BANK COMPETITION IN RUSSIA: FROM AGGREGATION TO GEOGRAPHICAL SEGMENTS

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Abstract

This empirical paper adds to competition and industrial organization literature by exploring the interplay between industry structure and competitiveness on local, rather than nation-wide, markets. We use micro-level statistical data for banks in two Russian regions (Bashkortostan and Tatarstan) to estimate Herfindahl-Hirschman index, Lerner index, and Panzar-Rosse model. We estimate Panzar-Rosse model in two ways: via the widely used price-equation that accounts for scale effects and then via a revenue-equation that disregards scale effects as suggested by Bikker, Shaffer and Spierdijk (2009). We find both regional markets to be ruled by monopolistic competition, although estimation by revenue-equation does not reject monopoly hypothesis for Tatarstan. Existence of sizeable locally-owned and operated institutions does not necessarily lead to higher competitiveness of the given regional market. Non-structural methods of estimation suggest that bank competition in Bashkortostan is stronger than in Tatarstan.

1. Introduction

Russian banking sector is numerically quite substantial: according to the Central Bank of Russia (CBR), by January 1, 2012 there were 978 functioning credit institutions in existence. Nevertheless, this industry is widely perceived as being highly concentrated and monopolized, mostly in view of the market dominance exerted by a handful of state-controlled institutions. Sberbank, VTB group of banks, Rosselkhozbank and Gazprombank jointly control over 52 percent of the nation’s banking assets.

It remains an open question whether for a geographically vast and diverse country like Russia its entire market is an appropriate object for empirical study of competition. This paper aims to demonstrate that in reality there is a mix of different regional and local markets (geographical segmentation) for banking services. We suppose that looking separately at each tier of the banking sector [Mamonov, 2010] is a step forward from assessments of an average level of competitiveness nation-wide. Our approach goes ahead to assume that absolute majority of banks compete in local markets while only a few top-tier banks compete with each other on a national scale for business with the blue chip corporate customers. Russia is too vast a country with low factor mobility and market integration. We cannot conceive two small or medium-sized banks from Russia’s geographically distant regions competing directly, least of all in retail services.
The focus of our analysis thus shifts downwards to the regional level where the range of players includes both the local banks and the federal banks’ branches.

We compare the competitiveness of banking markets on a regional level, our initial hypothesis being that a region hosting sizeable players should be featured by a more competitive banking market as assumed by Selyanin and Ivanter [2008]. We employ Herfindahl-Hirschman index (hereinafter HHI) to measure concentration, Lerner index to gauge market power, and the Panzar–Rosse non-structural model to determine the type of market structure in each of the regional banking markets. We estimate Panzar-Rosse model in two ways: via the widely used price-equation that accounts for scale effects and then via a revenue-equation that disregards scale effects as suggested by Bikker, Shaffer and Spierdijk [2009].

The rest of the paper is organized as follows. Section 2 provides an overview of relevant literature and explains our approach. In Section 3 we look into the banking market structures of chosen Russian regions and calculate HHI index figures. Section 4 provides results for nonstructural approach (Lerner index and Panzar-Rosse model). Section 5 concludes.

2. Literature and our approach

Drobyshevsky and Paschenko [2006] were, to our knowledge, the first to address segmentation in Russian banking. They suggest a modification of Barros–Modesto model that allows accounting for heterogeneity of the Russian banking market. Selyanin and Ivanter [2008] use simple statistical tools to compare regional banking markets in Russia. Mamonov [2010] assesses competitiveness within each of the 4 separate bank groups organized size-wise. Mamonov calculates Panzar–Rosse H-statistic to suggest that the Russian banking sector is featured by monopolistic competition. Anzoátegui, Martínez Pería and Melecky [2012] measure the competition in different Russian districts (macro-regions) by means of Lerner index. They find that Urals, Volga and the Central districts are the most competitive, while the Siberian district is the least competitive. Moreover they discover factors that enhance competition, i.a. lower bank concentration, greater presence of bank branches, and higher economic and financial development. Anisimova and Vernikov [2011] explore the interplay between market structure and competitiveness on a regional level in an earlier version of this paper.

In this study we use structural methods and modern non-structural methods to assess competitiveness in regional markets and compare them. Firstly, we compute Herfindahl-Hirschman indices$^1$ to measure concentration that serves as a proxy for competition in the SCP (Structure-Conduct-Performance) paradigm. Secondly, we use Lerner index as a representative of modern nonstructural measures of competition that allow measuring banks’ conduct directly.

\[ HHI = \sum_{i=1}^{N} S_i^2, \] where \( S_i^2 \) is the market share of \( i \)-firm.

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$^1$
through the use of micro-level bank data. The Lerner index is defined as the difference between a bank’s price and the marginal cost, divided by the price.

Price is computed by estimating the average price of bank production (proxied by total assets) as the ratio of total revenue to total assets. The marginal cost is estimated on the basis of a translog cost function with one output (total assets) and three input prices (price of labor, price of funding and price of other expenses, which are operational expenses minus personnel expenses). It has the following form:

\[
\ln TC = \alpha_0 + \alpha_1 \ln y + 0.5 \alpha_2 (\ln y)^2 + \sum_{j=1}^{3} \beta_j \ln w_j + \sum_{j=1}^{3} \sum_{k=1}^{3} \beta_{jk} \ln w_j \ln w_k + \sum_{j=1}^{3} \ln y \ln w_j + \varepsilon \tag{1}
\]

where TC denotes total production costs, y – total assets (output), \(w_1\) – the price of labor (ratio of personnel expenses to total assets), \(w_2\) – the price of funding (ratio of interest expenses to deposits), \(w_3\) – the price of other expenses (ratio of other expenses to total assets). The estimated coefficients of the cost function are then used to compute the marginal cost (MC) by taking the first derivative with respect to output:

\[
MC = \frac{TC}{y} (\alpha_1 + \alpha_2 \ln y + \sum_{j=1}^{3} \gamma_j \ln w_j) \tag{2}
\]

Once marginal cost is estimated and the price of output computed it is possible to calculate the Lerner index for each bank, thus obtaining a direct measure of bank competition.

Thirdly, we estimate Panzar-Rosse model in order to capture conduct directly. The estimation that uses ‘total assets’ as a control variable and therefore accounts for scale effect is in line with most of the modern empirical literature on bank competition. Bikker et al. [2009] pointed out a ‘striking dichotomy’ between reduced form relation derived in the seminal papers of Panzar and Rosse [1987] and the Panzar-Rosse models estimated in empirical papers on banking competition that use price equation instead of revenue equation or estimate the revenue equation accounting for scale effects. According to Bikker et al., inclusion of the scale effect into the model deprives the final results of accuracy and relevance. We therefore estimate Panzar-Rosse model in two different ways: regarding and disregarding scale effects, to make sure that our results are robust.

The main indicator, H-statistic, is calculated as a sum of elasticities of revenue by price of each factor: \(\beta_1 + \beta_2 + \beta_3\). The value of H-statistic varies within the interval of: \(-\infty < H \leq 1\). If H-statistic is below 0, we face a monopoly; value between 0 and 1 denotes monopolistic competition; and \(H = 1\) means perfect competition.

Taking into consideration the critiques of ‘scaled’ Panzar-Rosse model (Bikker et al., 2009), an ‘unscaled’ Panzar-Rosse regression model can be estimated:

\[
\ln TR_{it} = \alpha_i + \beta_1 \ln lw_{1it} + \beta_2 \ln lw_{2it} + \beta_3 \ln lw_{3it} + \gamma_1 \ln le_{it} + \gamma_2 \ln la_{it} + \delta D_t + \varepsilon_{it} \tag{3}
\]
Though this test is valid, it is a one-tail test of conduct. If $H<0$ hypothesis is rejected, than one should conclude that there is definitely competitive conduct in the market (monopolistic competition or perfect competition). If $H=1$, there is perfect competition. But if $H>0$ hypothesis is rejected, Bikker et al. [2009] state that any market form may exist under different conditions (including form of average costs curve, type of equilibrium). Moreover there is certain concern whether one can use numerical value of $H$-statistic as an indicator of market power. For example, Bikker et al. [2009] find insufficient proof of greater market power in one market in comparison to another with higher H-statistic.

In case of H-statistic equality to unity ($H=1$) both models are valid and determine this environment as ‘competitive’. Main problem arises if banks in the industry compete in imperfect manner. Bikker et al. [2009] point that $H$-statistic would be positive ($H>0$) for any monopoly when the revenue equation is controlled for scale. This means that this approach cannot distinguish between two basic market forms – competition and monopoly – and that strikingly similar result of ‘monopolistic competition’ in many countries (resulting from $H$-statistic being between 0 and 1) as stated in previous empirical literature is misleading. Panzar-Rosse model accounting for scale only can tell whether there is perfect competition in the market or not, $H=1$ case.

We use panel data covering six half-yearly periods from 2008 to 2010. Data sources include bank-level statistics in respective regions as processed by CBR’s regional authorities. The period of observations starts in 2008 in order to avoid transformation of data for previous periods as a result of a new CBR methodology implemented since 2008. A longer time period covered by the dataset, and especially inclusion of earlier periods, would enhance the quality of estimates. Unfortunately such data are currently unavailable.

3. Structural analysis

We focus on the neighboring Russian regions of Bashkortostan and Tatarstan whose choice was driven by comparability in terms of size, wealth, economic structure, geographical position, institutional environment, and – last but not least – high quality of bank-level statistics collected by the respective regional branches of the CBR [Anisimova, Vernikov, 2011]. In the former case the banking sector is controlled by branches of banks from outside Bashkortostan, whereas our other region (Tatarstan) has a relatively ‘independent’ banking sector with several strong local banks, which should supposedly lead to higher competitiveness.

In terms of the number of locally-chartered banks, Tatarstan with its 25 institutions holds the 4th position among all Russian regions whereas Bashkortostan lags behind with 11 local banks. Some of Tatarstan’s banks (Ak Bars and Tatfondbank) are quite sizeable. Between 22 and
24 banks from other regions are active in Tatarstan, but their combined market share does not exceed 30 percent (of which the local Sberbank branch controls 17 percent). In Bashkortostan local banks are small in size and only command a market share of 13 percent, of which Investkapitalbank has 4 percent. Here the top players are Sberbank, UralSib, VTB and Gazprombank (25, 14, 12 and 11 percent of the market, respectively).

Average values of Herfindahl-Hirschman index (HHI) for each of the two regions (1,904 for Bashkortostan and 2,074 for Tatarstan) suggest that these banking sectors had similar degree of concentration in 2008-2010 (see Fig.1). In Tatarstan the HHI displays a slight downward trend, due to redistribution of market shares between Ak Bars Bank, Sberbank and Tatfondbank. The downward trend in Bashkortostan was more explicit. HHI decreased from 2,230 in the early-2008 to 1,155 in late-2010, i.e. by almost one-half. We attribute that to erosion of market shares of Sberbank and UralSib to the benefit of VTB and Gazprombank.

**Fig. 1: Herfindahl-Hirschman indices for banking sectors of Bashkortostan and Tatarstan**

4. Nonstructural models

Table 1 contains variables used in our estimation and their proxies for non-structural models of competition estimation. Assets are used as a proxy for bank product.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Symbol</th>
<th>Calculation*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Price of bank production</td>
<td>( \ln p )</td>
<td>Ratio of total revenue to total assets</td>
</tr>
<tr>
<td>Total costs</td>
<td>( \ln c )</td>
<td>Total bank expenses</td>
</tr>
<tr>
<td>Price of funding</td>
<td>( \ln w1 )</td>
<td>Ratio of interest expenses to deposits</td>
</tr>
<tr>
<td>Price of labor</td>
<td>( \ln w2 )</td>
<td>Ratio of personnel expenses to total assets</td>
</tr>
<tr>
<td>Price of other expenses</td>
<td>( \ln w3 )</td>
<td>Ratio of other expenses (operational expenses less personnel expenses, i.e. depreciation, administrative expenses, etc.) to total assets</td>
</tr>
</tbody>
</table>
Equity-to assets \( lnea \) Ratio of bank equity to its assets  
Loans-to-assets \( lnla \) Ratio of total loans to assets  
Assets \( lna \) Assets  

* All variables are natural logarithms.

Total revenue, interest expenses, personnel expenses, other expenses and total costs were allocated via regional assets’ share in a bank’s total assets taken from consolidated financial statements. Balance sheet data for regional branches were available to us, so allocation procedures were only applied to P&L figures, in contrast to Anzoategui et al. [2012] who were forced to allocate the whole dataset. We used least-square method with fixed time effects for our six-period panel dataset. For both regions the estimation of translog costs function produced results of acceptable quality, as judged by high values of coefficient of determination and zero \( p \)-value of \( F \)-statistics.

Based on our regression estimates we compute semi-yearly **Lerner indices** for each region separating local and non-local banks (Fig.2). Generally index values did not change dramatically and fluctuated around 0.47-0.52 in Tatarstan and 0.34-0.42 in Bashkortostan. Index values were tested to be statistically different, thus indicating that in Tatarstan banks exert more market power.

![Graph](image_url)

**Fig.2: Lerner index for the banking sectors of Bashkortostan and Tatarstan**

We now estimate **Panzar-Rosse model**, first with **effects of scale**. Models are of good quality as noted by determination coefficient, though for Bashkortostan it is much higher. Regression model is adequate as noted by zero \( p \)-value of \( F \)-statistics (Tab.3).
Table 3: Results of scaled Panzar – Rosse model estimation

<table>
<thead>
<tr>
<th>variable</th>
<th>Bashkortostan</th>
<th>Tatarstan</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>coefficient</td>
<td>P-value</td>
</tr>
<tr>
<td>const</td>
<td>0.3533</td>
<td>0.650</td>
</tr>
<tr>
<td>lnw1</td>
<td>0.0538</td>
<td>0.169</td>
</tr>
<tr>
<td>lnw2</td>
<td>0.3156</td>
<td>0.000</td>
</tr>
<tr>
<td>lnw3</td>
<td>0.0787</td>
<td>0.218</td>
</tr>
<tr>
<td>Inla</td>
<td>0.0247</td>
<td>0.574</td>
</tr>
<tr>
<td>Inea</td>
<td>-0.0859</td>
<td>0.213</td>
</tr>
<tr>
<td>lna</td>
<td>0.0428</td>
<td>0.342</td>
</tr>
<tr>
<td>H-statistics</td>
<td>0.448</td>
<td>0.329</td>
</tr>
<tr>
<td>P-value H=0</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>P-value H=1</td>
<td>0.000</td>
<td>0.000</td>
</tr>
<tr>
<td>R²</td>
<td>0.516</td>
<td></td>
</tr>
<tr>
<td>F-statistic</td>
<td>16.68</td>
<td>12.34</td>
</tr>
<tr>
<td>P-value</td>
<td>0.000</td>
<td></td>
</tr>
</tbody>
</table>

The key parameter – H-statistics - is a sum of elasticities of the price of bank’s production to all price inputs. It is computed as a sum of estimated coefficients of regressors lnw1, lnw2 and lnw3. For Tatarstan and Bashkortostan they are 0.329 and 0.448 respectively. H=0 and H=1 hypotheses were rejected. This result means that banks in both regions operate under monopolistic competition, though competition in Bashkortostan is more intense.

Finally, we estimate Panzar-Rosse model (regression model (3)) disregarding scale effects. We obtain $H = 0.1136$ for Tatarstan. $H < 0$ hypothesis is not rejected, indicating possibility of monopolistic behavior in the market. Thus, an unscaled test cannot tell us accurately the market form; it can be anything from monopoly to perfect competition. As for Bashkortostan, its $H$-statistic value is 0.386; $H<0$ hypothesis is rejected, though $H = 1$ is rejected too. It indicates competitive environment in the market – either monopolistic competition or perfect competition, excluding monopoly power. In line with Bikker et al. [2009], numeric values of H-statistics in price equation are higher than in revenue equation, demonstrating positive bias. Thus, banking market in Bashkortostan is more competitive than in Tatarstan because in the former case we are able to reject the monopoly hypothesis. This supports the conclusion coming from the estimation of the Panzar-Rosse model with scale effects.

Our results are in line with the assumption that Lerner index is reversely proportional to $H$-statistics, i.e. the weaker the competition in the given market, the higher the average market power indicator. Lower value of H-statistic for Tatarstan matches a higher average value of
Lerner index than in Bashkortostan. It could be concluded that bank competition is stronger in Bashkortostan than in Tatarstan, confirming the importance of geographical segmentation.

5. Conclusions

In this paper we stress the importance of geographical segmentation in Russian banking. Taking the case of two neighboring regions (Bashkortostan and Tatarstan) we empirically assess the contestability of their banking markets in Russia in three ways. We use bank-level statistical data to estimate Herfindahl-Hirschman index, Lerner index, and Panzar-Rosse model. The Panzar-Rosse model was estimated in two different ways: via the widely used price-equation that accounts for scale effects and via a revenue-equation that disregards scale effects as suggested by Bikker et al. [2009].

Our study adds to the work of Anzoátegui et al. [2012] who analyze Russian banking market on the federal district level of aggregation, demonstrating that researching deeper into the competition in different regions and product segments could be the next step in dealing with Russian banking segmentation issue. Concentration is similar on both regional markets; however the conduct of banks differs. Our study shows that both regions are featured by monopolistic competition. Bashkortostan and Tatarstan, although being parts of the same macro-region (Volga), are featured by significantly different levels of competition. The market of Bashkortostan is more contestable than in Tatarstan thanks to the activity of bank branches from other regions, including those of foreign-controlled banks. This finding rejects our ex ante hypothesis of Tatarstan’s market being more competitive due to stronger presence of locally chartered banks. In the institutional context of a specific region the existence of strong local players can foster competition as well as suppress it. Our findings could be used for the purposes of anti-trust regulation of banking markets in the regions.

References


Anzoátegui D., Martínez Pería M.S., Melecky M. (2012), Bank competition in Russia: An examination at different levels of aggregation, Emerging Markets Review 13(1): 42-57.


CBRpro: http://cbpro.ru


