Structural Changes in the Russian Banking System: Directions and Evaluation

L. V. Krylova\textsuperscript{a} \textsuperscript{*}, S. V. Krylov\textsuperscript{b}, A. F. Mudretsov\textsuperscript{c}, and A. A. Prudnikova\textsuperscript{a}

\textsuperscript{a} Financial University under the Russian Federation Government, Moscow, Russia
\textsuperscript{b} Moscow Financial and Industrial University Synergy, Moscow, Russia
\textsuperscript{c} Institute for Market Problems, Russian Academy of Science, Moscow, Russia

\textsuperscript{*}e-mail: rucap233@yandex.ru

Received May 27, 2021; revised June 7, 2021; accepted June 16, 2021

Abstract—The article presents the results of a correlation and regression analysis of the spatial placement of banking divisions in Russia as a basis for the development of structural transformations corresponding to solving the problems of modernizing the country’s economy and eliminating regional imbalances in socioeconomic development. Variants of a qualitative assessment of structural changes in the Russian banking system are proposed, taking into account Russian specifics and predictive studies. The authors’ contribution is an introduction to the correlation-regression analysis of the territorial location of the banking structures of microfinance organizations to test the hypothesis of their mutual complementarity.

Keywords: banking system, structural shifts, banks, microfinance organizations, spatial distribution, imbalances

DOI: 10.1134/S1075700722010099

The scale and speed of changes in banking systems are such that they require close study, given the impact that these systems have on the state of the economies of the respective countries. Stable modern and dynamic banking systems ensure socioeconomic development, the formation of a modern progressive structure and innovative modernization of economic systems. Weak banking systems, leading to the conservation of economic backwardness, unable to finance the introduction of innovations, and pose a threat of financial crises.

Structural changes observed in the Russian banking system over the past two decades may be objective and determined by global trends in the development of the banking sector, as well as be subjectively set, for example, by the policy of the state regulator, but they are sustainable and lead to the consolidation of both historically determined and emerging imbalances. The task of this work consists in determining the degree of adequacy of structural changes.

Global trends in banking. Over the past 10 years, in most countries, there has been a decrease in the growth rate of banking assets, the volume of banking sectors in relation to the GDP of the respective countries, a decrease in the total number of banks, the size of branch networks and the number of bank employees. Average annual growth rates of assets of deposit institutions in the global economy for 2013–2018 accounted for 3.8%, while in the sector of nonbank financial institutions (NBFI), 5.9%. As a result, by the end of 2019, banks accounted for only 38.5% of global financial assets, while NBFIIs accounted for 49.5%. [1]

The downward trend in the share of the banking sector in the global financial system is due to many factors. In addition to the general deterioration of the macroeconomic conditions for the implementation of banking activities and the tightening regulatory requirements of international standards, this is due, in particular, to the development of processes of digitalization of financial services, the expansion of the scope of their provision outside the banking sector, and increased competition in financial markets. The meeting on the same competitive field of regulated depository and unregulated other financial intermediaries turned out to be not in favor of banks.

The desire to increase the resilience of credit institutions to financial shocks and smooth out the procyclicality of banks’ lending activity has formed a trend to tighten prudential requirements at the micro level and the development of macroprudential regulation in national banking systems. The application of Basel III norms resulted in a change in the configuration of the banking sector by reducing the number of small banks unable to meet the new requirements. BCBS revised its recommendations and developed a proportional regulation model that applied simplified prudential and supervisory requirements to small banks with simple organizational structures and a standard range of
mass banking products. At the same time, special requirements were envisaged for national systemically important banks (domestic systemically important banks, D-SIB) [2], the loss of stability of which is dangerous for the local financial system. The implementation of the new requirements resulted not only in a slowdown in the growth rate of banking activities, but also in a weakening of the competitive positions of banks, an intensification of the disintermediation and parallel banking processes.

**Directions of structural changes in the Russian banking system.** It should be noted that these trends were also typical for the Russian banking sector, indicating its involvement in the processes of financial globalization. However, in this study we will focus on the problems of the structural transformation of the banking system.

The implementation of the Basel requirements and recommendations in the national banking system led to fundamental structural changes, as a result of which, by the beginning of 2019, four groups or subsystems of credit institutions were formed in it: national systemically important banks (D-SIB), banks with a universal license, banks with a basic license and nonbank credit institutions. As a result, as of March 1, 2021, there were 405 credit institutions in the Russian banking system, including 364 banks (235 banks with a universal license, including 12 systemically important banks, and 117 banks with a basic license) and 41 nonbank credit institutions [3].

At the same time, serious imbalances have formed in the banking sector with a tendency to aggravate. Against the background of a rapid reduction in the total number of credit institutions (Fig. 1), spatial differences in the location of banking divisions are growing: if 78.3% of all assets of the banking system are concentrated in the Central Federal District, then in the North Caucasus Federal District it is 0.01%, in the Siberian Federal District, 0.2%, and the Far Eastern Federal District, 0.5% [3].

Are 366 banks sufficient for such a vast country as the Russian Federation, even if they have 28,843 internal structural divisions (Fig. 2)? There are no studies in the scientific literature that would reliably determine the required number of banks for a particular economic system. Actual data across countries differ dramatically. For example, in the United States at the beginning of 2020 there were 4,261 banks, including 1,996 large commercial banks (with assets of USD 300 mln and more) [4]. And this despite the fact that in the United States, financing of economic activity is carried out mainly from the securities market. And in the Republic of Kazakhstan on the same date there were only 26 banks.

It is customary to evaluate the physical aspect of the availability of banking divisions using an indicator characterizing the number of bank divisions per 100,000 people. It should be noted that it refers to the indicators of the achievement of the UN sustainable development goals. In Russia, this indicator in 2019 was 25.1 units (in 2013, 30.3 units). Compared with other countries, Russia is in the fourth ten, behind such countries as the United States (30.9), France (34.8), Italy (40.9), Japan (34.0), Australia (28.2) and a number of others, but ahead of all BRICS states [5].

However, if we consider another aspect of the physical availability of banking units: their number per 1000 km², then the situation turns out to be much worse. The uneven spatial distribution of banking structures and the size of the country’s territory result in limited access to basic banking services for the population of some regions. In terms of this indicator (1.8 units/1000 km²), Russia lags behind not only most of the G20 countries, but also lags behind all the BRICS countries. At the beginning of 2016, there were 10 constituent entities of the Federation in the country, in which not a single credit institution was registered, and banking services were provided by single structural divisions of federal banks, primarily Sberbank of Russia.
In connection with the aggravation of these disproportions, the question arises about the sufficiency of the available number of banking units and the adequacy of the existing structure of the country’s banking system.

**Study of the structure of the banking sector.** Many scientific works are devoted to the study of the institutional and structural aspects of the functioning of banking systems. Most authors analyze the structure of the banking sector, highlighting certain elements, proposing approaches to their classification based on specific criteria [6–20].

Researchers are also interested in the regional structure of the Russian banking sector in the context of its impact on systemic stability [8]. The analysis of various indicators and factors influencing the spatial configuration of the system [9], including the role of the regulator in the development of regional banks [10, 11].

Part of the work is aimed at studying the nature of the distribution of structural elements of the banking system by shares of assets and other key indicators [12], as well as assessing the impact of certain macroeconomic factors on its equilibrium state [13] using econometric models.

Of interest is a study in which an attempt was made to determine, on the basis of an analysis of the rank distributions of assets and capital, the optimal number of banks that would allow achieving an equilibrium state of the Russian banking system under the existing trends of its development. According to the author, the equilibrium number of banks by 2021 will be 100–110 units [14].

Another direction is represented by works in which researchers operate with indicators of institutional changes in the context of D. North [15]. In particular, the need to distinguish between indicators of institutional and structural changes is noted [16, p. 116] and the strengthening of the role of state bodies and state banks in the period after 2008 in Russia [17, pp. 103–112].

When assessing the impact of economic, institutional, and geographical factors on the state of the regional banking network of the Russian Federation and the localization of banks, the determining role of economic factors was revealed [18, pp. 52–75]. Nevertheless, the importance of studying the role of the institutional aspects of the development of the banking system is confirmed by studies [19, pp. 1–45] and, in general, is not in doubt.

The lack of reliable data that would indicate the fundamental inefficiency of banks under the control of the state, on the one hand, and the accumulation of evidence that the effectiveness of market forces, mechanisms and models are clearly overrated, led to the creation of new theories of alternative banks [20] having longer time horizons of planning, and including the goals of state economic and social policy in their corporate missions.

The works devoted to the structure of the banking sector are predominantly analytical in nature, they practically lack a qualitative assessment of the subject of research and sustainable trends in structural transformation. It is proposed to approach the assessment of structural changes in the banking system from the standpoint of its adequacy. The contribution of the authors is also an introduction to the correlation-regression analysis of the territorial location of the banking structures of microfinance organizations to test the hypothesis of their mutual complementarity.

**Research methodology.** When characterizing the adequacy of the Russian banking system, it is advisable to take into account the functional and institutional aspects of this concept in their relationship. By the
functional adequacy of the banking system, we mean its ability to effectively fulfill its basic function in accordance with the needs of the national economy, ensuring the possibility of implementing the main tasks of sustainable socioeconomic development in the given specific historical conditions [21, p. 12].

The main functions of banks are transformational and transactional.

The transformation function characterizes the activities of banks to transform savings and savings of economic agents into loans and investments, as well as the transformation of temporal and risk parameters of attracted and allocated resources by converting market liabilities of clients into own liabilities of credit institutions.

The transaction function of banks is associated with providing economic agents with basic financial services: deposit, credit and settlement. The implementation of this function presupposes the accumulation and redistribution of financial resources at the inter-subject level, as well as intersectoral and interregional capital outflows. In other words, banks play an important role in the redistribution of a country’s GDP.

In this regard, to assess the adequacy of the Russian banking system, it is necessary to consider the ability of banking structures to perform the functions of accumulating and redistributing financial resources in various regions of the country, despite the reduction in the number of banking divisions and their uneven distribution across the territory.

The accumulation of financial resources is carried out by banks conducting passive deposit operations, the redistribution of funds is associated with the implementation of noncash payments and settlements on customer accounts, as well as lending to individuals and legal persons. The listed operations are the main mass operations of credit institutions; the activities of most regional divisions are focused on them. Since the operations of opening and maintaining bank accounts and deposits involve at least an initial visit to a bank branch (especially for clients, legal entities), the location of banking structures should tend to places where economic activity is concentrated. Active economic activity also presupposes a fairly high population density.

**Hypothesis 1 of the authors is to justify the spatial placement of banking divisions by the needs of servicing mainly legal entities, since modern remote banking technologies are more focused on providing basic banking services to individuals. At the same time, savings of citizens are a significant factor in expanding the resource base of banks, therefore, when locating banking units, it is advisable to focus also on the level of income of citizens.**

We consider only economic parameters as the main factors determining the spatial location of banking divisions.

To determine the dependence of the placement of banking units in the regions of the Russian Federation, pairwise correlation coefficients were calculated, where the result (y) was associated with three main factors: the size of the gross regional product (GRP), the size of the region’s population, and per capita money income. These factors were selected on a logical basis based on the above considerations.

In addition, the authors were interested not in the simultaneous (combined) influence of all these three factors on the result, but, primarily, in the functional aspects underlying the placement of additional offices and other divisions of banks in a particular territory. It is impractical to use the multiple correlation coefficient for such an analysis.

To identify the stability of relationships and their possible changes over time, a calculation was carried out based on data at the beginning of 2013 (Table 1) and at the beginning of 2020 (Table 2). The first date characterizes the state in the presanction period, the second, before the onset of the crisis associated with the COVID-19 pandemic.

**Correlation analysis algorithm.** The degree of influence of these factors on the quantitative characteristics of the regional banking network was determined within the framework of correlation analysis based on the application of the linear correlation coefficient of Pearson and Spearman’s rank correlation coefficient. As the first factor $x_1$, the size of the gross regional product (GRP) was adopted, as the second $x_2$, the population of the region, and as a third factor $x_3$, the average monthly cash income per capita in this region (Table 3).

In this case, the calculations were carried out in the following sequence:

1. Calculation of the Pearson linear coefficient $R_{xy}$ was performed according to the formula:

   $$R_{xy} = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sigma_x \sigma_y},$$

   where $\sigma_x$ and $\sigma_y$ are the standard deviations for the factor attribute and the result; $\bar{x}$ and $\bar{y}$ are the average of the products of the factor and the result $x$ and $y$; $\bar{x}$ and $\bar{y}$ are average values of the factor and the result $x$ and $y$, respectively.

   Checking these coefficients for significance by Student’s $t$-test showed that the first and second coefficients are significant for all probabilities, and the third, for probabilities of 0.7 or less.

2. The calculation of Spearman’s rank correlation coefficient $\rho$ was carried out according to the formula

   $$\rho = 1 - \frac{6 \sum d^2}{n(n^2 - 1)},$$

   where $d$ is the difference of ranks by $x$ and $y$ ($R_x - R_y$); $n$ is the number of pairs of features $x$ and $y$. 
Significance testing also showed that the first and second coefficients are significant for all probabilities, and the third, for probabilities of 0.7 or less.

It should be noted that there is a close direct relationship between the GRP size \((x_1)\) and the population in the region \((x_2)\) and the number of banking structures \((y)\). The relationship of average monthly cash income per capita \((x_3)\) with the number of banking structures \((y)\) is weak.

Coefficients of determination \(R^2\) calculated for the specified factors \((x_1, x_2, x_3)\), have the corresponding values of 0.75; 0.95 and 0.043. Consequently, the number of credit institutions in the regions is only 4.3% determined by the variation in personal income and 95% depends on the population of the region.

**Results of the analysis of hypothesis 1 and their interpretation.** The results of the calculations (Table 3) indicate that our hypothesis that the location of banKing-

| No. | Region | Number of COs, branches, DO, opera. and credit cash offices | Number of MFOs | Gross regional product for 2019, RUB bln | Number population, thousand people | Medium period cash income per capita, RUB | Growth income compared with 2013, % |
|-----|--------|------------------------------------------------------------|----------------|---------------------------------|-----------------------------------|--------------------------------|----------------------------------|
| 1   | CFD    | 7937                                                      | 483            | 32938                           | 39433.6                           | 46921                         | +61.1                            |
| 2   | NWFD   | 2952                                                      | 202            | 10523                           | 13982.0                           | 37917                         | +63.9                            |
| 3   | SFD    | 3325                                                      | 144            | 10523                           | 16466.1                           | 24386                         | +42.2                            |
| 4   | NCFD   | 821                                                       | 42             | 2297                            | 9931.0                            | 28268                         | +46.5                            |
| 5   | VFD    | 6811                                                      | 350            | 14098                           | 29287.7                           | 36855                         | +47.5                            |
| 6   | UFD    | 2797                                                      | 99             | 13228                           | 12360.7                           | 37949                         | +53                              |
| 7   | NFD    | 3596                                                      | 301            | 9179                            | 17118.3                           | 37949                         | +52.4                            |
| 8   | FEFD   | 1900                                                      | 153            | 5972                            | 8169.2                            | 37949                         | +53                              |
| 9   | Total for RF | 30 139                                                    | 1774           | 94807                           | 146748.6                          | On average in the Russian Federation: 35247 | +54.5                            |

Source. Authors’ calculations according to the Bank of Russia, Rosstat.

### Table 3. Correlation coefficients of factors and results (number of credit organizations, branches, subsidiaries, operational and credit and cash offices)

| Year | \(x_1\) | \(x_2\) | \(x_3\) | \(x_1\) | \(x_2\) | \(x_3\) |
|------|---------|---------|---------|---------|---------|---------|
| 2013 | 0.929   | 0.981   | 0.050   | 0.860   | 0.953   | 0.300   |
| 2020 | 0.863   | 0.974   | 0.207   | 0.786   | 0.976   | 0.215   |

Source. Authors’ calculations.
Structural changes in the Russian banking system differ from other countries where the mission of such institutions is to increase financial inclusion. Meanwhile, in Russia, the majority of MFOs are commercial structures and when locating their offices are guided by almost the same rationale as banks. The difference lies in the structure of the client base: MFOs serve less well-to-do citizens with a low credit rating, who do not have access to bank loans. Therefore, the algorithm for their placement does not presuppose the replacement of banks in remote areas, but the selection of their clientele in the same regions where the banks’ subdivisions are concentrated. In a sense, MFOs complement banking structures, expanding the coverage of the serviced contingent in the regions of deployment. It is no coincidence that many large federal banks have microfinance organizations as part of their banking groups.

An additional calculation of the cross-correlation in the placement of MFOs and credit institutions showed a strong relationship ($\rho_{mn} = 0.881$), which confirms the correctness of our argumentation.

**Conclusions.** Structural shifts in the Russian banking system are determined by both objective and subjective factors. Objective global trends of a decrease in the number of banks, their structural divisions and branches, as well as an increase in the concentration of banking assets and capital are also characteristic of the Russian banking sector.

Subjective factors of structural transformation are associated with the desire of the Bank of Russia to increase the stability and manageability of the supervised banking system. Under the influence of the mega-regulator, a policy of controlled consolidation is being implemented.

The results of the study showed that banks tend to locate structural divisions in economically developed regions with a high population density, while vast sparsely populated areas are not attractive for their deployment, which constrains regional development and perpetuates territorial disproportions. Moreover, in the context of a rapid decline in the total number of operating banks, this negative trend is sustainable.

The hypothesis about the complementarity of the structures of banks and MFOs in the context of their territorial location was not confirmed. MFOs complement banking structures in regions where banks are concentrated, expanding the coverage of the serviced contingent, but do not seek to penetrate into remote sparsely populated areas with a low level of socioeconomic development.

If the existing trends continue in the future, the configuration of the banking system will most likely be represented by a couple of hundred large banks with a developed branch network located in economically developed regions. The availability of the simplest banking products and services in the rest of the coun-
try is supposed to be ensured, obviously, through remote services.

Increasing the degree of adequacy of the structure of the banking system with the existing global trends in its development requires strengthening government incentives for the development of the regional banking network. There are possibilities for this, given the increasing role and weight of banks under the control of the state. Maintaining market trends and a departmental approach to this issue does not meet the interests of the country’s sustainable development.

According to the authors, the modern structure of the Russian banking system and, especially, the directions of its transformation, do not contribute to solving the problems of modernizing the country’s economy and eliminating regional disparities in socioeconomic development. The existing trends, stimulated by the Bank of Russia, lead to the deepening of the existing imbalances in the spatial and structural development of the banking sector.

REFERENCES
1. Global shadow banking monitoring report, 2020. https://www.fsb.org/2020/12/global-monitoring-report-on-non-bank-financial-intermediation-2020/. Cited December 25, 2020.
2. Basel Committee on Banking Supervision: Global systemically important banks: assessment methodology and the additional loss absorbency requirement, 2011. http://www.bis.org/publ/bcbs207.htm/. Cited December 11, 2020.
3. Bank of Russia. https://www.cbr.ru/banking_sector/statistics/. Cited February 10, 2021.
4. Federal Reserve Supervision and Regulation Report, 2020. https://www.federalreserve.gov/publications/2020-may-supervision-and-regulation-report.htm/. Cited February 10, 2021.
5. Analytical report on indicators of financial availability for 2019 (based on the results of measurement in 2020), Bank of Russia, 2020. https://www.cbr.ru/develop/analytics/.
6. O. A. Lepekhin, A. G. Knyazev, and K. E. Torbina, “Trend analysis of Russian banks’ qualitative composition,” Stud. Russ. Ec. Dev. 24, 165–169 (2013). https://doi.org/10.1134/S107570071302007X
7. I. V. Vashchekina and A. N. Vashchekin, “Structural features of the banking system of the Russian Federa-

tion and the dynamics of the main indicators of its functioning,” Nauch. Obozr. Ekon. Nauki, No. 1, 5–10 (2019).
8. E. A. Chetverikova, E. A. Bibikova, and A. A. Valinurova, “Methodology for assessing the financial stability of the regional banking system,” Reg. Ekon.: Teor. Prakt. 18 (2), 284–300 (2020). https://doi.org/10.24891/re.18.2.284
9. L. V. Krylova and S. V. Krylov, “Institutional structure of the Russian banking system and directions of its transformation,” Fin. Anal. Probl. Resheniya, No. 40 (226), 24–32 (2014).
10. K. Kh. Ibragimov, Kh. Zh. Mushkanova, and R. V. Tapaev, “Impact of regulatory institutions on the transformation of the banking sector (based on materials from developing countries),” Fundam. Issled., No. 12, 80–87 (2020).
11. D. Kh. Gallyamova and A. I. Miftakhov, “Boosting the autonomy of regional banking systems as a driver of economic development: the case of Russia,” Reg. Sci. Inquiry 2, 55–68 (2017).
12. D. I. Malakhov, N. P. Pil’nik, and S. A. Radionov, “Stability of the distribution of banks as an argument in favor of the concept of an aggregated agent,” Ekon. Zh. Vyssh. Shk. Ekon., No. 4, 395–422 (2015).
13. N. P. Pilnik, I. G. Pospelov, and S. A. Radionov, “On limits of the influence of the Bank of Russia key rate on indicators of the Russian banking system,” Stud. Russ. Econ. Dev. 31, 229–237 (2020). doi https://doi.org/10.1134/S1075700720020082
14. G. A. Grachev, “Forecasting the optimal structure of the Russian banking system,” Stud. Russ. Econ. Dev. 22, 535–539 (2011). https://doi.org/10.1134/S1075700711050042
15. T. Beck, A. Demirguc-Kunt, and M. S. Martinez Peria, “Reaching out: access to and use of banking services across countries,” J. Financ. Econ. 85 (1), 234–266 (2007).
16. A. Vernikov, “Measuring institutional change: the case of the Russian banking industry,” J. Inst. Stud., No. 9 (2) (2017). https://doi.org/10.17835/2076-6297.2017.9.2.119-136
17. S. A. Urazova, “Waves of reforms and counterreforms of the Russian banking system in the dynamics of long-term economic Kondrat’ev waves,” Fin. Issled., No. 3 (48), 79–90, No. 4 (49), 103–112 (2015).
18. S. D. Ageeva and A. V. Mishura, “Institutional factors in assessing the spatial development of regional banks,” Reg.: Ekon. Sotsiol., No. 2 (94), 52–75 (2017).