerging economies are generally mixed and not always significant. Thus, our results for Russia are in line with findings of studies on other emerging economies. An insignificant coefficient for market structure might indicate that regional concentration in the Russian banking sector did not change substantially over the observation period. Indeed, even today there are a few major players in the market, so changes in the rest of the banking system are likely insufficient to have much influence on the overall structure of the market.

The second part of Table 5 provides estimation results for the sample that excludes banks located in Moscow. The results are qualitatively similar to those obtained for the entire sample, suggesting that the aforementioned relationship between interest margins and their determinants in Russia is not driven by large banks concentrated in Moscow (both in asset size and sample size) and can thus be generalized for the other Russian regions.

Next, as suggested by the theoretical model, we find that operational costs incurred by banks are transmitted to their clients through higher margins charged for their financial services. In line with the theoretical prediction, the impact of operational costs is positive and most sizable in economic terms among the margin determinants. This corresponds to the previous research on both developed and emerging economies.

Another result corresponding to the previous findings is the positive significant coefficient for capitalization ratio, which indicates that banks with higher risk aversion tend to set higher margins. The economic impact of this variable measured by the response to a one standard deviation change is quite sizable: it has the second largest impact following personnel expenses. Very similar is also the economic significance of bank's size of operations. In line with Maudos and Fernandez de Guevara (2004), size of operations measured by the logarithm of total assets confirms the presence of economies of scale as larger banks tend to have lower margins. The estimated coefficient for liquidity risk is significant and negative as is the case in the previous studies that use similar definition of this variable to measure liquidity risk.

Finally, the estimated coefficient for credit risk is negative, which contradicts most findings in the literature. However, unlike earlier studies that proxy credit risk by the ratio of loan loss provisions to total loans, we employ the now-preferred ratio of nonperforming loans to total loans. The negative sign we get can thus be explained using the market discipline argument for Russia (Karas, Pyle and Schoors, 2008). Following this argument, depositors require a higher premium for depositing their savings in riskier banks (i.e. banks with higher non-performing loan ratios). An in-

crease in deposit rates ceteris paribus would contribute to the decline in interest margins, establishing a negative relationship between non-performing loans and the margin.

4.2 Estimation results by ownership

As mentioned, sources of interest income and expenditures differ by bank ownership. Thus, different bank owners have different incentives, and consequently different strategies, when setting margins. Domestic and foreign banks may also respond differently to the increase in credit risk created by moral hazard. State-controlled banks in Russia control the lion's share of the market and expect to be bailed out by the state when they encounter problems. Similarly, the cost inefficiencies of state-controlled banks are, as a rule, less likely to translate into increased margins than in the case of domestic private and foreign banks, because state-controlled banks tend to participate in social projects and public enterprise lending. Moreover, foreign-owned banks, backed by their parents abroad, must also compete aggressively to gain market share. For these banks, risk aversion might not be as significant as for domestic private banks which have considerably higher capitalization ratios. Unlike domestic private banks, the majority of the state-controlled and foreign banks have access to the interbank market, which makes liquidity risk less crucial for these banks.

The fact that determinants of bank interest margins might differ by bank ownership has not been properly investigated in the literature so far. It was only accounted for by introducing a dummy variable for ownership and the assumption has been that the impact of interest margin determinants (slope coefficients) is the same across banks with different ownership structure, the only difference coming from varying intercepts. However, our detailed data enables us to investigate whether both intercept and slope coefficients differ when ownership is taken into account.

For this purpose, we estimate three models, one for each ownership structure, to capture differences in the impact of interest margin determinants for state-controlled, domestic private and foreign-owned banks. State-controlled banks are defined using the list provided in Vernikov (2007). The bank is considered to be foreign-owned, if more than 50% of its stake is owned by a foreign entity. We use information from the Central Bank of Russia to identify these banks. The remaining banks are defined as domestic private.

Table 6, which summarizes estimation results for banks in each ownership group, shows that the coefficient for personnel expenses and capitalization are consistent across all ownership groups. This finding is in line with previous studies and implies that all banks respond similarly to

changes in operational costs when setting the interest margin. The same holds true for capitalization ratio; banks' risk aversion is positively reflected in their margins.

Table 6 Estimation results by bank ownership

	State-controlled banks		**Foreign-owned banks**		**Private domestic banks**	
	Estimated coefficient	Economic significance	Estimated Coefficient	Economic significance	Estimated Coefficient	Economic significance
HERF	-0.005	-0.001	**0.048** ***	0.003	-0.001	-0.0001
PER	**0.859** ***	0.007	**0.323** ***	0.002	**0.616** ***	0.005
CAP	**0.011** ***	0.001	**0.007** **	0.001	**0.007** ***	0.001
CR	0.014	0.001	0.007	0.000	**-0.008** ***	-0.0003
LA	0.001	0.002	**0.002** ***	0.004	**-0.001** ***	-0.001
LIQ	3.5E-05	3.6E-05	**-0.0004** ***	-0.001	**-0.001** ***	-0.001
Obs.	913		857		31708	
R^2	0.4734		0.0159		0.2306	

Note: We report estimated coefficients and their significance (***significant at 1% level, **significant at 5% level, *significant at 10% level). Seasonal and yearly dummy variables, as well as constant term, are included but not reported. Economic significance is measured by the impact of one standard deviation change.

Foreign-owned banks differ from the other banks in two respects. First, only margins of foreign-owned banks are affected by changes in market structure. The sign of the estimated coefficient is positive, which corresponds to previous studies. The economic significance is higher than the significance of operational costs (the most important for other subgroups and the banking sector in general). This result indicates that foreign-owned banks exploit their unique position in the market and positive public perception by charging higher margins in more concentrated regions. On the other hand, despite their large market share state-controlled banks do not appear to fully exploit their market power when setting interest margins.

The second distinctive feature of foreign-owned banks is the positive and significant coefficient for the size of operations, indicating that larger foreign-owned banks charge higher margins. Considering economic significance, this coefficient is the most important for foreign-owned banks. It is also necessary to bear in mind that the measure of size is related to the market share of the individual bank in Russia. Thus, this result could be connected to the finding of higher margins, especially in the case of larger foreign-owned banks able to exploit their unique position in the market. On the other hand, the impact of the size of operations is negative for domestic private banks, suggesting that scale economies play a more prominent role in setting interest margins by these banks than potential losses per unit of operation (see the discussion of Table 1). In their attempt to expand

their presence in the market, domestic private banks might be tempted to decrease the margins as soon as they start to benefit from the economies of scale.

We find a significant impact of credit risk only for domestic private banks. As with the results for the entire sample, the sign of the estimated coefficient is negative, which is in line with the findings of Williams (2007), who reports negative association between credit risk and interest margins for Australian banks. With the exception of the market discipline explanation mentioned above, the negative sign could also imply that these banks do a poor job of controlling for credit risk when setting their margins. It could also indicate a more aggressive strategy on the part of domestic private banks fighting for the market share and thus willing to accept higher credit risk without raising their margins.

Liquidity risk is a significant determinant of bank interest margins for foreign-owned and private domestic banks. As expected, the impact of liquidity risk is negative. For state-controlled banks, liquidity does not play a role as it may well be that they can rely on state intervention in the event of liquidity problems. Moreover, most of these banks have access to the interbank market. The differences between banking groups may further indicate that these banks are involved in different type of operations.

Overall, our results suggest that there exist substantial differences in terms of the impact of bank interest margin determinants across ownership groups. Results for the total sample presented in the previous section are largely driven by the sample of domestic private banks – the most numerous group of banks in Russia. Even so, state-controlled banks still hold a substantial part of banking sector assets. Therefore, disregarding the ownership structure might lead to erroneous conclusions regarding the impact of interest margin determinants in Russia.

4.3 Robustness checks

In this subsection, we summarize the series of robustness checks on our baseline specification. There is a possible problem of simultaneity between the dependent and explanatory variables as are generated using current indicators from income statement and balance sheet of banks. We provide a solution to this problem by using lagged values for the explanatory variables. Table 7 summarizes the estimation results.

Table 7 Robustness check − lagged values of explanatory variables

	State-controlled banks		Foreign-owned banks		Private domestic banks	
	Estimated coefficient	Economic significance	Estimated coefficient	Economic significance	Estimated coefficient	Economic significance
HERF	-0.009	-0.002	**0.059** ***	0.003	-4.9E-05	-6.9E-06
PER	**0.565** ***	0.004	**0.255** ***	0.002	**0.457** ***	0.004
CAP	**0.010** ***	0.001	**0.008** **	0.001	**0.006** ***	0.001
CR	**0.032** ***	0.001	0.008	0.0003	**-0.008** ***	0.000
LA	0.001	0.002	**0.003** ***	0.004	**-0.001** ***	-0.002
LIQ	-0.0005	-0.0005	**-0.001** ***	-0.001	**-0.001** ***	-0.001
Obs.	853		770		29090	
R^2	0.2585		0.0087		0.2153	

Note: We report estimated coefficients and their significance (***significant at 1% level, **significant at 5% level, *significant at 10% level). Seasonal and yearly dummy variables , as well as constant term, are included but not reported.

Estimated coefficients and their significance correspond to the main results reported in the previous section. The sole exception is the coefficient accounting for the credit risk of state-controlled banks, which becomes significant with one period lag. Its sign is positive, indicating that state-controlled banks belatedly account for credit risk when setting margins.

In the second robustness check we use an alternative measure of market concentration. It is measured by the share of the three largest banks' assets in the total bank assets in a given region. Estimation results reported in Table 8 confirm that the results obtained for the baseline model remain valid.

Table 8 Robustness check – alternative definition of market concentration

	State-controlled banks		Foreign-owned banks		Private domestic banks	
	Estimated coefficient	Economic significance	Estimated coefficient	Economic significance	Estimated coefficient	Economic significance
TOP3 SHARE	-0.010	-0.002	**0.030** **	0.003	-0.001	-0.0002
PER	**0.860** ***	0.007	**0.344** *	0.002	**0.616** ***	0.005
CAP	**0.012** ***	0.001	**0.007** **	0.001	**0.007** ***	0.001
CR	0.015	0.001	0.005	0.0002	**-0.008** ***	-0.0003
LA	0.001	0.002	**0.002** ***	0.004	**-0.001** ***	-0.001
LIQ	0.0001	0.0001	**-0.0004** ***	-0.001	**-0.001** ***	-0.0006
Obs.	913		857		31708	
R^2	0.3865		0.0188		0.2286	

Note: We report estimated coefficients and their significance (***significant at 1% level, **significant at 5% level, *significant at 10% level). Seasonal and yearly dummy variables , as well as constant term, are included but not reported.

Finally, we employ alternative definition of foreign-owned banks. In the baseline model we consider a foreign-owned bank to be the one with majority (i.e. more than 50%) foreign ownership. For the purpose of this robustness check a foreign-owned bank is a bank with foreign ownership share higher than 20%. This provides us with 35 more banks in the foreign-owned subgroup.

Table 9 Robustness check – alternative definition of foreign-owned banks

	State-controlled banks		**Foreign-owned banks**		**Private domestic banks**	
	Estimated Coefficient	Economic significance	Estimated coefficient	Economic significance	Estimated coefficient	Economic significance
HERF	-0.005	-0.001	**0.016** *	0.001	-8.7E-04	-0.0001
PER	**0.859** ***	0.007	**0.349** ***	0.003	**0.619** ***	0.005
CAP	**0.011** ***	0.001	**0.007** ***	0.001	**0.007** ***	0.001
CR	0.014	0.001	0.009	0.000	**-0.009** ***	-0.0004
LA	0.001	0.002	**0.002** ***	0.003	**-0.001** ***	-0.001
LIQ	3.5E-05	3.6E-05	**-0.0004** **	-0.001	**-0.001** ***	-0.001
Obs.	913		1279		31298	
R^2	0.4734		0.0414		0.2316	

Note: We report estimated coefficients and their significance (***significant at 1% level, **significant at 5% level, *significant at 10% level). Seasonal and yearly dummy variables , as well as constant term, are included but not reported.

Table 9 presents our estimation results. Definition of the state-controlled banks did not change in this case. The results for the subgroup of private domestic banks as well as foreign-owned ones stay in line with the main results.

5 Conclusions

This study provides the first evidence on the determinants of bank interest margins in Russia with a particular emphasis on the role of bank ownership. We find that the impact of the commonly used determinants in Russia is in line with the relevant literature for emerging markets. Unlike previous studies, which evaluate the impact of bank ownership by introducing dummy variables, we estimate separate regressions for banks with different ownership to allow for the impact of interest margin determinants to vary across different ownership structures. Our findings lend support to the hypothesis that bank ownership moderates the impact of the theoretically motivated determinants of

the bank interest margin. The obtained results emphasize the importance of the bank ownership structure and call for reassessment of previous empirical findings on interest margin determinants, especially for those panel data studies that include countries with significant variation in the banking sector ownership structures.

We show that most of the traditional determinants of bank interest margins differ in their impact when considering ownership categories of banks. Robustness checks further corroborate these results. The impact of credit risk is only significant for domestic private banks. State-controlled and foreign-owned banks do not seem to take the credit risk into account in their pricing strategy. Further results show that the estimated coefficient for the size of operations is significant for private domestic and foreign-owned banks, but foreign banks charge higher margins for more "weighty" operations to compensate for the higher risk associated with these operations. Domestic banks, on the other hand, charge lower margins for large-scale operations where they benefit from economies of scale.

The impact of the market concentration (with the exception of foreign-owned banks) is insignificant, which contrasts with previous findings for developed economies. This finding likely reflects the distinct characteristics of the Russian banking system. The estimated coefficient for foreign-owned banks is positive, which indicates that foreign-owned banks exploit their unique position in the market and positive public perception by charging relatively higher margins in more concentrated regions.

We also show that there are certain similarities across banks with different ownership structures. Significant and economically sizable impact of operational costs across all subgroups justifies the extension of the basic dealership model by Maudos and Fernandez de Guevara (2004), which includes this important variable. Moreover, risk aversion has a significant and positive impact for all ownership subgroups.

The overall results are broadly in line with theoretical predictions and correspond to findings obtained in other studies on interest margin determinants in emerging markets. Nevertheless, bank ownership plays an important role in emerging markets and should not be disregarded when analyzing interest margin determinants.

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APPENDIX

DEVELOPED ECONOMIES						
Authors	Maudos and Fernandez de Guevara	Williams	Angbanzo	Saunders and Schumacher	Carbo Valverde and Rodriguez Fernandez	Maudos and Solis
Year	2004	2007	1997	2000	2007	2009
Journal/Working paper	JBF	FMII	JBF	JIMF	JBF	JBF
Market structure	(+)	(+)	(+)	(+)	(?)	(+)
Operating costs	(+)	(+)	N/A	N/A	(+)	(+)
Risk aversion	(+)	(+)	(+)	(+)	(+)	(+)/(?)
Credit risk	(+)	(-)	(+)	N/A	(+)	(+)
Size of operations	(-)	(?)	N/A	N/A	N/A	(+)/(?)
Liquidity	(+)	(?)	(-)	(+)	(+)	(?)
Foreign ownership	N/A	(-)	N/A	N/A	N/A	N/A
Sample	France, Germany, Italy, Spain, UK	Australia	USA	Germany, Spain, France, UK, Italy, Switzerland, USA	Germany, Spain, France, the Netherlands, Italy, UK, Sweden	Mexico
Estimation method	FE OLS	Pooled OLS, Random effects OLS	GLS	Cross-sectional OLS for each year	Dynamic panel GMM estimator (Arellano-Bond)	FE model / Dynamic panel GMM estimator (Arellano-Bond)

Note: (+), (-) and (?) indicate positive significant, negative significant and insignificant, respectively.

EMERGING ECONOMIES									
Authors	Dabla-Norris and Floerkemeier	Drakos	Hesse	Clayes and Vander Vennet	Demirguc-Kunt and Huizinga	Claessens, Demirguc-Kunt, Huizinga	Martinez Peria Mody	Schwaiger and Liebeg	Horváth
Year	2007	2003	2007	2007	2000	2001	2004	2008	2009
Journal/Working paper	IMF Working Paper	JPM	WB Policy Research Paper	ES	WB Econ Review	JBF	JMCB	OeNB Financial Report	Czech Journal of Economics and Finance
Market structure	(+)	N/A	(-)	(?)	(?)	N/A	(+)	(+)	(?)
Operating costs	(?)	N/A	(+)	N/A	(+)	(+)	(+)	(+)	(+)
Risk aversion	(-)	(+)	(+)	(+)	(+)	(?)	(?)	(+)	(-)
Credit risk	N/A	(+)	(-)	(+) accession; (?) non-accession	(+)	N/A	(?)	(+)	(+)
Size of operations	(?)	N/A	N/A	N/A	N/A	N/A	N/A	(?)	(-)
Liquidity	(-)	(-)	(-)	N/A	(-)	(?)	(+)	N/A	N/A
Foreign ownership	(?)	(-)	N/A	foreign: (-) accession; (+) non-accession; state: mostly (?) accession; (-) non-accession	(+)	(?)	(-)	foreign: (+), state: (?)	N/A
Sample	Armenia	Belarus, Bulgaria, Czech Republic (CR), Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Ukraine	Nigeria	CR, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia; Bulgaria, Croatia, Romania, Russia, Ukraine	80 countries worldwide .	80 countries worldwide	Argentina, Chile, Colombia, Mexico, Peru	CR, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Romania, Bulgaria, Croatia	Czech Republic
Estimation method	OLS with clustered standard errors	GLS	Pooled OLS, FE OLS, median LS	RE OLS	Pooled WLS	Pooled WLS	Pooled OLS	FE OLS	Dynamic panel GMM estimator (Arellano-Bond)

Note: (+), (-) and (?) indicate positive significant, negative significant and insignificant, respectively.

EMERGING ECONOMIES									
Authors	Dabla-Norris and Floerkemeier	Drakos	Hesse	Clayes and Vander Vennet	Demirguc-Kunt and Huizinga	Claessens, Demirguc-Kunt, Huizinga	Martinez Peria Mody	Schwaiger and Liebeg	Horváth
Year	2007	2003	2007	2007	2000	2001	2004	2008	2009
Journal/Working paper	IMF Working Paper	JPM	WB Policy Research Paper	ES	WB Econ Review	JBF	JMCB	OeNB Financial Report	Czech Journal of Economics and Finance
Market structure	(+)	N/A	(-)	(?)	(?)	N/A	(+)	(+)	(?)
Operating costs	(?)	N/A	(+)	N/A	(+)	(+)	(+)	(+)	(+)
Risk aversion	(-)	(+)	(+)	(+)	(+)	(?)	(?)	(+)	(-)
Credit risk	N/A	(+)	(-)	(+) accession; (?) non-accession	(+)	N/A	(?)	(+)	(+)
Size of operations	(?)	N/A	N/A	N/A	N/A	N/A	N/A	(?)	(-)
Liquidity	(-)	(-)	(-)	N/A	(-)	(?)	(+)	N/A	N/A
Foreign ownership	(?)	(-)	N/A	foreign: (-) accession; (+) non-accession; state: mostly (?) accession; (-) non-accession	(+)	(?)	(-)	foreign: (+), state: (?)	N/A
Sample	Armenia	Belarus, Bulgaria, Czech Republic (CR), Estonia, Hungary, Latvia, Lithuania, Poland, Romania, Slovakia, Ukraine	Nigeria	CR, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia; Bulgaria, Croatia, Romania, Russia, Ukraine	80 countries worldwide .	80 countries worldwide	Argentina, Chile, Colombia, Mexico, Peru	CR, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia, Slovenia, Romania, Bulgaria, Croatia	Czech Republic
Estimation method	OLS with clustered standard errors	GLS	Pooled OLS, FE OLS, median LS	RE OLS	Pooled WLS	Pooled WLS	Pooled OLS	FE OLS	Dynamic panel GMM estimator (Arellano-Bond)

Note: (+), (-) and (?) indicate positive significant, negative significant and insignificant, respectively.

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